

# Construction Environmental Management Plan (CEMP) Nyngan Solar PV Power Station





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## **CEMP** Attachments

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## **CEMP** Appendices

**Appendix CEMP-A** *Register of Construction Work Hazards (Environmental Risk Register)* 

**Appendix CEMP-B** Environmental Management Activities

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Appendix CEMP-D Weekly Site Inspections

Appendix CEMP-E Soil and Water Management Plan

Appendix CEMP-F Flora and Fauna Management Plan

Appendix CEMP-G Landscape Plan

**Appendix CEMP-H** *Revegetation and Rehabilitation Management Plan* 

Appendix CEMP-I Ground Cover Management Plan

**Appendix CEMP-J** Aboriginal Heritage Management Plan

Appendix CEMP-K Historical Heritage Management Plan



**Appendix CEMP-L** Construction Noise Management Plan

Appendix CEMP-M Bush Fire Management Plan

**Appendix CEMP-N** *Air Quality Management Plan* 

**Appendix CEMP-O** *Construction Traffic Management Plan* 

**Appendix CEMP-P** *Complaints Management Protocol* 

Appendix CEMP-Q Incident Management Protocol

**Appendix CEMP-R** *Community Consultation Plan* 

**Appendix CEMP-S** Worker Environmental Awareness and Compliance Training

Appendix CEMP-T CEMP Audit and Review

Appendix CEMP-U Waste Management Plan

**Appendix CEMP-V** Dangerous Goods and Spill Response

Appendix CEMP-W CEMP Checklist



## **Document Control**

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- Beca: Peer reviews of CEMP (main document) and 14 of the CEMP Appendices



## Abbreviations

| AGL / Applicant | AGL Energy Limited   |
|-----------------|--|
| ARI             | Average Recurrence Interval                                  |
| CEMP            | Construction Environmental Management Plan                   |
| Council         | Bogan Shire Council  |
| CWD             | Coarse Woody Debris  |
| dB              | Decibel  |
| DEMP            | Decommissioning Environmental Management Plan                |
| DPI             | NSW Department of Planning and Infrastructure                |
| EIA             | Environmental Impact Assessment                              |
| EIS             | Nyngan Solar PV Power Station Environmental Impact Statement |
| EPC             | Engineering, Procurement and Construction                    |
| First Solar     | First Solar (Australia) Pty Ltd                              |
| ha              | Hectare  |
| HSE             | Health, Safety and Environment                               |
| km              | Kilometre  |
| kV              | Kilovolt   |
| m               | Metre  |
| ММ              | Mitigation Measure   |
| MW              | Megawatt   |
| MWh             | Megawatt hours   |
| NW Act          | Noxious Weeds Act 1993                                       |
| OEMP            | Operational Environmental Management Plan                    |
| OEH             | NSW Office of Environment and Heritage                       |
| PV              | Photovoltaic   |
| RFS             | NSW Rural Fire Service                                       |
| RMS             | Roads and Maritime Services                                  |
| SSD             | State Significant Development                                |
| Solar Plant     | Nyngan Solar PV Power Station                                |
| WEAC Training   | Worker Environmental Awareness and Compliance Training       |



## 1 Purpose

This Construction Environmental Management Plan (CEMP) for the Nyngan Solar PV Power Station has been developed to meet the requirements of:

- The Nyngan Solar PV Power Station Development Consent (SSD-5355):
  - Condition C2

The purpose of the CEMP is to ensure that the actual environmental effects associated with the construction of the Nyngan Solar PV Power Station, as evaluated in the Environmental Impact Assessment (EIA) process, are consistent with the actual environmental impacts.

## 2 Scope

#### 2.1 Overview

As required by Condition C2 the Development Consent (SSD-5355) for the Nyngan Solar PV Power Station, First Solar (Australia) Pty Ltd (First Solar) has developed the following Construction Environmental Management Plan (CEMP) for the development as it relates to the activities of First Solar. Specifically this CEMP relates to the Construction Phase of the power station and associated power station access tracks.

The following CEMP document has been written in accordance with the *Guideline for the Preparation of Environmental Management Plans* (Department of Infrastructure, Planning and Natural Resources, 2004).

The CEMP has been developed to:

- Describe the implementation of the project EIA, including the Development Consent Conditions and the Mitigation Measures.
- Ensure that the project complies with environmental legislation
- Manage environmental risks associated with the construction of the power station
- Apply environmental best practice during the construction of the power station

A second CEMP is being prepared for the power station grid connection by a separate contractor. The grid connection for the Nyngan Solar PV Power Station is not under the mandate of First Solar (Australia) Pty Ltd (First Solar) and is therefore not included within the following document. Please refer to the separate grid connection / transmission line CEMP for information specific to the grid connection construction works.



### 2.2 Background

AGL submitted a Scoping Study for the project in June 2012 to the NSW Department of Planning and Infrastructure (DPI). The project was assessed under the State Significant Development (SSD) guidelines. On the receipt of the Environmental Assessment Requirements in July 2012, AGL prepared an Environmental Impact Statement (EIS) for the power station. The EIS was developed for AGL by NGH Environmental.

The EIS for the Nyngan Solar PV Power Station was publicly notified in March 2013. A total of 9 submissions were received in relation to the proposal. A Submissions Report was developed in response to the submissions and submitted to the DPI in June 2013.

The DPI referred the project to the Planning Assessment Commission for final determination and Development Consent was granted by the Planning Assessment Commission on 15 July 2013.

The conditions of the Development Consent are required to:

- Prevent, minimise, and / or offset adverse environmental impacts;
- Set standards and performance measures for acceptable environmental performance;
- Require regular monitoring and reporting; and
- *Provide for the ongoing environmental management of the development.*

#### 2.3 Relevant Approval Conditions

The approval provisions for the Nyngan Solar PV Power Station relevant to the Construction Environmental Management Plan are as follows:

This Construction Environmental Management Plan (CEMP) has been prepared in accordance with Condition C2 of the Nyngan Solar PV Power Station Development Consent (SSD-5535), which requires:

- C2. The Applicant shall prepare and implement a Construction Environmental Management Plan in consultation with Council in accordance with the Guideline for the Preparation of Environmental Management Plans (Department of Infrastructure, Planning and Natural Resources, 2004) or any replacement guideline. No construction associated with the development shall commence until written approval of this plan has been received from the Director-General or his nominees. The Plan must include:
  - (a) a description of all relevant activities to be undertaken on the site during construction including an indication of stages of construction ,where relevant;
  - (b) identification of the potential for cumulative impacts with other construction activities occurring in the vicinity and how such impacts would be managed;
  - (c) details of any construction sites and mitigation, monitoring, management and rehabilitation measures specific to the site compound(s) that would be implemented;



- (d) statutory and other obligations that the Applicant is required to fulfill during construction including all relevant approvals/consents, consultations and agreements required from authorities and other stakeholders, and key legislation and policies;
- (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;
- (f) a description of the roles and responsibilities for all relevant employees involved in the construction of the development 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 consent;
- (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.
- (h) specific consideration of relevant measures identified in the documents referred to under conditions A2(b) and A2(c) of this consent;
- (i) the additional requirements of this consent;
- *(j)* a complaints handling procedure during construction identified in conditions C13 and C14;
- (k) register of construction work hazards and the anticipated level of risk associated with each;
- (I) measures to monitor and manage soil and water impacts in consultation with NOW including: control measures for works close to or involving waterway crossings (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;
- (m) measures to monitor and manage flood impacts in consultation with NOW;
- (n) measures to monitor and manage dust emissions including dust generated by traffic on unsealed public roads and unsealed internal access tracks;
- (o) emergency management measures including measures to control bushfires;
- (p) information on water sources, including details on sources and security of water supply and water use on site;
- (q) the Proponent shall ensure that it has sufficient water for all stages of the project, and if necessary, include the provision for a replacement dam. Details for any replacement dam must be prepared in consultation with OEH and NOW and submitted to the Director General for approval prior to developing the dam; and
- (r) incorporation of the plans identified in C3.



### 2.4 Development Consent Condition C2

The following table identifies where each of the items listed under Development Condition C2 has been addressed within the First Solar CEMP.

|     | Condition:   | Addressed:  |
|-----|--|---|
| (a) | a description of all relevant activities to be<br>undertaken on the site during construction<br>including an indication of stages of<br>construction, where relevant;  | Section 3.5 of the CEMP   |
| (b) | identification of the potential for cumulative<br>impacts with other construction activities<br>occurring in the vicinity and how such<br>impacts would be managed;  | Section 8.4 of the CEMP   |
| (c) | details of any construction sites and<br>mitigation, monitoring, management and<br>rehabilitation measures specific to the site<br>compound(s) that would be implemented;  | <b>Appendix CEMP-H</b> Rehabilitation and<br>Revegetation Management Plan |
| (d) | statutory and other obligations that the<br>Applicant is required to fulfill during<br>construction including all relevant<br>approvals/consents, consultations and<br>agreements required from authorities and<br>other stakeholders, and key legislation and<br>policies;  | Section 7.3 of the CEMP   |
| (e) | evidence of consultation with relevant public<br>authorities required under this condition and<br>how issues raised by the agencies have been<br>addressed in the plan;  | <ul><li>Section 4.3.2 of the CEMP</li><li>Attachment CEMP-01</li></ul>    |
| (f) | a description of the roles and responsibilities<br>for all relevant employees involved in the<br>construction of the development including<br>relevant training and induction provisions<br>for ensuring that all employees, contractors<br>and sub-contractors are aware of their<br>environmental and compliance obligations<br>under these conditions of consent; | Section 7.2 of the CEMP   |
| (g) | details of how the environmental<br>performance of construction will be<br>monitored, and what actions will be taken   | Section 7.4 of the CEMP<br>Section 9 of CEMP                              |



|     | to address identified potential adverse environmental impacts.   |  |
|-----|--|--|
| (h) | specific consideration of relevant measures<br>identified in the documents referred to<br>under conditions A2(b) and A2(c) of this<br>consent;   | The CEMP including the CEMP Appendices   |
| (i) | the additional requirements of this consent;   | The CEMP including the CEMP Appendices<br>Additional requirements include the Mitigation<br>Measures (MM) outlined in the Nyngan Solar<br>Plant Submissions Report                       |
| (j) | a complaints handling procedure during construction identified in conditions C13 and C14;  | Appendix CEMP-P Complaints Management  |
| (k) | register of construction work hazards and  | Section 8 of the CEMP  |
|     | the anticipated level of risk associated with each;  | • Appendix CEMP-A Environmental Risk<br>Register   |
|     |  | • See also the First Solar <i>Project Site Safety</i><br><i>Plan</i>   |
| (1) | measures to monitor and manage soil and<br>water impacts in consultation with NOW<br>including: control measures for works close<br>to or involving waterway crossings<br>(including rehabilitation measures following<br>disturbance and monitoring measures and<br>completion criteria to determine<br>rehabilitation success), identification of<br>construction activities that are likely to pose<br>a risk of groundwater interference, and<br>procedures for managing groundwater<br>impacts should they occur; | <ul> <li>Section 8.5 of the CEMP</li> <li>Soil and Water Management Plan<br/>Appendix CEMP-E</li> <li>Rehabilitation and Revegetation<br/>Management Plan<br/>Appendix CEMP-H</li> </ul> |
| (m) | measures to monitor and manage flood impacts in consultation with NOW;   | Section 7.8 of the CEMP  |
| (n) | measures to monitor and manage dust  | Section 8.5 of the CEMP  |
|     | emissions including dust generated by traffic<br>on unsealed public roads and unsealed   | Air Quality Management Plan  |
|     | internal access tracks;  | Appendix CEMP-N  |
|     |  | • Soil and Water Management Plan<br>Appendix CEMP-E  |



| (0) | emergency management measures<br>including measures to control bushfires;  | <ul> <li>Section 7.6 of the CEMP</li> <li>First Solar Project Site Safety Plan</li> </ul>   |
|-----|--|---|
| (p) | information on water sources, including<br>details on sources and security of water<br>supply and water use on site;   | Section 8.3 of the CEMP   |
| (q) | the Proponent shall ensure that it has<br>sufficient water for all stages of the project,<br>and if necessary, include the provision for a<br>replacement dam. Details for any<br>replacement dam must be prepared in<br>consultation with OEH and NOW and<br>submitted to the Director General for<br>approval prior to developing the dam; and | It is noted that it is no longer proposed to<br>remove the onsite dam.<br>Should the removal of the dam be required later<br>in the Construction Phase the requirements of<br>this condition would be met.<br>Information on water sources is included in<br>Section 8.3 of the CEMP.   |
| (r) | incorporation of the plans identified in C3.   | <ul> <li>C3(a) Flora and Fauna Management Plan<br/>Appendix CEMP-F</li> <li>C3(b) Ground Cover Management Plan<br/>Appendix CEMP-I</li> <li>C3(c) Landscape Plan<br/>Appendix CEMP-G</li> <li>C3(d) Construction Noise Management Plan<br/>Appendix CEMP-L</li> <li>C3(e) Traffic Management Plan<br/>Appendix CEMP-O</li> <li>C3(f) Aboriginal Heritage Management Plan<br/>Appendix CEMP-J</li> </ul> |

## **3 Project Description**

### 3.1 Overview

The Nyngan Solar PV Power Station forms part of the Australian Governments Solar Flagships Program. The Flagships Program is part of the Australian Government's Clean Energy Initiative (CEI).

As part of the Flagships Program, AGL Energy Limited (AGL) will deliver the nominal 102 Megawatt (MW) Solar Photovoltaic (PV) Solar Power Station at Nyngan, central west NSW.



First Solar (Australia) Pty Ltd have been engaged by AGL as the main Engineering, Procurement and Construction (EPC) contractor for the design, supply, construction and commissioning of the Nyngan Solar PV Power Station.

### 3.2 Location

The Nyngan Solar PV Power Station will consist of a 102MW solar PV power station located approximately 10km west of Nyngan. The solar plant will occupy approximately 300 hectares of land to the north of the Barrier Highway. The location of the site is shown on Figure 1 below.

The Nyngan site falls within the Bogan Shire Local Government Area. The local area is characterised by rural activities on large holdings. Population density is low.



Figure 1: Project location

### 3.3 Nyngan Solar PV Power Station Development

First Solar (Australia) Pty Ltd have been engaged by AGL to provide engineering, procurement and construction (EPC) services. The Nyngan Solar PV Power Station will utilise First Solar's advanced cadmium telluride (CdTe) thin film photovoltaic modules. The solar modules generate electricity with no air emissions, no waste production, no water use and have one of the smallest carbon footprints of any current PV technology. Over 7,000MW of First Solar PV modules have been installed worldwide, including at many of the world's largest solar PV plants, since beginning



commercial production in 2002. First Solar has been actively involved in the Australian market since mid-2008.

The construction of the Nyngan Solar PV Power Station project is expected to commence in early 2014 and will take approximately 18 months to complete. Once constructed the Nyngan Solar PV Power Station will generate an estimated 233,000 megawatt hours (MWh) of electricity annually.

The Nyngan Solar PV Power Station development will include:

- Four blocks of PV arrays with a total of approximately 1.3 million cadmium telluride (CdTe) thin film PV modules
- Aboveground and underground electrical cabling to connect the PV modules to central inverters and transformers
- A switchyard that includes a 33/132kV substation to transform the energy to grid voltage
- An operations and maintenance building and amenities
- Access tracks and parking
- Fencing and landscaping around the site
- An approximately 1.6km access road off the Barrier Highway

The power station will be connected to the grid via a new overhead transmission line, approximately 3km in length. The transmission line will connect the onsite Nyngan Solar PV Power Station substation into the Nyngan-Cobar 132 kV transmission line. The construction of the transmission line will be undertaken by a separate EPC Contractor who will construct the line on behalf of AGL.

### 3.4 Phasing of Construction Activities

The Construction Phase for the Nyngan Solar PV Power Station will be divided in three sub-phases. These sub-phases are:

- 1. Site preparation, civil works, construction of site perimeter security fence and the construction of site access roads / tracks
- 2. Installation of posts, tilts, tables, panels and electrical cabling
- 3. Electrical commissioning, testing and grid connection

At the conclusion of the Construction Phase for the Nyngan Solar PV Power Station any temporary buildings or site features not required for the Operational Phase will be demobilised from the site.



### 3.5 Construction Activities

Construction activities will be scheduled generally as follows:

| Construction Phase                 | Activity   |  |  |
|------------------------------------|--|--|--|
| 1. Mobilisation / Site Preparation | Installing perimeter fencing around the site   |  |  |
|                                    | <ul> <li>Locating temporary construction offices and<br/>construction equipment to the power station site</li> </ul>   |  |  |
|                                    | <ul> <li>Earthworks for construction of power station access<br/>road and construction parking areas, including<br/>vegetation clearing</li> </ul>                             |  |  |
|                                    | <ul> <li>Minor grading and trimming of areas for permanent<br/>site office and switchyard</li> </ul>   |  |  |
|                                    | <ul> <li>Minor grading and trimming in array areas</li> </ul>  |  |  |
|                                    | Drum rolling and compaction of array areas   |  |  |
|                                    | Installation of onsite erosion and sediment controls   |  |  |
| 2. Construction                    | Install steel support posts for array tables   |  |  |
|                                    | <ul> <li>Trenching and wiring of underground cabling (DC and AC)</li> </ul>  |  |  |
|                                    | <ul> <li>Attachment of tilt brackets and rails using pre-<br/>fabricated steel members</li> </ul>  |  |  |
|                                    | Connection of PV modules to the brackets   |  |  |
|                                    | Installation of inverter and transformer skid  |  |  |
|                                    | • Commencement of site rehabilitation works within the power station development area  |  |  |
| 3. Commissioning                   | <ul> <li>Commissioning and testing of solar plant, noting that<br/>each array block would be commissioned as it is<br/>completed.</li> </ul>                                   |  |  |
| 4. Demobilisation                  | • Removal of temporary construction facilities and completion of works within the power station development area and of temporary access tracks within the power station site. |  |  |

The timing for the commissioning of the power station will be subject to the completion of the grid connection and transmission line. The grid connection and transmission line is being constructed by a separate contractor reporting to the project owner (AGL).



### 3.6 Construction Schedule

As set out in Section 3.4, the Construction Phase for the Nyngan Solar PV Power Station will be broken up in to three sub-parts. The Construction Schedule will reflect the phases outlined in Section 3.4 and the activities outlined in Section 3.5.

Information regarding the Construction Schedule will be provided to AGL, in accordance with **CEMP**-**R** *Community Consultation Plan*, to meet the requirements of Condition C11(a) of the Development Consent. In accordance with Condition C11(a) this information will be made available on the AGL Nyngan Project Website.

### 3.7 Construction Site Layout

The site layout that will dictate the implementation of the CEMP Appendices within the First Solar CEMP will be the final Construction Site Layout. This layout will be used to ensure consistency between the environmental management activities and the construction activities.

Where amendments to the final Construction Site Layout is required, the Site Environmental Advisor will work with the Site Construction Manager to ensure that the changes to the layout are reflected back in to the relevant CEMP Appendices (in accordance with **CEMP-T** *CEMP Auditing and Review*).

## 4 CEMP Context

### 4.1 Requirement

A Construction Environmental Management Plan (CEMP) is required to be developed by Conditions C2 and C3 of the Nyngan Solar PV Power Station Development Consent (SSD-5355).

The requirements for Condition C2 is included in Section 2.3 and Section 2.4.

### 4.2 CEMP Structure

The First Solar CEMP has been developed utilising the following structure:

- Overarching CEMP document
- Appendices to the CEMP (Appendices A-W)

The Appendices to the CEMP (attached) include all of the Environmental Management Plans required to be developed by First Solar for the Construction Phase for the Nyngan Solar PV Power Station.



The Construction Environmental Management Plans included within the First Solar CEMP Appendices are outlined within the following table. The appendix references cited are as referenced throughout the CEMP and Appendices.

| Environmental Management Plan:                                       | Reference:                     | Appendix Reference: |  |
|--|--------------------------------|---------------------|--|
| Erosion and Sediment Control Plans<br>Soil and Water Management Plan | MM60<br>Condition B9           | CEMP-E              |  |
| Flora and Fauna Management Plan                                      | Condition C3(a)                | CEMP-F              |  |
| Landscape Plan   | Condition C3(c)                | CEMP-G              |  |
| Rehabilitation and Revegetation<br>Management Plan                   | Condition B21                  | CEMP-H              |  |
| Ground Cover Management Plan<br>Weed Management Plan                 | Condition C3(b), MM17<br>MM 12 | CEMP-I              |  |
| Aboriginal Heritage Management Plan                                  | Condition C3(f)                | CEMP-J              |  |
| Historical Heritage Management Plan                                  | Condition B30                  | СЕМР-К              |  |
| Construction Noise Management Plan                                   | Condition C3(d), MM30          | CEMP-L              |  |
| Bush Fire Management Plan  | MM58                           | CEMP-M              |  |
| Air Quality Management Plan  | Condition B6, MM42             | CEMP-N              |  |
| Traffic Management Plan  | Condition C3(e), MM52          | CEMP-O              |  |
| Waste Management Plan  | MM55                           | CEMP-U              |  |
| Dangerous Goods and Spill Response Plan                              | MM61                           | CEMP-V              |  |

In addition to the above environmental management plans, First Solar has developed the following procedural management plans. The procedural management plans have been developed to meet further requirements of the Development Consent and Mitigation Measures.

| Appendix:                           | Reference: | Appendix Reference: |
|-------------------------------------|------------|---------------------|
| Environmental Risk Register         | C2(k)      | CEMP-A              |
| Environmental Management Activities |            | CEMP-B              |



| Environmental Schedules                       |                             | CEMP-C |
|---|-----------------------------|--------|
| Weekly Site Inspections                       |                             | CEMP-D |
| Complaints Management Plan                    | Condition C13, 14, 15       | CEMP-P |
| Incident Management Protocol                  | Condition C8                | CEMP-Q |
| Community Consultation Plan                   | Condition C10, C11,<br>MM49 | CEMP-R |
| Worker Environmental Awareness and Compliance |                             | CEMP-S |
| CEMP Auditing and Review                      |                             | CEMP-T |
| CEMP Checklist                                |                             | CEMP-W |

The Road Dilapidation Report and the Pre-Construction Road Report are also the responsibility of First Solar. These Plan's are being developed in accordance with the requirements of Condition B28 and fall outside of the First Solar CEMP.

### 4.3 Development of the CEMP

#### 4.3.1 Project Approval Documents

In accordance with Condition A2 of the Development Consent, First Solar has developed the CEMP on the basis of the requirements set out in the following documents:

- State Significant Development Application (SSD-5355)
- Nyngan Solar Plant Environmental Impact Statement prepared by NGH Environmental (dated March 2013)
- Nyngan Solar Plant Submissions Report prepared by NGH Environmental (dated June 2013)
- Conditions of the Development Consent (SSD-5355)

Additionally, First Solar has developed the First Solar CEMP to be consistent with the AGL CEMP Staging Document.

#### 4.3.2 Consultation

During the development of First Solar CEMP, First Solar has consulted with the stakeholders outlined in the following table. Consultation has been undertaken in accordance with the Development Consent requirements and as per the *Guideline for the Preparation of Environmental Management Plans* (Dept. of infrastructure, Planning and Natural Resources, 2004).



| Stakeholder:                                   | CEMP Section:                      |
|--|------------------------------------|
| Bogan Shire Council                            | СЕМР                               |
|  | Traffic Management Plan            |
| NSW Department of Planning                     | Construction Noise Management Plan |
| NSW Office of Environmental and Heritage (OEH) | Flora and Fauna Management Plan    |
| NSW Office of Water (NOW)                      | Soil and Water Management Plan /   |
|  | Erosion and Sediment Control Plan  |
| NSW Roads and Maritime Services (RMS)          | Traffic Management Plan            |
| NSW Rural Fire Service (RFS)                   | Bush Fire Management Plan          |

Evidence of consultation with key stakeholders, as required by Condition C2(e), is attached to this document as **Attachment CEMP-01**.

In addition to the above listed stakeholders, First Solar has developed to the CEMP in consultation with AGL (the Applicant) and the Project Environmental Representative (engaged in accordance with Condition C1).

Consultation during the development of the CEMP was undertaken where government agencies with specific environmental protection responsibilities were identified and / or where consultation was required by the Development Consent.

## 5 **CEMP Objectives and Targets**

The following section outlines the objectives and targets for the First Solar CEMP. The purpose of setting objectives and targets for the CEMP is to enable the construction works to meet a defined level of performance against identified criteria. The criteria outlined below will provide context to any review of the CEMP undertaken in accordance with **CEMP-T** *CEMP Auditing and Review*.

The following objectives and targets have been set to be specific, measurable, realistic and achievable. The First Solar Environmental Manager is responsible for setting and managing the achievement of the environmental objectives and targets (in consultation with the Site Project Manager and the Site Construction Manager) outlined in the following table.



| Item:  | Objective:   | Target:   | Documentation:   |
|--|--|---|--|
| Environmental<br>compliance                  | Construction to be<br>undertaken in<br>accordance with the<br>Nyngan Development<br>Consent                              | <ul> <li>100% compliance with<br/>the Development<br/>Consent</li> <li>Zero reportable<br/>environmental incidents</li> </ul>   | <ul> <li>Weekly Site Inspections<br/>(CEMP-D)</li> <li>External Audits</li> <li>Internal CEMP Audits<br/>(CEMP-T)</li> </ul>   |
| Legal compliance                             | Compliance with all<br>environmental legal<br>requirements   | <ul> <li>100% compliance with<br/>all environmental legal<br/>requirements</li> <li>Zero reportable<br/>environmental incidents.</li> </ul>   | <ul> <li>Compliance tracking<br/>through Intelex (see<br/>Section 7.4.5)</li> <li>Internal CEMP Audits<br/>(CEMP-T)</li> </ul>   |
| Best practice<br>environmental<br>management | Effective<br>implementation of<br>CEMP Appendices to<br>ensure best practice<br>environmental<br>management              | <ul> <li>100% compliance with<br/>measurable<br/>management and<br/>mitigation measures<br/>outlined in the CEMP<br/>Appendices.</li> <li>Zero reportable<br/>environmental incidents.</li> </ul>   | <ul> <li>Monthly Compliance<br/>Tracking reporting to<br/>AGL.</li> <li>Internal CEMP Audits<br/>(CEMP-T)</li> </ul>   |
| Environmental<br>complaints                  | Minimise environmental<br>complaints and<br>adequately address any<br>environmental<br>complaints in a timely<br>manner. | <ul> <li>Zero community<br/>complaints</li> <li>100% compliance with<br/>complaints response<br/>timeframes outlined in<br/><b>CEMP-P.</b></li> <li>100% compliance with<br/>timeframes outlined<br/>within <b>CEMP-P</b> for<br/>complaint investigations<br/>and close-outs.</li> </ul> | <ul> <li>Monthly Compliance<br/>Tracking reporting to<br/>AGL.</li> <li>CEMP-P Complaints<br/>Management</li> <li>Internal CEMP Audits<br/>(CEMP-T CEMP Auditing<br/>and Review)</li> </ul>                                    |
| Incidents                                    | Minimise, avoid and<br>appropriately manage all<br>environmental incidents.  | <ul> <li>Zero reportable<br/>environmental incidents.</li> <li>100% compliance with<br/>incident reporting,<br/>investigation and<br/>implementation of<br/>corrective action<br/>timeframes.</li> </ul>  | <ul> <li>Environmental Incident<br/>Register (CEMP-Q)</li> <li>Environmental Incident<br/>Reports (CEMP-Q)</li> <li>Monthly Compliance<br/>Tracking reporting to<br/>AGL</li> <li>Internal CEMP Audits<br/>(CEMP-T)</li> </ul> |
| Non conformance                              | Minimise, avoid and<br>appropriately manage all<br>environmental non<br>conformances.                                    | <ul> <li>Zero reportable<br/>environmental non-<br/>conformances</li> <li>100% compliance with</li> </ul>   | <ul> <li>Weekly Inspections<br/>(CEMP-D)</li> <li>Monthly Compliance<br/>Tracking reporting to</li> </ul>  |



| Item:   | Objective:  | Target:  | Documentation:   |
|---|---|--|--|
|   |   | timeframes for the<br>investigation and<br>implement of corrective<br>actions.   | AGL <ul> <li>Internal CEMP Audits</li> <li>(CEMP-T)</li> </ul>   |
| Audit and inspection                                  | Undertake<br>environmental site<br>audits and inspections in<br>a timely manner.  | <ul> <li>100% compliance with<br/>timeframes for<br/>environmental audits<br/>and inspections</li> <li>100% compliance with<br/>timeframes for<br/>implementation of<br/>identified corrective<br/>actions.</li> </ul> | <ul> <li>Weekly Site Inspections<br/>(CEMP-D)</li> <li>External Audits</li> <li>Internal CEMP Audits<br/>(CEMP-T)</li> </ul>         |
| Environmental<br>awareness and<br>compliance training | All staff to be aware of<br>their environmental<br>obligations and to be<br>competent in relation to<br>their environmental<br>responsibilities | <ul> <li>100% compliance with<br/>WEAC Training<br/>Commitments (CEMP-S)</li> <li>Zero reportable<br/>environmental incidents.</li> </ul>  | <ul> <li>Site induction register</li> <li>WEAC Training required<br/>by CEMP-S</li> <li>Internal CEMP Audits<br/>(CEMP-T)</li> </ul> |

## 6 First Solar Environmental Policy

First Solar (Australia) Pty Ltd has a combined Health, Safety and Environmental Policy. The First Solar Health, Safety and Environmental Policy is attached to the CEMP as **Attachment CEMP-02**.

## 7 First Solar Environmental Management

### 7.1 Environmental Management Structure

The environmental management structure for the construction of the Nyngan Solar PV Power Station is attached to the CEMP as **Attachment CEMP-03**.

### 7.2 Construction Roles and Responsibilities

#### 7.2.1 First Solar

Where required, each of the CEMP Appendices identifies the key roles and responsibilities for persons responsible for ensuring environmental compliance.



Environmental compliance is the responsibility of all site personnel, however the key persons responsible for environmental compliance during the construction of the Nyngan Solar PV Power Station include:

- First Solar Site Project Manager
- First Solar Site Construction Manager
- First Solar Site Environmental Advisor
- Project Environmental Representative (as defined in Condition C1)

Primary responsibility for the day to day compliance activities will sit with the Site Environmental Advisor.

#### 7.2.2 Project Environmental Representative

Condition C1 of the Development Consent requires AGL (as the Applicant) to:

- C1. Prior to the commencement of construction of the development, or as otherwise agreed by the Director-General, the Applicant shall nominate for the approval of the Director-General a suitably qualified and experienced Environmental Representative(s) that is independent of the design and construction personnel. The Applicant shall employ the Environmental Representative(s) for the duration of construction, or as otherwise agreed by the Director-General. The Environmental Representative(s) shall:
  - (a) Be the principal point of advice in relation to the environmental performance of the development;
  - (b) Monitor the implementation of the environmental management plans and monitoring programs required under this consent and advise the Applicant upon the achievement of these plans / programs;
  - (c) Have responsibilities for considering and advising the Applicant on matters specified in the conditions of this consent, and other licenses and approvals/consents related to the environmental performance and impacts of the development;
  - (d) Ensure that environmental auditing is undertaken in accordance with the Applicant's Environmental Management System(s);
  - (e) Be given the authority to approve / reject minor amendments to the Construction Environmental Management Plan. What constitutes a "minor" amendment shall be clearly explained in the Construction Environmental Management Plan required under Condition C2;
  - (f) Be given the authority and independence to require reasonable steps be taken to avoid or minimise unintended or adverse environmental impacts, and failing the effectiveness of such steps, to direct that relevant actions be ceased immediately should an adverse impact on the environment be likely to occur; and
  - (g) Be consulted in responding to the community concerning the environmental performance of the development where the resolution of points of conflict between



#### the Applicant and the community is required.

The approved Project Environmental Representative for the construction of the Nyngan Solar PV Power Station is **Michael Woolley** of MCW Environmental.

A definition for a "minor" amendment (required by Condition C1(e)) is included in Section 9.3.2 of this CEMP.

### 7.3 Approval and Licensing Requirements

The Nyngan Solar PV Power Station has been approved in accordance with Section 89E of the *Environmental Planning and Assessment Act 1979*. No further approvals are required to be obtained by First Solar for the construction of the Nyngan Solar PV Power Station.

A list of all Development Consent Conditions and Mitigation Measures is included in **CEMP-W** *CEMP Checklist*. This list identifies where each condition or mitigation measure relevant to the Construction Phase and the activities of First Solar is addressed within the CEMP.

Please refer to the separate transmission line CEMP for information relating to any additional licenses, permits or approvals required to be obtained in relation to the transmission line.

Other licences, permits or approvals not identified within the First Solar CEMP, and deemed to be required through legislative changes, will be progressively obtained by the First Solar Environmental Manager during the course of the construction of the power station. The specific conditions of any additional approvals will be incorporated into the CEMP and Appendices as required (as per **CEMP-T** *CEMP Auditing and Review*).

### 7.4 Reporting

#### 7.4.1 Overview

The following section of the CEMP sets out the First Solar compliance reporting requirements, including type, responsibility, mechanisms and timing for reporting.

The First Solar reporting requirements relate to the construction of the Nyngan Solar PV Power Station. Reporting requirements for the construction of the transmission route and the Operational Phase for the power station fall outside of the First Solar reporting requirements.

#### 7.4.2 Compliance Tracking Program

Condition C16 of the Development Consent requires:

C16. Prior to the commencement of construction, the Applicant shall develop and implement a Compliance Tracking Program, to track compliance with the requirements of this consent during the construction and operation of the development and shall include, but necessarily be limited to:



| a) | Provisions for periodic reporting of<br>compliance status to the Director<br>General including at least prior to the<br>commencement of construction of the<br>development, prior to the<br>commencement of operation of the<br>development and within two years of<br>operation commencement; | In accordance with its agreement with AGL, First<br>Solar will provide periodic Construction Phase<br>environmental compliance reporting through to<br>AGL. AGL will retain responsibility for periodic<br>reporting through to the Director-General as<br>required by Condition C16(a).<br>Refer to:<br>• Section 9 of the CEMP<br>• CEMP-T CEMP Auditing and Review |
|----|--|---|
| b) | A program for independent<br>environmental auditing in accordance<br>with AS/NZ ISO 19011:2003 –<br>Guidelines for Quality and / or<br>Environmental Management Systems<br>Auditing;   | <ul> <li>Refer to:</li> <li>Section 9 of the CEMP</li> <li>CEMP-T CEMP Auditing and Review</li> </ul>   |
| c) | Procedures for rectifying any non-<br>compliance identified during<br>environmental auditing or review of<br>compliance;   | <ul> <li>Refer to:</li> <li>Section 9 of the CEMP</li> <li>CEMP-D Weekly Site Inspections</li> <li>CEMP-T CEMP Auditing and Review</li> </ul>   |
| d) | Mechanisms for recording<br>environmental incidents and actions<br>taken in response to those incidents;   | <ul> <li>Refer to:</li> <li>CEMP-Q Incident Management Protocol</li> </ul>  |
| e) | Provisions for reporting environmental<br>incidents to the Director-General<br>during construction and operation; and  | <ul> <li><b>CEMP-Q</b> Incident Management Protocol</li> </ul>  |
| f) | Provisions for ensuring all employees,<br>contractors and sub-contractors are<br>aware of, and comply with, the<br>conditions of this consent relevant to<br>their respective activities.  | <ul> <li>Refer to:</li> <li>Section 7.5 of CEMP</li> <li>CEMP-S Worker Environmental Awareness and Compliance Training</li> </ul>   |

#### 7.4.3 Reporting Requirements

There are broadly three types of reporting required during the construction of the Nyngan Solar PV Power Station:

- 1. Reporting required in CEMP Appendices, e.g. CEMP-G Landscape Plan
- 2. Periodic Compliance Reporting
- 3. Incident Based Reporting



The location of each of the First Solar Environmental Schedules is identified in **CEMP-C** *Environmental Schedules.* For simplicity, all of the Environmental Schedules can be located within the CEMP Appendix to which they relate.

The Environmental Schedules represent the records that will be kept by First Solar during the construction of the Nyngan Solar PV Power Station. Records will be kept within the First Solar HSE Intelex system outlined in Section 7.4.5.

The following table provides an overview of the First Solar compliance reporting requirements:

| Reporting Type:    | Reporting<br>Interval:          | Reporting:   | Responsibility:                  | Reporting To:  |
|--------------------|---------------------------------|--|----------------------------------|--|
| CEMP Appendix      | As required by<br>CEMP Appendix | As required by CEMP Appendix   | Site<br>Environmental<br>Advisor | As required by CEMP<br>Appendix  |
|                    | Daily                           | <ul> <li>Verbal to First Solar Site<br/>Project Manager and Site<br/>Construction Manager</li> <li>Written to First Solar<br/>National HSE Manager (via<br/>Intelex)</li> <li>Nb: Incident based reporting to<br/>be communicated to above<br/>parties.</li> </ul> | Site<br>Environmental<br>Advisor | Internal First Solar   |
| Periodic Reporting | Weekly                          | <ul> <li>CEMP-D Weekly Site<br/>Inspections</li> <li>Incident Based Reporting</li> </ul>   | Site<br>Environmental<br>Advisor | Internal First Solar   |
|                    | Monthly                         | <ul> <li>Compilation of:</li> <li>CEMP-D Weekly Site<br/>Inspections</li> <li>Incident Based Reporting</li> <li>CEMP Review Reports<br/>(CEMP-T)</li> <li>CEMP Appendix Reporting</li> </ul>   | Site<br>Environmental<br>Advisor | <ul> <li>Internal First Solar</li> <li>External AGL</li> <li>Project<br/>Environmental<br/>Representative</li> </ul> |



|                    | Incident Based<br>Condition C8     | In accordance with:<br><b>CEMP-Q</b> Incident Management<br>Protocol<br><b>CEMP-V</b> Dangerous Goods and<br>Spill Response                 | Site<br>Environmental<br>Advisor | <ul> <li>Internal First Solar</li> <li>External AGL</li> <li>Project<br/>Environmental<br/>Representative</li> <li>Regulators**</li> </ul> |
|--------------------|------------------------------------|---|----------------------------------|--|
| Incident Reporting | Incident Based<br>Non-Condition C8 | In accordance with:  CEMP-Q Incident Management Protocol  | Site<br>Environmental<br>Advisor | Internal First Solar   |
|                    | Complaints Based                   | <ul> <li>In accordance with:</li> <li>CEMP-P Complaints<br/>Management Protocol</li> <li>CEMP-Q Incident<br/>Management Protocol</li> </ul> | Site<br>Environmental<br>Advisor | <ul> <li>Internal First Solar</li> <li>External AGL</li> <li>Project<br/>Environmental<br/>Representative</li> </ul>                       |

\*\* Regulator notification will only occur where required by the Development Consent or relevant Environmental Legislation.

#### 7.4.4 Regulator Reporting Requirement

The Development Consent identifies incident based notification to regulators with respect to the following Conditions and Mitigation Measures:

| Condition:   | Trigger:  | Regulator:   |
|--------------|---|--|
| В30          | Unexpected Aboriginal object found  | NSW Office of Environment and Heritage (OEH)<br>Registered Aboriginal stakeholders       |
| MM24         | Human skeletal remains unearthed  | NSW Police<br>NSW Office of Environment and Heritage (OEH)                               |
| B31 and MM59 | Unexpected Heritage object found  | NSW Office of Environment and Heritage (OEH)   |
| C8           | Incident that has caused, or threatens to cause, material harm to the environment | Director-General and "any other relevant agencies", e.g. Environmental Protection Agency |

Not all incidents will trigger notification in accordance with Condition C8 of the Development Consent. Notification requirements for incidents that trigger notification (under Condition C8) is outlined within **CEMP-Q** *Incident Management Protocol*.



Nofication of Aboriginal or Historic Heritage finds will be undertaken in accordance with **CEMP-J** *Aboriginal Heritage Management Plan* and **CEMP-K** *Historic Heritage Management Plan* (respectively).

#### 7.4.5 First Solar HSE "Intelex" System

First Solar implements an integrated Health, Safety and Environmental Management System via a web based computer system called Intelex.

Intelex is workflow management tool which provides the following functionality:

- A structured approach to scheduled audits and monitoring inspections, capturing noncompliance and incidents, with follow–up actions for resolution
- Ability to report and compare actual HSE performance within and across all First Solar projects and at all levels of the organisation
- Intuitive data entry and retrieval, which allows First Solar to improve reporting accuracy and identify HSE trends across the business.
- A robust process for capturing HSE incidents, including investigation findings, incident management and corrective action items
- A secure, centralised repository for HSE document control and records management
- A uniform and proactive approach to HSE risk management

The reporting requirements outlined in Section 7.4.3 will be captured within the First Solar Intelex system.

### 7.5 Environmental Training

All employees are required to undergo general Worker Environmental Awareness and Compliance Training (WEAC Training).

The WEAC training will cover general environmental compliance requirements and, where applicable, training will also be provided that relates to the specific responsibilities of the employee (e.g. traffic management).

For the purposes of this training, "employees" captures all onsite personnel, including visitors to the power station site.

The WEAC Training will be provided in the following ways:

- 1. Via the Nyngan Solar PV Power Station site induction (all)
- 2. Via targeted training sessions with relevant personnel (job specific)
- 3. Via morning pre-starts or worker Toolbox sessions

WEAC Training will identify the environmental compliance requirements for all personnel on all matters covered by the CEMP appendices including, but not limited to, the following:



- Aboriginal / Historical Heritage
- Traffic Management
- Weed Hygiene
- Waste Management

The requirements for WEAC Training is included in **Appendix CEMP-S** Worker Environmental Awareness and Compliance Training.

#### 7.6 Emergency Contacts and Response

First Solar will have a dedicated onsite Site Environmental Advisor present for the duration of the construction of the Nyngan Solar PV Power Station. In the event that the Site Environmental Advisor is not available, an appropriate alternate person from the First Solar HSE Team will be nominated to fill this role.

The Site Environmental Advisor will have authority to:

- 1. Stop or direct control works in the event of an environmental emergency
- 2. Direct clean-up activities in the event of an environmental emergency
- 3. Stop works where a risk of material environmental harm is present

An environmental emergency is any event that causes or has the potential to cause material harm to the environment requiring notification to the Director-General in accordance with Condition C8 of the Development Consent.

Material harm to the environment is defined in Section 147 of the *Protection of the Environment Operations Act 1997*:

- *"(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."

Onsite environmental emergencies will be managed in accordance with the First Solar Nyngan Site Emergency Response Plan.

Environmental Emergency contact details are:

- Name: Steph Froggatt
- Mobile phone: 0408 471 150



The Site Environmental Advisor will also be available on handheld UHF onsite during construction works. Contact information for the Site Environmental Advisor will be included within the WEAC Training (**CEMP-S**).

### 7.7 Bush Fire Management

Emergency management measures, including measures to control bushfires, have been developed by First Solar in consultation with the NSW Rural Fire Service (RFS) (refer **Attachment CEMP-01**). A *Bush Fire Management Plan* is attached as Appendix **CEMP-M**.

The Bush Fire Management Plan was developed to meet the following objectives:

- Define appropriate measures and processes to minimise bushfire related risks during the construction of the Nyngan Solar PV Power Station.
- Confirm the intent to continue to engage with the Rural Fire Service (RFS) in the implementation of this Management Plan as the Nyngan Solar PV Power Station construction schedule progresses.
- Provide a monitoring, auditing and reporting framework to ensure the effectiveness of the bush fire controls implemented.

All construction personnel and contractors will be provided Worker Environmental Awareness and Compliance Training (**CEMP-S**). Part of this program will include information on worker obligations to comply with the Bush Fire Management Plan and the need to understand and comply with responsibilities for minimising the potential for creating a bush fire risk onsite.

During the development of the Bush Fire Management Plan, First Solar included all requirements / mitigations requested by the RFS. First Solar received written advice (by email) on 30 September 2013 from the local branch of the RFS confirming they were satisfied by the mitigation measures and controls outlined in the First Solar Bush Fire Management Plan.

### 7.8 Flood Risk

In accordance with Condition C2(m), First Solar undertook consultation with NOW in relation to the monitoring and management of flood impacts at the site (refer **Attachment CEMP-01**).

To inform the EIS, SKM were engaged to undertake a Hydrology Assessment for the Nyngan Solar PV Power Station site. Key observations from this report include:

- The SKM Hydrology Report details flooding risk at the following watercourses (based on a 100 year ARI)
  - Bogan River (8km away from site)
  - Whitbarrow Creek (500m away from site)



- Hydrological modeling by SKM confirmed that the site will not be prone to flooding from the Bogan River during either a 100 or 200 year ARI.
- The site may be subject to flooding during a 100 ARI flood from Whitbarrow Creek. Flooding would be concentrated on the eastern and south-eastern parts of the site (in the direction of Whitbarrow Creek).
- There are no stream-flow meters within Whitbarrow Creek. The modeling by SKM was undertaken using conservative estimates of flooding risk.
- There is no evidence of prolonged inundation of flooding on the site. This observation was supported by the landowner during the SKM Hydrological Assessment and more recently by the Bogan Shire Council during discussions with First Solar. The current site for the power station was selected by AGL (over two other sites in the area) due to its low risk of flooding.
- SKM have conservatively modeled an approximately 60% flood coverage of the site in a 100 ARI. The depth of the water would be 0.3m (or less) and have a slow moving velocity of 0.2m/s.

Noting the findings of the SKM Hydrological Assessment, the risk of catastrophic flooding of the site was deemed to be low. Where flooding was identified to be possible the water would be shallow, slow moving and concentrated to the eastern half of the site.

To address the risk of flooding the following requirements are set out in Development Consent Condition B1 and Mitigation Measure 25:

- B1. Unless otherwise approved by the Director-General, the location of Ancillary Facilities shall:
  - (j) be above the 20 ARI flood level unless a contingency plan to manage flooding is prepared and implemented.
- 25. The substation and office building would be designed to accommodate a 1:100 year flood and located in the south-west of the site, outside of the inundation zone (Figure 6-1 of the EIS).

Noting the above requirements, First Solar has positioned Ancillary Facilities in the south-west site of the site. Based on the modeling of SKM, First Solar has met the above site design requirements.

With respect to the risk to other infrastructure within the "inundation zone", the height of flooding predicted by SKM would put the level of water below that of the constructed solar PV arrays.

NOW confirmed their understanding of flood risk with respect to the Nyngan Solar PV Power Station. No mitigations to monitor or manage flood impacts, additional to Condition B1 and Mitigation Measure 25, were identified during the discussions with NOW.



## 8 Implementation

### 8.1 Construction Work Hazards

A register of construction work hazards, the anticipated level of risk and relevant control measures is provided in **CEMP-A** *Environmental Risk Register*.

This risk register shall be updated as required during construction if new work hazards are identified. The Environmental risk register will be managed in coordination with the First Solar Health & Safety Team to ensure consistency of risk rating, approach and risk controls.

The risk rating is a factor of the **consequence** of an impact occurring and the **likelihood** of the impact occurring. Depending on the combination of consequence and likelihood, the overall risk rating could be low to extreme. Very high to extreme risks (termed 'key risks') have warranted a higher level of control.

### 8.2 Environmental Management Activities

The tables provided in Appendix **CEMP-B** *Environmental Management Activities* set out:

- Specific issues
- Requirements for mitigating environmental impacts
- Responsibility for ensuring that the environmental obligations are met
- Timing for ensuring that the environmental obligations are met.

Timing of environmental management activities have been separated in accordance with the phasing of Construction Activities identified in Section 3.5:

- Mobilisation / Site preparation
- Construction
- Commissioning
- Demobilisation

### 8.3 Construction Water Supply

In accordance with Conditions C2(p) and C2(q), First Solar has undertaken an assessment of water options for construction activities. Construction water is required for:

- 1. Dust mitigation (CEMP-N Air Quality Management Plan)
- 2. Bush fire prevention activities (CEMP-M Bush Fire Management Plan)

Construction water is also expected to be used during the rehabilitation and revegetation activities outlined in Appendix **CEMP-H** *Rehabilitation and Revegetation Management Plan*.



Construction water requirements will be met from the following supply sources:

- Bogan Shire Council depot
- Bogan River
- Private dam supplies (if required)

In accordance with Mitigation Measure 62 this construction water has been confirmed prior to construction works commencing. Construction water will be available at the commencement of site enabling works.

Provisional construction water has been secured from the Bogan River. This water has been sourced via the local water sharing scheme and will be extracted legally via a local water licence holder on behalf of First Solar. The water is being extracted and is being trucked by a local water carrier via private property tracks (as far as practicable) to a >500,000L dam on neighbouring land to the north of the power station site. A stand pipe has been put in place on the edge of the power station site (fed from an approximately 70m hose from the dam) to allow for the continued availability of water in support of the onsite works.

The longer term construction water supply for the site will consist of a pipeline from the Bogan River to the dam to the north of the power station site. The purpose of the pipeline is to reduce the carbon footprint associated with the movement of water and to ensure that the dam is kept topped up in support of construction works.

No trees will be required to be removed during the installation of the temporary pipeline.

The advantages of this water supply option are:

- Timely refilling of water carts for dust suppression as water will be available from within the power station construction site
- Ongoing availability of water for construction purposes
- Security of supply during the Construction Phase

Construction water usage has been estimated on the basis of an average of 300,000L of water per day during the initial period of enabling / civil works. Water usage will progressively reduce during the construction of the power station development. The dam will provide approximately 2 days of dust suppression water for the project to ensure security in supply in the event that water deliveries are delayed.

The construction of the dam on the adjacent private land has removed the need for the 19,000L dust suppression pond within the power station site construction footprint. The change will result in a reduction (from the original proposal) in earthworks, ground cover disturbance and post construction rehabilitation / revegetation.

The dam on the adjacent private land will be constructed in accordance with the requirements of the landowner and falls outside of the scope of the CEMP. The dam has been constructed in a manner



that will minimise water loss, ensure maximum stormwater capture (to reduce the take from the Bogan River as far as practicable) and to ensure the ongoing stability of the dam structure itself for longevity beyond the end of the Construction Phase.

No additional environmental approvals are required for the construction of the dam on the adjacent private land.

### 8.4 Potential Cumulative Impacts

#### 8.4.1 Local Services

The Nyngan Solar PV Power Station construction activities will not impact on existing services, including water, sewerage, communications or electricity due to the relatively low number of personnel on site.

During the Construction Phase the power station site will be self-sufficient. The following is proposed with respect to the provision of services:

| Item:          | Source:   |
|----------------|---|
| Water          | Potable water will be trucked to site to meet the needs of onsite personnel. Potable water will be held on tanks onsite and will not be connected to the local potable water supply.                              |
| Sewerage       | Sewerage generated on the site will be captured in holding tanks onsite and removed from site by an appropriately licensed provider. For further information refer to <b>CEMP-U_</b> <i>Waste Management Plan</i> |
| Communications | No impact on local communication services is expected during the Construction Phase.  |
| Electricity    | Onsite generators will be utilised to provide a power source during the Construction Phase.   |

#### 8.4.2 EMC Metals Corporation

Mitigation Measure 64 requires:

64. Should the Nyngan Scandium Project receive development approval, EMC Metals Corp would be consulted by the Nyngan Solar Plant proponent to determine if construction traffic for the respective proposals could be scheduled to minimise cumulative impacts on third parties.

The trigger for this Mitigation Measure is development approval being granted to EMC Metals Corp for the Nyngan Scandium Project. As at November 2013, the NSW Department of Planning and Infrastructure (DPI) "Major Projects" website identifies the status of the Nyngan Scandium Project (SSD-5157) status as "DGRs Issued". This status remains unchanged from 19<sup>th</sup> March 2013.



A review of the EMC Metals website identified advice that:

"The resource indicates a very low strip ration, and it is expected that the plant will be satisfied by a partial-year mining schedule during the dry summer season (contractor campaign mining)".

Partial year monitoring is relevant with respect to the generation of construction traffic associated with the Scandium Project.

First Solar will continue to monitor the status of the Nyngan Scadium Project and engage with EMC Metals as and when appropriate in accordance with Mitigation Measure 64.

#### 8.5 Construction Soil and Water Management

Measures to monitor and manage soil and water impacts at the Nyngan Solar PV Power Station have been developed by First Solar in consultation with the NSW Office of Water (NOW) and in accordance with the requirements of Condition B9 of the Development Consent. Specifically, the soil and water management measures developed for the construction of the power station are consistent with *Managing Urban Stormwater – Soils and Construction Vol.1* (Landcom, 2004).

In order to address the requirements of Condition B9, a site specific *Soil and Water Management Plan* has been developed for the construction of the Nyngan Solar PV Power Station. The *Soil and Management Plan* also meets the requirements of Mitigation Measure 60 and includes site specific Erosion and Sediment Control Measures. Please refer to Appendix **CEMP-E** for the combined Soil and Water Management Plan / Erosion and Sediment Control Document.

Aeolian erosion of soils is also covered in Appendix **CEMP-N** Air Quality Management Plan.

First Solar received written advice on November 2013 from the NSW Office of Water (NOW) confirming they were satisfied by the mitigation measures and controls outlined in the First Solar *Soil* and Water Management Plan (refer **Attachment CEMP-01**).

#### 8.6 **Dust Emissions**

A site specific *Air Quality Management Plan* has been developed by First Solar for the control of dust emissions during the construction of the Nyngan Solar PV Power Station. The Air Quality Management Plan is attached as Appendix **CEMP-N**. The *Air Quality Management Plan* includes measures to monitor and manage dust emissions onsite in accordance with Condition C2(n).

The two primary potential causes of air quality issues onsite during the construction of the Nyngan Solar PV Power Station and associated power station access tracks are:

Dust generated from onsite activities

e.g. Vehicle movements, vegetation clearance, disturbed and exposes soils, stockpiled soils and materials, progressive rehabilitation



- Vehicle emissions

The *Air Quality Management Plan* (**CEMP-N**) includes the mitigation measures and monitoring that will be utilised by First Solar to ensure compliance with the requirements of the Nyngan Development Consent.

All site personnel will be advised of the requirement to minimise dust generation including the speed limit on unsealed roads in the *Worker Environmental Awareness and Compliance Training* (refer **CEMP-S**)

Dust mitigation is also covered in part within the *Soil and Water Management Plan* (**CEMP-E**). As cited in Section 8.6, First Solar received written advice in November 2013 from the NSW Office of Water (NOW) confirming they were satisfied by the mitigation measures and controls outlined within the *Soil and Water Management Plan*.

## 9 Monitoring and Review

### 9.1 Environmental Monitoring

The environmental management activities, controls and mitigations outlined in the CEMP shall be monitored and recorded in accordance with Appendix **CEMP-B** *Environmental Management Activities* and the environmental schedules identified in Appendix **CEMP-C** *Environmental Schedules*.

All monitoring records shall be held on site in the Site Office for the duration of the construction of the power station. Where practicable, the use of hard copies will be minimised in favour of soft copies stored electronically in Intelex (see Section 7.4.5).

Reporting will be undertaken in accordance with Section 7.4 of the CEMP.

### 9.2 Corrective Actions

Non-compliance may be identified through routine (e.g. **CEMP-D** *Weekly Site Inspections*) and impromptu site inspections, via the CEMP Review or Audit process (**CEMP-T**) or be incident based.

The hierarchy of environmental non-compliance is generally as follows:

- 1. Non-compliance with environmental management controls or mitigation
- 2. Environmental incidents
- 3. Potential environmental emergencies (as defined in Section 7.6)
- 4. Actual environmental emergencies (as defined in Section 7.6)

Corrective actions may be triggered by any of the above.


Where a need for correction actions is identified, the Site Environmental Advisor shall, in consultation with relevant onsite or external stakeholders, identify and implement corrective actions.

Where correction actions are developed, First Solar will utilise the Intelex system outlined in Section 7.4.5 of the CEMP to record, track and close-out corrective actions.

Incidents shall be recorded and reported in accordance with the *Incident Management Protocol* (**CEMP-Q**).

## 9.3 Review of the CEMP

#### 9.3.1 CEMP Audit and Review

As recommended by Section 3.5 of the *Guideline for the Preparation of Environmental Management Plans* and in accordance with Condition C16(c), First Solar has developed a CEMP Auditing and Review Procedure. This Procedure is attached as Appendix **CEMP-T** *CEMP Auditing and Review* of the CEMP.

**CEMP-T** has been developed in recognition of the CEMP as a working document that requires review and amendment during the life of the project. Reviewing and amending the CEMP during the life of the project is an important tool to First Solar as it will allow First Solar the opportunity to continue to improve onsite environmental management.

As outlined in **CEMP-T**, a review of the CEMP will be undertaken in the following circumstances:

- Subsequent to each CEMP audit
- As required, throughout the Construction Phase where there is a change to the construction schedule, the site layout or a change in the construction methodology.
- As required, throughout the Construction Phase where site based conditions require a change to the environmental controls and procedures identified within the CEMP.
- As required, throughout the Construction Phase in response to an environmental incident.

CEMP Audits will be undertaken at the intervals defined in **CEMP-T** *CEMP Auditing and Review*.

#### 9.3.2 Definition of Minor Change

A minor change to the First Solar CEMP is defined as a change that does not materially:

- 1. Compromise First Solar's ability or intent to comply with the documents identified in Development Consent Condition A2
- 2. Increase the likelihood of material environmental harm occurring



## **10** References

- 1. AS1940 The Storage and Handling of Flammable and Combustible Liquids (2004)
- 2. Assessment Report: Nyngan Solar Plant, Nyngan (SSD-5355) NSW Planning and Infrastructure (July, 2013)
- 3. First Solar Nyngan Project Site Safety Plan
- 4. First Solar Nyngan Site Emergency Response Plan
- 5. *Guideline for the Preparation of Environmental Management Plans* (Department of Infrastructure, Planning and Natural Resources, 2004)
- 6. Heritage Act 1977
- 7. Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009)
- 8. Managing Urban Stormwater Soils and Construction Vol.1 (Landcom, 2004)
- 9. National Parks and Wildlife Act 1974
- 10. Nyngan Solar Plant Development Consent (SSD-5355) (15 July 2013)
- 11. Nyngan Solar Plant Environmental Impact Statement (NGH Environmental, March 2013)
- 12. Nyngan Solar Plant Submissions Report (NGH Environmental, June 2013)
- 13. Planning for Bushfire Protection (2006)
- 14. Standards for Asset Protection (Undated)
- 15. State Significant Development Application SSD-5355



Attachment CEMP-01: Agency Consultation



# Attachment CEMP-01 – First Solar Consultation with Key Stakeholders

| Organisation:                                   | Consultation:  | Formal Response:               | Contact Person: | Location of<br>Contact Person |
|---|--|--------------------------------|-----------------|-------------------------------|
| Bogan Shire Council                             | Consultation regarding the Traffic Management Plan and the CEMP  | <u>CEMP</u><br>No response     | Timothy Riley   | Nyngan                        |
|   | <u>CEMP</u>  |                                |                 |                               |
|   | 1. Email discussions (via Geolyse)   |                                |                 |                               |
|   | 2. Presentation to the Council (19/11/2013)  |                                |                 |                               |
|   | 3. Follow up emails (attached)   |                                |                 |                               |
|   | Traffic Management Plan:   | <u>Traffic Management Plan</u> |                 |                               |
|   | 1. Verbal discussions (phone)  | Email                          |                 |                               |
|   | 2. Email discussion (via Geolyse)  |                                |                 |                               |
|   | <ol> <li>Email confirming no comments on the Traffic<br/>Management Plan (attached)</li> </ol>             |                                |                 |                               |
| NSW Department of Planning                      | 1. Consultation regarding the SLR Nyngan Solar Plant<br>Construction Noise Assessment                      | Verbal                         | Jeff Parnell    | Sydney                        |
|   | 2. Verbal discussion (Via SLR)   |                                |                 |                               |
|   | 3. Email discussion (attached)   |                                |                 |                               |
| NSW Office of Environment<br>and Heritage (OEH) | <ol> <li>Consultation regarding draft Flora and Fauna<br/>Management Plan</li> </ol>                       | Written                        | Terry Mazzer    | Dubbo                         |
|   | 2. Email discussions   |                                |                 |                               |
|   | 3. Letter including comments from OEH on plan  |                                |                 |                               |
|   | 4. Verbal discussions (phone)  |                                |                 |                               |
|   | 5. Email discussions   |                                |                 |                               |
|   | <ol> <li>Letter confirming satisfaction with the Flora and Fauna<br/>Management Plan (attached)</li> </ol> |                                |                 |                               |

# Attachment CEMP-01 – First Solar Consultation with Key Stakeholders

| Organisation:                            | Consultation:   | Formal Response: | Contact Person: | Location of<br>Contact Person |
|--|---|------------------|-----------------|-------------------------------|
| NSW Office of Water (NOW)                | <ol> <li>Consultation regarding draft Soil and Water Management<br/>Plan (CEMP-E)</li> </ol>              | Written          | Tim Baker       | Dubbo                         |
|  | 2. Verbal discussions (phone)   |                  |                 |                               |
|  | 3. Email discussion   |                  |                 |                               |
|  | <ol> <li>Letter confirming satisfaction with the Soil and Water<br/>Management Plan (attached)</li> </ol> |                  |                 |                               |
| NSW Roads and Maritime<br>Services (RMS) | <ol> <li>Consultation regarding draft Traffic Management plan<br/>(CEMP-O)</li> </ol>                     | Written          | Tony Hendry     | Sydney                        |
|  | 2. Verbal discussions (phone)   |                  |                 |                               |
|  | 3. Email discussion   |                  |                 |                               |
|  | <ol> <li>Letter confirming satisfaction with Traffic Management<br/>Plan (attached)</li> </ol>            |                  |                 |                               |
| NSW Rural Fire Service (RFS)             | 1. Consultation regarding Bush Fire Management Plan   | Written          | Greg Sim        | Dubbo                         |
|  | 2. Verbal discussions (phone and in person)   |                  |                 |                               |
|  | 3. Email discussion   |                  |                 |                               |
|  | <ol> <li>Email confirming satisfaction with the Bush Fire<br/>Management Plan (attached)</li> </ol>       |                  |                 |                               |

**Bogan Shire Council** 

From: Sent: To: Cc: Subject: Julie Stiglish Friday, November 22, 2013 3:24 PM timothy.riley@bogan.nsw.gov.au Steph Froggatt CEMP Draft

Hi Tim,

Any initial comments on the first read thru?

Thanks, Julie Stiglish

EHS First Solar, Inc 350 West Washington Street #600 Tempe, AZ 85281 M 702.372.0051 O 602.414.9318

#### **First Solar Australia**

L3 16 Spring St Sydney, NSW 2000 Australia AU +61 439 399 550



From: Sent: To: Subject: Julie Stiglish Monday, November 25, 2013 11:50 AM timothy.riley@bogan.nsw.gov.au Construction Environmental Management Plan First Solar

Hi Tim,

We are going to be submitting the CEMP to AGL this week. If there are any comments, I would need them by COB today.

Thanks, Julie Stiglish

EHS First Solar, Inc 350 West Washington Street #600 Tempe, AZ 85281 M 702.372.0051 O 602.414.9318

#### **First Solar Australia**

L3 16 Spring St Sydney, NSW 2000 Australia AU +61 439 399 550



From: Sent: To: Subject: Julie Stiglish Friday, November 29, 2013 3:52 PM timothy.riley@bogan.nsw.gov.au CEMP Comments

Hi Tim,

The CEMP will be submitted to AGL on Monday. AGL will be submitting the plan to the Department of Planning. This has been reviewed by the Project Environmental Representative and slight changes have been made. There has been no major changes to the plans that have been submitted to you.

Although your sign off is not required for us to submit the document, it is important to First Solar that we consult with the council and that you have been involved in the review of the document.

If you have reviewed the document, we would appreciate an email or letter stating that you have reviewed and agree with the plans.

If you have questions, please contact me at anytime.

Thanks, Julie Stiglish

EHS First Solar, Inc 350 West Washington Street #600 Tempe, AZ 85281 M 702.372.0051 O 602.414.9318

#### **First Solar Australia**

L3 16 Spring St Sydney, NSW 2000 Australia AU +61 439 399 550



#### Subject:

FW: 213225 FW: TMP Nyngan Solar Plant

From: Alistair Whittle [mailto:awhittle@geolyse.com]
Sent: Thursday, 29 August 2013 1:42 PM
To: Samantha Coras; Gavin Randall
Cc: Andrew Brownlow; Orange Document Control
Subject: 213225 FW: TMP Nyngan Solar Plant

Samantha

Please see below the email from Bogan Council stating that they have no comments on the draft TMP.

I'll call to discuss how we move forward from here with getting feedback from RMS and issuing the final version of the report.

Regards

Alistair Whittle Senior Civil Engineer Geolyse Pty Ltd 154 Peisley St PO Box 1963 Orange NSW 2800 Ph: 02 6393 5000 Fx: 02 6393 5050 Mob: 0400 161 710 Email: awhittle@geolyse.com Web: www.geolyse.com

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From: Graeme Bourke [mailto:graeme.bourke@bogan.nsw.gov.au] Sent: Thursday, 29 August 2013 1:00 PM To: <u>awhittle@geolyse.com</u> Subject: TMP Nyngan Solar Plant

Alister

I have reviewed the Traffic Management Plan for the Nyngan Solar Plant have no additional comments to add to the plan.

Thank you for your consultation with Council.

Regards

#### **Graeme Bourke**

Manager of Engineering Services



PO Box 221 | 81 Cobar Street Nyngan, NSW, 2825 P: (02)68359021 | F: (02)68359011 | E: <u>admin@bogan.nsw.gov.au</u> W: <u>www.bogan.nsw.gov.au</u> **NSW Department of Planning** 

## **Julie Stiglish**

| From:    | Samantha Coras  |
|----------|---|
| Sent:    | Monday, November 04, 2013 1:52 PM   |
| То:      | jeff.parnell@planning.nsw.gov.au  |
| Cc:      | Steph Froggatt; Gavin Randall; Matthew Harrison (mharrison@slrconsulting.com) |
| Subject: | Department of Planning Noise Discussion with SLR - Nyngan Project             |

Good afternoon Jeff,

I understand that you have been in discussion with our consultant, Matt Harrison (SLR), regarding their noise testing results and report for the Nyngan Solar Power Plant, for which First Solar will start construction next January.

I understand the outcomes of your discussions with Matt to be:

#### 1. Noise Mitigation for Out of Hours Work

With only 3 residents in proximity to the site, you have suggested that the best outcome for all parties may be for First Solar to develop a negotiated agreement directly with the residents, which would apply to noisy work completed outside of standard construction hours. Such an agreement would avoid the requirement to use moveable barriers as a noise mitigation measure during out-of-hours pile driving activities.

#### 2. Impulsive Noise Definition B24

First Solar was seeking a clarification from the Department on the definition of 'impulsive noise' with respect to pile driving activities. I understand that you have discussed with Matt that impulsive noise should not be measured or defined at the source, but should correspond to the sensitive receiver locations. Further to this, SLR will be including the agreed technical definition for 'impulsive noise' in an updated draft of their noise report, including their site-specific measurements and calculations for your review. Based on the measurements taken at site, we are expecting that SLR's calculations will indicate that pile driving is not impulsive at any of the sensitive receivers. As such, the work hours specified under B23 should apply to the pile driving activities.

#### 3. Construction Environmental Management Plan (CEMP)

First Solar confirms that we are submitting a CEMP, which includes a noise category. FS understands that the Department recommends that the Out of Hours Work (Item 1 above) and the Impulsive Noise Definition (Item 2 above) are to be explained and the management strategy included in our CEMP, which will then be signed off and approved for construction. In order to clarify the definition of impulsive noise in Condition B24, the Department prefers that this clarification is done via the wording and information that First Solar includes in our CEMP, rather than via a formal clarification or amendment to be issued by the Department.

SLR will issue an updated noise report tomorrow that addresses the key outcomes of your discussion. We will share the report with you asap.

I appreciate if you can review the summary above and confirm that I have accurately captured the key messages and way forward from your discussion with SLR.

Kind regards, Samantha

Samantha Coras Project Development Engineer First Solar Australia, L3 16 Spring St, Sydney, NSW 2000 Australia P: +61 9002 7725 | M: +61 400 312 402 | samantha.coras@firstsolar.com

NSW Office of Environment and Heritage



Date: Your reference: Our reference: Contact: 24<sup>th</sup> October 2013 213225\_CEMP-F.02 DOC13/75162 Terry Mazzer 6883 5302

Andrew Brownlow Project Manager CEnvP Geolyse Pty Ltd PO Box 1963 Orange NSW 2800

Dear Mr Brownlow

### RE: Flora and Fauna Management Plan for Nyngan Solar Plant (SSD 5355)

I refer to your letter dated 17<sup>th</sup> October 2013 seeking comment from the Office and Environment and Heritage (OEH) on the Flora and Fauna Management Plan (FFMP) for the Nyngan Solar Plant Project.

OEH has reviewed the FFMP and the following advice is provided for your consideration.

#### Scope of the FFMP

The scope of the FFMP is exclusively on measures required to be adopted during the construction phase of the project. While the FFMP is directly related to the Biodiversity Offset Management Package (consent condition C5), its relationship to other plans required under the conditions of consent has not been stated. The connections between the FFMP and the Operation Environmental Management Plan (OEMP) (consent condition C4) and the Decommissioning Management Plan (DMP) (consent condition C6) should be included as part of the FFMP. OEH assumes that further flora and fauna management plans will be included in the OEMP and the DMP.

#### **Threatened Flora Surveys**

Surveys for the threatened plant species Pine Donkey Orchid *Diuris tricolor* and Red Darling Pea *Swainsona plagiotropis* were to be conducted this spring. OEH understands that **ngh**environmental had planned to conduct these surveys in early October. The FFMP should discuss how the findings of these surveys would be incorporated, and how these species would be managed during construction, if located.

#### **Grey-crowned Babbler**

The FFMP states that "*Two family groups and two nest sites were detected in Area 2. In the degraded woodland remnant to be cleared, one family group and three (3) nesting sites have been recorded.*" The FFMP should clearly state how these family groups and nest sites are to be impacted and/or managed during the construction phase of the project. The area of native vegetation to be removed from Area 2, and the area to be retained with improved ground layer complexity, should be clearly delineated in the FFMP. It is assumed that the longer-term management of Grey-crowned Babblers will be addressed in additional flora and fauna management plans within the Operation Environmental Management Plan and the Decommissioning Management Plan. Again, this should be stated.

PO Box 2111 Dubbo NSW 2830 Level 1 48-52 Wingewarra Street Dubbo NSW Tel: (02) 6883 5312 Fax: (02) 6884 8675 ABN 30 841 387 271 www.environment.nsw.gov.au

#### **Nest Boxes**

The section on Habitat Relocation discusses the use of nest boxes and salvaged hollows. In the OEH adequacy review of the draft Environmental Assessment dated 16<sup>th</sup> November 2012 we stated,

"OEH does not generally support use of nest boxes as a mitigation measure as (1) these are often used by pests such as honeybees and Starlings that may prevent the occupancy of these artificial structures by target species, (2) different species have very different requirements and hence multiple sizes and designs may be needed, (3) there is often no evidence that a species will use a nest box and (4) nest boxes do not last long and hence a program of maintenance and replacement is required which is costly."

While OEH has accepted the decision to use artificial nest boxes in conjunction with salvaged tree hollows, it is not clear whether a variety of sizes and designs will be used. OEH requests that monitoring of artificial nest boxes also provides the following information:

- The size and design of each nest box
- What species is using each nest box

The FFMP should also detail what action will be taken if nest boxes are found to be inhabited by introduced species such as honeybees and Starlings.

#### **Perimeter Fence and Collision Monitoring**

Mitigation measure 13 of the EIS states that the *"Perimeter security fencing will feature heavy duty fabric to increase visibility to fast flying parrots."* However, the FFMP refers to *"heavy duty mesh"*. The use of the word mesh may have been simply an error but it needs to be made compatible with the EIS.

The FFMP states that the perimeter cyclone fence line would be inspected monthly for evidence of any parrot collision and any mortality recorded. OEH suggests that mortality of any species should be recorded, parrot or otherwise.

#### **Removal of Trapped Fauna**

The FFMP is very general about the handling and relocation of native fauna particularly where removing fauna from tree hollows or trenches. It is not considered acceptable for the clearing to occur without suitably clear and detailed procedures in place to ensure appropriate handling of fauna and that each wildlife handler is suitably qualified and licensed.

Should you require further information regarding these matters please contact Terry Mazzer, Conservation Planning Officer on (02) 6883 5302 or email <u>terry.mazzer@environment.nsw.gov.au</u>.

Yours sincerely,

SONYA ARDILL Senior Team Leader Planning North West Region

From: Sent: To: Cc: Subject: Steph Froggatt Friday, November 08, 2013 11:56 AM 'terry.mazzer@environment.nsw.gov.au' Julie Stiglish Nyngan - Flora and Fauna Management Plan

Hi Terry,

Further to the earlier email from Andrew Brownlow (Geolyse) and the voicemail messages I have left for you, I wanted to provide you with a quick update with respect to the development of the First Solar Flora and Fauna Management Plan for the Nyngan solar farm.

The previous correspondence you have had with respect to this plan has been with Geolyse. As correctly identified in Andrew's email, First Solar are currently in the process of finalising the Construction Environmental Management Plan (inclusive of the appendices) in-house. This change reflects my recent engagement to First Solar in the role of Environmental / Approvals Manager.

By way of update on the Flora and Fauna Management Plan, noting the comments received from the OEH (letter dated 24/10/2013) I undertook a comprehensive review of the Flora and Fauna Management Plan to ensure that we were meeting (in particular) the following provisions:

- 1. Condition A1 of the Development Consent "Obligation to Minimise Harm to the Environment"
- 2. Condition A2 "To carry out the development in generally in accordance with the following documents"

My review of the plan identified several items that have required additional reflection by First Solar. Of particular interest is the mitigation relating to the perimeter security fence.

First Solar has sought further specialist ecological advice on several matters relating to this plan. The plan is currently under review by a 3<sup>rd</sup> party consultant to ensure that First Solar will be meeting its obligations under the Development Consent.

Once the plan has been returned to me I would like to forward this back to you for further review. To aid this review I will highlight the parts of the document that have been revised since your previous review of the document. The changes will reflect both the comments from the OEH and the advice from our external specialist consultants. I hope to have this plan back through to you early next week.

Please feel free to contact me if you would like to discuss the process outlined above.

I trust you are well.

Kind regards, Steph Froggatt

Environmental / Approvals Manager First Solar Australia L3 16 Spring St Sydney, NSW 2000 Australia Ph: +61 2 9002 7711 Mbl: +61 408 471 150



| From:        | Steph Froggatt  |  |
|--------------|---|--|
| Sent:        | Wednesday, November 13, 2013 9:12 AM                          |  |
| То:          | 'terry.mazzer@environment.nsw.gov.au'                         |  |
| Cc:          | Julie Stiglish  |  |
| Subject:     | Nyngan Flora and Fauna Management Plan                        |  |
| Attachments: | CEMP-F Construction Flora and Fauna Management Plan (OEH).pdf |  |

Hi Terry,

Further to our phone call yesterday, please find the following document attached:

1. First Solar Nyngan Construction Flora and Fauna Management Plan

The attached plan forms Appendix CEMP-F of the First Solar CEMP for Nyngan. I will send the figures for the attached plan through in a separate email shortly.

As discussed, I have highlighted the sections that we updated subsequent to your initial comments (letter dated 24/10/13). These areas are presented in blue writing in the attached. We have sought to address the permeter fence in more detail. The advice from our ecologist is included as Attachment F01 in the attached plan.

If you were able to review the attached and provide any additional comments or confirmation that the plan meets the expectations of the OEH by the end of this week (as per our discussion) that would be greatly appreciated.

Please feel free to contact me should you have any questions regarding the attached.

Kind regards, Steph Froggatt

Environmental / Approvals Manager First Solar Australia L3 16 Spring St Sydney, NSW 2000 Australia

Ph: +61 2 9002 7711 Mbl: +61 408 471 150



From:Steph FroggattSent:Wednesday, November 13, 2013 5:05 PMTo:'Terry Mazzer'Subject:RE: Nyngan Flora and Fauna Management Plan

Hi Terry,

At this time we have not completely settled on a mitigation measure. This is primarily due to:

- 1. Needing more time to understand more fully the mitigation options available, including further research in to the options and their availability / practicality in the numbers we will need for the perimeter security fence.
- 2. Working with AGL (as the Applicant) to ensure that they are satisfied with the option that First Solar utilises. First Solar hold responsibility for the Construction Phase of the project. As the owner/operator AGL need to be satisfied that the mitigation measure will meet mitigation requirements in to the Operational Phase of the project as the fence is a 'permanent' feature of the project site (i.e. for the life of the project). Ongoing mitigation measures for the fence would be included by AGL in the Operational Environmental Management Plan (required by Condition C4 of the Development Consent).

To confirm, fauna mitigation is proposed to be installed on the perimeter security fence at the same time that the fence itself is installed. It is First Solar's intention to adopt one of the mitigation measures outlined in *Nyngan Solar Farm* – *Advice on Options to Mitigate Impacts of Fencing* document with ongoing consultation with our ecologist (as required). The effectiveness of the mitigation will be monitored during the fence collision monitoring programme throughout the Construction Phase by First Solar. Ongoing monitoring beyond the Construction Phase will fall under AGL's Operational Environmental Management Plan.

With respect to wording for the Flora and Fauna Management Plan, I am happy to commit to your suggested wording. To confirm I propose to include the following bullet point underneath the bullet point you have highlighted in blue below:

"The visibility of the chain-link fence will be increased by the use of one of the alternatives in Table 3 of the and the visibility of the barbed wire section by replacing the top strand(s) with the options in Table 5 (respectively) of the Biosis Pty Ltd Report (November 2013)"

Please let me know whether this provides you with sufficient detail on this matter.

Thanks, Steph

From: Terry Mazzer [mailto:Terry.Mazzer@environment.nsw.gov.au]
Sent: Wednesday, November 13, 2013 3:09 PM
To: Steph Froggatt
Subject: RE: Nyngan Flora and Fauna Management Plan

Dear Stephanie

I'm just seeking some clarification regarding making the perimeter fencing more visible. The second last dot point in section 6.2.8 of the CEMP-F states that:

The mitigation measure(s) adopted for the fence will be in line with the options outlined in *Nyngan Solar Farm – Advice* on Options to Mitigate Impacts of Fencing (Biosis Pty Ltd, November 2013) (see **Attachment F01** attached).

This leaves me unsure of what will actually be done. Does this mean that you have not yet made a decision regarding the optimal method(s) to be employed? If this is the case could you clarify this as much as possible. For example the dot point above could be followed by something like "The visibility of the chain-link fence will be increased by the use of one of the alternatives in Table 3 and the visibility of the barbed wire section by replacing the top strand(s) with the options in Table 5" (Or are you still looking at the options in Table 4?). Something like this would make the final outcome more apparent.

Thanks Terry

Terry Mazzer Conservation Planning Officer Regional Operations, North West Office of Environment and Heritage NSW Department of Premier and Cabinet 48-52 Wingewarra St (PO Box 2111) Dubbo NSW 2830 T: 6883 5302 F: 6884 8675 W: <u>www.environment.nsw.gov.au</u>

I work part-time: Monday to Thursday

From: Steph Froggatt [mailto:Steph.Froggatt@FIRSTSOLAR.COM]
Sent: Wednesday, 13 November 2013 9:12 AM
To: Mazzer Terry
Cc: Julie Stiglish
Subject: Nyngan Flora and Fauna Management Plan

Hi Terry,

Further to our phone call yesterday, please find the following document attached:

1. First Solar Nyngan Construction Flora and Fauna Management Plan

The attached plan forms Appendix CEMP-F of the First Solar CEMP for Nyngan. I will send the figures for the attached plan through in a separate email shortly.

As discussed, I have highlighted the sections that we updated subsequent to your initial comments (letter dated 24/10/13). These areas are presented in blue writing in the attached. We have sought to address the permeter fence in more detail. The advice from our ecologist is included as Attachment F01 in the attached plan.

If you were able to review the attached and provide any additional comments or confirmation that the plan meets the expectations of the OEH by the end of this week (as per our discussion) that would be greatly appreciated.

Please feel free to contact me should you have any questions regarding the attached.

Kind regards, Steph Froggatt

Environmental / Approvals Manager First Solar Australia L3 16 Spring St Sydney, NSW 2000 Australia

Ph: +61 2 9002 7711 Mbl: +61 408 471 150



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From: Sent: To: Cc: Subject: Steph Froggatt Friday, November 15, 2013 2:37 PM 'Terry Mazzer' Liz Mazzer RE: Nyngan Flora and Fauna Management Plan

Hi Terry,

Thanks for your response and expediency undertaking this additional review of our plan.

Kind regards, Steph

From: Terry Mazzer [mailto:Terry.Mazzer@environment.nsw.gov.au]
Sent: Friday, November 15, 2013 2:25 PM
To: Steph Froggatt
Cc: Liz Mazzer
Subject: RE: Nyngan Flora and Fauna Management Plan

Hi Stephanie

OEH's response attached. Basically we're happy with the measures in the FFMP.

I'm away all next week doing Biobanking training in Sydney but if you have any further questions/issues next week please contact this office.

Terry Mazzer Conservation Planning Officer Regional Operations, North West Office of Environment and Heritage NSW Department of Premier and Cabinet 48-52 Wingewarra St (PO Box 2111) Dubbo NSW 2830 T: 6883 5302 F: 6884 8675 W: <u>www.environment.nsw.gov.au</u> I work part-time: Monday to Thursday

From: Steph Froggatt [mailto:Steph.Froggatt@FIRSTSOLAR.COM] Sent: Wednesday, 13 November 2013 5:05 PM To: Mazzer Terry Subject: RE: Nyngan Flora and Fauna Management Plan

Hi Terry,

At this time we have not completely settled on a mitigation measure. This is primarily due to:

- 1. Needing more time to understand more fully the mitigation options available, including further research in to the options and their availability / practicality in the numbers we will need for the perimeter security fence.
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need to be satisfied that the mitigation measure will meet mitigation requirements in to the Operational Phase of the project as the fence is a 'permanent' feature of the project site (i.e. for the life of the project). Ongoing mitigation measures for the fence would be included by AGL in the Operational Environmental Management Plan (required by Condition C4 of the Development Consent).

To confirm, fauna mitigation is proposed to be installed on the perimeter security fence at the same time that the fence itself is installed. It is First Solar's intention to adopt one of the mitigation measures outlined in *Nyngan Solar Farm* – *Advice on Options to Mitigate Impacts of Fencing* document with ongoing consultation with our ecologist (as required). The effectiveness of the mitigation will be monitored during the fence collision monitoring programme throughout the Construction Phase by First Solar. Ongoing monitoring beyond the Construction Phase will fall under AGL's Operational Environmental Management Plan.

With respect to wording for the Flora and Fauna Management Plan, I am happy to commit to your suggested wording. To confirm I propose to include the following bullet point underneath the bullet point you have highlighted in blue below:

"The visibility of the chain-link fence will be increased by the use of one of the alternatives in Table 3 of the and the visibility of the barbed wire section by replacing the top strand(s) with the options in Table 5 (respectively) of the Biosis Pty Ltd Report (November 2013)"

Please let me know whether this provides you with sufficient detail on this matter.

Thanks, Steph

From: Terry Mazzer [mailto:Terry.Mazzer@environment.nsw.gov.au] Sent: Wednesday, November 13, 2013 3:09 PM To: Steph Froggatt Subject: RE: Nyngan Flora and Fauna Management Plan

Dear Stephanie

I'm just seeking some clarification regarding making the perimeter fencing more visible. The second last dot point in section 6.2.8 of the CEMP-F states that:

The mitigation measure(s) adopted for the fence will be in line with the options outlined in *Nyngan Solar Farm – Advice* on Options to Mitigate Impacts of Fencing (Biosis Pty Ltd, November 2013) (see **Attachment F01** attached).

This leaves me unsure of what will actually be done. Does this mean that you have not yet made a decision regarding the optimal method(s) to be employed? If this is the case could you clarify this as much as possible. For example the dot point above could be followed by something like "The visibility of the chain-link fence will be increased by the use of one of the alternatives in Table 3 and the visibility of the barbed wire section by replacing the top strand(s) with the options in Table 5" (Or are you still looking at the options in Table 4?). Something like this would make the final outcome more apparent.

Thanks Terry

Terry Mazzer Conservation Planning Officer Regional Operations, North West Office of Environment and Heritage NSW Department of Premier and Cabinet 48-52 Wingewarra St (PO Box 2111) Dubbo NSW 2830 T: 6883 5302 F: 6884 8675 W: <u>www.environment.nsw.gov.au</u>

I work part-time: Monday to Thursday

From: Steph Froggatt [mailto:Steph.Froggatt@FIRSTSOLAR.COM]
Sent: Wednesday, 13 November 2013 9:12 AM
To: Mazzer Terry
Cc: Julie Stiglish
Subject: Nyngan Flora and Fauna Management Plan

Hi Terry,

Further to our phone call yesterday, please find the following document attached:

1. First Solar Nyngan Construction Flora and Fauna Management Plan

The attached plan forms Appendix CEMP-F of the First Solar CEMP for Nyngan. I will send the figures for the attached plan through in a separate email shortly.

As discussed, I have highlighted the sections that we updated subsequent to your initial comments (letter dated 24/10/13). These areas are presented in blue writing in the attached. We have sought to address the permeter fence in more detail. The advice from our ecologist is included as Attachment F01 in the attached plan.

If you were able to review the attached and provide any additional comments or confirmation that the plan meets the expectations of the OEH by the end of this week (as per our discussion) that would be greatly appreciated.

Please feel free to contact me should you have any questions regarding the attached.

Kind regards, Steph Froggatt

Environmental / Approvals Manager First Solar Australia L3 16 Spring St Sydney, NSW 2000 Australia

Ph: +61 2 9002 7711 Mbl: +61 408 471 150



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Your reference: Our reference: Contact: CEMP-F 12NOV13 DOC13/82661 Terry Mazzer 02 6883 5302

Stephanie Froggatt Environmental / Approvals Manager First Solar Australia L3 16 Spring St Sydney, NSW 2000 Australia

15 November 2013

Dear Ms Froggatt

#### RE: CEMP-F Construction Flora and Fauna Management Plan for Nyngan Solar PV Power Station

I refer to your email of the 13<sup>th</sup> November 2013 seeking comment from the Office and Environment and Heritage (OEH) on the revised Flora and Fauna Management Plan (FFMP) for the Nyngan Solar Plant Project. This FFMP has been revised in response to comments from OEH in a letter dated 24<sup>th</sup> October 2013.

OEH has reviewed the FFMP and is satisfied that the advice provided in our letter has been incorporated in the revision of the plan. The only outstanding issue was the clarification of options to increase the visibility of the perimeter fence and in your email dated 13<sup>th</sup> November 2013 you committed to inserting the following dot point into section 6.2.8 Perimeter Fence:

"The visibility of the chain-link fence will be increased by the use of one of the alternatives in Table 3, and the visibility of the barbed wire section by replacing the top strand(s) with the options in Table 5 (respectively) of the Biosis Pty Ltd Report (November 2013)."

OEH would like to thank First Solar for their cooperation in the production of this FFMP. Should you require further information regarding these matters please contact Terry Mazzer, Conservation Planning Officer on (02) 6883 5302 or email <u>terry.mazzer@environment.nsw.gov.au</u>.

Yours sincerely

SONYA ARDILL Senior Team Leader Planning North West Region

> PO Box 2111 Dubbo NSW 2830 Level 1 48-52 Wingewarra Street Dubbo NSW Tel: (02) 6883 5330 Fax: (02) 6884 8675 ABN 30 841 387 271 www.environment.nsw.gov.au

| From:        | Steph Froggatt  |  |
|--------------|---|--|
| Sent:        | Monday, December 02, 2013 7:19 AM                         |  |
| То:          | 'Terry Mazzer'  |  |
| Cc:          | Julie Stiglish  |  |
| Subject:     | RE: Nyngan Flora and Fauna Management Plan                |  |
| Attachments: | CEMP-F Flora and Fauna Management Plan Attachment F01.pdf |  |

Hi Terry,

On review the final draft of the CEMP late last week I noted that the tables referenced in the OEH response (dated 15 November 2013), and during our discussions on the First Solar CEMP for the Nyngan Solar PV Power Station, were incorrect.

The wording we had agreed on (as outlined in the response from the OEH) was the following:

"The visibility of the chain-link fence will be increased by the use of one of the alternatives in Table 3, and the visibility of the barbed wire section by replacing the top strand(s) with the options in Table 5 (respectively) of the Biosis Pty Ltd Report (November 2013)."

I note that this should have read **Table 4** not Table 5.

I apologise for not picking this up at the time of our discussion.

To confirm, as outlined in Section 3.2.7 of the Nyngan Solar PV Power Station EIS and within Section 6.2.8 of the First Solar Construction Flora and Fauna Management Plan, the perimeter fence will be constructed in accordance with AS1725 (Appendix K) and will be indicatively 1.8m (6ft) in height and have three strands of barbed wire at the top. To address the potential impacts on avifauna and glider species, First Solar is committing to place fauna mitigation on the fence. First Solar commissioned the Biosis Report (Attachment F01 of the Construction Flora and Fauna Management Plan – attached to this email for your information) to identify mitigation options for the perimeter fence.

Table 3 of the Biosis Report identifies alternative options to the heavy duty fabric (as identified in Mitigation Measure 13 of the Nyngan Submissions Report) for the lower chain-link portion of the fence.

**Table 4** of the Biosis Report identifies alternative options to barbed wire.

Please note that it is not proposed to replace the top strand of barbed wire. The purpose of the fence is to provide security for the power station site. Noting this, First Solar is currently investigating different options for improving the visibility of the barbed wire fencing (option 4 from **Table 4** of the Biosis Report). The options outlined within **Table 4** include the following:

Improving the visibility of barbed wireMarking barbed wire with a visual deterrent to increase it's visibility and make it easier for avifauna to<br/>avoid. Some examples include:

- Using shade cloth to increase the visibility of the fence to parrots (as per Ptennigwerth, 2008).
- All-nylon highly visible sighter wire is nylon tape that is intended to increase the visibility of babe effective, albeit is relatively costly (Booth 2007).
- Stringing electric fence tape above the top strand of barbed wire (LFW, 2011).
- Attach reflective materials such as metal tags along the top wire (LFW, 2011).

First Solar will be working with the fencing sub-contractor to identify an effective mitigation measure prior to the commencement of the construction of the fencing around the site. Once this mitigation has been identified First Solar will confirm the details of the mitigation through to the OEH for its information.

The collision monitoring outlined within the First Solar Construction Flora and Fauna Management Plan remains unchanged from that proposed within the document.

Please let me know if you wish to discuss this further.

Kind regards, Steph Froggatt

Environmental / Approvals Manager First Solar Australia L3 16 Spring St Sydney, NSW 2000 Australia

Ph: +61 2 9002 7711 Mbl: +61 408 471 150



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To: Mazzer Terry
Cc: Julie Stiglish
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Please feel free to contact me should you have any questions regarding the attached.

Kind regards, Steph Froggatt

Environmental / Approvals Manager First Solar Australia L3 16 Spring St Sydney, NSW 2000 Australia

Ph: +61 2 9002 7711

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NSW Office of Water (NOW)

| From:        | Steph Froggatt   |                               |  |
|--------------|--|-------------------------------|--|
| Sent:        | Friday, November 08, 2013 11:17 AM   |                               |  |
| То:          | 'tim.baker@water.nsw.au'   |                               |  |
| Cc:          | Julie Stiglish   |                               |  |
| Subject:     | Nyngan - soil and water management plan  |                               |  |
| Attachments: | CEMP-E_Soil and Water Management Plan_Rev D.pdf; CEMP-D_Weekly Site<br>Inspections.pdf; First Solar SWMP document review |                               |  |
| Tracking:    | Recipient  | Delivery                      |  |
|              | 'tim.baker@water.nsw.au'   |                               |  |
|              | Julie Stiglish   | Delivered: 11/8/2013 11:17 AM |  |

Hi Tim,

Thank you for your time earlier.

As discussed, First Solar has developed a Soil and Water Management Plan for the Nyngan solar farm. The First Solar Soil and Water Management Plan forms an appendix of the First Solar CEMP for this project.

Further to our discussion, please find the following documents attached:

- 1. Soil and Water Management Plan (appendix CEMP-E of the First Solar CEMP)
- 2. Weekly Site Inspections (appendix CEMP-D of the First Solar CEMP)

Both documents form the Soil and Water Management Plan for the Nyngan solar farm.

This attached Soil and Water Management Plan has been developed by First Solar in conjunction with Geolyse. As discussed, to ensure compliance with Condition B9 (Blue Book) First Solar also engaged Beca to undertake a peer review of the document to ensure compliance with this condition. The Beca review has been attached for your information.

It would be great if you could please review the attached documents and provide any comments back through to me. First Solar is committed to environmental compliance and your review/input would be greatly appreciated.

If you have any questions or you require any additional information to assist your review of the attached please feel free to contact me.

Kind regards, Steph Froggatt

Environmental / Approvals Manager First Solar Australia L3 16 Spring St Sydney, NSW 2000 Australia

Ph: +61 2 9002 7711 Mbl: +61 408 471 150


### **Steph Froggatt**

From:Steph FroggattSent:Thursday, November 21, 2013 1:28 PMTo:'Tim Baker'Subject:RE: Nyngan Solar PV Power Station - Whitbarrow Creek

Okay, cool – no probs.

Thanks, Steph

From: Tim Baker [mailto:Tim.Baker@water.nsw.gov.au] Sent: Thursday, November 21, 2013 2:27 PM To: Steph Froggatt Subject: Re: Nyngan Solar PV Power Station - Whitbarrow Creek

Thanks Steph,

That's enough to answer my question.

Regards Tim

>>> Steph Froggatt <<u>Steph.Froggatt@FIRSTSOLAR.COM</u>> 11/21/2013 10:19 am >>> Hi Tim,

Sorry I missed your call yesterday afternoon.

Noting the details of your message, I have undertaken some further investigation in to the risk of flooding from Whitbarrow Creek.

To confirm, a levee bank is not currently proposed for the Nyngan site. During the planning process for the Development Consent, it appears that the risk of flooding was deemed sufficiently low that a levee bank has not been required by either the Development Consent Conditions or the Mitigation Measures (as defined in the Nyngan Submissions Report).

During the development of the EIS, SKM were engaged to undertake a Hydrology Assessment for the Nyngan Solar PV Power Station site. Key observations from this report include:

- ? The SKM Hydrology Report details flooding risk at the following watercourses (based on a 100 year ARI)
  - Bogan River
  - Whitbarrow Creek
- ? The site will not be prone to flooding from the Bogan River during either a 100 or 200 year ARI.
- ? The site may be subject to flooding during a 100 ARI flood from Whitbarrow Creek. Flooding would be concentrated on the eastern (lower) part of the site (in the direction of Whitbarrow Creek).
- ? There are no stream-flow meters within Whitbarrow Creek. The modeling by SKM was undertaken using conservative estimates of flooding risk.

- ? There is no evidence of prolonged inundation of flooding on the site. This observation is supported by the landowner and more recently by the Bogan Shire Council during discussions with First Solar. The current site was selected by AGL (over two other sites in the area) due to its low risk of flooding.
- ? SKM have conservatively modeled an approximately 60% flood coverage of the site in a 100 ARI. The depth of the water would be 0.3m (or less) and have a slow moving velocity of 0.2m/s.

Noting the above, the only Development Consent Condition relevant to the works of First Solar (within the footprint of the power station) requires the following:

B1. Unless otherwise approved by the Director-General, the location of Ancillary Facilities shall: (j) be above the 20 ARI flood level unless a contingency plan to manage flooding is prepared and implemented.

As part of the design process, First Solar has located Ancillary Facilities for the site on the North-Western corner of the site. Figure 6.2 *Inundation zones at solar plant site* of the EIS identifies that the location of the Ancillary Facilities will not be subject to flooding during a 100 ARI flood. Based on the modeling of SKM, First Solar have met the requirement of this condition.

With respect to the solar PV arrays themselves during flooding, the height of flooding predicted by SKM would put the level of water below that of the constructed solar PV arrays.

The EIS identifies that sections of the Transmission Route may be subject to flooding. The Transmission Line is being constructed by a separate EPC Contractor reporting to AGL.

Based on my assessment of the SKM Report and the EIS, First Solar is satisfied that the risk of flooding is sufficiently low not to require the construction of a levee bank along the eastern and southern edges of the site. Our position is consistent with the EIS assessment of the flooding risk from Whitbarrow Creek.

Please feel free to ring me to discuss.

Kind regards, Steph Froggatt

Environmental / Approvals Manager First Solar Australia L3 16 Spring St Sydney, NSW 2000 Australia

Ph: +61 2 9002 7711 Mbl: +61 408 471 150





Steph Frogatt First Solar Australia Level 3, 16 Spring Street SYDNEY NSW 2000 ContactTim BakerPhone02 6841 7403Mobile0428 162 097Fax02 6884 0096EmailTim.Baker@water.nsw.gov.au

Our ref ER21946

Dear Steph

### NYNGAN SOLAR PLANT – CEMP - SOIL AND WATER MANAGEMENT PLAN

I refer to your email dated the 8<sup>th</sup> November 2013 requesting comments from the NSW Office of Water in relation to the draft Soil and Water Management Plan for the Nyngan Solar Plant Project. It is recognised this request is in accordance with Schedule 2, Part C, Condition C2 of Project Approval SSD-5355. The NSW Office of Water has reviewed the document and a supporting email dated 21 November 2013, and deems it satisfactory based on the following comments:

- Soil and water management measures are to be consistent with the guideline "*Managing Urban Stormwater: Soils and Construction* (Landcom 2004)".
- There is no proposal for levee banks or diversion structures to mitigate potential flood flows from Whitbarrow Creek. Construction of such works would require consideration of approval and assessment requirements under Part 8 of the *Water Act 1912*. It is understood a flood event with a 100yr ARI from Whitbarrow Creek is predicted to inundate approximately 60% of the site to a maximum depth of 30cm and velocity of 0.2m/s. These flows are proposed to traverse between the proposed solar infrastructure (posts supporting the panels) and the perimeter security fencing. Due to the potential for debris build up during a flood event and resulting alteration of flood paths, it is recommended a maintenance program be included to remove flood debris as required.

Should you have any further queries in relation to this submission please do not hesitate to contact Tim Baker on (02) 6841 7403.

Yours sincerely

Mitchell Isaacs Manager Strategic Stakeholder Liaison 26 November 2013

NSW Roads and Maritime Services (RMS)



WST12/00103/08

Ms Samantha Coras Project Development Engineer First Solar Australia Level 3/16 Spring Street SYDNEY NSW 2000

Dear Ms Coras

### SSD5355: Nyngan Solar Power Plant Project Transport Management Plan

Thank you for your email on 13 September 2013 seeking an adequacy review of the Transport Management Plan (TMP) prepared by Geolyse dated September 2013.

Roads and Maritime Services has reviewed the TMP and is satisfied that it addresses Clause C3 Section E of State Significant Development Consent No.5355.

Clause B29 of SSD5355 requires the intersection of the site access road and the Barrier Highway to be upgraded to the satisfaction of Roads and Maritime prior to the commencement of construction works. Following review of the TMP, the intersection treatment is required to include the following:

 Rural Channelised T-junction – [CHR] is to be provided in accordance with Figure 7.7 of Austroads Guide to Road Design 2010 - Part 4A: Unsignalised and Signalised Intersections and Roads and Maritime Supplements.

Note: The storage length of the protected right turn lane will need to accommodate the combine storage length of a 36.5 metre long road train and a standard passenger sedan;

- Rural Auxiliary Left Turn Treatment Short Turn Lane [AUL(S)] is to be provided in accordance with Figure 8.3 of Austroads Guide to Road Design 2010 – Part 4A: Unsignalised and Signalised Intersections and Roads and Maritime Supplements;
- An acceleration lane shall be provided adjacent to the eastbound travel lane in the Barrier Highway in accordance with Section 5 of Austroads Guide to Road Design 2010 - Part 4A: Unsignalised and Signalised Intersections and Roads and Maritime Supplements. The acceleration lane shall commence at the Solar Plant access to the Barrier Highway and provide sufficient length for a 36.5 metre eastbound road train to accelerate to a speed no less than 70km/h;
- A 3 metre wide shoulder seal shall be provided adjacent to the west bound travel lane in the Barrier Highway. The shoulder seal shall be provided from the intersection of the access road to the Barrier Highway, match the existing highway pavement and be of a length which matches the distance required for a 36.5 metre road train to exit the solar plant site heading west and accelerate to a speed no less than 70km/h;

Roads and Maritime Services

 The width of the access road at the approach and connection to the Barrier Highway shall be wide enough to accommodate the simultaneous passing of turning road train vehicles. The access road shall be sealed a minimum of 40 metres from the edge of hold line;

As previously advised, the Barrier Highway is a state road and the developer will be required to undertake private financing and construction of works on a road in which Roads and Maritime has a statutory interest. A formal agreement in the form of a Works Authorisation Deed (WAD) is required between the developer and Roads and Maritime prior to works commencing. A WAD Information Pack will be sent to AGL shortly to begin this process. Further, a Road Occupancy Licence is required prior to any works commencing within 3 metres of the travel lanes in the Barrier Highway. To obtain a licence you will need to contact the Traffic Operations Manager on (02) 6861 1686.

Should you require further information please contact Andrew McIntyre on (02) 6861 1453.

Yours faithfully

Tony Hendry

23/9/13

Road Safety & Traffic Manager Western

cc The Manager Infrastructure Projects NSW Department of Planning & Infrastructure GPO Box 39 SYDNEY NSW 2001 NSW Rural Fire Service (RFS)

### **RURAL FIRE SERVICE – CONSULTATION**

From: Andrew Brownlow [mailto:abrownlow@geolyse.com]
Sent: Monday, 30 September 2013 7:46 AM
To: 'Greg Sim'
Cc: 'Orange Document Control'; 'Samantha Coras'; 'Gavin Randall'
Subject: 213225 - Bush Fire Management Plan (RFS Sign-Off - Nyngan Solar Project)

### Greg

Thanks for looking at this so quickly – we (and First Solar) appreciate the sign-off. In addition to the below comment on contact details (which we will include in an up-dated version of the plan), we have also added a couple of more things.

- 1) Confirmation that the RFS will be provided with a set of site access keys.
- 2) Detail on the location of the site (and surrounding) static water points (farm dams) for tanker access.
- 3) Confirmation that a set of plans will be provided on completion of design and post construction, showing the location of access gates.

I will forward a copy of the up-dated plan for your records and again, thanks for the assistance, and hope you have a quiet uneventful season.

Andrew

### **Andrew Brownlow**

Project Manager CEnvP Geolyse Pty Ltd 154 Peisley St PO Box 1963 Orange NSW 2800 Ph: 02 6393 5000

.....

From: Greg Sim [mailto:Greg.Sim@rfs.nsw.gov.au]
Sent: Sunday, 29 September 2013 6:51 PM
To: 'Andrew Brownlow'
Subject: RE: 213225 - Bush Fire Management Plan (Nyngan Solar Project)

Hi Andrew

Sorry for the delay, I had one of my staff members look over the document as well. We are both happy with the content and would be happy for you to implement that plan.

The only changes that need to be made are to my contact details.

### Currently you have this

Operations Manager Mr Greg Sim Phone: 02 68224422 Mobile: 0428 253 224 E-mail: <u>greg.sim@rfs.nsw.gov.au</u> After Hours Duty Officer Phone: 02 68 ???????

#### Could you please change to this

Zone Manager North West Zone Inspector Greg Sim Phone: 02 682 24422 Mobile: 0428 253 224 E-mail: greg.sim@rfs.nsw.gov.au Please call 000 for all emergencies

I am happy to discuss with you if there is anything further that you require.

Regards Greg Sim Zone Manager North West

From: Andrew Brownlow [mailto:abrownlow@geolyse.com]
Sent: Tuesday, 10 September 2013 1:06 PM
To: Greg Sim
Cc: 'Orange Document Control'; 'Gavin Randall'
Subject: 213225 - Bush Fire Management Plan (Nyngan Solar Project)

Rural Fire Service North West Region Zone Manager Mr Greg Sim

Greg

Nice to talk and thanks for your time.

As discussed, there was a requirement in the Minister's consent conditions for the Nyngan Solar Farm project approval to prepare a Construction Environmental Management Plan (CEMP). Two CEMPs are being prepared for the project. One for the farm infrastructure and the other for the grid connection. Geolyse has been engaged to prepare the CEMP for the former. To this end we have prepared the following as a sub-plan that will form part of the CEMP. The focus has been to concentrate on requirements related to construction. The intent is for the sub-plan to be understood and applied by all contractors and sub-contractors who undertake any works on the farm. Would you mind having a look at the attached and let me know whether you have any comment.

With thanks and regards

Andrew

#### **Andrew Brownlow**

Project Manager CEnvP Geolyse Pty Ltd 154 Peisley St PO Box 1963 Orange NSW 2800 Ph: 02 6393 5000

### **Steph Froggatt**

| From:        | Steph Froggatt                        |
|--------------|---------------------------------------|
| Sent:        | Friday, November 08, 2013 11:35 AM    |
| То:          | 'Greg Sim'                            |
| Cc:          | Julie Stiglish                        |
| Subject:     | First Solar bush fire management plan |
| Attachments: | CEMP-M Bushfire Management Plan.pdf   |

Good morning Greg,

My name is Steph Froggatt and I am the new Environmental / Approvals Manager at First Solar.

As correctly identified by Andrew Brownlow in his earlier email, First Solar are now finalising the Construction Environmental Management Plan ('CEMP', of which the Bush Fire Management Plan forms part) in house.

I yesterday finalised the Bush Fire Management Plan for transmittal to our client (AGL). I have attached a copy of the finalised document for your information.

You may notice that the plan does differ slightly to the plan that formed the basis of our initial consultation with you. The key differences are as follows:

- 1. The document has been moved in to a First Solar template to ensure consistency with the other parts of the CEMP
- 2. I have strengthened the wording and added additional clarification to the First Solar commitments within the document

To confirm, First Solar remains fully committed to addressing / mitigating bush fire risk at the Nyngan site. Further, we remain committed to ongoing consultation with the NSW Rural Fire Service.

In accordance with Section 3.1.8 *Access* in the attached management plan, once detailed design has been completed First Solar will be in a position to send through a final site plan identifying the access points to the Nyngan site. This plan should be available shortly.

Please feel free to contact me should you require any additional information.

Kind regards, Steph Froggatt

Environmental / Approvals Manager First Solar Australia L3 16 Spring St Sydney, NSW 2000 Australia

Ph: +61 2 9002 7711 Mbl: +61 408 471 150



### **Steph Froggatt**

From: Sent: To: Cc: Subject: Steph Froggatt Tuesday, December 03, 2013 1:31 PM 'Greg Sim' Julie Stiglish RE: Nyngan Solar PV Power Station

Hi Greg,

Thanks for your email.

Yes, I can confirm in terms of sequencing one of the first things will be doing is constructing the road around the outside of the site for both access and fire break purposes. This is in recognition, as you have identified, of the time of year that we are looking to commence works at the site.

If you could get me a letter that would be great. We are due to present to the CEMP (including the Bush Fire Management Plan) through to the Dept of Planning on Thursday.

Thanks, Steph

From: Greg Sim [mailto:Greg.Sim@rfs.nsw.gov.au] Sent: Tuesday, December 03, 2013 1:28 PM To: Steph Froggatt Subject: RE: Nyngan Solar PV Power Station

Hi Steph

I have received your email and sorry for the delayed response. I am seeking clarification from our Developments section of Head Office on a couple of items. I will get back to you with a letter as soon as possible.

On another note during the meeting held in Dubbo it came up that you were planning to construct a 8 – 10m road around the perimeter of the site. Is that something that can be completed in the initial stages of development? It will provided a significant fire break for fires either entering your site, or escaping from you site. Given that constructing is scheduled to begin during the Bush Fire Danger Period it would be advisable to have this protection in place prior to or at the start of the construction phase.

Regards



Greg Sim Manager North West NSW Rural Fire Service Coonamble FCC | Lot 3 Buckley Drive Coonamble NSW 2829 Mail | PO Box 370 Coonamble NSW 2829 m 0428 253 224 | p 02 6822 4422 | f 02 6822 4203 | email: greg.sim@rfs.nsw.gov.au

PREPARE. ACT. SURVIVE.

From: Steph Froggatt [mailto:Steph.Froggatt@FIRSTSOLAR.COM] Sent: Friday, November 22, 2013 2:46 PM To: Greg Sim Subject: Nyngan Solar PV Power Station

Hi Greg,

Further to the consultation that was undertaken between Geolyse (on behalf of First Solar) and yourself, I was wondering whether it would be possible for you to confirm by way of letter that you are happy with the measures outlined within the First Solar Bush Fire Management Plan.

At present we have an email between yourself and Andrew Brownlow at Geolyse. We are required by the Development Consent to include confirmation of consultation – it would be great if you could please provide me with a letter from the RFS for inclusion (in place of the attached email).

The Bush Fire Management Plan remains unchanged from the version I sent you on the 8<sup>th</sup> of November 2013.

It was nice to meet you the other day and put a name to a face.

Kind regards, Steph

Environmental / Approvals Manager First Solar Australia L3 16 Spring St Sydney, NSW 2000 Australia

Ph: +61 2 9002 7711 Mbl: +61 408 471 150



**RFS** Disclaimer:

This email message is intended only for the addressee(s) and contains information which may be confidential. If you are not the intended recipient, please notify the sender and delete this email and any copies or links to this email completely and immediately from your system. Views expressed in this message are those of the individual sender, and are not necessarily the views of the NSW Rural Fire Service.



### SMP: 01 First Solar Health (Australia), Safety & Environmental Policy

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 ENIVRONMENTAL operational excellence, waste minimization, resource conservation and a world-class recycling program;
- Comply with all applicable laws, regulations and statutory obligations;
- Proactively identify and control HEALTH, SAFETY AND ENIVRONMENTAL 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.

18-07-2013

Endorsed By: Jack Curtis, Vice President APAC

.

SMP:01 Australian HSE Policy, Objectives & Targets. Rev 1 Issue Date: July 2013 Review Date: July 2014

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## CEMP-A Environmental Risk Register

| umber | Project Phase | Risk                        | Cause  | Effect/Impact                                |    | Und       | control | lled Risk R      | ating |        | Recommended Controls   | Responsible Person<br>First Solar | Related Documents   |
|-------|---------------|-----------------------------|--|--|----|-----------|---------|------------------|-------|--------|--|-----------------------------------|---|
| ž     |               |                             |  |  | Co | nsequence | Li      | ikelihood        |       | Rating |  |                                   |   |
| 1     | All Phases    | Increased traffic movements | Vehicle and equipment movement<br>Construction personnel movement  | Road congestion                              | 1  | Minor     | L       | Likely           | 1L    | Medium | Scheduling from First Solar logistics<br>First Solar Non-inducted Delivery<br>Driver Procedure<br>Dedicated personnel bus scheduling                                     | Site Environmental Advisor        | CEMP-O<br>Construction Traffic Management<br>Plan   |
| 2     | All Phases    | Increased traffic movements | Vehicle and equipment movement<br>Construction personnel movement  | Vehicle collisions                           | 2  | Moderate  | U       | Unlikely         | 2U    | Medium | Fatigue management via First Solar<br>logistics  | Site Environmental Advisor        | CEMP-O<br>Construction Traffic Management<br>Plan   |
| 3     | All Phases    | Increased traffic movements | Vehicle and equipment movement<br>Construction personnel movement  | Animal collisions                            | 1  | Minor     | U       | Unlikely         | 1U    | Low    | Scheduling from First Solar logistics<br>Dedicated personnel bus scheduling<br>Driver fauna interaction awareness<br>(H&S induction)                                     | Site Environmental Advisor        | CEMP-O<br>Construction Traffic Management<br>Plan   |
| 4     | All Phases    | Noise                       | Vehicle and equipment movement<br>Construction personnel movement  | Impact on local noise amenity                | 2  | Moderate  | L       | Likely           | 2L    | Medium | WEAC Training (CEMP-S)<br>Scheduling of onsite activities  | Site Environmental Advisor        | CEMP-L<br>Construction Noise Management<br>Plan   |
| 5     | All Phases    | Dust generation             | Vehicle and equipment movement<br>Construction personnel movement  | Short term impact on local air quality       | 3  | Major     | L       | Likely           | 3L    | High   | Dust carts<br>Use of dust palliatives<br>WEAC Training<br>Ground cover management  | Site Environmental Advisor        | CEMP-N<br>Air Quality Management Plan<br>CEMP-E<br>Soil and Water Management Plan<br>CEMP-1<br>Ground Cover Management Plan |
| 6     | All Phases    | Soil and water movement     | Inappropriate or lack of ESCP measures<br>Lack of ESCP maintenance | Water pollution<br>Movement of soil off-site | 2  | Moderate  | U       | Unlikely         | 2U    | Medium | Erosion and sediment control<br>installation in accordance design<br>Ground cover management   | Site Environmental Advisor        | CEMP-E<br>Soli and Water Management Plan<br>CEMP-D<br>Weekly Site Inspection<br>CEMP-I Ground Cover Management<br>Plan      |
| 7     | All Phases    | Lack of water               | No water for dust supression pond<br>No agreement for water access | Potential dust generation                    | 3  | Major     | VU      | Very<br>Unlikely | 3VU   | Medium | Early identification of water<br>source(s).<br>Identify water source with security of<br>supply<br>Secure necessary water agreements<br>prior to construction commencing | Site Environmental Advisor        | CEMP-N<br>Air Quality Management Plan<br>CEMP-E<br>Soil and Water Management Plan   |
| 8     | All Phases    | Spreading of weeds          | Construction vehicle movement<br>Soil/vegetation movement          | Spreading of weeds                           | 2  | Moderate  | U       | Unlikely         | 2U    | Medium | Pre-construction weed spraying<br>Vehicle weed hygiene controls at<br>upon entry to site<br>WEAC Training  | Site Environmental Advisor        | CEMP-I<br>Ground Cover Management Plan<br>CEMP-D<br>Weekly Site Inspection  |

| 9  | All Phases       | Air emissions               | Vehicle and equipment movement<br>Poor machinery maintenance   | Local air quality impacts  | 1 | Minor    | U | Unlikely | 1U | Low    | WEAC Training<br>H&S Plant Acceptance Procedure  | Site Environmental Advisor              | CEMP-N<br>Air Quality Management Plan   |
|----|------------------|-----------------------------|--|--|---|----------|---|----------|----|--------|--|---|---|
| 10 | All Phases       | Litter generation           | Lack of bins<br>Too infrequent bin removal<br>Lack of compliance by site personnel                           | Local amenity impacts  | 1 | Minor    | U | Unlikely | 1U | Low    | Engagement of a regular bin<br>collection service<br>Monitoring of onsite waste<br>generation, maximise recycling and<br>reuse where possible<br>WEAC Training | Site Environmental Advisor              | CEMP-U<br>Waste Management Plan   |
| 11 | All Phases       | Spills                      | Refueling of vehicles, plant, machinery<br>Refueling of generators<br>Chemical storage                       | Surface water pollution<br>Soil contamination                              | 2 | Moderate | U | Unlikely | 2U | Medium | Storage in accordance with AS1940<br>Onsite spill kits   | Safety Manager<br>Environmental Advisor | CEMP-V<br>Dangerous Goods and Spill<br>Response                                     |
| 12 | All Phases       | Cumulative impacts          | Other major development(s) occur in the region   | Additional road congestion<br>Lack of resources                            | 1 | Minor    | U | Unlikely | 1U | Low    | Monitor the progress of other local<br>developments<br>Consultation with other developers<br>Scheduling of vehicle movements<br>(First Solar Logistics)        | Project Manager                         | CEMP-B<br>Environmental Management<br>Activities                                    |
| 13 | All Phases       | Non compliance with CEMP    | Lack of personnel training   | Non compliance with CEMP<br>Possible environmental impact                  | 3 | Major    | U | Unlikely | 3U | Medium | Record site inductions   | Site Environmental Advisor              | CEMP-S<br>WEAC Training   |
| 14 | Site Preparation | Aboriginal heritage impacts | Excessive clearing/site works<br>Not adhering to management plan   | Impacts on Aboriginal heritage   | 3 | Major    | U | Unlikely | 3U | Medium | Site surveying undertaken prior to<br>site civil works<br>Bunting and demarcation of non<br>disturbed areas<br>WEAC Training                                   | Site Environmental Advisor              | CEMP-J<br>Aboriginal Heritage Plan<br>CEMP-Q<br>Incident Management Protocol        |
| 15 | Site Preparation | Flora and fauna impacts     | Excessive clearing/site works<br>Undertaking clearing works at wrong time<br>Not adhering to management plan | Impacts on local flora and fauna   | 3 | Major    | U | Unlikely | 3U | Medium | Sile surveying undertaken prior to<br>site civil works<br>Bunting and demarcation of non<br>disturbed areas<br>WEAC Training                                   | Site Environmental Advisor              | CEMP-F<br>Flora and Fauna Management Plan<br>CEMP-I<br>Ground Cover Management Plan |
| 16 | Site Preparation | Flooding impacts            | Not locating switchyard above 100 year flood line  | Flood imapct on equipment/infrastructure<br>Potential floodwater pollution | 1 | Minor    | U | Unlikely | 1U | Low    | Site design<br>Compliance with Development<br>Consent requirements   | Project Manager                         | First Solar Civil Drawings<br>CEMP-E<br>Soll and Water Management Plan              |
| 17 | Structural       | Noise                       | Post installation<br>Machinery movements   | Impact on local noise amenity  | 3 | Major    | U | Unlikely | 3U | Medium | Monitoring of noise generation<br>during construction works<br>WEAC Training   | Site Environmental Advisor              | CEMP-L<br>Construction Noise Management<br>Plan                                     |

| 18 | Structural    | Waste generation | PV module packaging<br>Excess steel/construction materials | Increased waste to local landfill<br>Litter   | 1 | Minor | U | Unlikely | 1U | Low    | Maximising recycling of cardboard                                      | Site Environmental Advisor | CEMP-U<br>Waste Management Plan  |
|----|---------------|------------------|--|---|---|-------|---|----------|----|--------|--|----------------------------|--|
| 19 | Structural    | Fire             | Hot work   | Uncontrolled bush fire                        | 3 | Major | U | Unlikely | 3U | Medium | Control of onsite loads<br>Construction of fire break<br>WEAC Training | Construction Manager       | CEMP-M<br>Bush Fire Management Plan<br>CEMP-U<br>Waste Management Plan |
| 20 | Commissioning | Waste generation | Excess/waste construction materials                        | Increased waste to local landfill<br>Litter   | 1 | Minor | U | Unlikely | 1U | Low    | Maximising recycling and reuse of<br>waste                             | Site Environmental Advisor | CEMP-U<br>Waste Management Plan  |
| 21 | Commissioning | Spills           | Refueling<br>Filling of transformers                       | Surface water pollution<br>Soil contamination | 3 | Major | U | Unlikely | 3U | Medium | Storage in accordance with AS1940<br>Onsite spill kits                 | Construction Manager       | CEMP-V<br>Dangerous Goods and Spill<br>Response                        |
| 22 | Commissioning | Fire             | Hot work<br>Sparks   | Uncontrolled bush fire                        | 3 | Major | U | Unlikely | 3U | Medium | Control of onsite loads<br>Construction of fire break<br>WEAC Training | Construction Manager       | CEMP-M<br>Bush Fire Management Plan                                    |



# CEMP-B Environmental Management Activities Nyngan Solar PV Power Station





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#### **Document Control**

| Doc<br>Rev | Date     | Reason                                  | Issued by   | Review             |       | Review                       |                    |
|------------|----------|---|-------------|--------------------|-------|------------------------------|--------------------|
| А          | 25/10/13 | Issued for FS review                    | Geolyse     | SF                 | 28/11 | JS                           | 28/11              |
| В          | 28/11/13 | Issued for AGL and<br>Project ER review | First Solar | Michael<br>Woolley | 30/11 | SF<br><br>Michael<br>Woolley | 02/12<br><br>02/12 |
| С          | 04/12/13 | Issued as Final                         | First Solar |                    |       |                              |                    |

Cited Cross References within Document:

- 1. Appendix CEMP-E Soil and Water Management Plan
- 2. Appendix CEMP-F Flora and Fauna Management Plan
- 3. Appendix CEMP-G Landscape Plan
- 4. Appendix CEMP-H Rehabilitation and Revegetation Management Plan
- 5. Appendix CEMP-I Ground Cover Management Plan
- 6. Appendix CEMP-J Aboriginal Heritage Management Plan
- 7. Appendix CEMP-K Historic Heritage Management Plan
- 8. Appendix CEMP-L Construction Noise Management Plan
- 9. Appendix CEMP-M Bush Fire Management Plan
- 10. Appendix CEMP-N Air Quality Management Plan
- 11. Appendix CEMP-S Worker Environmental Awareness and Compliance Training
- 12. Appendix CEMP-U Waste Management Plan
- 13. Appendix CEMP-V Dangerous Goods and Spill Response



# **1** Overview

The following Environmental Management Activities document sets out:

- Specific issues
- Requirements for mitigation environmental impacts
- Responsibility for ensuring that environmental obligations are met
- Timing for ensure that environmental obligations are met

The timing for the Environmental Management Activities has been separated in accordance with the phasing of Construction Activities. The phasing is generally as follows:

- Mobilisation / Site preparation
- Construction
- Commissioning
- Demobilisation

It is noted that the references cited in the following table are not an exclusive list of controls. For example, whilst not cited against each Construction Activity the controls associated with the following will be applied consistently (on a as required basis) throughout the construction of the Nyngan Solar PV Power Station:

- Dust generation (**CEMP-N** *Air Quality Management Plan*)
- The storage and handling of dangerous or hazardous goods (**CEMP-V** Dangerous Goods and Spill Response)
- Bush fire management (**CEMP-M** Bush Fire Management Plan)
- Accidental discoveries of Aboriginal objects (**CEMP-J** Aboriginal Heritage Management *Plan*)
- Accidental discoveries of Heritage objects (**CEMP-K** *Historical Heritage Management Plan*)



# 2 Environmental Management Activities

| Environmental Management Control  | Project Person Responsible             | Timing            | Reference                        |  |
|---|--|-------------------|----------------------------------|--|
| Mobilisation / Site Preparation   |  | •                 | •                                |  |
| СЕМР  |  |                   |                                  |  |
| Prepare CEMP consistent with Conditions C2, C3 and A2.  | First Solar Environmental Manager      | Pre-construction  | Condition C2                     |  |
| Prepare CEMP Staging Document   | AGL Project Manager                    | Pre-construction  | Condition A5                     |  |
| Obtain written approval for CEMP from<br>Director General   | AGL Project Manager                    | Pre-construction  | Condition C2                     |  |
| Develop Site Specific WEAC Training<br>Induction  | First Solar Environmental Manager      | Pre-construction  | CEMP-S                           |  |
| Mobilisation / Site Preparation   |  |                   |                                  |  |
| Weed control activities   | First Solar Site Environmental Advisor | Site Mobilisation | CEMP-I                           |  |
| Surveying of the site   | First Solar Site Project Manager       | Site Mobilisation | CEMP I                           |  |
| Installation of environmental signage, flagging and exclusions  | First Solar Site Environmental Advisor | Site Mobilisation | CEMP-F                           |  |
| Ecological pre-clearance surveys  | First Solar Site Environmental Advisor | Site Mobilisation | CEMP-F                           |  |
| Installing perimeter fence around site  | First Solar Site Project Manager       | Site Preparation  | Where relevant<br>CEMP-F         |  |
| Topsoil stripping and stockpiling of soils<br>from within disturbance areas<br>Installation of onsite dust suppression<br>water storage basin | First Solar Site Project Manager       | Site Preparation  | CEMP-E<br>CEMP-N<br>CEMP K and J |  |
| Installation of onsite modular buildings  | First Solar Site Project Manager       | Site Preparation  |                                  |  |
| Earthworks for construction of power<br>station access and construction parking<br>areas<br>Stockpiling of topsoil and subsoil                | First Solar Site Project Manager       | Site Preparation  | CEMP-E<br>CEMP-F<br>CEMP-N       |  |
| (respectively)  |  |                   | CEMP K and J                     |  |



| Environmental Management Control   | Project Person Responsible   | Timing           | Reference                            |
|--|--|------------------|--------------------------------------|
| Removal of onsite vegetation within array areas  | First Solar Site Project Management /<br>First Solar Environmental Advisor   | Site Preparation | CEMP-E<br>CEMP-F<br>CEMP-U           |
| Grading and trimming of array areas<br>Stockpiling of topsoil<br>Drum rolling and compaction of array<br>areas | First Solar Site Project Manager   | Site Preparation | CEMP-E<br>CEMP-F<br>CEMP-N<br>CEMP-I |
| Construction of ESC Controls   | First Solar Site Project Manager /<br>First Solar Site Environmental Advisor | Site Preparation | СЕМР-Е                               |
| Planting of landscape planting   | First Solar Site Environmental Advisor                                       | Site Preparation | CEMP-G                               |
| Construction   |  |                  |                                      |
| Installation of steel support posts  | First Solar Site Project Manager   | Construction     |                                      |
| Trenching for installation of electrical cabling   | First Solar Site Project Manager   | Construction     | CEMP-E                               |
| Attachment of tilt brackets and tables   | First Solar Site Project Manager   | Construction     | CEMP-F<br>CEMP-L                     |
| Connection of PV modules   | First Solar Site Project Manager   | Construction     | CEMP-U                               |
| Installation of inverter and transformer skid  | First Solar Site Project Manager   | Construction     |                                      |
| Commencement of site rehabilitation works within development area  | First Solar Site Environmental Advisor                                       | Construction     | CEMP-H<br>CEMP-E                     |
| Commissioning  |  |                  |                                      |
| Commissioning and testing of solar plant   | First Solar Site Project Manager   | Commissioning    | Where relevant<br>CEMP-M             |
| Demobilisation   |  |                  |                                      |
| Removal of temporary construction facilities   | First Solar Site Project Manager   | Demobilisation   |                                      |



| Rehabilitation of disturbance areas and | First Solar Site Project Manager /     | Demobilisation | CEMP-H |
|---|--|----------------|--------|
| temporary access tracks.                | First Solar Site Environmental Advisor |                | CEMP-I |





# CEMP-C Environmental Schedules Nyngan Solar PV Power Station





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### **Document Control**

| Doc<br>Rev | Date     | Reason                                  | Issued by   | Review             |       | Review                       |                    |
|------------|----------|---|-------------|--------------------|-------|------------------------------|--------------------|
| А          | 25/10/13 | Issued for FS review                    | Geolyse     | SF                 | 24/11 | JS                           | 24/11              |
| В          | 24/11/13 | Issued for AGL and<br>Project ER review | First Solar | Michael<br>Woolley | 29/11 | SF<br><br>Michael<br>Woolley | 02/12<br><br>02/12 |
| С          | 04/12/13 | Issued as Final                         | First Solar |                    |       |                              |                    |



# 1 Purpose

The following document sets out the location of each of the Environmental Schedules within the First Solar CEMP. For simplicity, all of the Environmental Schedules can be located within the CEMP Appendix to which they relate.

The Environmental Schedules set out below represent the records that will be kept by First Solar during the construction of the Nyngan Solar PV Power Station.

Record requirements for each CEMP Appendix is set out in the back of each CEMP Appendix. Where record requirements within an Appendix relates to a separate Appendix this is cited.

| Schedule: | Title:   | CEMP Location:   |
|-----------|--|--|
| Form D01  | Weekly Inspection Checklist                                | CEMP-D<br>Weekly Site Inspections                            |
| Form E01  | Construction Water Record                                  | CEMP-E<br>Soil and Water Management Plan                     |
| Form F01  | Perimeter Fence and Nest Box Monitoring<br>Record          | CEMP-F<br>Flora and Fauna Management Plan                    |
| Form F02  | Fauna Handling Record                                      | CEMP-F<br>Flora and Fauna Management Plan                    |
| Form G01  | Landscape Monitoring Record                                | CEMP-G<br>Landscape Plan                                     |
| Form G02  | Photo Point Record   | CEMP-G<br>Landscape Plan                                     |
| Form H01  | Ground Cover Monitoring Record                             | CEMP-H<br>Rehabilitation and Revegetation<br>Management Plan |
| Form H02  | Rehabilitation and Revegetation Photo<br>Monitoring Record | CEMP-H<br>Rehabilitation and Revegetation<br>Management Plan |

# 2 Environmental Schedules



| Form I01 | Weed Management Activities and Control      | CEMP-I<br>Ground Cover Management Plan                              |  |
|----------|---|---|--|
| Form L01 | Noise Monitoring Record                     | CEMP-L<br>Construction Noise Management Plan                        |  |
| Form P01 | Complaints Register                         | CEMP-P<br>Complaints Management Protocol                            |  |
| Form P02 | Complaints Record                           | CEMP-P<br>Complaints Management Protocol                            |  |
| Form Q01 | Incidents Register                          | CEMP-Q<br>Incident Management Protocol                              |  |
| Form Q02 | Event Notification and Investigation Report | CEMP-Q<br>Incident Management Protocol                              |  |
| Form S01 | WEAC Induction Register                     | CEMP-S<br>Worker Environmental Awareness and<br>Compliance Training |  |
| Form SO2 | WEAC Training Register                      | CEMP-S<br>Worker Environmental Awareness and<br>Compliance Training |  |
| Form T01 | CEMP Auditing and Review Register           | CEMP-T<br>CEMP Auditing and Review                                  |  |
| Form U01 | Non-Regulated / Regulated Waste Register    | CEMP-U<br>Waste Management Plan                                     |  |





# CEMP-D Weekly Site Inspections Nyngan Solar PV Power Station









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|      | 2.2  | Nyngan Solar PV Power Station Development | 5 |  |  |  |
| 3    | Actions                                    |   | 5 |  |  |  |
| 4    | Respons                                    | ibilities                                 | 6 |  |  |  |
| 5    | Records                                    |   | 6 |  |  |  |
| Form | Form D01 Weekly Site Inspection Checklist7 |   |   |  |  |  |



### **Document Control**

| Doc<br>Rev | Date     | Reason                                  | Issued by   | Review             |       | Review                       |                    |
|------------|----------|---|-------------|--------------------|-------|------------------------------|--------------------|
| A          |          | Issued for FS review                    | Geolyse     | SF                 | 22/10 | JS                           | 22/10              |
| В          | 25/10/13 | Issued for FS review                    | Geolyse     | SF                 | 26/10 | JS                           | 27/10              |
| С          | 28/10/13 | Issued for Beca review                  | First Solar | Веса               | 29/10 | SF                           | 28/11              |
| D          | 08/11/13 | Issued for NOW review                   | First Solar | NOW                | 26/11 | SF                           | 26/11              |
| E          | 24/11/13 | Issued for AGL and<br>Project ER review | First Solar | Michael<br>Woolley | 29/11 | SF<br><br>Michael<br>Woolley | 02/12<br><br>02/12 |
| F          | 04/12/13 | Issued as Final                         | First Solar |                    |       |                              |                    |
|            |          |   |             |                    |       |                              |                    |

Cited Cross References within Document:

1. Appendix CEMP-E Soil and Water Management Plan



# 1 Purpose

Weekly inspection checklist to review and record site conditions, check compliance with the Nyngan Solar PV Power Station CEMP, identify new actions and provide records of CEMP compliance.

# 2 Scope

### 2.1 Overview

**CEMP-D** Weekly Site Inspections has been developed to monitor onsite environmental compliance, particularly with respect to the commitments set out within **CEMP-E** Soil and Water Management Plan. Form D01 Weekly Site Inspections (attached) covers the following:

- 1. **Part A:** General site environmental compliance, e.g. weed growth (**CEMP-I** *Ground Cover Management Plan*) and rehabilitated areas (**CEMP-H** *Rehabilitation and Revegetation Management Plan*)
- 2. Part B: Compliance with CEMP-E Soil and Water Management Plan

The Appendix **CEMP-D** Weekly Site Inspections forms part of the Construction Environmental Management Plan (CEMP) for the Nyngan Solar PV Power Station construction activities as the construction of the development relates to the activities of First Solar (Australia) Pty Ltd. Specifically **CEMP-D** Weekly Site Inspections relates to construction of the power station and associated access to the power station development.

A second CEMP is being prepared for the power station's grid connection by a separate contractor. The grid connection for the Nyngan Solar PV Power Station is not under the mandate of First Solar (Australia) Pty Ltd (First Solar) and is not included within the following document. Please refer to the separate grid connection CEMP for information specific to the grid connection construction works.

In addition to the scheduled *Weekly Site Inspections* outlined within this document, a scheduled monthly inspection will be undertaken by the First Solar Site Environmental Advisor with the Project Environmental Representative (position as defined in Condition C1). Inspections by the Project Environmental Representative will be undertaken (indicatively) monthly with inspections expected to occur with greater frequency during initial site works. During the monthly inspections the Project Environmental Representative will monitor the implementation of the CEMP in accordance with Condition C1(b).



### 2.2 Nyngan Solar PV Power Station Development

The Nyngan Solar PV Power Station will consist of a 102MW solar PV power station located approximately 10km west of Nyngan. The solar plant will occupy approximately 300 hectares of land to the north of the Barrier Highway.

First Solar (Australia) Pty Ltd have been engaged by AGL to provide engineering, procurement and construction (EPC) services. The Nyngan Solar PV Power Station will utilise First Solar's advanced cadmium telluride (CdTe) thin film photovoltaic modules. The solar modules generate electricity with no air emissions, no waste production, no water use and have one of the smallest carbon footprints of any current PV technology. Over 7,000MW of First Solar PV modules have been installed worldwide, including at many of the world's largest solar PV plants, since beginning commercial production in 2002. First Solar has been actively involved in the Australian market since mid-2008.

The construction of the Nyngan Solar PV Power Station project is expected to commence in early 2014 and will take approximately 18 months to complete. Once constructed the Nyngan Solar PV Power Station will generate an estimated 233,000 megawatt hours (MWh) of electricity annually.

## 3 Actions

- 1. The Site Environmental Advisor shall undertake a full weekly site inspection on Monday (weather permitting).
- 2. The site inspection shall cover the following work areas:
  - Barrier Highway intersection
  - Site access road
  - Site construction compound area
  - Construction laydown areas
  - Switchyard area
  - PV arrays
  - Areas external to the site works but within the property boundary
- 3. The weekly site inspection and any actions shall be recorded on **Form-D01** (see attached).
- 4. The weekly site inspection shall include erosion and sediment control measures as required by **CEMP-E** *Soil and Water Management Plan*.
- 5. Inspection shall be made immediately prior and following rainfall exceeding 15 mm in 24 hours and be recorded on **Form-D01** (attached). It is expected that falls of 15 mm will be sufficient to cause site runoff, although smaller rainfall events in wet conditions may also generate runoff in certain circumstances. Site inspections should be initiated if site runoff is observed.



- 6. The Site Environmental Advisor shall advise the Construction Manager of any required actions and follow up on their completion.
- 7. Originals of **Form-D01** (attached) are to be held in the Site Office and maintained by the Site Environmental Advisor
- 8. The Site Environmental Advisor shall forward copies of **Form-D01** (attached) to the First Solar Project Manager at the end of each month.

## 4 **Responsibilities**

### Site Environmental Advisor

- Weekly Site Inspections each Monday.
- Completion of Weekly Site Inspection Form-D01 (attached).
- Completion of inspection immediately prior to and following rainfall exceeding 15 mm in 24 hours (Form-D01).
- Advising and directing actions works as required.
- Maintenance of Weekly Site Inspection records in accordance with **CEMP-D** Weekly Site Inspections.
- Forwarding copies of **Form-D01** to the First Solar Project Manager at the end of each month.

## 5 Records

Records of weekly inspections are maintained on Form-D01 (attached).


## Form - D01: Weekly Inspection Checklist

This form is be completed weekly or immediately following significant rainfall (>15mm rainfall event)

| Week Ending:             | Date: |  |
|--------------------------|-------|--|
| Inspection Completed by: |       |  |

| Section A - General   | Yes | No | N / A |
|---|-----|----|-------|
| A1 Site is litter free  |     |    |       |
| A2 Any noxious weed growth evident  |     |    |       |
| A3 All work being confined to designated areas  |     |    |       |
| A4 Are rehabilitation areas healthy   |     |    |       |
| A5 Were there any incidents in the past week  |     |    |       |
| A6 Were any complaints received in the past week  |     |    |       |
| Section B – SWMP  | Yes | No | N / A |
|   |     |    |       |
| B1 Are all work areas clearly marked and defined  |     |    |       |
| B1 Are all work areas clearly marked and defined<br>B2 Are all temporary and permanent drains operation<br>effectively (i.e. not eroding, discharging to stable areas)  |     |    |       |
| B1 Are all work areas clearly marked and defined<br>B2 Are all temporary and permanent drains operation<br>effectively (i.e. not eroding, discharging to stable areas)<br>B3 Are all sediment traps functioning |     |    |       |
| Section B – SWMP  | Yes | Νο | N / A |

| B5 Are all sediment fences in a good state of repair                      |  |  |
|---|--|--|
| B6 Are action undertaken after the last inspection adequate and effective |  |  |
| B7 Are any additional sediment control measures required                  |  |  |



#### Section C – Non Conformance and Corrective Actions

| Reference<br>(e.g. A1) | Non Conformance | Corrective Action Required | Expected<br>Completion |
|------------------------|-----------------|----------------------------|------------------------|
|                        |                 |                            |                        |
|                        |                 |                            |                        |
|                        |                 |                            |                        |
|                        |                 |                            |                        |
|                        |                 |                            |                        |

#### Non Conformance

### Additional Non-Conformance Information

#### **Outstanding Corrective Actions**

| Item | Action Required | First Identified<br>(W/E) | Expected<br>Completion (W/E) |
|------|-----------------|---------------------------|------------------------------|
|      |                 |                           |                              |
|      |                 |                           |                              |
|      |                 |                           |                              |

Signed: \_\_\_\_\_





# CEMP-E Soil and Water Management Plan Nyngan Solar PV Power Station









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#### **Document Control**

| Doc<br>Rev | Date     | Reason                                     | Issued by   | Review             |          | Review             |          |
|------------|----------|--|-------------|--------------------|----------|--------------------|----------|
| А          |          | Issued for FS review                       | Geolyse     | SF                 | 22/10/13 | JS                 | 22/10/13 |
| В          | 25/10/13 | Issued for FS review                       | Geolyse     | SF                 | 26/10/13 | JS                 | 27/10/13 |
| С          | 28/10/13 | Issued for Beca Review                     | First Solar | Веса               | 29/10/13 | SF                 | 29/10/13 |
| D          | 08/11/13 | Issued for NOW Review                      | First Solar | NOW                | 26/11/13 | SF                 | 29/11/13 |
| E          | 25/11/13 | Issued for AGL and<br>Project ER Review    | First Solar | Michael<br>Woolley | 30/11/13 | SF<br>             | 02/12/13 |
|            |          |  |             |                    |          | Michael<br>Woolley | 02/12/13 |
| F          | 04/12/13 | Issued as Final                            | First Solar | DPI                | 15/01/14 | SF                 | 25/01/14 |
| G          | 12/02/14 | Final re-issued to<br>address DPI comments | First Solar |                    |          |                    |          |
|            |          |  |             |                    |          |                    |          |

Cited Cross References within Document:

- 1. **Appendix CEMP-D** Weekly Site Inspections
- 2. Appendix CEMP-H Rehabilitation and Revegetation Management Plan
- 3. Appendix CEMP-M Bush Fire Management Plan
- 4. **Appendix CEMP-N** *Air Quality Management Plan*
- 5. Appendix CEMP-S Worker Environmental Awareness and Compliance Training



## 1 Purpose

The purpose of the *Soil and Water Management Plan – Nyngan PV Power Station* is to meet the requirements of:

- Nyngan PV Power Station Development Consent (Application No. SSD-5355)
  - Condition B1
  - Condition B9
- Submissions Report Nyngan Solar Plant (NGH Environmental, June 2013)
  - Mitigation Measure 9
  - Mitigation Measure 10
  - Mitigation Measure 11
  - Mitigation Measure 14
  - Mitigation Measure 25
  - Mitigation Measure 56
  - Mitigation Measure 57
  - Mitigation Measure 60
  - Mitigation Measure 62
  - Mitigation Measure 63

## 2 Scope

### 2.1 Overview

The Soil and Water Management Plan – Nyngan Solar PV Power Station (SWMP) forms part of the Construction Environmental Management Plan (CEMP) for the Nyngan Solar PV Power Station construction activities as the construction of the development relates to the activities of First Solar (Australia) Pty Ltd. Specifically the SWMP relates to construction of the power station and associated access to the power station development.

A second CEMP is being prepared for the power station's grid connection by a separate contractor. The grid connection for the Nyngan Solar PV Power Station is not under the mandate of First Solar (Australia) Pty Ltd (First Solar) and is not included within the following document. Please refer to the separate grid connection CEMP for information specific to the grid connection construction works.

The work areas covered by this SWMP are as shown on Drawings C800 and C801.



The following SWMP includes the following information:

- Description of the erosion and sediment controls proposed for the Nyngan Solar PV Power Station and power station access construction
- Construction water demands for the power station and power station access, and the proposed water sources
- Flooding and waterway impacts in the vicinity of the power station and the power station access as it relates to the activities of First Solar.

### 2.2 Nyngan Solar PV Power Station Development

The Nyngan Solar PV Power Station will consist of a 102MW solar PV power station located approximately 10km west of Nyngan. The solar plant will occupy approximately 300 hectares of land to the north of the Barrier Highway.

First Solar (Australia) Pty Ltd have been engaged by AGL to provide engineering, procurement and construction (EPC) services. The Nyngan Solar PV Power Station will utilise First Solar's advanced cadmium telluride (CdTe) thin film photovoltaic modules. The solar modules generate electricity with no air emissions, no waste production, no water use and have one of the smallest carbon footprints of any current PV technology. Over 7,000MW of First Solar PV modules have been installed worldwide, including at many of the world's largest solar PV plants, since beginning commercial production in 2002. First Solar has been actively involved in the Australian market since mid-2008.

The construction of the Nyngan Solar PV Power Station project is expected to commence in early 2014 and will take approximately 18 months to complete. Once constructed the Nyngan Solar PV Power Station will generate an estimated 233,000 megawatt hours (MWh) of electricity annually.

## 2.3 Relevant Approval Provisions

The approval provisions for the Nyngan Solar PV Power Station relevant to the SWMP are as follows:

Condition B1 of the Nyngan Development Consent (SSD-5355) states:

- B1. Unless otherwise approved by the Director-General, the location of Ancillary Facilities shall:
  - (j) be above the 20 ARI flood level unless a contingency plan to manage flooding is prepared and implemented.

Condition B9 of the Development Consent states:

B9 Soil and water management measures consistent with Managing Urban Stormwater – Soils and Construction Vol. 1 (Landcom, 2004) shall be employed during the construction of the development to minimise soil erosion and the discharge of sediment and other pollutants to land and/or waters.



Mitigation Measure 9 states:

9. Excavated topsoil would be stored separately from subsoil and replaced in a manner that replicates the original profile as closely as possible to assist rapid revegetation.

Mitigation Measure 10 states:

10. Site stabilisation, rehabilitation and revegetation would be undertaken progressively during works, to ensure that soils are stabilised as soon as practical. This would minimise weed infestation, sedimentation and erosion, which degrade habitat.

Mitigation Measure 11 states:

11. Disturbed areas would be identified and used preferentially for vehicle and machinery access, materials laydown, stockpiling of cleared vegetation and the deposition and retrieval of spoil where practicable, to minimise the footprint of the development on intact native-dominated areas.

Mitigation Measure 14 states:

14. Where trenches are to be excavated and backfilled in well vegetated areas, whole sods would be removed, stored in moist shaded conditions and replaced following the works. Sod storage time would be minimised and sods would be replaced in a manner that maximises the chances of re-establishment and soil stabilisfation.

Mitigation Measure 25 states:

25. The substation and office building would be designed to accommodate a 1:100 year flood and located in the south-west of the site, outside of the inundation zone (Figure 6-1 of the EIS).

Mitigation Measure 56 states:

56. Excess subsoil would be removed from the site and disposed of at an appropriate fill storage site.

Mitigation Measure 57 states:

57. Excess topsoil would be retained and used in site rehabilitation.

#### Mitigation Measure 60 states:

60. Site specific Erosion and Sediment Control Plans would be prepared, implemented and monitored during the project, in accordance with Landcom (2004), to minimise soil and water impacts. These plans would include provisions to ensure any discharge of water from the site is managed to ensure ANZECC (2000) water quality criteria are met and traffic generated soil erosion is minimised.

Mitigation Measure 62 states:

- 62. If water is required from the local water supply authorities, access would be obtained prior to the commencement of activities in consultation with:
  - Cobar Water Board, for water from the Cobar Water pipeline; and
  - Bogan Shire Council, for water from the local council supply.



Mitigation Measure 63 states:

- 63. During construction and decommissioning
  - A water cart (truck) would be utilised routinely, wetting all access roads and exposed dusty surfaces as appropriate to the condition of the project site.
  - Stockpiled topsoil and other materials that exhibit significant dust lift off would be wet down routinely and as appropriate.
  - Stabilising techniques and/or environmentally acceptable dust pallatives will be utilised if the wetting down of surfaces prove to be ineffective.

Noting the above requirements SWMP has been prepared to collectively cover the following with respect to the construction of the Nyngan Solar PV Power Station and the power station access tracks:

- Soil and Water Management
- Erosion and Sediment Control

## 2.4 EIS Background

To inform the EIS, SKM were engaged to undertake a Hydrology Assessment for the Nyngan Solar PV Power Station site. Key observations from this report include:

- The SKM Hydrology Report details flooding risk at the following watercourses (based on a 100 year ARI)
  - Bogan River (8km away from site)
  - Whitbarrow Creek (500m away from site)
- Hydrological modeling by SKM confirmed that the site will not be prone to flooding from the Bogan River during either a 100 or 200 year ARI.
- The site may be subject to flooding during a 100 ARI flood from Whitbarrow Creek. Flooding would be concentrated on the eastern and south-eastern parts of the site (in the direction of Whitbarrow Creek).
- There are no stream-flow meters within Whitbarrow Creek. The modeling by SKM was undertaken using conservative estimates of flooding risk.
- There is no evidence of prolonged inundation of flooding on the site. This observation was supported by the landowner during the SKM Hydrological Assessment and more recently by the Bogan Shire Council during discussions with First Solar. The current site for the power station was selected by AGL (over two other sites in the area) due to its low risk of flooding.
- SKM have conservatively modeled an approximately 60% flood coverage of the site in a 100 ARI. The depth of the water would be 0.3m (or less) and have a slow moving velocity of 0.2m/s.

Noting the findings of the SKM Hydrological Assessment, the risk of catastrophic flooding of the site was deemed to be low. Where flooding was identified to be possible the water would be shallow, slow moving and concentrated to the eastern half of the site.



The SKM Hydrological Assessment and the EIS Assessment have been used to inform the combined First Solar *Soil and Water Management Plan* and *Erosion and Sediment Control Plan*.

## 3 Soil and Water Management Plan

## 3.1 Introduction

This Soil and Water Management Plan (SWMP) has been prepared for the Nyngan Solar PV Power Station and power station access track construction activities and incorporates:

- Scheduling and sequencing of power station and power station access track construction activities
- Control of water movement onto and through the power station site and power station access tracks site
- Construction of temporary soil and water control measures associated with the construction of the power station and power station access tracks
- Erosion and sediment control measures associated with the construction of the power station and power station access tracks
- Scheduling of rehabilitation and rehabilitation maintenance works within the power station site and in relation to the construction access tracks.

The Nyngan Solar PV Power Station site layout and details of the SWMP are shown on Drawings C800 and C801.

## 3.2 Aims of the SWMP

The aims of the SWMP are to:

- Protect the water quality of minor watercourses in the vicinity of the Nyngan Solar PV Power Station
- Manage onsite stormwater to protect the site from erosion derived from stormwater transit across the surface of the disturbed areas
- Manage the potential for aeolian erosion onsite

## 3.3 Principles of the SWMP

The principles that form the basis of the SWMP for the Nyngan Solar PV Power Station and the access tracks include:

• Minimisation of disturbed areas. All work areas will be defined as far as practicable prior to construction commencing. Disturbance outside of defined areas will be kept to a minimum.



- Minimising the soil erosion potential during construction
- Diversion of clean water from undisturbed areas around or away from disturbed areas, where required, during the construction of the power station and power station access tracks
- Controlling water movement through the power station construction site
- The use of temporary erosion control measures as required within the power station construction site and where appropriate with respect to the power station access tracks
- Directing stormwater runoff from disturbed areas within the construction site to sediment trapping devices
- Adequate maintenance of erosion and sediment control structures throughout construction
- Site rehabilitation.

## 3.4 Nyngan Site Constraints

Site constraints and characteristics for the Nyngan Solar PV Power Station site is defined in Table E1.

| Constraint / Opportunity | Value                                   |
|--------------------------|---|
| Rain erosivity           | R = 1200                                |
| Rainfall zone            | Zone 11                                 |
| Slopes                   | Range: 0.05% to<br>0.3%: Generally less |
| Soil erodibility         | 0.04                                    |
| Calculated soil loss     | 12 tonnes / ha / year                   |
| Soil loss class          | Class 1 – very low erosion hazard       |
| Soil texture group       | Type C – coarse grained                 |
| Soil hydrologic group    | Group A – very low runoff potential     |

Table E1 – Constraints and characteristics

The soil at the site is identified as being red-brown silt, with minor clay and sand and moderately deep to deep red earth with a sandy topsoil (NGH Environmental, 2013).

The likely soil loss is calculated using the Revised Universal Soil Loss Equation (RUSLE) with the following factors:

R = 1200



- K = 0.04
- LS = 0.2 (average 100m length with <1% slope) P = 1.3
- C = 1.0 (bare soil)

Given that the site is Soil Loss Class 1, there are no constraints on the timing of development at this site (refer Table 4.3 *Managing Urban Stormwater – Soils and Construction Vol. 1* (Landcom, 2004)).

The predominant red earths and onsite characteristics (e.g. site gradient, flood risk and annual rainfall) mean that localised, non-structural, erosion control measures are considered appropriate.

No "permanent" erosion and sediment control structures (e.g. sediment basins) are expected to be required during the construction of the power station.

## 3.5 Onsite SWMP Advice

The following general advice (via the *Worker Environmental Awareness and Compliance Training* outlined in **CEMP-S**) shall be given to employees and sub-contractors engaged by First Solar as part of the construction of the Nyngan Solar PV Power Station and the power station access tracks (area as identified in Figure 1.1):

- The conceptual layout of the erosion and sedimentation control works required for the construction phase of the Nyngan Solar PV Power Station are as identified on Drawings C800, C801 and C811 attached. The drawings and this report should be read in conjunction with relevant construction plans and documentation relating to the construction of the Nyngan Solar PV Power Station.
- 2. It is possible that the SWMP may require modification as construction progresses to ensure compliance with the documentation (or any subsequent iteration) identified in Condition A2 of Development Consent (SSD-5355). The same principles outlined in Section 3.3 of the SWMP shall continue to form the basis for any necessary modifications to the SWMP.
- 3. All erosion and sedimentation control works are to be undertaken in accordance with the SWMP and constructed in a manner consistent with *Managing Urban Stormwater Soils and Construction Vol. 1 (Landcom, 2004)* as required by Condition B9 of the Development Consent (SSD-5355).
- 4. All subcontractors will be informed of their responsibilities in reducing the potential for soil erosion and sediment pollution to downslope areas.

Onsite SWMP information will be communicated to onsite employees and contractors via the:

- Nyngan Site Induction
- Daily pre-start meetings
- Toolbox meetings
- Onsite supervisors



• Site Environmental Advisor

The responsibilities of onsite personnel is further discussed in Section 3.9 of the SWMP.

## **3.6** Construction Staging

The construction activities for the Nyngan Solar PV Power Station and power station access track construction will be scheduled generally as outlined in Table E2.

| Construction Phase                 | Activity   |
|------------------------------------|--|
| 1. Mobilisation / Site Preparation | <ul> <li>Installing perimeter fencing around the site</li> </ul>   |
|                                    | <ul> <li>Locating temporary construction offices and<br/>construction equipment to the power station site</li> </ul>   |
|                                    | • Earthworks for construction of power station access road and construction parking areas  |
|                                    | <ul> <li>Minor grading and trimming of areas for permanent<br/>site office and switchyard</li> </ul>   |
|                                    | Minor grading and trimming in array areas  |
|                                    | Drum rolling and compaction of array areas   |
|                                    | Installation of onsite erosion and sediment controls   |
| 2. Construction                    | Install steel support posts for array tables   |
|                                    | <ul> <li>Trenching and wiring of underground cabling (DC and AC)</li> </ul>  |
|                                    | <ul> <li>Attachment of tilt brackets and rails using pre-<br/>fabricated steel members</li> </ul>  |
|                                    | Connection of PV modules to the brackets   |
|                                    | Installation of inverter and transformer skid  |
|                                    | • Commencement of site rehabilitation works within the power station development area  |
| 3. Commissioning                   | <ul> <li>Commissioning and testing of solar plant, noting that<br/>each array block would be commissioned as it is<br/>completed.</li> </ul>   |
| 4. Demobilisation                  | <ul> <li>Removal of temporary construction facilities and<br/>completion of works within the power station<br/>development area and of temporary access tracks<br/>within the power station site.</li> </ul> |

|--|



## 3.7 Land Disturbance

The following section of the SWMP outlines the general mitigation measures proposed by First Solar to minimise impacts on soil (as required by Mitigation Measure 60) within the Nyngan Solar PV Power Station site and in areas associated with the power station access tracks.

#### 3.7.1 Grading and Topsoil Stripping

1. Exposed areas will be kept to a minimum by utilising the limitations outlined in **Table E3**.

| Land Use          | Limitation  | Comment  |
|-------------------|---|--|
| Construction area | Wherever practicable soil disturbance shall be restricted to an area no further than 5 metres from the edge of any essential construction activity (as shown on the power station and power station access track engineering drawings). | All site workers should clearly<br>recognise construction areas which<br>are identified with barrier mesh<br>(upslope) and silt fencing<br>(downslope), or similar materials<br>appropriate to the specific onsite<br>conditions.          |
| Access area       | Wherever practicable (i.e. where the free flow of onsite traffic is not unduly restricted), access tracks shall be limited to a maximum width of 10 metres.   | Access roads are shown on the<br>power station and power station<br>access track engineering plans.<br>Access tracks will be identified using<br>appropriate markers, e.g. barrier<br>mesh, silt fencing, bunting or similar<br>materials. |
| Remaining land    | Entry prohibited except for essential vehicles and personnel, e.g. vehicles and personnel associated with emergency response.   | All site workers clearly recognise this<br>land by marking boundary with<br>barrier mesh or similar materials  |

#### Table E3 – Work limitations

- 2. The limit of disturbance is defined on Drawing C800 (see attached) and will be in accordance with the final site layout drawing.
- 3. Grading will be kept to a minimum as far as practicable in order to retain as much of the existing natural ground cover as possible (where applicable, i.e. outside of areas of disturbance). This practice is proposed to minimise areas of disturbed soil, to reduce the potential for soil loss from site through aeolian means or via stormwater run-off and to reduce the potential for dust generation from exposed areas.
- 4. In order to protect topsoil onsite, disturbance of the topsoil will be minimised as far as practicable. Where disturbance to topsoil is unavoidable (e.g. in areas of grading within the array areas and roadway / access track construction) topsoil will be lightly stripped / trimmed during site preparation (grading) and stockpiled in defined onsite stockpile areas.



- 5. During site preparation works the solar array areas will be lightly stripped to level the site (in accordance with the First Solar project civil drawings) prior to being drum rolled and compacted. Compaction within the array area is required to ensure the structural adequacy required by Condition A6, with respect to the solar PV arrays, of the Development Consent is achieved.
- 6. Where appropriate, vehicle movements will be restricted to site access tracks to avoid unnecessary trafficking and damage to topsoil outside of disturbed areas within the power station site.
- 7. Topsoil shall be stripped and stockpiled before commencing any bulk earthworks around the site ancillary (both permanent and temporary) facilities. Topsoil shall be stockpiled in accordance with the guidelines outlined in *Managing Urban Stormwater Soils and Construction Vol.1 (Landcom 2004)* and industry best practice.
- 8. Stockpile areas will be located in accordance with final site layout drawing.
- 9. In accordance with Mitigation Measure 57, excess topsoil will be retained and used in site rehabilitation (as far as practicable).
- 10. In accordance with Mitigation Measure 56, excess subsoil will be removed from site and disposed of at an appropriate fill storage site.
- 11. Disturbed areas would be used preferentially for vehicle and machinery access, materials laydown, stockpiling of cleared vegetation and the deposition and retrieval of spoil where practicable, as shown on Drawing C800and C801 attached.
- 12. A water cart (truck) will be utilised routinely on site, wetting all access roads and exposed dusty surfaces as appropriate to the conditions of the site. Dust control techniques will be utilised in the event that topsoil stockpiles exhibit significant dust lift off.
- 13. In accordance with the provisions of Condition B6 of the Development Consent (SSD-5355), in the event that construction activities generate visible dust emissions, First Solar will implement all practicable dust mitigation measures such that the emissions of visible dust cease. This may include cessation of relevant works until appropriate / additional dust controls can be put in place.
- 14. During periods of high winds, dust controls will be adapted to ensure ongoing compliance with Condition B6 of the Development Consent (SSD-5355).
- 15. In accordance with Mitigation Measure 63, in the event that wetting of exposed areas proves ineffective, additional stabilising techniques and / or environmentally acceptable dust palliatives will be utilised. Techniques employed will be in accordance with *Managing Urban Stormwater Soils and Construction Vol.1* (Landcom, 2004) as required by Condition B9. These techniques may include (e.g.) hydro-seeding or mulch matts for topsoil stockpile coverage.
- 16. Temporary stablisation works should be undertaken on disturbed areas within the power station site that are likely to remain unattended for more than 30 days during construction.
- 17. Complete permanent rehabilitation works on disturbed areas as soon as practicably possible following conclusion of onsite construction works, or in accordance with Condition B21 of the Development Consent (SSD-5355) as it relates to the power station and power station access tracks which states:



#### Rehabilitation and Revegetation

B21 The Applicant shall implement a revegetation and rehabilitation program for all areas of the development footprint which are disturbed during the construction of the development but which are not required for the ongoing operation of the development including temporary construction facility sites and sections of construction access roads. The Applicant 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 agree to by the Director-General, the Applicant 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 Director-General) as being well established, in good health and self sustaining.

All rehabilitation and revegetation undertaken on site will be undertaken in accordance with **CEMP-H** *Rehabilitation and Revegetation Management Plan*.

From a practicality point of view, compliance with Mitigation Measure 14 (as cited in Section 2.3 above) may not be possible with respect to the construction of the power station. This is due to availability of moist shaded areas onsite. In well vegetated areas, where possible, sods will be removed and replaced as soon as practicable. Moving sods from the source will result in added vehicles movements onsite and may result in the loss of topsoil in the movement of sods from source to shaded conditions. Indicatively trenches are open for 24 to 48 hours. It is expected that sods will be replaced as part of the infilling of the trench. Where necessary (and in accordance with the above) topsoil will be watered at the time of replacement.

#### 3.7.2 Site Compound and Laydown Areas

- 1. The onsite power station site compound and laydown areas will be restricted to the areas shown on Drawing C800 (see attached).
- 2. The downslope side of the site compound and laydown areas will be delineated with a silt fence, or other appropriate erosion and sediment control device, which will also serve to control runoff from these disturbed areas.
- 3. Any fuels or chemicals stored in the site compound area must be in accordance with the CEMP and the relevant Australian Standard.
  - AS1940 The Storage and Handling of Flammable and Combustible Liquids
  - AS3780 The Storage and Handling of Corrosive Substances
  - AS/NZ4452 The Storage and Handling of Toxic Substances
  - Storage and Handling Liquids: Environmental Protection Participants Manual, 2007
  - Environmental Compliance Report: Liquid Chemical Storage, Handling and Spill Management; Part B, Review of Best Proactive and Regulation, 2005
- 4. Site disturbance and access to the power station site compound and laydown areas will be restricted as far as practicable to avoid unnecessary soil disturbance and to reduce incidental soil loss or dust creation.
- 5. Topsoil will be removed from the site compound and laydown areas during site preparation



and stockpiled in accordance with Section 3.7.4.

6. Site compound and laydown areas not required for the Operational Phase of the power station will be rehabilitated in accordance with the *Rehabilitation and Revegetation Management Plan* (**CEMP-H**).

#### 3.7.3 Construction Access Road

- 1. A stabilised site entrance access road shall be constructed at the location shown on Drawing C801.
- 2. The Construction Access Road from the Barrier Highway will be graveled to prevent dust generation (in accordance with **CEMP-N** *Air Quality Management Plan*).

#### 3.7.4 Stockpiles

- 1. Stockpile areas within the power station will be located in accordance with the final site layout drawing.
- 2. Stockpiles will be constructed in accordance with *Managing Urban Stormwater Soils and Construction Vol.1 (Landcom 2004)* and industry best practice.
- 3. All stockpile areas will be defined with appropriate delineators (e.g. bunting or sediment fencing).
- 4. Separate stockpiles shall be used for topsoil and subsoil (if any). Stormwater diversion structures will be installed upslope of stockpiles as required. The diversion structures will be installed in accordance with the provisions of the *Managing Urban Stormwater Soils and Construction Vol.1* (Landcom, 2004).
- 5. Silt fencing or other appropriate erosion and sediment control device will be installed on the downslope side of stockpiles. Upslope stormwater diversion drains will be installed as required.
- 6. Stockpiles will be located on level ground (as far as practicable), 5 metres away from drainage lines, 5 metres from standing vegetation and out of the drip line.
- 7. Dust control practices will be employed on stockpiles as required. Control strategies may include watering or other appropriate erosion and sediment control mechanisms (e.g. sediment blankets, soil tackifiers).

#### 3.7.5 Erosion Control

- 1. Clearly visible barrier fencing or appropriate demarcation markers shall be installed at the limit of disturbance as shown on Drawings C800 and C801 (attached) and on the final site layout drawing, and elsewhere within the Nyngan Solar PV Power Station at the discretion of the First Solar Construction Manager (in consultation with the First Solar Environmental Advisor), to ensure traffic control and restrict unnecessary site disturbance.
- 2. Slope lengths on disturbed areas will be kept as short as necessary to minimise the risk of soil loss. The Nyngan Solar PV Power Station site is a largely flat site, however where appropriate slope length will be regulated through the construction of temporary diversion berms across disturbed areas, through use of silt fence as required or through the employment of other appropriate erosion and sediment control device.
- 3. Temporary diversion drains shall be completed as required at the end of each working day



or when heavy rain is imminent. These will be designed to control onsite stormwater runoff, including diverting clean runoff away from disturbed areas as far as practicable.

- 4. Temporary diversion drains will be implemented to promote the discharge of clean stormwater runoff to stable areas as far as practicable.
- 5. Complete temporary stabilisation work on exposed areas that are likely to remain unattended for more than 30 days during construction works.
- 6. During windy weather, appropriate dust controls shall be employed, e.g. keeping unprotected areas moist by water application.
- 7. An energy dissipater shall be constructed on the downslope side of the culvert on the access road as shown on Drawing C801. The energy dissipater shall be constructed in accordance with SD 5-8 on Drawing C811 (see attached).

#### 3.7.6 Sediment Control

- 1. Silt fences (or appropriate equivalent) shall be installed as indicated on Drawing C800 and Drawing C801 (see attached) and downslope of disturbed areas, or at the discretion of the Construction Manager (in consultation with the Site Environmental Advisor).
- 2. Silt fences are a temporary structure constructed using wood or steel fence posts supporting a suitable filter fabric. The filter fabric should be laid in a manner such that short-circuiting of the erosion and sediment control device is prevented. The silt fence serves to retain soil on the site and reduce overland flow velocity across downstream areas. Silt fence shall be constructed in accordance with SD 4-1 (Drawing C811).
- 3. Vegetation downslope of silt fences and below discharge points of temporary diversion drains should remain undisturbed (as far as practicable) to act as filter strips.
- 4. Where sediment traps are employed, sediment shall be removed from the traps (upstream of silt fences) when it increases to a level that reduces the volume of the trap by approximately 30%. Sediment removed from any trapping device will be disposed in locations where further erosion and consequent sediment pollution of downstream lands and waterways will not occur and / or the sediment shall be placed in areas protected by soil erosion protection works.
- 5. Erosion and sediment controls have been designed to ensure that water leaving the site will be compliance with the ANZECC (2000) water quality criteria.

#### 3.7.7 Rehabilitation

Rehabilitation, as defined in the following section, relates to areas that will be subject to active rehabilitation by First Solar. Areas subject to active rehabilitation include the areas of the site compound, site laydowns and access tracks that are not required for the Operational Phase of the power station.

Rehabilitation and revegetation of areas beneath the solar PV arrays will be undertaken in accordance with *Rehabilitation and Revegetation Management Plan* (**CEMP-H**).

1. Final site rehabilitation shall be undertaken as soon as practicable after completion of land shaping and construction works, or in accordance with Condition B21 of the Development Consent (SSD-5355) as it relates to the power station and power station



access tracks (construction area as generally identified on Drawings C800 and C801).

- 2. Before placing topsoil on areas being rehabilitated (e.g. the site compound / laydown areas), the surface shall be cleared of any construction materials (e.g. gravel), scarified or ripped (depth to be subject to the extent of subsoil compaction) along the contour to provide keying for topsoil.
- 3. Topsoil shall be handled moist and reapplied to a depth consistent with the existing onsite soil profile as far as practicable.
- 4. Topsoil and subsoil shall be replaced in a manner that replicates the original profile as closely as possible to assist rapid revegetation.
- 5. Temporary erosion and sediment control devices will be removed only after rehabilitation works have been completed on more than 90% of the contributing catchment or where site stabilisation has been achieved to a standard where the erosion risk is removed as far as practicable.
- 6. Recently rehabilitated areas will be regularly maintained by First Solar during the Construction Phase (in accordance with **CEMP-H** *Rehabilitation and Revegetation Management Plan*). At the conclusion of the Construction Phase, rehabilitated areas will be managed by the owner/operator (AGL) in accordance with the Operational Environmental Management Plan (required by Condition C4) until such time that the planting have been verified by an independent and suitably qualified expert (in accordance with Condition B21 of the Development Consent).
- 7. 7. Remove temporary erosion and sediment control devices as a last activity in the rehabilitation program.

#### 3.7.8 Site Inspection and Maintenance

- 1. The maintenance of erosion and sediment control structures is critical for their ongoing operation. Adequate maintenance keeps the potential soil erosion risk on the site, and consequent sediment pollution to downslope areas, to a minimum. The site inspection and maintenance programme detailed below will be implemented.
- 2. The Site Environmental Advisor will undertake a full check of the operation of onsite erosion and sediment (within the areas shown on Drawings C800 and C801) works weekly and initiate repair or maintenance as required. The weekly inspection and maintenance program shall include:
  - Ensuring all drains operate effectively
  - Removing spilt sand, soil or other material from within 2 m of hazard areas such as areas of concentrated of high velocity flow
  - Ensuring rehabilitated lands have effectively reduced the erosion risk
  - Controlling dust emission
  - Maintaining the sediment retention traps in good working condition ensuring trapped sediment is removed whenever less than the design capacity remains
  - Constructing additional erosion and sediment control measures as might become necessary



- Maintaining erosion and sediment control measures in a functioning condition until all earthwork activities are completed and the site is rehabilitated to the level outlined in Section 3.7.6.
- 3. Records of weekly inspections shall be maintained on **Form D01** (refer to **CEMP-D** *Weekly Site Inspections*). The completed forms will be kept on-site and made available to any authorised person on request.
- 4. Inspection shall be made prior to and following rainfall exceeding 15 mm in 24 hours and be recorded on **Form D01** (refer to **CEMP-D** *Weekly Site Inspections*). It is expected that falls of 15 mm will be sufficient to cause site runoff, although smaller rainfall events in wet conditions may also generate runoff in some circumstances. Site inspections should be initiated if site runoff is observed during a rainfall event.
- 5. This SWMP shall be reviewed as the work progresses to ensure it remains applicable. Where necessary the plan will be reviewed and updated in
- 6. As requested by the NSW Office of Water (NOW), in the event of a significant flood event First Solar will remove flood debris from around the security perimeter fence and from within the site where debris traverses between onsite infrastructure. The purpose of the debris removal will be to avoid alterations to flood paths occurring as a result of debris build up. Monitoring for flood debris during the Operational Phase will be subject to the Operational Environmental Management Plan to be developed by the project owner/operator (AGL) in accordance with Condition C4. As cited within Section 2.4, the site may be subject to flooding during a 100 year ARI flood from Whitbarrow Creek.

### 3.8 Water

#### 3.8.1 Construction Water

In accordance with Conditions C2(p) and C2(q), First Solar has undertaken an assessment of water options for construction activities. Construction water is required for:

- 1. Dust mitigation (CEMP-N Air Quality Management Plan)
- 2. Bush fire prevention activities (CEMP-M Bush Fire Management Plan)

Water is also expected to be used during the rehabilitation and revegetation activities outlined in Appendix **CEMP-H** *Rehabilitation and Revegetation Management Plan*.

As cited in Section 7.9.2 of the EIS

- Water usage during construction is estimated to be up to 150,000 litres per day.
- Based on this expected use over a 15 month construction period, a total of 68ML of water will be required.
- The volume of water utilised on a daily basis will vary depending on climatic conditions.

First Solar has assessed its daily water usage and revised the figures based on a 300,000L per day requirement during the enabling works phase. Daily water usage will directly correlate to the onsite



activities, including an expected peaking of water usage during the site enabling works followed by an expected reduction as the project moves through the three respective sub-phases associated with the construction of the power station (as outlined in Section 3.4 of the CEMP overaching document).

Construction water requirements will be met from the following supply sources:

- Bogan Shire Council depot
- Bogan River
- Private dam supplies (if required)

In accordance with Mitigation Measure 62 this water has been confirmed prior to construction works commencing. Construction water will be available at the commencement of site enabling works.

Water will be initially available to First Solar from a 500,000L dam located on adjacent private land immediately north of the power station site. The dam will be filled from the Bogan River via water extracted from an existing take site and trucked to the dam. Water will be legally extracted by agreement with an existing licence holder.

The dam will be connected via a short length (<70m) of above ground pipe (connected to a pump) to the northern edge of the power station site where the onsite water carts will be able to refill from an onsite stand pipe. The pipe from the dam will be located to minimise any damage to the existing vegetation on the northern edge of the site. No trees will be required to be removed during the installation of the temporary pipeline.

The advantages of this water supply option are:

- Timely refilling of water carts for dust suppression as water will be available from within the power station construction site
- Ongoing availability of water for construction purposes
- Security of supply during the Construction Phase

Further details regarding construction water (including water licence requirements) has been provided in Section 8.3 of the CEMP overarching document. It is noted that the above water source will not require any additional water licences from either the Bogan Shire Council or Cobar Water (as per Mitigation Measure 62). Water will be taken under agreement with the Bogan Shire Council (by JR & DJ Carter Pty Ltd) under existing water licences.

The longer term construction water supply for the site will consist of a pipeline from the Bogan River to the dam to the north of the power station site. The purpose of the pipeline is to reduce the carbon footprint associated with the movement of water and to ensure that the dam is kept topped up in support of construction works.

The Site Environmental Advisor will maintain records of water used for construction purposes and its source on **Form-E01** (see attached).



Potable water will be separately transported to the site for the use of onsite personnel.

The existing farm dam on the edge of the power station site will not be removed and will remain largely unaffected by the construction of the power station. Condition C2(q) of the Development Consent (SSD-5355) will therefore not be triggered with respect to the onsite dam.

#### 3.8.2 Flooding and Waterways

As detailed within the SKM Hydrological Assessment for the Nyngan Solar PV Power Station site, the site has extremely low grades. There are no defined floodways within the Nyngan Solar PV Power Station site suggesting that local drainage is mainly sheet flow following the gentle south-west to north-east grade across the site. The low grades onsite and the lack of defined watercourses (outside of Whitbarrow Creek 500m South-East) in the immediately area reduces the stormwater erosion risk to extremely low for the Nyngan Solar PV Power Station site.

The SKM Hydrological Assessment has identified a potential for flooding of the site from Whitbarrow Creek during a 1/100 ARI flood. Where flooding is predicted the flooding will be concentrated to the eastern 60% of the site, it will be slow moving (0.2m/s) and shallow in depth (circa 0.3m).

To address the risk of flooding the following requirements are set out in Development Consent Condition B1 and Mitigation Measure 25:

- B1. Unless otherwise approved by the Director-General, the location of Ancillary Facilities shall:
  - (j) be above the 20 ARI flood level unless a contingency plan to manage flooding is prepared and implemented.
- 25. The substation and office building would be designed to accommodate a 1:100 year flood and located in the south-west of the site, outside of the inundation zone (Figure 6-1 of the EIS).

Noting the above requirements, First Solar has positioned Ancillary Facilities in the south-west site of the site. Based on the modeling of SKM, First Solar has met the above site design requirements.

With respect to the risk to other infrastructure within the "inundation zone", the height of flooding predicted by SKM would put the level of water below that of the constructed solar PV arrays.

NOW confirmed their understanding of flood risk with respect to the Nyngan Solar PV Power Station. No mitigations to monitor or manage flood impacts, additional to Condition B1 and Mitigation Measure 25, were identified during the discussions with NOW.

#### 3.8.3 Groundwater Management:

As detailed in Section 6.4 of the EIS, the depth of local groundwater resources is 30-60m. At the depths of the groundwater resources in the area, it is considered that groundwater will not be affected by the physical impacts of construction.

Construction water, as outlined in Section 3.8.1 (above) will not be sourced from local groundwater sources.



As there are no construction activities that are likely to pose a risk of groundwater no specific management measures are proposed.

### 3.9 Responsibilities:

#### Project Manager

- Obtaining approval for access to construction water for the construction of the Nyngan Solar PV Power Station and power station access tracks (as highlighted in Figure 1.1) prior to construction commencing.
- Advising the Construction Manager and Site Environmental Advisor of approved access source for construction water.

#### **Construction Manager**

- Completion of Worker Environmental Awareness and Compliance Training.
- Implementation of this SWMP in coordination with the Site Environmental Advisor.
- Coordination of access to construction water.
- Maintaining records of water used for construction purposes and its source (Form E01).

#### Site Environmental Advisor

- Completion of Worker Environmental Awareness and Compliance Training.
- Completion of weekly site inspections on Form-D01 (refer to CEMP-D Weekly Site Inspections).
- Completion of inspection immediately following rainfall exceeding 15 mm in 24 hours on **Form-D01** (refer to **CEMP-D** *Weekly Site Inspections*).
- Implementation of this SWMP in coordination with the Construction Manager
- Coordination and approval of any changes to the SWMP.

#### **Construction Supervisors**

- Completion of Worker Environmental Awareness and Compliance Training.
- Implementation of the SWMP.
- Observing SWMP principles.
- Reporting SWMP issues to the Construction Manager.

#### Construction Crew, Contractors and Sub-contractors

- Completion of Worker Environmental Awareness and Compliance Training.
- Observing SWMP principles.
- Reporting SWMP issues to the Construction Supervisors.



## 3.10 Records:

- Records of weekly and rainfall events inspections are maintained on **Form-D01** (refer to **CEMP-D** *Weekly Site Inspections*).
- Records of water used in construction would be maintained on **Form-E01** (attached).



| Date | Water Source | Volume<br>(Litres) | Use                 |       |                        |  |  |
|------|--------------|--------------------|---------------------|-------|------------------------|--|--|
|      |              |                    | Dust<br>Suppression | Other | If "Other" Specify Use |  |  |
|      |              |                    |                     |       |                        |  |  |
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### FORM-E01: Construction Water Record





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NOTES:

- REFER TO DRAWING COOD FOR GENERAL NOTES, ABBREVIATIONS AND LEGEND.
- SURVEY BASED ON GEOLYSE "CONTOUR & FEATURE SURVEY PLAN" DATED 09/10/13. CONTOURS ARE SHOWN AT AN INTERVAL OF 0.2 METRES. CO-ORDINATES ARE MAP GRID AUSTRALIA ZONE 55 (MGA) AND HEIGHTS ARE TO AUSTRALIAN HEIGHT DATUM (AHD).
- 3. THE FLOOD PLAIN BOUNDARY SHOWN IS BASED ON FIGURE 3-2 OF SINCLAIR KNIGHT MERZ'S "PRELIMINARY HYDROLOGIC ANALYSIS NYNGAN SOLAR PV PLANT (NORTHERN BLOCK)" DATED 29/03/31. THIS FLOOD PLAIN IS ATTRIBUTED TO FLOODING OF WHITBARROW CREEK. IN ADDITON, THE REMAINDER OF THE SITE IS SUBJECT TO A 300 YEAR ARI OVERLAND FLOW OF 0.25 METRES.
- 4. THE SITE IS TO BE CONSIDERED A LOW EROSION HAZARD SITE, BASED ON THE ASSESSMENT OUTLINED IN SECTION 4.4.1. OF THE LANDCOM MANAGING URBAN STORMWATER, SOILS AND CONSTRUCTION MANUAL (THE "BLUE BOOK"). FOR THIS REASON, THE FOLLOWING NON-STRUCTURAL MEASURES WILL GENERALLY BE ADEQUATE TO MANAGE BOTH SOIL AND WATER ON SITE:
  - NO GRADING WILL OCCUR WITHIN THE MAJORITY OF THE WORK AREA. THE ONLY AREAS TO BE GRADED ARE THE CULVERT AREA ON THE ACCESS ROAD AND THE DUST CONTROL POND IN THE MOVE-ON AREA.
  - TOPSOIL STRIPING WILL ONLY BE PERFORMED IN THE AREAS OF GRADING AND ROADWAY CONSTRUCTION.
  - TOPSOIL STRIPPED FROM AREAS OF GRADING WILL BE STORED IN THE STOCKPILE SHOWN HEREON, FOR USE IN SITE RESTORATION AT THE END OF CONSTRUCTION. THE TOPSOIL STOCKPILE WILL BE PROTECTED WITH SEDIMENT FENCE AS SHOWN HEREON.
  - TOPSOIL STRIPPED FROM ROADWAY AREAS WILL BE SPREAD EVENLY IN THE AREA ADJACENT TO THE ROADWAY, IN A MANNER THAT WILL NOT IMPEDE EXISTING DRAINAGE PATTERNS, AND IMMEDIATELY STABILISED WITH SEEDING OR
  - OTHER ACCEPTABLE MEASURES. A DUST CONTROL POND WITH AN APPROXIMATE VOLUME OF 1,900 CUBIC METRES WILL BE CONSTRUCTED ON SITE DURING THE INITIAL MOVE-ON PHASE. WATER TRUCKS WILL USE WATER FROM THE POND TO SPRINKLE THE SITE TO CONTROL DUST.
- A STABILISED SITE ACCESS WILL BE CONSTRUCTED AT THE SITE ENTRANCE, AS SHOWN ON DRAWING C801. THE STABILISED SITE ACCESS WILL BE AT LEAST 15 METRES LONG AND 200mm THICK, CONSTRUCTED WITH MAXIMUM 75 mm AGGREGATE, AND UNDERLAIN BY NEEDLE-PUNCHED GEOTEXTILE. CONTRACTOR TO ENSURE ACCORDANCE WITH SD6-14.
- AN ENERGY DISSIPATER SHALL BE CONSTRUCTED AT THE OUTLET END OF THE ACCESS ROAD CULVERT, AS SHOWN ON DRAWING C801, IN ACCORDANCE WITH SD5-8.
- TOPSOIL FROM UTILITY TRENCHING WILL BE STOCKPILED NEAR THE TRENCH LOCATION, SEPARATE FROM SUB-SURFACE SOIL, AND BACKFILLED WITHIN 3 TO 5 WORKING DAYS. TOPSOIL SHALL BE REPLACED IN ACCORDANCE WITH SD4-2.

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| PROJECT: 102.14 MWac SOLAR PHOTOVOLTAIC SYSTEM  |   |           |                            |            |      |      |     |            |
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KIKIKIKIKI Sediment fence

Κ

Stabilise stockpile

surface

## **Construction Notes**

Earth bank

1. Place stockpiles more than 2 (preferably 5) metres from existing vegetation, concentrated water flow, roads and hazard areas.

2. Construct on the contour as low, flat, elongated mounds.

3. Where there is sufficient area, topsoil stockpiles shall be less than 2 metres in height.

Where they are to be in place for more than 10 days, stabilise following the approved ESCP or SWMP to reduce the C-factor to less than 0.10.

Construct earth banks (Standard Drawing 5-5) on the upslope side to divert water around stockpiles and sediment fences (Standard Drawing 6-8) 1 to 2 metres downslope.



SD 4-1

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# CEMP-F Construction Flora and Fauna Management Plan Nyngan Solar PV Power Station





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#### **Document Control**

| Doc<br>Rev | Date     | Reason                                  | Issued by   | Review             | Review |                    |       |
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Cited Cross References within Document:

- 1. Appendix CEMP-H Rehabilitation and Revegetation Management Plan.
- 2. Appendix CEMP-I Ground Cover Management Plan
- 3. Appendix CEMP-S Worker Environmental Awareness and Compliance Training
- 4. **Appendix CEMP-T** *CEMP Auditing and Review*



## 1 Purpose

This Construction *Flora and Fauna Management Plan* for the Nyngan Solar PV Power Station and associated access tracks has been prepared to meet the requirements of:

- Nyngan Solar PV Power Station Development Consent (Application No. SSD-5355)
  - Condition C3(a)
  - Condition B15
  - Condition B16
- Nyngan Solar Plan Submissions Report (NGH Environmental, June 2013)
  - Mitigation Measure 2-8
  - Mitigation Measure 13
  - Mitigation Measure 16
  - Mitigation Measure 19
  - Mitigation Measure 21

## 2 Scope

### 2.1 Overview

As required by Condition C3(a) of the Development Consent (SSD-5355) for the Nyngan Solar PV Power Station, First Solar (Australia) Pty Ltd (First Solar) has developed the following Flora and Fauna Management Plan for the development as it relates to the activities of First Solar. Specifically this Flora and Fauna Management Plan relates to the Construction Phase of the power station and associated access tracks.

A second CEMP is being prepared for the power station's grid connection by a separate contractor. The grid connection for the Nyngan Solar PV Power Station is not under the mandate of First Solar (Australia) Pty Ltd (First Solar) and is therefore not included within the following document. Please refer to the separate grid connection / transmission line CEMP for information specific to the grid connection construction works.

For detail on Condition B17 *Fauna Impacts* of the Development Consent (SSD-5355) please refer for the grid connection / transmission line CEMP.

Noting the above, there are Conditions and Mitigation Measures (documents as identified in Condition A2) that whilst instigated pre and during construction, will extend beyond the



Construction Phase and require ongoing management during the Operational and the Decommissioning phases of the project.

Flora and Fauna Management Plans specific to the Operational Phase and Decommissioning Phase will be included in the Operational Environmental Management Plan and Decommissioning Management Plan (respectively) and will provide continuity in the management of flora and fauna beyond the Construction Phase of the project. These documents will be developed by the project owner/operator (AGL) and currently fall outside of the mandate of First Solar. Monitoring information gathered during the Construction Phase and Operational Phase (respectively) will be utilised to inform the development of the Operational Environmental Management Plan and Decomissioning Plan.

### 2.2 Nyngan Solar PV Power Station Development

The Nyngan Solar PV Power Station will consist of a 102MW solar PV power station located approximately 10km west of Nyngan. The solar plant will occupy approximately 300 hectares of land to the north of the Barrier Highway.

First Solar (Australia) Pty Ltd have been engaged by AGL to provide engineering, procurement and construction (EPC) services. The Nyngan Solar PV Power Station will utilise First Solar's advanced cadimium telluride (CdTe) thin film photovoltaic modules. The solar modules generate electricity with no air emissions, no waste production, no water use and have one of the smallest carbon footprints of any current PV technology. Over 7,000MW of First Solar PV modules have been installed worldwide, including at many of the world's largest solar PV plants, since beginning commercial production in 2002. First Solar has been actively involved in the Australian market since mid-2008.

The construction of the Nyngan Solar PV Power Station project is expected to commence in early 2014 and will take approximately 18 months to complete. Once constructed the Nyngan Solar PV Power Station will generate an estimated 233,000 megawatt hours (MWh) of electricity annually.

## **3** Relevant Approval Provisions

The approval provisions for the Nyngan Solar PV Power Station relevant to the Flora and Fauna Management Plan are as follows:

Condition C3(a) of the Nyngan Development Consent (SSD-5355) states:

(a) The Flora and Fauna Management Plan is to be developed in consultation with OEH to outline measures to protect and minimise loss of native vegetation and native fauna habitat as a result of the construction of the development. The Plan shall include, but not necessarily be limited to:



- i) plans showing terrestrial vegetation communities; important flora and fauna habitat areas; locations of 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;
- ii) methods to manage impacts on flora and fauna species and their habitat which may be directly or indirectly affected by the development, such as location of fencing, procedures for vegetation clearing or soil removal/stockpiling, procedures for rehabilitation directly impacted native vegetation (where appropriate) and procedures for enhancing native habitat (such as re-locating hollows or installing nesting boxes and managing weeds);
- *iii)* procedures to accurately determine the total area, type and condition of vegetation community to be cleared; and
- *iv)* a procedure to monitor the effectiveness of flora and fauna management, and review management methods where they are found to be ineffective.

Condition B15 of the Nyngan Development Consent states:

B15 The clearing of all native vegetation is to be limited to the minimal extent practicably required. Details regarding the procedures for clearing native vegetation and minimising the extent of clearing shall be clearly included in the Flora and Fauna Management Plan contained in condition C3(a).

Condition B16 of the Nyngan Development Consent states:

B16 Tree trunks and major branches from cleared trees shall be used, to the fullest extent practicable, to enhance habitat (coarse woody debris) in rehabilitated areas (either in offset areas of areas adjoining impacted areas) and included in the Construction Flora and Fauna Management Plan contained in condition C3(a).

Mitigation Measure 2 states:

2. Grey-crowned Babbler nest sites identified in Figure 4-7 of the Biodiversity Assessment would be protected from impact during infrastructure siting and design process.

Mitigation Measure 3 states:

3. Pre-clearance surveys would be conducted prior to felling hollow-bearing trees.

Mitigation Measure 4 states:

4. Works would avoid impacts to mature trees that are to be retained. Tree protection standards would comply with Australian Standard AS4970-2009 Protection of Trees on Development Sites (Standards Australia, 2009). Wherever practicable, excavations and vehicle/machinery movements would occur outside the canopy dripline of large eucalypts.


### Mitigation Measure 5 states:

5. Removal of the east-west strip of vegetation must be conducted outside of the breeding season of the Grey-crowned Babbler (June to February) unless the nests have been confirmed to be inactive.

Mitigation Measure 6 states:

6. *Restoration of habitat:* 

Hollows from felled hollow-bearing trees would be salvaged and placed in retained trees or on poles in adjacent habitat. For each hollow salvaged, a nest box would also be installed to offset the loss of habitat.

Where it is not deemed to be a fire hazard, timber from cleared trees (coarse woody debris – CWD – including logs) is to be relocated into areas of adjacent woodland to provide foraging habitat for species such as Grey-crowned Babblers and other ground dwelling fauna. CWD would be scattered evenly across relocation areas, not piled or windrowed. Cleared native vegetation not likely to provide habitat would be mulched rather than burned.

Mitigation Measure 7 states:

7. Within areas of native vegetation, existing tracks would be used wherever possible to avoid compaction and/or disturbance.

Mitigation Measure 8 states:

8. Traffic management measures would be incorporated into the construction and operation phase and would address traffic flow, vehicle speed and vehicle numbers entering and leaving the site. This would aim to prevent collisions with fauna utilising the site, particularly Grey-crowned Babblers.

Mitigation Measure 13 states:

13. Perimeter security fencing will feature heavy duty fabric to increase visibility to fast flying parrots.

## Mitigation Measure 16 states:

16. Trenches would be left open for the least time practical and would be inspected for trapped fauna prior to the back filling. Any trench sections left open overnight would be inspected early in the morning and any trapped fauna removed.

Mitigation Measure 19 states:

19. Nest boxes and salvaged hollows remounted during the construction phase would be routinely inspected to check the integrity of the structures and remedy them if required.

## Mitigation Measure 21 states:

21. An Offset Plan would be developed with input from OEH and the CMA and according to the strategy provided in Appendix G of the Biodiversity Assessment. It would be finalised prior to any construction impacts, as outlined in the Biodiversity Assessment. The objective of offsetting is to ensure that an overall 'maintain or improve' outcome is met



for the project; where impacts cannot be avoided, or sufficiently minimized, the residual impact would be to offset in perpetuity.

With respect to compliance with Mitigation Measure 15, which states:

15 If the dam on the south of the solar plant site is removed during the works, an alternative watering point would not be established on the proposal site.

It is noted that this dam will no longer be removed and will continue to provide an available faunal watering point.

## 4 Relationship to the Biodiversity Offset Management Package

Condition C5 of the Development Consent (SSD-5355) requires the development of Biodiversity Offset Management Package. In accordance with Condition C5, the package shall detail how ecological values lost as a result of the development will be offset. The Management Package is required to be developed prior to the commencement of construction (or as otherwise agreed to by the Director-General). The requirements for the Offset Plan are outlined further in Mitigation Measure 21.

The Biodiversity Offset Management Package is being prepared by a third party on behalf of the project owner (AGL). The Biodiversity Offset Management Package does not form part of this Flora and Fauna Management Plan.

For further information relating to the Offset Site boundaries please refer to the AGL Biodiversity Offset Management Package for Nyngan. The Flora and Fauna Management Plan will be reviewed in consultation with the AGL Biodiversity Offset Management Plan (refer to **CEMP-T** *CEMP Auditing and Review* for information on the CEMP Auditing and Review process).

Condition C3(a)(iii), with respect to biodiversity offset and procedures to determine the area, type, condition of vegetation community to be cleared is addressed within the AGL *Biodiversity Offset Management Plan*. The *Biodiversity Offset Management Plan* has been developed by AGL in consultation with Liz Mazzer from OEH. This document was submitted by AGL to the DPI for approval on 22<sup>nd</sup> January 2014. This document is attached as Attachment F02 to the Appendix CEMP-F *Flora and Fauna Management Plan*.

## 5 Flora and Fauna Plans

**Figure-F01** (see attached) identifies the indicative total area, type and condition of vegetation community to be cleared from within the construction footprint. The clearance area includes the following:

• <u>Poor condition</u> Poplar Box – Gum-barked Coolibah – White Cypress Pine shrubby woodland



- <u>Moderate condition</u> Poplar Box Gum-barked Coolibah White Cypress Pine shrubby woodland
- <u>Good condition</u> Poplar Box Gum-barked Coolibah White Cypress Pine shrubby woodland.

The balance of clearing from within the power station site is not native vegetation and will be restricted to exotics (i.e. cultivation crop). For information on the extent of vegetation removed, please refer to the final First Solar Detailed Construction Drawings.

**Figure-F02** (see attached) identifies the three habitat areas within the power station site. Area 2, in particular the northern end, has been identified in the *Nyngan Environmental Impact Statement Biodiversity Assessment* as an area of native vegetation within the power station footprint that is in 'good' condition. The remainder of the site is considered 'moderate' or 'poor'condition. Area 3, as depicted on this Figure, includes the area of primary vegetation removal on the site. Vegetation removal within the other two areas identified within Figure F-02 will be restricted to access track construction. Exclusion areas will be established as far as practicable in accordance with Section 6.2.1 *Avoidance*.

**Figure-F03** (see attached) identifies key habitat trees within the power station site, including hollow bearing trees and known grey-crowned babbler nests.

No EECs exist on, or adjacent to, the site.

Mitigation Measure 1 requires supplementary surveys for threatened plant species the Red-darling Pea and Pine Donkey Orchid that potentially (confirmation subject to survey) inhabit higher quality woodland vegetation south of the Barrier Highway. It is noted that this requirement relates specifically to the transmission line and falls outside of the mandate of First Solar. Please refer to the grid connection / transmission CEMP for information relating to these species.

## 6 Management Measures

## 6.1 Key Performance Indicators

This section identifies methods to be adopted prior to, during and post construction to manage impacts on flora and fauna species and their habitat which may be directly or indirectly affected by the development.

Key performance indicators for the management measures include:

- 1. Fauna mortality, e.g. fauna collision
- 2. Fauna relocations and release
- 3. Numbers of family groups / nest sites of the Grey-crowned babbler protected
- 4. Number of Hollow Bearing Trees (HBT) protected
- 5. Number of nest boxes and types of species targeted
- 6. Percentage vegetation retained / protected in accordance with the final Detailed Construction Drawings and **CEMP-I** *Ground Cover Management Plan*.



## 6.2 General Management Methods

## 6.2.1 Avoidance

- The extent of vegetation to be removed and retained will be clearly marked by differentiating with coloured flagging tape. Indicatively these will be:
  - YELLOW AND BLACK flagging tape designates a tree to be RETAINED
  - GREEN AND WHITE flagging tape designates a tree to be REMOVED
- In accordance with Mitigation Measure 4, works will be tailored to avoid impacts to mature trees that are to be retained. Protection of trees on site will be undertaken in accordance with AS4970.
- Excavations and vehicle/machinery movements will occur outside the canopy drip line of mature trees that are to be retained.
- Where practicable blocks of trees to be retained within the power station footprint will be marked in to exclusion areas using flagging / bunting (positioned outside of the drip line) and signage to protect plants against accidental damage. Typically this approach will be adopted in areas of high traffic flow (e.g. adjacent to access tracks) or where incidental damage to retained trees may result.
- In accordance with Mitigation Measure 7, existing tracks/cleared areas will be used within areas of native vegetation wherever possible to avoid compaction and/or disturbance to the existing environment.
- Trees will be felled towards the zone of disturbance to avoid damaging adjacent vegetation.

## 6.2.2 Hollow Bearing Trees (HBT)

- **Figure-F03 (**attached) shows the hollow bearing trees (HBTs) in the area impacted by the construction of the power station.
- HBT to be retained will be clearly marked with BLACK AND YELLOW coloured flagging tape.
- All non-hollow bearing vegetation will be removed prior to the removal of HBT that are not to be retained. The purpose of this practice will be to allow fauna to leave HBT on their own accord prior to the felling of the tree.
- In accordance with Mitigation Measure 3, pre-clearance surveys would be conducted prior to the felling of HBT.
- The pre-clearance surveys will include checking for animals in the zone of disturbance before clearing and / or removing them before beginning operations where possible. Refer to Section 6.2 for further information.
- HBTs will be left standing for at least one night after other clearing to allow any fauna the opportunity to remove themselves after site disturbance, unless the clearance activities are being monitored by an appropriately qualified and experienced ecologist/fauna handler.
- Before felling of a HBT:
  - Tap along the trunk to scare animals from the hollows



## - Repeat several times

The aim of this is to 'substantially' shake the tree.

- For medium-large-HBTs which may contain arboreal mammals, section removal will be used with an appropriately qualified and experienced fauna handler present. This person would ensure that any fauna found is safely located to nearby habitat.
- When using sectional removal, the non-hollow-bearing branches should be removed before the hollow-bearing branches.
- After felling, HBTs would be re-checked to ensure no animals have become trapped or injured during clearing operations.
- In accordance with Mitigation Measure 6, hollows from felled HBTs will be salvaged and placed in the sections of uncleared trees within the north-south oriented strip of native vegetation that will run through the centre of the solar plant site (identified as Area 2 in **Figure-F02**).
- In accordance with Mitigation Measure 19, for each hollow salvaged, a nest box would also be installed in Area 2 to offset the loss of habitat.

## 6.2.3 Coarse Woody Debris

- In accordance with Mitigation Measure 6, Coarse Woody Debris (CWD), including logs, will be relocated into Area 2 to provide foraging habitat for species such as Grey-crowned Babblers and other ground dwelling fauna.
- CWD would be scattered evenly across Area 2, and not be piled or windrowed as required by Mitigation Measure 6.

## 6.2.4 Grey Crowned Babbler

- Known Grey-crowned Babbler locations are as identified on **Figure F03** (attached). In accordance with Mitigation Measure 2, known Grey-crowned Babbler nest sites and the location of family groups have been taken into consideration during infrastructure siting and design as far as practicable.
- The ecological works outlined below will be coordinated on-site by a suitably qualified and licenced ecologist. Prior to works commencing a pre-clearance survey will be undertaken to confirm the continued presence of Grey-crowned Babbler.
- In accordance with Mitigation Measure 5, the removal of the east-west strip of vegetation will be conducted outside of the breeding season of the Grey-crowned Babbler (June to February) unless the nests have been confirmed to be inactive by a suitably qualified and licenced ecologist during the pre-clearance surveys.
- Works within Area 2 and direct disturbance to habitat will be limited to two access tracks joining the eastern and western arrays. Electrical cabling will also be trenched immediately adjacent to these tracks. Trees removed during this process will be subject to pre-clearance survey. The indicative location of these areas of disturbance to Area 2 is shown in Figure F01 (attached).



- The areas of disturbance shown in **Figure F01** seek to avoid works in close proximity to the two recorded Grey-crowned Babbler nesting sites. As annotated on **Figure F01** (attached), micro-sighting of the southern track will be undertaken on-site to minimise disturbance to habitat and tree removal. Recorded hollow bearing trees will be avoided as far as practicable.
- In accordance with Mitigation Measure 6, large tree trunks and limbs, particularly hollows, and fallen timber from the areas to be cleared, will be redistributed into those patches in Area 2 with poor ground layer complexity to supplement foraging habitat for Grey-crowned Babblers.
- In accordance with Mitigation Measure 8, traffic management measures will be incorporated in to the Construction Phase of the project. Traffic will be managed in accordance with the Vehicle Movement Management Plan which forms part of the First Solar Nyngan Project Site Safety Plan
- The longer term management of Grey-crowned Babblers will be addressed in the Flora and Fauna Management Plans that form part of the Operational Environmental Management Plan (OEMP) and Decommissioning Management Plan (DMP) (respectively).

## 6.2.5 Trenching

- Indicatively, trenches for electrical cables are 100-110cm deep and up to 60cm wide.
- In accordance with Mitigation Measure 16, trenches will be left open for the least time practical and will be inspected for trapped fauna prior to the laying of cables and prior to back filling.
- Trenches left open will be sloped at the end to allow any trapped fauna to escape. Additionally, 30<sup>®</sup> ramps will be located at regular intervals along the length of the trench. Typically ramps are located every 5m along the length of the trench. Ramps will provide a safe trench entry and exit point for both personnel and fauna.
- Open trenches opened up early in the day will be checked for trapped fauna at the end of the day. Any trench sections left open overnight will be inspected early in the morning and any trapped fauna removed.
- Where open trenches orientate such that there is full sunlight in the trench during the hottest time of the day, shade structures will be placed at intervals to provide areas of respite for fauna that may become trapped during the day.

## 6.2.6 General clearing and trimming

• Tree and shrub removal should aim to minimise disturbance to soils and neighbouring vegetation. Where felling is unavoidable, trees and shrubs will be felled towards the disturbance area.

## 6.2.7 Use and disposal of cleared vegetation

• Non-weedy vegetation will be mulched and re-used for site stabilisation and rehabilitation. Vegetation that contains weeds will not be re-used as mulch on any part of the site. For further information please refer to **CEMP-H** *Rehabilitation and Revegetation Management Plan.* 



- Mulched plant material will be shredded when it is first cut, and allowed to decompose while the works are carried out. The decomposing pile will be stockpiled in a weed free area.
- Cleared vegetation that is not needed for mulch should be removed from the site to the Bogan Shire Council landfill.
- Where practicable, vegetation (in addition to hollow bearing trees) may be placed within areas of retained vegetation to provide additional ground based fauna habitat.

## 6.2.8 Perimeter fence

- As detailed in Section 3.2.7 of the Nyngan Solar Plan Environmental Impact Statement, the site boundary will be protected by a perimeter security fence.
- First Solar will construct the perimeter fence will be constructed in accordance with AS1725 (Appendix K). The proposed perimeter fence will be indicatively 1.8m (6ft) in height and have three strands of barbed wire at the top.
- It is proposed to construct the perimeter fence sequentially across the site to avoid entrapment of larger fauna species (e.g. kangaroos) within the perimeter fence.
- Mitigation Measure 13 requires that the security perimeter fence will feature heavy duty fabric to increase visibility to fast flying parrots.
- The Nyngan Solar Plan Submissions Report does not identify mitigation measures specific to microbats or gliders. As identified in the Environmental Impact Statement 12 bat species, including several threatened species, were identified during anabat monitoring. An unknown glider species was identified during onsite faunal surveys during the development of the Environmental Impact Statement.
- It is First Solar's position that Mitigation Measure 13 does not adequately address the risk posed to avifauna and gliders. Further, the heavy duty fabric required by the Mitigation Measure poses a structural integrity risk to the perimeter security fence, particularly during high winds.
- In November 2013, First Solar sought advice from an appropriately qualified zoologist (Biosis Pty Ltd) with respect to:
  - The risk to fauna posed by the security perimeter fence, including the risk posed by the lower chainlink portion of the fence and the barbed wire section (respectively)
  - Mitigation options to address collision risk and entanglement risk for avifauna (birds and bats) and gliders.
- With respect to collision and entanglement risk, these were generally identified by Biosis Pty Ltd as being the following:

Chainlink fence:

- Fast flying parrots: Low
- Microbats: Negligible
- Gliders: Negligible

#### Barbed wire:

- Fast flying parrots: Low
- Microbats: High



- Gliders: High
- The risk assessment identified that the top strand of barbed wire presents the greatest risk to fauna, with the risk to microbats and gliders being identified as the highest risk.
- In order to appropriately mitigate the risk posed to fauna from the perimeter security fence and the risk to the structural integrity of the fence posed by the heavy duty fabric, First Solar propose to adopt an alternate mitigation measure(s) in consultation with Biosis Pty Ltd.
- The mitigation measure(s) adopted for the fence will be in line with the options outlined in *Nyngan Solar Farm Advice on Options to Mitigate Impacts of Fencing* (Biosis Pty Ltd, November 2013) (see **Attachment F01** attached).
- The visibility of the chain-link fence will be increased by the use of one of the alternatives in Table 3 of the and the visibility of the barbed wire section by replacing the top strand(s) with the options in Table 4 (respectively) of the Biosis Pty Ltd Report (November 2013).
- In addition to physical a mitigation measure(s) on the security perimeter fence, First Solar will undertake monthly collision risk inspections around the perimeter security fence (as detailed below in Section 7.1.2). Where practicable corrective actions will be implemented to respond to recorded mortality.

## 6.2.9 Weed Management

• Weeds within the power station site and along associated access tracks will be controlled in accordance with the *Ground Cover Management Plan* (**CEMP-I**).

## 6.2.10 Worker Environmental Awareness and Compliance Training

- All workers (including sub-contractors) will be required to undertake *Worker Environmental Awareness and Compliance Training* relevant to the Nyngan Solar PV Power Station site (refer to **CEMP-S**).
- Drivers accessing the site will be provided with induction training on the need to restrict vehicle movements to formed access tracks and to limit speeds to minimise the potential for fauna collision.
- Speed control signs will be posted on site.

## 6.3 Handling of Fauna

The handling and relocation of all native fauna will be undertaken by an ecologist/fauna or wildlife handler who is suitably qualified and licensed, and in accordance with the procedures detailed below.

## 6.3.1 Native fauna Handling and Rescue Protocol

Measures will be implemented to prevent fauna entering active construction areas, however there remains a possibility that some fauna will still manage to enter active construction areas. Fauna may be identified in the construction area by the construction team, by the



ecologist/fauna handler or by the onsite Environmental Advisor during daily trench searches or other onsite duties.

### 6.3.2 Pre-clearance Surveys

The ecologist/fauna handler will search fauna habitats during pre-clearance surveys. All fauna habitat identified that will be impacted by construction activities, will be searched for resident fauna prior to work commencing. If individuals are found they will be relocated to adjacent habitat along with their habitat i.e. logs, if possible, outside of impact areas and in locations where they cannot readily / quickly re-enter active construction areas. Arboreal mammals will be relocated to areas containing hollow-bearing trees, reptiles inhabiting fallen logs will be relocated along with the logs (if practicable), any burrowing fauna will be relocated and their burrows filled in to prevent them returning to the construction area.

Relocation of species will be restricted to native faunal species. Where pest species are identified they will be humanly euthanised by an appropriately qualified person (e.g. fauna or wildlife handler).

## 6.3.3 General Capture and Release Methods

The ecologist/fauna handler will be present at all times during the clearance of native vegetation and/or fauna habitats. Animals that require handling will not be approached or handled until the ecologist/fauna handler is present, unless in an emergency (e.g. when ecologist/fauna handler is not on-site and where the failure to immediately intervene would place the animal at significant risk). In such an emergency, the Site Environmental Advisor may obtain over the phone instructions from the ecologist/fauna handler to ameliorate the situation.

All native animals encountered would be treated humanely, ethically and in accordance with relevant codes under the NSW *Prevention of Cruelty to Animals Act 1979*.

If an animal is considered at risk of injury or undue stress by the ecologist/fauna handler, it will be encouraged to vacate the area via knocking, banging or gently shaking the area where the animal is sheltering, and the animal directed into secure adjoining habitat. Where deemed necessary by the ecologist/fauna handler, the animal may be required to be captured and released. Capture and release operations will proceed via the following protocols:

- All construction activities that are considered by the ecologist/fauna handler to be likely to increase the risk of injury, mortality or stress to the animal will be halted until the animal has been removed. Construction activities that do not contribute to the risk of injury, mortality or stress to the animal can continue (as determined by the ecologist/fauna handler).
- Only the ecologist/fauna handler (possessing appropriate licences and permits) are authorised to handle animals.
- Animals will be captured by the ecologist/fauna handler using a safe and ethical technique, as is appropriate for the particular species. Animals that are unable to depart of their own accord will be captured and held in a receptacle appropriate for that species until release. All captive-held animals will be provided with food, water



and warmth as is appropriate for the species. Each receptacle will only hold one animal at a time and will be cleaned and disinfected between uses to avoid the spread of disease.

## 6.3.4 Appropriate containers for temporarily holding fauna

Animals that are unable to depart from a trench/pit or other parts of the construction area of their own accord will be captured and held in an appropriate receptacle until their release. Appropriate containers for temporarily holding various types of animals are:

- Small calico bag (~20cm x 30cm with cord to secure the opening, turned inside out so that seams are on the outside of the bag): small lizards, dragons, micro-chiropteran bats. Bag then slung from beam in a holding box until the time of release.
- Large calico bag or pillow slip (~ 60cm x 90cm with cord to secure the opening, turned inside out so that seams are on the outside of the bag): snakes, medium-sized arboreal mammals. Bag then stored in a cardboard box with padding if required for transport.
- Cage trap (~30cm x 30cm x 60cm): medium sized arboreal and ground-dwelling mammals. Trap to be covered with bag to reduce stress.
- Elliot trap: small mammals (e.g. Antechinus) and reptiles (e.g. larger lizards).
- Small box/open container with appropriate material for nestlings

## 6.3.5 Management of captured native animals - uninjured

The following methods will be followed for the release of uninjured native fauna:

- Uninjured captured individuals will be immediately released at the nearest suitable habitat at a suitable distance away from the construction area.
- 'Suitable locations' will include habitats that are considered appropriate for the species, as determined by the ecologist/wildlife carer (e.g. sufficient protective cover, habitat features likely to support adequate food and water). The requirements of the species type will be taken in to consideration during relocation (e.g. territorial boundaries).
- If the ecologist/fauna handler is not trained to handle snakes (or a particular snake species), then either another Specialist who is trained and experienced at handling snakes will be brought to the site, or a licensed snake handler will be engaged.
- For particular species (e.g, nocturnal species), the ecologist/fauna handler may also determine that it is beneficial to hold the animal/s safely in an appropriate receptacle until (or after) sunset to reduce risks to the animal such as disorientation or attack from predators. The receptacle will be kept in a shaded or otherwise suitable location during the day so that the temperatures experienced by the animals are well within its normal range. At all times, the receptacle will be kept in a secure location, under the supervision of the ecologist/wildlife carer.

## 6.3.6 Management of captured native animals - injured

The following methods will be followed for the management of injured native fauna:



- If an injured animal is found then the ecologist/wildlife carer will immediately take this animal to a nearby veterinarian for assessment.
- For animals whose injuries can be repaired and that stand a good chance of a successful return to the wild (as determined by the veterinarian), they will be placed into the care of a local and 'accredited party' if they are experienced in the care of that particular animal species. This may include WIRES carers.
- For particular species of injured animals where the local accredited party is not qualified in their care and recovery, alternative accredited party(s) will be arranged from a wider area.
- If there are animals for which no suitable accredited parties can be found, advice will be sought from OEH will be sought on an appropriate solution.
- When injured animals have recovered sufficiently, they will be released safely at the point of capture by the ecologist/wildlife carer in suitable habitat.
- Animals whose injuries have a poor chance of repair or for which a successful return to the wild is considered unlikely (as determined by the veterinarian) will be euthanised humanely by the veterinarian.

## 6.3.7 Management of captured native fauna - deceased animals

The ecologist/fauna handler will offer deceased animals to the Australian Museum. If the Museum rejects some or all of the specimens, then the specimens will be offered to OEH. If both parties reject the specimens, then the specimens will be disposed of thoughtfully and hygienically- either buried or securely wrapped and disposed of in the waste collection.

In the event that the animal has sustained considerable damage the specimens will be disposed of in accordance with the above practice.

## 6.3.8 Reporting and documentation

Records of all native animals that are handled, or otherwise managed, will be maintained on a project register or database (including both dead and living individuals). Data to be recorded includes:

- Date and time of the sighting and details of the observer.
- Location of the sighting (including GPS coordinates).
- Species name.
- Number of individuals recorded.
- Condition of the animal (living/dead/injured/sick).
- Vegetation type in which the animal was recorded.
- Biological information (where possible) including the age, sex, breeding condition and size.
- Management action undertaken (e.g. captured, handled, taken to vet).



• Results of any management actions (e.g. released, euthanised, placed with carer). Records will be completed and signed off by appropriately qualified fauna or wildlife handler.

Records of all sightings will be supplied to OEH quarterly for inclusion on the NSW Wildlife Atlas database. Records of all handled, dead or injured animals will also be submitted to OEH and the Animal Welfare Branch of DPI NSW at the completion of the construction phase.

## 7 Monitoring Effectiveness of Management Actions

## 7.1.1 Records of approved clearing methods

- The Site Environmental Advisor and an appropriately qualified fauna / wildlife handler will oversee clearing, HBT removal, hollow relocation, nest box establishment and CWD placement in accordance with the above procedures.
- Compliance with the above management procedures shall be recorded on **Table B2** at the completion of these works.

## 7.1.2 Collision Monitoring

- As identified in Section 6.1.8, First Solar proposed to undertake collision monitoring inspections around the perimeter security fence. This collision monitoring inspection programme has been developed subsequent to discussions with the NSW Office of Environment and Heritage (OEH, Dubbo).
- Once a month for the first 12 months post erection, the perimeter cyclone mesh fence line would be visually inspected for evidence of any fauna collision or entanglement. Any mortality would be recorded, including the month, location and species involved. These inspections would be recorded on **Form-F01** (attached).
- If evidence of mortality through collision is collected, on a quarterly basis this data will be analysed to determine whether there are specific hot spots. If required, measures will then be employed to make the fence more visible at these locations. In the first incidence these measures would include the installation of aerial marker balls or high visibility surveyor's flagging ribbon. These hot spots would then be continually monitored on a monthly basis during the Construction Phase to determine their effectiveness.
- For the first three years of operation, on an annual basis, a report would be prepared and submitted to the Office of Environment and Heritage (OEH) detailing the results of all monitoring, measures implemented to minimise collision, and an assessment of their effectiveness. Contingent on the results, and sign-off from OEH, this monitoring program would be either scaled back or dropped completely. Onsite monitoring activities will be against the Key Performance Indicators in Section 6.1.

It is noted that some of the monitoring associated with the above will extend beyond the construction period and as such, will fall outside the control/responsibility of First Solar. It would be proposed to continue this monitoring effort, post construction, with the



responsibility for doing so transferring across to AGL as the owner/operator of the power station. It is anticipated that detail (and continuity) of the monitoring program will be achieved through incorporating these measures into the power station's Operational Environmental Management Plan (OEMP).

The OEMP, pursuant to Consent Condition C4 of the Minister's approval, must be submitted to the Director General no later than one month prior to the commencement of Operation of the development or within such period as otherwise agreed to by the Director General.

First Solar, as part of its handover arrangements with AGL, will provide a summary of all monitoring undertaken during the Construction Phase.

### 7.1.3 Habitat Relocation

• The Nyngan Environmental Impact Statement (EIS) identified, in addition to the salvage and either pole or tree mounting of hollows from felled hollow bearing trees, supplementary nest boxes to be installed.

As noted in the Nyngan EIS, the OEH does not generally support the use of nest boxes as a mitigation measure, this is due to:

- 1) Nesting boxes are often used by pests such as honeybees and starlings that may prevent the occupancy of these artificial structures by displaced species
- 2) Different species have very different requirements and hence multiple sizes and designs may be needed
- 3) Nest boxes are not a long term solution. Nesting boxes do not last long and a program of maintenance and replacement would be required.

During consultation with the OEH during the development of this Flora and Fauna Management Plan, the OEH has, in this instance, accepted the decision to use artificial nest boxes in conjunction with salvaged tree hollows.

This acceptance from the OEH is conditional on monitoring of artificial nest boxes to provide the following information:

- The size and design of each nest box.
- What species is using each nest box.

In addition to the monitoring requested by OEH, First Solar will seek advice from an appropriately qualified ecologist with respect to the placement of any nesting boxes required under Mitigation Measure 6.

- To ensure a variety of nesting opportunities for displaced species, nest boxes installed will be of a different design and size.
- Nest boxes and salvaged hollows remounted during the construction phase would be inspected on a monthly basis to check the integrity of the structures and remedy them if required, as well as record what species are utilising each. This would be recorded on Form-F01.
- If the nest boxes are found to be inhabited by introduced species such as honeybees or Starlings they will be removed.



• Where nest boxes are removed (in accordance with the above bullet point) First Solar shall discuss and recommend alternative management measures (suitable for target species) with the project owner/operator (AGL) for inclusion in the Operational Environmental Management Plan.

## 8 Responsibilities:

## **Project Manager**

• Advising the AGL Project Manager of the actual areas impacted by construction to inform the Biodiversity Offset Management Package for Nyngan.

## **Construction Manager**

- Completion of Worker Environmental Awareness and Compliance Training.
- Ensuring all clearing works are conducted in accordance with the above management procedures.
- Ensure clearing and HBT removal is undertaken within the nominated periods:
  - HBT removal will be conducted between January to March
  - Clearing of other trees will be undertaken in March, April and May, unless Greycrowned Babbler nests have been confirmed to be inactive
- Control and monitoring of site disturbance extents within the footprint of the power station.

## Site Environmental Advisor

- Completion of Worker Environmental Awareness and Compliance Training.
- Oversee clearing, HBT removal, hollow relocation, nest box establishment and CWD placement in accordance with the above procedures.
- Recording compliance with the above management procedures on **Table B2** at the completion of these works.
- Monthly monitoring of next boxes and perimeter fence (Form-F01.01).

## **Project Ecologist**

- Provide input relating to ecological obligations for the Worker Environmental Awareness and Compliance Training.
- Conduct pre-clearance surveys prior to felling HBTs.
- Specifying the location for placement of salvaged hollows and coarse woody debris within the north-south oriented strip of native vegetation that will run through the centre of the solar plant site (identified as Area 2 in **Figure-F02**).
- Verify Grey Crowned Babbler nests are inactive.
- Undertake monthly collision mortality monitoring on perimeter fence and quarterly analysis.



• Design and locate nest boxes and undertake monthly monitoring.

## Fauna Handler / Project Ecologist

- Undertake any and all handling and relocation of native fauna.
- Be present on-site during HBT felling
- After felling, re-check HBTs to ensure no animals have become trapped or injured during clearing operations.
- Maintain animal handling records (Form F02)

## **Project Surveyors**

• Measure and record with GPS the exact areas impacted by construction to ensure that the actual, not estimated area is offset in the Biodiversity Offset Plan.

## Supervisors

- Completion of Worker Environmental Awareness and Compliance Training.
- Ensuring all clearing works are conducted in accordance with the above management procedures.

## **Construction Personnel, Contractors and Sub-contractors**

- Completion of Worker Environmental Awareness and Compliance Training.
- Ensuring all clearing works are conducted in accordance with the above management procedures.

## 9 Records

- Records of monthly perimeter security fence collision inspections are maintained on **Form-F01** (attached).
- Records of Fauna Handling on Form-F02 (attached)



Attachment F01: Nyngan Solar Farm – Advice on Options to Mitigate Impacts of Fencing





# Nyngan Solar Farm Advice on Options to Mitigate Impacts of Fencing

## Prepared for Beca (on behalf of First Solar)

6 November 2013





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## 1 Introduction

## 1.1 Background

The Nyngan Solar Farm ("the project") is a 102 MW solar project located approximately 10 km west of Nyngan in Central West NSW. The project was granted development consent as a State Significant Development (SSD) under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) on the 15 July 2013.

The proponent, AGL, has engaged First Solar to construct the solar farm. Construction of the solar farm will include construction of a permanent fence around the site. The proposed fence will be built in accordance with AS1725, and will be approximately 1.8 metres in height with three strands of barbed wire on the top.

Biosis Pty Ltd (Biosis) has been commissioned by Beca, on behalf of First Solar, to provide zoological advice in relation to fauna friendly fencing for the project. First Solar have raised concerns regarding the adequacy of the risk assessment that the fence poses to birds and bats, as well as the proposed measures to mitigate any impacts. Currently, the proposed mitigation is limited to the use of heavy duty fabric to increase visibility to fast flying birds.

In addition, First Solar are seeking alternatives to the use of heavy duty fabric due to the potent risk this poses to the structural integrity of the fence over the life of the project (25 years).

## 1.2 Objectives

The objective of the advice document is to provide Beca and First Solar with a short opinion piece on the following:

- Provide an overview of the risk the fence, in particular the barbed wire, poses to the bat species identified in the Environment Impact Statement (EIS).
- Provide ecological advice on whether the EIS adequately addressed the issue, and a conclusion on whether a risk exists.
- Assess the adequacy of the existing mitigation (EIS, Mitigation Measure 13) with respect to the impact on bird species, and whether the existing mitigation measure would mitigate risks to bats.
- Provide alternative fencing options to minimise risk to birds and bats (avifauna). Options should be appropriate, effective, cost effective and long lasting (noting the 25 year lifespan of the project).

## 1.3 Methods

In order to achieve the objectives listed above, the following tasks were undertaken:

- A review of the EIS to determine those species at risk of impact due to barbed wire fencing.
- A literature review to ensure comprehensive assessment of the potential impacts to avifauna.
- A discussion of potential impacts associated with the perimeter fence to fauna species identified in the EIS.
- A discussion of options available to mitigate identified impacts.



• Recommendations regarding the most effective option with regards to impact reduction, longevity and cost effectiveness.



## 2 Risk Assessment

## 2.1 Species at Risk

Species considered most at risk of impact from the perimeter fence includes avifauna as well as gliders. Fencing can limit movement of other terrestrial species; however the risk of significant impact, such as fatal injury or mortality due to collision or entanglement, is considered limited and these species have not been considered further.

A review of the EIS has determined the following avifauna and glider species to be considered at risk of impact due to barbed-wire fencing, including the:

- Birds: Superb Parrot Polytelis swainsonii.
- Microchiropteran bats: South-eastern Long-eared bat *Nyctophilus corbeni*<sup>1</sup>, Yellow-bellied sheathtail bat *Saccolaimus flaviventris*, Little pied bat *Chalinolobus picatus*, Inland forest bat *Vespadelus baverstocki*.
- Gliders: unidentified Glider species (*Petaurus* spp.), either a Sugar Glider *Petaurus breviceps* or Squirrel Glider *Petaurus norfolcensis*.

Given the ecology of each of these species, different components of the perimeter fence pose varied risks to these species. For example, birds, particularly fast flying birds such as Parrots, are much more likely to collide with lower portions of the fence, whilst glider species are most likely to become entangled in barbed wire atop the fence. Potential impacts are discussed below.

## 2.2 Potential Impacts

In Australia, there is estimated to be around 10 million kilometres of barbed wire fencing in existence around the country (LFW, 2011). Scientific studies and anecdotal reports from landholders suggest that the injury of animals from barbed wire fences is widespread (van der Ree, 1999). In particular, barbed wire fences are known to be a significant cause of fatalities in birds, arboreal mammals, ground mammals, reptiles and bats (Gleeson and Gleeson, 2012).

Solid fences, such a chain-link fences, represent a collision risk to some species, particularly fast flying species such as Parrots.

## 2.2.1 Birds

High chain-link fences are recognized as a hazard to fast flying parrot species (Pfennigwerth, 2008), which includes the Superb Parrot which was recorded on site.

<sup>&</sup>lt;sup>1</sup> Presence has been assumed for this threatened species in the absence of harp trapping, given that call characteristics and frequencies almost completely overlap between subspecies within the Nyctophilus genus, making them indistinguishable using standard anabat parameters (Pennay et al, 2004) such as those used for the surveys conducted as part of the EIS



Birds that are active during daylight hours have the best colour vision (Berger, 2012). In some bird species, the visual spectrum extends into the ultraviolet (UV) range. A recent study (Lind and Kelber, 2009) on two Australian parrots, the Bourke's parrot *Neopsephotus bourkii* and Budgerigar *Melopsittacus undulates* positively demonstrated varying intensity of UV vision spectrum between species. Parrot species, including the Superb Parrot, rely on visual cues to navigate and chain-link fences may not be highly visible to this species.

There is no publicly available data on collision of the Superb Parrot with fences, although data for the Swift Parrot indicates that between 2002 and 2005 two out of 25 (8%) collisions were with fences (Biosis, 2005).

The Superb Parrot is a fast flying species that moves in small flocks, which are generally compact and their flight direct. When making local foraging movements, the species usually moves along wooded corridors, rarely crossing large areas of open ground. The species mostly forages on the ground, but is also known to forage in canopy trees and among outer branches of shrubs (Higgins, 1999). During the nesting period the species is known to travel to and from foraging sites 2-3 times per day, whilst following the breeding season (September to January) the species can disperse en masse to foraging habitat.

Given the height at which this species flies, and the lack of being identified as a significant risk to this species (compared to the Swift Parrot) we conclude that the potential risk to the Superb Parrot is relatively low.

## 2.2.2 Microbats

Barbed wire fencing is recognized as a major contributing factor to the death and injury of bats (Duncan et al, 1999). Table 1 provides a summary of relevant literature.

| Species                        | Reference   |
|--------------------------------|---|
| South-eastern Long-eared Bat   | A study by (Strahan, 1983) recorded one individual of the genus Nyctophilus entangled in barbed wire fencing in NSW (van der Ree, 1999)               |
| Yellow-bellied sheath-tail bat | A study by (Martin Schulz) recorded 12 individuals entangled in barbed wire fencing around Forty Mile Scrub National Park in Queensland (Booth, 2007) |
| Little pied bat                | A newsletter by (LFW, 2008) references the Little Pied Bat as a species that is a common casualty to barbed wire fencing.                             |
| Inland forest bat              | No data   |

## Table 1: Documented fatalities in microbats

This data illustrates that barbed wire presents a significant risk to microbat species. Anecdotal information indicates that the top strand of barbed wire fencing presents the greatest risk.

There is no data available on the risk of microbat species colliding with lower portions of fences. Given the echolocation ability of these species is likely that the risk of collision with larger fences, such as chain-link fences, is negligible.

## 2.2.3 Gliders

Gliders are commonly caught on barbed wire fences (Amesbury, 2007). A case study in the Euroa area in Victoria found that of the 33 animals recorded entangled on barbed wire between 1994 and 1998, 15 out of the 33 were positively identified at Squirrel Gliders, while another 11 were identified as gliders but could not be reliably be identified to species. The results of this study show that Gliders accounted for the largest proportion (79%) of individuals killed by barbed wire fencing in this area (van der Ree 1999). Table 2 provides a summary of relevant literature.



## **Table 2: Documented fatalities in Gliders**

| Species         | Reference   |
|-----------------|---|
| Squirrel Glider | A study by (van der Ree, 1999) recorded 15 individuals entangled in barbed wire fencing in Victoria (Booth, 2007)                               |
| Sugar Glider    | A study by (van der Ree, 1999) recorded 78 individuals entangled in barbed wire fencing, with 34 in Victoria and 44 in Queensland (Booth, 2007) |

This data illustrates that barbed wire presents a significant risk to Gliders. Anecdotal information indicates that the top strand of barbed wire fencing presents the greatest risk.

There is no data available on the risk of Gliders colliding with lower portions of fences. These species are nocturnal, and unless fences are highly visible and / or reflective there is potential for these species to collide with lower portions of fences. However, given the speed at which these species glide the risk of catastrophic injury and / or death is considered low.



## 3 Mitigation Measures

## 3.1 Current Mitigation Measures

Current mitigation measures listed in the Biodiversity Assessment (refer to Appendix D1 *in* NGH, 2013b) related to the utilization of fencing for the project, include the following:

• If cyclone mesh fencing is to be used then shade cloth or other methods to increase the visibility to fast flying parrots would be incorporated (refer to Section 6.2).

## 3.2 Literature Review

Perimeter fences have the potential to impact native fauna by creating a barrier to movement and by providing a collision risk (Preston 2007, Pfennigwerth 2008). Records collated from across Australia indicate that the problem is widespread. A recent review (van der Ree, 1999) identified entanglement with barbed wire fences as a major cause of mortality for over 62 species of wildlife across Australia. In particular, barbed wire fences can cause significant fatalities, with the most susceptible groups being birds, arboreal mammals, ground mammals, reptiles and bats (Gleeson and Gleeson, 2012).

Furthermore, barbed wire fencing has been identified as a key threatening process in the recovery plans for a number of threatened species listed under the TSC Act and/ or EPBC Act, including the Yellow-bellied glider *Petaurus australis*, the Mahogany glider *Petaurus gracilis*, the Spectacled flying fox *Pteropus conspicillatus* and Grey-headed flying fox *Pteropus poliocephalis* (WFF, 2013).

High-risk areas are considered to include regular flight paths for avifauna, and movement paths for mammals that may include areas of fragmented and continuous habitat (van der Ree, 1999). As the land within the study area is considered to be highly modified, fragmented and representative of much of the farmland in the district (refer to Appendix D1: Biodiversity Assessment in NGH, 2013b), flight paths and travelling routes for avifauna are likely to be situated along linear remnants as well as in direct lines between areas of remnant vegetation. Gliders are limited to gliding between treed areas at distances of approximately 40 metres. Thus, those species travelling through the study area to linear remnants surrounding the site, or traversing linear remnants running through the site, are considered at greatest risk.

As stated in Section 2.2, each of the components of the fence present different levels of risk to different species. Based on our literature review, the overall risk of avifauna or gliders colliding with the lower portions of the fence (the chain-link) are considered low and the risk of serious injury or death negligible. Despite this, option to mitigate any impacts are outlined in Section 3.3. Barbed wire sections of the fence present the greatest risk to avifauna and Gliders, and options to mitigate impacts from barbed wire are outlined in Section 3.4

## 3.3 Alternate options to the use of heavy duty fabric

As stated above, the potential risk of a significant impact from lower portions of the fence is considered limited, and discussion of options to mitigate any impacts should be assessed in this context.

There is little data available on the effectiveness of options to prevent collision with chain-link fences. However, the goal of any mitigation measure should be to increase the visibility for both diurnal and nocturnal species. Options to mitigate impacts are outlined in Table 3.



## Table 3: Alternative options to heavy duty fabric

| Option  | Description  |
|---|--|
| Use of solid materials with slats<br>cut into it                                | The risk heavy duty fabric poses to the structural integrity of the fence can be reduced by cutting wind holes (semicircular cuts) into the fabric. Although this may reduce the risk the authors have observed fences, including braced fences, failing during high winds.  |
| Use of vertical of horizontal slats,<br>inserted into the chain-link fence      | Vertical slats can be fed through the chain-link fence at various intervals. A variety of materials are available. The benefit of this type of mitigation is that wind can pass readily through gaps in the slats.   |
| Securing solid materials, such as iron, to sections of the fence                | Securing horizontal sections of a solid material to the fence is likely to increase the visibility of the fence, and materials are likely to be long lasting. However during periods of high wind such structures may act as wind sails, reducing the structural integrity of fences requiring maintenance.  |
| Replacement of standard chain-<br>link fencing with coated chain-<br>link fence | Chain-link fence can be purchased as either coated wire fencing (in green and black)<br>or now high density plastics in high visibility colours are now available. Colour<br>variations, particularly green and fluorescent, are likely to increase visibility.<br>However plastics may break down over the lifespan of the project and fluorescent<br>materials may not suit visual amenity considerations. |
| Steel fencing   | The use of solid steel fencing is likely to both increase the visibility of the fence and increase the structural integrity of the fence. However such fencing can be high cost.   |
| Use of reflective tags  | Using reflective tags attached to fences can increase visibility for fauna species, resulting in reduced collision risk.   |

## 3.4 Alternative options to barbed wire

A number of studies have been undertaken into the effectiveness of alternatives to barbed wire fences. In particular, cost-effective fencing alternatives have been sought by landholders that are easy to install and long lasting (Gleeson and Gleeson, 2012). As a result, a number of alternatives to barbed wire fencing, and modifications to existing fences to help reduce the likelihood of wildlife entanglement have been developed (LFW, 2011).

A review of alternatives to barbed wire fences are provided in **Table 4**, below.

## Table 4: Alternative options to barbed wire fencing

| Option                                       | Description   |
|--|---|
| Replacing top strand of barbed<br>wire fence | <ul> <li>Studies show that 86% of wildlife entanglements occur on the top strand of wire, so in situations where all of the barbed wire cannot be replaced with wildlife-friendly fencing, replacing the top strand alone can result in a significant reduction in risk to wildlife (as per AWS, 2010). Options include: <ul> <li>Replacing the top strand of wire with plain wire (AWS, 2010; LFW, 2011).</li> <li>Replacing the top strand of wire with 'borderline', a high tension white plastic coated nylon wire (LFW, 2011).</li> </ul> </li> <li>First Solar will need to assess impacts to security risk.</li> </ul> |
| High-tensioned plain wire                    | Plain wire (i.e. unbarbed) tensioned for strength. All strands in the fence can be high-tensioned plain wire. Even replacing the top two strands can result in a  |



| Option   | Description   |  |  |
|--|---|--|--|
|  | significant reduction in risk to fauna.<br>First Solar will need to assess impacts to security risk.  |  |  |
| Electric fences with no barbed<br>wire               | Strands in the fence are electrified. The remaining strands may be plain wire. This can be restricted to upper sections of the fence, replacing barbed wire. Electricity supply and maintenance will need to be considered.   |  |  |
| Improving the visibility of barbed<br>wire fencing   | <ul> <li>Marking barbed wire with a visual deterrent to increase it's visibility and make it easier for avifauna to avoid. Some examples include:</li> <li>Using shade cloth to increase the visibility of the fence to parrots (as per Ptennigwerth, 2008).</li> </ul>   |  |  |
|  | <ul> <li>All-nylon highly visible sighter wire is nylon tape that is intended to<br/>increase the visibility of barbed wire fence and has been shown to be<br/>effective, albeit is relatively costly (Booth 2007).</li> </ul>  |  |  |
|  | • Stringing electric fence tape above the top strand of barbed wire (LFW, 2011).  |  |  |
|  | • Attach reflective materials such as metal tags along the top wire (LFW, 2011).  |  |  |
|  | These measures are considered to last for approximately 10 years, and thus may require replacement through the life of the project.   |  |  |
| Covering barbed wire with split<br>tubing            | <ul> <li>Physically covering the barbed wire so avifauna is not caught on the barbs. Some examples include:</li> <li>Use of polypipe in predicted/ known hotspots (LFW, 2011).</li> </ul>   |  |  |
|  | First Solar will need to assess impacts to security risk.   |  |  |
| Use of solid sheet or iron instead<br>of barbed wire | Use of 1.8 x 2.4 m cyclone type fence to enclose the proposed works, both for safety<br>and security purposes, avoiding the requirement for barb-wire topped cyclone<br>fencing (Solar Choice, 2013).<br>Chain-link fence can be topped with solid iron sheeting instead of barbed wire.<br>Although this may act as a wind sail. |  |  |



## 4 Discussion and conclusions

Various components of the perimeter fence pose varying risk to Gliders and avifauna. Impacts of chain-link fencing are likely to be low. For this reason we consider that mitigation of potential impacts to fauna are not required for the chain-link portion of the fence. We understand First Solar and AGL are considering implementing a monitoring program. Such a program could be undertaken during routine maintenance of the solar farm. Should this program identify significant fauna fatalities many of the mitigation measures outlined in Section 3.3 can be retro-fitted.

However, barbed wire fencing has been implicated in a number of wildlife fatalities and injuries across the Australian landscape (van der Ree 1999, Gleeson and Gleeson 2007). The results of the literature review show that barbed wire fencing has the ability to pose a significant risk of fatality and injury to a range of avifauna and Gliders, including those species identified in the EIS for the study area. In order to adequately mitigate the risk of potential fatalities for these species, a number of alternative fauna friendly fencing options have been reviewed and summarised (refer to Table 4).

Studies have shown that 86% of wildlife entanglements occur on the top strand of barbed wire, so in situations where all of the barbed wire cannot be replaced with wildlife-friendly fencing, then even replacing the top strand alone will result in a significant reduction in risk of entanglement and consequent impacts to fauna (AWS, 2010).

As a minimum, the top strand should be replaced with plain wire. Where possible, it is recommended that the top <u>two</u> strands are replaced with high tension plastic coated nylon wire (LFW, 2011). There is widespread perception that plain wire costs more than barbed wire, and although it may have in the past, this is no longer considered to be the case. It also should be noted that it takes less manual labour time to run out plain wire than barbed wire (Booth, 2007).

Furthermore, taking into consideration the nocturnal nature of the target species, improving visibility of the fencing to these species in the study area is considered to be a critical component. Therefore, it is recommended that a product that glows in the dark be utilised for the fencing, where feasible. Some practical examples have been sourced, and are included in Table 5, below. This option is further supported by the fact that most entanglements occur at night (Booth, 2007), and therefore reflective deterrents that operate in low light, such as reflective metal are most likely better (Gleeson and Gleeson, 2012).

Whereby, a glow in the dark solid nylon wire, such as the Amacron Knight Line, cannot be sourced (i.e. it has been discovered that this product has recently been taken off the market by manufacturers), reflective deterrents such as metal tags are then recommended, to make the fence more visible to birds and echolocating bats.

## **Table 5: Nylon fencing options**

| Company              | Nylon fencing   |
|----------------------|---|
| Amacron Technologies | This company makes Border Line, a solid nylon wire, and Knight Line, that glows in the dark |



| Company             | Nylon fencing  |
|---------------------|--|
|                     | Border Line (\$297/ 600 metres inclusive of GST)<br>Knight Line (\$400/ 600 metres inclusive of GST)2<br>http://amacron.com.au/horse-fencing/border-line-fencing-en/ |
| Austwan Enterprises | This company makes Sita wire, a 4mm sighter wire for horses<br>W2 SITA wire (\$275/ 770 metres inclusive of GST)<br>http://www.austwan.com/contents/en-us/d5.html    |

We conclude that the implementation of these low cost and easily constructed measures will result in a significant reduction in risk to fauna species. However, all mitigation measures will need to be considered in relation to durability and constructability.

<sup>&</sup>lt;sup>2</sup> This product has recently been taken off the market by the manufacturers as it was not selling a high enough quantity of the product to make production viable (pers comm Amacron 6/11/2013)



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## 6 Appendices



- Absorbs sunlight during the day and then glows visibly at night.
- 4 mm diameter, solid nylon (no steell), HT polymer.
- Can be strained using normal fencing strainers.
- Will break before it cuts into a horse, 100% safer than steel.
- No radiation totally safe.
- Appears white in colour in the light, but glows in the dark.
- UV stable for 10 years+.

KNIGHTLINE can be installed as a complete 5 strand fence or installed along with other non-glowing fencing wires. Night blindness in horses is a real problem to many serious horse lovers and KNIGHTLINE is designed to stand out in the vision of horses, making the fence a visible boundary on the darkest of nights. The darker the night, the more KNIGHTLINE will stand out. KNIGHTLINE will not cut into a horse in the event of a horse running through the fence. **KNIGHTLINE** will glow for 8-12 hours in the dark, depending on the amount of exposure to the sun during the day. The more exposure to the sun, the longer it glows.

Recommended tension = 4%.

KNIGHTLINE is available in 600 metre and 100 metre rolls.

# Attachment F02: Nyngan Solar Plant Biodiversity Offset Management Plan



# **Biodiversity Offset Management Plan**

NYNGAN SOLAR PLANT



JANUARY 2014



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## **Document Verification**

| ng          | h enviro | nmental Project Title:             | Biodiversi         | Nyngan Solar Plant<br>ty Offset Management Plan |
|-------------|----------|------------------------------------|--------------------|---|
| Project Nu  | umber:   | 5317                               |                    |   |
| Project Fil | e Name:  | Nyngan Solar Offset Plan Fi        | nal v1.0           |   |
| Revision    | Date     | Prepared by (name)                 | Reviewed by (name) | Approved by (name)                              |
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| Draft v1.2  | 11/11/13 | Dave Maynard                       | Brooke Marshall    | Brooke Marshall                                 |
| Draft v2.0  | 17/01/14 | Dave Maynard                       | Nick Graham-Higgs  | Nick Graham Higgs                               |
| Final v1.0  | 22/01/14 | Dave Maynard and Jane<br>Blomfield | Nick Graham-Higgs  | Nick Graham-Higgs                               |

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# **ACRONYMS AND ABBREVIATIONS**

| BBAM     | BioBanking Assessment Methodology  |
|----------|--|
| BBCC     | BioBanking Credit Calculator   |
| СМА      | Catchment Management Authority   |
| COA      | Condition of approval  |
| DECC     | Refer to OEH   |
| DP&I     | (NSW) Department of Planning and Infrastructure  |
| EEC      | Endangered ecological community – as defined under relevant law applying to the proposal                               |
| EIS      | Environmental Impact Statement   |
| EPBC Act | Environmental Protection and Biodiversity Conservation Act 1999 (Cwth)   |
| ha       | Hectares   |
| НВТ      | Hollow-bearing tree  |
| km       | Kilometres   |
| kV       | Kilovolt   |
| m        | Metres   |
| MW       | Megawatt   |
| NSW      | New South Wales  |
| OEH      | (NSW) Office of Environment and Heritage, formerly Department of Environment, Climate Change and Water (DECC or DECCW) |
| PV       | Photovoltaic   |
| TSC Act  | Threatened Species Conservation Act 1995 (NSW)   |

# **1** INTRODUCTION

### 1.1 BACKGROUND

AGL Energy Limited (AGL) has approval to construct a solar photovoltaic (PV) power station with a nominal capacity of up to 106 megawatts (MW) at Nyngan in Central West New South Wales (NSW). The solar plant will be located approximately 10 kilometres west of the Nyngan township. The solar plant will occupy approximately 300 hectares of privately owned agricultural land. The site is largely cleared with some small remnant patches of degraded native vegetation and scattered trees. It is currently used for agriculture (cropping and grazing). A transmission line and easement will be constructed over a length of approximately 3 kilometres to the south of the solar plant site to connect the solar plant with the existing Nyngan – Cobar 132 kilovolt (kV) transmission line. The location of the development site and the proposed access and transmission easements are shown on Figure 1-1.

The project will result in the permanent loss of approximately 10 hectares of native vegetation ranging from poor to good condition. The Biodiversity Assessment for the project (**ngh**environmental 2013) determined that no threatened ecological communities or flora species would be impacted by the project. The development site does, however, contain known breeding habitat for the threatened Grey-crowned Babbler (listed as Vulnerable under the *Threatened Species Conservation Act 1995*) with a number of family groups and active nests identified at the development site during field surveys for the Biodiversity Assessment. A strategy to offset the residual impacts of the project, including habitat for the Grey-crowned Babbler, was included in the Biodiversity Assessment.

The project was approved by the Department of Planning and Infrastructure (DP&I) on 15 July 2013 under Section 89E of the *Environmental Planning and Assessment Act 1979*. It is a condition of approval (COA) that a Biodiversity Offset Management Package be developed to offset the ecological values lost as a result of the project (COA C5 detailed in Appendix A). In addition to this condition of consent, the proponent also committed to the following mitigation measures relating to offsets within the Nyngan Solar Plant Submissions Report (**ngh**environmental June 2013):

- An Offset Plan would be developed with input from OEH and the CMA and according to the strategy provided in Appendix G of the Biodiversity Assessment (which included a proposed 1:5 offset ratio). It would be finalised prior to any construction impacts, as outlined in the Biodiversity Assessment. The objective of offsetting is to ensure that an overall 'maintain or improve' outcome is met for the project; where impacts cannot be avoided, or sufficiently minimised, the residual impact would be offset in perpetuity.
- Prior to finalising the Offset Site boundaries, the proponent would validate the area impacted by construction to ensure that the actual, not estimated, impacted area is offset.
- The offset site management actions and their outcomes would be reported annually to the Department of Planning and Infrastructure for the duration of the project (up to 30 years) to demonstrate that a 'maintain or improve' outcome has been met.

AGL have identified a proposed Offset Site located approximately 10 km southwest of the solar plant site. The proposed site is approximately 50 hectares (ha) in area and is located in the north-western corner of Lot 30 DP 752879 (Figure 1-1). As an additional compensatory measure, AGL also propose to revegetate approximately five hectares of degraded farmland within the development site to further mitigate the loss of habitat for the Grey-crowned Babbler.



#### 1.2 PURPOSE AND SCOPE OF THIS REPORT

This report documents how the proponent will meet its obligations under COA C5. Specifically this report provides:

- An overview of the development site and the values that require offsetting.
- Details of the methodologies employed in assessing the values of the Offset Site.
- A description of the Offset Site and the biodiversity values it contains.
- Details of the method for securing the Offset Site and recommendations for its future management and monitoring.
- Details of proposed additional compensatory measures.
- A discussion of the suitability of the proposed offset and additional compensatory measures.

The location of the proposed Offset Site was refined during consultation between the landowner and the Central West Catchment Management Authority (CMA). The NSW Office of Environment and Heritage (OEH, Liz Mazzer) has been consulted throughout the preparation of this report.

## **1.3 OBJECTIVES AND OUTCOMES**

The overarching objectives of this plan and the biodiversity outcomes to be achieved are to:

- Provide a 'like for like' offset with regard to vegetation types and threatened species habitats impacted by the development.
- Ensure offsets are consistent with the *Principles for the use of Biodiversity Offsets in NSW.*
- Achieve a net improvement in the biodiversity values within the Offset Site and maintain this for the long-term.







Figure 1-1 Location of the proposed development and Offset Site

# **2 DEVELOPMENT SITE: OVERVIEW**

## 2.1 VEGETATION TYPES

The 'development site' is defined as the areas that would be impacted by the solar plant and transmission line, illustrated in Figure 1-1. A Biodiversity Assessment for the development site was prepared by **ngh**environmental as part of the Environmental Impact Statement (EIS) for the project. Vegetation communities were classified as described in *New South Wales Vegetation Classification and Assessment: Part 1 Plant communities of the NSW Western Plains* by Benson (2006)<sup>1</sup>. Native vegetation within and surrounding the development site consists of, or is derived from, Poplar Box - Gum-barked Coolabah - White Cypress Pine Shrubby Woodland (Veg ID 103). It is dominated by Poplar Box (Eucalyptus populnea subsp. bimbil) and co-dominated by White Cypress Pine (*Callitris glaucophylla*) with scattered individuals of Gum-barked Coolibah (Inland Red Box, *E. intertexta*).

The majority of native vegetation within the solar plant site is in moderate or poor condition with a degraded understorey and is restricted to narrow strips of vegetation dividing otherwise cleared and cropped paddock areas. Vegetation in good condition with a more intact understorey occurs south of the Barrier Highway within the transmission line corridor.

The cleared paddock areas consist of mostly exotic species and are no longer representative of any native vegetation type. These areas are dominated by Lucerne with dense patches of Stinkgrass (*\*Eragrostis cilianensis*) scattered across these areas.

No endangered ecological communities (EECs) or threatened flora species listed under State or Commonwealth legislation were recorded or considered likely to occur within the development site.

## 2.2 FAUNA HABITATS

Habitat in the project area can be defined as open Poplar Box Woodland. The structure of woodland is generally simple with the open canopy dominated by eucalypts, a grassy groundcover with fallen timber and leaf litter.

Generally the fauna habitat quality was higher in the southern portion of the study area (south of the Barrier Highway, where the transmission easement is located) where patches of open woodland with an intact understorey and some connectivity exist. North of the Barrier Highway, the site is of less value to fauna being more degraded due to past and present land management practices. A history of disturbance is evident across the majority of the site with vast paddocks of cleared land and existing vehicle tracks.

Hollow-bearing trees (HBTs) are an important fauna habitat, providing refuge and breeding habitat for a suite of native fauna. HBTs were abundant within woodland areas. Tree heights ranged from 6 metres to 15 metres with DBH (Diameter at Breast Height) ranging from 30 cm up to 120 cm. Hollows within the trees to be impacted ranged from small (<5cm entrance width) to large (>15cm entrance width).

A total of five threatened fauna species were identified during field surveys, including two species of threatened bird (Superb Parrot and Grey-crowned Babbler), and three species of microbat (Yellow-bellied Sheathtail Bat, Little Pied Bat and Inland Forest Bat).



<sup>&</sup>lt;sup>1</sup> This classification has been used to describe vegetation communities throughout this report.

### 2.3 IMPACTS OF THE DEVELOPMENT

Approximately 10 ha of native Poplar Box - Gum-barked Coolabah - White Cypress Pine Shrubby Woodland will be cleared for the project. Anticipated biodiversity impacts during the construction, operation and decommissioning phases of the Nyngan Solar Plant project are summarised in Table 2-1 below (sourced from the Biodiversity Assessment for the project; **ngh**environmental June 2013).

| Tahla 2-1 | Dotontial im   | nacts of the | nronocod | colar plar | nt and tr | anemission ling |
|-----------|----------------|--------------|----------|------------|-----------|-----------------|
|           | FULEIILIAIIIII | Jacis of the | proposed | solal plai | it and th |                 |

|                   |  |   | Operation phase   |
|-------------------|--|---|---|
| Solar plant       |  |   |   |
| Flora •           | Clearing and disturbance during<br>construction and installation of the<br>array and associated infrastructure.<br>Total footprint of approximately 300 ha<br>of which 5.7 ha (1.9%) is native Poplar<br>Box Woodland vegetation.<br>Risk of noxious and environmental<br>weed introduction and spread.  | • | Microclimate impacts under the PV<br>array (shading, temperature, humidity).<br>Weed growth and spread.   |
| Fauna •           | Clearing of habitat for construction and<br>installation of the solar plant and<br>associated infrastructure (such as tree<br>food sources, tree hollows, rock<br>habitats). Includes loss of habitat<br>connectivity and nest sites.<br>Potential entrapment of fauna from<br>trenching.<br>Disturbance to local fauna from noise,<br>light and vibration.<br>Vehicle collision risks to fauna. | • | Loss of or alteration to grassland<br>habitat for macropods, birds, reptiles<br>and insects due to shading, changed<br>microclimate and reduced productivity.<br>Movement barrier and collision hazard<br>created by perimeter fencing.<br>Habitat avoidance due to presence of<br>infrastructure.<br>Vehicle collision risks to fauna. |
| Transmission line |  |   |   |
| Flora •           | Clearing and disturbance during<br>establishment of the easement and<br>construction and installation of the<br>line.<br>Total footprint of approximately 14 ha<br>of which 4.2 ha (30%) is native Poplar<br>Box Woodland vegetation.<br>Risk of noxious and environmental   | • | Vegetation maintenance within the<br>easement<br>Weed growth and spread   |
|                   | weed introduction and spread   |   |   |
| Fauna •           | Clearing of habitat for the transmission<br>line easement (such as tree food<br>sources, tree hollows, rock habitats).<br>Includes loss of habitat connectivity.<br>Disturbance to local fauna from noise,<br>light and vibration  | • | Movement barrier and collision hazard<br>created by transmission lines<br>Vehicle collision risks to fauna  |



## **3 OFFSET SITE ASSESSMENT METHODOLOGY**

In order to offset the impacts identified in Section 2, AGL have identified an Offset Site approximately 10 kilometres south-west of the development site. The selection of the offset area was informed by advice provided to the landowner by the Central West CMA. The NSW OEH was then consulted with regard to the preferred site's potential suitability. The proposed Offset Site is approximately 50 hectares in area. The methods used to assess it biodiversity values are explained in this section. The results are provided in Section 4.

## **3.1 DESKTOP ASSESSMENT**

Prior to field work, the following database searches were carried out to obtain lists of threatened and migratory flora and fauna species that have the potential to occur at the Offset Site:

- The OEH threatened species database was searched in relation to the Canbelego Downs and Bogan - Macquarie sub-regions of the Western Catchment Management Authority (October 2013). This search identified species listed as threatened under the NSW *Threatened Species Conservation Act 1995* (TSC Act).
- The DSEWPC protected matters search tool was used to search an area approximately 10 kilometres in radius from the study area (May 2013). This search identified species listed as threatened or migratory under the Commonwealth *Environment Protection Biodiversity Conservation Act 1999* (EPBC Act)

Habitats for threatened species with the potential to occur at the site were targeted during the field survey to further refine the likelihood of their occurrence.

#### **3.2 FIELD SURVEY**

A field survey of the Offset Site was undertaken by a senior ecologist on the 9 October 2013. A total of 10 person hours was spent on the field survey.

#### 3.2.1 Mapping of vegetation types

The majority of the site was traversed either on foot or by vehicle. Dominant species were recorded sufficient to identify the vegetation types present across the site. Boundaries of vegetation types were recorded using a Garmin GPSmap 62s hand held GPS to an accuracy of ±3 metres. Vegetation mapping was completed using ArcGIS v10.0. Waypoints recorded in the field were overlayed onto georectified aerial imagery to determine the spatial location of vegetation type boundaries. Where different vegetation types were evident on the aerial imagery, the boundaries between types were further extrapolated from the field data.

#### 3.2.2 Vegetation condition assessment and establishment of monitoring plots

BioBanking plots were conducted according to the BioBanking Assessment Methodology (BBAM, DECC 2009) to collect baseline data on vegetation structure and quality. The location of the plots is shown on Figure 4-2. In the field, plots were marked using 1650mm star pickets to facilitate the replication of the plots. The ends of the star pickets were painted white to enable easy identification in the field (Figure 3-1).



Star pickets were placed at the start and end of the 50 metre transect required by the BBAM and their coordinates recorded (Table 3-1). To delineate the start point of transects, orange flagging tape was tied to the top of the appropriate picket. The 20 x 20 metre quadrat required by the BBAM was conducted within an area bounded by the first 20 metres of the transect and extending 10 metres either side as shown on Figure 3-2.

Photo points were established at each of the start points of the transects, with views along the length of the transect.

|           | Transe      | ct start    | Transect end |             |  |  |
|-----------|-------------|-------------|--------------|-------------|--|--|
| Plot name | Easting*    | Northing*   | Easting*     | Northing*   |  |  |
| M01       | 501365.4948 | 6498409.989 | 501388.4344  | 6498371.304 |  |  |
| M02       | 501144.511  | 6498635.457 | 501106.7714  | 6498605.313 |  |  |
| M03       | 500822.2086 | 6498302.868 | 500820.4033  | 6498254.1   |  |  |
| M04       | 501271.0288 | 6498145.767 | 501221.3488  | 6498151.204 |  |  |

Table 3-1 Coordinates for each of the monitoring plots

\* Coordinates are in MGA zone 55 relative to the GDA94 datum



Figure 3-1 Star pickets used to identify the monitoring plots in the field



Figure 3-2 Monitoring plot layout

#### Data evaluation

Data recorded from the BioBanking monitoring plots were compared with the benchmark data for the Poplar Box - Gum-barked Coolabah - White Cypress Pine shrubby woodland community as provided in the BioBanking vegetation types benchmark database (DECC 2008). Monitoring plot data was also entered into the BioBanking Credit Calculator (BBCC) version 2 to obtain a baseline site value score for each of the two dominant vegetation formations at the site. As only two plots were conducted per formation, data from each plot was duplicated (four plots per formation) to achieve the minimum number of plots required by the BBCC given the areas of each formation within the Offset Site (41.55 and 8.55 hectares requiring a minimum of 4 and 3 plots respectively).

#### 3.2.3 Fauna habitat evaluation

General notes on fauna habitats present were taken across the broader site during the site traverses for the vegetation mapping. At each of the monitoring plot locations, detailed notes were taken with regard to the habitats present.

Particular attention was paid to areas that may provide habitat for threatened fauna species listed under the *Threatened Species Conservation Act 1995* (NSW) (TSC Act) or the *Environmental Protection and Biodiversity Conservation Act 1999* (Cwth) (EPBC Act).

#### 3.2.4 Targeted surveys

#### Flora

Targeted surveys were undertaken for the Pine Donkey Orchid (*Diuris tricolor*) and Red Darling Pea (*Swainsona plagiotropis*) during the foot and vehicle based traverses which covered the majority of the open Cypress Pine woodland within the Offset Site. In addition, foot based random meanders (according to Cropper 1993) were undertaken through the entire area of the White Cypress Pine – Poplar Box woodland targeting these species.

#### Fauna

Hollow-bearing trees (HBTs) were identified and recorded using a handheld GPS during the random meanders through the White Cypress Pine – Poplar Box woodland. Mature trees were examined from all angles to determine the number, size and structural characteristics of hollows (if present) in each tree. If



hollows were not able to be conclusively identified from the ground, but a tree was bearing structures that were likely to be hollow-bearing, the tree was identified as a 'potential' hollow-bearing tree. Hollow-bearing trees were given a class according to the criteria outlined in Table 3-2 below.

| HBT class | Criteria  |
|-----------|---|
| 1         | Small hollows (<5cm entrance) or fissures present only                      |
| 2         | One or two medium hollows (5 – 15cm entrance) with or without small hollows |
| 3         | One or more large hollows (> 15cm entrance) or more than two medium hollows |

Table 3-2 Hollow-bearing tree quality criteria

Active searches were also undertaken throughout the random meander surveys for nests of the threatened Grey-crowned Babbler which was recorded at the development site. The tree canopy was examined in detail for evidence of the stick nests constructed by this species.

Throughout the survey all incidental fauna sightings were recorded.

### 3.3 LIMITATIONS

#### 3.3.1 Survey timing

The spring timing of the survey was considered suitable for identifying the vegetation types and fauna habitats present at the site and determining the general quality of the site with regard to species diversity. However, prolonged dry weather preceding the survey during late winter and early spring also meant that many plant individuals were dead or stressed (particularly grasses) making them difficult to identify. It is likely that there are species present that were not evident or identifiable during the survey. Weather during the survey was warm with a maximum of 30.5°C and light to moderate winds which would have maximised fauna activity.

#### 3.3.2 GIS mapping

High resolution georeferenced aerial imagery was not available for mapping. Aerial imagery used for mapping was sourced from Google Earth and then georectified by comparison with georeferenced topographic layers (Topoview 2006) mostly on the basis of the locations of roads and features such as farm dams. As such, there are small discrepancies in the spatial accuracy of the vegetation layer, however this is only relevant if the layer were to be utilised in other GIS environments where georeferenced aerial imagery is available. All mapping as displayed in this document is accurate.



# 4 OFFSET SITE VALUES

### 4.1 **VEGETATION TYPES**

Native vegetation within the Offset Site consists of, or is derived from, a single vegetation type: Poplar Box - Gum-barked Coolabah - White Cypress Pine shrubby woodland (Veg ID 103) (Benson *et al.* 2006). The vegetation also shows characteristics of White Cypress Pine - Poplar Box woodland on footslopes and peneplains (ID 72), particularly with regard to the dominance of White Cypress Pine (*Callitris* glaucophylla) and the presence of particular groundcover species. However, the species composition of the groundcover shows greater affinity for Poplar Box - Gum-barked Coolabah - White Cypress Pine Shrubby Woodland. The Biometric benchmarks for these vegetation types are the same. The dominance of White Cypress Pine may be a factor resulting from past disturbance or altered fire regimes. The conservation status of this vegetation community is listed in Table 4-2.

| Vagatation type   | Pre-1750    | Extant    | Reserved in    | Reservation | Cleared    | Threat     |  |
|-------------------|-------------|-----------|----------------|-------------|------------|------------|--|
| vegetation type   | extent (ha) | area (ha) | Bioregion (ha) | status      | (OEH 2012) | category   |  |
| Vegetation ID 103 | 800,000     | 500,000   | 12,995         | Inadequate  | 10%        | Near       |  |
| Poplar Box - Gum- | ±30%        | ±30%      | (1.62% of      |             |            | threatened |  |
| barked Coolabah - |             | (62.5% of | 1750 extent)   |             |            |            |  |
| White Cypress     |             | 1750      |                |             |            |            |  |
| Pine shrubby      |             | extent)   |                |             |            |            |  |
| woodland          |             |           |                |             |            |            |  |

Table 4-1 Conservation status of vegetation identified within the Offset Site

Differences in structure and species composition occur across the Offset Site, most likely due to past disturbance and land management which have resulted in two main forms of the community being present:

- 1. Open White Cypress Pine Woodland
- 2. White Cypress Pine Poplar Box woodland

A small area (0.66 hectares) dominated by Budda (*Eremophila mitchellii*) also occurs in the east of the site (Figure 4-1). Budda is a common species within the Poplar Box - Gum-barked Coolabah - White Cypress Pine community and dominates this small area possibly due to the removal of other overstorey and or midstorey species (thus eliminating competition) or other past disturbance such as a localised fire. Budda is sometimes considered a woody (native) weed by land owners in the area.



Figure 4-1 Budda dominated area in the east of the Offset Site



The distribution of the forms of Poplar Box - Gum-barked Coolabah - White Cypress Pine shrubby woodland at the site is shown on Figure 4-2. The characteristics and condition of each of the two dominant forms along with the results of the monitoring plots are discussed individually for each form below. The monitoring plot data is presented along with the benchmarks for each vegetation type for comparative purposes. All vegetation within the Offset Site is considered to be in moderate to good condition according to the Biometric definitions (DECC 2009).

A list of species recorded during the survey is provided as Appendix B. Vegetation condition classes are the same as described in the Biodiversity Assessment for the development site (**ngh**environmental June 2013) and are as listed in Table 4-2 below.

| Condition | Description  |
|-----------|--|
| Exotic    | Groundlayer dominated by exotics (exotics > natives), no native overstorey present.  |
| Poor      | Groundlayer dominated by exotics, native overstorey present (>25% of benchmark)      |
| Moderate  | Some exotics present in the groundlayer but mostly native dominated (low diversity). |
| Good      | Groundlayer dominated by native species (high diversity), few exotics present.       |

Table 4-2 Vegetation condition classes used within the biodiversity assessment for the development site





Figure 4-2 Forms of Poplar Box - Gum-barked Coolabah - White Cypress Pine shrubby woodland within the Offset Site and the location of monitoring plots

#### 4.1.1 Open White Cypress Pine Woodland

This form is the dominant form of vegetation within the Offset Site (41.55 hectares). The overstorey is generally very sparse and comprised of scattered patches of White Cypress Pine with the occasional mature Poplar Box (*Eucalyptus populneus* subsp. *bimbil*). The midstorey is also very sparse and mostly comprised of regenerating White Cypress Pine. Isolated Wilga (*Geijera parvifolia*) and Budda (*Eremophila mitchellii*) individuals also occur. A dense, predominately grassy, understorey is present dominated by Number 9 Wiregrass (*Aristida jerichoensis* var. *subspinulifera*), Corkscrew Grass (*Austrostipa scabra* ssp *falcata*) and Mulga Mitchell Grass (*Thyridolepis mitchelliana*). A relatively high diversity of forbs is also present.

Cut-leaf Medic (\**Medicago laciniata*) is a common weed within the groundcover. Other exotic species present include occasional Saffron Thistle (\**Carthamus lanatus*) and Milk Thistle (\**Sonchus oleraceus*). Although a low diversity of exotic annual species are present, the vegetation is predominately native with a good diversity of groundcover species and considered to be in good condition.

The monitoring plot data along with the benchmarks for this vegetation type (DECC 2008) are shown in Table 4-3. In summary, species richness (which is the number of native species, shown in the table below as 'Native Spp. #') is considerably above the benchmark for this value which may be due to the modified structure of the vegetation. No overstorey or midstorey cover was recorded as these strata have been predominately cleared. Grass cover is well above benchmark which again is likely due to the modified structure of the community. Shrub and other native cover within the ground layer are within benchmark. No hollow bearing trees were recorded given the lack of overstorey trees and that those present within the open woodland were mostly White Cypress Pine, which generally does not form hollows. The amount of fallen timber was variable across the site and the values recorded are indicative of this range although still below benchmark. Overstorey regeneration was observed for White Cypress Pine but not for Poplar Box or Gum-barked Coolabah.

The data from the monitoring plots return a site value score of 64.67 when entered into the BioBanking Credit Calculator.

|           | Native | Native cover |       |           |     | Native ground cover |     |        |     |       | HBTs | Logs |    |
|-----------|--------|--------------|-------|-----------|-----|---------------------|-----|--------|-----|-------|------|------|----|
|           | Spp. # | Overstorey   |       | Midstorey |     | Grasses             |     | Shrubs |     | Other |      |      |    |
|           |        | Min          | Max   | Min       | Max | Min                 | Max | Min    | Max | Min   | Max  |      |    |
| Benchmark | 15     | 3%           | 22%   | 0%        | 30% | 5%                  | 30% | 2%     | 10% | 2%    | 30%  | 0.1  | 20 |
| Plot M01  | 28     | 0%           |       | 0%        |     | 58%                 |     | 4%     |     | 24%   |      | 0    | 5  |
| Plot M02  | 29     | 0            | 0% 0% |           | 50  | )%                  | 2%  |        | 30% |       | 0    | 17   |    |

Table 4-3 Benchmark and monitoring plot data comparison for open White Cypress Pine woodland at the Offset Site

Benchmark variables:

Native Spp. #: number of native species (species richness) HBT: number of hollow bearing trees Logs: linear length of fallen logs.





Figure 4-3 Open White Cypress Pine woodland at monitoring plot M01 (top) and M02 (bottom)



#### 4.1.2 White Cypress Pine - Poplar Box Woodland

This form occurs as linear strips approximately 45 to 75 metres wide along the western and southern boundaries of the site and occupies approximately 8.5 hectares (Figure 4-4). The overstorey is dominated by White Cypress Pine with mature Poplar Box scattered throughout. In more open areas, Poplar Box is dominant. Gum-barked Coolabah (*Eucalyptus intertexta*) is also present to a lesser extent occurring as occasional individuals. Dense White Cypress Pine recruits form a distinct small tree layer across much of the area.

The midstorey shrub layer is generally sparse and restricted to occasional individuals of Budda, Berrigan (*Eremophila longifolia*) and Sticky Hopbush (*Dodonaea viscosa* subsp. *mucronata*). Climbing saltbush (*Einadia nutans* subsp. *nutans*) is a common low shrub along with Galvanised Burr (*Sclerolaena birchii*), Grey Copperburr (*S. diacantha*) and Eastern Cottonbush (*Maireana microphylla*). The ground cover is patchy and predominately grassy being mostly comprised of Mulga Mitchell Grass, Curly Windmill Grass (*Enteropogon asicularis*), Number 9 Wiregrass and Corkscrew Grass. Native forbs are common but generally sparser than the adjacent open White Cypress Pine woodland.

The exotic forb species London Rocket (*\*Sisymbrium irio*) dominates the groundcover in patches, generally where White Cypress Pine regrowth is denser. In areas where London Rocket is dominant, native groundcover diversity tends to be lower and these areas are considered to be in moderate condition. Generally a high diversity of species is present in other areas which are considered to be in good condition.

The monitoring plot data along with the benchmarks for this vegetation type (DECC 2008) are shown in Table 4-4. In summary, species richness is above the benchmark for this value. Overstorey cover is at the maximum benchmark value or slightly above it. No midstorey cover was recorded, however this is within the benchmark for this vegetation type. Grass cover is within or slightly above benchmark and shrub and other native cover within the ground layer are within benchmark. Hollow bearing trees are common throughout as is fallen timber and these values exceed the benchmark. Overstorey regeneration was observed for White Cypress Pine but not for Poplar Box or Gum-barked Coolabah.

The data from the monitoring plots return a site value score of 82 when entered into the BioBanking Credit Calculator.

|           | Native | Native cover |        |      | Native ground cover |     |      |     | HBTs | Logs |     |     |    |
|-----------|--------|--------------|--------|------|---------------------|-----|------|-----|------|------|-----|-----|----|
|           | Spp. # | Overs        | storey | Mids | torey               | Gra | sses | Shr | ubs  | Ot   | her |     |    |
|           |        | Min          | Max    | Min  | Max                 | Min | Max  | Min | Max  | Min  | Max |     |    |
| Benchmark | 15     | 3%           | 22%    | 0%   | 30%                 | 5%  | 30%  | 2%  | 10%  | 2%   | 30% | 0.1 | 20 |
| Plot M03  | 24     | 28           | .5%    | 0    | %                   | 32  | 2%   | 6   | %    | 1(   | 0%  | 2   | 35 |
| Plot M04  | 21     | 22           | 2%     | 0    | %                   | 18  | 3%   | 1(  | )%   | 6    | %   | 1   | 36 |

Table 4-4 Benchmark and monitoring plot data comparison for White Cypress Pine – Poplar Box woodland at the Offset Site





Figure 4-4 White Cypress Pine – Poplar Box woodland at monitoring plot M03 (top) and M04 (bottom)



### 4.2 WEEDS AND DISTURBANCE

Historically, the site has been utilised for grazing although information from the property owner suggests that grazing has not occurred for many years. Clearing of overstorey and midstorey vegetation has occurred in the past and there is extensive evidence of cut stumps and ring-barked trees particularly within the White Cypress Pine open woodland (Figure 4-5).



Figure 4-5 Evidence of past logging and ring-barking at the site

No noxious weeds were recorded within the Offset Site. Common weeds such as Saffron Thistle and Milk Thistle were widespread across the more open areas of the site in low numbers. Cut-leaf Medic formed a common component of the groundcover particularly in more disturbed areas (Figure 4-6). London Rocket formed patchy dense swathes within the denser woodland seemingly with a preference for the more shaded areas. All of these weeds are annual species that would not be present at other times of the year.

There was extensive evidence of feral pig activity across the site (Figure 4-6). A large male was disturbed from undergrowth during the survey within the White Cypress Pine Poplar Box woodland. Numerous European Rabbits were also observed across the site.



Figure 4-6 Evidence of feral pig activity at the site and dense colonisation of pig disturbed areas by Cut-leaf Medic (right)



### 4.3 FAUNA HABITATS

The dominant fauna habitat at the site consists of sparse open woodland with a dense grassy groundcover. Habitat values with this habitat type are limited. Scattered fallen timber occurs variably across the area (Figure 4-7) and may provide shelter for a range of small ground dwelling mammals and reptiles. The open nature of the habitat and scattered dead and living trees provides foraging opportunities for birds of prey. A single Nankeen Kestrel was observed perching within a White Cypress Pine during the survey.



Figure 4-7 Fallen timber within the open and denser woodland habitats at the site

The denser woodland along the western and southern boundaries of the site provides a range of habitat values. Fallen timber is abundant (Figure 4-7) and the regular dense to open overstorey provides nesting and roosting opportunities for a range of woodland birds. Numerous mature Poplar Box and Gum-barked Coolabah trees are hollow-bearing (Figure 4-8). The distribution of hollow-bearing trees at the site is shown on Figure 4-9. Details for each tree are provided in Appendix C. The majority of the hollow-bearing trees support large and medium sized hollows which provide habitat for a wide range of bats, woodland birds, owls and arboreal mammals such as gliders.

No rocky habitats are present at the site.







Figure 4-8 Examples of hollow-bearing trees at the site





Figure 4-9 Hollow-bearing trees recorded at the Offset Site

### 4.4 HABITAT CONNECTIVITY

The proposed Offset Site is located adjacent to a larger area of more continuous native vegetation to the west. Management of the offset will contribute to the biodiversity values of this larger area by ultimately providing a connected adjacent area with high habitat values. Linear corridors containing connected vegetation extend to the north, east and south of the proposed Offset Site and the proposed offset will enhance sections of the corridors to the north and east and provide a refuge between these corridors.

A farm dam is located approximately 750 metres east of the north-east corner of the proposed offset which also has some more intact native vegetation surrounding it. Farm dams provide an important water source for native fauna in semi-arid environments. The proposed offset will enhance connectivity between the dam and the more extensive native vegetation to the west.

### 4.5 HABITAT FOR THREATENED SPECIES

The results of the database searches and field studies at the Offset Site were considered to determine what habitats may be available for threatened species and communities. Table 4-5 lists the threatened species known to occur within the Canbelego Downs and Bogan – Macquarie sub-regions of the Western CMA for which there is suitable habitat within the Offset Site and which may occur given the proximity of nearest records. Conspicuous flora species not detected during the survey of the Offset Site have not been included. No threatened ecological communities are considered to occur at the site.

| Common Name                                      | Scientific name                 | Status                          | Likelihood of<br>occurrence |  |
|--|---------------------------------|---------------------------------|-----------------------------|--|
| Flora  |                                 |                                 |                             |  |
| Pine Donkey Orchid                               | Diuris tricolor                 | Vulnerable (TSC Act)            | Low                         |  |
| Red-darling Pea                                  | Swainsona plagiotropis          | Vulnerable (TSC & EPBC<br>Acts) | Low                         |  |
| Birds  |                                 |                                 |                             |  |
| Bush Stone-curlew                                | Burhinus grallarius             | Endangered (TSC Act)            | Low                         |  |
| Red-tailed Black-Cockatoo<br>(Inland subspecies) | Calyptorhynchus banksii samueli | Vulnerable (TSC Act)            | Moderate                    |  |
| Pied Honeyeater                                  | Certhionyx variegatus           | Vulnerable (TSC Act)            | Moderate                    |  |
| Speckled Warbler                                 | Chthonicola sagittata           | Vulnerable (TSC Act)            | Low                         |  |
| Spotted Harrier                                  | Circus assimilis                | Vulnerable (TSC Act)            | Moderate                    |  |
| Varied Sittella                                  | Daphoenositta chrysoptera       | Vulnerable (TSC Act)            | Moderate                    |  |
| Grey Falcon                                      | Falco hypoleucos                | Endangered (TSC Act)            | Moderate                    |  |
| Black-breasted Buzzard                           | Hamirostra melanosternon        | Vulnerable (TSC Act)            | Low                         |  |
| Little Eagle                                     | Hieraaetus morphnoides          | Vulnerable (TSC Act)            | Moderate                    |  |
| Pink Cockatoo                                    | Lophochroa leadbeateri          | Vulnerable (TSC Act)            | Moderate                    |  |
| Square-tailed Kite                               | Lophoictinia isura              | Vulnerable (TSC Act)            | Moderate                    |  |
| Turquoise Parrot                                 | Neophema pulchella              | Vulnerable (TSC Act)            | Low                         |  |

Table 4-5 Threatened species of the Canbelego Downs and Bogan- Macquarie sub-regions, which have habitat requirements met by the Offset Site



| Common Name                               | Scientific name                    | Status                          | Likelihood of<br>occurrence |
|---|------------------------------------|---------------------------------|-----------------------------|
| Flame Robin                               | Petroica phoenicea                 | Vulnerable (TSC Act)            | Low                         |
| Superb Parrot                             | Polytelis swainsonii               | Vulnerable (TSC & EPBC<br>Acts) | Low                         |
| Grey-crowned Babbler (eastern subspecies) | Pomatostomus temporalis temporalis | Vulnerable (TSC Act)            | High                        |
| Diamond Firetail                          | Stagonopleura guttata              | Vulnerable (TSC Act)            | Low                         |
| Masked Owl                                | Tyto novaehollandiae               | Vulnerable (TSC Act)            | Low                         |
| Mammals                                   |                                    |                                 |                             |
| Little Pied Bat                           | Chalinolobus picatus               | Vulnerable (TSC Act)            | Moderate                    |
| South-eastern Long-eared Bat              | Nyctophilus corbeni                | Vulnerable (TSC & EPBC<br>Acts) | Moderate                    |
| Yellow-bellied Sheathtail-bat             | Saccolaimus flaviventris           | Vulnerable (TSC Act)            | Moderate                    |
| Inland Forest Bat                         | Vespadelus baverstocki             | Vulnerable (TSC Act)            | Moderate                    |
| Striped-faced Dunnart                     | Sminthopsis macroura               | Vulnerable (TSC Act)            | Low                         |

Targeted searches for the Pine Donkey Orchid and Red-darling Pea did not detect these species within the Offset Site. The timing of the survey was considered suitable and it is therefore considered unlikely that they occur. No other threatened flora species were detected during the survey.

One threatened fauna species was detected during the survey. A group of five Grey-crowned Babblers were observed crossing the south-west corner of the Offset Site. Targeted searches failed to locate any nests of this species and it is considered unlikely that they are utilising the site for breeding. This may be due to an abundance of Noisy Miners at the site and this is discussed more in Section 4.6 below.

The other species listed in Table 4-5 also have the potential to occur at the site, although no surveys have been specifically conducted to identify these species and their presence or absence cannot be confirmed. The likelihood of these species to occur at the site has been provided in Table 4-5 based on habitat quality and structure at the site.

## 4.6 KEY THREATS TO BIODIVERSITY VALUES

The vegetation and habitats at the site have been subject to modification due to a range of disturbances including past clearing and grazing. Two key threatening processes are currently in operation that pose a risk to biodiversity values at the site:

- Predation, habitat degradation, competition and disease transmission by feral pigs
- Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners

Feral pig activity was widespread at the site and one individual was observed. Within open areas across the site, common weeds such as Cut-leaf Medic and Saffron Thistle were colonising areas disturbed by pigs. It is likely that pigs are also preying on native fauna.

Noisy Miners were abundant at the site and were observed actively hunting other birds away from occupied areas. The Noisy Miner favours open, lightly timbered areas and habitat edges (NSW SC 2013) so has likely benefitted from the past clearing at the site and linear strips of vegetation along the western and



southern boundaries. Reducing the edge effects by increasing the general density of vegetation across the more open areas may counteract this effect by reducing the preferred habitat of Noisy Miners. It would also provide additional habitat for other native bird species to compete with Noisy Miners. Re-introducing nectar producing shrubs would also attract a greater diversity of native bird species.

The Grey-crowned Babbler is listed as a species that may be adversely affected by Noisy Miners (NSW SC 2013). Although they were detected on the site, no Grey-crowned Babbler nests were observed despite suitable habitat similar to that at the development site where numerous nests were detected. It is possible that Noisy Miners are preventing Grey-crowned Babblers from breeding at the Offset Site.

Additionally, indirect impacts such as the exclusion of fire may also be impacting on the structure of vegetation communities at the site. Anecdotal evidence from the landowner suggests that a fire event may not have occurred at the site for up to 150 years. Extensive regeneration of White Cypress Pine was observed (a fire sensitive species) while no regeneration of the two Eucalypt species was seen (which may be promoted by fire). Fire may also promote diversity within the midstorey and groundcover strata and assist in controlling weeds.

Predation by feral cats and foxes may also be impacting on populations of native fauna with both species recorded in the local area.

The issues identified above form the focus for the management measures recommended in Section 5.2 of this report.



# 5 SECURITY AND MANAGEMENT OF THE OFFSET SITE

### 5.1 IN PERPETUITY SECURITY

A Conservation Property Vegetation Plan (CPVP) will be implemented by AGL. The CPVP will include management actions associated with the offset area that will apply in perpetuity. It is the intention of this report to detail management actions that will be carried over into the CPVP (specified in Section 5.2 below).

To ensure that the CPVP is binding on successors in title, an abstract of the CPVP will be registered with the NSW Office of Land and Property Information under the *Real Property Act 1900*. The CPVP will be a legally binding agreement under both the *Native Vegetation Act 2003* and the *Threatened Species Conservation Act 1995*. The terms of the CPVP will not be 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.

As the CPVP is attached to the land title, the landowner is ultimately responsible for funding the management actions required at the Offset Site and monitoring the effectiveness of their implementation. However the Proponent will take responsibility for management and will ensure the landowner has sufficient resources and information to implement the management actions for the operational life of the solar plant as this forms a condition of the solar plant's consent.

Even though a CPVP is binding in perpetuity, it is acknowledged that there is less incentive to manage the Offset Site after the decommissioning of the solar plant. Therefore, it is proposed that the bulk of the management actions be focused in the early years of the project.

#### 5.2 MANAGEMENT MEASURES

Offset site management measures are outlined in Table 5-1. These measures aim to result in an improvement in the biodiversity values of the site and are designed to be adaptive, informed by the monitoring regime outlined in Section 5.2. These management measures will be incorporated into a management plan for the Offset Site. The management plan will be prepared prior to establishment of the Offset Site. The removal of any timber, fallen logs or rocks will also be prohibited within the Offset Site.

All management measures will be the responsibility of, and funded by, AGL. At the end of the operational life of the solar plant, the ongoing management will be the responsibility of the landowner. It is expected that by this time the majority of the required management actions will have been undertaken and ongoing management tasks will largely coincide with routine agricultural activities. Land use restrictions will remain in place on the Offset Site so that any activities undertaken on the Offset Site must be compatible with the site's overall function as a conservation area.



#### Table 5-1 Offset site management measures

| Management<br>measure     | Objective  | Justification   | Action   | Timing  |
|---------------------------|--|---|--|---|
| Prior to<br>establishment |  |   |  |   |
| Validate offset area      | To ensure that offsets are appropriate<br>for the actual impacts of the<br>development   | The current offset area is based on an<br>estimation of impacts. Impacts may<br>differ from those estimated. Offsets<br>need to be adequate to offset the final<br>impacts. | <ul> <li>Validate the area impacted by<br/>construction to ensure that the<br/>actual, not estimated, impacted<br/>area is offset.</li> </ul>  | <ul> <li>Prior to establishment of Offset Site</li> </ul>                                   |
| General measures          |  |   |  |   |
| Exclusion of stock        | To prevent overgrazing and encourage regeneration of native vegetation   | The Offset Site has not been subject to grazing for a number of years. Reintroduction of grazing would be likely to degrade habitat.  | <ul> <li>Install stock proof fencing around<br/>the perimeter of the Offset Site.</li> </ul>   | <ul><li>At establishment of the Offset Site.</li><li>Ongoing repairs as required.</li></ul> |
| Weed control              | To minimise the occurrence of weeds<br>within the Offset Site particularly<br>Weeds of National Significance (WoNS)<br>and listed noxious weeds. | Weeds compete with native species<br>and degrade habitats. The Offset Site<br>has occurrences of common weeds<br>that have the potential to be invasive.                    | <ul> <li>Survey to identify target locations<br/>for weed control.</li> <li>Weed control using appropriate<br/>methodologies considering target<br/>species and landscape context.</li> </ul>        | <ul><li>At establishment of the Offset Site.</li><li>Ongoing as required.</li></ul>         |
| Exclusion of feral pigs   | To exclude feral pigs.   | Feral species can degrade habitat,<br>compete for resources with native<br>fauna and introduce disease.   | <ul> <li>Install and maintain preventative<br/>fencing suitable for the target<br/>species.</li> <li>Remove pigs (by trapping or other<br/>means) if detected within the Offset<br/>Site.</li> </ul> | <ul><li>At establishment of the Offset Site.</li><li>Ongoing as required.</li></ul>         |

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| Management<br>measure     | Objective  | Justification  | Action  | Timing  |
|---------------------------|--|--|---|---|
| Cat and/or fox<br>control | To minimise the presence of cats and foxes within the Offset Site.     | Predation by cats and foxes can have<br>serious impacts on the populations of<br>native fauna, particularly threatened<br>species.   | <ul> <li>Monitor for presence of cats and foxes.</li> <li>Conduct baiting or trapping if cats or foxes are detected within the offset area.</li> <li>Where possible, coordinate baiting or trapping with adjacent landowners to maximise effects</li> </ul>                   | <ul> <li>Consideration given to action on the basis of monitoring results.</li> </ul> |
| Rabbit control            | To minimise the risk of the Offset Site becoming a refuge for rabbits. | Increased rabbit numbers can reduce<br>native regeneration and support<br>higher numbers of pest animals such<br>as cats and foxes.<br>Overgrazing by herbivores can prevent<br>the successful ongoing establishment<br>and persistence of native vegetation<br>and lead to degradation. | <ul> <li>Monitor for presence of rabbits.</li> <li>Conduct baiting or controlled<br/>grazing to reduce the ability of the<br/>site to act as a refuge to rabbits.</li> <li>Where possible, coordinate baiting<br/>with adjacent landowners to<br/>maximise effects</li> </ul> | <ul> <li>Consideration given to action on the basis of monitoring results.</li> </ul> |
| Monitoring                | To determine the effectiveness of management measure                   | Monitoring is required to determine<br>whether current management is<br>appropriate and to inform ongoing<br>management.   | <ul> <li>Conduct monitoring as detailed in<br/>Section 5.3 of this report</li> <li>Adapt management measures<br/>where required</li> </ul>  | • Annually  |

| Management<br>measure                         | Objective  | Justification   | Action   | Timing                                   |
|---|--|---|--|--|
| Specialised measures                          | 5  |   |  |  |
| Adapt measures to<br>resident native<br>fauna | To ensure that resident native fauna<br>are not adversely impacted by<br>management actions. | While monitoring is restricted to<br>vegetation and habitat parameters and<br>will not include fauna survey, evidence<br>of fauna activity may be detected.   | <ul> <li>If resident native fauna may be<br/>impacted by management actions,<br/>adapt actions as required to address<br/>the risk of impact.</li> </ul> | <ul> <li>Ongoing as required.</li> </ul> |
|   |  | Some actions such as weed spraying<br>may adversely affect resident fauna<br>(e.g., ground nesting birds. In these<br>cases, actions should be adapted<br>(postponed or excluded from certain<br>areas) to avoid adverse impacts. |  |  |

### 5.3 MONITORING AND REPORTING

Monitoring plots have been established at the site as described in Section 3. It is recommended that the methodologies undertaken in this report be repeated at these sites annually. As a part of monitoring surveys, the locations and extent of weeds across the entire site will also be recorded. Surveys will be conducted to determine the presence of cats, foxes, rabbits and feral pigs. Consideration will be given to control methods in coordination with broader control programs on adjacent land and in the local area. Fences will be inspected and maintenance carried out if required.

The Offset Site monitoring, management actions and their outcomes will be reported annually to the Department of Planning and Infrastructure for the duration of the project (up to 30 years) to demonstrate that a 'maintain or improve' outcome has been met. The report will also be submitted to OEH. Management measures may be altered to reflect the results of monitoring. A decision to reduce or continue annual reporting may also be made by DPI or OEH following submission of each report.



## 6 ADDITIONAL COMPENSATORY MEASURES

Although the proposed offset site contains vegetation suitable for breeding and foraging for Grey-crowned Babblers and a group were recorded at the proposed offset site, no evidence of the use of the site for breeding by this species (evidenced by active or old nests) was detected. As discussed in Section 4.6, Noisy Miners may be preventing Grey-crowned Babblers from breeding at the site. It is uncertain whether improvements in the Offset Site resulting from management over time will reduce the adverse effects of Noisy Miners and whether the site can adequately compensate for the loss of Grey-crowned Babbler breeding habitat at the development site.

It is a condition of approval for the project that visual screening be provided along the southern boundary of the solar plant site to reduce visual impacts. It is proposed to incorporate the provision of visual screening with habitat restoration of approximately 5 hectares of farmland at the development as an additional compensatory measure. In the long-term this will provide additional habitat for the Grey-crowned Babbler in the immediate area where habitat is being lost and where the species is known to occur and breed. A Landscape Plan has been prepared for the project (First Solar 2013) and planting would be undertaken as outlined in this plan. The area proposed to be revegetated is shown on Figure 6-1. Key features of the plan are summarised below. Measures, additional to the landscape plan, that have the objective of enhancing habitat for the Grey-crowned Babbler are also included below (see section 6.4).

### 6.1 SPECIES TO BE PLANTED

Species to be planted are those which are native to the Nyngan area and found on the development site. The Landscape Plan lists a number of suitable species. These and the recommended planting densities are listed in Table 6-1.

| Stratum               | Suitable species  | Suggested planting density   |
|-----------------------|---|--|
| Trees and tall shrubs | Acacia excelsa<br>Acacia melvillei<br>Callitris glaucophylla<br>Capparis mitchellii<br>Eremophila mitchellii<br>Eucalyptus intertexta<br>Geijera parviflora<br>Hakea tephrosperma<br>Eucalyptus populnea ssp bimbil | Approximately 3m spacing in rows<br>spaced a minimum of approximately 3m<br>apart. Trees and tall shrubs would be<br>alternated with shrubs and sub-shrubs |
| Shrubs and sub-shrubs | Dodonaea viscosa subsp. mucronata<br>Eremophila longifolia<br>Senna form taxon 'zygophylla'   |  |

Table 6-1 Species recommended for revegetation activities within the development site

## 6.2 PLANTING METHODS

The Landscape Plan proposes the use of tubestock to maximise the chances of planting success. Tube stocks should be planted in a hole slightly longer than the root mass and potting mix. Soil should then be placed over the potting mix to prevent rapid drying after planting. For weed control, anchored jute matting should



be used around the seedling. Matting also helps to conserve soil moisture, improves water infiltration and soil structure, and moderates soil temperatures, thereby improving plant growth. Contact between the matting and the seedling should be avoided to minimise the risk of collar rot, although this is not likely to be a high risk at Nyngan. The use of tree guards is also recommended, as they protect against grazing by wildlife and pests such as rabbits and hares, as well as providing protection from drying winds. Standard plastic sleeve guards held away from the seedling by three stakes would be utilised as far as practicable to protect new plantings. Landscape plantings would be enclosed within a stock proof fence where practicable to protect the new plantings from larger grazing herbivores including wildlife and livestock.

## 6.3 MAINTENANCE

Maintenance of the plantings would be conducted for approximately two years. Key maintenance activities described in the Landscape Plan include:

- Regular checks of fences to ensure stock do not gain access.
- Checks of tree guards to ensure they are correctly in place and/or undamaged. Tree guards should be removed when plants are well established and at a stage where the viability of the plant will not be compromised by pest animal activity.
- Rainfall and soil moisture levels should be monitored for the first six months. If necessary young plants should be watered if it becomes very dry. However, if the conditions are good at the time of planting additional watering can be minimised.
- Checks for weed competition. Spot spraying of weeds with selective herbicides would be undertaken if weeds start to overpower seedlings. The need for weed spraying will be minimised as far as practicable with pre-planting site preparation.
- Checks for evidence of browsing by wildlife such as hares and wallabies. Additional measures to prevent browsing should be employed. Measures may include wire cages or branches strategically placed around seedlings.
- Unviable plants should be replaced as soon as practicable e.g. after the first autumn rains or in the following spring.

## 6.4 ADDITIONAL MEASURES TO ENHANCE HABITAT VALUES

In addition to the planting outlined in the management plan the following measures will also be implemented to enhance the habitat values of the planted area for Grey-crowned Babblers:

- Where possible, tubestock and seed used for revegetation would be of local provenance.
- Stock would be excluded from the revegetation area for the life of the solar plant.
- Groundcover revegetation would be conducted focusing on establishing a grassy understorey suitable for foraging by the Grey-crowned Babbler. It is proposed to utilise grass species that are known to occur on the site and are considered suitable for revegetation as outlined in Table 6-2.
- Larger logs that are cleared from other activities within the development site would be placed within the revegetation area to provide additional habitat features.
- Ongoing weed control within the revegetation area would be carried out as described for the development site in the projects Operational Environmental Management Plan.



| Stratum                         | Suitable species  | Suggested planting density      |
|---------------------------------|---|---------------------------------|
| Groundcover<br>(direct seeding) | Austrostipa scabra ssp falcata<br>Austrostipa verticillata<br>Bothriochloa macra<br>Chloris ventricosa<br>Digitaria brownii<br>Enteropogon acicularis<br>Leptochloa digitata<br>Panicum laevinode<br>Themeda australis<br>Thyridolepis mitchelliana | 3 kilograms of seed per hectare |

 Table 6-2 Species to be utilised in groundcover revegetation activities

#### 6.5 MONITORING AND REPORTING

Monitoring of the success of the plantings conducted as part of the Landscape Plan would be conducted monthly until the end of the construction phase as outlined in the Landscape Plan. Monitoring of the habitat values of the revegetation area and reporting would occur annually in conjunction with the monitoring and reporting requirements for the offset site. The aim of monitoring would be to determine whether the area was being utilised by Grey-crowned Babblers and to identify any factors that may be limiting habitat values. During each monitoring period the revegetation area would be searched for the presence of Grey-crowned Babbler nests and the number of individual birds within the area recorded. Survey effort would be consistent for each monitoring event to facilitate accurate comparisons. Additional measures that may improve habitat values would be identified if considered necessary and included as recommendations within the report.

In conjunction with the monitoring conducted for the Offset Site, the results of monitoring of the revegetation area will be reported annually to the Department of Planning and Infrastructure for the duration of the project (up to 30 years) and also submitted to OEH. Management measures may be altered to reflect the results of monitoring. A decision to reduce or continue annual reporting may also be made by DPI or OEH following submission of each report.





Figure 6-1 Proposed revegetation area within the development site

## 7 SUITABILITY OF PROPOSED OFFSETS

The proposed Offset Site and additional compensatory measures provide a 'like for like' offset with respect to the vegetation type and threatened species habitats that are to be impacted by the development. Overall the proposed offset presents a 1:5 area impacted to area offset ratio. The Offset Site contains 29 hollow-bearing trees and three that are likely to be hollow-bearing, providing a ratio of approximately 1:3 hollow-bearing trees impacted to offset. The majority of the hollow-bearing trees within the Offset Site are considered to be of high quality.

Opportunities exist for improvement with appropriate management of the Offset Site. Recommended management measures have been outlined in Section 5 along with a monitoring regime to determine whether the objectives are being met. A gain in the biodiversity value of the site is anticipated which would meet the 'maintain or improve' standard. With appropriate management, the proposed offset is considered to meet the *Principles for Biodiversity Offsets in NSW*. A detailed assessment against these principles is provided as Appendix C.

The proposed offset is considered to be suitable on the basis of the vegetation types and habitats it conserves, the potential improvements to be realised and consistency with NSW offset principles. The conservation status of the Offset Site will be attached to the title of the land which will ensure that the biodiversity values of the site will be enhanced, maintained and protected for the long-term.

The additional compensatory measures at the development site aim to actively restore degraded farmland to be representative of the surrounding native vegetation which is being impacted by the development. In the long-term this is intended to provide additional habitat for the Grey-crowned Babbler in the immediate area where habitat is being lost and where the species is known to occur and breed. A monitoring regime has been proposed to determine whether these objectives are being met. Combined with the Offset Site, these additional measures form a Biodiversity Offset Package which is considered adequate to offset the residual impacts of the Nyngan Solar Plant development.



## 8 **REFERENCES**

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## APPENDIX A BIODIVERSITY OFFSET MANAGEMENT PLAN - CONDITION OF APPROVAL C5

C5. Following final design and prior to the commencement of construction, or as otherwise agreed to by the Director-General, the Proponent shall develop and submit a Biodiversity Offset Management Package for the approval of the Director-General. The package shall detail how the ecological values lost as a result of the Project will be offset. The Biodiversity Offset Management Package shall be developed in consultation with the OEH and shall (unless otherwise agreed by the Director-General) include, but not necessarily be limited to:

(a) an assessment of all native vegetation communities and threatened species habitat supported by a suitable metric method (such as the Biobanking Assessment Methodology) that will either be directly or indirectly impacted by the proposal;

(b) the objectives and biodiversity outcomes to be achieved (including 'improve or maintain' biodiversity values), and the adequacy of the proposed offset considered;

(c) the final suite of the biodiversity offset measures selected and secured including but not necessarily limited to;

*i)* an offset proposal which is supported by a suitable metric method (such as the Biobanking Assessment Methodology);

*ii)* details of the relative condition and values of communities on the offset site in comparison to those to be impacted, including all areas of native shrubland in moderate to good condition;

*iii) proposed management actions and expected gains;* 

(d) the monitoring requirements for compensatory habitat works and other biodiversity offset measures proposed to ensure the outcomes of the package are achieved, including:

*i*) the monitoring of the condition of species and ecological communities at offset locations;

*ii) the methodology for the monitoring program(s), including the number and location of offset monitoring sites, and the sampling frequency at these sites;* 

*iii) provisions for the annual reporting of the monitoring results for a set period of time as determined in consultation with the OEH;* 

(e) timing and responsibilities for the implementation of the provisions of the Package.

Land offsets shall be consistent with the Principles for the use of Biodiversity Offsets in NSW (NSW Office of Environment and Heritage, June 2011). Any land offset shall be enduring and be secured by a conservation mechanism which protects and manages the land in perpetuity. Where land offsets cannot solely achieve compensation for the loss of habitat, additional measures shall be provided to collectively deliver an improved or maintained biodiversity outcome for the region.

Where monitoring referred to in condition (d) indicates that biodiversity outcomes are not being achieved, remedial actions shall be undertaken to ensure that the objectives of the Biodiversity Offset Package are achieved.



## APPENDIX B SPECIES RECORDED DURING SURVEYS

### B.1 FLORA SPECIES LIST

Relative abundance is given by a cover abundance scale (modified Braun-Blanquet):

- 1 1 to a few individuals present, less than 5% cover
- 2 many individuals present, but still less than 5% cover
- 3 5 < 20% cover
- 4 20 < 50% cover
- 5 50 < 75% cover
- 6 75 100% cover

Cover/abundance scores relate to representative quadrats within monitoring plots. For the broader site, cover/abundance is not given as the entire site was not surveyed in detail. Presence of species additional to those recorded within the quadrats is indicated by an 'X'.

\*Introduced species are preceded by an asterisk. Where it was not possible to identify a species to specific level, the genus is listed followed by 'sp.' (species). Where uncertainty exists, the taxon is preceded by a question mark '?'.

| Scientific name                   | Common name           | Family         | Abundance |     |     |     |                 |
|-----------------------------------|-----------------------|----------------|-----------|-----|-----|-----|-----------------|
|                                   |                       |                | M01       | M02 | M03 | M04 | Broader<br>site |
| TREES                             |                       |                |           |     |     |     |                 |
| Callitris glaucophylla            | White Cypress<br>Pine | Cupressaceae   | 1         |     | 3   | 4   |                 |
| Eremophila mitchellii             | Budda                 | Myoporaceae    |           |     |     |     | х               |
| Eucalyptus intertexta             | Inland Red Box        | Myrtaceae      |           |     |     |     | х               |
| Eucalyptus populnea ssp<br>bimbil | Bimble Box            | Myrtaceae      | 1         |     | 1   | 1   |                 |
| Geijera parviflora                | Wilga                 | Rutaceae       |           |     |     |     | х               |
| Hakea tephrosperma                | Hooked<br>Needlewood  | Proteaceae     |           |     |     |     | х               |
| SHRUBS, SUB-SHRUBS                |                       |                |           |     |     |     |                 |
| Dodonaea viscosa ssp<br>mucronata | Broad-leaf<br>Hopbush | Sapindaceae    |           |     |     | 1   |                 |
| Einadia nutans subsp.<br>nutans   | Climbing Saltbush     |                | 1         |     | 2   | 2   |                 |
| Enchylaena tomentosa              | Ruby Saltbush         | Chenopodiaceae |           |     | 2   |     |                 |
| Eremophila longifolia             | Myoporaceae           |                |           | 1   |     |     |                 |
| Maireana microphylla              | Eastern<br>Cottonbush | Chenopodiaceae |           |     | 1   |     |                 |
| ?Melhania oblongifolia            |                       | Malvaceae      |           | 1   |     |     |                 |



| Scientific name                                  | Common name             | Family          | Abundance |     |     |     |         |
|--|-------------------------|-----------------|-----------|-----|-----|-----|---------|
|  |                         |                 | M01       | M02 | M03 | M04 | Broader |
|  |                         |                 |           |     |     |     | site    |
| Sclerolaena birchii                              | Galvanised Burr         | Chenopodiaceae  |           | 1   |     | 2   |         |
| Sclerolaena convexula                            |                         | Chenopodiaceae  |           |     |     |     | х       |
| Sclerolaena diacantha                            | Grey Copperburr         | Chenopodiaceae  |           | 1   | 2   | 1   |         |
| FERNS  |                         |                 |           |     |     |     |         |
| Cheilanthes sieberi ssp<br>sieberi               | Rock or Mulga<br>Fern   | Sinopteridaceae | 1         |     |     |     |         |
| VINES AND TWINERS                                |                         |                 |           |     |     |     |         |
| Convolvulus recurvatus<br>ssp. recurvatus        | Bindweed                | Convolvulaceae  | 1         | 1   | 1   |     |         |
| Parsonsia eucalyptophylla                        | Gargaloo                | Apocynaceae     |           |     |     | 1   |         |
| Rhyncharrhena linearis                           | Purple pentatrope       | Apocynaceae     |           |     |     |     | х       |
| FORBS  |                         |                 |           |     |     |     |         |
| Abutilon halophilum                              | Plains Lantern-<br>bush | Malvaceae       |           | 1   |     |     |         |
| Actinobole uliginosum                            | Flannel Cudweed         | Asteraceae      | 2         | 2   |     |     |         |
| *Asphodelus fistulosus                           | Wild Onion              | Asphodelaceae   |           |     |     |     | х       |
| Brunoniella australis                            | Blue Trumpet            | Acanthaceae     |           |     |     | 2   |         |
| Calotis cuneifolia                               | Purple Burr-daisy       | Asteraceae      | 2         | 2   |     |     |         |
| Calotis lappulacea                               | Yellow Burr-daisy       | Asteraceae      | 2         | 2   |     |     |         |
| *Carthamus lanatus                               | Saffron Thistle         | Asteraceae      | 1         | 1   |     |     |         |
| Chamaesyce drummondii                            | Caustic Weed            | Euphorbiaceae   | 1         |     |     |     |         |
| Chrysocephalum<br>apiculatum                     | Yellow Buttons          | Asteraceae      | 3         | 2   |     |     |         |
| Daucus glochidiatus                              | Native Carrot           | Apiaceae        | 3         | 3   | 1   |     |         |
| Dianella longifolia var.<br>Iongifolia           |                         | Phormiaceae     |           |     | 1   |     |         |
| Erodium crinitum                                 | Blue Storksbill         | Geraniaceae     | 1         | 2   |     | 1   |         |
| Euchiton sphaericus                              | Cudweed                 | Asteraceae      | 1         |     |     |     |         |
| Goodenia cycloptera                              | Serrated Goodenia       | Goodeniaceae    | 2         | 2   | 1   |     |         |
| Harmsiodoxa<br>blennodioides                     |                         | Brassicaceae    | 2         | 2   |     | 2   |         |
| ?*Hypochaeris<br>microcephalum ssp.<br>albiflora |                         | Asteraceae      |           |     |     | 1   |         |
| *Medicago laciniata                              | Cut-leaf Medic          | Fabaceae        | 2         | 3   | 2   | 2   |         |
| Plantago cunninghamii                            |                         | Plantaginaceae  |           | 1   |     |     |         |
| Portulaca oleracea                               | Purslane, Pigweed       | Portulacaceae   |           |     |     |     | х       |
| Ptilotus sessilifolius                           | Crimson Foxtail         | Amaranthaceae   |           |     | 2   | 1   |         |



| Scientific name                               | Common name                     | Family        | Abundance |     |     |     |         |
|---|---------------------------------|---------------|-----------|-----|-----|-----|---------|
|   |                                 |               | M01       | M02 | M03 | M04 | Broader |
|   |                                 |               |           |     |     |     | site    |
| Ptilotus obovatus                             |                                 | Amaranthaceae |           |     |     |     | Х       |
| Ptilotus polystachyos                         | Long-tails                      | Amaranthaceae |           | 1   |     |     |         |
| Rhodanthe corymbiflora                        | Small White<br>Sunray           | Asteraceae    | 2         | 2   |     |     |         |
| Rostellularia adscendens<br>var. pogonanthera | Pink Tongues                    | Acanthaceae   |           |     | 2   | 2   |         |
| Sida corrugata                                | Corrugated Sida                 | Malvaceae     |           | 2   |     | 2   |         |
| *Sisymbrium irio                              | London Rocket                   | Brassicaceae  |           |     | 2   | 3   |         |
| Solanum esuriale                              | Quena                           | Solanaceae    |           | 1   | 2   |     |         |
| *Sonchus oleraceus                            | Milk Thistle                    | Asteraceae    | 1         |     |     | 1   |         |
| Stuartina muelleri                            | Spoon Cudweed                   | Asteraceae    |           |     | 2   |     |         |
| Vittadinia gracilis                           |                                 | Asteraceae    | 1         | 2   |     |     |         |
| Vittadinia ?pustulatum                        | Fuzzweed                        | Asteraceae    |           | 1   |     |     |         |
| Wahlenbergia communis                         | Tufted Bluebell                 | Campanulaceae | 2         |     |     |     |         |
| Wahlenbergia graniticola                      |                                 | Campanulaceae | 1         | 1   |     |     |         |
| Wahlenbergia sp.                              |                                 | Campanulaceae |           | 2   |     |     |         |
| Xerochrysum bracteatum                        | Paper Daisy                     | Asteraceae    | 2         | 2   | 1   | 1   |         |
| GRASSES                                       |                                 |               |           |     |     |     |         |
| Aristida behriana                             | Brush Wiregrass                 | Poaceae       |           |     |     | 1   |         |
| Aristida jerichoensis var.<br>subspinulifera  | Number 9<br>Wiregrass           | Poaceae       | 3         | 3   | 2   | 2   |         |
| Austrodanthonia setacea                       | Small-flowered<br>Wallaby Grass | Poaceae       |           |     |     |     | х       |
| Austrostipa scabra ssp<br>falcata             | Corkscrew Grass                 | Poaceae       | 3         | 3   | 2   | 2   |         |
| Austrostipa verticillata                      | Slender Bamboo<br>Grass         | Poaceae       |           |     |     |     | х       |
| Chloris truncata                              | Windmill Grass                  | Poaceae       |           |     |     |     | х       |
| Cymbopogon refractus                          | Barbed Wire Grass               | Poaceae       |           |     |     |     | х       |
| Digitaria brownii                             | Cotton Panic Grass              | Poaceae       |           |     |     |     | х       |
| Elymus scaber                                 | Wheat Grass                     | Poaceae       | 2         | 2   |     |     |         |
| Enteropogon acicularis                        | Curly Windmill<br>Grass         | Poaceae       |           |     | 2   | 2   |         |
| ?Microlaena stipoides                         | Weeping Grass                   |               |           |     | 1   |     |         |
| Panicum decompositum                          | Pepper Grass                    | Poaceae       |           |     |     |     | х       |
| Themeda australis                             | Kangaroo Grass                  | Poaceae       | 1         |     |     |     |         |
| Thyridolepis mitchelliana                     | Mulga Mitchell<br>Grass         | Poaceae       | 2         | 2   | 2   | 2   |         |



| Scientific name | Common name      | Family       | Abundance |     |     |     |                 |
|-----------------|------------------|--------------|-----------|-----|-----|-----|-----------------|
|                 |                  |              | M01       | M02 | M03 | M04 | Broader<br>site |
| GRAMINOIDS      |                  |              |           |     |     |     |                 |
| Lomandra effusa | Scented Mat-rush | Lomandraceae |           | 1   |     |     |                 |

### B.2 FAUNA SPECIES LIST

| Common Name           | Scientific Name                    | Sighting |
|-----------------------|------------------------------------|----------|
| Birds                 |                                    |          |
| Apostlebird           | Struthidea cinerea                 | Observed |
| Australian Magpie     | Cracticus tibicen                  | Observed |
| Australian Raven      | Corvus coronoides                  | Observed |
| Blue Bonnet           | Northiella haematogaster           | Observed |
| Crested Pigeon        | Ocyphaps lophotes                  | Observed |
| Galah                 | Eolophus roseicapillus             | Observed |
| Grey-crowned Babbler  | Pomatostomus temporalis temporalis | Observed |
| Little Corella        | Cacatua sanguinea                  | Observed |
| Nankeen Kestrel       | Falco cenchroides                  | Observed |
| Noisy Miner           | Manorina melanocephala             | Observed |
| White-winged Chough   | Corcorax melanorhamphos            | Observed |
| Willie Wagtail        | Rhipidura leucophrys               | Observed |
| Mammals               |                                    |          |
| Eastern Grey Kangaroo | Macropus giganteus                 | Observed |
| *European Rabbit      | Oryctolagus cuniculus              | Observed |
| *Feral Pig            | Sus scrofa                         | Observed |
| Reptiles              |                                    |          |
| Sand Goanna           | Varanus gouldii                    | Observed |



## **APPENDIX C HOLLOW-BEARING TREE REGISTER**

| Easting   | Northing | Species                | Features                                | Class     | DBH (mm) |
|-----------|----------|------------------------|---|-----------|----------|
|           |          | Eucalyptus             |   |           |          |
| 6498139   | 501602.3 | intertexta             | Several small spouts                    | 1         | 1000     |
| C 400100  | 501504.0 | Eucalyptus             |   | 2         | 1.000    |
| 6498109   | 501594.8 | populnea<br>Eucalyptus | I medium spout near trunk               | Z         | 1600     |
| 6498137   | 501513.9 | populnea               | 1 large spout several small             | 3         | 900      |
|           |          | Eucalyptus             |   |           |          |
| 6498106   | 501479.3 | populnea               | 3 medium spouts                         | 3         | 900      |
|           |          | Eucalyptus             |   |           |          |
| 6498127   | 501477.6 | populnea               | 1 large fissure                         | 2         | 1000     |
| c 4004 C0 |          | Eucalyptus             |   |           | 1000     |
| 6498160   | 501473.6 | populnea               | Potential large spout                   | Potential | 1000     |
| 6409140   | F01462 2 | Eucalyptus             | 1 large in base of trunk                | 2         | 1000     |
| 0498149   | 501462.3 | Fucalvatus             | I large in base of trunk                | 3         | 1000     |
| 6/08130   | 501/60 2 | nonulnea               | 2 large shouts notentially others       | 3         | 1200     |
| 0490130   | 501400.2 | Fucalvotus             | 2 small shouts and 1 medium in trunk    | 5         | 1200     |
| 6498152   | 501384 7 | nonulnea               | with feathers around entrance           | 2         | 800      |
| 0450152   | 501504.7 | Fucalyptus             | 1 medium in main limb potentially       | 2         | 000      |
| 6498153   | 501338.3 | populnea               | others                                  | 2         | 1100     |
| 0.00100   | 0010000  | Eucalvotus             |   | -         |          |
| 6498174   | 501292.1 | populnea               | 1 large in main trunk                   | 3         | 1000     |
|           |          | Eucalyptus             | 2 medium spouts and large fissure in    |           |          |
| 6498153   | 501269   | populnea               | trunk                                   | 2         | 1000     |
|           |          | Eucalyptus             |   |           |          |
| 6498128   | 501257.9 | intertexta             | Potential medium spout                  | Potential | 1000     |
|           |          | Eucalyptus             |   |           |          |
| 6498135   | 501209.2 | populnea               | 2 medium spouts                         | 2         | 700      |
|           |          | Eucalyptus             |   |           |          |
| 6498156   | 501172.6 | intertexta             | 1 very large hollow in trunk            | 3         | 1000     |
|           |          | Eucalyptus             |   |           |          |
| 6498184   | 501155.9 | populnea               | Large fissure in trunk only             | 1         | 1200     |
| C 400402  | 501121 2 | Eucalyptus             | 4 we address at an ell of we aim limite | 2         | 1000     |
| 6498192   | 501131.2 | Fuceluntur             | 1 medium at end of main limb            | 2         | 1000     |
| 6/08108   | 501002 6 | nonulnea               | I sinali spout and I large in main      | 2         | 000      |
| 0490190   | 501092.0 | Fucalvotus             | ti ulik                                 | J         | 900      |
| 6498193   | 501034 4 | intertexta             | 1 medium spout                          | 2         | 900      |
| 0150155   | 50105111 | Eucalyptus             |   | -         | 500      |
| 6498160   | 500989.1 | intertexta             | 1 large spout                           | 3         | 1000     |
|           |          | Eucalyptus             |   |           |          |
| 6498170   | 500969.8 | populnea               | 1 small spout                           | 1         | 600      |
|           |          | Eucalyptus             | 1 medium spout and potentially          |           |          |
| 6498188   | 500971.6 | populnea               | others                                  | 2         | 900      |
|           |          | Eucalyptus             | 1 medium spout though seems to          |           |          |
| 6498185   | 500898.8 | populnea               | narrow quickly                          | 1         | 800      |
|           |          | Eucalyptus             | 1 small in trunk and one medium         |           |          |
| 6498205   | 500864.2 | populnea               | spout                                   | 2         | 1100     |
| C 400     |          | Eucalyptus             |   |           |          |
| 6498158   | 500828.6 | populnea               | 1 small and 1 medium spout              | 2         | 1000     |

| Easting | Northing | _Species                             | _Features  | Class     | DBH (mm) |
|---------|----------|--------------------------------------|--|-----------|----------|
| 6498202 | 500819.6 | Eucalyptus<br>populnea<br>Eucalyptus | 1 small spout and 1 large in main<br>trunk                                 | 3         | 800      |
| 6498270 | 500833   | populnea<br>Eucalyptus               | 1 medium spout<br>1 large in main trunk and potentially                    | 2         | 800      |
| 6498307 | 500836.1 | populnea<br>Eucalyptus               | others   | 3         | 1100     |
| 6498329 | 500812.8 | populnea<br>Eucalyptus               | 1 large spout  | 3         | 1200     |
| 6498380 | 500836.9 | populnea<br>Eucalyptus               | 1 large spout and potentially others                                       | 3         | 1200     |
| 6498419 | 500832.8 | populnea<br>Eucalyptus               | 2 large spouts   | 3         | 900      |
| 6498551 | 500870.8 | populnea<br>Eucalyptus               | 2 small in trunk and 1 medium spout<br>Potentially 2 medium spouts in dead | 2         | 800      |
| 6498681 | 500855   | populnea<br>Fucalyptus               | limbs  | Potential | 800      |
| 6498764 | 500877   | populnea                             | 1 medium in main trunk   | 2         | 700      |



## APPENDIX D PRINCIPLES FOR BIODIVERSITY OFFSETS IN NSW - CHECKLIST

The following principles, developed by OEH, provide a useful framework for developing offset proposals. They have been considered in developing this Offset Plan, as detailed below.

#### Impacts must be avoided first by using prevention and mitigation measures.

Offsets are then used to address remaining impacts. This may include modifying the proposal to avoid an area of biodiversity value or putting in place measures to prevent offsite impacts.

The proposal has avoided impacts to the extent that the impacts are the minimum required to meet the objectives of the proposal. Mitigation measures to minimise impacts form part of the conditions of consent for the project. Residual impacts resulting from the clearing of common vegetation types are being offset only.

#### All regulatory requirements must be met.

Offsets cannot be used to satisfy approvals or assessments under other legislation, e.g. assessment requirements for Aboriginal heritage sites, pollution or other environmental impacts (unless specifically provided for by legislation or additional approvals).

The Offset Plan is required as part of the approval conditions for the project. The proposed offsets will not be used to satisfy approvals or assessments under other legislation.

#### Offsets must never reward ongoing poor performance.

Offset schemes should not encourage landholders to deliberately degrade or mismanage offset areas in order to increase the value from the offset.

The Offset Site will be set up in perpetuity – this removes the incentive to degrade the Offset Site to facilitate development at a later date.

The management measures have clear targets and are set out to push most management to the beginning of the agreement, where successful accomplishment of targets would be rewarded by less intensive management in ongoing years. This suits measures such as weed and feral animal control which are more easily achieved with intensive efforts to eradicate infestations rather than small ongoing efforts that may allow re-colonisation or dispersal.

#### Offsets will complement other government programs.

A range of tools is required to achieve the NSW Government's conservation objectives, including the establishment and management of new national parks, nature reserves, state conservation areas and regional parks and incentives for private landholders.

A CPVP for the Offset Site will be attached to the title of the land containing measures that will ensure longterm management for conservation. Privately managed conservation lands complement public reserves and contribute to the protected area system in NSW.

#### Offsets must be underpinned by sound ecological principles.

They must:

• include the consideration of structure, function and compositional elements of biodiversity, including threatened species



- enhance biodiversity at a range of scales
- consider the conservation status of ecological communities
- ensure the long-term viability and functionality of biodiversity.

Biodiversity management actions, such as enhancement of existing habitat and securing and managing land of conservation value for biodiversity, can be suitable offsets. Reconstruction of ecological communities involves high risks and uncertainties for biodiversity outcomes and is generally less preferable than other management strategies, such as enhancing existing habitat.

The biodiversity values contained within the Offset Site have been described in this report and include consideration for threatened species. The condition of vegetation at the site has been assessed using the Biometrics methodology. The site contains the same community and habitat types that are to be impacted by the development.

The management measures to be implemented at the Offset Site focus on the removal of threatening processes which should be effective in enhancing threatened species habitats. Additionally, the progress and outcomes of management measures can be monitored and adapted over time to ensure continuing beneficial outcomes.

#### Offsets should aim to result in a net improvement in biodiversity over time.

Enhancement of biodiversity in offset areas should be equal to or greater than the loss in biodiversity from the impact site.

Setting aside areas for biodiversity conservation without additional management or increased security is generally not sufficient to offset against the loss of biodiversity. Factors to consider include protection of existing biodiversity (removal of threats), time-lag effects, and the uncertainties and risks associated with actions such as revegetation.

Offsets may include enhancing habitat, reconstructing habitat in strategic areas to link areas of conservation value, or increasing buffer zones around areas of conservation value and removal of threats by conservation agreements or reservation.

This biodiversity offset management plan:

- Identifies threats to the Offset Site's values.
- Sets out suitable management measures that can be undertaken for the long-term.
- Provides security by registering the site as a conservation area on title.

# Offsets must be enduring - they must offset the impact of the development for the period that the impact occurs.

As impacts on biodiversity are likely to be permanent, the offset should also be permanent and secured by a conservation agreement or reservation and management for biodiversity. Where land is donated to a public authority or a private conservation organisation and managed as a biodiversity offset, it should be accompanied by resources for its management. Offsetting should only proceed if an appropriate legal mechanism or instrument is used to secure the required actions.

The offset plan for this development is required in perpetuity. A CPVP will be prepared for the Offset Site and attached to the land title making it binding on all successors. The CPVP will contain management measures to ensure a maintain or improve outcome.



#### Offsets should be agreed prior to the impact occurring.

Offsets should minimise ecological risks from time-lags. The feasibility and in-principle agreements to the necessary offset actions should be demonstrated prior to the approval of the impact. Legal commitments to the offset actions should be entered into prior to the commencement of works under approval.

It is proposed that all offset arrangements are approved and in order prior to construction. An audit of the actual area impacted by the development will be conducted post construction and the offset area adjusted if required.

#### Offsets must be quantifiable - the impacts and benefits must be reliably estimated.

Offsets should be based on quantitative assessment of the loss in biodiversity from the clearing or other development and the gain in biodiversity from the offset. The methodology must be based on the best available science, be reliable and used for calculating both the loss from the development and the gain from the offset. The methodology should include:

- the area of impact
- the types of ecological communities and habitat/species affected
- connectivity with other areas of habitat/corridors
- the condition of habitat
- the conservation status and/or scarcity/rarity of ecological communities
- management actions
- *level of security afforded to the offset site.*

These points are addressed and described in this Offset Plan. The methodologies used to assess the Offset Site are the same as those used to determine the impacts. Vegetation condition has been assessed using the Biometrics methodology. Management actions have been described and a methodology for monitoring the success of these actions has been implemented. The offset will be secured in perpetuity as discussed above.

The best available information/data should be used when assessing impacts of biodiversity loss and gains from offsets. Offsets will be of greater value where:

- they protect land with high conservation significance
- management actions have greater benefits for biodiversity
- the offset areas are not isolated or fragmented
- the management for biodiversity is in perpetuity (e.g. secured through a conservation agreement).

These points have been considered in the selection of Offset Site. The Offset Site and proposed security and management meet the above objectives.



#### Management actions must be deliverable and enforceable.

Management actions and their objectives, proposed methods of delivery and monitoring requirements are outlined in Section 5 of this plan. Provisions have been included for the annual reporting of monitoring results to DP&I and OEH.

#### Offsets must be targeted.

They must offset impacts on the basis of like-for-like or better conservation outcome. Offsets should be targeted according to biodiversity priorities in the area, based on the conservation status of the ecological community, the presence of threatened species or their habitat, connectivity and the potential to enhance condition by management actions and the removal of threats. Only ecological communities that are equal or greater in conservation status to the type of ecological community lost can be used for offsets. One type of environmental benefit cannot be traded for another: for example, biodiversity offsets may also result in improvements in water quality or salinity but these benefits do not reduce the biodiversity offset requirements.

Offsets have been proposed based on biodiversity values that will be impacted and to achieve a 'like for like' outcome with regard to the vegetation types and habitats being impacted.

#### Offsets must be located appropriately.

Wherever possible, offsets should be located in areas that have the same or similar ecological characteristics as the area affected by the development.

Locating the Offset Site in close proximity (approximately 10 km south-west) of the impacts within the same vegetation types achieves this aim.

#### Offsets must be supplementary.

They must be beyond existing requirements and not already funded under another scheme. Areas that have received incentive funds cannot be used for offsets. Existing protected areas on private land cannot be used for offsets unless additional security or management actions are implemented. Areas already managed by the government, such as national parks, flora reserves and public open space cannot be used as offsets.

The proposed offset is not covered by any existing covenants or agreements. The land is owned by a private land owner and it is not being managed for conservation. The offset is therefore considered supplementary.

Offsets and their actions must be enforceable through development consent conditions, licence conditions, conservation agreements or a contract.

Offsets must be audited to ensure that the actions have been carried out, and monitored to determine that the actions are leading to positive biodiversity outcomes.

Monitoring requirements are outlined in Section 5 of this plan and have been designed to ensure that the actions lead to positive biodiversity outcomes.





| Date | Any evidence of bird strike<br>on perimeter fence?<br>Yes No |  | If yes, what location and species? | All nest boxe<br>sect<br>Are introdu<br>pres | s in place and<br>ure?<br>uced species<br>sent? | Actions |
|------|--|--|------------------------------------|--|---|---------|
|      |  |  |                                    | Yes  | No  |         |
|      |  |  |                                    |  |   |         |
|      |  |  |                                    |  |   |         |
|      |  |  |                                    |  |   |         |
|      |  |  |                                    |  |   |         |
|      |  |  |                                    |  |   |         |
|      |  |  |                                    |  |   |         |
|      |  |  |                                    |  |   |         |
|      |  |  |                                    |  |   |         |
|      |  |  |                                    |  |   |         |
|      |  |  |                                    |  |   |         |
|      |  |  |                                    |  |   |         |
|      |  |  |                                    |  |   |         |
|      |  |  |                                    |  |   |         |
|      |  |  |                                    |  |   |         |
|      |  |  |                                    |  |   |         |
|      |  |  |                                    |  |   |         |

### FORM-F01 - Perimeter Fence and Nest Box Monitoring Record

To be completed monthly.

Photocopy form as required.



## FORM F02 - Fauna Handling Record

| No:   | Time:   |
|---|---|
| Date:   | Location:                                     |
|   |   |
| GPS coordinates:  |   |
| Species name and number of individuals:   |   |
|   |   |
|   |   |
| Condition of the animal: Living:  Dead:  Other:   | Injured:  Sick:  Other:                       |
|   |   |
|   |   |
| Vegetation type in which the animal was rec   | corded:                                       |
|   |   |
|   |   |
| Biological information (where possible) incl  | luding age, sex, breeding condition and size: |
|   |   |
|   |   |
| Management action: Captured:       Handled:         Other or comment:       Image: Captured:       Image: Captured: | □ Taken to vet: □ Other: □                    |
|   |   |
|   |   |
| Result of management action: Released:  | Euthanised:  Placed with carer:  Other:       |
| Other or comment:   |   |
|   |   |
|   |   |
| Recorded by:  |   |
| Name:   | Signature:                                    |
|   | •   |



Figure F01—Vegetation Type and Condition



Figure F02—Habitat Areas



Figure-F03 - Fauna Habitat



# CEMP-G Landscape Plan Nyngan Solar PV Power Station





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### **Document Control**

| Doc<br>Rev | Date     | Reason                                  | Issued by   | Review             |          | Review             |                      |
|------------|----------|---|-------------|--------------------|----------|--------------------|----------------------|
| А          |          | Issued for FS review                    | Geolyse     | SF                 | 26/10/13 | JS                 | 27/10/13             |
| В          | 30/10/13 | Issued for FS review                    | Geolyse     | SF                 | 30/10/13 | JS                 | 30/10/13             |
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| F          | 05/02/14 | Final reissued to address DPI comments  | First Solar |                    |          |                    |                      |
|            |          |   |             |                    |          |                    |                      |

Cited Cross References within Document:

- 1. Appendix CEMP-H Rehabilitation and Revegetation Management Plan
- 2. Appendix CEMP-F Flora and Fauna Management Plan



## 1 Purpose

This Landscape Plan for the Nyngan Solar PV Power Station has been prepared to meet requirements of:

- Development Consent (SSD-5355)
  - Condition C3
- Nyngan Solar Plan Submissions Report (NGH Environmental, June 2013)
  - Mitigation Measure 40

## 2 Scope

### 2.1 Overview

### 2.1.1 Construction Phase

As required by Condition C3 of the Development Consent (SSD-5355) for the Nyngan Solar PV Power Station, First Solar (Australia) Pty Ltd (First Solar) has developed the following Landscape Plan for the development as it relates to the activities of First Solar. Specifically this Landscape Plan relates to the Construction Phase of the power station and associated access tracks.

A second CEMP is being prepared for the power station's grid connection by a separate contractor. The grid connection for the Nyngan Solar PV Power Station is not under the mandate of First Solar (Australia) Pty Ltd (First Solar) and is therefore not included within the following document. Please refer to the separate grid connection / transmission line CEMP for information specific to the grid connection construction works.

The landscape planting required by Mitigation Measure 38 falls outside of the mandate of First Solar. Please refer to the separate grid connection / transmission line CEMP for details on the mitigation proposed to address Mitigation Measure 38.

The reporting required by Conditions B18 and B19 fall outside of the scope of the First Solar CEMP.

For planting relating specifically to the Rehabilitation and Revegetation of the power station site and associated access tracks please refer to the First Solar *Rehabilitation and Revegetation Management Plan* (**CEMP-H**).

For information on indicatively what existing trees will be retained within the power station site please refer to the *Flora and Fauna Management Plan* (**CEMP-F**).



#### 2.1.2 Operational Phase

The landscape plantings discussed within this document relate to the Construction Phase of the Nyngan Solar PV Power Station. Measures relating to the maintenance and monitoring of plantings detailed within the Landscape Plan that extend beyond the construction period, fall outside of the mandate of First Solar. At the conclusion of the Construction Phase of the Nyngan Solar PV Power Station, responsibility for the site will return to AGL as the owner / operator of the power station development. Measures relating operational measures please refer to the AGL's Operational Environmental Management Plan (OEMP).

The AGL OEMP, pursuant to Consent Condition C4 of the Minister's approval, must be submitted to the Director General no later than one month prior to the commencement of Operation of the development, or within such period as otherwise agreed to by the Director General.

For screening planting required by Condition B20 of the Development Consent please refer to the AGL OEMP.

### 2.2 Nyngan Solar PV Power Station Development

The Nyngan Solar PV Power Station will consist of a 102MW solar PV power station located approximately 10km west of Nyngan. The solar plant will occupy approximately 300 hectares of land to the north of the Barrier Highway.

First Solar (Australia) Pty Ltd have been engaged by AGL to provide engineering, procurement and construction (EPC) services. The Nyngan Solar PV Power Station will utilise First Solar's advanced cadmium telluride (CdTe) thin film photovoltaic modules. The solar modules generate electricity with no air emissions, no waste production, no water use and have one of the smallest carbon footprints of any current PV technology. Over 7,000MW of First Solar PV modules have been installed worldwide, including at many of the world's largest solar PV plants, since beginning commercial production in 2002. First Solar has been actively involved in the Australian market since mid-2008.

The construction of the Nyngan Solar PV Power Station project is expected to commence in early 2014 and will take approximately 18 months to complete. Once constructed the Nyngan Solar PV Power Station will generate an estimated 233,000 megawatt hours (MWh) of electricity annually.

### 2.3 Relevant Approval Provisions

Condition C3 of the Nyngan Development Consent states:

- *C3.* As part of the Construction Environmental Management Plan required under condition C2 of this consent, the Applicant shall prepare and implement the following :
  - (c) a **Landscape Plan**, to minimise visual impacts from the solar plant. The Plan shall include, but not necessarily be limited to:



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

Mitigation Measure 40 states:

40 The colour of the above ground structures, including the construction site offices, would be sympathetic to the landscape character of the site to minimise visual contrast.

## 2.4 Landscape Planting Objectives

The objective of the landscape planting detailed within the Landscape Plan is to minimise the visual impact of the power station development, particularly with respect to the visual impacts of the development when viewed from the Barrier Highway, during the Construction Phase for the Nyngan power station and access tracks. In addition to the proposed planting, existing trees within the site will be retained as far as practicable.

The landscape planting outlined in the following Landscape Management Plan is in accordance with Section 6.6.4 *Mitigation* of the Nyngan Environmental Impact Statement.

The plantings shall start as soon as reasonably practicable to allow the plantings time to mature during the construction of the power station. To give the plants the best change planting will be timed to avoid any site preparation activities that may impact the plants during the initial settling period.

The plantings are designed for long term visual impact mitigation. The plantings will not provide an immediate screening of the development. Construction activities will continue to be visible in the two gaps on the Barrier Highway until the in-fill landscape plantings have matured.

## **3** Principles

The principles are broadly to utilise:

- Endemic native species that are suited to the local environment
- That will provide a suitably dense and high foliage cover to effectively screen development infrastructure



• Species selection that will enhance localised biodiversity values through provision of additional habitat opportunities.

The intent of the plantings outlined in this Landscape Plan is to mitigate any potential visual amenity effects presented by the power station development, specifically when viewed from the Barrier Highway where identified gaps (Section 6.6.4 of Environmental Impact Statement) in the existing tree line are present. As identified in the Environmental Impact Statement, existing mature vegetation along the northern, western and eastern boundaries of the power station site will provide visual mitigation for the power station when viewed from these angles.

The management of the landscape plantings beyond the Construction Phase will become the responsibility of the project owner/operator (AGL).

Any additional planting required outside of the areas identified within this Landscape Plan is the responsibility of the project owner (AGL) and falls outside of the mandate of First Solar.

## 4 Species

Trees and shrubs recommended below are all native to the Nyngan area and are suited to the local environment. For the purposes of the list below, Wild Orange, Budda, Wilga and Hooked Needlewood have been listed as trees. Whilst all three species present as tall shrubs, they have been listed under trees as they can be practically used in place of trees to mitigate the effects of the development.

#### TREES

- Acacia excelsa Ironwood
- Acacia melvillei Yarran
- Callitris glaucophylla White Cypress Pine
- Capparis mitchellii Wild Orange
- Eremophila mitchellii Budda
- Eucalyptus intertexta Inland Red Box
- Eucalyptus populnea ssp bimbil Bimble Box
- Geijera parviflora Wilga
- Hakea tephrosperma Hooked Needlewood

#### SHRUBS, SUB-SHRUBS

- Dodonaea viscosa ssp mucronata Broad-leaf Hopbush
- Eremophila longifolia Emubush
- Senna form taxon 'zygophylla' Punty Bush



Final tree selection will be made to ensure compliance with Section 6.1 of the Nyngan Solar Plant Visual Impact Assessment (Fresh Landscape Design, October 2012).

## 5 Screening Location

## 5.1 Initial

The initial landscape planting to be undertaken would be restricted to a corridor on the southern boundary of the power station complemented with two strategically located infill plantings, intended to screen infrastructure from viewpoints, on edge of the Barrier Highway.

The location of these plantings is shown in **Figure-G01** (see attached).

### 5.2 Post Construction

In addition to the initial landscape planting that will be undertaken as part of the Construction Phase for the power station, a procedure will be followed to identify the need for any additional plantings on completion of construction and the transfer in to the Operational Phase of the project. Detail of this procedure is provided below (refer to Section 7)

## 6 Implementation, Management and Monitoring Strategies

### 6.1 Planting Material and Methods

The use of tube stock seedlings is recommended. The species identified in Section 4 are generally available from recognised native plant nurseries. Machine planting is likely to be feasible in the open environment at Nyngan. However, hand planting may produce a better result and may be utilised where practicable.

Tube stocks should be planted in a hole slightly longer than the root mass and potting mix. Soil should then be placed over the potting mix to prevent rapid drying after planting.

For weed control, anchored jute matting should be used around the seedling. Matting also helps to conserve soil moisture, improves water infiltration and soil structure, and moderates soil temperatures, thereby improving plant growth. Contact between the matting and the seedling should be avoided to minimise the risk of collar rot, although this is not likely to be a high risk at Nyngan.

The use of tree guards is also recommended, as they protect against grazing by wildlife and pests such as rabbits and hares, as well as providing protection from drying winds. Standard plastic sleeve guards held away from the seedling by three stakes would be utilised as far as practicable to protect new plantings.



Landscape plantings would be enclosed within a stock proof fence where practicable to protect the new plantings from larger grazing herbivores including wildlife and livestock.

### 6.2 Planting Distances and Ratios

Four rows would provide an adequate screen to the site. Equal numbers of trees and shrubs should be used in the plantings on an alternating pattern in different rows.

Three metre spacings for hand planted planting of trees and shrubs would generally produce a good result. The site specific conditions will be taken in to consideration at the time of planting to ensure that the desired screening coverage is attained.

### 6.3 Watering

Newly planted tube stocks would be watered-in to reduce planting shock, to remove air pockets next to roots and to help establish good root to soil contact.

Follow up watering would be utilised only if extreme adverse weather conditions occur that threaten survival of the seedlings. It is generally recognised that additional watering is not needed if adequate weed control, correct planting methods (no exposed potting mix) and normal rainfall occur. The plant species, in accordance with the Standards outlined in Section 3, have been selected as they are suited to the specific climatic conditions in this area.

### 6.4 Monitoring

The following section provides an indicative overview of the monitoring requirements for screening landscape planting identified in **Figure G-01** (attached). Monitoring of the success of the screening plantings is important for documenting the progress and impact of the landscape plantings.

Monitoring would record (on Form G01):

- Number of live and dead plants of each species
- Any plants replaced
- Plant height
- Plant condition: Is the foliage healthy? Is there any evidence of insect or vertebrate browsing? Is there any dieback of leaves or twigs?
- Whether the tree guard is still present and its condition (replace faulty guards if necessary and record)
- The status of weeds, percentage of surface area covered, and whether each plant is subject to excessive competition or has outgrown the weed threat
- The moisture status of the soil, dry, damp or wet.



The purpose of the screening plants outlined in this Landscape Plan is to minimise the visual impacts of the power station from the Barrier Highway. The areas of landscape screening planting covered by this Landscape Plan would be photographed from established photo points (at a minimum photo points 15, 16 and 17 – see **Figure G02** attached) at the time of planting (by First Solar) and annually thereafter (by the owner / operator) until plantings are established.

First Solar commits to undertaking monitoring checks on a monthly basis from initial planting until the end of the Construction Phase. The results of the monthly monitoring will be provided to AGL to help inform the OEMP.

### 6.5 Maintenance

The following section provides an indicative overview of the likely Maintenance requirements for screening landscape planting identified in **Figure G-01** (attached). Subsequent to the Construction Phase the power station development will be returned to the owner / operator (AGL). As part of the handover from the Construction Phase to the Operation Phase the responsibility for the ongoing maintenance of the screening plantings will be passed to the owner / operator (AGL) of the power station. Specific maintenance requirements for landscape plantings during the Operation Phase for the power station will be encapsulated within the Operational Environmental Management Plan (required by Condition C4 of the Development Consent).

Indicatively a minimum of two years of maintenance of screening landscape planting areas (as identified in **Figure-G01** attached) after completion of plantings would be undertaken. Maintenance requirements for the Operational Phase will be informed by the First Solar monitoring activities outlined in the above section.

Maintenance activities may include:

- Regular checks of fences to ensure stock do not gain access.
- Checks of tree guards to ensure they are correctly in place and /or undamaged. Tree guards should be removed when plants are well established and at a stage where the viability of the plant will not be compromised by pest animal activity.
- Rainfall and soil moisture levels should be monitored for the first six months. If necessary young plants should be watered if it becomes very dry. However, if the conditions are good at the time of planting additional watering can be minimised.
- Checks for weed competition. Spot spraying of weeds with selective herbicides would be undertaken if weeds start to overpower seedlings. The need for weed spraying will be minimised as far as practicable with pre-planting site preparation.
- Checks for evidence of browsing by wildlife such as hares and wallabies. Additional measures to prevent browsing should be employed. Measures may include wire cages or branches strategically placed around seedlings.
- Unviable plants should be replaced as soon as practicable to ensure effective screening is attained, e.g. after the first autumn rains or in the following spring.



## 6.6 Ancillary Facilities

In accordance with Mitigation Measure 40, the colour of both the permanent (Operational Phase) and temporary (Construction Phase) above ground structures will be "sympathetic" to the landscape character of the site to minimise visual contrast.

The temporary Construction Phase buildings are expected to be recessively coloured, e.g. beige. These buildings will be supplied to the site using the standard factory colours.

The permanent ancillary facilities will be coloured using the Colourbond colour schedule. The buildings have been designed using "Puebo Tan" coloured Colourbond steel. The roof cladding for each building has been designed using "Zincalume" coloured Colourbond steel.

## 7 Consultation Strategy

Consultation with the local community (as required by Condition C3(c)(iv)) will be undertaken via the Community Consultative Committee. This process will be led by AGL as the owner / operator of the site.

The Community Consultative Committee, in accordance with in Section 7 of the AGL Community Consultation Plan, has been established during the planning stage of the project and will continue until completion of construction.

The committee comprises of representatives from key stakeholder groups who have demonstrated an interest in, or connection to, the Nyngan Solar PV Power Station project. The committee also includes relevant AGL and First Solar project team members and community representatives.

Community Consultation Committee meetings will be held at least quarterly (or more regularly as deemed appropriate) during construction. The committee members have an opportunity to list specific topics of concern on the meeting agenda. AGL have confirmed to First Solar that any additional landscape plantings required for the project will be discussed and identified via this committee.

Additional landscape plantings may be identified by the committee as being necessary to mitigate any potential visual effects associated with the project, additional to the plantings identified within this Landscape Plan (plantings as required by the EIS) will be the managed and undertaken by the project owner / operator (AGL).

## 8 Responsibilities

### Site Environmental Advisor

• Coordination and supervision of landscape planting.



- Monitoring of landscape plantings during Construction Phase (Form-G01).
- Visual monitoring and records immediately after construction has finished (Form-G02).

At the conclusion of the Construction activities (up to and including rehabilitation activities required by **CEMP-H** *Rehabilitation and Revegetation Management Plan*), the management of the operational site will be handed back to the AGL as the owner / operator of the site.

Please refer to the Operational Environmental Management Plan (OEMP) for information on onsite responsibilities during the Operational Phase of the Nyngan Solar PV Power Station.

## 9 Records

- Records of landscape planting inspections are maintained on Form-G01 (attached)
- Records of visual monitoring on Form-G02 (attached).







Figure-G01: Landscape plan





Figure-G02: Photo viewpoints



### FORM G01 – Landscape Planting Monitoring Record

| Date | Area | No. of<br>Dead<br>Plants | No. of<br>Plants<br>Replaced | General plant condition (height/health), comment on weeds, soil moisture | All tree<br>guards in<br>place? | Actions |
|------|------|--------------------------|------------------------------|--|---------------------------------|---------|
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### FORM G02 – Photo Point Record

| Date | Photo Point | Photo File Reference |
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# CEMP-H Rehabilitation and Revegetation Management Plan Nyngan Solar PV Power Station





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#### **Document Control**

| Date     | Reason   | Issued by   | Review   |   | Review   |   |
|----------|--|---|--|---|--|---|
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Cited Cross References within Document:

- 1. Appendix CEMP-D Weekly Site Inspections
- 2. Appendix CEMP-E Soil and Water Management Plan
- 3. Appendix CEMP-I Ground Cover Management Plan



## 1 Purpose

The Revegetation and Rehabilitation Program for the Nyngan Solar PV Power Station and associated access tracks has been prepared to meet the requirements of:

- The Nyngan Solar PV Power Station Development Consent (SSD-5355)
  - Condition B21
- The Nyngan Solar Plant Submissions Report (NGH Environmental, June 2013)
  - Mitigation Measure 10
  - Mitigation Measure 57

## 2 Scope

### 2.1 Overview

As required by Condition B21 of the Development Consent (SSD-5355) for the Nyngan Solar PV Power Station, First Solar (Australia) Pty Ltd (First Solar) has developed the following Rehabilitation and Revegetation Management Plan for the development as it relates to the activities of First Solar. Specifically this Rehabilitation and Revegetation Management Plan relates to the Construction Phase of the power station and associated access tracks.

A second CEMP is being prepared for the power station's grid connection by a separate contractor. The grid connection for the Nyngan Solar PV Power Station is not under the mandate of First Solar (Australia) Pty Ltd (First Solar) and is therefore not included within the following document. Please refer to the separate grid connection / transmission line CEMP for information specific to the grid connection construction works.

### 2.2 Nyngan Solar PV Power Station Development

The Nyngan Solar PV Power Station will consist of a 102MW solar PV power station located approximately 10km west of Nyngan. The solar plant will occupy approximately 300 hectares of land to the north of the Barrier Highway.

First Solar (Australia) Pty Ltd have been engaged by AGL to provide engineering, procurement and construction (EPC) services. The Nyngan Solar PV Power Station will utilise First Solar's advanced cadmium telluride (CdTe) thin film photovoltaic modules. The solar modules generate electricity with no air emissions, no waste production, no water use and have one of the smallest carbon footprints of any current PV technology. Over 7,000MW of First Solar PV modules have been installed worldwide, including at many of the world's largest solar PV plants, since beginning


commercial production in 2002. First Solar has been actively involved in the Australian market since mid-2008.

The construction of the Nyngan Solar PV Power Station project is expected to commence in early 2014 and will take approximately 18 months to complete. Once constructed the Nyngan Solar PV Power Station will generate an estimated 233,000 megawatt hours (MWh) of electricity annually.

## 2.3 Relevant Approval Conditions

The approval provisions for the Nyngan Solar PV Power Station relevant to the Flora and Fauna Management Plan are as follows:

Condition B21 of the Nyngan Development Consent (SSD-5355) states:

B21. The Applicant shall implement a revegetation and rehabilitation program for all areas of the development footprint which are disturbed during the construction of the development but which are not required for the ongoing operation of the development including temporary construction facility sites and sections of constructions access roads. The Applicant 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 Director-General, the Applicant 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 Director-General) as being well established, in good health and selfsustaining.

Mitigation Measure 10 states:

10 Site stabilitation, rehabilitation and revegetation would be undertaken progressively during works, to ensure that soils are stabilized as soon as practical. This would minimise weed infestation, sedimentation and erosion, which degrade habitat.

Mitigation Measure 57

57. Excess topsoil would be retained and used in site rehabilitation.

For detail on Mitigation Measure 39 of the Nyngan Solar Plant Submissions Report please refer to the separate grid connection / transmission line CEMP.

## 2.4 Link to the Ground Cover Management Plan (CEMP-I)

In accordance with Condition C3(b) First Solar has developed a *Ground Cover Management Plan*. This Plan is attached to the CEMP as Appendix **CEMP-I**.

The *Ground Cover Management Plan* outlines measures to ensure adequate vegetation cover and composition beneath the solar PV array's. The Ground Cover Management Plan considers both the retention of existing ground cover (outside of areas disturbed by construction works) and the



development of new ground cover (within areas disturbed by the construction works) in accordance with the *Rehabilitation and Revegetation Management Plan*.

Both the *Ground Cover Management Plan* and the *Rehabilitation and Revegetation Management Plan* have been developed in consultation with an agronomist.

The current ground cover at the Nyngan Solar PV Power Station site is agricultural crops (barley). Ground cover on the site needs to be managed to prevent dust but also to manage the generation / development of potential fire fuel loads. Whilst the power station does not present an immediate fire risk, the presence of electricity generation is taken in to consideration by First Solar during the development of long term vegetation solutions on site. First Solar has a long and successful development history managing vegetation cover in dry / arid / semi-desert locations. This expertise and experience will be drawn on during the implementation of the *Ground Cover Management Plan*.

The rationale behind the need to retain an adequate vegetation cover and composition beneath the solar PV array within the Nyngan Solar PV Power Station is linked to two primary considerations:

- Potential erosion hazards.
- Spread of declared noxious weeds.

Retention and maintenance of existing groundcover was identified within the Environmental Impact Assessment as an appropriate means of minimising these risks. The *Rehabilitation and Revegetation Management Plan* has been developed to support the objectives of the *Ground Cover Management Plan* (CEMP-I).

# 3 Revegetation

All areas of the development footprint which are disturbed during construction of the Nyngan Solar PV Power Station, but are not required for the ongoing operation of the power station site, including temporary construction facility sites and sections of constructions access roads, will be rehabilitated in accordance with Condition B21.

Rehabilitation will be captured broadly in two categories:

- Areas of "active" rehabilitation and revegetation: These areas include areas where rehabilitation will include the removal of construction materials (e.g. gravel) or the ripping of subsoil prior to the replacement of topsoil and revegetation activities. Areas where active rehabilitation will be undertaken includes the parts of the site compound, site laydown and site access tracks that are not required for the Operational Phase. These areas will require minor civil works to be undertaken as part of the rehabilitation works.
- 2. Areas of non-invasive rehabilitation and revegetation: These areas include areas where natural regeneration is either being undertaken or where human intervention to facilitate ground cover regeneration is being undertaken. These areas will include the areas underneath the solar PV arrays where civil works are not practicable without risk of damage to the arrays. As outlined within the Soil and Water Management Plan (**CEMP-E**), topsoil will be retained underneath the PV arrays. The purpose of retaining topsoil is to minimise



damage associated with moving the soil and to allow for non-invasive rehabilitation to be undertaken around the arrays once installation works are complete.

The rehabilitation of disturbed areas that fall under Category 1 (above) will include scarifying these areas, replacing topsoil and preparing a suitable soil profile for subsequent sowing with an appropriate ground cover mix. Topsoil will be replaced in a manner that replicates the original soil profile as far as practicable to assist rapid revegetation. The management and use of topsoil during rehabilitation and revegetation will be in accordance with **CEMP-E** *Soil and Water Management Plan.* 

The rehabilitation of disturbed areas that fall under Category 2 (above) will include provision for natural regeneration (if practicable) and human intervention which would include the spread of seeds within these areas. The management of these areas during rehabilitation will be in accordance with the principles of **CEMP-N** *Air Quality Management Plan.* 

The mix used during rehabilitation should include one or more of the following forbs (10 percent) and three or more of the following native grasses. The grasses cited in bold print are the preferred variety for the Nyngan site. The other varieties cited would also be suitable.

#### 3.1.1 Forbs

- *Medicago laciniata* Cut-leaf Medic
- *Medicago truncatula* Barrel Medic
- *Medicago polymorpha* Burr Medic

#### 3.1.2 Native Grassess

- Austrodanthonia setacea Small-flowered Wallaby Grass
- Bothriochloa macra Red-stem Grass
- Chloris truncata Windmill Grass
- Chloris ventricosa Tall Windmill Grass
- Dichanthium sericeum Queensland Bluegrass
- Enteropogon acicularis Curly Windmill Grass
- Panicum laevinode Pepper Grass
- Paspalidium constrictum Knotty Butt Grass

The grasses cited above are all species recorded at the Nyngan site. All species have a proven ability to cope with the soils and environment at this site.

Planting rates should be indicatively 1 to 2 kg of seed per hectare (subject on the type of seeds used and the specific onsite conditions).

A commercial contractor would be used for sowing for larger areas, in smaller areas hand operated seeders would be adequate and utilised where practicable to allow for timely resowing. Native seeds will be obtained from a certified weed free Australian native seed stockist.



Where and when practicable (in accordance with Mitigation Measure 10), these revegetation measures will implemented progressively during the Construction Phase. Where progressive revegetation is not practicable, revegetation works will be completed within six months of the cessation of construction activities in accordance with the requirements of Condition B21 of the Development Consent (cited above).

As the groundcover plantings are undertaken, the date of sowing, application rates and a record of the seed mix applied will be recorded on **Form-H01** (attached). A photographic log will also be recorded (refer **Form-H02** attached) at this time to allow for comparative monitoring. The locations of all rehabilitated areas will also be recorded on a site plan.

For details on rehabilitation and revegetation measures relating to the grid connection / transmission line, please refer to the transmission line CEMP.

# 4 Monitoring

Vegetation benchmarks will be set at the time of sowing. These benchmarks will be set noting the following variables:

- Climatic conditions at the time of sowing
- Soil moisture levels at the time of sowing
- Type and percentage of seed sown (in accordance with Section 3)
- The area being rehabilitated, e.g. areas of "active" or "non-invasive" rehabilitation (as defined in Section 3).

The benchmarks will cover (taking in to consider the above variables):

- 1. Expected germination rates for species sown
- 2. Percentage cover expected for species sown

Post sowing, all areas revegetated during the Construction Phase will be monitored (photographed) against the vegetation benchmarks and maintained throughout the Construction Phase by First Solar with a view to ensuring these areas are well established, in good health and self-sustaining (as far as practicable).

Where areas rehabilitated and revegetated during the Construction Phase do not meet the vegetation benchmarks (identified at the time of sowing) and are observed (during site monitoring) to have the following characteristics:

- Poor germination rates by target / seeded species
- Poor condition
- Notable weed development within rehabilitated areas



First Solar will engage an appropriately qualified agronomist to assess and advise on corrective actions to address the issues identified noting the objective to develop ground cover that is well established, in good health and self-sustaining.

At the conclusion of the Construction Phase, responsibility for the monitoring and maintaining the health of the revegetated areas will move to the owner / operator (AGL). Monitoring and maintaining the revegetated areas will be subject of the Operational Environmental Management Plan (required by Condition C4 of the Development Consent).

Once all revegetated areas are well established, in good health and self sustaining, a suitably qualified expert (whose appointment has been agreed to by the Director-General – as required by the Development Consent Condition B21) will be invited by the owner/operator (AGL) to inspect these sites to verify the success of the rehabilitation program.

# 5 **Responsibilities**

Site Environmental Advisor

- Coordinating rehabilitation activities.
- Weekly inspection of rehabilitation areas (CEMP-D Weekly Site Inspections)
- Completion of rehabilitation management records Form-H01 (attached).

# 6 Records

- Records of weekly inspections are maintained on Form-D01 (refer CEMP-D Weekly Site Inspections)
- Records of rehabilitation management activities are maintained on Form-H01 (attached).
- Records of monitoring photographs taken during rehabilitation and revegetation on **Form-H02** (attached)





### FORM H01 – Groundcover Monitoring Record

| Date | Area | Seed Mix Applied | Photo Reference |
|------|------|------------------|-----------------|
|      |      |                  |                 |
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#### FORM H02 – Revegetation and Rehabilitation Photo Monitoring Record

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# CEMP-I Ground Cover Management Plan Nyngan Solar PV Power Station





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#### **Document Control**

| Doc<br>Rev | Date     | Reason                                  | Issued by   | Review             |       | Review                       |                    |
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Cited Cross References within the Document:

- 1. **Appendix CEMP-D** Weekly Site Inspections
- 2. Appendix CEMP-E Soil and Water Management Plan
- 3. Appendix CEMP-F Flora and Fauna Management Plan
- 4. Appendix CEMP-H Rehabilitation and Revegetation Management Plan
- 5. Appendix CEMP-M Bush Fire Management Plan
- 6. Appendix CEMP-N Air Quality Management Plan
- 7. Appendix CEMP-S Worker Environmental Awareness and Compliance Training



# 1 Purpose

This Ground Cover Management Plan for the Nyngan Solar PV Power Station and associated access tracks has been prepared to meet the requirements of:

- The Nyngan Solar PV Power Station Development Consent (SSD-5355)
  - Condition C3(b)
- The Nyngan Solar Plant Submissions Report (NGH Environmental, June 2013)
  - Mitigation Measure 10
  - Mitigation Measure 11
  - Mitigation Measure 12
  - Mitigation Measure 17
  - Mitigation Measure 18

# 2 Scope

#### 2.1 Overview

As required by Condition C3(b) of the Development Consent (SSD-5355) for the Nyngan Solar PV Power Station, First Solar (Australia) Pty Ltd (First Solar) has developed the following Ground Cover Management Plan for the development as it relates to the activities of First Solar. Specifically this Ground Cover Management Plan relates to the Construction Phase of the power station and associated power station access tracks.

The Ground Cover Management Plan has also been developed to meet the requirements of Mitigation Measure 12, which requires the development of a Weed Management Plan.

The Ground Cover Management Plan relates to the protection of onsite ground cover vegetation both within and outside of areas disturbed by the construction works. In accordance with Condition C3(b) of the Development Consent, First Solar has developed the Ground Cover Management in consultation with an agronomist (Tony Elliot and Alan Murphy from Geolyse). Additional botanical input was also provided by Colin Bower (also of Geolyse).

A second CEMP is being prepared for the power station's grid connection by a separate contractor. The grid connection for the Nyngan Solar PV Power Station is not under the mandate of First Solar (Australia) Pty Ltd (First Solar) and is therefore not included within the following document. Please refer to the separate grid connection / transmission line CEMP for information specific to the grid connection works.

The ongoing management of the items covered by the Ground Cover Management Plan will be covered by the Operational Environmental Management Plan (OEMP) required by Condition C4 of



the Development. The OEMP will be developed by the Nyngan project owner/operator (AGL) and falls outside of the mandate of First Solar.

The current ground cover at the Nyngan Solar PV Power Station site is agricultural crops (barley). Ground cover on the site needs to be managed to prevent dust but also to manage the generation / development of potential fire fuel loads. Whilst the power station does not present an immediate fire risk, the presence of electricity generation is taken in to consideration by First Solar during the development of long term vegetation solutions on site. First Solar has a long and successful development history managing vegetation cover in dry / arid / semi-desert locations. This expertise and experience will be drawn on during the implementation of the *Ground Cover Management Plan*.

#### 2.2 Nyngan Solar PV Power Station Development

The Nyngan Solar PV Power Station will consist of a 102MW solar PV power station located approximately 10km west of Nyngan. The solar plant will occupy approximately 300 hectares of land to the north of the Barrier Highway.

First Solar (Australia) Pty Ltd have been engaged by AGL to provide engineering, procurement and construction (EPC) services. The Nyngan Solar PV Power Station will utilise First Solar's advanced cadmium telluride (CdTe) thin film photovoltaic modules. The solar modules generate electricity with no air emissions, no waste production, no water use and have one of the smallest carbon footprints of any current PV technology. Over 7,000MW of First Solar PV modules have been installed worldwide, including at many of the world's largest solar PV plants, since beginning commercial production in 2002. First Solar has been actively involved in the Australian market since mid-2008.

The construction of the Nyngan Solar PV Power Station project is expected to commence in early 2014 and will take approximately 18 months to complete. Once constructed the Nyngan Solar PV Power Station will generate an estimated 233,000 megawatt hours (MWh) of electricity annually.

### 2.3 Relevant Approval Conditions

The approval provisions for the Nyngan Solar PV Power Station relevant to the Ground Cover Management Plan (as described in Section 1), are as follows:

Condition C3(b) of the an Development Consent states:

- (b) a Ground Cover Management Plan, developed in consultation with an agronomist, 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:
  - *i)* procedures to minimise disturbance to ground cover not impacted by the development;
  - *ii)* procedures for the stabilisation, rehabilitation and revegetation of disturbed ground cover including reference to field trials where required;



- *iii)* weed management measures to control and prevent the spread of noxious weeds;
- *iv)* monitoring methods to assess the impact of the development on the ground cover vegetation; and
- v) a procedure to review management methods where they are found to be ineffective.

Mitigation Measure 10 states:

10. Site stabilisation, rehabilitation and revegetation would be undertaken progressively during works, to ensure that soils are stabilised as soon as practical. This would minimise weed infestation, sedimentation and erosion, which degrade habitat.

Mitigation Measure 11 states:

11. Disturbed areas would be identified and used preferentially for vehicle and machinery access, materials laydown, stockpiling of cleared vegetation and the deposition and retrieval of spoil whenever practicable to minimise the footprint of the development on intact native-dominated areas.

Mitigation Measure 12 states:

12. A weed management plan would be developed for the site, guided by the measures set out in the Biodiversity Assessment.

Mitigation Measure 17 states:

17. A groundcover management plan would be developed, as outlined in the Biodiversity Assessment.

Mitigation Measure 18 states:

18. The space between the PV array rows would be kept clear to enable access by vehicles for ongoing weed control, and pasture renovation, if required.

# 3 Actions

### 3.1 Rationale

The rationale behind the need to retain an adequate vegetation cover and composition beneath the solar PV array within the Nyngan Solar PV Power Station is linked to two primary considerations:

- Potential erosion hazards.
- Spread of declared noxious weeds.

Retention and maintenance of a groundcover was identified within the Environmental Impact Assessment as an appropriate means of minimising these risks. *This Ground Cover Management Plan* has been developed to address these risks.



Additionally, First Solar has developed the following Ground Cover Management Plan with the view to minimising biodiversity impacts by maintaining native ground cover (in accordance with the *Rehabilitation and Revegetation Management Plan* **CEMP-H**) and managing weeds on site.

Ground cover management on site is divided in to two categories:

- 1. The retention and protection of ground cover on site outside of areas of disturbance
- 2. The regeneration of new ground cover in areas disturbed by the project and subject to rehabilitation (in accordance with **CEMP-H** *Rehabilitation and Revegetation Management Plan*)

#### **3.2** Procedures to Minimise Disturbance to Ground Cover

The following section outlines the procedures proposed to minimise disturbance to ground cover not directly impacted by the construction of the solar PV arrays.

- Ground disturbance onsite will be managed in accordance with:
  - Soil and Water Management Plan (CEMP-E)
  - Air Quality Management Plan (CEMP-N)
  - Rehabilitation and Revegetation Management Plan (CEMP-H)
  - Vehicle Movement Management Plan which forms part of the First Solar Nyngan Site Safety Plan
- All contractors accessing the site will undertake an Environmental Awareness and Compliance Training induction session. This training will be in accordance with **CEMP-S** *Worker Environmental Awareness and Compliance Training*.
- Surveying will be undertaken on site ahead of any disturbance within the power station site to ensure that any areas outside of the disturbance footprint are protected as far as practicable. The site will be surveyed in accordance with the final site layout drawing.
- Once the site has been surveyed, the environmental signage and exclusion areas will be marked out within the site. Exclusion areas will be marked in accordance with Section 6.2.1 **CEMP-F** *Flora and Fauna Management Plan.*
- A perimeter security fence will be constructed around the boundary of the site. The perimeter fence will prevent access to all persons not inducted in accordance with **CEMP-S** *Worker Environmental Awareness and Compliance Training.*
- In accordance with Mitigation Measure 11, disturbed areas would be used preferentially for vehicle and machinery access, materials laydown, stockpiling of cleared vegetation and the deposition and retrieval of soil where practicable. Disturbed areas are as defined on the final Design Construction Drawings.
- Designated access tracks will be utilised as far as practicable for vehicle movements to minimise disturbance to ground cover.
- The Site Environmental Advisor will undertake periodic and random compliance inspections. Periodic Weekly Site Inspections will be undertaken in accordance with **CEMP-D** *Weekly Site*



*Inspections*. Bunting, flagging and exclusion signage installed on the site will be checked, maintained and replaced (as required) during the weekly site inspections.

# 3.3 Procedures for the Stabilisation, Rehabilitation and Revegetation of Disturbed Ground Cover

The following section outlines the procedures proposed for the stabilisation, rehabilitation and revegetation of disturbed ground cover around and beneath the solar PV arrays.

- The stabilisation, rehabilitation and revegetation of ground cover will be managed in accordance with:
  - Soil and Water Management Plan (CEMP-E)
  - Rehabilitation and Revegetation Management Plan (CEMP-H)
- In accordance with Mitigation Measure 10, rehabilitation of disturbed ground cover will be undertaken progressively during works. This would be undertaken to minimise weed infestation, sedimentation, erosion and to help mitigate potential dust issues that may result from disturbed ground.
- Temporary stabilisation works will be undertaken on exposed areas that are likely to remain unattended for more than 30 days during construction works. This may include the use of environmentally acceptable dust palliatives in accordance with Mitigation Measure 63 and **CEMP-N** *Air Quality Management Plan*.
- Temporary stabilisation may include:
  - Exclusion areas for pedestrians and vehicles in accordance with the *Flora and Fauna Management Plan* (**CEMP-F**)
  - The use of dust palliatives in accordance with Soil and Water Management Plan (CEMP-E).
  - The installation of further erosion and sediment controls, e.g. localised use of geofabric, in accordance with the *Soil and Water Management Plan* (**CEMP-E**).
- Erosion and sediment control devices will be installed in accordance with **CEMP-E** *Soil and Water Management Plan.*
- As outlined in **CEMP-E** *Soil and Water Management Plan*, disturbance associated with the removal, moving and stockpiling of topsoil will be avoided as far as practicable. The PV array areas will be subject to minor grading activities to level the site. Once the area is level within the array areasthe areas will be compacted with a drum roller prior to the installation of the solar PV arrays. The purpose of the compaction works will be to ensure that the PV arrays are installed in accordance with the requirements of Condition A6,
- Subject to onsite conditions, e.g. rainfall, it may be practical to allow some natural restablishment of ground cover beneath the solar PV arrays once the arrays have been installed. As outlined within the *Rehabilitation and Revegetation Management Plan* (**CEMP-H**) non-invasive rehabilitation will occur in the vicinity of the solar PV arrays to prevent damage to the arrays once installed.



- Dust control activities onsite will provide an additional water source for naturally occurring ground cover species on the site. The composition of this ground cover will be unknown and is likely to change over time. Naturally occurring ground cover is likely to contain weeds.
- The presence of the weeds, with the exception of declared species that require active management (see **Attachment IO2** for species specific to the Bogan Shire), is not in itself problematic. Non-declared weed species can prove beneficial in terms of soil binding and dust control. Weed management is outlined further in Section 4.
- It is proposed to provide opportunity for some natural revegetation to allow for local species to re-emerge on the site. The procedure for establishing a ground cover is to therefore allow for and monitor natural revegetation of a groundcover under the arrays during the Construction Phase. As the site is currently vegetated in agricultural crops it is expected that vegetation by native species may require human intervention.
- Where human intervention is required First Solar will utilise the methods and species outlined in **CEMP-H** *Rehabilitation and Revegetation Management Plan.*
- Fuel loads around the site will be managed in accordance with the *Bush Fire Management Plan* (**CEMP-M**).
- First Solar will consult with an appropriately qualified agronomist ahead of undertaking any field trials at the site.

# 4 Weed Management Measures

#### 4.1 Scope

The following section outlines the Weed Management Measures proposed for use on site to control and prevent the spread of declared noxious weeds. The Weed Management Measures have been developed to meet the requirements of Condition C3(b)(iii) and Mitigation Measure 12.

### 4.2 Overview

A weed is defined as a plant environmentally suited to its place in the landscape, but from an agricultural productivity, ecological or aesthetic perspective is a plant out of place (Department of Primary Industries, *Weed Control for Cropping and Pastures in Central West NSW*). A weed is often defined simply as a plant growing in the wrong place.

In New South Wales, noxious weed species are required by law to be controlled by all landowners in an area. A weed declared as noxious are those weeds that have the potential to cause harm to the community and individuals, can be controlled by reasonable means and have the potential to spread within an area and to other areas. Noxious weeds are regulated in New South Wales by the *Noxious Weeds Act 1993*.

A plant that is not declared noxious, that provides a groundcover and prevents erosion, is not, by definition, necessarily a weed in the context of the proposed land use.



## 4.3 Nyngan Solar PV Power Station Site

Two declared noxious weeds were identified on the Nyngan Solar PV Power Station site during the Environmental Impact Assessment (refer Section 6.2.2 of the Environmental Impact Assessment) stage of the development.

These species were:

- Bathurst Burr (*\*Xanthium spinosum*)
- Hunter Burr (\*Xanthium italicum)

Both species are Class 4 noxious weeds.

Class 4 noxious weeds are plants that pose a serious threat to primary production, the environment or human health. These weed species are widely distributed to an area and are likely to spread in the area or to another area.

Bathurst burr has been identified as number 2 in the Top 5 of the Bogan Shire Council 'Problem Weeds'.

In the Bogan Shire the requirements (Source: NSW Department of Primary Industries) for control of the Bathurst burr are:

Bogan: The growth of the plant must be managed in a manner that reduces its numbers spread and incident and continuously inhibits its reproduction.

A full list of noxious weed species in the Bogan Shire area is attached (see Attachment IO2).

Information on the New South Wales weed classes is attached as Attachment I01.

### 4.4 Bogan Shire Council

Appropriate control methods for noxious weeds can be located on the Macquarie Valley and Lachlan Valley weed advisory website:

http://www.westernweeds.org/index.php?act=contacts\_detail&group=16

### 4.5 Construction Phase Weed Control

The following section sets out onsite weed controls during the Construction Phase for the Nyngan Solar PV Power Station and access tracks.

Where herbicide based weed control is required, treatment will be undertaken by an appropriately qualified weed control contractor.

Treatment of weeds (physical and chemical) will be recorded on Treatment of onsite weeds will be recorded on **Form-I01** (see attached).



#### 4.5.1 Pre-construction

- 1. A pre-construction noxious weed inspection will be undertaken of the site.
- 2. Pre-construction herbicide control will be undertaken prior to site disturbance.
- 3. Herbicide control will focus on areas that will be disturbed during the development of laydown areas, access tracks and other works that will require disturbance to topsoil.

#### 4.5.2 During Construction

Weed hygiene practices would be adopted to prevent the introduction of weeds in accordance with the *Noxious Weeds Act 1993*. Weed hygiene practices include:

- Vehicle weed hygiene
- Plant and equipment weed hygiene
- Sourcing materials such as sand and gravel certified weed free from suppliers

For the purposes of the following section, a Weed Hygiene Declaration are documents used for vehicles or items that may contain soil or organic material that may contain reproductive material of all plants including Class Listed species and non-declared plants. These are legal declarations from the owner / operator of the vehicle, plant or equipment that is entering the site.

The following methods will be adopted to ensure that the above listed weed hygiene practices can be met:

1. Vehicles, plant and / or equipment will be inspected upon entrance to the site. Inspections will be undertaken by the Site Environmental Advisor or a person who is qualified to undertake 3rd party contaminated machinery inspections.

Visiting vehicles, plant and / or equipment that remain on gravelled sections of the site and do not travel beyond these areas do not require a Weed Hygiene Declaration, <u>except</u> where caked mud / soil / vegetative matter is observed that may pose a contamination risk where potentially contaminated material can drop from vehicles, plant and equipment and be spread on to the site.

- 2. For the purposes of this document, gravelled areas will be considered weed clean. Gravel will be sourced from a certified weed free supplier.
- 3. Visibly dirty (e.g. items with soil, vegetative matter etc) vehicles, plant and equipment that need to travel on to the unsealed dirt sections of the site that do not possess a valid Weed Hygiene Declaration will not be permitted to enter the Nyngan solar plant construction site. The person responsible for the vehicle, plant and/ or equipment will be advised of their responsibilities with respect to the spread of weeds and will be asked to remove the item from site until they are can provide a valid Weed Hygiene Declaration for the item.
- 4. Once passing the site entry inspection, a green sticker placed on the vehicle, plant or equipment to confirm that they were certified weed clean upon entering the site. This sticker will be dated. Once certified, site based plant and equipment will continue to be deemed weed clean until they leave the site. Once vehicles, plant and/or equipment is removed from site it will be required to be re-inspected upon re-entry to the site. Operators will be warned of the risk posed by the Class listed species identified on site and the need to remain on approved disturbed areas while driving on the site to minimise contamination risk.



- 5. All contractors and personnel accessing the site will undertake an Environmental Awareness and Compliance Training induction session. This training will be in accordance with **CEMP-S** (*Worker Environmental Awareness and Compliance* Training) and include:
  - Weed spread prevention and their obligations
  - Information on the entry and certification process for vehicles, plant and equipment entering the Nyngan
  - Information on known species on the Nyngan Solar PV Power Station site

Relevant noxious weed identification charts will also be posted within key site buildings for personnel to read in their own time.

- 6. Sub-contractors will be reminded of their obligations ahead of their arrival to the site and advised of the site entry requirements.
- 7. Construction materials will be sourced from certified weed free suppliers to prevent the introduction of noxious weed species to the Nyngan Solar PV Power Station site.
- 8. Soil stockpiles will be monitored for the emergence of declared noxious weed species and treated accordingly. Monitoring will be undertaken in accordance with **CEMP-D** *Weekly Site Inspections*.
- 9. Disturbed areas will be monitored for the emergence of declared noxious weed species and treated accordingly. Monitoring will be undertaken weekly in accordance with **CEMP-D** *Weekly Site Inspections*.
- 10. Topsoil will be managed in accordance with **CEMP**-E (*Soil and Water Management Plan*) and in accordance with *Managing Urban Stormwater Soils and Construction Vol.* 1 (Lancom, 2004) as required by Condition B9 of the Development Consent. Topsoil will be managed and stockpiled in a manner that preserves the organic properties of the soil as far as practicable to facilitate rapid revegetation during rehabilitation. Rapid revegetation (in accordance with **CEMP-H** *Rehabilitation and Revegetation Management Plan*) will help to prevent opportunity for weed infestation.
- 11. Site stabilisation would be undertaken progressively during works to ensure that soils are stabilised as soon as practical. This would minimise weed infestation and the potential for sedimentation and erosion.

#### 4.5.3 Post Construction

Post Construction Phase weed control will be managed in accordance with the Operational Environmental Management Plan (OEMP). The OEMP will be developed in accordance with Condition C4 of the Development Consent.

The ongoing control of declared noxious weeds would be actively managed consistent with requirements of the *Noxious Weeds Act 1993*. The Act imposes obligations on occupiers of land to control noxious weeds declared for their area.



# 5 Monitoring Methods to Assess the Impact of the Development on Ground Cover

Short term monitoring (during the Construction Phase) of ground cover at the Nyngan Solar PV Power Station site will be undertaken by First Solar in accordance with the *Rehabilitation and Revegetation Management Plan* (refer **CEMP-H**) and the *Soil and Water Management Plan* (refer **CEMP-E**). Photographic records of ground cover will be regularly taken during the Construction Phase to allow for comparison monitoring of vegetation to be made.

The area of land within the security fence and under the solar PV arrays will effectively be taken out of agricultural production. As the land outputs are reduced (protein and nutrients in grazed livestock and/or harvested crops), so too will land inputs (fertiliser). The net effect of the power station will therefore be a resting and 'reserving' of the soil resource.

The project life will be approximately 25 years. The long term groundcover at the site can only be speculated upon. 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 will be through monitoring and adaptive management during the lifetime of the project.

Monitoring of ground cover during the Operational Phase of the Nyngan Solar PV Power Station will be subject to the Operational Environmental Management Plan (required by Condition C4 of the Development Consent. Monitoring beyond the Construction Phase will be the responsibility of the project owner/operator (AGL).

# 6 **Procedure to Review Management Methods**

During the Construction Phase, where ground cover management and weed management methods are found to be ineffective, First Solar would following the following procedure:

- Weekly monitoring will be undertaken by the Site Environmental Advisor in accordance with **CEMP-D** *Weekly Site Inspections*.
- Where a ground cover issue is identified, the extent of the issue across the entire solar array would be inspected and mapped.
- Reference site photography from the Nyngan Solar PV Power Station site will be used to identify whether the problem areas are sporadic, as opposed to widespread and uniform. These photographs will be assessed alongside pre-construction site photography.
- Where problems areas are identified the causal agent at each would be investigated.
- Where required, First Solar will engage an appropriately qualified person to review / redesign the Erosion and Sediment Controls outlined in **CEMP-E** *Soil and Water Management Plan*. Any changes to **CEMP-E** *Soil and Water Management Plan* would be undertaken in accordance with the requirements of Condition B9.



- Where changes to the site Erosion and Sediment controls are recommended, the revised control measure(s) will be implemented. These measures may include hardening with mulch, seeding and covering with an open weave jute matting, gypsum application to improve soil structure and infiltration, protection with geotextile fabric or localised flow dispersal and diversion structures.
- After the rectification works have been installed (e.g. energy dissipaters placed under drip zones or at points of relatively concentrated flow), these locations would be inspected and photographed after heavy rainfall events.
- Photographs would be retained on-site and continue to be taken until the problem areas are fully stabilised.

If the problem is widespread, the issue would be reported (via the project owner) to the OEH, Department of Planning and Infrastructure and the Bogan Shire Council. A program of structural and non-structural works would be prepared and presented to these stakeholders within eight weeks. The presentation would be conducted at the power station site, and following an inspection of the groundcover by all parties.

# 7 Responsibilities

#### **Project Manager**

- Completion of Worker Environmental Awareness and Compliance Training
- Engagement with relevant stakeholders (as required)
- Compliance with the Nyngan site weed hygiene requirements

#### **Construction Manager**

- Completion of Worker Environmental Awareness and Compliance Training
- Control and monitoring of site disturbance extents
- Ensuring site based vehicles, plant and / or equipment arrive to site weed free
- Ensuring sub-contractors are aware of the site entry requirements
- Ensuring sub-contractors and site personnel comply with weed management methods
- Ensuring weed free construction materials are used
- Compliance with the Nyngan site weed hygiene requirements

#### Site Environmental Advisor

- Completion of Worker Environmental Awareness and Compliance Training
- Completion of weekly site inspections (CEMP-D Weekly Site Inspections)
- Undertake periodic and random spot checks to audit against compliance
- Photographic monitoring of areas of ground cover disturbance
- Update the Bogan Shire Council noxious weeds list (Attachment IO2) every 12 months



- Management of weed hygiene methods, including site entry requirements
- Compliance with the Nyngan site weed hygiene requirements

#### **Supervisors**

- Completion of Worker Environmental Awareness and Compliance Training.
- Reporting the presence of noxious weeds to the Construction Manager and Site Environmental Advisor.
- Compliance with the Nyngan site weed hygiene requirements

#### **Construction Personnel, Contractors and Sub-contractors**

- Completion of Worker Environmental Awareness and Compliance Training.
- Reporting the presence of noxious weeds to the Construction Manager.
- Compliance with the Nyngan site weed hygiene requirements

# 8 Records

- Records of weekly inspections are maintained on **Form-D01** (refer to **CEMP-D** Weekly Site Inspections)
- Records of erosion and sediment controls (refer **CEMP-E** Soil and Water Management Plan)
- Records of weed management activities are maintained on **Form-I01** (attached).



# **Attachment I01: Control Classes of Noxious Weeds**

New South Wales noxious weed control classes.

| Control<br>class | Weed type   | Example control requirements   |
|------------------|---|--|
| Class 1          | Plants that pose a potentially serious threat to primary<br>production or the environment and are not present in the State<br>or are present only to a limited extent.  | The plant must be eradicated from the land<br>and the land must be kept free of the plant.<br>The weeds are also "notifiable" and a range of<br>restrictions on their sale and movement exist. |
| Class 2          | Plants that pose a potentially serious threat to primary<br>production or the environment of a region to which the order<br>applies and are not present in the region or are present only to<br>a limited extent.                       | The plant must be eradicated from the land<br>and the land must be kept free of the plant.<br>The weeds are also "notifiable" and a range of<br>restrictions on their sale and movement exist. |
| Class 3          | Plants that pose a potentially serious threat to primary<br>production or the environment of a region to which the order<br>applies, are not widely distributed in the area and are likely to<br>spread in the area or to another area. | The plant must be fully and continuously suppressed and destroyed.*  |
| Class 4          | Plants that pose a potentially serious threat to primary<br>production, the environment or human health, are widely<br>distributed in an area to which the order applies and are likely<br>to spread in the area or to another area.    | The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its reproduction*  |
| Class 5          | Plants that are likely, by their sale or the sale of their seeds or<br>movement within the State or an area of the State, to spread in<br>the State or outside the State.   | There are no requirements to control existing<br>plants of Class 5 weeds.<br>However, the weeds are "notifiable" and a<br>range of restrictions on their sale and<br>movement exists.          |

Source:

http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/definition



# Attachment IO2: Noxious weed declarations for Bogan Shire Council

The following weeds are declared noxious in the control area of Bogan Shire Council.

| Weed  | Class | Legal requirements  |
|---|-------|---|
| African boxthorn [Lycium ferocissimum]<br>A Weed of National Significance |       | The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its |
|   |       | reproduction  |
| African feathergrass [Pennisetum macrourum]                               | 5     | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with                                      |
|   |       | This is an All of NSW declaration   |
| African turnip weed [Sisymbrium runcinatum]                               | 5     | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with                                      |
|   |       | This is an All of NSW declaration   |
| African turnip weed [Sisymbrium thellungii]                               | 5     | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with                                      |
|   |       | This is an All of NSW declaration   |
| Alligator weed [Alternanthera philoxeroides]                              | 2     | The plant must be eradicated from the land and the land must be kept free of the plant  |
| A Weed of National Significance   |       |   |
| Anchored water hyacinth [Eichhornia azurea]                               | 1     | The plant must be eradicated from the land and the land must be kept free of the plant.   |
|   |       | This is an All of NSW declaration   |
| Annual ragweed [Ambrosia artemisiifolia]                                  | 5     | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with                                      |
|   |       | This is an All of NSW declaration   |
| Arrowhead [Sagittaria montevidensis]                                      | 4     | The plant must not be sold propagated or knowingly distributed  |
|   |       | This is an All of NSW declaration   |
| Artichoke thistle [Cynara cardunculus]                                    | 5     | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with                                      |
|   |       | This is an All of NSW declaration   |



| Athel pine [Tamarix aphylla]   | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with  |
|--|---|---|
|  |   | This is an All of NSW declaration   |
| Bathurst/Noogoora/Hunter/South<br>American/Californian/cockle burr [Xanthium<br>species] | 4 | The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its reproduction  |
| Bear-skin fescue [Festuca gautieri]  | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with  |
|  |   | This is an All of NSW declaration   |
| Black knapweed [Centaurea nigra]   | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.   |
|  |   | This is an All of NSW declaration   |
| Blackberry [ <i>Rubus fruticosus</i> aggregate species]                                  | 4 | The growth of the plant must be managed in a manner that reduces<br>its numbers spread and incidence and continuously inhibits its<br>reproduction and the plant must not be sold propagated or |
| except cultivars Black satin Chehalem Chester  |   | knowingly distributed   |
| Thornless Dirksen Thornless Loch Ness Murrindindi  |   | This is an All of NSW declaration   |
| Silvan Smooth stem Thornfree   |   |   |
| Blue heliotrope [Heliotropium amplexicaule]  | 4 | The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its reproduction  |
| Boneseed [Chrysanthemoides monilifera subspecies monilifera]                             | 2 | The plant must be eradicated from the land and the land must be kept free of the plant  |
| A Weed of National Significance  |   |   |
| Bridal creeper [Asparagus asparagoides]  | 4 | The plant must not be sold propagated or knowingly distributed  |
| A Weed of National Significance  |   |   |
| Broomrapes [Orobanche species]   | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.   |
| Includes all Orobanche species except the native O.                                      |   |   |
| cernua variety australiana and O. minor  |   | This is an All of NSW declaration   |
| Burr ragweed [Ambrosia confertiflora]  | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with  |
|  |   | This is an All of NSW declaration   |
| Cabomba [ <i>Cabomba</i> species]  | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with  |
| Includes all Cabomba species except C. furcata   |   |   |



| A Weed of National Significance   |   | This is an All of NSW declaration  |
|---|---|--|
| Cayenne snakeweed [Stachytarpheta cayennensis]                              | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with   |
|   |   | This is an All of NSW declaration  |
| Chilean needle grass [Nassella neesiana]<br>A Weed of National Significance | 4 | The growth of the plant must be managed in a manner that reduces<br>its numbers spread and incidence and continuously inhibits its<br>reproduction and the plant must not be sold propagated or<br>knowingly distributed |
| Chinese violet [ <i>Asystasia gangetica</i> subspecies <i>micrantha</i> ]   | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.  |
|   |   | This is an All of NSW declaration  |
| Clockweed [Gaura parviflora]  | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with   |
|   |   | This is an All of NSW declaration  |
| Columbus grass [Sorghum x almum]  | 3 | The plant must be fully and continuously suppressed and destroyed  |
| Corn sowthistle [Sonchus arvensis]  | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with   |
|   |   | This is an All of NSW declaration  |
| Dodder [ <i>Cuscuta</i> species]  | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with   |
| Includes All Cuscuta species except the native                              |   | This is an All of NSW declaration  |
| species C. australis, C. tasmanica and C. victoriana                        |   |  |
| East Indian hygrophila [Hygrophila polysperma]                              | 4 | The plant must not be sold propagated or knowingly distributed   |
| Espartillo [Amelichloa brachychaeta,<br>Amelichloa caudata]                 | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with   |
|   |   | This is an All of NSW declaration  |
| Eurasian water milfoil [Myriophyllum spicatum]                              | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.  |
|   |   | This is an All of NSW declaration  |
| Fine-bristled burr grass [Cenchrus brownii]                                 | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with   |
|   |   | This is an All of NSW declaration  |
| Fountain grass [Pennisetum setaceum]  | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable  |



#### weed must be complied with

This is an All of NSW declaration

| Gallon's curse [Cenchrus biflorus]          | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with   |
|---|---|--|
|   |   | This is an All of NSW declaration  |
| Glaucous starthistle [Carthamus glaucus]    | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with   |
|   |   | This is an All of NSW declaration  |
| Golden dodder [ <i>Cuscuta campestris</i> ] | 4 | The growth of the plant must be managed in a manner that reduces its numbers spread and incidence and continuously inhibits its reproduction   |
| Golden thistle [Scolymus hispanicus]        | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with   |
|   |   | This is an All of NSW declaration  |
| Green cestrum [Cestrum parqui]              | 3 | The plant must be fully and continuously suppressed and destroyed  |
| Harrisia cactus [ <i>Harrisia</i> species]  | 4 | The growth of the plant must be managed in a manner that reduces<br>its numbers spread and incidence and continuously inhibits its<br>reproduction and the plant must not be sold propagated or<br>knowingly distributed |
|   |   | This is an All of NSW declaration  |
| Hawkweed [Hieracium species]                | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.  |
|   |   | This is an All of NSW declaration  |
| Heteranthera [Heteranthera reniformis]      | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.  |
|   |   | This is an All of NSW declaration  |
| Horsetail [Equisetum species]               | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.  |
|   |   | This is an All of NSW declaration  |
| Hydrocotyl [Hydrocotyl ranunculoides]       | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.  |
|   |   | This is an All of NSW declaration  |
| Hygro [Hygrophila polysperma]               |   | See East Indian hygrophila   |



| Hymenachne [ <i>Hymenachne amplexicaulis</i> and hybrids] | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.   |
|---|---|---|
| A Weed of National Significance                           |   | This is an All of NSW declaration   |
| Johnson grass [Sorghum halepense]                         | 3 | The plant must be fully and continuously suppressed and destroyed   |
| Karroo thorn [ <i>Acacia karroo</i> ]                     | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.   |
|   |   | This is an All of NSW declaration   |
| Kochia [Bassia scoparia]                                  | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.   |
| except Bassia scoparia subspecies trichophylla            |   | This is an All of NSW declaration   |
| Koster's curse [ <i>Clidemia hirta</i> ]                  | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.   |
|   |   | This is an All of NSW declaration   |
| Lagarosiphon [Lagarosiphon major]                         | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.   |
|   |   | This is an All of NSW declaration   |
| Lantana [Lantana species]                                 | 4 | The plant must not be sold propagated or knowingly distributed  |
| A Weed of National Significance                           |   |   |
| Leafy elodea [ <i>Egeria densa</i> ]                      | 4 | The plant must not be sold propagated or knowingly distributed  |
|   |   | This is an All of NSW declaration   |
| Lippia [ <i>Phyla canescens</i> ]                         | 4 | The plant must not be sold propagated or knowingly distributed by<br>any person other than a person involved in hay or lucerne production<br>and the growth of the plant must be managed in a manner that<br>reduces its spread and continuously inhibits its reproduct |
|   |   | This is an All of NSW declaration   |
| Long-leaf willow primrose [Ludwigia longifolia]           | 4 | The plant must not be sold propagated or knowingly distributed  |
| Mesquite [Prosopis species]                               | 2 | The plant must be eradicated from the land and the land must be   |
| A Weed of National Significance                           |   | kept free of the plant  |
| Mexican feather grass [Nassella tenuissima]               | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.   |
|   |   | This is an All of NSW declaration   |
| Mexican poppy [Argemone mexicana]                         | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable   |



#### weed must be complied with

This is an All of NSW declaration

| Miconia [ <i>Miconia</i> species]          | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.    |
|--|---|--|
|  |   | This is an All of NSW declaration  |
| Mikania [ <i>Mikania micrantha</i> ]       | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.    |
|  |   | This is an All of NSW declaration  |
| Mimosa [ <i>Mimosa pigra</i> ]             | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.    |
| A Weed of National Significance            |   |  |
|  |   | This is an All of NSW declaration  |
| Mossman River grass [Cenchrus echinatus]   | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with |
|  |   | This is an All of NSW declaration  |
| Noogoora burr [Xanthium species]           |   | See Bathurst/Noogoora/Hunter/South American/Californian/cockle<br>burr                     |
| Parkinsonia [Parkinsonia aculeata]         | 2 | The plant must be eradicated from the land and the land must be kept free of the plant     |
| A Weed of National Significance            |   |  |
| Parthenium weed [Parthenium hysterophorus] | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.    |
| A Weed of National Significance            |   |  |
|  |   | This is an All of NSW declaration  |
| Pond apple [Annona glabra]                 | 1 | The plant must be eradicated from the land and the land must be<br>kent free of the plant  |
| A Weed of National Significance            |   |  |
|  |   | This is an All of NSW declaration  |
| Prickly acacia [Acacia nilotica]           | 1 | The plant must be eradicated from the land and the land must be                            |
| A Weed of National Significance            |   | kept free of the plant.  |
| -  |   | This is an All of NSW declaration  |
| Prickly pear [Cylindropuntia species]      | 4 | The growth of the plant must be managed in a manner that reduces                           |
| A Weed of National Significance            |   | its numbers spread and incidence and continuously inhibits its                             |
|  |   | reproduction and the plant must not be sold propagated or knowingly distributed            |
|  |   | This is an All of NSW declaration  |
| Prickly pear [ <i>Opuntia</i> species]     | 4 | The growth of the plant must be managed in a manner that reduces                           |



| Includes all <i>Opuntia</i> species except <i>O. ficus-indica</i><br>A Weed of National Significance |   | its numbers spread and incidence and continuously inhibits its reproduction and the plant must not be sold propagated or knowingly distributed  |
|--|---|---|
|  |   | This is an All of NSW declaration   |
| Red rice [Oryza rufipogon]   | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with  |
|  |   | This is an All of NSW declaration   |
| Rhus tree [Toxicodendron succedaneum]  | 4 | The growth of the plant must be managed in a manner that prevents<br>any above ground part the plant from encroaching within 2 metres of<br>the property boundary and the plant must not be sold propagated or<br>knowingly distributed |
|  |   | This is an All of NSW declaration   |
| Rubber vine [Cryptostegia grandiflora]   | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.   |
| A weed of National Significance  |   | This is an All of NSW declaration   |
| Sagittaria [Sagittaria platyphylla]  | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with  |
| A Weed of National Significance  |   | This is an All of NSW declaration   |
| Salvinia [ <i>Salvinia molesta</i> ]<br>A Weed of National Significance                              | 2 | The plant must be eradicated from the land and the land must be kept free of the plant  |
| Senegal tea plant [Gymnocoronis<br>spilanthoides]  | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.   |
|  |   | This is an All of NSW declaration   |
| Serrated tussock [Nassella trichotoma]<br>A Weed of National Significance                            | 4 | The growth of the plant must be managed in a manner that reduces<br>its numbers spread and incidence and continuously inhibits its<br>reproduction and the plant must not be sold propagated or   |
|  |   | knowingly distributed   |
| Siam weed [Chromolaena odorata]  | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.   |
|  |   | This is an All of NSW declaration   |
| Silk forage sorghum [ <i>Sorghum</i> species hybrid cultivar]  | 3 | The plant must be fully and continuously suppressed and destroyed   |
| Smooth-stemmed turnip [ <i>Brassica barrelieri</i> subspecies <i>oxyrrhina</i> ]                     | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with  |



|   |   | This is an All of NSW declaration  |
|---|---|--|
| Soldier thistle [Picnomon acarna]   | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with   |
|   |   | This is an All of NSW declaration  |
| Spiny burrgrass [Cenchrus incertus]                                       | 4 | The growth of the plant must be managed in a manner that reduces<br>its numbers spread and incidence and continuously inhibits its<br>reproduction and the plant must not be sold propagated or<br>knowingly distributed |
| Spiny burrgrass [Cenchrus longispinus]                                    | 4 | The growth of the plant must be managed in a manner that reduces<br>its numbers spread and incidence and continuously inhibits its<br>reproduction and the plant must not be sold propagated or<br>knowingly distributed |
| Spotted knapweed [ <i>Centaurea stoebe</i> subspecies <i>micranthos</i> ] | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.  |
|   |   | This is an All of NSW declaration  |
| Texas blueweed [Helianthus ciliaris]                                      | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with   |
|   |   | This is an All of NSW declaration  |
| Tropical soda apple [ <i>Solanum viarum</i> ]                             | 2 | The plant must be eradicated from the land and the land must be kept free of the plant   |
| Water caltrop [ <i>Trapa</i> species]                                     | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.  |
|   |   | This is an All of NSW declaration  |
| Water hyacinth [Eichhornia crassipes]                                     | 2 | The plant must be eradicated from the land and the land must be kept free of the plant   |
| A Weed of National Significance   |   |  |
| Water lettuce [Pistia stratiotes]   | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.  |
|   |   | This is an All of NSW declaration  |
| Water soldier [Stratiotes aloides]  | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.  |
|   |   | This is an All of NSW declaration  |
| Willows [Salix species]   | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with   |
| reichardtii S x calodendron   |   | This is an All of NSW declaration  |
| reionaruth, J. A culduchurun  |   |  |



| Witchweed [Striga species]<br>Striga species except the native Striga parviflora | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.    |
|--|---|--|
|  |   | This is an All of NSW declaration  |
| Yellow burrhead [Limnocharis flava]  | 1 | The plant must be eradicated from the land and the land must be kept free of the plant.    |
|  |   | This is an All of NSW declaration  |
| Yellow nutgrass [Cyperus esculentus]   | 5 | The requirements in the Noxious Weeds Act 1993 for a notifiable weed must be complied with |
|  |   | This is an All of NSW declaration  |
| Source:  |   |  |

http://www.dpi.nsw.gov.au/agriculture/pests-weeds/weeds/noxweed





| FORM 101 - | Weed | Management | Activities                              | and Co | ontrols |
|------------|------|------------|---|--------|---------|
|            |      | management | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | ana 66 |         |

| Date | Location | Weed Species | Contro<br>Physical | l Method<br>Chemical | Herbicide Used | Who By | Onsite Conditions |
|------|----------|--------------|--------------------|----------------------|----------------|--------|-------------------|
|      |          |              |                    |                      |                |        |                   |
|      |          |              |                    |                      |                |        |                   |
|      |          |              |                    |                      |                |        |                   |
|      |          |              |                    |                      |                |        |                   |
|      |          |              |                    |                      |                |        |                   |
|      |          |              |                    |                      |                |        |                   |
|      |          |              |                    |                      |                |        |                   |
|      |          |              |                    |                      |                |        |                   |
|      |          |              |                    |                      |                |        |                   |
|      |          |              |                    |                      |                |        |                   |
|      |          |              |                    |                      |                |        |                   |
|      |          |              |                    |                      |                |        |                   |



# CEMP-J Aboriginal Heritage Management Plan Nyngan Solar PV Power Station





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#### **Document Control**

| Doc<br>Rev | Date     | Reason  | Issued by   | Review                        | Review             |                              |                    |
|------------|----------|---|-------------|-------------------------------|--------------------|------------------------------|--------------------|
| А          | 25/10/13 | Issued for FS review                                  | Geolyse     | SF                            | 04/11              | JS                           | 05/11              |
| В          | 07/11/13 | Issued for AGL and<br>Project ER review               | First Solar | AGL<br><br>Michael<br>Woolley | 16/11<br><br>18/11 | SF<br><br>Michael<br>Woolley | 02/12<br><br>02/12 |
| С          | 04/12/13 | Issued as Final                                       | First Solar | DPI                           | 15/01/14           | SF                           | 20/02/14           |
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| E          | 22/02/14 | Final re-issued to<br>address DPI and AGL<br>comments | First Solar |                               |                    |                              |                    |

Cited Cross References within Document:

- 1. Appendix CEMP-Q Incident Management Protocol
- 2. Appendix CEMP-S Worker Environmental Awareness and Compliance Training


# 1 Purpose

This Aboriginal Heritage Management Plan for the Nyngan Solar PV Power Station has been prepared to meet the requirements of:

- The Nyngan Solar PV Power Station Development Consent (SSD-5355):
  - Condition B30
  - Condition C3(f)
- Nyngan Solar Plant Submissions Report (NGH Environmental, June 2013)
  - Mitigation Measure 24

# 2 Scope

### 2.1 Overview

As required by Condition C3 of the Development Consent (SSD-5355) for the Nyngan Solar PV Power Station, First Solar (Australia) Pty Ltd (First Solar) has developed the following Aboriginal Heritage Management Plan for the development as it relates to the activities of First Solar. Specifically this Aboriginal Heritage Management Plan relates to the Construction Phase of the power station and associated access tracks.

A second CEMP is being prepared for the power station's grid connection by a separate contractor. The grid connection for the Nyngan Solar PV Power Station is not under the mandate of First Solar (Australia) Pty Ltd (First Solar) and is therefore not included within the following document. Please refer to the separate grid connection / transmission line CEMP for information specific to the grid connection construction works.

The information included within the following Aboriginal Management Plan has been sourced from the wider Nyngan Project Aboriginal Management Plan developed for AGL Energy Limited (AGL) by Dr Julie Dibden. The Aboriginal Management Plan developed by Dr Dibden is attached to the First Solar Aboriginal Heritage Management Plan as **Attachment J01**.

### 2.2 Nyngan Solar PV Power Station Development

The Nyngan Solar PV Power Station will consist of a 102MW solar PV power station located approximately 10km west of Nyngan. The solar plant will occupy approximately 300 hectares of land to the north of the Barrier Highway.



First Solar (Australia) Pty Ltd have been engaged by AGL to provide engineering, procurement and construction (EPC) services. The Nyngan Solar PV Power Station will utilise First Solar's advanced cadmium telluride (CdTe) thin film photovoltaic modules. The solar modules generate electricity with no air emissions, no waste production, no water use and have one of the smallest carbon footprints of any current PV technology. Over 7,000MW of First Solar PV modules have been installed worldwide, including at many of the world's largest solar PV plants, since beginning commercial production in 2002. First Solar has been actively involved in the Australian market since mid-2008.

The construction of the Nyngan Solar PV Power Station project is expected to commence in early 2014 and will take approximately 18 months to complete. Once constructed the Nyngan Solar PV Power Station will generate an estimated 233,000 megawatt hours (MWh) of electricity annually.

### 2.3 Relevant Approval Conditions

The approval provisions for the Nyngan Solar PV Power Station relevant to the Aboriginal Heritage Management Plan are as follows:

Condition B30 of the Nyngan Development Consent states:

B30 If during the course of construction the Applicant 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 the OEH and the registered Aboriginal stakeholders and written authorization for the OEH is received by the Applicant.

Condition C3(f) of the Nyngan Development Consent states:

- (f) an **Aboriginal Heritage Plan** to monitor and manage Aboriginal heritage shall be developed in consultation with the OEH and registered Aboriginal stakeholders, and included the following:
  - *i) details of further archaeological investigations and/or salvage measures to be carried out prior to construction;*
  - *ii) procedures for the management of identified objects within the development site;*
  - *iii)* procedures for dealing with unidentified objects and/or human remains;
  - iv) Aboriginal cultural heritage induction processes for construction personnel; and
  - v) procedures for ongoing Aboriginal consultation and involvement.



Mitigation Measure 24 states:

24 If human skeletal remains are found during the activity, work in the area of the remains would stop immediately, the area would be secured to prevent unauthorised access and the NSW Police and OEH would be contacted.

### 2.4 EIS Context

As outlined in Section 6.3 of the EIS, an Aboriginal Cultural Heritage Assessment was undertaken by New South Wales Archaeology Pty Limited during the development of the EIS.

The Aboriginal Cultural Heritage Assessment sought to identify and record any Aboriginal cultural areas, objects or places, to assess the archaeological potential of the proposed areas, and to formulate management recommendations based on the results of community consultation, background research, field survey and a significance assessment.

As identified within the EIS, the Aboriginal landuse in the area is likely to be have been extremely limited. The range of activities may have included hunting and gathering, resource gathering and travel through the country. Such levels of activity are likely to have resulted in very low levels of artefact discard.

An assessment of a 56km<sup>2</sup> was assessed within the NSW OEH Aboriginal Heritage Movement Information System (AHMIS). The assessment identified no recorded Aboriginal objects within the search area. Noting these results, a predictive Aboriginal Site Distribution was undertaken for the search area – the results of this were included in Table 6-3 *Predicted Aboriginal Sites and Potential Presence* of the EIS. The predictive modelling identified the potential for Aboriginal sites from "negligible" to "some potential" with respect to scar trees.

During a site inspection by New South Wales Archaeology Pty Ltd, all trees within the site were inspected for the presence of scars. No scar trees were identified. A study area of 437 ha at the power station site was checked for any objects of Aboriginal heritage. During this inspection a total of three items, being single stone artefacts, were identified.

Noting the results of the Aboriginal Cultural Heritage Assessment, First Solar has developed an accidental discovery protocol to follow in the event of the unexpected discovery of an object of Aboriginal Heritage.

# **3** Registered Aboriginal Parties

The Registered Aboriginal Parties (RAPs) for the Nyngan Project are:

• Nyngan Local Aboriginal Land Council



- Bogan Aboriginal Corporation
- Mr John Shipp.

Contact details for these parties are provided in the AGL Aboriginal Heritage Management Plan (see **Attachment J01**, attached).

# 4 Actions

The following sections summarise the key actions from the AGL Aboriginal Heritage Management Plan, as the Actions relate to the construction of the Nyngan Solar PV Power Station and associated access tracks. Full details of the Actions included under the AGL Aboriginal Heritage Management Plan are provided in **Attachment J01** (attached).

#### 4.1.1 Management of Identified Aboriginal Heritage

As outlined in Section 2.4, three Aboriginal objects were identified by New South Wales Archaeology Pty Limited during the initial site survey in June 2012. In December 2013, the Applicant (AGL), in coordination with the Nyngan Local Aboriginal Council (LALC), attempted to relocate the previouslyidentified objects. One of the three objects was successfully relocated. The remaining two objects were not located. It is noted that the site was utilised for the cropping between the initial site survey and the effort to relocate the objects. No further salvage measures are required prior to the commencement of construction works (as provided for by Condition C3(f)(i)).

First Solar will undertake works at the site in accordance with the Accidental Discovery Protocol outlined in Section 4.1.2 to prevent damage to any unidentified Aboriginal objects.

#### 4.1.2 Management of Unidentified Aboriginal Objects and/or Burials

- 1. In accordance with Condition B30 of the Development Consent, should any previously unidentified Aboriginal object(s) (or suspected Aboriginal object) be revealed during construction work all work likely to affect the object(s) shall cease immediately
- 2. Cordon off the area in the immediate vicinity of the find until the find is confirmed by a qualified archaeologist.
- 3. Notify the AGL Project Manager of the discovery.
- 4. An Incident Report shall be prepared in accordance with **CEMP-Q** *Incident Management Protocol*.
- 5. If the object or site is confirmed as being Aboriginal in origin, a NSW OEH representative and the RAPs would be contacted to discuss how best to proceed.
- 6. Work shall not recommence until written authorisation from the NSW OEH has been received.



In accordance with Mitigation Measure 24, should suspected ancestral human remains be encountered, the following process would be followed:

- 1. Do not further disturb or move the remains.
- 2. Immediately cease work in the vicinity and cordon the area off.
- 3. Notify the AGL Project Manager of the discovery.
- 4. Notify the NSW Police.
- 5. Notify the OEH's Environment Line on 131 555 as soon as practicable and provide details of the remains and their location.
- 6. An Incident Report shall be prepared in accordance with **CEMP-Q** Incident Management *Protocol*.
- 7. Work shall not recommence until AGL received written authorisation from the NSW OEH.

#### 4.1.3 Aboriginal Heritage Induction Processes for Construction Personnel

All construction personnel and contractors will be provided *Worker Environmental Awareness and Compliance Training* (**CEMP-S**).

Part of this program will include a session on Aboriginal Heritage issues and the need to understand and comply with the protocol for dealing with the detection of unidentified objects and/or human remains during the construction of the Nyngan Solar PV Power Station and access tracks.

In accordance with Section 5.4 of the AGL Aboriginal Heritage Management Plan, First Solar will engage an appropriately qualified person to provide training sessions on the following matters:

- 1. The identification of Aboriginal objects and skeletal material
- 2. Aboriginal cultural awareness
- 3. The AHMP procedures are to be followed during the operational life of the project and in the event of a discovery of an Aboriginal object or burial.

Indicatively Aboriginal Heritage training sessions would be run quarterly to capture new starters on the project site. The frequency of training sessions will be subject to increases in onsite personnel.

In addition to the training sessions, Aboriginal Heritage awareness will be included in site inductions for new site personnel, sub-contractors and any other persons requiring access to the site.

Evidence of participation and understanding of responsibilities associated with the *Worker Environmental Awareness and Compliance Training* will be recorded on **Form-S02**.

#### 4.1.4 Protocol for Continued Aboriginal Consultation

1. A member from each RAP will be appointed to an Aboriginal Working Party. The function of the Aboriginal Working Party is as defined in the AGL Aboriginal Heritage Management Plan (refer **Attachment J01**).



- 2. In the event that any of the following incidents occur, the First Solar Project Manager shall notify the AGL Project Manager:
  - If any inadvertent impacts occur to sites beyond that which is agreed to in the AHMP (Attachment J01)
  - If any previously unrecorded Aboriginal sites/objects are located in the vicinity
  - If any areas are to be impacted that have not as yet been surveyed for the presence of Aboriginal sites

# 5 **Responsibilities**

#### AGL Project Manager

• Notification to RAPs of unexpected finds of Aboriginal origin

#### **First Solar Project Manager**

- Completion of Worker Environmental Awareness and Compliance Training
- Notifying the AGL Project Manager of unexpected finds
- Advising the Construction Manager when works can recommence
- Advising the Site Environmental Advisor when works can recommence

#### Site Environmental Advisor

- Notification to the OEH in the event of an unexpected discovery of an object of Aboriginal origin (in accordance with Condition B23) and liaising with the OEH with regards how best to proceed.
- Advising the AGL Project Manager and the First Solar Project when written confirmation has been received from the OEH that works can recommence.
- Notification to the OEH and the NSW Police in the event of human remains (in accordance with Mitigation Measure 24).
- Advising the AGL Project Manager and the First Solar Project Manager when confirmation has been received from the OEH and the NSW Police that works can recommence.
- Completion of Worker Environmental Awareness and Compliance Training
- Notifying the First Solar Project Manager of unexpected finds
- Completion of Incident Report Form-Q02 (refer CEMP-Q Incident Management Protocol)

#### **Construction Manager**

- Completion of Worker Environmental Awareness and Compliance Training;
- Notifying the Project Manager of unexpected finds



- Input to Incident Report Form-Q02 (refer CEMP-Q Incident Management Protocol)
- Advising the Supervisors when works can recommence

#### Supervisors

- Completion of Worker Environmental Awareness and Compliance Training
- Notifying the Construction Manager of unexpected finds and ceasing all work in the area
- Input to Incident Report Form-Q02 (refer CEMP-Q Incident Management Protocol)

#### **Construction Personnel, Contractors and Sub-contractors**

- Completion of Worker Environmental Awareness and Compliance Training
- Notifying the Supervisors of unexpected finds and ceasing all work in the area
- Input to Incident Report Form-Q02 (refer CEMP-Q Incident Management Protocol)

# 6 Records

- Incident Report Form-Q02 (refer CEMP-Q Incident Management Protocol)
- Worker Environmental Awareness and Compliance Training Form-S02 (refer CEMP-S Worker Environmental Awareness and Compliance Training)



**Attachment J01:** 

AGL Aboriginal Heritage Management Plan



Nyngan Solar Plant Aboriginal Heritage Management Plan

Date: 1 November 2013 Author: Dr Julie Dibden Proponent: AGL Energy Limited Local Government Area: Bogan Shire Council



www.nswarchaeology.com.au

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#### EXECUTIVE SUMMARY

AGL Energy Limited (AGL) received Development Consent on 15 July 2013 from the NSW Department of Planning and Infrastructure (the Department) for the development of the Nyngan Solar Plant (the development).

New South Wales Archaeology Pty Ltd conducted an Aboriginal cultural heritage assessment of the Nyngan Solar Plant project in 2012. Three Aboriginal objects were identified. The Aboriginal representatives of Nyngan Local Aboriginal land Council and the archaeological consultant concluded that the area was generally of low Aboriginal cultural heritage potential and sensitivity.

Whilst it was concluded during the Aboriginal cultural heritage assessment that avoidance and mitigation strategies were not necessary, the Department has set out a condition of Development Consent that requires an Aboriginal Heritage Management Plan (AHMP) be developed which would describe the management of identified Aboriginal objects and previously unidentified objects which may be discovered during construction.

This document is the final version of the AHMP, prepared following a review process with the Registered Aboriginal Parties (RAPs).

This document is prepared to guide the process for management and mitigation of impacts to Aboriginal cultural heritage during construction and operations at the Nyngan Solar Plant. The report will comprise an appendix to the Construction Environmental Management Plan currently being prepared for the development.

#### 1. INTRODUCTION

NSW Archaeology Pty Ltd has been commissioned by AGL Energy Limited (AGL) to prepare an Aboriginal Heritage Management Plan (AHMP) to guide the management and mitigation of impacts to Aboriginal cultural heritage during construction of the Nyngan Solar Plant.

AGL has been granted Development Consent under Section 89E of the Environmental Planning and Assessment Act 1979 from the NSW Department of Planning and Infrastructure (Department) for construction of the Nyngan Solar Plant.

The development would comprise the installation of a solar plant for electricity generation with a capacity of up to approximately 106 MW. Along with the solar plant, the development would include the installation and operation of a 132kV transmission line, approximately three kilometres in length.

The solar plant will be constructed on Lot 34, DP751328, approximately 10 kilometres west of Nyngan (Figure 1). Five land parcels will be traversed by the 132kV transmission line: two private rural land holdings (Lot 24, DP751328 and Lot 8, DP724628); a rail corridor owned by Transport for NSW (Lot 25, DP 1181299); Crown Land parcel (Lot 7300, DP1156652); and the Barrier Highway Road Reserve.

The plan is based on the Aboriginal Cultural Heritage Assessment Report prepared by NSW Archaeology Pty Ltd during the Environmental Assessment for the development application (Dibden 2012) and further requirements as outlined in the Department's Development Consent conditions, dated 15 July 2013.

During the Aboriginal heritage study conducted during the Environmental Assessment, background research and a field survey was undertaken, in conjunction with a process of Aboriginal consultation.

The Registered Aboriginal Parties (RAPs) in the process of consultation for the Nyngan Solar Plant development are:

- The Nyngan Local Aboriginal Land Council
- Bogan Aboriginal Corporation
- o Mr John Shipp

This AHMP has been developed in consultation with the three Registered Aboriginal Parties and the NSW Office of Environment and Heritage (NSW OEH). This AHMP sets out strategies for the inclusion of the relevant Aboriginal stakeholders in the management of their cultural heritage.



Figure 1 Location of the Nyngan Solar Plant (source: AGL).

#### 2. LEGISLATIVE CONTEXT

The National Parks and Wildlife Act 1974 (NPW Act) is the primary legislation for the protection of some aspects of Aboriginal cultural heritage in NSW. One of the objectives of the NPW Act is:

... the conservation of objects, places or features (including biological diversity) of cultural value within the landscape, including but not limited to: (i) places, objects and features of significance to Aboriginal people ... (s.2A(1)(b))

Part 6 of the NPW Act is administered by the NSW OEH and provides specific protection for Aboriginal objects and declared Aboriginal places by establishing offences of harm. Harm is defined to mean destroying, defacing or damaging an Aboriginal object or declared Aboriginal place, or moving an object from the land. Anyone proposing to carry out an activity that may harm an Aboriginal object or declared Aboriginal place must investigate, assess and report on harm that may be caused by the activity they propose.

An Aboriginal Heritage Impact Permit (AHIP) may be required if harm to Aboriginal objects and declared Aboriginal places is proposed. When this is the case, an Aboriginal Cultural Heritage Assessment Report (ACHAR) is required to support the AHIP application.

Section 86 of the NPW Act, *Harming or desecrating Aboriginal objects and Aboriginal places*, sets out the penalties for harming an Aboriginal object. For an individual, the penalty for harming an object the person knows is an Aboriginal object, is imprisonment for up to 2 years and a significant fine (>\$200,000). For corporations, the penalties exceed \$1,000,000.

However, the project is classed as State Significant Development (SSD) under State Environmental Planning Policy (State and Regional Development) 2011. Under Section 89J of the Environmental Planning and Assessment Act 1979, the following authorisations are not required for State Significant Development that is authorised by development consent granted after the commencement of this Division (and accordingly the provisions of any Act that prohibit an activity without such an authority do not apply):

 an Aboriginal heritage impact permit under section 90 of the National Parks and Wildlife Act 1974.

Nevertheless, a number of other sections of the National Parks and Wildlife Act 1974 remain relevant to Aboriginal heritage.

Unser Section 89A Notification of sites of Aboriginal objects. A person who is aware of the location of an Aboriginal object that is the property of the Crown or, not being the property of the Crown, is real property, and does not, in the prescribed manner, notify the Director-General thereof within a reasonable time after the person first becomes aware of that location is guilty of an offence against this Act unless the person believes on reasonable grounds that the Director-General is aware of the location of that Aboriginal object. An Aboriginal Site Recording Form allows for primary site recording (see link in Appendix 2). Aboriginal Site Recording Forms are provided to the Aboriginal Heritage Information Management System (AHIMS) which is maintained by NSW OEH.

An Aboriginal Site Impact Recording Form has been developed to ensure that current information about the status of AHIMS sites is maintained and an accurate picture of the condition of all registered Aboriginal sites is always available. The form must be completed after authorised impacts to AHIMS sites occur. Once completed, the forms must be sent to the AHIMS Registrar. Authorised impacts are those:

- which occur as a result of test excavation carried out in accordance with the Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW;
- o allowed by an AHIP issued by the NSW OEH;
- undertaken for the purpose of complying with Director-General Requirements issued by the Department of Planning and Infrastructure for State Significant Development (SSD – Part 4), State Significant Infrastructure (SSI – Part 5.1) or a Major Project (Part 3A – now repealed) under the Environmental Protection and Assessment Act 1979 – EP&A Act); or
- allowed by an SSD/SSI/Part 3A consent/approval under the EP&A Act.

Many Aboriginal communities wish to have care of Aboriginal objects which have been excavated, disturbed or moved by development activities, erosion or other processes. Under Section 85A of the NP&W Act 1974, the transfer of Aboriginal objects from a site to an Aboriginal person or organisation for safe keeping is allowed. The person or organisation must enter into an agreement with the NSW OEH. A Care Agreement Application Form must be completed and sent to the relevant NSW OEH regional office. A link to the form can be found in Appendix 2.

Links to various relevant web sites relating to Aboriginal heritage regulation in NSW are provided in Appendix 2.

#### 3. RATIONALE FOR THE AHMP

#### 3.1 Background

The development would comprise the installation of a solar plant with a capacity of up to approximately 106 MW and would include the following elements:

- Photovoltaic (PV) arrays incorporating rows of solar panels mounted on fixed steel frames and a series of central inverters and transformers;
- Aboveground and underground electrical conduits and cabling to connect the arrays to the inverters and transformers;
- Marshalling switchgear to collect the power from the PV arrays;
- A substation;
- An aboveground 132kV transmission line to connect into the existing electrical network;
- A site office and maintenance building;
- Internal access tracks;
- Perimeter security fencing and landscaping.

An Aboriginal cultural heritage assessment of the project was conducted in 2012 by Julie Dibden (NSW Archaeology Pty Ltd), Leslie Ryan (Bogan Aboriginal Corporation), and Sheila Couley (Nyngan Local Aboriginal Land Council). The assessment is documented in Dibden (2012) and summarised below.

The archaeological and heritage literature review conducted for the region indicates that the single most determining factor influencing the distribution of sites across the landscape is water (Dibden 2012).

Leslie and Tommy Ryan of the Bogan Aboriginal Corporation and Nyngan Local Aboriginal Land Council, respectively, have informed us that the proposal area is of extremely low archaeological potential and, that locally, sites would most likely be situated in close proximity to the Bogan River. In respect of a previous project in the Nyngan area (Dibden 2010), Mr John Shipp, a Registered Aboriginal Party (RAP) who has conducted extensive surveys in the Nyngan area and recorded many scarred trees, artefacts and hearths, advised that these site types have the potential to be present in the local area, except for places that have been cultivated.

The Solar Plant is located at some considerable distance from the Bogan River. The site contains no surface evidence of large relic drainage areas and tributaries. Based on its environmental context, Dibden (2012) concluded that the area was likely to have been utilised by Aboriginal people for an extremely limited range of activities which may have included hunting and gathering, resource gathering and travel through country, and that

these would have resulted in very low levels of artefact discard. Furthermore, the site has been cultivated extensively, and in line with Mr Shipp's indications, sites such as scarred trees and hearths would not now be present.

A search of the NSW OEH AHIMS was conducted on the 14<sup>th</sup> June 2012 (Client Service ID: 72500). No Aboriginal objects were recorded on AHIMS as being present within the search area (see, Appendix 1 in Dibden 2012).

Three Aboriginal objects (isolated stone artefacts) were identified during the field inspection. These were assessed to be representative of extremely low density artefact distribution. Their cultural and archaeological heritage value was assessed to be low (Dibden 2012). Undetected or subsurface stone artefacts were predicted to be present in extremely low density.

#### 3.2 Planning Consent Conditions

Whilst it was concluded during the Environmental Assessment that avoidance and mitigation strategies were not necessary in respect of the development, an Aboriginal Heritage Management Plan which sets out the management procedures to be followed in respect of identified and previously unidentified Aboriginal objects that may be discovered during the course of construction is required as a condition of Development Consent.

In respect of impacts to heritage, the following Development Consent conditions have been issued by the Department:

- B30. If during the course of construction the Applicant 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 the OEH is received by the Applicant.
- B31. If during the course of construction the Applicant 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 Applicant receives written authorisation from the Heritage Office.

Further, Part C of the Development Consent requires that:

an Aboriginal Heritage Plan to monitor and manage Aboriginal heritage shall be developed in consultation with the OEH and registered Aboriginal stakeholders, and include the following: (i) details of further archaeological investigations and/or salvage measures to be carried out prior to construction;

(*ii*) procedures for the management of identified objects within the development site;

(iii) procedures for dealing with unidentified objects and/or human remains;

(*iv*)Aboriginal cultural heritage induction processes for construction personnel; and

(v) Procedures for ongoing Aboriginal consultation and involvement.

The AHMP seeks to ensure that the Development Consent conditions, as outlined above, are complied with during the construction of the Nyngan Solar Plant.

3.3 The Purpose of the AHMP

This AHMP aims to outline the appropriate responsibilities and actions that the proponent shall undertake for the purposes of managing impacts to Aboriginal heritage.

The AHMP describes:

- a) The procedures for the management of identified objects within the development site.
- b) The procedures to be followed if any unidentified objects and/or human remains are identified during the development works.
- c) The process for how the AHMP procedures will be managed and adhered to during the construction and operation of the project.
- d) The process that will be followed for continuing consultation with the Aboriginal stakeholders and the NSW OEH, where required.

This AHMP seeks to provide the proponent with an appropriate means of meeting its obligations in regard to the requirements as outlined above.

#### 4. CONSULTATION PROCESS

#### 4.1 Consultation

The Aboriginal consultation undertaken for this project commenced in 2012 and has been conducted in accordance with the guidelines as set out in the *Draft Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (NSW DEC July 2005) and OEH's *Aboriginal cultural heritage consultation requirements for proponents* 2010 (NSW DECCW 2010b).

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

- The Nyngan Local Aboriginal Land Council
- Bogan Aboriginal Corporation
- Mr John Shipp

Leslie Ryan, Bogan Aboriginal Corporation and Sheila Couley, Nyngan Local Aboriginal Land Council, participated in the fieldwork conducted during the 2012 heritage assessment of the development.

#### 4.2 AHMP Consultation Framework

Consultation with the Registered Aboriginal Parties would be ongoing during the life of the development. This would include, but not be limited to:

- Consultation in regard to processes and strategies as outlined in this AHMP; and
- Consultation in the event of any Aboriginal objects or burials being found during the construction and operation of the Solar Plant.

A meeting with the RAPs was held on 22 October 2013 to finalise the processes and strategies as outlined in this AHMP. Veneta Dutton, representing Nyngan LALC, attended the meeting. Following consultation with NSW OEH and Veneta Dutton, the following aspects of the AHMP were finalised and concluded:

- The identified Aboriginal objects located in the activity area would be salvaged before impacts and transferred to a safe place nearby and outside any impact areas.
- The identified Aboriginal objects would be salvaged by Tommy Ryan, representing Nyngan LALC and Doug Landfear, AGL, in consultation with Julie Dibden.

#### 5. ABORIGINAL HERITAGE MANAGEMENT PROCEDURES

#### 5.1 Further Archaeological Investigations

The proposed development area has been assessed to be of low archaeological potential and there are no requirements for further archaeological investigations and/or salvage measures to be carried out at the site prior to construction.

In the event that changes are made to the development layout, any areas which were not surveyed during the cultural heritage fieldwork would require further archaeological investigation. Any such investigations would be conducted by an appropriately qualified person.

5.2 Management of Identified Aboriginal Heritage

The identified Aboriginal objects located in the activity area would be salvaged before impacts and transferred to a safe place nearby and outside any impact areas. The identified Aboriginal objects would be salvaged by Tommy Ryan, representing Nyngan LALC and Doug Landfear, AGL, in consultation with Julie Dibden.

If an object is not able to be re-located with reasonable effort, it will not be salvaged and relocated.

An Aboriginal Site Impact Recording Form would be completed and submitted to NSW OEH following the salvage of the three Aboriginal objects.

5.3 Management of Unidentified Aboriginal Objects and/or Burials

Should any previously unidentified Aboriginal object or site be revealed during construction, then work in the area should cease and the local vicinity of the find should be cordoned off until confirmed by a qualified archaeologist. If the object or site is Aboriginal in origin, a NSW OEH representative and the RAPs should be contacted to discuss how best to proceed.

Should suspected ancestral human remains be encountered, the following process should be adhered to:

- Do not further disturb or move the remains;
- Immediately cease work in the vicinity and cordon area off;
- Notify the NSW Police;
- Notify the NSW OEH Environment Line on 131 555 as soon as practicable and provide available details of the remains and their location; and
- Do not re-commence work in the area unless authorised in writing by NSW OEH.

#### 5.4 Aboriginal Heritage Induction

In order for site workers and contractors to be able to identify Aboriginal objects and burials, and to know what processes to follow if required, they would be provided with induction training.

The construction contractor would need to engage an appropriately qualified person to provide induction training on the following matters:

- 1. The identification of Aboriginal objects and skeletal material;
- 2. Aboriginal cultural awareness;
- 3. The AHMP procedures to be followed during the operational life of the project and in the event of a discovery of an Aboriginal object or burial.

Members of the construction team, including sub-contractors, machine operators and truck drivers, etc., should undergo site induction concerning Aboriginal cultural heritage issues, prior to working on the site. This would preferably be undertaken by an individual who has a good working knowledge of Aboriginal sites and of the legislation protecting them. This induction should inform workers / contractors of the location of sites within the Project Area, and of their legislative protection under Section 90 of the NSW National Parks and Wildlife Act 1974. Those workers attending such inductions will sign a register indicating their understanding of the cultural importance and legislative requirements to protect Aboriginal sites. Such inductions assist greatly in avoiding inadvertent impact to Aboriginal sites.

#### 5.5 Protocol for Continued Aboriginal Community Consultation

For the purpose of further consultation, it is suggested that a member of each RAP be appointed to an Aboriginal Working Group, the contacts for which are contained in this protocol.

In the event that any of the following incidents occur, AGL will contact NSW OEH and the RAPs as per condition B32 of the Planning Consent within 24 hours:

- 1. If any inadvertent impacts occur to sites beyond that which is agreed to in this AHMP;
- 2. If any previously unrecorded Aboriginal sites/ objects are located in the vicinity; or
- 3. If any areas are to be impacted that have not as yet been surveyed for the presence of Aboriginal sites.

Contact names and details for these groups are presented in Appendix 1.

#### 6. REFERENCES

- Dibden, J. 2010 Proposed Nyngan Photovoltaic Solar Farm Indigenous Archaeological and Cultural Heritage Assessment. A report to nghenvironmental.
- Dibden, J. 2012 Nyngan Solar Plant Aboriginal Cultural Heritage Assessment Report A Report to AGL.
- NSW Department of Environment and Conservation 2005 Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation.

# APPENDIX 1 CONTACT DETAILS FOR REGISTERED ABORIGINAL PARTIES

Nyngan Local Aboriginal Land Council 102 Pangee St Nyngan NSW 2825 nynganlalc@bigpond.com

**Bogan Aboriginal Corporation** c/o Nyngan LALC

John Shipp PO Box 6088 Dubbo NSW 2830 0428466933 john.shipp@bigpond.com

### APPENDIX 2 LINKS RELATING TO ABORIGINAL HERITAGE REGULATION IN NSW

#### General Aboriginal Heritage regulation

• General info about the changes to Aboriginal Heritage regulation can be found at: <u>http://www.environment.nsw.gov.au/licences/achregulation.htm</u>

#### Amendment Act and Regulations

- The National Parks and Wildlife Act 1974 is the primary act that manages Aboriginal heritage in NSW. The Aboriginal heritage provisions of the Act were amended in October 2010. Full details of the Act can be found at: http://www.legislation.nsw.gov.au/maintop/view/inforce/act+80+1974+cd+0+N
- The National Parks and Wildlife Regulation 2009 also contains regulations dealing with Aboriginal cultural heritage in NSW. See: <u>http://www.legislation.nsw.gov.au/maintop/view/inforce/subordleg+427+2009+cd+0</u> <u>+N</u>

#### Aboriginal Heritage Information Management System (AHIMS)

- The following link provides general information about the types of information you can obtain from the Aboriginal Heritage Information Management System (AHIMS) and also provides a table on the service fees: <u>http://www.environment.nsw.gov.au/licences/WhatInformationCanYouObtainFrom AHIMS.htm</u>
- If you wish to undertake <u>a free basic search</u> using the internet yourself, you can access AHIMS through the following link: <u>http://www.environment.nsw.gov.au/awssapp/login.aspx</u>. If you are a first time user you will need to register using an email address. You will be asked to fill in some details and a password. If you have previously used the system you will need to enter your email address and password. You will then need to enter the details of the search or service you want to request.
- If you require assistance with the AHIMS database the AHIMS Registrar can be contacted on:

Phone: 02 9585 6345 Fax: 02 9585 6094 Email: <u>ahims@environment.nsw.gov.au</u> Street address: Level 6, 43 Bridge Street, Hurstville NSW Postal address: PO Box 1967, Hurstville NSW 2220

- The AHIMS Basic Search will tell you whether there are any Aboriginal sites recorded in the search area.
- If the results of your AHIMS Basic Search indicate that there is an Aboriginal site in the area of your proposed activity, you will need to seek further information in order to determine the precise nature of the Aboriginal site. This would involve conducting

an Extensive Search; a fee may apply. Further details of this search are available on the same website.

• If the results of your AHIMS Basic Search indicate that there are no Aboriginal sites in the area of any proposed activity, you would do not need to carry out an Extensive Search.

**Declared Aboriginal Places** 

- General information about declared Aboriginal Places can be found at: <u>http://www.environment.nsw.gov.au/conservation/AboriginalPlacesNSW.htm</u>
- The Atlas of declared Aboriginal Places comprises a map and table of declared Aboriginal Places in NSW. For each Aboriginal place you will find information describing the place and a summary of why it is important to Aboriginal people. See: <a href="http://www.environment.nsw.gov.au/AboriginalPlaces/">http://www.environment.nsw.gov.au/AboriginalPlaces/</a>

Aboriginal Sites Decision Support Tool (ASDST)

- The Aboriginal sites decision support tool (ASDST) has been developed to support the assessment of Aboriginal sites issues in NSW at the landscape-scale: <u>http://www.environment.nsw.gov.au/licences/AboriginalSitesDecisionSupportTool.ht</u> <u>m</u>
- A direct link to the maps can be found at: <u>http://mapdatal.environment.nsw.gov.au/asdst/default.aspx</u>
- For further information and support in interpreting the ASDST products, please contact: <u>asds.tool@environment.nsw.gov.au</u>

#### Due Diligence

• The Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales (DECCW 2010) can be used by individuals or organisations who are contemplating undertaking activities which could harm Aboriginal objects. This Due Diligence Code provides a process whereby a reasonable determination can be made whether or not Aboriginal objects will be harmed by an activity, whether further investigation is warranted and whether the activity requires an AHIP application. A copy of this Due Diligence Code can be found at: http://www.environment.nsw.gov.au/resources/cultureheritage/ddcop/10798ddcop.pd <u>f</u>

Industry Specific Due Diligence Codes:

• Other industry specific codes of practice adopted by the NPW Regulation. The industry specific codes of practice must meet minimum standards which have been set by the Director General. These standards were published in the Government Gazette on 10 September 2010. (The Plantations and Reafforestation Code and the Private Native Forestry Code of Practice are existing statutory codes and currently do not need to meet these minimum standards).

- These codes are:
  - the <u>Plantations and Reafforestation Code (being the Appendix to the</u> <u>Plantations and Reafforestation (Code) Regulation 2001</u>) <sup>I</sup> as in force on 15 June 2010,
  - 2. the <u>Private Native Forestry Code of Practice</u> approved by the Minister for Climate Change, Environment and Water and published in the Gazette on 8 February 2008,
  - 3. the <u>NSW Minerals Industry Due Diligence Code of Practice for the Protection</u> <u>of Aboriginal Objects</u> published by NSW Minerals Council Ltd and dated 13 September 2010,
  - 4. the <u>Aboriginal Objects Due Diligence Code for Plantation Officers</u> <u>Administering the Plantations and Reafforestation (Code) Regulation 2001</u> published by the Department of Industry and Investment and dated 13 September 2010,
  - 5. the <u>Operational Guidelines for Aboriginal Cultural Heritage Management</u> published by Forests NSW and dated 13 September 2010.

Archaeological surveys and assessments

- Anyone proposing to carry out an activity that may harm an Aboriginal object or a declared Aboriginal place must investigate, assess and report on the harm that may be caused by that activity. An Aboriginal cultural heritage assessment report is the written report detailing the results of the assessment and recommendations for actions to be taken before, during and after an activity to manage and protect any identified Aboriginal objects or declared Aboriginal places. The Aboriginal cultural heritage assessment report is required to support any application made to OEH for an Aboriginal Heritage Impact Permit (AHIP) where harm cannot be avoided. The *Guide to investigating, assessing and reporting on Aboriginal cultural heritage in NSW* outlines the requirements of an Aboriginal cultural heritage assessment report. See: <a href="http://www.environment.nsw.gov.au/resources/cultureheritage/20110263ACHguide.pdf">http://www.environment.nsw.gov.au/resources/cultureheritage/20110263ACHguide.pdf</a>
- Some test excavations can be carried out without the requirement for an AHIP provided they are done in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal objects in NSW*. This Code sets out the minimum standards for archaeological investigation undertaken in NSW under the <u>National Parks and Wildlife Act 1974 (NPW Act)</u>. See: <a href="http://www.environment.nsw.gov.au/resources/cultureheritage/10783FinalArchCoP.pdf">http://www.environment.nsw.gov.au/resources/cultureheritage/10783FinalArchCoP.pdf</a>

Aboriginal community consultation

- OEH has produced some background information that sets out the requirements for consulting with those Aboriginal people who can provide information about the significance of Aboriginal cultural heritage as part of the heritage assessment process that informs any application for an Aboriginal Heritage Impact Permit (AHIP). See: <a href="http://www.environment.nsw.gov.au/licences/consultation.htm">http://www.environment.nsw.gov.au/licences/consultation.htm</a>
- The OEH policy for Aboriginal community consultation, *Aboriginal Cultural Heritage Consultation Requirements for proponents*, can be found at: <u>http://www.environment.nsw.gov.au/resources/cultureheritage/commconsultation/09</u> <u>781ACHconsultreq.pdf</u>.

#### Local Aboriginal land Councils

- Information relating to boundaries of Local Aboriginal Land Councils can be obtained via State Land Council at: <u>http://www.alc.org.au/land-councils/lalc-regions-boundaries.aspx</u>
- Information relating to contact details for Local Aboriginal Land Councils can also be obtained via State Land Council at: <u>http://www.alc.org.au/land-councils/lalc-contact-details.aspx</u>

Aboriginal Site Recording Forms (site cards):

- General information in relation to recording Aboriginal objects and sites can be found at: <u>http://www.environment.nsw.gov.au/licences/DECCAHIMSSiteRecordingForm.htm</u>
- Access to the Aboriginal Site Recording Form itself (also known as a site card) can be found at: <u>http://www.environment.nsw.gov.au/resources/parks/SiteCardMainV1\_1.pdf</u>
- Information on how to fill in an Aboriginal site recording form can be found at: <u>http://www.environment.nsw.gov.au/resources/parks/20121008SiteRecordGuide.pdf</u>

Aboriginal Heritage Impact Permits (AHIPs):

- Recent changes to the <u>NPW Act</u> allow a single permit (referred to as an Aboriginal Heritage Impact Permit or AHIP) to be issued in relation to impacts to Aboriginal objects and Aboriginal places, or types or classes of Aboriginal objects and Aboriginal places. See: <u>http://www.environment.nsw.gov.au/licences/Section87Section90.htm</u>
- There is also a Guide titled "Applying for an Aboriginal Heritage Impact Permit: Guide for applicants" on the OEH website that may assist in the process for applying for an AHIP if one is required for your project. See: <u>http://www.environment.nsw.gov.au/resources/cultureheritage/20110280AHIPguidef</u> <u>orapplicants.pdf</u>
- Aboriginal Heritage Impact Permit (AHIP) application form. See:<u>http://www.environment.nsw.gov.au/resources/cultureheritage/20110734AHIPapplication.pdf</u>
- AHIPs may also be varied or transferred. Application forms to vary transfer an AHIP can be found at: <u>http://www.environment.nsw.gov.au/licences/AHIPforms.htm</u>

Care Agreements

- Many Aboriginal communities wish to have care of Aboriginal objects which have been excavated, disturbed or moved by development activities, erosion or other processes.
- The NPW Act allows the transfer of Aboriginal objects to an Aboriginal person or Aboriginal organisation for safekeeping. The person or organisation must enter into a care agreement with OEH.
- A care agreement is a document that sets out the obligations of OEH and the Aboriginal person or Aboriginal organisation for the long-term safekeeping of the

transferred Aboriginal object(s). The Aboriginal person or organisation does not become the owner of the Aboriginal objects.

- A person or organisation wanting to be a custodian for objects can apply for a transfer of those objects to themselves using the application form below. There is no cost to do this.
- If you are applying to be custodian of Aboriginal objects that are also subject to an Aboriginal Heritage Impact Permit (AHIP) or an application for an AHIP, it is important that you discuss the management of the objects with the Registered Aboriginal Parties for that application.
- Link to further information on Care Agreements:
  <u>http://www.environment.nsw.gov.au/licences/CareAgreements.htm</u>

Public Register

- The Public Register under the National Parks and Wildlife Act (NPW Act) provides the public with information related to Aboriginal heritage and other regulatory functions under the NPW Act and the Threatened Species Conservation Act (TSC Act). This register supports OEH's broad principle of ensuring that where possible, the department's decisions are publicly available and transparent. It contains:
  - 1. <u>applications for Aboriginal heritage impact permits (AHIPs)</u> and other decisions made by the Director General of the Department of Premier and Cabinet regarding AHIPs.
  - 2. <u>convictions in prosecutions under the NPW Act or the TSC Act</u> initiated by OEH
  - 3. <u>the results of civil proceedings before the Land and Environment Court</u> under the NPW Act or the TSC Act by or against OEH
  - 4. Aboriginal Places <u>http://www.environment.nsw.gov.au/AboriginalPlaces/</u>
  - 5. remediation directions issued by the Director General

OEH internal guidance material

- OEH staff use internal policy and guidance to assist them in regulating Aboriginal cultural heritage, including assessing applications for Aboriginal heritage impact permits (AHIPs).
- These documents are intended as internal OEH policy documents only and should not be used for any other purpose.
  - 1. <u>Operational Policy: Protecting Aboriginal cultural heritage</u> (1103960ppolach.pdf; 239 KB): This document provides an operational framework for OEH staff regulating Aboriginal cultural heritage, which is practical, legally appropriate and consistent across the state.
  - 2. <u>Guide to Aboriginal Heritage Impact Permit Processes and Decision-making</u> (110397guideahipprocess.pdf; 577 KB): This guide aims to ensure OEH decisions on Aboriginal heritage impact permits (AHIPs) are transparent and defensible and that any AHIPs issued are appropriate, reasonable and enforceable.

Aboriginal Cultural Heritage Fact Sheets

• Fact sheet 1 - New Aboriginal heritage provisions (http://www.environment.nsw.gov.au/resources/cultureheritage/NPWAct/10701npwf acts1.pdf)

- Fact sheet 2 Providing certainty for the protection of Aboriginal heritage through due diligence (<u>http://www.environment.nsw.gov.au/resources/cultureheritage/NPWAct/10702npwf</u> <u>acts2.pdf</u>)
- Fact sheet 3 Better law enforcement for the protection of Aboriginal heritage, national parks and threatened species in New South Wales (<u>http://www.environment.nsw.gov.au/resources/cultureheritage/NPWAct/10703npwf</u> <u>acts3.pdf</u>)
- Fact sheet 4 New procedures for boards of management for Aboriginal owned parks (<u>http://www.environment.nsw.gov.au/resources/cultureheritage/NPWAct/10704npwfacts4.pdf</u>)
- Fact sheet 5 Summary of miscellaneous provisions (http://www.environment.nsw.gov.au/resources/cultureheritage/NPWAct/10705npwf acts5.pdf)
- Fact sheet 6 The Low Impact Activity Defence (<u>http://www.environment.nsw.gov.au/resources/cultureheritage/NPWAct/110103npw</u> <u>facts6.pdf</u>)
- Fact sheet 7 Aboriginal Heritage Impact Permits (<u>http://www.environment.nsw.gov.au/resources/cultureheritage/NPWAct/110104npw</u> <u>facts7.pdf</u>)
- Fact sheet 8 The Aboriginal Heritage Information Management System (<u>http://www.environment.nsw.gov.au/resources/cultureheritage/NPWAct/110105npw</u> <u>facts8.pdf</u>)



# CEMP-K Historical Heritage Management Plan Nyngan Solar PV Power Station





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|            |          |   |             |                               |                    |                              |                    |

Cited Cross References within Document:

- 1. Appendix CEMP-J Aboriginal Heritage Management Plan
- 2. Appendix CEMP-Q Incident Management Protocol
- 3. Appendix CEMP-S Worker Environmental Awareness and Compliance Training



# 1 Purpose

This Historical Heritage Management Plan for the Nyngan Solar PV Power Station has been prepared to meet the requirements of:

- The Nyngan Solar PV Power Station Development Consent (SSD-5355)
  - Condition B31
- Nyngan Solar Plan Submissions Report (NGH Environmental, June 2013)
  - Mitigation Measure 59

# 2 Scope

### 2.1 Overview

First Solar (Australia) Pty Ltd (First Solar) has developed the following Historical Heritage Management Plan for the Nyngan Solar PV Power Station development as the development relates to the activities of First Solar. Specifically this Historical Heritage Management Plan relates to the Construction Phase for the solar power station and associated access tracks.

A second CEMP is being prepared for the power station's grid connection by a separate contractor. The grid connection for the Nyngan Solar PV Power Station is not under the mandate of First Solar (Australia) Pty Ltd (First Solar) and is therefore not included within the following document. Please refer to the separate grid connection / transmission line CEMP for information specific to the grid connection works.

For information specific to Aboriginal Heritage Management please refer to CEMP-J.

### 2.2 Nyngan Solar PV Power Station Development

The Nyngan Solar PV Power Station will consist of a 102MW solar PV power station located approximately 10km west of Nyngan. The solar plant will occupy approximately 300 hectares of land to the north of the Barrier Highway.

First Solar (Australia) Pty Ltd have been engaged by AGL to provide engineering, procurement and construction (EPC) services. The Nyngan Solar PV Power Station will utilise First Solar's advanced cadmium telluride (CdTe) thin film photovoltaic modules. The solar modules generate electricity with no air emissions, no waste production, no water use and have one of the smallest carbon footprints of any current PV technology. Over 7,000MW of First Solar PV modules have been installed worldwide, including at many of the world's largest solar PV plants, since beginning



commercial production in 2002. First Solar has been actively involved in the Australian market since mid-2008.

The construction of the Nyngan Solar PV Power Station project is expected to commence in early 2014 and will take approximately 18 months to complete. Once constructed the Nyngan Solar PV Power Station will generate an estimated 233,000 megawatt hours (MWh) of electricity annually.

### 2.3 Relevant Approval Conditions

The approval provisions for the Nyngan Solar PV Power Station relevant to the Historical Heritage Management Plan are as follows:

Condition B31 of the Nyngan Development Consent states:

B31 If during the course of construction the Applicant 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 Applicant receives written authorisation from the Heritage Office.

Mitigation Measure 59 states:

59 Should an item of historic heritage be identified, the Heritage Branch (Office of Environment and Heritage) would be contacted prior to further works being carried out in the vicinity.

### 2.4 EIS Context

As outlined in Section 7.8.1 of the EIS, a desktop study was undertaken during the development of the EIS to identify any historical heritage (non-aboriginal) items or places in proximity to the site. The desktop study had a particular focus on the proposed works site.

The historical heritage searches undertaken by NGH Environmental identified that there were no known historic heritage items or places within the site. The desktop assessment findings were supported by a subsequent site inspection for Aboriginal and Historical Heritage.

Irrespective of the above findings, First solar has developed a procedure for dealing with the accidental discovery of unidentified heritage items. This procedure is outlined in Section 3.



# 3 Actions

## **3.1** Procedures for Dealing with Unidentified Objects

The following procedure, developed in accordance with Condition B31, will be followed in the event of the discovery of finds of possible historical significance during the construction of the Nyngan Solar PV Power Station and associated access tracks.

- 1. Should any previously unidentified historical objects be revealed during construction activities, work in the immediate area would cease immediately.
- 2. Immediate notification to the AGL Project Manager and the Heritage Office (in accordance with the *Heritage Act* 1977) will be undertaken.
- 3. Work in the vicinity of the find will not recommence until written authorisation is received from the Heritage Office.

An Incident Report shall be prepared in accordance with **CEMP-Q**.

## 3.2 Historical Heritage Induction Processes for Construction Personnel

All construction personnel and contractors will be provided *Worker Environmental Awareness and Compliance Training* (**CEMP-S**).

Part of the Worker Environmental Awareness and Compliance Training program will include a section specific to heritage issues and the need to understand and comply with the protocol for dealing with the detection of unidentified objects. This Training will be a requirement for all site personnel, inclusive of sub-contractors and any other persons requiring access to the site for activities that may result in the discovery of heritage objects.

Evidence of participation and understanding of responsibilities associated with the *Worker Environmental Awareness and Compliance Training* will be recorded on **Form-S01**.

# 4 **Responsibilities**

#### First Solar Project Manager

- Completion of Worker Environmental Awareness and Compliance Training
- Notifying the AGL Project Manager of unexpected finds
- Sign-off of Incident Report Form-Q02
- Advising the Construction Manager when works can recommence



• Advising the Site Environmental Advisor when works can recommence.

#### Site Environmental Advisor

- Notify the Heritage Office (OEH) of unexpected finds and liaising with Heritage Office with regards to how best to proceed
- Advising the First Solar Project Manager when written authorisation from the Heritage Office has been obtained to recommence work.
- Completion of Worker Environmental Awareness and Compliance Training
- Notifying the First Solar Project Manager of unexpected finds
- Completion of Incident Report Form-Q02

#### **Construction Manager**

- Completion of Worker Environmental Awareness and Compliance Training;
- Notifying the Project Manager of unexpected finds
- Input to Incident Report Form-Q02
- Advising the Supervisors when works can recommence

#### Supervisors

- Completion of Worker Environmental Awareness and Compliance Training
- Notifying the Construction Manager of unexpected finds and ceasing all work in the area
- Input to Incident Report Form-Q02

#### **Construction Personnel, Contractors and Sub-contractors**

- Completion of Worker Environmental Awareness and Compliance Training
- Notifying the Supervisors of unexpected finds and ceasing all work in the area
- Input to Incident Report Form-Q02

# 5 Records

- Incident Report Form-Q02 (refer CEMP-Q)
- Worker Environmental Awareness and Compliance Training Form-S01 (refer CEMP-S)




# CEMP-L Construction Noise Management Plan Nyngan Solar PV Power Station





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Cited Cross References within Document:

- 1. Appendix CEMP-G Landscape Plan
- 2. Appendix CEMP-I Ground Cover Management Plan
- 3. Appendix CEMP-N Air Quality Management Plan
- 4. **Appendix CEMP-O** *Construction Traffic Management Plan*
- 5. Appendix CEMP-P Complaints Management Protocol
- 6. Appendix CEMP-Q Incident Management Protocol
- 7. Appendix CEMP-R Community Consultation Plan
- 8. Appendix CEMP-S Worker Environmental Awareness and Compliance Training



## 1 Purpose

This Construction Noise Management Plan for the Nyngan Solar PV Power Station has been prepared to meet the requirements of:

- Development Consent (SSD-5355):
  - Consent Condition C3(d)
  - Consent Condition B22
  - Consent Condition B23
  - Consent Condition B24
  - Consent Condition B25
- Nyngan Solar Plant Submissions Report (NGH Environmental, June 2013):
  - Mitigation measure 26-36.

## 2 Scope

### 2.1 Overview

As required by Condition C3(d) of the Development Consent (SSD-5355) for the Nyngan Solar PV Power Station and Mitigation Measure 31 of the Nyngan Solar Plant Submissions Report, First Solar (Australia) Pty Ltd (First Solar) has developed the following Construction Noise Management Plan for the development as it relates to the activities of First Solar. Specifically this Construction Noise Management Plan relates to the Construction Phase of the power station and associated power station access tracks.

A second CEMP is being prepared for the power station's grid connection by a separate contractor. The grid connection for the Nyngan Solar PV Power Station is not under the mandate of First Solar (Australia) Pty Ltd (First Solar) and is therefore not included within the following document. Please refer to the separate grid connection / transmission line CEMP for information specific to the grid connection construction works.

### 2.2 Nyngan Solar PV Power Station Development

The Nyngan Solar PV Power Station will consist of a 102MW solar PV power station located approximately 10km west of Nyngan. The solar plant will occupy approximately 300 hectares of land to the north of the Barrier Highway.



First Solar (Australia) Pty Ltd have been engaged by AGL to provide engineering, procurement and construction (EPC) services. The Nyngan Solar PV Power Station will utilise First Solar's advanced cadmium telluride (CdTe) thin film photovoltaic modules. The solar modules generate electricity with no air emissions, no waste production, no water use and have one of the smallest carbon footprints of any current PV technology. Over 7,000MW of First Solar PV modules have been installed worldwide, including at many of the world's largest solar PV plants, since beginning commercial production in 2002. First Solar has been actively involved in the Australian market since mid-2008.

The construction of the Nyngan Solar PV Power Station project is expected to commence in early 2014 and will take approximately 18 months to complete. Once constructed the Nyngan Solar PV Power Station will generate an estimated 233,000 megawatt hours (MWh) of electricity annually.

### 2.3 Relevant Approval Conditions

The approval provisions for the Nyngan Solar PV Power Station relevant to the Construction Noise Management Plan are as follows:

Condition C3(d) of the Nyngan Development Consent states:

- (d) A Construction Noise Management Plan to manage noise impacts during construction and to identify all feasible and reasonable mitigation measures. The Plan shall include, but not necessarily be limited to:
  - (i) details of construction activities and an indicative schedule for construction works;
  - (ii) identification of construction activities that have the potential to generate noise impacts on surrounding land uses, particularly residential areas;
  - (iii) detail the requirements for Noise Impact Statements (NIS) for discrete work areas, including construction site compounds;
  - (iv) detail what reasonable and feasible actions and measures would be implemented to minimise noise impacts;
  - (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;
  - (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 B22 of this consent, including a risk assessment process under which an Environmental Representative may approve out-of-hour construction activities deemed to be of low environmental risk and refer high risk works for the Director-General'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 Director-General; and



(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.

Condition B22 of the Development Consent states:

- B22 Construction activities associated with the development shall be undertaken during the following standard construction hours:
  - (a) 7:00 am to 6:00 pm Mondays to Fridays, inclusive;
  - (b) 8:00 am to 1:00 pm Saturdays; and
  - (c) at no time on Sundays or public holidays.

Except unless otherwise provided in condition B23.

#### Condition B23 of the Development Consent states:

- B23 Construction works outside of the standard construction hours identified in condition B22 may be undertaken in the following circumstances:
  - (a) construction works that generate noise that is:
    - (i) no more than 5 dB(A) above rating background level at any residence in accordance with the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009); and
    - (ii) no more than the noise management levels specified in Table 3 of the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009) at other sensitive receivers; or
  - (b) for the delivery of materials required outside those hours by the NSW Police Force or other authorities for safety reasons; or
  - (c) where it is required in an emergency to avoid the loss of life, property and/or to prevent environmental harm;
  - (d) works as approved through the out-of-hours works protocol outlined in the Construction Noise Management Plan required under condition C3(d).

Condition B24 of the Development Consent states:

- B24 Any activities resulting in impulsive or tonal noise emission (such as rock breaking, rock hammering, pile driving) shall only be undertaken:
  - (a) between the hours of 8:00 am to 5:00 pm, Mondays to Fridays;
  - (b) between the hours of 8:00 am to 1:00 pm Saturdays; and
  - (c) in continuous blocks not exceeding three hours each with a minimum respite from those activities and works of not less than one hour between each block.

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.



Condition B25 of the Development Consent states:

B25 The Applicant shall implement all reasonable and feasible measures to minimise noise generation from the construction of the development 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 development.

Conditions B26 and B27 of the Nyngan Development Consent will be addressed as part of the Operational Environmental Management Plan and fall outside of the requirements of the Construction Noise Management Plan (as required by Condition C3(d)). Operational noise will be managed in accordance with the Operational Environmental Management Plan to be developed by the power station owner/operator (AGL) in accordance with Condition C4.

Mitigation Measure 26 states:

26. The employee and contractor induction would inform all site personnel about noise management measures, construction hours and the nearest sensitive receivers.

Mitigation Measure 27 states:

27. All employees are responsible for managing noise for their work activities and working in a manner to reduce noise.

Mitigation Measure 28 states:

28. Works are to be carried out during standard work hours (i.e. 7am to 6pm Monday to Friday; 8am to 1pm Saturdays). Any construction outside of these normal working hours would only be undertaken with prior approval from relevant authorities. For works outside standard hours, inform affected residents and other sensitive land use occupants between 5 and 14 days before commencement.

Mitigation Measure 29:

29. Where reasonable and feasible, noisy activity would be carried out in the least sensitive time periods (to be determined through community consultation).

Mitigation Measure 30:

30. A Construction Noise Management Plan would be prepared as part of the Construction Environmental Management Plan. It would include provision for noise monitoring to be undertaken in the event a noise complaint is received to verify if target noise levels are exceeded at that receiver. If so, additional measures would be developed in consultation with the complainant.

Mitigation Measure 31:

31. Community consultation would be ongoing for residences with close proximity to the works. The information would include details of:



- The proposed works
- The duration and nature of the works during construction
- What works are expected to be noisy
- What is being done to minimise noise
- When respite period would occur
- Regular updates on progress of works

Mitigation Measure 32 states:

32. Ensure equipment is operated and maintained in accordance with manufacturer's instructions including replacement of engine covers, repair of defective silencing equipment, tightening of rattling components, repair of leakages in compressed air lines and shutting down equipment not in use.

Mitigation Measure 33 states:

33. Avoid the operation of noisy equipment near noise-sensitive areas and where possible, loading and unloading would be conducted away from sensitive areas.

Mitigation Measure 34 states:

34. Position plant and equipment on site in a position that provides the most acoustic shielding from buildings and topography. Plant known to emit noise in one direction would be orientated where practicable to screen the emissions.

Mitigation Measure 35 states:

35. Where feasible and reasonable install multi-frequency alarms and smart alarms on vehicles, taking into account the requirements of the Work Health and Safety legislation.

## **3** Construction Activities

## **3.1** Phasing of Construction Activities

The Construction Phase for the Nyngan Solar PV Power Station will be divided in three sub-phases. These sub-phases are:

- 1. Site preparation, civil works and the construction of site access roads / tracks
- 2. Installation of posts, tilts, tables, panels and electrical cabling
- 3. Electrical commissioning, testing and grid connection

Each phase will have a different noise profile based on the changing activities.



## **3.2** Construction Noise Generating Activities

The following section outlines potential noise generating activities associated with the Construction Phase for the Nyngan Solar PV Power Station.

- Noise from vehicles, plant and equipment (including generators)
- Traffic noise associated with the delivery of materials for construction, including:
  - Construction materials (e.g. gravel)
  - Plant and equipment
  - Portable buildings
  - Solar PV panels, tables, tilts and posts

Traffic noise may also be generated during waste management activities onsite, including the delivery of skips and the removal of waste.

- Noise from post installation
- General construction noise, including noise generated from:
  - Construction of access roads
  - Installation of perimeter security fencing
  - Installation of solar PV panels, tables and tilts
  - Trenching, clear and grade, general civil works
  - Waste compacting

## 3.3 Construction Scheduling

#### 3.3.1 Overview

With respect to the construction of the Nyngan Solar PV Power Station, First Solar will be undertaking construction works in accordance with the Nyngan Development Consent. Standard construction works will be undertaken within the timeframes outlined in Condition B22. Outside of the standard construction hours identified in Condition B22, construction works will be undertaken in accordance with the requirements of Condition B23.

First Solar will be undertaking construction works onsite 7 days a week.

In accordance with Condition C3(d)(i), an indicative Construction Schedule has been attached as Attachment L02. The schedule may be subject to change but is attached to provide an indicative overview of the scheduling and structure of the construction works for the power station.



#### 3.3.2 Works Outside of Standard Working Hours

SLR Consulting Australia Pty Ltd (SLR) (see Section 4) have advised First Solar that based on their assessment of predicted compliance to the Noise Management Levels at noise sensitive receivers (see Section 4.2.3 of this report), it is considered feasible for construction hours to be 7am to 6pm Monday's to Sunday's (inclusive).

Works outside of standard working hours may include construction activities (within the parameters of Condition B23) on Saturday afternoons and Sundays, and works associated with the commissioning of the site. Due to the nature of the development, some essential works associated with the commissioning of the solar PV panels need to be undertaken in darkness when the panels are not generating electricity. Night works will also be undertaken outside of the standard construction hours and will be subject to the requirements of B23.

In accordance with Mitigation Measure 29, the noisiest activities will be scheduled to periods of the day / week where disruption to sensitive receivers is minimised as far as practicable. A project scheduler will be based on the site during construction works.

With respect to Mitigation Measure 28, it is noted that no noise requirements / controls are identified within the Mitigation Measure. Mitigation Measure 28 contradicts the requirements of Condition B23 which allows for works to be undertaken outside of standard construction hours subject to compliance with the requirements of the Condition. In this instance, First Solar will comply with the parameters set out in the Development Consent.

Based on advice from SLR in terms of predicted compliance with the Development Consent, First Solar will remain in compliance with the Development Consent noise conditions during construction works that are undertaken outside of standard work hours. As required by Condition C3(d)(vi), an out-of-hours work (OOWP) has been developed by First Solar. The OOHW protocol (refer Section 6.2) includes the assessment and management of works undertaken outside of the standard work hours.

## 4 **Construction Noise Impact Assessment**

### 4.1 SLR Construction Noise Assessment

As part of the development of this Construction Noise Management Plan, First Solar sought independent advice from SLR Consulting Australia Pty Ltd (SLR). The purpose of the SLR assessment was to:

- Revise the existing assessment of construction noise impacts (as per the EIS) to reflect:
  - Current construction methodologies
  - Final site layout and design



- Proposed hours of construction
- Potential sensitive receivers (as per the revised assessment)
- Compliance requirements associated with the project approvals
- Identification of appropriate management and mitigation measures to reduce noise levels and ameliorate potential noise impacts from Construction

The SLR assessment relates only to the works being undertaken by First Solar during the construction of the Nyngan Solar PV Power Station and the construction of associated access tracks. The assessment did not include works associated with the construction of the transmission line which is covered under a separate CEMP specific to these works.

The SLR Noise Assessment was developed to supplement the Construction Noise Assessment undertaken as part of the EIS and to undertake specific assessment of the actual (as opposed to potential as detailed within the EIS) construction noise impacts. The SLR Nyngan Construction Noise Assessment was developed by SLR in consultation with the Department of Planning and Infrastructure (DPI).

### 4.2 Overview of SLR Construction Noise Assessment

The SLR Construction Noise Assessment was designed to confirm the findings of the original Construction Noise Assessment and to assess Construction Noise based on the actual construction activities proposed to be undertaken by First Solar. The SLR Report is attached as **Attachment L01**.

#### 4.2.1 Potential Construction Noise Impacts

Subsequent to undertaking an assessment of the original construction noise assessment and undertaking their own assessment of the local environment, SLR concluded that the construction activity that provides the greatest risk of noise impacts on the sensitive receivers identified in Section 4.2.3 is the post installation works. This is due to the undertaking of post driving which may emit noise emissions with an impulsive characteristic.

#### 4.2.2 Impulsive Noise

The measurement of impulsive noise is defined in the NSW Industrial Noise Policy as:

If difference in A-weighted maximum noise levels between fast response and impulsive response is greater than 2dB.

To understand the risk of impulsive noise impact associated with post installation, SLR undertook noise monitoring for post installation at a First Solar post installation trial in September 2013.

Based on the measured noise levels during the post installation trials, the post driver noise emissions are not impulsive greater than 25m from the post driver. This conclusion was based on an assessment of both the Fast Response and the Impulsive Response readings taken. Where a difference between the Fast Response and the Impulsive Response decibel readings are less than



2dB (as per the above definition), the noise generated is not defined as impulsive. The outcomes of this assessment are included within Table 6 of the SLR Report (see **Attachment L01**).

The conclusion of SLR was that whilst the noise generated from the post driver had impulsive characteristics close to the post driver itself (i.e. at source), with distance (i.e. beyond 25m) the impulsive characteristic became indistinguishable from the general noise generated from the post driver.

The effect of distance with respect to nearest noise sensitive receivers to the Nyngan Solar PV Power Station site is that noise will be received from the post driving activities as general noise and not as impulsive noise. Whilst the testing was undertaken with a single post driver, over the distances between the Nyngan site and the nearest noise sensitive receivers (in excess of 2.5km), SLR has concluded that the addition of post drivers will not increase the likelihood that noise will be received at sensitive receivers as impulsive.

The distances between the three nearest sensitive receivers and the power station site is identified in the section below.

Based on the assessment of SLR, post driving activities associated with the construction of the Nyngan Solar PV Power Station will not trigger Condition B24 of the Development Consent. There are no other construction activities associated with the construction of the power station that are expected to generate impulsive or tonal noise emissions. The time restrictions outlined within Condition B24, including the requirements associated with continuous works, are not expected to be triggered by the construction activities.

If complaints are received, First Solar will investigate these complaints in accordance with Section 6.2 of this report and in accordance with **CEMP-P** *Complaints Management Protocol* and **CEMP-R** *Community Consultation Plan*. Additional mitigations will be investigated and put in place as far as practicable where required to ensure compliance with the Development Consent.

#### 4.2.3 Nearest Noise Sensitive Receivers

| Receiver   | Distance to Solar Plant (km) | Distance to Access Road (km) |
|------------|------------------------------|------------------------------|
| Tikkara    | 2.56km                       | 1.98km                       |
| Rutherglen | 4.67km                       | 2.47km                       |
| Redlands   | 3.28km                       | 2.51km                       |

The nearest receivers identified by SLR are as follows:

The receivers identified are consistent with the original noise assessment. The three nearest noise sensitive receivers are identified in Figure 1 of the attached SLR *Nyngan Solar Plan - Construction Noise Assessment* (see **Attachment L01**).

SLR have assessed that predicted noise levels for all construction works during standard hours of construction and outside of the standard hours of construction (as defined by Condition B22) are well within the Noise Management Levels and, as required by Condition B23, comply with the



*Interim Construction Noise Guideline* (NSW Department of Environmental and Climate Change, 2009).

The Noise Management Levels for works outside of the standard hours of construction relating to nearest sensitive receivers is outlined in Table 5 of the SLR Report (see **Attachment L01**).

## 5 Construction Noise Management and Mitigation Measures

The following mitigation measures are inclusive of Mitigation Measures required under the Nyngan Solar Plan Submissions Report and mitigation recommended by SLR.

#### 5.1.1 Vehicle, Plant and Equipment Noise Management

In accordance with Mitigation Measure 32, vehicles, plant and equipment associated with the Nyngan power station Construction Phase will be operated and maintained in accordance with manufacturer's instructions.

Construction vehicles, plant and equipment entering the Nyngan power station site will be inspected upon arrival. This inspection will be undertaken by the First Solar HSE Team and will include the following:

- Mechanical soundness
- Mechanical service history
- Weed hygiene (in accordance with **CEMP-I** *Ground Cover Management Plan*)

The inspection will check each vehicle against the relevant manufacturers specifications.

In addition, operators will be required to undertake a vehicle / plant / equipment inspections daily prior to use. Inspection sheets will be vehicle / plant / equipment specific and will be developed for each item of vehicle / plant / equipment from the manufacturers specifications for each item.

In accordance with Work Health and Safety legislation, reversing beepers will be placed on site vehicles. Where practicable (i.e. where retrofitting of a reversing beeper is required) First Solar will seek to install multi-frequency alarms, smart alarms or low frequency beepers (e.g. "quackers") on vehicles. Given the size of the site, the frequency of vehicles reversing and the number of vehicles on site First Solar does not propose to retrofit reversing beepers where beepers are already fitted. First Solar proposes to monitor beeper use on site, particularly where this noise is concentrated, during the Construction Phase. If a need for mitigation of reversing beepers is identified First Solar will identify practical mitigation solutions to address this matter. Mitigations may include the provision of turning areas that do not require reversing or retrofitting new beepers on to vehicles.

The management of vehicles / plant / equipment will also be undertaken in accordance with the provisions of the First Solar *Air Quality Management Plan* (refer to **CEMP-N**) and the *Construction Traffic Management Plan* (refer to **CEMP-O**).



#### 5.1.2 Post Installation

The following mitigation measures have been recommended by SLR to address potential construction noise impacts on sensitive noise receivers when post installation is undertaken outside of the standard work hours defined by Condition B22:

• For the post installation works <u>outside</u> of the standard construction hours, noise mitigation is to be implemented where post driving is required within 2.4km to the 3km of the nearest receiver.

The need for noise mitigation will be made on a risk basis. The location of post installation, the intensity of the works, climatic conditions will be taken in to consideration when determining the need and requirements for noise mitigation outside of standard construction hours.

Works outside of standard work hours will be undertaken in accordance with the Out of Hours Work Protocol in Section 6.2.

#### 5.1.3 Sensitive Receivers

SLR observed that the existing background noise at the nearest receivers is influenced by the following:

- Road traffic from the Barrier Highway
- The Nyngan-Cobar Railway
- Farm vehicles and machinery

The original baseline noise survey undertaken during the development of the EIS did not identify any existing industrial noise. The baseline noise environment could reasonably be expected to be higher than the baseline noise assessment with the inclusion of these existing features of the local environment.

It is also noted that the noise generated from the site may be further buffered by the landscape plantings outlined in **CEMP-G** Landscape Plan. Landscape plantings are proposed for infill planting on the Barrier Highway and planting at the lower end of the power station site itself. These plantings may help reduce the impact on Tikkarra and Rutherglen in particular.

In the event that consultation with the three landowners (in accordance with **CEMP-R** *Community Consultation Plan*) identifies a compliance issue or issues are identified via the *Complaints Management Protocol* (**CEMP-P**) at the sensitive receivers located in Section 4.2.3, First Solar will investigate the issue and implement mitigation where required. This may require the placement of a noise monitoring device at the receiver location to help tailor appropriate mitigation to address the compliance issue.

Other than the other mitigation measures outlined in Section 5 and Section 6.2 of this plan, no other mitigation specific to these sensitive receivers is proposed at this time.

#### 5.1.4 Noise Compliance Monitoring (Standard Working Hours)

First Solar will monitor onsite noise using a portable decibel meter. Noise monitoring will be undertaken during Standard Working Hours (as defined by Condition B22) as follows:



- 1. Routinely at set periods during the day
- 2. During periods of intense construction activity (e.g. post driving)
- 3. Monitoring during works outside of standard construction hours

Monitoring (both routine and during periods of intense activity) will be undertake at the following locations:

- 1. The entrance to the site access road from the Barrier Highway
- 2. Guard house entry to the site (south western boundary of the site)
- 3. South-eastern corner of the site
- 4. North-western corner of the site
- 5. North-eastern corner of the site

Monitoring at Sensitive Receivers will be undertaken on a risk basis, e.g. during periods of high onsite construction activity or during construction outside of standard work hours. Monitoring at Sensitive Receivers will be undertaken to ensure compliance with the requirements of the Development Consent, notably Conditions B23 and B24.

Results from noise monitoring will be recorded on **Form L01** (attached). Routine monitoring will be initially undertaken daily (subject to onsite activity and weather conditions) at the above locations by the Site Environmental Advisor. Routine monitoring will be undertaken during periods of construction works (outside of break times) in the morning and/or in the afternoon.

Where the results from noise monitoring shows ongoing periods of compliance and site activities are not expected to generate construction noise (e.g. during the installation of solar modules or during electrical commissioning), the frequency of noise monitoring by the Site Environmental Advisor will be reduced. Noise monitoring in these circumstances will be undertaken on a risk basis.

Pre-construction noise monitoring of the onsite background noise will be undertaken (as far as practicable) to provide a baseline for monitoring.

Where high acoustic readings are measured that may result in a noise nuisance at sensitive receivers (that is not in accordance with the Development Consent), the Site Environmental Advisor will notify the Site Construction Manager. Construction activities onsite will be assessed and scaled back (or staggered to avoid multiple sources of noise generation) if required to reduce the level of construction noise being generated from the site.

Meteorological predictions for the site will be monitored. The Site Environmental Advisor will advise the Construction Manager of any predicted wind directions that may 'carry' noise to the three identified potential sensitive receiver locations.



## 6 **Construction Noise Impact Management**

### 6.1 Community Consultation

Responsibility for Community Consultation remains with the Applicant (AGL) during the Construction Phase. First Solar has developed a First Solar Community Consultation Plan (refer to **CEMP-R**) from the AGL *Community Consultation Plan Broken Hill and Nyngan Solar Plants*.

As required by Mitigation Measure 31, First Solar will provide the following information to AGL for the purposes of informing community consultation:

- The proposed works
- The duration and nature of the works during construction
- What works are expected to be noisy
- What is being done to minimise noise
- When respite period would occur
- Regular updates on progress of works
- What activities are expected to be undertaken outside of standard construction hours

How the information is filtered to the community will be at the discretion of AGL in accordance with Mitigation Measure 10.

As stated in **CEMP-R** *Community Consultation Plan* First Solar will work closely with AGL during the Construction Phase for the Nyngan power station and associated power station access tracks to ensure compliance with the community consultation requirements set out in the Development Consent and the Nyngan Solar Plant Submissions Report (specifically Conditions C10-C12 and Mitigation Measures 28, 31 and 36).

At the request of AGL, First Solar will provide appropriate personnel for the attendance at meetings with Key Stakeholders (e.g. neighbouring landowners, Bogan Shire Council etc). Further information on this commitment is provided in Section 3.3 of the First Solar *Community Consultation Plan* (refer to **CEMP-R**).

### 6.2 Out of Hours Work Protocol

#### 6.2.1 Hours of Work

The following Out of Hours Work (OOHW) Protocol has been developed to meet the requirements of Condition C3(d)(vi). The OOHW protocol covers work undertaken during the following periods (as defined by Condition B22):



- 1. Hours prior to 7am Monday to Friday
- 2. Hours post 6pm Monday to Friday
- 3. Hours post 1pm Saturday
- 4. Sundays and public holidays

Work is provided for during this period under Condition B23 of the Development Consent.

#### 6.2.2 Sensitive Receivers

The OOHW Protocol has been developed to address potential impacts on the noise amenity for the three sensitive receivers identified in Section 4.2.3.

In accordance with Mitigation Measure 29, where reasonable and feasible noisy activities will be carried out in the least sensitive time periods. These periods will be determined in consultation with the three closest sensitive receivers, the closest of which falls 2.56km from the edge of the power station site and 1.98km from the access track to the power station site.

First Solar (in consultation with AGL) has worked to develop a relationship with the three nearest sensitive receivers during the pre-construction period for the development. First Solar is committed to minimising the potential impact on these receivers as far as practicable.

#### 6.2.3 Noise Compliance Monitoring (Out of Hours)

The background noise levels identified in the following table is sourced from the Environmental Impact Statement (EIS). The maximum allowable limit cited is in accordance with the 5 dBA provided for under Condition B23(a)(i).

| Receiver   | Rating Background Level<br>(at receiver) | Allowable Limit Outside of<br>Standard Working Hours<br>(at receiver) |
|------------|--|---|
| Tikkara    | 32.4 dBA                                 | 37.4 dBA  |
| Redlands   | 34.9 dBA                                 | 39.9 dBA  |
| Rutherglen | 33.7 dBA                                 | 38.7 dBA  |

As outlined in Section 5.1.3, the original baseline noise survey undertaken during the development of the EIS did not identify any existing industrial noise in the local area. The baseline noise environment could reasonably be expected to be higher than the baseline noise assessment with the inclusion of these existing features of the local environment. Noting this however, First Solar will comply with the rating background levels identified within the EIS (in accordance with Condition A2(b)).

As confirmed in Table 8 of the SLR Construction Noise Impact Assessment (Section 4.1), noise generated on the First Solar site during the Construction Phase will be compliant at all three receivers during both standard working hours and the out of hours. First Solar does not propose to



alter it's construction schedule as it is confident that with the right management of onsite construction noise (as outlined below) it will remain compliant with Condition B23. The SLR Report confirmed that the noisest activities, e.g. post installation utilising three post pounders, can be undertaken without noise mitigation up to 1.8km from a receiver and remain compliant. The closest sensitive receiver to the power station site where the post installation will be undertaken is 2.56km from the closest receiver (Tikkara).

First Solar will manage the construction noise generated onsite utilising the controls outlined in Section 5.1.4. Specifically, noise monitoring will be undertaken out of hours at the following locations:

- 1. The entrance to the site access road from the Barrier Highway
- 2. Guard house entry to the site (south western boundary of the site)
- 3. South-eastern corner of the site
- 4. North-western corner of the site
- 5. North-eastern corner of the site

Additionally, noise monitoring will be undertaken at the three identified sensitive receivers (with the permission of the landowner) on a risk basis. Circumstances where a higher risk to noise amenity at the sensitive receivers is presented (out of standard work hours) include:

- During periods of high construction activity by both First Solar and the EPC Contractor responsible for the construction of the connection to the transmission line.
- Where works progress to areas of the site where separation distances between the construction works and the sensitive receiver are at their closest.

Risk will be assessed ahead of works outside of standard work hours. This assessment will be undertaken conjointly by the following First Solar personnel:

- 1. First Solar Project Manager
- 2. First Solar Construction Manager
- 3. First Solar Field Environmental Advisor

This risk assessment will be undertaken no less than five days ahead of undertaking works outside of standard work hours.

Management of combined construction noise from both First Solar and the transmission line EPC Contractor will be managed via onsite interface meetings.

Where a risk of impact to the noise amenity is identified, First Solar will implement one or all of the following controls (subject to the level of risk identified):

- 1. Approach the affected landowner(s) to discuss a possible risk to their noise amenity. In accordance with Mitigation Measure 28 this process will occur between 5 and 14 days prior the commencement of works outside of standard work hours.
- 2. Discuss the likelihood, expected nature of construction noise and the control



measures that will be implemented by First Solar to manage construction noise generated from the site.

- 3. Management onsite activities in accordance with the commitments to the landowner(s) to ensure compliance with the noise limits identified in the above table.
- 4. Acoustic monitoring onsite in accordance with Section 5.1.4.
- 5. Invite the landowner to contact the First Solar Project Manager where the landowner
- 6. First Solar will assess the onsite activities. First Solar Project Manager will deploy the Field Environmental Advisor (at the agreement of the landowner) to undertake noise monitoring at the receiver.
- 7. Where an impact on the landowner(s) is identified, First Solar will immediately implement:
  - Alteration of onsite methodologies where the potential for a reduction in noise generation is identified.
  - A reduction of onsite works to ensure compliance with the noise limits identified in the above table.

#### 6.2.4 Approvals for Works Outside of Standard Hours

Condition C3(d)(vi) separates out-of-hour construction activities in to two categories:

- "low environmental risk" requiring approval from the Project Environmental Representative (as engaged in accordance with Condition C1); and
- "high environmental risk" requiring approval from the Director General.

The trigger for approvals from either the Project Environmental Representative and the Director General are where the onsite construction activities will generate noise at the sensitive receivers where the noise will be higher than the levels provided for under Condition B23.

Where a need for approval is identified during the risk assessment by the First Solar personnel identified in Section 6.2.2, approval will be sought by the relevant party (subject to whether the works will generate either a low or high environmental risk). The personnel identified in Section 6.2.2 will work with the First Solar Project Scheduler to identify periods where a risk is presented to ensure sufficient lead time to gain the necessary approval.

Where approval is required, First Solar will make a written request to the relevant party for approval to undertake either low or high environmental risk. This written request will identify:

- The timing of the works
- Identification of noise generating activities
- Basis for the assessment of the environmental risk, e.g. why the noise has been determined to present a low or high environmental risk
- Mitigation that First Solar will undertake to reduce the potential for noise generation
- Basis for why works are being undertaken outside of standard construction hours



• Confirmation of consultation undertaken with the sensitive receivers

### 6.3 Complaints Management

Condition C13 of the Development Consent and Mitigation Measure 30 both require a complaints management procedure will be in place during Construction.

During the Construction Phase, in accordance with Condition 13, AGL will have the following in place:

- 24 hour project telephone number
- Postal address
- Email address

AGL will make this information available to the public in accordance with the requirements of the Development Consent.

The process for the management of Complaints during the Construction Phase is set out in the First Solar *Complaints Management Protocol* (refer to **CEMP-P**).

First Solar are will work closely with AGL during the Construction Phase to ensure that all complaints are investigated and mitigated (as necessitated within the requirements of the Development Consent and relevant project approval documents) in a timely manner. Complaints Management is closely linked to the *Community Consultation Plan* (refer to **CEMP-R**) outlined in the above section.

Noise monitoring proposed during the Construction Phase of the Nyngan power station project is outlined in Section 5 of this report.

Additionally, First Solar has developed a *CEMP Auditing and Review Protocol* (refer to **CEMP-T**) to allow for amendments to be made to the CEMP (inclusive of the appendices). Where additional mitigation is identified or where mitigation measures are improved on site, these measures can be encapsulated within the CEMP via this Auditing and Review process.

## 6.4 Worker Environmental Awareness and Compliance Training

All Nyngan site personnel (including sub-contractors) will be required to undertaken *Worker Environmental Awareness and Compliance Training* (refer to **CEMP-S**).

As required by Mitigation Measure 26, site personnel will be advised of their responsibilities with respect to the minimisation of site construction noise.

The *Worker Environmental Awareness and Compliance Training* (refer to **CEMP-S**) will include measures to address the following:



- Condition B25
- Mitigation Measure 27
- Mitigation Measure 28
- Mitigation Measure 32
- Mitigation Measure 33
- Mitigation Measure 34

Information included within the worker environmental awareness and compliance training will include, but not be limited to, the following:

- Positioning plant and equipment on site in a position that provides the most acoustic shielding from buildings
- Information on the location of potentially noise-sensitive receptors
- The need to orientate plant items that emit noise in one direction, away from the location of potentially noise-sensitive receptors
- The need to avoid the operation of noisy equipment away from potentially noisesensitive receptors as far as practicable
- To undertake loading and unloading of equipment in locations away from potentially noise-sensitive areas as far as practicable
- Construction noise restrictions, including noise restrictions associated with works undertaken outside of standard construction hours (as required by Condition B23).

Targeted worker environmental and compliance training will be provided to truck drivers addressing the requirements of Mitigation Measure 36, specifically:

- Designated vehicle routes
- Parking locations
- Delivery hour restrictions (where applicable)
- Other relevant practices (e.g. use of engine brakes and engine idling)

Where practicable, First Solar will work with its haulage contractors ahead of their access to the site to make sure that drivers are aware of their responsibilities under Mitigation Measure 27.

## 7 Responsibilities

#### **Site Project Manager**

- Completion of Worker Environmental Awareness and Compliance Training
- Managing construction schedules to ensure compliance with noise requirements for construction works undertaken outside of standard work hours (Condition B23)



- Attendance at key stakeholder meetings (as requested by AGL) (refer to **CEMP-R** *Community Consultation Plan*)
- Attendance at community meetings (as requested by AGL) (refer to **CEMP-R** *Community Consultation Plan*)
- Providing AGL with project information requested in accordance with the Development Consent

#### Site Construction Manager

- Completion of Worker Environmental Awareness and Compliance Training
- Managing construction schedules to ensure compliance with noise requirements for construction works undertaken outside of standard work hours (Condition B23)
- Ensure mitigation measures outlined in the Construction Noise Management Plan are implemented as required.
- Advising the Project Manager and Site Environmental Advisor of upcoming activities that may require community consultation
- Managing construction noise and construction works in a manner to reduce noise generated
- Implement additional construction noise control measures where required
- Attendance at key stakeholder meetings (as requested by AGL) (refer to **CEMP-R** *Community Consultation Plan*)
- Attendance at community meetings (as requested by AGL) (refer to **CEMP-R** *Community Consultation Plan*)

#### Site Environmental Advisor

- Completion of Worker Environmental Awareness and Compliance Training
- Ensure mitigation measures outlined in the Construction Noise Management Plan are implemented as required.
- Undertake periodic noise measurements throughout the construction phase and record on **Form-L01**.
- Complaints Management in accordance with the responsibilities outlined in **CEMP-Q** *Incident Management Protocol*
- Attendance at key stakeholder meetings (as requested by AGL) (refer to **CEMP-R** *Community Consultation Plan*)
- Attendance at community meetings (as requested by AGL) (refer to **CEMP-R** *Community Consultation Plan*)



#### **Site Supervisors**

- Completion of Worker Environmental Awareness and Compliance Training
- Managing construction noise and construction works in a manner to reduce noise generated
- Ensuring that noise mitigation is in place prior to the commencement of noise generating activities
- Advising Construction Manager of noise generating activities ahead of the commencement of works

#### Site Personnel

- Completion of Worker Environmental Awareness and Compliance Training
- Manage noise generated from their work in a manner that reduces noise generated
- Ensuring that noise mitigation is in place prior to the commencement of noise generating activities
- Daily vehicle / machinery / plant inspections
- Advising Supervisors of noise generating activities ahead of the commencement of works

## 8 Records

- Noise measurements shall be recorded on **Form-L01** (attached)
- Noise complaints shall be recorded on Form Q02 (refer CEMP-Q Complaints Management *Protocol*)





## Form L01 – Noise Monitoring Record

| Date | Time | Location | Measured<br>Noise Level | Comply w | vith NML? |
|------|------|----------|-------------------------|----------|-----------|
|      |      |          | dBA                     | Yes      | No        |
|      |      |          |                         |          |           |
|      |      |          |                         |          |           |
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Nyngan Solar Plant Construction Noise Assessment

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Version: Revision 0

## Nyngan Solar Plant

### **Construction Noise Assessment**

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#### 1 INTRODUCTION

#### 1.1 The Nyngan Solar Plant Project

AGL Energy Limited (AGL) will construct and operate a nominal 102 megawatt photovoltaic (PV) Solar Plant (the Project) at Nyngan, central west NSW. The Project was developed in response to the Federal Government's Solar Flagship Program, which is part of the Australian Government's \$4.5 billion Clean Energy Initiative.

The Project includes arrays of solar modules and cabling, a substation, site office, maintenance building and car park, internal access roads and an approximate 3 km transmission line (132 kV) between the solar plant and electricity grid. The Project site is located approximately 10 km west of Nyngan on the northern side of the Barrier Highway. The local area is characterised by rural activities on large holdings.

An Environmental Impact Statement<sup>1</sup> (EIS) was prepared in 2012 to assess the potential environmental impacts of the Project. A noise assessment<sup>2</sup> was prepared for the EIS to assess potential noise impacts associated with the construction of the Project. The Project was conditionally approved by the Minister for Planning and Infrastructure in 2013.

First Solar has been appointed by AGL as the main Engineering, Procurement and Construction (EPC) contractor for the design, supply, construction and commissioning of the facility.

#### **1.2** Relevant Conditions of Approval

The following Ministers Conditions of Approval (MCoA) in the Development Consent<sup>3</sup> relate to noise from construction activities.

#### Condition B22

Construction activities associated with the development shall be undertaken during the following standard construction hours:

- a. 7:00 am to 6:00 pm Mondays to Fridays, inclusive.
- b. 8:00 am to 1:00 pm Saturdays; and
- c. At no time on Sundays or Public Holidays.

Except unless otherwise provided in condition B23.

#### Condition B23

Construction works outside of the standard construction hours identified in condition B22 may be undertaken in the following circumstances:

- a. Construction works that generate noise that is:
  - i. No more than 5 dB(A) above rating background level at any residence in accordance with the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009); and

<sup>&</sup>lt;sup>1</sup> NGH Environmental Nyngan Solar Plant Environmental Impact Statement, March 2013.

<sup>&</sup>lt;sup>2</sup> NGH Environmental Nyngan Solar Plant Noise Assessment, October 2012.

<sup>&</sup>lt;sup>3</sup> Development Consent 12/10541-2, Nyngan Solar Plant (Application Number SSD-5355).

- ii. No more than the noise management levels specified in Table 3 of the Interim Construction Noise Guideline (Department of Environment and Climate Change, 2009) at other sensitive receivers; or
- b. For the delivery of materials required outside those hours by the NSW Police Force or other authorities for safety reasons; or
- c. Where it is required in an emergency to avoid the loss of life, property and/ or to prevent environmental harm;
- d. Works as approved through the out-of-hours work protocol outlined in the Construction Noise Management Plan required under condition C3(d).

#### Condition B24

Any activities resulting in impulsive or tonal noise emission (such as rock breaking, rock hammering, pile driving) shall only be undertaken:

- a. Between the hours of 8:00 am to 5:00 pm Mondays to Fridays;
- b. Between the hours of 8:00 am to 1:00 pm Saturdays; and
- c. In continuous blocks not exceeding three hours each with a minimum respite from these activities and works of not less than one hour between each block.

#### Condition B25

The Applicant shall implement all reasonable and feasible measured to minimise noise generation from the construction of the development consistent with the requirement of the Interim Construction Noise Guideline (DECC, July 2009) including noise generated by heavy vehicle haulage and other construction traffic associated with the development.

#### 1.3 Objectives of This Assessment

To reduce construction timeframes First Solar propose to undertake construction works during the daytime (7:00 am to 6:00 pm) seven days a week. This represents an extension of the permitted standard construction hours in MCoA B22 and B24 and the Project would not implement respite periods for construction activities resulting in impulsive or tonal, noise emissions (MCoA B24, part c).

The proposed construction hours for the Project would be:

- Monday to Friday 7:00 am to 6:00 pm.
- Saturdays and Sundays 7:00 am to 6:00 pm
- No works on Public Holidays.

First Solar engaged SLR Consulting Australia Pty Ltd (SLR) to provide a revised assessment of construction noise impacts to reflect the current construction methodologies and the proposed hours of construction. The study was to assess compliance to the requirements of the MCoA and where necessary recommend appropriate management and mitigation measures to reduce noise levels and ameliorate potential noise impacts.

The assessment is solely for the construction of the Solar Plant and the access road, the transmission line has been excluded from this assessment as it will be not be constructed by First Solar.

#### 2 EXISTING NOISE ENVIRONMENT

#### 2.1 Noise Sensitive Receivers

The nearest noise sensitive receivers to the Project are all residential properties and have been presented in Figure 1 and summarised in Table 1.

| Sensitive Receiver |            | Nearest Distance to Proposed Construction Works, m |                  |  |  |
|--------------------|------------|--|------------------|--|--|
|                    |            | Solar Plant  | Site Access Road |  |  |
| 1                  | Tikkara    | 2,560  | 1,980            |  |  |
| 2                  | Rutherglen | 4,670  | 2,470            |  |  |
| 3                  | Redlands   | 3,280  | 2,510            |  |  |

#### Table 1 Nearest Noise Sensitive Receivers

#### 2.2 Baseline Noise Survey

A baseline survey of existing ambient noise levels at the noise sensitive receivers was undertaken on 16 and 17 May 2012 as part of the EIS noise assessment. The noise monitoring locations are shown in **Figure 1**.

The Rating Background Level (RBL) at each monitoring location in **Table 2** has been obtained by referencing the EIS noise assessment. The RBL for the monitoring duration is the median of the 90th percentile background (LA90) noise levels in each assessment period and represents the minimum repeatable background noise level measured at each location rather than the average background noise.

| Sei | nsitive Receiver | Rating Background Level 7:00 am to 6:00 pm, LA90(15minute) |
|-----|------------------|--|
| 1   | Tikkara          | 32   |
| 2   | Rutherglen       | 35   |
| 3   | Redlands         | 34   |

#### Table 2 Rating Background Level at the Noise Sensitive Receivers

The existing noise environment is influenced by noise from road traffic on the Barrier Highway, the Nyngan-Cobar Railway, farm vehicles and machinery and local fauna. In May 2012, the baseline noise survey at the nearest receiver locations did not identify any existing industrial noise.



Figure 1 Nearest Noise Sensitive Receivers

#### 3 NOISE ASSESSMENT CRITERIA

The Interim Construction Noise Guideline (ICNG), referenced in MCoA B23, requires Noise Management Levels (NMLs) to be established for noise affected receivers. In the event construction noise levels are predicted to be above the NMLs, all feasible and reasonable work practices are to be investigated to minimise noise emissions.

The guideline provides an approach for determining LAeq(15minute) NMLs using the RBL, the procedure has been summarised in **Table 3**. A highly noise affected NML of 75 dBA LAeq daytime is a trigger level indicating a strong community response to noise can be expected and additional mitigation may be required, such as respite periods and scheduling works to periods when the community is less sensitive to noise.

| Time of Day   | NML<br>LAeq(15minute)          | How to Apply  |  |
|---|--------------------------------|---|--|
| Standard hours<br>Monday to Friday  | Noise affected<br>RBL + 10 dBA | The noise affected level represents the point above which there may be some community reaction to noise.  |  |
| 7:00 am to 6:00 pm<br>Saturday<br>8:00 am to 1:00 pm<br>No work on Sundays or |                                | <ul> <li>Where the predicted or measured LAeq(15minute) is greater<br/>than the noise affected level, the proponent should applyall<br/>feasible and reasonable work practises to meet the noise<br/>affected level.</li> </ul> |  |
| publicholidays  |                                | • The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.   |  |
|   | Highly noise<br>affected       | The highly noise affected level represents the point above which there may be strong community reaction to noise.   |  |
|   | 75 dBA                         | Where noise is above this level, the relevant authority (consent determining or regulatory) may require respite periods by restructuring the hours that the very noisy activities can occur, taking into account:               |  |
|   |                                | <ul> <li>Times identified by the community when they are less<br/>sensitive to noise (such as before and after school for works<br/>near schools or mid-morning or mid-afternoon for works near<br/>residences.</li> </ul>      |  |
|   |                                | • If the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.  |  |
| Outside recommended standard hours  | Noise affected<br>RBL + 5 dBA  | <ul> <li>A strong justification would typically be required for works<br/>outside the recommended standard hours.</li> </ul>  |  |
|   |                                | • The proponent should apply all feasible and reasonable work practices to meet the noise affected level.   |  |
|   |                                | • Where all feasible and reasonable practises have been applied and noise is more than 5 dB above the noise affected level, the proponent should negotiate with the community.  |  |

| Table 3 | Determination of Nois | e Management Levels at | <b>Residential Receivers</b> |
|---------|-----------------------|------------------------|------------------------------|
|---------|-----------------------|------------------------|------------------------------|

#### 3.1 Noise Management Levels for Standard Construction Hours

Referencing the RBLs in **Table 2**, NMLs have been established at the nearest residential receivers for the standard hours of construction. These levels are presented in **Table 4**.

| Sei | nsitive Receiver | RBL | NML (RBL +10 dBA),<br>LAeq dBA | Highly Affected Noise<br>Level, LAeq dBA |
|-----|------------------|-----|--------------------------------|--|
| 1   | Tikkara          | 32  | 42                             | 75                                       |
| 2   | Rutherglen       | 35  | 45                             | 75                                       |
| 3   | Redlands         | 34  | 44                             | 75                                       |

#### Table 4 NMLs for Standard Hours of Construction

#### 3.2 Noise Management Levels for Works Outside the Standard Construction Hours

The adopted NMLs for construction works outside of the standard hours of construction are presented in **Table 5**. The NMLs in **Table 5** would apply during the following periods:

- 7:00 am to 8:00 am and 5:00pm to 6:00 pm Mondays to Fridays.
- 7:00 am to 8:00 am and 1:00 pm to 6:00 pm Saturdays.
- 7:00 am to 6:00 pm Sundays.

The installation of 132,000 steel posts is required for the construction of the solar plant. Each post will be installed using a post driver which hammers the post directly into the ground. This type of construction activity can generate impulsive noise characteristics. To assist in the management of potential disturbance issues, a NML specific for post installation works outside the standard construction hours has been derived as the RBL + 0 dBA. This approach requires LAeq construction noise levels to not be greater than the existing background noise level at the residential receivers. The conservative NMLs for post installation works are an alternative noise management approach to the restriction of construction work times as per MCoA B24.

In accordance with the ICNG, NMLs for all other construction works outside of the standard hours of construction have been established as the RBL + 5 dBA.

| Sensitive Receiver RBL dBA |            | RBL dBA | Post Installation Works<br>NML LAeq dBA (RBL + 0 dBA) | All Other Works<br>NML(RBL +5 dBA) |
|----------------------------|------------|---------|---|------------------------------------|
| 1                          | Tikkara    | 32      | 32  | 37                                 |
| 2                          | Rutherglen | 35      | 35  | 40                                 |
| 3                          | Redlands   | 34      | 34  | 39                                 |

 Table 5
 NMLs for Works Outside the Standard Hours of Construction

The NMLs in **Table 4** would apply for post installation construction works during the standard construction hours in MCoA B22.

#### 4 ASSESSMENT OF CONSTRUCTION NOISE LEVELS

#### 4.1 Analysis of Impulsive Noise From Post Installation

The operation of the post driver has the potential to generate noise emissions with an impulsive characteristic. A definition of impulsive noise has been referenced from the NSW Industrial Noise Policy<sup>4</sup>, which identifies noise to be impulsive:

If difference in A-weighted maximum noise levels between fast response and impulse response is greater than 2 dB.

<sup>&</sup>lt;sup>4</sup> NSW Environmental Protection Authority, 2000. NSW Industrial Noise Policy.

SLR undertook noise monitoring for post installation trial works in September 2013 to investigate noise emissions of the pile driver plant. The maximum A-weighted (LAmax) noise levels measured on the fast and impulse response settings are presented in **Table 6**.

| Measurement Distance | <b>Measured Maximum</b> | Noise Level, LAmax dBA | Difference Impulsive and |
|----------------------|-------------------------|------------------------|--------------------------|
| from Post Driver     | Fast Response           | Impulse Response       | - Fast Response          |
| 5                    | 111.4                   | 113.6                  | 2.2                      |
| 5                    | 110.0                   | 113.2                  | 3.2                      |
| 5                    | 106.2                   | 107.8                  | 1.6                      |
| 5                    | 106.3                   | 109.1                  | 2.8                      |
| 10                   | 104.6                   | 106.0                  | 1.5                      |
| 10                   | 96.6                    | 98.7                   | 2.2                      |
| 10                   | 96.7                    | 99.5                   | 2.7                      |
| 10                   | 92.8                    | 95.0                   | 2.2                      |
| 25                   | 73.4                    | 74.4                   | 1.1                      |
| 25                   | 74.3                    | 75.7                   | 1.4                      |
| 50                   | 62.9                    | 64.8                   | 1.8                      |
| 50                   | 68.5                    | 70.5                   | 2.0                      |
| 100                  | 65.6                    | 69.0                   | 3.4                      |
| 200                  | 60.8                    | 62.3                   | 1.6                      |
| 200                  | 51.5                    | 65.6                   | 14.1                     |
| 200                  | 47.7                    | 51.9                   | 4.2                      |

Note: Measured noise levels include the influence of a steel mesh fence with acoustic barrier material to attenuate noise emissions.

Based on the measured noise levels post driver noise emissions are generally not impulsive greater than 25 m from the post driver. At 100 m and 200 m from the post driver the measured noise levels were influenced by ambient noise at the monitoring location as such any difference in impulsive and fast response noise levels of >2 dB is not solely a result of post driver noise emissions.

The nearest noise sensitive residential receivers are at least 2,560 m from the Solar Plant and associated post installation locations. The operation of the post driver is not expected to result in impulsive noise at these receivers; consequently no adjustment for impulsive noise characteristics has been applied to the post driver source noise levels or the predicted noise levels for post installation works.

#### 4.2 Assessed Construction Activities

The assessed stages of construction are provided in **Table 7** along with source sound power levels (SWL) for each item of construction plant and equipment. In September 2013 SLR measured post driver noise emissions with and without acoustic fencing noise mitigation to derive the adopted SWLs of 116 dBA LAeq (**Appendix B**) and 124 dBA LAmax (**Table 6**).
| Stages of Construction |                       | Construction Plant and                         | No. of Plant | Individual SWL dBA |       |  |
|------------------------|-----------------------|--|--------------|--------------------|-------|--|
|                        |                       | Equipment                                      | Assessed     | LAeq               | LAmax |  |
| 1                      | Solar Farm site       | Trencher <sup>1</sup>                          | 1            | 105                | 113   |  |
|                        | preparation           | Grader <sup>2</sup>                            | 1            | 110                | 118   |  |
|                        |                       | Front End Loader <sup>2</sup>                  | 1            | 106                | 114   |  |
| 2                      | Postinstallation      | Post driver with acoustic fencing <sup>3</sup> | 3            | 116                | 124   |  |
| 3                      | Installation of solar | Pneumatic wrench & compressor <sup>1</sup>     | 1            | 102                | 105   |  |
|                        | plant                 | Generator <sup>1</sup>                         | 1            | 79                 | 80    |  |
|                        |                       | Mobile Crane <sup>2</sup>                      | 1            | 97                 | 100   |  |
|                        |                       | Front End Loader <sup>2</sup>                  | 1            | 106                | 114   |  |
| 4                      | Main Access Road      | Excavator <sup>2</sup>                         | 1            | 103                | 111   |  |
|                        | Preparation of road   | Vibratory Roller <sup>2</sup>                  | 1            | 102                | 110   |  |
|                        |                       | Dump Truck <sup>2</sup>                        | 1            | 104                | 112   |  |
| 5                      | Main Access Road      | Asphaltpaver <sup>2</sup>                      | 1            | 106                | 114   |  |
|                        | Pavementsurfacing     | Compactor <sup>2</sup>                         | 1            | 106                | 114   |  |
|                        |                       | Dump Truck <sup>2</sup>                        | 1            | 104                | 112   |  |

#### Table 7 Assessed Construction Works and Source Noise Levels

Note 1 Source: Supplied by First Solar, from measurements of construction noise from previous solar farm projects.

Note 2 Source: SLR noise source database.

Note 3 Source: Post driver noise levels measured by SLR in September 2013 where the post driver noise was mitigated by 10 dBA LAeq with fencing lined with absorptive acoustic material.

### 4.3 **Predicted Construction Noise Levels**

Potential construction noise levels were predicted at the assessed receivers utilising a site-specific noise model developed with the SoundPLAN noise propagation software. The proposed construction work locations, receiver buildings and ground terrain were digitised in the noise model.

Applying the CONCAWE calculation algorithms the model predicted noise levels at the nearest receivers accounting for the distance between the noise sources and the receiver and potential attenuation from the absorption of sound by the intervening soft ground and air.

The following assumptions were included in the prediction of construction noise levels:

- Noise sources were modelled as point noise sources located at the nearest work location to the assessed receivers; the south western corner of the Solar Plant and where the access road was immediately adjacent to Receiver 1 Tikkara and Receiver 3 Redlands.
- For each stage of construction works all noise sources were modelled within a 200m<sup>2</sup> work area.
- Post driver noise emissions were modelled with the inclusion of acoustic fencing all other construction plant was modelled without noise mitigation.
- For each construction stage, all plant and equipment in **Table 7** was modelled in simultaneous operation to predict worst case noise levels. This is a conservative assessment approach to identify all potential requirements for noise management and mitigation. Reduction in noise levels would occur where less plant is in simultaneous operation.

The predicted construction noise levels at the nearest residential receivers are summarised in Table 8.

| Stages of Construction |  | s of Construction Predicted Noise Levels,<br>dBA |             |                   | NML Compliance               |            |  |
|------------------------|--|--|-------------|-------------------|------------------------------|------------|--|
|                        |  | LAmax  | LAeq(15min) | Standard<br>Hours | Outsid<br>Hours <sup>1</sup> | e Standard |  |
| Receiver 1 Tikkara     |  |  | LAeq NMLs   | 42                | 37                           | 32         |  |
| 1                      | Solar Farm site Preparation works      | 26   | 18          | Yes               | Yes                          | -          |  |
| 2                      | Solar Farm post installation           | 33   | 25          | Yes               | -                            | Yes        |  |
| 3                      | Solar Farm Installation of solar plant | 20   | 13          | Yes               | Yes                          | -          |  |
| 4                      | Main Access Road Preparation works     | 28   | 17          | Yes               | Yes                          | -          |  |
| 5                      | Main Access Road Pavement surfacing    | 26   | 18          | Yes               | Yes                          | -          |  |
| Rec                    | ceiver 2 Rutherglen                    |  | LAeq NMLs   | 45                | 40                           | 35         |  |
| 1                      | Solar Farm site Preparation works      | 15   | 7           | Yes               | Yes                          | -          |  |
| 2                      | Solar Farm Post installation           | 23   | 15          | Yes               | -                            | Yes        |  |
| 3                      | Solar Farm Installation of solar plant | 9  | 2           | Yes               | Yes                          | -          |  |
| 4                      | Main Access Road Preparation works     | 24   | 13          | Yes               | Yes                          | -          |  |
| 5                      | Main Access Road Pavement surfacing    | 16   | 13          | Yes               | Yes                          | -          |  |
| Rec                    | ceiver 3 Redlands                      |  | LAeq NMLs   | 44                | 39                           | 34         |  |
| 1                      | Solar Farm site Preparation works      | 20   | 13          | Yes               | Yes                          | -          |  |
| 2                      | Solar Farm Post installation           | 29   | 22          | Yes               | -                            | Yes        |  |
| 3                      | Solar Farm Installation of solar plant | 15   | 8           | Yes               | Yes                          | -          |  |
| 4                      | Main Access Road Preparation works     | 21   | 13          | Yes               | Yes                          | -          |  |
| 5                      | Main Access Road Pavement surfacing    | 23   | 15          | Yes               | Yes                          | -          |  |

#### Table 8 Predicted Construction Noise Levels

Note: Outside of standard construction hours more conservative NML are proposed for post driver construction works.

#### 4.3.1 Summary of Construction Noise Impacts

At the assessed receivers the predicted noise levels for all construction works during standard hours of construction and outside the standard hours of construction are well within the NMLs and, as required by MCoA B23, comply with the ICNG.

The predicted noise levels of up to 25 dBA LAeq for the post installation works are below the existing daytime background noise levels of 32 to 35 dBA LA90. Consequently, post installation noise may not be clearly audible above the existing ambient noise at all receivers; reducing the potential for subjective annoyance from impulsive noise characteristics.

#### 4.3.2 Post Installation Noise Levels

The predicted noise levels in **Table 8** demonstrate that, with the exception of post installation works, the construction stages would not require noise mitigation to achieve the NMLs. Noise levels have been predicted with and without the acoustic fencing to identify setback distances required for compliance with the noise criteria at the most sensitive receivers. This is shown in **Figure 2**.

Noise levels have been predicted for one, two and three post drivers in operation and noise levels have been assessed to the most conservative NMLs of 42 dBA LAeq standard hours of construction and 32 dBA LAeq during outside of standard hours of construction.

Based on the existing noise environment the predicted noise levels of up to 33 dBA LAmax at the nearest receivers are not expected to be considered disturbing. All predicted noise levels are within the highly noise affected trigger (75 dBA LAeq) which typically is used to identify where respite periods may be required for daytime works.



### Figure 2 Predicted Post Driver Noise Levels



Based on the predicted noise levels in **Figure 2**, the post driver operations would comply with the 42 dBA LAeq NML for standard hours of construction where receivers are located at least:

- 1,800 m from 3 post drivers in operation (unmitigated).
- 1,600 m from 2 post drivers in operation (unmitigated).
- 1,200 m from nearest receivers with 1 post driver in operation (unmitigated).
- 700 m from nearest receivers with 3 post drivers in operation (mitigated).
- 600 m from nearest receivers with 2 post drivers in operation (mitigated).
- 450 m from nearest receivers with 1 post driver in operation (mitigated).

The nearest residential receivers are located at least 2,560 m from the Solar Plant site and associated post installation locations. As such noise levels from all post installation works at the site are expected to comply with the NMLs for standard hours of construction without the requirement for noise mitigation.

Where post installation works are required outside the standard hours of construction, the predicted noise levels would comply with the 32 dBA LAeq NML where receivers are at least:

• 3,000 m from 3 post drivers in operation (unmitigated).

- 2,800 m from 2 post drivers in operation (unmitigated).
- 2,400 m from nearest receivers with 1 post driver in operation (unmitigated).
- 1,850 m from nearest receivers with 3 post drivers in operation (mitigated).
- 1,550 m from nearest receivers with 2 post drivers in operation (mitigated).
- 1,200 m from nearest receivers with 1 post drivers in operation (mitigated).

Dependent upon the number of post drivers in simultaneous operation, noise mitigation is likely to be required where post installation works are undertaken 2,400 m to 3,000 m from the nearest residential receivers. Where noise emissions are mitigated predicted noise levels at the nearest receivers comply with NMLs for post installation works outside of the standard hours of construction.

### 5 **RECOMMENDATIONS**

Based on the predicted compliance to the NMLs it is considered feasible for the construction hours to be 7:00 am to 6:00 pm Mondays to Sundays (no works public holidays). The predicted noise levels are below the existing ambient noise environment at nearest receivers at least 2.5 km from the construction work areas. Consequently, the restricted hours of operation and respite periods potentially required by MCoA B24 would not be necessary to mitigate subjective impulsive noise impacts.

Noise impacts from the construction of the Solar Plant and access road will be managed through the Project's Construction Environmental Management Plan (CEMP). The following are to be included in the CEMP as addition noise mitigation and noise management measures:

• For the post installation works outside of the standard construction hours, noise mitigation such as acoustic fencing is to be implemented where post driver works are required within 2,400 m to 3,000 m of nearest receivers.

The recommended acoustic fencing is to be installed not more than 10 m from the post drivers and be a minimum height of 2 m. The acoustic fencing must fully impede line of sight to the post drivers and be constructed to avoid any air gaps or openings. Based on SLR's in-field measurement of post driver operations (**Appendix B**), a 10 dBA LAeq attenuation of post driver noise levels is achievable where fencing is lined with acoustic material that has a weighted sound transmission loss of at least Rw 20.

Due to the mobile nature of the post driver operations it is recommended the fencing is of sufficient length to enclose a full day of post installation works to minimise the requirement to continually move the fencing in line with the equipment.

It may not be practical to continually install and relocated the acoustic fencing (noise mitigation) during the mobile post installation works. It may not be feasible to install noise mitigation to ameliorate noise levels at the three potentially affected receivers which are located greater than 1 km away from each other. Furthermore construction noise is not expected to impact all three receivers at the same time.

Where acoustic fencing is determined to not be feasible, reasonable or practical it is recommended that First Solar arrange a negotiated agreement with the three potentially affected landowners. The agreement would include compensatory measures to be provided by First Solar where post installation works are undertaken outside of the standard hours of construction and received noise levels are expected to exceed the NMLs in **Table 5** of this report. Compensation measures could include financial payments, pre-purchased movie tickets or similar beneficial offers.

The negotiated agreement would be implemented instead of measures to mitigated noise emissions and by entering into the negotiated agreement the landowner is confirming they would be accepting of construction noise during works outside of standard construction hours.

- The negotiated agreement would be documented in the out-of-hours work protocol required as per MCoA B23 (d).
- Construction noise levels will be measured at the nearest assessed receivers at the commencement of works and periodically throughout the construction program to verify the predicted noise levels in this assessment and confirm compliance to the ICNG. As a minimum, the noise monitoring should be undertaken during the more sensitive periods of 6:00 am to 8:00 am Mondays to Sundays when background noise levels are likely to be lowest.
- First Solar will investigate all noise related complaints and where noise levels exceed the NMLs and result in unacceptable noise amenity, additional noise management and mitigation measures to achieve the NMLs will be investigated and, where feasible, implemented in full.

Note that, with the exception of the post installation works outside of the standard construction hours, noise mitigation is not required to control noise emissions from all other plant and equipment in **Table 7**.

### 6 CONCLUSION

The assessment of potential noise from the construction of the solar plant and access road has determined that predicted noise levels would comply with the requirements of MCoA B23 at all nearest residential receivers during standard hours of construction and works outside the standard hours.

It is feasible to extend the standard construction hours for all construction works to 7:00 am to 6:00 pm Mondays to Sundays, and comply with the NMLs and the ICNG. Restricted hours of work and respite periods for post installation are not necessary to minimise potential impulsive noise impacts. All construction noise will be appropriate managed and controlled in accordance with the MCoA B23, MCoA B25 and the Projects CEMP.

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#### Acoustic Terminology

### 1 Sound Level or Noise Level

The terms 'sound' and 'noise' are almost interchangeable, except that in common usage 'noise' is often used to refer to unwanted sound.

Sound (or noise) consists of minute fluctuations in atmospheric pressure capable of evoking the sense of hearing. The human ear responds to changes in sound pressure over a very wide range. The loudest sound pressure to which the human ear responds is ten million times greater than the softest. The decibel (abbreviated as dB) scale reduces this ratio to a more manageable size by the use of logarithms.

The symbols SPL, L or LP are commonly used to represent Sound Pressure Level. The symbol LA represents A-weighted Sound Pressure Level. The standard reference unit for Sound Pressure Levels expressed in decibels is  $2 \times 10^{-5}$  Pa.

#### 2 'A' Weighted Sound Pressure Level

The overall level of a sound is usually expressed in terms of dBA, which is measured using a sound level meter with an 'A-weighting' filter. This is an electronic filter having a frequency response corresponding approximately to that of human hearing.

People's hearing is most sensitive to sounds at mid frequencies (500 Hz to 4000 Hz), and less sensitive at lower and higher frequencies. Thus, the level of a sound in dBA is a good measure of the loudness of that sound. Different sources having the same dBA level generally sound about equally loud.

A change of 1 dBA or 2 dBA in the level of a sound is difficult for most people to detect, whilst a 3 dBA to 5 dBA change corresponds to a small but noticeable change in loudness. A 10 dBA change corresponds to an approximate doubling or halving in loudness. The table below lists examples of typical noise levels

| Sound<br>Pressure Level<br>(dBA) | Typical<br>Source                             | Subjective<br>Evaluation |  |
|----------------------------------|---|--------------------------|--|
| 130                              | Threshold of pain                             | Intolerable              |  |
| 120                              | Heavy rock concert                            | Extremely noisy          |  |
| 110                              | Grinding on steel                             | _                        |  |
| 100                              | Loud car horn at 3 m                          | Very noisy               |  |
| 90                               | Construction site with<br>pneumatic hammering |                          |  |
| 80                               | Kerbside of busy street                       | Loud                     |  |
| 70                               | Loud radio or television                      |                          |  |
| 60                               | Department store                              | Moderate to quiet        |  |
| 50                               | General Office                                |                          |  |
| 40                               | Inside private office                         | Quiet to very quiet      |  |
| 30                               | Inside bedroom                                |                          |  |
| 20                               | Recording studio                              | Almost silent            |  |

Other weightings (eg B, C and D) are less commonly used than A-weighting. Sound Levels measured without any weighting are referred to as 'linear', and the units are expressed as dB(lin) or dB.

#### 3 Sound Power Level

The Sound Power of a source is the rate at which it emits acoustic energy. As with Sound Pressure Levels, Sound Power Levels are expressed in decibel units (dB or dBA), but may be identified by the symbols SWL or Lw, or by the reference unit 10<sup>-12</sup> W.

The relationship between Sound Power and Sound Pressure may be likened to an electric radiator, which is characterised by a power rating, but has an effect on the surrounding environment that can be measured in terms of a different parameter, temperature.

#### 4 Statistical Noise Levels

Sounds that vary in level over time, such as road traffic noise and most community noise, are commonly described in terms of the statistical exceedance levels LAN, where LAN is the A-weighted sound pressure level exceeded for N% of a given measurement period. For example, the LA1 is the noise level exceeded for 1% of the time, LA10 the noise exceeded for 10% of the time, and so on.

The following figure presents a hypothetical 15 minute noise survey, illustrating various common statistical indices of interest.



Of particular relevance, are:

- LA1 The noise level exceeded for 1% of the 15 minute interval.
- LA10 The noise level exceed for 10% of the 15 minute interval. This is commonly referred to as the average maximum noise level.
- LA90 The noise level exceeded for 90% of the sample period. This noise level is described as the average minimum background sound level (in the absence of the source under consideration), or simply the background level.
- LAeq The A-weighted equivalent noise level (basically the average noise level). It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.
- LAmax The maximum A-weighted noise level measured during the specified measurement period.

When dealing with numerous days of statistical noise data, it is sometimes necessary to define the typical noise levels at a given monitoring location for a particular time of day. A standardised method is available for determining these representative levels.

This method produces a level representing the 'repeatable minimum' LA90 noise level over the daytime and night-time measurement periods, as required by the EPA. In addition the method produces mean or 'average' levels representative of the other descriptors (LAeq, LA10, etc).

#### 5 Tonality

Tonal noise contains one or more prominent tones (ie distinct frequency components), and is normally regarded as more offensive than 'broad band' noise.

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#### 6 Impulsiveness

An impulsive noise is characterised by one or more short sharp peaks in the time domain, such as occurs during hammering.

#### 7 Frequency Analysis

Frequency analysis is the process used to examine the tones (or frequency components) which make up the overall noise or vibration signal. This analysis was traditionally carried out using analogue electronic filters, but is now normally carried out using Fast Fourier Transform (FFT) analysers.

The units for frequency are Hertz (Hz), which represent the number of cycles per second.

Frequency analysis can be in:

- Octave bands (where the centre frequency and width of each band is double the previous band)
- 1/3 octave bands (3 bands in each octave band)
- Narrow band (where the spectrum is divided into 400 or more bands of equal width)

The following figure shows a 1/3 octave band frequency analysis where the noise is dominated by the 200 Hz band. Note that the indicated level of each individual band is less than the overall level, which is the logarithmic sum of the bands.



#### 8 Vibration

Vibration may be defined as cyclic or transient motion. This motion can be measured in terms of its displacement, velocity or acceleration. Most assessments of human response to vibration or the risk of damage to buildings use measurements of vibration velocity. These may be expressed in terms of 'peak' velocity or 'rms' velocity.

The former is the maximum instantaneous velocity, without any averaging, and is sometimes referred to as 'peak particle velocity', or PPV. The latter incorporates 'root mean squared' averaging over some defined time period.

Vibration measurements may be carried out in a single axis or alternatively as triaxial measurements. Where triaxial measurements are used, the axes are commonly designated vertical, longitudinal (aligned toward the source) and transverse.

The common units for velocity are millimetres per second (mm/s). As with noise, decibel units can also be used, in which case the reference level should always be stated. A vibration level V, expressed in mm/s can be converted to decibels by the formula 20 log (V/V<sub>0</sub>), where V<sub>0</sub> is the reference level ( $10^{-9}$  m/s). Care is required in this regard, as other reference levels may be used by some organizations.

### Acoustic Terminology

#### 9 Human Perception of Vibration

People are able to 'feel' vibration at levels lower than those required to cause even superficial damage to the most susceptible classes of building (even though they may not be disturbed by the motion). An individual's perception of motion or response to vibration depends very strongly on previous experience and expectations, and on other connotations associated with the perceived source of the vibration. For example, the vibration that a person responds to as 'normal' in a car, bus or train is considerably higher than what is perceived as 'normal' in a shop, office or dwelling.

#### 10 Over-Pressure

The term 'over-pressure' is used to describe the air pressure pulse emitted during blasting or similar events. The peak level of an event is normally measured using a microphone in the same manner as linear noise (ie unweighted), at frequencies both in and below the audible range.

#### 11 Ground-borne Noise, Structure-borne Noise and Regenerated Noise

Noise that propagates through a structure as vibration and is radiated by vibrating wall and floor surfaces is termed 'structure-borne noise', 'ground-borne noise' or 'regenerated noise'. This noise originates as vibration and propagates between the source and receiver through the ground and/or building structural elements, rather than through the air.

Typical sources of ground-borne or structure-borne noise include tunnelling works, underground railways, excavation plant (eg rockbreakers), and building services plant (eg fans, compressors and generators).

The following figure presents the various paths by which vibration and ground-borne noise may be transmitted between a source and receiver for construction activities occurring within a tunnel.



The term 'regenerated noise' is also used in other instances where energy is converted to noise away from the primary source. One example would be a fan blowing air through a discharge grill. The fan is the energy source and primary noise source. Additional noise may be created by the aerodynamic effect of the discharge grill in the airstream. This secondary noise is referred to as regenerated noise

Post Pounder Noise Testing

In September 2013, SLR conducted noise monitoring trials for post driver operation. Measured noise levels with and without acoustic mitigation are provided below. The noise mitigation consisted of steel mesh fencing with an acoustic barrier material extending 2 m in height and located 10 m from the post driver.

Noise measurements were made at the locations in Figure 1.

#### Figure 1 Noise Monitoring Locations



### Appendix **B**

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Post Pounder Noise Testing

| Location | Post Drivers In Operation     | Distance to Post Driver, m | Measured SPL, dBA LAeq |
|----------|-------------------------------|----------------------------|------------------------|
| 1        | 1                             | 5                          | 106                    |
| 1        | 1                             | 5                          | 105                    |
| 2        | 1                             | 5                          | 102                    |
| 2        | 1                             | 5                          | 102                    |
| 3        | 3 1 5                         |                            | 103                    |
| 3        | 1                             | 5                          | 102                    |
| 4        | 1                             | 5                          | 94                     |
| 4        | 1                             | 5                          | 93                     |
| 1        | 2                             | 5                          | 103                    |
|          | Average SPL LAeq at 5 m indiv | idual post driver          | 101                    |
|          | Maximum SPL LAeq at 5 m ind   | ividual post driver        | 106                    |
| 5        | 1                             | 10                         | 98                     |
| 6        | 1                             | 10                         | 93                     |
| 7        | 1                             | 10                         | 94                     |
| 8        | 1                             | 10                         | 88                     |
|          | Average SPL LAeq at 10 m ind  | ividual post driver        | 91                     |
|          | Maximum SPL LAeg at 10 m in   | dividual post driver       | 98                     |

### Table 1 Sound Pressure Levels Post Driver Operation – No Mitigation

Note: SPL = Sound Pressure Level.

#### Table 2 Sound Pressure Levels Single Post Driver Operation – Unnamed Absorptive Material

| Location | Distance Location to Fence | Distance Post Driver to Fence | Measured SPL, dBA LAeq |
|----------|----------------------------|-------------------------------|------------------------|
| 9        | 10                         | 10                            | 77                     |
| 10       | 25                         | 11                            | 69                     |
| 11       | 50                         | 12                            | 59                     |
| 12       | 100                        | 13                            | 51                     |
| 13       | 200                        | 14                            | 45                     |

Note: SPL = Sound Pressure Level.

#### Table 3 Sound Pressure Levels Post Driver Operation – 'Flex-shield' Fixed to Fencing

| Location | Distance Location to Fence | Distance Post Driver to Fence | Measured SPL, dBA LAeq |
|----------|----------------------------|-------------------------------|------------------------|
| 9        | 10                         | 10                            | 76                     |
| 10       | 25                         | 11                            | 71                     |
| 11       | 50                         | 12                            | 61                     |
| 12       | 100                        | 13                            | 52                     |
| 13       | 200                        | 14                            | 45                     |

Note: SPL = Sound Pressure Level.

#### Table 4 Estimated Sound Attenuation

| Sound Pressure Level         | SPL dBA LAeq                  |                     |                          |             |                          |  |  |
|------------------------------|-------------------------------|---------------------|--------------------------|-------------|--------------------------|--|--|
|                              | No Mitigation<br>(Location 6) | Unnamed<br>Material | Estimated<br>Attenuation | Flex-Shield | Estimated<br>Attenuation |  |  |
| Measured/Derived SPL at 10 m | 92                            | 82                  | 10                       | 81          | 11                       |  |  |

Appendix B Report 620.10874 Page 3 of 4 Post Pounder Noise Testing

### Site Photographs

Post driver in operation



Post driver 10m behind Fence Covered with Acoustic Absorptive Sheeting



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Post Pounder Noise Testing



Post driver 10m behind Fence Covered with Flex Shield

| Nyngan Power Plant - Construction |  | Construction | Activities  |           |                   |            |              | Fi             | irst Solar    |
|-----------------------------------|--|--------------|-------------|-----------|-------------------|------------|--------------|----------------|---------------|
| Activity ID                       | Activity Name                            | Sta          | ırt         | Finish    |                   | A S        | O N          |                |               |
| Total                             |  | 12-          | Apr-14      | 06-Mar-15 |                   |            |              |                |               |
| AC Ca                             | bles                                     | 12-          | Apr-14      | 25-Jul-14 |                   | 25-Jul-14, | AC Cable     | s              |               |
| DC Ca                             | ibles                                    | 12-          | Apr-14      | 25-Jul-14 |                   | 25-Jul-14, | DC Cable     | s              |               |
| Posts                             |  | 18-          | Apr-14      | 11-Oct-14 |                   |            | ▼ 11-Oct     | 14, Posts      |               |
| Tilt Br                           | acket                                    | 02-          | May-14      | 25-Oct-14 |                   |            | <b>25-</b> C | oct-14, Tilt B | racket        |
| Tables                            | •  | 15-          | May-14      | 07-Nov-14 |                   |            | 07           | -Nov-14, Ta    | lbles         |
| Harne                             | SS                                       | 29-          | May-14      | 21-Nov-14 | •                 |            |              | 21-Nov-14,     | Harness       |
| Modu                              | es                                       | 12-          | Jun-14      | 27-Feb-15 |                   |            |              |                | 🔫 27-Fel      |
| Modu                              | es Terminate                             | 26-          | Jun-14      | 06-Mar-15 |                   |            |              |                | <b>—</b> 06-M |
| Comb                              | iner Box                                 | 10-          | Jun-14      | 25-Sep-14 |                   | <b>—</b>   | 25-\$ep-1    | 4, Combiner    | Box           |
| Power                             | Control System                           | 04-          | Jul-14      | 18-Nov-14 |                   |            |              | 8-Nov-14, I    | Power Cont    |
|                                   |  |              |             |           |                   |            |              |                |               |
| Remainin                          | ng Level of Effort Critical Remaining Wo | prk          | Page 1 of 1 | Current   | t Date: 02-Feb-14 |            |              |                |               |
| Remainin                          | ng Work Summary                          |              |             |           |                   |            |              |                |               |



# CEMP-M Bushfire Management Plan Nyngan Solar PV Power Station





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### **Document Control**

| Doc<br>Rev | Date     | Reason                                      | Issued by   | Review             |          | Review            |                          |
|------------|----------|---|-------------|--------------------|----------|-------------------|--------------------------|
| А          |          | Issued for FS review                        | Geolyse     |                    |          |                   |                          |
| В          | 10/09/13 | Issued for Rural Fire<br>Service review     | First Solar | Greg<br>Sim        | 29/11/13 | SF                | 07/11/13                 |
| С          | 07/11/13 | Issued for AGL and<br>Project ER review     | First Solar | Michael<br>Woolley | 18/11/13 | SF<br><br>Michael | 02/12/13<br><br>02/12/13 |
|            |          |   |             |                    |          | Woolley           |                          |
| D          | 04/12/13 | Issued as Final                             | First Solar | DPI                | 15/01/14 | SF                | 22/01/13                 |
| E          | 22/01/14 | Final Reissued to<br>address DPI<br>Comment |             |                    |          |                   |                          |

Cited Cross References within Document:

- 1. Appendix CEMP-Q Incident Management Protocol
- 2. Appendix CEMP-S Worker Environmental Awareness Training
- 3. Appendix CEMP-U Waste Management Plan



## 1 Purpose

This Bush Fire Management Plan for the Nyngan Solar PV Power Station has been prepared to meet applicable requirements of:

- Development Consent (SSD-5355)
  - Condition B3
  - Condition B4
- Nyngan Solar Plan Submissions Report (NGH Environmental, June 2013)
  - Mitigation Measure 58

## 2 Scope

### 2.1 Overview

As required by the Development Consent (SSD-5355) for the Nyngan Solar PV Power Station, First Solar (Australia) Pty Ltd (First Solar) has developed the following Bush Fire Management Plan for the development as it relates to the activities of First Solar. Specifically this Bush Fire Management Plan relates to the Construction Phase of the power station and associated power station access tracks.

The overall approach First Solar will adopt in relation to bush fire is as follows:

- Avoidance and control of potential ignition risks in accordance with the *Bushfire Management Plan*
- Extinguishment of fires where practicable and safe to do so using onsite fire extinguishers
- Safe evacuation from site in the event of a fire
- Dial 000 in the event of uncontrolled fire
- Reliance on the NSW Rural Fire Service (RFS) to manage any uncontrolled fires on site

The First Solar *Bush Fire Management Plan* should be read in conjunction with the First Solar *Emergency Response Plan*.

A second CEMP is being prepared for the power station's grid connection by a separate contractor. The grid connection for the Nyngan Solar PV Power Station is not under the mandate of First Solar (Australia) Pty Ltd (First Solar) and is therefore not included within the following document. Please refer to the separate grid connection / transmission line CEMP for information specific to the grid connection construction works.



### 2.2 Objectives of the Bush Fire Management Plan

The objectives of this Bush Fire Management Plan are to:

- Define appropriate measures and processes to minimise bushfire related risks during the construction of the Nyngan Solar PV Power Station.
- Confirm the intent to continue to engage with the Rural Fire Service (RFS) in the implementation of this Management Plan as the Nyngan Solar PV Power Station construction schedule progresses.
- Provide a monitoring, auditing and reporting framework to ensure the effectiveness of the bush fire controls implemented.

### 2.3 Nyngan Solar PV Power Station Development

The Nyngan Solar PV Power Station will consist of a 102MW solar PV power station located approximately 10km west of Nyngan. The solar plant will occupy approximately 300 hectares of land to the north of the Barrier Highway.

First Solar (Australia) Pty Ltd have been engaged by AGL to provide engineering, procurement and construction (EPC) services. The Nyngan Solar PV Power Station will utilise First Solar's advanced cadmium telluride (CdTe) thin film photovoltaic modules. The solar modules generate electricity with no air emissions, no waste production, no water use and have one of the smallest carbon footprints of any current PV technology. Over 7,000MW of First Solar PV modules have been installed worldwide, including at many of the world's largest solar PV plants, since beginning commercial production in 2002. First Solar has been actively involved in the Australian market since mid-2008.

The construction of the Nyngan Solar PV Power Station project is expected to commence in early 2014 and will take approximately 18 months to complete. Once constructed the Nyngan Solar PV Power Station will generate an estimated 233,000 megawatt hours (MWh) of electricity annually.

### 2.4 Relevant Approval Provisions

The approval provisions for the Nyngan Solar PV Power Station relevant to the Bush Fire Management Plan are as follows:

Condition B3 of the Nyngan Development Consent states:

B3. The applicant shall ensure that all development components on site are designed, constructed and operated to minimise ignition risks, provide for asset protection consistent with relevant NSW Rural Fire Service (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.

Condition B4 of the Development Consent states:

B4. Throughout the operational life of the development, the Applicant shall regularly consult with the local RFS to ensure its familiarity with the development, including the construction timetable and the final location of all infrastructures on the site. The Applicant shall comply with any reasonable request of the local RFS to reduce the risks of bushfire and to enable fast access in emergencies.

### Mitigation Measure 58 states:

- 58 Develop a Bush Fire Management Plan with input from the RFS to include but no be limited to:
  - Management of activities with a risk of fire ignition.
  - Management of fuel loads onsite.
  - Storage and maintenance of fire fighting equipment, including siting and provision of adequate water supplies for bush fire suppression.
  - The below requirements of Planning for Bush Fire Protection 2006
    - Identifying asset protection zones.
    - Providing adequate egress/access to the site (s4.1.3).
    - *– Emergency evacuation procedures (s4.2.7).*
  - Operational procedures relating to mitigation and suppression of bush fire relevant to the solar plant.
  - Post-fire clean up procedures, including the need for sampling for emissions of cadmium and lead, where appropriate.

### 2.5 EIS Context

### 2.5.1 Overview

The local bush fire season in the Nyngan area generally occurs annually between October and March. The predominate weather conditions through the fire season are north-westerly winds with high daytime temperatures and low relative humidity.

The North West Bush Fire Risk Management Plan identifies that the main ignition sources for bush fires include electrical storms, lightening, ignition from farming and arson.

The nearest Rural Fire Service (RFS) Station is located in Nyngan township (65 Cobar Street) approximately 10km from the site.



### 2.5.2 Construction Phase Bush Fire Risk

As defined in Section 7.7.2 of the EIS, activities associated with project construction that may cause or increase the risk of bush fire include:

- Smoking and careless disposal of cigarettes on site
- Site maintenance activities such as mowing, slashing and using other petrol powered tools
- Welding and soldering activities
- Operating a petrol, LPG or diesel powered motor vehicle over land containing combustible material
- Operating plant fitted with power hydraulics on land containing combustible material.

Considering the sparse vegetation cover over the power station construction site, it is considered unlikely that project would pose a significant bush fire risk. Site access will be formalised at the beginning of the construction stage during civil works, which will increase the ability of the RFS to access and suppress any fire onsite or on adjoining sites.

### 2.6 Risk Controls

The following table identifies risk controls for each of the Construction Risk bush fire risks identified in Section 2.5.2.

| Risk:   | Control   |
|---|---|
| Smoking and careless disposal of cigarettes on site   | Designated smoking areas  |
|   | Worker Environmental Awareness and Compliance Training ( <b>CEMP-S</b> )  |
| Site maintenance activities such as mowing, slashing and using other petrol powered tools         | Not anticipated to be required during the Construction Phase.   |
| Welding and soldering activities  | Welding and soldering activities to be<br>undertaken away from possible fuel loads, e.g.<br>vegetative and waste  |
|   | Controls as per First Solar Project Site Safety<br>Plan.  |
| Operating a petrol, LPG or diesel powered motor vehicle over land containing combustible material | Works to be minimised as far as practicable<br>Vehicles to be restricted to formed access<br>tracks (in accordance with <b>CEMP-E</b> <i>Soil and</i><br><i>Water Management Plan</i> ) |



|   | Battery powered machinery to be used if possible<br>Maintenance of machinery |
|---|--|
| Operating plant fitted with power hydraulics on | Works to be minimised as far as practicable                                  |
| land containing combustible material            | Maintenance of machinery   |

It is noted that the power station site vegetative cover is expected to consist of crop stubble. The overall risk of bush fire onsite from the above identified risks is considered to be low and highly manageable.

### 2.7 Legislative Requirements

The following is an indicative, but not exclusive, list of legislative requirements relevant to the *Bush Fire Management Plan*:

- AS1940 The Storage and Handling of Flammable and Combustible Liquids
- AS3780 The Storage and Handling of Corrosive Substances
- AS/NZ4452 The Storage and Handling of Toxic Substances
- Rural Fires Act 1997
- Rural Fires Regulation 2008
- Storage and Handling Liquids: Environmental Protection Participants Manual, 2007
- Environmental Compliance Report: Liquid Chemical Storage, Handling and Spill Management; Part B, Review of Best Proactive and Regulation, 2005

## **3 Preventative Actions**

### 3.1.1 Constantly Monitor and Advise Fire Danger Status

The fire danger status shall be obtained through the RFS website:

http://www.rfs.nsw.gov.au/dsp content.cfm?cat id=1109

The fire danger status will be communicated at the First Solar onsite sign-in register daily.

Nyngan is located in Zone 14 "Upper Central West Plains" on the NSW Rural Fire Service "Total Fire Ban and Current Fire Danger Map".



### 3.1.2 Adhere to Total Fire Ban rules

The Rural Fires Regulation 2008 states:

A person must not, in connection with any agricultural, pastoral or other land use, drive or use in any grass, crop or stubble land any motorised machine unless:

- the machine is constructed so that any heated areas will not come into contact with combustible matter, and
- the machine is maintained in a good and serviceable condition so as to prevent the outbreak of fire.

A person must not, in connection with any agricultural, pastoral or other land use:

- drive or use in any grass, crop or stubble land, a motorised machine on which it is practicable to carry prescribed fire safety equipment, or
- carry out welding operations or use explosives or an angle grinder or any other implement that is likely to generate sparks, unless the person carries on the machine, or has in the vicinity, prescribed fire safety equipment that is maintained in a serviceable condition.

First Solar will implement appropriate controls with respect to machinery maintenance to ensure compliance with the above provision. Further detail regarding the specific controls are detailed in Section 3.1.6.

### 3.1.3 No Intentionally Lit Fires for Any Purpose

No fires will be intentionally lit within the Nyngan Solar PV Power Station site or in areas associated with the power station access tracks for any purpose.

### 3.1.4 Extinguish and/or Contain When Safe To Do So

Pursuant to the Rural Fires Act 1997 (RFA, 1997):

- It is the duty of the owner or occupier of land to take notified and practicable steps to prevent the occurrence of bush fires on, and to minimise the danger of the spread of bush fires on or from, that land;
- If a fire (not being a fire or part of a fire lit under the authority of this Act or any other Act) is burning on any land at any time during a bush fire danger period applicable to the land the occupier of the land must:
  - (a) immediately on becoming aware of the fire and whether the occupier has lit or caused the fire to be lit or not, take all possible steps to extinguish the fire, and
  - (b) if the occupier is unable without assistance to extinguish the fire and any practicable means of communication are available, inform or cause to be informed an appropriate officer of the existence and locality of the fire if it is practicable to do so without leaving the fire unattended.

Any fire incident would be appropriately recorded in an Incident Report prepared in accordance with **CEMP-Q** *Incident Management Protocol.* 



First Solar will have fire extinguisher equipment available In all onsite vehicles. The management and maintenance of this equipment will be undertaken in accordance with the First Solar Project Site Safety Plan.

First Solar will only utilise fire extinguishers for life safety evacuations or for putting out small fires where the operator of the fire extinguisher has been trained in it's use.

### 3.1.5 Storage of Fuel and Combustibles

During work hours fuels and combustible materials that present an ignition risk are to be stored and used in accordance with the manufacturer/suppliers recommendations, including the availability of fire-fighting equipment. Where applicable, First Solar will ensure that fuels and combustible materials that present an ignition risk are also stored in accordance with CEMP-V Dangerous Goods and Spill Response Plan and the relevant Australian Standard including:

- AS1940 The Storage and Handling of Flammable and Combustible Liquids
- AS3780 The Storage and Handling of Corrosive Substances
- AS/NZ4452 The Storage and Handling of Toxic Substances
- Storage and Handling Liquids: Environmental Protection Participants Manual, 2007
- Environmental Compliance Report: Liquid Chemical Storage, Handling and Spill Management; Part B, Review of Best Proactive and Regulation, 2005

Upon the cessation of work for the day all portable fuels and like products must be returned to the main site compound and appropriately stored in the designated area (as far as practicable). This designated area will be sign posted "Fuel Storage Area" and appropriate controls such as fire-fighting equipment made available to the fuel storage area. The fuel storage area will be free of grass and other combustible material.

### **3.1.6** Specific Controls

The following measures would be adopted to minimise bush fire related risks throughout the Construction Phase for the Nyngan Solar PV Power Station and associated access tracks.

- Motorised equipment would not be driven in heavily vegetated / grassed areas unless that machine is constructed so that any heated areas do not come in contact with combustible materials.
- All machines and equipment would be maintained in a good and serviceable condition.
- All plant and equipment accessing the Nyngan Solar PV Power Station site, and activities that could generate sparks (i.e. welding and use of angle grinders), would require ready access to prescribed fire safety equipment (e.g. knapsack spray pump of 16L capacity filled with water, fire extinguisher (liquid type) of 9L capacity or dry powder type extinguisher of 0.9kg capacity).
- During construction, trailer mounted water tankers with fire fighting pumps and spray hoses would be available on site at all times.
- Throughout construction, the areas immediately around infrastructure would be managed to prevent the build-up of combustible materials.
- Waste will be removed from site in accordance with CEMP-U Waste Management Plan.



### 3.1.7 Worker Environmental Awareness and Compliance Training

All construction personnel and contractors will be provided Worker Environmental Awareness and Compliance Training (CEMP-S). Part of this program will include a session on obligations to comply with the Bush Fire Management Plan and the need to understand and comply with responsibilities for minimising the potential for creating a bush fire risk onsite.

Evidence of participation and understanding of responsibilities associated with the Worker Environmental Awareness and Compliance Training will be recorded on Form-S01 (refer CEMP-S).

### 3.1.8 Inspections and Monitoring

Maintenance and ready access to all fire-fighting equipment is a critical element of bushfire risk management.

During the bushfire season access to and the operation of all fire fighting equipment will be checked on a weekly basis. Outside the bushfire season equipment will be inspected and checked on a monthly basis. Records of weekly and monthly inspections shall be maintained.

## 4 NSW Rural Fire Service (RFS)

### 4.1 Consultation

In accordance with Condition B4 of the Development Consent, as the construction schedule for the Nyngan Solar PV Power Station is refined and the construction effort progresses, First Solar will continue to consult with the NSW Rural Fire Service to ensure:

- Restrictions related to the prohibition and / or restriction of certain construction activities, at certain locations, in certain circumstances (e.g. periods of total fire bans) are clearly understood by all parties and adhered to.
- The specification of fire suppression equipment available on site, include tanker access and sources of water, are adequate.
- That a detailed and accurate site map is made available that specifies the location and quantities of all stored flammable material (e.g. fuels).
- That a suitable emergency evacuation plan is prepared and adequate training in the use of fire fighting equipment is provided.

First Solar acknowledges that the Minister's consent requires it to comply with any reasonable request of the local RFS.

The appropriate local RFS contact is the Zone Manager, North West Zone (contact details below):

Zone Manager North West Zone



Inspector Greg Sim Phone: 02 682 24422 Mobile: 0428 253 224 E-mail: greg.sim@rfs.nsw.gov.au Please call 000 for all emergencies

### 4.2 Access

A set of gate keys will be provided to the NSW Rural Fire Service to enable access to the Nyngan Solar PV Power Station site as required. A final site plan, showing access points (and static water supply location – refer below) will be provided to Rural Fire Service on completion of detailed design for the Nyngan Solar PV Power Station and again post construction.

### 4.3 Emergency Evacuation

Emergency evacuation from the power station construction site will be undertaken in accordance with the First Solar Emergency Response Plan. All onsite personnel (including visitors) will be made aware of the emergency evacuation protocol.

First Solar will only utilise fire extinguishers for life safety evacuations or for putting out small fires where the operator of the fire extinguisher has been trained in it's use.

### 4.4 Static Watering Point

As required by Mitigation Measure 58, the following section sets out the location and availability of adequate water supplies for the RFS to undertake bush fire suppression.

- 1. The 1.2 mega litre existing farm dam located midway on the southern boundary of the Nyngan Solar PV Power Station will be retained to provide a static watering point for tanker access.
- 2. Figures M01 and M02 attached show the location of this dam and the location of other dams in the vicinity of the Nyngan site.
- 3. In addition to the static water sources identified in Figures M01 and M02, an approximately 1,900 cubic metre dust suppression pond will be constructed onsite.
- 4. A bush fire water storage tank will also be present on site to provide an additional source of water to the Rural Fire Service.



### 4.5 Post Fire Clean Up Procedure

Mitigation Measure 58 (bullet point 6) requires the development of a post-clean up procedure for the Nyngan Solar PV Power Station, including the need for post fire sampling for emissions of cadmium and lead (where appropriate), to be included within the Bush Fire Management Plan.

As outlined in Section 2.3, the construction of the Nyngan Solar PV Power Station will include the installation of First Solar's advanced cadmium telluride (CdTe) thin film photovoltaic (PV) modules. First Solar CdTe PV modules, unlike crystalline silicon PV modules which typically connect individual cells with lead based solder, have minimal lead content (<0.003% per module). In terms of post fire clean up and sampling, it is the determination of First Solar that the risk of onsite lead contamination posed by the CdTe modules is negligible.

With respect to emissions of cadmium, CdTe is a semiconductor compound with strong chemical bonding that leads to high chemical and thermal stability. Each First Solar CdTe PV module (dimensions 1.2m x 0.6m) contains less cadmium content than a C sized flashlight Ni-Cd battery. During the PV module manufacturing process, the CdTe is bound under high temperature to a sheet of glass by vapour transport deposition, coated with an industrial laminate material, and covered with a second sheet of glass, resulting in encapsulation of the semiconductor material.

The highest fire risk presented to solar PV power stations are from uncontrolled grass fires. For grass fires the flame resistance times in grass fuels is approximately 15 seconds and the fires burn at temperatures of approximately 800 to 1000°C. The likelihood of a grass fire exposing the CdTe modules to prolonged fire conditions or temperatures high enough to volatilise CdTe, which has a boiling point of 1,050°C, is considered to be very low. Further, experimental fire testing at temperatures ranging up to 1100 °C (well in excess of levels expected from a grass fire), indicates that PV module glass layers fuse together limiting the potential release of cadmium from the module to approximately 0.04% of the internal cadmium content. At the level cited, potential impacts from the release of cadmium in fire are well below health screening levels.

Noting the above, it is the determination of First Solar that post fire sampling for emissions of cadmium and lead will not be required on sites that utilise the First Solar CdTe PV modules, including the Nyngan Solar PV Power Station site.

The following post fire clean up procedure has been developed by First Solar to be employed in the event of an uncontrolled fire at the power station site during the Construction Phase:

- 1. Prior to re-entering the site, the First Solar HSE and Project Management Team (in consultation with the RFS) will undertake an hazard identification and risk assessment for site re-entry, including an assessment of any HSE risks that may be associated with:
  - Onsite fuel storage



- Onsite chemical storage
- Electrical infrastructure, including both power sources for ancillary buildings and power sources that may be under construction at the time of the fire
- 2. First Solar will wait for permission from the RFS prior to re-entering the site.
- 3. If required, risk controls identified during the hazard identification and risk assessment process will be implemented by First Solar.
- 4. An incident investigation will be undertaken by First Solar (in consultation with the RFS). Incident Management will be undertaken in accordance with **CEMP-Q** *Incident Management Protocol*.
- 5. A post fire damage assessment will be undertaken by First Solar. This assessment will be used to inform the post fire cleanup process.
- 6. Where safe and practicable to do so, First Solar will salvage undamaged construction materials from the site for use during the continued construction of the power station.
- 7. Where construction materials cannot be salvaged, disposal opportunities will be explored by First Solar. In accordance with **CEMP-U** *Waste Management Plan* and Mitigation Measure 55, First Solar will explore all opportunities to reuse and recycle materials.
- 8. Disposal of damaged construction materials will be undertaken in accordance with the relevant waste classification and, where required, waste will be disposed of to an appropriately licenced waste facility.
- 9. Where required, specialist machinery (e.g. civil machinery) may be deployed to the site to remove damaged power station infrastructure.
- 10. Subject to the nature and extent of the suspected damage and the timing in relation to the construction schedule, First Solar may engage an independent structural engineer to undertake an onsite assessment of the structural adequacy (as required by Condition A6) of the undamaged sections of the power station development (where ancillary facilities and structures exist) to ensure that these sections continue to meet the relevant requirements of the BCA.
- 11. Where identified during the incident investigation process, First Solar will implement additional fire mitigation measures at the power station site.



12. First Solar (in consultation with AGL) will recommence the construction of the power station.

## 5 **Responsibilities**

### **Project Manager**

- Completion of Worker Environmental Awareness and Compliance Training.
- Responsible for consultation with the NSW Rural Fire Service prior to and during the construction process.
- Notifying the AGL Project Manager of any fire incident.
- Sign-off of Incident Report Form-Q02
- Advising the Construction Manager when works can recommence.
- Advising the Site Environmental Manager when works can recommence.
- Involvement in post-fire clean up procedure (refer Section 4.5)

### **Construction Manager**

- Completion of Worker Environmental Awareness and Compliance Training.
- Ensuring adequate fire-fighting equipment is available on-site and that relevant personnel have appropriate training in the safe use of this equipment.
- Notifying the Project Manager of any fire occurrence.
- Input to Incident Report Form-Q02
- Involvement in post-fire clean up procedure (refer Section 4.5)

### Site Health and Safety Manager / Site Environmental Advisor

- Completion of Worker Environmental Awareness and Compliance Training
- Notifying the Construction Manager of any fire occurrence.
- Completion of Incident Report Form-Q02
- Involvement in post-fire clean up procedure (refer Section 4.5)

### Supervisors

- Completion of Worker Environmental Awareness and Compliance Training.
- Notifying the Construction Manager of any fire occurrence.
- Input to Incident Report Form-Q02

### **Construction Crew, Contractors and Sub-contractors**



- Completion of Worker Environmental Awareness and Compliance Training.
- Notifying the Supervisors of any fire occurrence.
- Input to Incident Report Form-Q02

## 6 Records

- Incident Report Form-Q02 (refer CEMP-Q Incident Management Procedure)
- Worker Environmental Awareness and Compliance Training Form-S01 (refer CEMP-S Worker Environmental Awareness and Compliance Training)





Figure-M01.01: Site Static Water Supply



Figure-M02.01: Surrounding Static Water Supply



# CEMP-N Air Quality Management Plan Nyngan Solar PV Power Station





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### **Document Control**

| Doc<br>Rev | Date     | Reason                                  | Issued by   | Review             |       | Review                       |                    |
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Cited Cross References within Document:

- **Appendix CEMP-D** Weekly Site Inspections
- Appendix CEMP-E Soil and Water Management Plan
- Appendix CEMP-H Rehabilitation and Revegetation Management Plan
- Appendix CEMP-M Bush Fire Management Plan
- Appendix CEMP-P Complaints Management Protocol
- Appendix CEMP-S Worker Environmental Awareness and Compliance Training
- First Solar Vehicle Movement Plan (refer to First Solar Project Site Safety Plan)



## 1 Purpose

This Air Quality Management Plan for the Nyngan Solar PV Power Station has been prepared to meet the requirements of:

- Development Consent (SSD-5355):
  - Condition B6
  - Condition B9
  - Condition C2(n)
- Nyngan Solar Plant Submissions Report (NGH Environmental, June 2013)
  - Mitigation Measure 42
  - Mitigation Measure 63

## 2 Scope

### 2.1 Overview

As required by the Development Consent (SSD-5355) for the Nyngan Solar PV Power Station, First Solar (Australia) Pty Ltd (First Solar) has developed the following Air Quality Management Plan for the development as it relates to the activities of First Solar. Specifically this Air Quality Management Plan relates to the Construction Phase of the power station and associated access tracks.

A second CEMP is being prepared for the power station's grid connection by a separate contractor. The grid connection for the Nyngan Solar PV Power Station is not under the mandate of First Solar (Australia) Pty Ltd (First Solar) and is therefore not included within the following document. Please refer to the separate grid connection / transmission line CEMP for information specific to the grid connection construction works.

### 2.2 Objectives

The objectives of this Air Quality Management Plan are to:

- Minimise and prevent negative impacts from construction activities on air quality.
- Ensure construction related dust and emissions do not cause harm or environmental nuisance.
- To prevent visible emissions of dust from the site and access roads.
- To ensure compliance with the relevant Nyngan Solar PV Power Station project approvals.



### 2.3 Nyngan Solar PV Power Station Development

The Nyngan Solar PV Power Station will consist of a 102MW solar PV power station located approximately 10km west of Nyngan. The solar plant will occupy approximately 300 hectares of land to the north of the Barrier Highway.

First Solar (Australia) Pty Ltd have been engaged by AGL to provide engineering, procurement and construction (EPC) services. The Nyngan Solar PV Power Station will utilise First Solar's advanced cadimium telluride (CdTe) thin film photovoltaic modules. The solar modules generate electricity with no air emissions, no waste production, no water use and have one of the smallest carbon footprints of any current PV technology. Over 7,000MW of First Solar PV modules have been installed worldwide, including at many of the world's largest solar PV plants, since beginning commercial production in 2002. First Solar has been actively involved in the Australian market since mid-2008.

The construction of the Nyngan Solar PV Power Station project is expected to commence in early 2014 and will take approximately 18 months to complete. Once constructed the Nyngan Solar PV Power Station will generate an estimated 233,000 megawatt hours (MWh) of electricity annually.

### 2.4 Relevant Approval Conditions

The approval provisions for the Nyngan Solar PV Power Station relevant to the Air Quality management Plan are as follows:

Condition B6 of the Nyngan Development Consent states:

B6 The Applicant shall construct and operate the development in a manner that minimises dust generation from the site, including wind-blown and traffic-generated dust as far as practicable. All development related activities on the site shall be undertaken with the objective of preventing visible emissions of dust form the site. Should visible dust emissions attributable to the development occur during construction and operation, the Applicant shall identify and implement all practicable dust mitigation measures, including cessation of the relevant works during construction, planting ground covers, using dust suppressants as appropriate, such that emissions of visible dust cease.

Condition B9 of the Development Consent states:

B9 Soil and water management measures consistent with Management Urban Stormwater – Soils and Construction Vol.1 (Landcom, 2004) shall be employed during the construction of the development to minimise soil erosion and discharge of sediment and other pollutants to land and/or waters.

Condition C2(n) of the Development Consent states:

(n) The CEMP must include measures to monitor and manage dust emissions including dust generated by traffic on unsealed public roads and unsealed internal access tracks.



Mitigation Measure 42 states:

- 42. Air quality impacts would be addressed via the development of:
  - *Protocols to guide vehicle and construction equipment use, to minimise emissions.*
  - Protocols to minimise and treat dust (water carts or similar).

Mitigation Measure 63 states:

63 Dust suppression activities would be undertaken, including:

During construction and decommissioning

- A water cart (truck) would be utilised routinely, wetting all access roads and exposed dusty surfaces as appropriate to the conditions of the project site.
- Stockpiled topsoil and other materials that exhibit significant dust lift off would be wet down routinely and as appropriate.
- Stabilising techniques and/or environmentally acceptable dust palliatives will be utilised if the wetting down of surfaces prove to be ineffective.

The operational dust mitigation requirements set out in Mitigation Measure 63 will be included in the Operational Environmental Management Plan and developed by the owner/operator of the power station (AGL). Operational requirements are outside of the mandate of First Solar and are not included within this Air Quality Management Plan.

### 2.5 EIS Context

The air quality in Nyngan is generally good, and is typical of that found in a rural setting in NSW due to the relatively low population and distance from industrial pollution sources. Local air quality can be affected by traffic fumes, agricultural practices and industrial activities. During colder months, there is a minimal increase in air contaminants due to smoke from the operation of solid fuel heating.

As described in the EIS, dust generation may occur during the construction of the power station as a result of excavation, earthworks and movement of trucks and work vehicles along unsealed access roads.

The EIS identifies the potential air quality impacts associated with the construction of the power station to be minimal. Potential dust impacts have been identified as having localised effects. The closest non-involved residential dwelling to the power station site is approximately 2.3 kilometres from the edge of the site. Over that distance any dust or vehicle emissions generated on the site will have opportunity to dissipate.

To ensure that the localized air quality effects identified within the EIS are controlled as far as practicable, First Solar has developed the following *Air Quality Management Plan* to outline the proposed mitigation and controls that will be utilised during the construction works.


# 3 Actions

The two primary potential causes of air quality issues onsite during the construction of the Nyngan Solar PV Power Station and associated access tracks are:

- Dust generated from onsite activities

e.g. Vehicle movements, vegetation clearance, disturbed and exposes soils, stockpiled soils and materials, progressive rehabilitation

- Vehicle emissions

The following section of the Air Quality Management Plan includes the mitigation measures and actions that will be utilised by First Solar to ensure compliance with the requirements of the Nyngan Development Consent (SSD-5355).

## 3.1 Measures to Control Air Quality

### **3.1.1** General Control Measures:

- Limit areas disturbed by construction to the minimum area necessary for the safe conduct of the work involved.
- Undertake progressive rehabilitation in accordance with the *Revegetation and Rehabilitation Management Plan* (**CEMP-H**).
- In accordance with Mitigation Measure 63, a water cart(s) will be used routinely, wetting access roads and exposed dusty surfaces.
- In dry windy conditions stockpiles and other materials that exhibit significant dust lift off will be routinely wetted as appropriate.
- Stabilising techniques and / or dust palliatives will be utilised where wetting down of exposed surfaces proves to be ineffective.
- Dust palliatives utilised on the site will be non-toxic, biodegradable and "environmentally friendly". Products considered for use at the power station site will be selected for use at the site based on the area to be covered, the success of the product on the soil type at the site and other factors that may influence the successful application of the product (including application methods).
- Monitor weather conditions on a daily basis, including wind speeds, humidity, precipitation. Adapt the use of dust controls during periods of high wind and / or dry conditions.
- Minimise dust generating activities as far as practicable during periods of high wind and / or dry conditions.
- Cease activity if dust controls prove ineffective to ensure compliance with Condition B6.



### **3.1.2** Vehicle Movement Control Measures:

- All site personnel will be advised of the requirement to minimise dust generation including the speed limit on unsealed roads in the *Worker Environmental Awareness and Compliance Training* (refer **CEMP-S**)
- Onsite vehicle movements (inclusive of onsite speed limits) will be determined through a site specific risk assessment. Speed limits will be in accordance with the First Solar *Vehicle Movement Management Plan*. The *Vehicle Movement Management Plan* will form part of the First Solar *Nyngan Project Site Safety Plan*. Vehicle speed limits will be restricted on the basis of safety to prevent vehicle based incidents and dust generation hazard.
- Onsite speed limits will be posted around the site and onsite speeds will be monitored in accordance with the First Solar *Vehicle Movement Management Plan*.
- Traffic movement will be restricted (as far as practicable) to formed access roads and construction tracks. Access roads and construction tracks will be watered as required to control dust generation. Access tracks will be signposted around the site. "No go" areas will be marked with signs, bunting and / or flagging to restrict vehicle movements to formed access tracks.
- Where practicable, well trafficked areas will be gravelled. The site entrance will be upgraded by the Applicant (AGL) in accordance with the requirements of Section 7.5 of the Environmental Impact Statement (EIS), which requires that the seal at the road junction from the Barrier Highway extend at least 20m from the property boundary to reduce dust and pavement damage associated with turning vehicles. First Solar will gravel the access track from the front entrance through to the entry to the site (as shown on Civil Drawing C399, see **Attachment N01**). The access track from the road through to the site entry has been identified as the most well trafficked area within the site. Access tracks on the site itself will typically consist of compacted dirt access tracks.

### 3.1.3 Vehicle Emission Control Measures

- All site personnel will be advised of the requirement to minimise unnecessary vehicle and plant emissions (as far as practicable) in the *Worker Environmental Awareness and Compliance Training* (refer **CEMP-S**).
- Vehicles and onsite plant will be properly maintained to ensure exhaust emissions comply with the NSW Clean Air Regulation 2010.
- Vehicles and onsite plant will be turned off (where practicable) to avoid unnecessary emissions.

### 3.1.4 Additional Onsite Controls

- Cleared vegetation, building/demolition materials and other combustible waste will not be burnt on site.
- Prompt action will be taken to extinguish fires in accordance with the First Solar Bush Fire Management Plan (refer **CEMP-M**).
- Soil stockpiles will be managed in accordance with **CEMP-E** Soil and Water Management Plan.



## 3.2 Actions in the Event of Excessive Dust Generation

To ensure compliance with Condition B6 of the Nyngan Development Consent (SSD-5355), First Solar will implement controls to manage dust generation. The objective of these controls is to prevent visible emissions of dust (attributable to the development) as far as practicable.

### 3.2.1 Dust Generation During Construction Activities:

Indicatively the following measures will be employed in the event of excessive visible dust generation:

- The work/activity causing the dust generation will be identified and will immediately cease.
- Where practicable, the affected area will be watered using the on-site water cart to prevent continued visible dust emissions
- Work shall not recommence until the area has been sufficiently treated to avoid excessive dust generation.
- The area will be visually monitored following recommencement of work to ensure the dust control measure is effective.
- If the area cannot be watered, works shall cease until:
  - Onsite conditions are conducive to minimal dust generation; or
  - An alternate work practice is identified that will prevent continued visible dust emissions; or
  - An alternate dust control method (e.g. dust palliative) is identified that will prevent continued visible dust emissions.

### 3.2.2 Dust Generation Complaints Procedure

Where a complaint is received from the community, the complaint will be managed in accordance with **CEMP-P** *Complaints Management Procedure*. With respect to dust mitigation, the following procedure will be followed:

- The complaint will be investigated.
  - Where the compliant relates to an activity that is in progress the control mechanisms outlined in Section 3.2.1 will be employed.
  - Where the complaint relates to an activity that is no longer in progress, the activity will be identified and (where practicable) dust mitigation measures will be identified for use when this activity is again being undertaken.
  - Onsite personnel will be reminded of their obligations regarding the prevention of visible dust emissions.
- A Complaint Investigation Report shall be prepared in accordance with **CEMP-P** *Complaints Management Procedure*.
- Where practicable / possible the Complainant will be notified of the outcome of the complaint.



## 3.3 Inspections and Monitoring

- The works and construction area within the Nyngan Solar PV Power Station site and along the associated access tracks will be monitored both on scheduled (e.g. at the start of the day, assessment based on the expected meteorological conditions) and ad hoc basis during the day (as required subject to onsite activity and meteorological conditions) by the Construction Manager and by the Site Environmental Advisor to identify non-compliance with the mitigation measures set out in the in the *Air Quality Management Plan*.
- All Site Personnel will be advised of their responsibilities under the Air Quality Management *Plan* with respect to dust control through the *Worker Environmental Awareness and Compliance Training* (**CEMP-S**). Site Personnel will also be responsible for monitoring of dust generation during the undertaking of their respective tasks.
- Records of weekly inspection by the Site Environmental Advisor shall be maintained in accordance with the *Weekly Site Inspection* (**CEMP-D**).

## 4 **Responsibilities**

### Site Construction Manager

- Completion of Worker Environmental Awareness and Compliance Training
- Ensuring works are undertaken in accordance with the Air Quality Management Plan
- Monitoring weather conditions on a daily basis
- Daily visual monitoring of dust and air quality
- Ceasing work if excessive dust is being generated
- Instructing the implementation of dust palliatives if necessary (in consultation with the Site Environmental Advisor).
- Regular checking of construction equipment condition and use to ensure air emissions are minimal
- Respond to Complaints in accordance with **CEMP-P** *Complaints Management Procedure*.

### Site Environmental Advisor

- Completion of Worker Environmental Awareness and Compliance Training
- Completion of Complaints Investigation Report (refer **CEMP-P** *Complaints Management Procedure*)
- Monitoring of weather conditions on a daily basis, including both the met office website and the onsite weather station
- Maintain records of daily weather conditions
- Regular visual checks of dust and air quality onsite during construction activities.
- Weekly inspections in accordance with **CEMP-D** Weekly Site Inspections



- Respond to Complaints in accordance with **CEMP-P** Complaints Management Procedure
- Checks of vehicles, plant and equipment coming to site in coordination with the Site H&S Manager to ensure all vehicles, plant and equipment coming to site is mechanically sound and with a full service history

### Supervisors

- Completion of Worker Environmental Awareness and Compliance Training
- Ensuring works are undertaken in accordance with the *Air Quality Management Plan* to minimise air emissions
- Notifying the Construction Manager of any potential or actual dust generating activities
- Notifying the Site Environmental Manager of any potential or actual dust generating activities

### **Construction Crew, Contractors and Sub-contractors**

- Completion of Worker Environmental Awareness and Compliance Training
- Ensuring works are undertaken in accordance with the CEMP to minimise air emissions
- Notifying Supervisors of any potential dust generating activities.

## 5 Records

- Worker Environmental Awareness and Compliance Training Form-S01 (refer CEMP-S)
- Weekly inspection Form-D01 (refer CEMP-D Weekly Site Inspections)
- Complaints Investigation Report **Form-P01** (refer **CEMP-P** *Complaints Management Procedure*)



**Attachment N01 - Civil Drawing C399** 







# CEMP-O Construction Traffic Management Plan Nyngan Solar PV Power Station





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### **Document Control**

| Doc<br>Rev | Date     | Reason                                  | Issued by   | Review             | Review |                              |                    |
|------------|----------|---|-------------|--------------------|--------|------------------------------|--------------------|
| А          |          | Issued for FS review                    | Geolyse     |                    |        |                              |                    |
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| С          | 25/10/13 | Issued for FS review                    | Geolyse     | SF                 | 12/11  | JS                           | 12/11              |
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| E          | 04/12/13 | Issued as Final                         | First Solar |                    |        |                              |                    |
|            |          |   |             |                    |        |                              |                    |



# 1 Purpose

This Construction Traffic Management Plan for the Nyngan Solar Farm and associated solar farm access tracks has been prepared to meet the requirements of:

- The Nyngan Solar PV Power Station Development Consent (SSD-5355)
  - Condition B28(a)
  - Condition B28 (b)
  - Condition C3(e)
- The Nyngan Solar Plant Submissions Report (NGH Environmental, June 2013)
  - Mitigation Measure 52

# 2 Scope

### 2.1 Overview

As required by Condition C3(e) of the Development Consent (SSD-5355) for the Nyngan Solar PV Power Station, First Solar (Australia) Pty Ltd (First Solar) has developed the following Traffic Management Plan for the development as it relates to the activities of First Solar. Specifically this Traffic Management Plan relates to the Construction Phase of the solar farm and associated solar farm access tracks.

A second CEMP is being prepared for the solar farm's grid connection by a separate contractor. The grid connection for the Nyngan Solar PV Power Station is not under the mandate of First Solar (Australia) Pty Ltd (First Solar) and is therefore not included within the following document. Please refer to the separate grid connection / transmission line CEMP for information specific to the grid connection construction works.

The requirements of Condition B29, Mitigation Measure 53 and Mitigation Measure 54 are being separately managed by the Applicant (AGL). Information on the Barrier Highway upgrades are not included within the following report.

### 2.2 Nyngan Solar PV Power Station Development

The Nyngan Solar PV Power Station will consist of a 102MW solar PV power station located approximately 10km west of Nyngan. The solar plant will occupy approximately 300 hectares of land to the north of the Barrier Highway.

First Solar (Australia) Pty Ltd have been engaged by AGL to provide engineering, procurement and construction (EPC) services. The Nyngan Solar PV Power Station will utilise First Solar's advanced



cadimium telluride (CdTe) thin film photovoltaic modules. The solar modules generate electricity with no air emissions, no waste production, no water use and have one of the smallest carbon footprints of any current PV technology. Over 7,000MW of First Solar PV modules have been installed worldwide, including at many of the world's largest solar PV plants, since beginning commercial production in 2002. First Solar has been actively involved in the Australian market since mid-2008.

The construction of the Nyngan Solar PV Power Station project is expected to commence in early 2014 and will take approximately 18 months to complete. Once constructed the Nyngan Solar PV Power Station will generate an estimated 233,000 megawatt hours (MWh) of electricity annually.

## 2.3 Relevant Approval Conditions

The approval provisions for the Nyngan Solar PV Power Station relevant to the Traffic Management Plan are as follows:

Condition B28 of the Nyngan Development Consent (SD-5355) states:

- B28. Unless otherwise agreed by the Director-General, the Applicant shall commission an independent, qualified person or team to undertake the following in consultation with the relevant road authority:
  - (a) Prior to the commencement of construction of the development, the Applicant shall commission a suitably qualified road infrastructure specialist to assess the condition of all local public roads proposed to be traversed by construction traffic associated with the development (including over-mass or over-dimension vehicles) in consultation with the relevant road authority, and to identify any upgrade requirements to accommodate development traffic for the duration of construction (including culvert, bridge and drainage design; intersection treatments; vehicle turning requirements; and site access), having regard to traffic volumes. The Pre-Construction Road Report shall be submitted to the Director-General prior to the commencement of construction works, clearly identifying recommendations made by the relevant road authority and how these have been addressed. The Applicant shall ensure that all upgrade measures identified in the report are implemented to meet the reasonable requirements of the relevant road authority, prior to the commencement of construction, and at no cost to the relevant road authority;
  - (b) Upon determining the haulage route(s) for construction vehicles associated with the development, and prior to construction, an independent and qualified person or team shall undertake a Road Dilapidation Report. The report shall assess the current condition of relevant local road(s) and describe the mechanisms to restore any damage that may result due to traffic and transport related to the construction of the development. The Report shall be submitted to the relevant road authority for review prior to the commencement of haulage;



Condition C3(e) of the Development Consent states:

- C3(e) a Traffic Management Plan to manage traffic conflicts that may be generated during construction. In preparing the Plan, the Applicant shall consult with the Council and RMS. The Plan shall address the requirements of the relevant road authority and shall include, but not necessarily be limited to:
  - (i) The origin, number, size, frequency and final destination of vehicles entering / existing the site;
  - (ii) Loads, weights and lengths of haulage and construction related vehicles and the number of movements of such vehicles;
  - (iii) The management and coordination of the movement of the movement of construction and personnel vehicles to the site and measures to limit disruption to other motorists, emergency vehicles and school bus timetables (particularly the Miandetta to Nyngan route);
  - (iv) Scheduling of haulage vehicle movements to minimise convoy length or platoons.
     Consideration should be given to minimise the route length for road transport of all size and over mass loads to minimise the impact on traffic;
  - (v) Details of intersection improvement works in accordance with Austroads Guide to Road Design 2010 and RMS Supplements;
  - (vi) Demonstration that all statutory responsibilities with regard to road traffic impacts have been complied with;
  - (vii) Details of measures to minimise interactions between the development and other users of the roads such as the use of fencing, lights, barriers, traffic diversions etc;
  - (viii) Procedures to manage construction traffic to ensure the safety of the school bus and its passengers, inclusive of driver training and procedures to ensure the adequacy of the management measures;
  - (ix) Implement all reasonable and feasible measures to reduce the construction related traffic on the Barrier Highway and public roads between the site and the highway;
  - (x) Schedule construction vehicle movements on site to occur outside school bus hours;
  - (xi) Procedures to manage construction traffic to ensure the safety of livestock and to minimise disruption to livestock;
  - (xii) Speed limits to be observed along routes to and from the site and within the site and access road; and
  - (xiii) Details of the expected behaviors requirements for vehicle drivers travelling to and from the site and within the site.



### Mitigation Measure 52 states:

- 52. A Traffic Management Plan and Haulage Plan would be developed for construction traffic prior to commencing construction activities and would be approved by RMS and the Department of Planning and Infrastructure in consultation with Council. The plans shall address, but not necessarily be limited to:
  - The origin, number, size, frequency and final destination of vehicles entering / existing the site.
  - Loads, weights and lengths of haulage and construction related vehicles and the number of movements of such vehicles.
  - The management and coordination of the movement of construction and personnel vehicles to the site and measures to limit disruption to other motorists, emergency vehicles and school bus timetables.
  - Scheduling of haulage vehicle movement to minimise convoy length or platoons. Consideration should be given to minimise the route length of road transport of all over size and over mass loads to minimise the impact on traffic.
  - Details of intersection improvement works in accordance with Austroads Guide to Road Design 2010 and RMS supplements.
  - A full and independent risk analysis and inspection of the proposed traffic route(s) with procedures for reporting and remediating any damages caused by oversize / overmass traffic.
  - A commitment from the proponent to provide funding for the maintenance and repair of any affected classified roads for the duration of transportation of oversize and overmass vehicles and loads, to the satisfaction of RMS.
  - Assessment of road condition prior to construction on all local roads that would be utilised.
  - Community consultation regarding traffic impacts where sensitive receiver exceedences are predicted.
  - Consideration of bus schedules (particularly school buses and Countrylink services) and safe interaction between buses and construction traffic, incorporating:
    - Documented vehicle safety procedures regarding the school bus.
    - Driver training requirements.
    - Community consultation regarding impacts to bus routes.
  - Traffic controls (speed limits, signage etc)
  - Procedure to monitor traffic impacts and adapt controls (where required) to reduce the impacts.



- Provision of a contract phone number to enable any issues or concerns to be rapidly identified and addressed through appropriate procedures.
- Reinstatement of pre-existing conditions, where required.
- Assessment of road routes to minimise impacts on transport infrastructure.
- Scheduling of deliveries of major components to minimise safety risks (on other local traffic including buses).

## 3 Actions

A Traffic Management Plan developed in accordance with Condition C3(e) of the Nyngan Solar PV Power Station Development Consent (as the activities relate to the activities of First Solar) and Mitigation Measure 52 is attached as **Attachment O1**.

The Traffic Management Plan has been developed in consultation with relevant stakeholders.

The Road Dilapidation and Pre-Construction reports are in development in accordance with Condition B28.

It is noted that onsite traffic movements will be undertaken in accordance with the First Solar *Vehicle Movement Plan* which forms part of the First Solar *Project Site Safety Plan*.

# 4 **Responsibilities**

All responsibilities are defined in the TMP.

# 5 Records

No records are required.



Attachment O1: First Solar Construction Traffic Management Plan





## TRAFFIC MANAGEMENT PLAN NYNGAN SOLAR PLANT

PREPARED FOR FIRST SOLAR

SEPTEMBER 2013



## **TRAFFIC MANAGEMENT PLAN**

NYNGAN SOLAR PLANT

PREPARED FOR:

**FIRST SOLAR** 

| Revision | Date                            | Comment   |
|----------|---------------------------------|---|
| 1        | 19 <sup>th</sup> September 2013 | Prepared for submission to RMS  |
| 2        | 9 <sup>th</sup> December 2013   | Revised per AGL's request   |
| 3        | 18 <sup>th</sup> December 2013  | Revised per AGL's request   |
| 4        | 21 <sup>st</sup> February 2014  | Revised to address comments from DPI in<br>response to submission of First Solar's CEMP |



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| Report Title: | Traffic Management Plan |
|---------------|-------------------------|
| Project:      | Nyngan Solar Plant      |
| Client:       | First Solar             |
| Report Ref.:  | 213225_REO_001D.docx    |
| Status:       | Final                   |
| Issued:       | 19 September 2013       |
|               |                         |

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 inform ation contained within this report is prepared for the exclusive use of First Solar for the land described herein and is not to be used for any other purpose or by any other person or entity. No reliance should be placed on the inform ation contained in this report for any purposes apart from those stated therein.

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



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# Introduction

## 1.1 BACKGROUND

The Nyngan Solar Plant project site is located in western NSW, approximately 10 kilometres west of the township of Nyngan. The project site is located within the Bogan Shire Council local government area and is comprised of rural land. The project site is located on a land parcel north of the Barrier Highway (Lot 34, DP 751328), see **Figure 1** below.

During both construction and operation the project site will be accessed from the Barrier Highway. The Barrier Highway is an important east-west link in outback NSW, which commences in Nyngan and continues through to the South Australian border.

The Barrier Highwa y, which is a sealed single carriageway public road, is suitable for use by heavy vehicles. The construction and operation of the proposed solar plant is not anticipated to have any significant impact on traffic flows on the Barrier Highway, given that there would be a minimal increase in traffic volum es from construction and delivery vehicles. Other public roads in the stud y area are local roads that carry only minor volumes of traffic.



Figure 1: Site Location



## 1.2 **PROJECT APPROVAL**

The Nyngan Solar Plant was granted Project Approval by the NSW Department of Planning and Infrastructure (Application No.: SSD – 5355) on July 15 2013. The Condition C3 (e) of the Development Consent requires a Traffic Management Plan (TMP) to be prepared and implemented as part of the Construction Environmental Management Plan (CEMP).

Schedule 1, Part C Environmental Management, Reporting and Auditing Clause C3 (e) of the Project Development Consent states:

"a Traffic Management Plan to manage traffic conflicts that may be generated during construction. In preparing the Plan, the Applicant shall consult with the Council and RMS\*. The Plan shall address the requirements of the relevant road authority and shall include, but not necessarily be limited to:

- i. the origin, number, size, frequency and final destination of vehicles entering/exiting the site;
- ii. loads, weights and lengths of haulage and construction related vehicles and the number of movements of such vehicles;
- iii. the management and coordination of the movement of construction and personnel vehicles to the site and measures to limit disruption to other motorists, emergency vehicles and school bus timetables (particularly the Miandetta to Nyngan route);
- iv. scheduling of haulage vehicle movement to minimise convoy length or platoons. Consideration should be given to minimise the route length for road transport of all size and over mass loads to minimise the impact on traffic;
- v. details of intersection improvement works in accordance with Austroads Guide to Road Design 2010 and RMS Supplements;
- vi. demonstration that all statutory responsibilities with regard to road traffic impacts have been complied with;
- vii. details of measures to minimise interactions between the development and other users of the roads such as the use of fencing, lights, barriers, traffic diversions etc;
- viii. procedures to manage construction traffic to ensure the safety of the school bus and its passengers, inclusive of driver training and procedures to ensure the adequacy of the management measures;
- ix. implement all reasonable and feasible measures to reduce the construction related traffic on the Barrier Highway and public roads between the site and the highway;
- x. schedule construction vehicle movements on site to occur outside school bus hours;
- xi. procedures to manage construction traffic to ensure the safety of livestock and to minimise disruption to livestock;
- xii. speed limits to be observed along routes to and from the site and within the site and access road; and
- xiii. details of the expected behavioural requirements for vehicle drivers travelling to and from the site and within the site.

\*RMS refers to the NSW Roads and Maritime Services.



## 1.3 PURPOSE OF REPORT

The TMP has been prepared to provide details and procedures to manage traffic conflicts that may be generated during the construction of the Nyngan Solar PV Power Station. It will ensure that traffic generated during the construction phase of the project will move in a safe manner with least impact on other road users.

First Solar's final TMP report, dated 19<sup>th</sup> September 2013, was submitted and approved by the RMS. The TMP was amended on 4<sup>th</sup> December 2013, at AGL's request, and re-submitted on 9<sup>th</sup> December 2013, in order for the RMS to re-evaluate the previously recommended Barrier Highway intersection treatment. This second amendment has been prepared and issued to RMS on 18<sup>th</sup> December 2013 for the same purpose, based on RMS' review of the first amendment and a telephone meeting between AGL and RMS on 16<sup>th</sup> December 2013. The amendments in this second version relate to a reformatting of the traffic volume information to remove ambiguity and a retraction of the earlier proposed speed limits.

The implementation of the TMP will minim ise the traffic related risks for the project employees, contractors, the general public and other vehicle operators on the wider road network surrounding the site. Specific detail regarding traffic flow and traffic management measures is detailed in Section 2 and Section 3 of this report.

## 1.4 LEGISLATION

In NSW the *Road Transport Act 2013* (the Act), governs the safe management of road transport and will be complied with and referred to during construction of the project.

In addition to the Act the following Standards and Guidelines will guide traffic management for the project:

- Austroads Guide to Road Design;
- RMS Supplements to Austroads Guide to Road Design; and
- Australian Standard AS1742- Manual of Uniform Traffic Control Devices.

## 1.5 CONSULTATION

### 1.5.1 RMS AND BOGAN SHIRE COUNCIL

The TMP has been developed in consultation with Roads and Maritime Services (RMS) and Bogan Shire Council (BSC).

As set out in **Attachment CEMP-01** of the CEMP, First Solar has obtained sign off from the RMS.and the Bogan Shire Council with respect to the First Solar Construction TMP, dated 19<sup>th</sup> September 2013.

### 1.5.2 BSC TRAFFIC COMMITTEE

Proposed details of the Traffic Management signage to be installed as part of this plan will be forwarded to the BSC Traffic Committee for discussion.



# **Traffic Details**

## 2.1 SITE ACCESS

The site access will be constructed off the Barrier Highway. Vehicle access to the site will be via two (2) routes:

- i. To/from Nyngan via the Barrier Highway; and
- ii. To/from Cobar via the Barrier Highway.

The Barrier Highway (National Route A32) is a two lane two way sealed road under the control of RMS. The Barrier Highway is signposted at 110km/hr in this section. The Nyngan-Cobar Railway line runs parallel to the Barrier Highway on the southern side of the Highway at the site access location.

## 2.2 VEHICLE TRAFFIC TYPES

The vehicle types accessing the site during construction would include:

- Light vehicles such as passenger vehicles and light delivery trucks;
- Heavy vehicles such as large rigid trucks and semi-trailers; and
- Oversize and overweight vehicles used for the delivery of major plant and infrastructure.

## 2.3 TRAFFIC VOLUMES

The anticipated traffic generated by the construction of the Solar Plant is summarised in **Table 2.1a** below whilst **Table 2.1b** provides a consolidation of peak movements by vehicle type and direction of approach. The total num bers of trucks listed in **Tables 2.1a&b** represent the expected maximum volum e of traffic movements for each component. The reason for this is that First Solar implements a continuous design and cost improvement process throughout the Engineering Procurement and Construction (EPC) process, which allows quarterly improvements in the module performance and Balance of Plant to be incorporated into the design. Continuous improvements means fewer electrical and structural components (modules, posts, tables etc) are needed to produce the same contracted PV plant performance. For exam ple, the quantity of modules required to build the Nyngan Solar Plant has reduced from 1.5 Million to 1.3 Million in the past 6 months due to improvements in module efficiency and a reduction in plant capacity from 106 MW (AC) to 102 MW (AC); this reduction in module volum e then has a flow through effect to other components, reducing the required quantity of posts, tables, tilts et cetera.

The approved site hours are between 0700 hours and 1800 hours. The peak hourly traffic volum es are expected between 0600 and 0700 hours and 1700 and 1800 hours. Standard work hours and the types of vehicles that will be travelling in this period are outlined further in Section 3.1.



#### Table 2.1a – Traffic Volumes

| Туре  | Origin   | Size/Type of<br>Vehicle                   | Heading to Site<br><i>(Turn-in)</i> | Heading from Site<br>(Turn-out) | Average<br>Daily Frequency  | Total Number of<br>Trucks |
|---|--|---|-------------------------------------|---------------------------------|---|---------------------------|
| Materials                                       |  |   |                                     |                                 |   |                           |
| Modules   | Adelaide   | 79t, 36.5m Road Train                     | Eastbound (Left)                    | Westbound (Right)               | 1.35vpd/2.7vmpd*  | 325                       |
| Posts   | Melbourne/Geelong  | 42.5t max <19m                            | Westbound (Right)                   | Eastbound (Left)                | 0.26vpd/0.52vmpd  | 62                        |
| Tilts   | Melbourne  | 42.5t max <19m                            | Westbound (Right)                   | Eastbound (Left)                | 0.07vpd/0.14vmpd  | 17                        |
| Tables <sup>2</sup>                             | Adelaide   | 79t, 36.5m Road Train                     | Eastbound (Left)                    | Westbound (Right)               | 1.15vpd/2.3vmpd   | 276                       |
| Electrical & Cable                              | Sydney   | 42.5t max <19m                            | Westbound (Right)                   | Eastbound (Left)                | 1.68vpd/3.36vmpd  | 100                       |
| Vaults  | Sunshine Coast   | 42.5t max <19m                            | Westbound (Right)                   | Eastbound (Left)                | 0.32vpd/0.64vmpd  | 76                        |
| Shelters  |  |   |                                     |                                 |   |                           |
| Inverters                                       |  |   |                                     |                                 | 0.32vpd/0.64vmpd  | 76                        |
| Xformers  |  |   |                                     |                                 |   | 10                        |
| PVCS/PVIS                                       | Adelaide   | 42.5t max <19m                            | Eastbound (Left)                    | Westbound (Right)               | 0.03vpd/0.06vmpd  | 6                         |
| Materials Total                                 |  |   |                                     |                                 | 5.2vpd/10.4vmpd over 240 day period<br>(arrive loaded & depart empty)   | 938                       |
| Employees to/from<br>site                       | Nyngan   | 50 person coach                           | Westbound (Right)                   | Eastbound (Left)                | 6vpd/12vmpd   | NA                        |
| Staff Cars to/from<br>site                      | Nyngan   | Light vehicle with GVM <4.5t              | Westbound (Right)                   | Eastbound (Left)                | 25vpd/50vmpd  | NA                        |
| Construction                                    | Sydney/Dubbo/Brisbane-<br>Site                               | 42.5t max. <19m                           | Westbound (Right)                   | Eastbound (Left)                | 4vpd/8vmpd during<br>10 day mobilisation and de-mobilisation<br>periods | NA                        |
| Equipment                                       | Sydney/Dubbo/Brisbane-<br>Site                               | 42.5t max. >19m<br>length and >2.5m width | Westbound (Right)                   | Eastbound (Left)                | 4vpd/8vmpd during<br>10 day mobilisation and de-mobilisation<br>periods | NA                        |
| Peak Daily Movements (<br>Peak Hourly Movements | (based on the sum of Materia<br>s (based on 6x 50 Person Coa | 88vpmd (rounded to 90)<br>31vph           |                                     |                                 |   |                           |

Source: First Solar. \*vpd-vehicles per day, vmpd- vehicle movements per day, vph-vehicles per hour



### Table 2.1b – Peak Traffic Movements consolidated by Type and Direction

| Туре  | Size/Type of<br>Vehicle         Heading to Site         Heading from Site           Origin         (Turn-in)         (Turn-out) |   | Average<br>Daily Frequency | Total Number of<br>Vehicle<br>Movements |  |        |
|---|---|---|----------------------------|---|--|--------|
| Peak Daily Movements                              |   |   |                            |   |  |        |
|   | Adelaide  | 79t, 36.5m Road Train                     | Eastbound (Left)           | Westbound (Right)                       | 2.50vpd/5.0vmpd  |        |
|   | Adelaide  | 42.5t max <19m                            | Eastbound (Left)           | Westbound (Right)                       | 0.35vpd/0.7vmpd  |        |
|   |   |   |                            | Total (Eastbound)                       | 2.85vpd/5.07vmpd   |        |
|   | Various east coast  | 42.5t max <19m                            | Westbound (Right)          | Eastbound (Left)                        | 2.33vpd/4.66vmpd   |        |
|   | Nyngan  | 50 person coach                           | Westbound (Right)          | Eastbound (Left)                        | 6vpd/12vmpd  |        |
|   | Nyngan  | Light vehicle with GVM <4.5t              | Westbound (Right)          | Eastbound (Left)                        | 25vpd/50vmpd   | 88vmpd |
| 10 day mobilisation and<br>de-mobilisation period | Sydney/Dubbo/Brisbane-<br>Site  | 42.5t max. <19m                           | Westbound (Right)          | Eastbound (Left)                        | 4vpd/8vmpd during<br>10 day mobilisation and de-<br>mobilisation periods |        |
|   | Sydney/Dubbo/Brisbane-<br>Site  | 42.5t max. >19m length<br>and >2.5m width | Westbound (Right)          | Eastbound (Left)                        | 4vpd/8vmpd during<br>10 day mobilisation and de-<br>mobilisation periods |        |
| i   |   |   | ·                          | Total (Westbound)                       | 41.33vpd/82.66vmpd   |        |
| Peak Hourly Movements                             |   |   |                            |   |  |        |
|   | Nyngan  | 50 person coach                           | Westbound (Right)          | N/A                                     | 6vpd   |        |
| 6-7am   | Nyngan  | Light vehicle with GVM <4.5t              | Westbound (Right)          | N/A                                     | 25vpd  | 31vmpd |
|   | Site  | 50 person coach                           | N/A                        | Eastbound (Left)                        | 6vpd   |        |
| 5-6pm   | Site  | Light vehicle with GVM                    | N/A                        | Eastbound (Left)                        | 25vpd  | 31vmpd |

The current project schedule has construction commencing in January 2014 and completion in June 2015 giving an expected maximum of 368 construction days (assuming seven working days per week). The total expected traffic generation is detailed in **Table 2.2** below.

|  | Table | 2.2 – | Total | Traffic | Generation |
|--|-------|-------|-------|---------|------------|
|--|-------|-------|-------|---------|------------|

| Vehicle Type          | Total Movements |
|-----------------------|-----------------|
| 79t, 36.5m Road Train | 1,202           |
| 42.5t max. <19m       | 1,446           |
| 50 person coach       | 4,416           |
| Light vehicles        | 18,400          |
| 42.5t max. >19m       | 160             |
| Total                 | 25,624          |

<sup>&</sup>lt;sup>1</sup> First Solar confirms that the PV Modules will be manufactured and shipped from Kulim, Malaysia and not from the U.S.A. Malaysia to Adelaide is a shorter shipping route than Malaysia to Sydney and allows the Modules to be transported to Nyngan from Adelaide Port via Road Train. The Origin and Number of Trucks has been updated to reflect this revised transport route. <sup>2</sup> IXL has confirmed its manufacturing facility will be in Adelaide, and the tables will be transported to Nyngan via Road Trains.





The draft materials delivery schedule is as follows:

March 2014 to Feb 2015 - structural components, DC electrical cables, AC collection stations transported to site;

May 2014 to March 2015- PV modules transported to site; and

June 2014 to Jan 2015 - AC electrical components/Power Conversion System transported to site. First Solar's expected monthly vehicle movements are presented in Figure 1; this includes the traffic flow due to materials, construction equipment and workers arriving at site, derived from Table 2.1a and Table 2.2



#### Figure 1: Monthly Construction Vehicle Movements (First Solar)

# **Management Measures**

## 3.1 MANAGEMENT AND COORDINATION OF VEHICLES

Standard work hours are expected to be Monday to Sunday, 7am to 6pm. This section outlines how First Solar intends to manage the transport of deliveries and employees so as to minimise vehicle movements and reduce the impact to the Nyngan town. The expected movements of construction vehicles, subcontractor vehicles and personnel vehicles are specified in **Table 2.1a**.

A HAZID study to identify risks has been undertaken. This process identified that control of traffic movement to, from and on the site as a mitigation to manage safety risk.

The Risk Mitigation for journeys to and from the site includes:

- Systems shall be in place to ensure that risks associated with vehicle journeys are identified managed and controlled, including Journey Management Plan (JMP) when applicable.
- The JMP shall include but not be limited to an effective communication system, journey monitoring at both ends of the journey, environmental risks, fatigue management and competency

### EMPLOYEE TRANSPORT TO SITE

A construction workers accommodation facility will be built to house employees of the Nyngan Solar PV Plant. This accommodation site is located at the former Nyngan Hospital Site on the north-eastern periphery of the town, bounded by Merilba Street and Hospital Road. This location has several advantages with respect to traffic flow:

- three established vehicle access points, two from Hospital Road and a third from Merilba Street
- The surrounding locality is characterised by low density residential developments to the west and north-west.

W orkers will typically complete a maximum shift of 21 days on site, after which they rotate out of town and return home. First Solar will recruit as many workers as possible from Nyngan and the surrounding towns, such as Dubbo, Cobar, and W arren. The remainder of the workforce will be supplemented via a fly-in-fly-out (FIFO) arrangement from Dubbo Airport.

First Solar will manage the transport of workers and minimise vehicle movements by using bus/coach transport. Coaches will transport staff:

- 1. From the workers camp to the local RSL club for breakfast (approx. 0530 to 0700) and dinner (approx.1800-2000),
- 2. To and from the construction site (0600-0700 and 1700-1800)
- 3. To and from the Dubbo airport

The coaches will be housed on site at the workers camp. Light vehicle movements will be limited to short term durations, for example when local workers drive to the camp at the commencement of a rotation and drive out at the shift end. The workers camp will incorporate a single central car parking area with a capacity for approximately 100 light vehicles. Only service vehicles will be allowed to drive to site and will be required to follow the bus schedule for site entry.

### SCHOOL BUS ROUTE AND SCHEDULE

The coach that will ferry personnel to and from site will be scheduled to occur outside of the school bus pick-up and drop-off hours. Two school bus operators have been identified in the Nyngan area, per Table 3.1:

|          | G | F | 0 | Î | v | ς | F |  |
|----------|---|---|---|---|---|---|---|--|
| धरित्राय | U | - | U | - |   | 9 | 5 |  |

| Operator             | Service                                     | School Pick-up/Drop-off Hours        |  |
|----------------------|---|--------------------------------------|--|
| Mr Rex Vane          | Nyngan – Miandetta via<br>Barrier Highway   | 7:50am to 8:35am<br>3:25pm to 4:10pm |  |
| WW, DT and JL Powell | Nyngan – Gilgai Road via<br>Barrier Highway | 8.15am to 8:30am<br>3.30pm to 3:45pm |  |

### HARVEST TRUCKS SCHEDULE

It is expected that grain trucks and other harvest equipment will increase heavy vehicle movements on the Barrier Highway during the harvest season, with the majority of harvest vehicle movements occurring in December and January. As per the draft delivery schedule provided above most of the proposed deliveries to site are weighted towards March/April 2014. The peak construction movements are expected to occur between 6-7am and 5-6pm with an average of 1.2 heavy vehicle movements per hour expected between 7am and 5pm. The proposed construction traffic is therefore not expected to impact on harvest vehicles.

### MAJOR SUPPLIERS

First Solar will be finalizing the preferred material supplier at the end of December. As such, the exact route/s for vehicles bringing materials is not confirmed. For example, two PCS skid suppliers have been short-listed, with one company located in Adelaide and the other in Newcastle. However, it is expected that the majority of materials will be transported to Nyngan via Adelaide, with some movements expected to originate from Melbourne/Geelong or Sydney/Newcastle. The expected routes for truck movem ents from Adelaide to site, from Melbourne/Geelong to site and Newcastle to site are shown below in **Figures 2, 3 and 4** respectively.



Figure 1: Expected Truck Route- Adelaide to Site





Figure 2: Expected Truck Route-Melbourne/Geelong to Site



Figure 3: Expected Truck Route-Newcastle to Site



### VEHICLE LOGISTICS AND CO-ORDINATION TO SITE

First Solar is experienced in ensuring that vehicles:

- arrive at site in an orderly manner;
- meet the resource availability to undertake the offload of goods;
- do not cause platooning;
- arrive within the approved delivery times.

Consequently, the scheduled peak traffic movements are not expected to impact upon other motorists or emergency vehicles. Further detail regarding First Solar's coordinated approach is specified in Section 3.2.

## 3.2 HAULAGE VEHICLE SCHEDULING

Haulage of m aterials and equipment to the site will be scheduled to arrive and depart from site at different times coinciding with the construction program. The varying origin of the haulage movements and limited number of deliveries to site each day will limit the potential for haulage vehicles to form convoys or platoons. Reduced heavy vehicle movements through the use of road trains from the port in Adelaide will be utilised whenever possible.

### LOGISTICS OF SITE DELIVERIES

First Solar employs a full-time logistics person who will be responsible for liaising directly with the Project Manager for expeditors on a daily basis in order to closely monitor the delivery schedules. Examples of the milestones monitored and level of communication include:

- Schedule of next day, and 2-day forecast of all deliveries, including inventory and timing.
- Expected ship date
- Number of containers from each supplier
- Transit time
- ETA
- Online access available for up to date reporting of each shipment
- Daily reports sent to site
- Minimum daily communication with transport company

First Solar has coordinated trucks to arrive at the highway at a specific time of day, in order to satisfy community and safety concerns on previous projects, including the use of police escorts when necessary.

### DRIVER CODE OF CONDUCT AND SITE INDUCTION

The driver code of conduct is regulated by the NSW Code of Practice for Long Haul Drivers. First Solar (FS) Logistics will schedule the acceptance of freight, but FS does not hire drivers and relies on the freight companies to manage their drivers with legislative requirements, log book entries, verification of licenses and so on.

First Solar has driver behavioral expectations and a site delivery process, which includes:

- Engagement of local drivers to ensure familiarity with the roads
- Planned layover areas defined in advance by Project Management
- Directions of approach to site are documented and specified in advance to the freight companies
- Arrival at pre-determined and approved time with logistics
- Driver site induction, including security gate process
- Logistics will escort all delivery vehicles to laydown areas



An example of a typical First Solar site induction for delivery drivers is summarized below.

### Requirements prior to accessing site

Prior to accessing site, the Non-Inducted Delivery Driver's site contact shall complete the following with the driver:

- Site Visitor's induction
- Pre-task hazard assessment (e.g. JHA) and implementation of controls
- Communication of the intended travel route on site, speed limits and road rules, site contact/escort name and contact number, and any work area specific hazards.

### **General Requirements**

The non-inducted delivery driver shall be escorted at all times when travelling to and from the site access point to any pick up or drop off point.

The completed visitor induction and attached pre-task hazard assessment and access/escort details shall be recorded and retained on the project site.

A load/unload plan and pre-task hazard assessment (e.g. JHA) shall be completed for loading and unloading tasks on site and relevant controls implemented prior to the commencement of these tasks.

The non-inducted transport driver's licensing and competence to operate vehicle or vehicle mounted equipment shall be checked.

On arrival at the pick-up/drop off point, Non-inducted Delivery Drivers shall exit the vehicle and remain in a pre-defined safe area whilst loading and unloading of freight is occurring, unless they are performing one of the tasks as outlined below.

Non-inducted Transport Drivers shall not perform any tasks other than:

- Driving to the designated drop-off or pick-up location
- Indicating the load distribution to First Solar personnel
- Operating vehicle and vehicle mounted loads for which they are competent, including discharge of material if required
- Performing release of load restraints on incoming loads
- Performing restraint of outgoing loads
- Completing any required paperwork.

Note: This process does not apply to: Persons delivering or collecting cash, mail or packages and/or conducting similar brief transactions

## 3.3 DETAILS OF INTERSECTION IMPROVEMENT WORKS

The intersection of the site access road and the Barrier Highway will undergo improvem ent works as specified by RMS and Council. RMS has specified that a minim um of 350m sight distance will be required in both directions on the Barrier Highway at the site entrance.

## 3.4 STATUTORY RESPONSIBILITIES

The Environm ental Im pact Statem ent prepared in relation to the consent application for the proposed solar facility identified the relevant statutory fram ework within which the application was considered. Of relevance to the preparation of this TMP are the following statutory documents.

### 3.4.1 ROADS ACT 1993

The Barrier Highwa y is a classified road by virtue of section 47 of the *Roads Act 1993* (Roads Act) and therefore the RMS is the relevant roads authority for any works proposed to the highway. It is



understood that AGL is directly liaising with RMS to provide the relevant design details for the upgrade of the construction site access intersection, as required by virtue of clause (e)(v) of Part C to Schedule 1 of the Project Approval.

Section 138 of the Roads Act provides that any works in, over or under a public road require the consent of the appropriate roads authority. AGL continue to liaise directly with RMS in relation to this consent.

# 3.4.2 STATE ENVIRONMENTAL PLANNING POLICY (INFRASTRUCTURE) 2007

The EIS identified clause 104 of the *State Environmental Planning Policy (Infrastructure)* 2007 (ISEPP) relates to the traffic generating developm ents, which require further referral to the Roads and Maritim e Services. The EIS concludes, on the basis that the developm ent does not result in 200 or more motor vehicles per day, that clause 104 did not apply.

**Table 2.1** of this TMP provides an updated summary of the predicted traffic volum es relating to the developm ent. As traffic volum es are now lower than the num bers assessed in the EIS it follows that the triggers identified in clause 104 and Schedule 3 to the ISEPP for traffic generating do not apply to the development.

There is therefore no obligation to refer the matter to RMS in the context of traffic generating developments.

### 3.4.3 NSW ROAD NOISE POLICY

The EIS contains an assessment of the proposed development by reference to the NSW Road Noise Policy (RNP). This assessment concluded that, for the one potentially affected non-involved residence, exceedance of levels identified within the RNP is unlikely. The preparation of this TMP has not revealed any matters that require the review of this conclusion.

## 3.5 MEASURES TO MINIMISE INTERACTIONS

The intersection of the site access road and the Barrier Highwa y will undergo improvem ent works to minim ise the impact of construction vehicles entering and exiting the site on other road users. During construction of the intersection upgrade works traffic will operate under a Road Occupancy Licence and a Traffic Control Plan (TCP). The TCP will include all signage, barriers, traffic controllers, traffic diversions and lighting required and will be developed in consultation with RMS and Council. The TCP will be prepared in accordance with Traffic Control at Worksites Manual by a suitably qualified and accredited person.

In addition to the main site access road, First Solar completed a Pre-Construction Road Assessment per the requirements of Condition B28(a) of the Development Consent :- *Nyngan Solar Power Station Pre-Construction Road Assessment,* (Beca, 20 Dec 2013). This report identified the following local public roads to be used by heavy vehicles associated with the construction of the Power Plant:

- Merilba Street from the workers camp at the disused Hospital;
- Hospital Road; and
- Mitchell Street.

In this report, an expert pavement engineer assessed the nature of the traffic movements and the condition of the infrastructure along these routes. The assessment concluded that a relatively low volume of traffic movements is expected and that no road upgrades were required.

In addition, and in order to minimise interactions with the residents on the afore-mentioned streets, First Solar is ensuring that:

1. The Project induction, mandatory for all employees, includes guidelines on considerate driving, when entering/exiting the accommodation site, such as driving at slow speeds on approach; and turning off car headlights near the driveway so as not to disturb the houses opposite Buses will transport workers to the main site and the meals, reducing the volume of personal vehicles



#### ADDITIONAL MITIGATION MEASURES

- First Solar, in conjunction with AGL, has consulted extensively with the local community regarding
  this Project in order to ensure an excellent flow of information, and to address any potential
  concerns within the township. Community engagement has included distribution of a Construction
  Notice, specifying "what to expect during construction", including a project description, timeline, and
  working hours. A Community Consultation Committee has also been formed, which includes
  prominent members of the town, First Solar and AGL Managers. This Committee meets regularly to
  maintain positive communication about the project and to address any concerns raised by locals. At
  the time of writing, no sensitive receivers with respect to traffic flow have been flagged.
- First Solar has assessed the traffic flow and vehicle types, and has confirmed that First Solar has no oversize or over-mass vehicles delivering to the Solar Power Plant. Consequently, the following mitigation measures (MM52) related to the impact of over-mass vehicles, have not been considered:
  - Funding for maintenance and repair of classified roads;
  - Independent risk analysis of transport routes, with procedures for reporting and remediating damage.

## 3.6 SCHOOL BUS SAFETY

All construction traffic movements will be scheduled outside of school bus hours (0750-0835 and 1525-1610), as per Table 3.1. In addition to this all personnel driving construction vehicles to and from the site will undergo a project induction which will include information on the management of traffic related issues (including school buses and passengers) while travelling to and from the site. A log will be kept at the site entrance detailing all traffic movements to and from the site. A regular review of the log will be undertaken to identify any vehicle movements during school bus hours.

### 3.7 REDUCTION OF CONSTRUCTION TRAFFIC

To reduce construction traffic on the Barrier Highway and surrounding public roads the following measures will be implemented:

- Workers will primarily be bussed to and from the site in 50 seat coaches; and
- Heavy vehicles will be generally be used for transport of materials and equipment;

In addition to the above reduced heavy vehicle movements through the use of road trains from the port in Adelaide will be maximised where possible.

# 3.8 SCHEDULING OF CONSTRUCTION TRAFFIC OUTSIDE SCHOOL BUS HOURS

As mentioned above all construction traffic movements will be scheduled outside of school bus hours.

## 3.9 SAFETY OF LIVESTOCK

The site access road and site will be fenced with livestock proof fencing prior to construction commencing. No interaction between construction traffic and livestock is expected.

### 3.10 SPEED LIMITS

As mentioned above all personnel driving construction vehicles to and from the site will undergo a project induction which will include information on the management of traffic related issues while travelling to and from the site. The induction will include the following points:

- Consideration and courtesy are essential when driving on public roads; and
- Speed limits must be strictly adhered to.



This TMP only envisages the application of speed restrictions for works on or directly adjacent to the Barrier Highway in support of the intersection treatment and site access, for which appropriate traffic control measures will be adopted in accordance with the Road Occupancy License.

## 3.11 DRIVER BEHAVIOURAL REQUIREMENTS

As mentioned above all personnel driving construction vehicles to and from the site will undergo a project induction which will include inform ation on behavioral requirements while travelling to and from the site. The induction will include the following points:

- Consideration and courtesy are essential when driving on public roads;
- Speed limits must be strictly adhered to;
- Drivers must adhere to any directions given by site personnel; and
- Drivers must adhere to maximum continuous driving times and rest breaks.

## 3.12 RESTRICTED ACCESS VEHICLES

Restricted Access Vehicles (RAV) will need to deliver construction equipment to site. Delivery of equipment to site using an RAV will need to consider the following:

- Appropriate permits being issued by RMS and the NSW Police;
- Use of escort vehicles as required;
- Provision of traffic controllers as required;
- Restriction of RAV deliveries to daylight hours (outside of school bus hours); and
- The delivery of large equipment will be coordinated with any known vehicular activity on the Barrier Highway or in the township of Nyngan.


# **Plan Operation**

### 4.1 ROLES AND RESPONSIBILITIES

The roles and responsibilities for the implementation of the TMP are indicated in Table 4.1 below.

#### Table 4.1 – Traffic Management Plan Implementation

| Entity Role                | Responsibility   |
|----------------------------|--|
| First Solar                | Implementation of the Traffic Management Plan during construction          |
| All personnel              | Follow all guidelines and Project Rules with respect to traffic management |
| Nyngan Solar Plant Manager | Implementation of the Traffic Management Plan during operation             |

### 4.2 TRAFFIC MANAGEMENT PLAN AUDIT

The TMP will be audited in accordance with the AGL Environmental Management Systems.

### 4.3 TRAFFIC MANAGEMENT PLAN REVIEW

The TMP will be reviewed in accordance with the AGL Environmental Management Systems.

### 4.4 COMPETENCE TRAINING AND AWARENESS

All personnel working on the project will undergo a project induction which will include inform ation on the management of traffic related issues while travelling to and from the site. The induction will include the following points:

- Consideration and courtesy are essential when driving on public roads and the worksite;
- All employees will be required to comply with the onsite Vehicle Movement Plan (VMP) being prepared by First Solar; and
- Speed limits must be strictly adhered to.

After completing the induction workers will sign a statement of attendance and records of this will be kept in the site office.



# References

Nyngan Solar Plant Environmental Impact Statement, October 2012, NGH Environmental

Traffic Control at Worksites Manual- Issue I:2000 Roads and Traffic Authority of NSW

AUSTROADS Guide to Traffic Engineering Practice – Local Area Traffic Management

Guide to Traffic Generating Developments Roads and Traffic Authority of NSW



# CEMP-P Complaints Management Nyngan Solar PV Power Station





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#### **Document Control**

| Doc<br>Rev | Date     | Reason                                  | lssued by   | Review             |       | Review                       |                    |
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| А          |          | Issued for FS review                    | Geolyse     | SF                 | 10/11 | JS                           | 11/11              |
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|            |          |   |             |                    |       |                              |                    |

Cited Cross References within the Document

- Appendix CEMP-N Air Quality Management Plan
- Appendix CEMP-Q Incident Management Protocol
- Appendix CEMP-R Community Consultation Plan
- Appendix CEMP-S Worker Environmental Awareness and Compliance Training



## 1 Purpose

This Complaints Management Protocol for the Nyngan Solar PV Power Station has been prepared to meet requirements of:

- The Nyngan Solar PV Power Station Development Consent (SSD-5355)
  - Condition C2(j)
  - Condition C13
  - Condition C14
  - Condition C15

### 2 Scope

### 2.1 Overview

As required by the Development Consent (SSD-5355) for the Nyngan Solar PV Power Station, First Solar (Australia) Pty Ltd (First Solar) has developed the following Complaints Management Protocol for the development as it relates to the activities of First Solar. Specifically this Complaints Management Protocol relates to the Construction Phase of the power station and associated access tracks.

During the Construction Phase for the Nyngan Solar PV Power Station, Complaints Management will remain the primary responsibility of the Applicant (AGL). As outlined within this and the *Community Consultation Plan* (**CEMP-R**), First Solar will provide the information required by the Development Consent through to AGL to ensure compliance with the relevant conditions, including those identified within Section 2.3 of this report.

A second CEMP is being prepared for the power station's grid connection by a separate contractor. The grid connection for the Nyngan Solar PV Power Station is not under the mandate of First Solar (Australia) Pty Ltd (First Solar) and is therefore not included within the following document. Please refer to the separate grid connection / transmission line CEMP for information specific to the grid connection construction works.

### 2.2 Nyngan Solar PV Power Station Development

The Nyngan Solar PV Power Station will consist of a 102MW solar PV power station located approximately 10km west of Nyngan. The solar plant will occupy approximately 300 hectares of land to the north of the Barrier Highway.



First Solar (Australia) Pty Ltd have been engaged by AGL to provide engineering, procurement and construction (EPC) services. The Nyngan Solar PV Power Station will utilise First Solar's advanced cadmium telluride (CdTe) thin film photovoltaic modules. The solar modules generate electricity with no air emissions, no waste production, no water use and have one of the smallest carbon footprints of any current PV technology. Over 7,000MW of First Solar PV modules have been installed worldwide, including at many of the world's largest solar PV plants, since beginning commercial production in 2002. First Solar has been actively involved in the Australian market since mid-2008.

The construction of the Nyngan Solar PV Power Station project is expected to commence in early 2014 and will take approximately 18 months to complete. Once constructed the Nyngan Solar PV Power Station will generate an estimated 233,000 megawatt hours (MWh) of electricity annually.

#### 2.3 Relevant Approval Conditions

The approval provisions for the Nyngan Solar PV Power Station relevant to the Flora and Fauna Management Plan are as follows:

Condition C2(j) of the Nyngan Development Consent (SSD-5355) states:

C2(j) A Complaints handling procedure during construction identified in conditions C13 and C14.

Condition C13 of the Development Consent states:

- C13. Prior to the commencement of construction, the Applicant shall ensure that the following are available for community complaints for the life of the development (including construction and operation) or as otherwise agreed by the Director-General:
  - a) A 24 hour telephone number on which complaints about the construction and operation activities at the site may be registered.
  - b) A postal address to which written complaints may be sent; and
  - c) An email address to which electronic complaints may be transmitted.

The telephone number, postal address and email address shall be advertised in a newspaper circulating in the local 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 development. These details shall also be provided on the Applicant's internet site required by condition C11. 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.



Condition C14 of the Development Consent states:

- C14. The Applicant shall record details of all complaints received through the means listed in condition C13 of this consent in an up-to-date Complaints Register. The Register shall record, but not necessarily be limited to:
  - a) The date and time, of the complaint;
  - b) The means by which the compliant was made (telephone, mail or email);
  - c) Any personal details about the complainant that were provided, or if no details were provided, a note to that effect;
  - *d)* The nature of the complaint;
  - *e)* Any action(s) taken by the Applicant in relation to the complaint, including timeframes for implementing the action; and
  - *f)* If no action was taken by the Applicant in relation to the complaint, the reason(s) why no action was taken.

The Complaints Register shall be made available for inspection by the Director-General upon request.

Condition C15 of the Development Consent states:

C15. The Applicant shall provide an initial response to any complaints made in relation to the development 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 C14. Any subsequent detailed response or action is to be provided within two weeks.

### **3** Actions

#### 3.1 Methods to Receive Complaints

In accordance with Condition C13 of the Development Consent, the community will have the ability to make complaints via the following methods:

- 1. A 24 hour telephone number on which complaints about construction activities may be registered.
- 2. A postal address to which a written complaint may be sent.
- 3. An email address to which electronic complaints may be transmitted.

The notification requirements (refer Condition C13) for the above complaints contact details will be managed by AGL as the Applicant. First Solar will work with AGL to ensure complaints are appropriately investigated and managed throughout the Construction Phase.



The community will be made aware of these methods of communication in accordance with First Solar *Community Consultation Plan* (refer to **CEMP-R**) and the AGL *Community Consultation Plan Broken Hill and Nyngan Solar Plants*.

### 3.2 Complaints Management Process

The process for managing complaints will be generally as follows:

- 1. First Solar receives a complaint (written or verbal directly, or via the Applicant)
- 2. The complaint is referred to the Site Environmental Advisor to assign a sequential number to the complaint and recorded it in the Complaints Register (Form-P01 attached)
- 3. Where a complaint has been made directly to First Solar, AGL as the Applicant will be notified of the receipt of a complaint
- 4. The Site Environmental Advisor will record the details and information on a Complaint Record (Form-P02);
- 5. In accordance with Condition C14, the following information will be collected:
  - Date and time, of the complaint
  - 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 action(s) taken in relation to the complaint, including timeframes for implementing the action
  - If no action was taken in relation to the complaint, the reason(s) why no action was taken
  - Follow up and close off date for complaint
- 6. Investigation of the complaint will be assigned to a relevant person for investigation in coordination with the Site Environmental Advisor
- 7. All complaints are to be addressed as soon as possible or within 48 hours of receiving the complaint
- 8. The complainant shall be notified of the outcome of the complaint by the Applicant (AGL)
- 9. The Site Environmental Advisor will sign off on the Complaint Record (**Form-P02**) when the complaint has been appropriately addressed or completed
- 10. The completed Complaint Record (Form-P02) shall be noted and filed by the Site Environmental Advisor

Where a complaint cannot be investigated / closed out by the Site Environmental Advisor, the issue will be raised to the attention of the Site Project Manager.



### **3.3** Verbal Complaints Received by Construction Personnel

The following actions shall be undertaken in the event that a verbal complaint is received directly by any construction personnel:

- 1. The person receiving the complaint shall:
  - acknowledge the complaint and advise that it will be referred to the relevant person
  - collect contact details
  - make the complainant aware of the formal mechanisms for lodging a complaint and the contact details for this
  - encourage the complainant to lodge this and future complaints via the available methods (phone, mail or email).
- 2. If applicable, the person receiving the complaint shall advise their immediate supervisor as soon as possible.
- 3. The supervisor shall notify the Site Environmental Advisor and Construction Manager of the receipt of a complaint as soon as possible to ensure compliance with reporting timeframes.
- 4. If a valid complaint relating to dust generation is received directly by Construction Personnel, the Construction Personnel shall stop the activity immediately. The Construction Personnel shall address dust management in accordance with Section 3 of the *Air Quality Management Plan* (refer to **CEMP-N**)
- 5. The Site Environmental Advisor shall follow up the complaint. The Complaints Procedure outlined in Section 3.2 will then be followed during the management of complaints.

## 4 **Responsibilities**

#### AGL Project Manager

- Provide initial response to complainant within 48 hours (in accordance with Condition C15)
- Provide detailed response to complainant within 14 days of the complaint (in accordance with Condition C15)

#### Site Construction Manager

- Completion of Worker Environmental Awareness and Compliance Training
- Advising the Site Environmental Advisor of any complaints received
- Working with the Site Environmental Advisor as required to resolve complaints
- Directing corrective action if required within two weeks
- Liaising with the Applicant (AGL) upon the receipt of complaints



#### Site Environmental Advisor

- Completion of Worker Environmental Awareness and Compliance Training
- Completion of Complaint Register (Form-P01) and Complaint Record (Form-P02)
- Follow up and sign off of Complaint Record
- Provide a detailed response to the AGL Project Manager
- Maintenance of complaint records
- Directing corrective action if required
- Working with the Construction Manager as required to resolve complaints
- Liaising with the Applicant (AGL) upon the receipt of complaints

#### Supervisors

- Completion of Worker Environmental Awareness and Compliance Training
- Referring all complaints to the Site Environmental Advisor

#### **Construction Crew, Contractors and Sub-contractors**

- Completion of Worker Environmental Awareness and Compliance Training
- Referring any directly received verbal complaints to their Supervisor

### 5 Records

- Worker Environmental Awareness and Compliance Training Form-S01 (refer to CEMP-S Worker Environmental Awareness and Compliance Training)
- Complaint Register Form-P01 (attached)
- Complaint Record Form-P02 (attached)
- Incident Report Form-Q02 (refer to CEMP-Q Incident Management Protocol)





#### FORM P01 – Complaints Register

| Complaint No. | Date | Nature of Complaint |
|---------------|------|---------------------|
|               |      |                     |
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FORM P02 – Complaints Record

| Complaint Number   | Date: Time: Complaint Number: |              |         |    |  |  |  |  |
|--------------------|-------------------------------|--------------|---------|----|--|--|--|--|
| Activity Occurring | g on Site (e.g. civil         | works):      |         |    |  |  |  |  |
| How Complaint W    | as Lodged:                    |              |         |    |  |  |  |  |
| Telephone:         | Post:                         | Email:       | Verbal: |    |  |  |  |  |
| Other:             |                               |              |         |    |  |  |  |  |
| Complainant Deta   | ils:                          |              |         |    |  |  |  |  |
| Not provided:      |                               |              |         |    |  |  |  |  |
| Name:              |                               |              |         |    |  |  |  |  |
| Address            |                               |              |         |    |  |  |  |  |
| Phone:             | Phone: Email:                 |              |         |    |  |  |  |  |
| Preferred Method   | Preferred Method of Contact:  |              |         |    |  |  |  |  |
| Cause of Complain  | nt:<br>/ Why No Action Ta     | ken:         |         |    |  |  |  |  |
| Assigned to:       |                               | Follow up Re | quired  |    |  |  |  |  |
|                    |                               |              |         |    |  |  |  |  |
| Close Off:         |                               |              | Dat     | e: |  |  |  |  |
| Signature:         |                               |              |         |    |  |  |  |  |
| Position:          |                               |              |         |    |  |  |  |  |



# CEMP-Q Incident Management Protocol Nyngan Solar PV Power Station





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| D          | 04/12/13 | Issues as Final                         | First Solar |                    |       |                              |                    |

Cited Cross References within the Document:

- 1. Appendix CEMP-J Aboriginal Heritage Management Plan
- 2. Appendix CEMP-K Historic Heritage Management Plan
- 3. Appendix CEMP-S Worker Environmental Awarenesss and Compliance Training



## 1 Purpose

This Incident Management Protocol for the Nyngan PV Power Station and associated access tracks has been prepared to meet the requirements of Condition C8 of the Nyngan Solar PV Power Station Development Consent (SSD-5355) which states:

C8. The Applicant shall notify, at the earliest opportunity, the Director-General and any other relevant agencies of any incident that has caused, or threatens to cause, material harm to the environment. For any other incident associated with the development, the Applicant shall notify the Director-General and any other relevant agencies as soon as practicable after the Applicant becomes aware of the incident. Within 7 days of the date of the incident, the Applicant shall provide the Director-General and any relevant agencies with a detailed report on the incident, and such further reports as may be requested.

## 2 Scope

### 2.1 Overview

As required by Condition C8 of the Development Consent (SSD-5355) for the Nyngan Solar PV Power Station, First Solar (Australia) Pty Ltd (First Solar) has developed the following Incident Management Protocol for the development as it relates to the activities of First Solar. Specifically this Incident Management Protocol relates to the Construction Phase of the power station and associated access tracks.

A second CEMP is being prepared for the power station's grid connection by a separate contractor. The grid connection for the Nyngan Solar PV Power Station is not under the mandate of First Solar (Australia) Pty Ltd (First Solar) and is therefore not included within the following document. Please refer to the separate grid connection / transmission line CEMP for information specific to the grid connection works.

### 2.2 Nyngan Solar PV Power Station Development

The Nyngan Solar PV Power Station will consist of a 102MW solar PV power station located approximately 10km west of Nyngan. The solar plant will occupy approximately 300 hectares of land to the north of the Barrier Highway.

First Solar (Australia) Pty Ltd have been engaged by AGL to provide engineering, procurement and construction (EPC) services. The Nyngan Solar PV Power Station will utilise First Solar's advanced cadmium telluride (CdTe) thin film photovoltaic modules. The solar modules generate electricity with no air emissions, no waste production, no water use and have one of the smallest carbon footprints of any current PV technology. Over 7,000MW of First Solar PV modules have been



installed worldwide, including at many of the world's largest solar PV plants, since beginning commercial production in 2002. First Solar has been actively involved in the Australian market since mid-2008.

The construction of the Nyngan Solar PV Power Station project is expected to commence in early 2014 and will take approximately 18 months to complete. Once constructed the Nyngan Solar PV Power Station will generate an estimated 233,000 megawatt hours (MWh) of electricity annually.

### 2.3 Notification Reporting Requirements

The Development Consent identifies incident based notification to regulators with respect to the following Conditions and Mitigation Measures:

| Condition:   | Trigger:  | Regulator:   |
|--------------|---|--|
| B30          | Unexpected Aboriginal object found  | NSW Office of Environment and Heritage (OEH)<br>Registered Aboriginal stakeholders |
| MM24         | Human skeletal remains unearthed  | NSW Police<br>NSW Office of Environment and Heritage (OEH)                         |
| B31 and MM59 | Unexpected Heritage object found  | NSW Office of Environment and Heritage (OEH)                                       |
| C8           | Incident that has caused, or threatens to cause, material harm to the environment | Director-General and "any other relevant agencies"                                 |

Not all incidents will trigger notification in accordance with Condition C8 of the Development Consent. This is discussed further in the following section.

Nofication of Aboriginal or Historic Heritage finds will be undertaken in accordance with **CEMP-J** *Aboriginal Heritage Management Plan* and **CEMP-K** *Historic Heritage Management Plan* (respectively).

## 3 Actions

### **3.1** Definition of Material Harm to the Environment

In accordance with Condition C8 of the Development Consent, an Environmental Incident is required to be notified at the earliest opportunity to the Director General and any other relevant agencies where the incident has caused, or threatened to cause, material harm to the environment.

Material harm to the environment is defined in Section 147 of the New South Wales *Protection of the Environment Operations Act 1997* as:



- (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."

### 3.2 Roles and Responsibilities

- The Applicant, as defined by the Development Consent for the Nyngan Solar PV Power Station, is the project owner AGL. The Applicant (AGL) shall be responsible for all notification to the Director-General and other relevant agencies.
- First Solar will be responsible for reporting incidents to the AGL Project Manager in accordance with this Incident Management Protocol in Section 3.3 so that the Applicant can fulfil their obligation under the development consent.
- First Solar will work with the Applicant with regards to incident reporting and any remedial action works as required.

Environmental incidents that do not cause, or threaten to cause, material harm to the environment will be managed onsite by the Site Environmental Advisor. Incident reporting for these incidents will be in accordance with Section 3.4.





#### 3.3 Environmental Incidents Process

First Solar.

### 3.4 Emergency Environmental Incident

A First Solar Site Environmental Advisor will:

- Be based at the Nyngan Solar PV Power Station site during the Construction Phase in the event of an environmental emergency that causes or has the potential to cause material harm to the environment.
- Have the authority to stop or direct work in the event of an environmental emergency.
- Be contactable on site via UHF or mobile phone. Additionally, the Site Environmental Advisor will have access to a site vehicle and spill response equipment to allow a rapid response to environmental incidents.

The responsibilities of the Site Environmental Advisor, with respect to Environmental Incidents, is included within the Worker Environmental Awareness and Compliance Training (refer to **CEMP-S**).

The onsite contact details for the Site Environmental Awareness will be made available onsite to relevant parties, including Site Supervisors.

#### 3.5 Incident report

The Site Environmental Advisor will:

- Assign a sequential number to each incident and recorded on the Incident Register (Form-Q01 attached)
- Prepare an Incident Report using **Form-Q02** (attached). Additional pages/reports will be attached to the Incident Report as required.

## 4 **Responsibilities**

The responsibilities below relate to environmental incidents that trigger the Incident Reporting requirements set out in Condition C8.

#### AGL Project Manager

- Advising the Director-General and other relevant agencies of an environmental incident
- Working with the Director-General and other agencies as required
- Working with First Solar as required to resolve environmental incidents
- Advising the Director-General and other relevant agencies when incident is resolved

#### First Solar Project Manager

- Advising the AGL Project Manager of an environmental incident at the earliest opportunity
- Working with the AGL Project Manager and Site Environmental Advisor as required to resolve incidents



• Directing corrective action if required

#### **First Solar Construction Manager**

- Completion of Worker Environmental Awareness and Compliance Training
- Advising the Site Environmental Advisor of an environmental incident
- Working with the Site Environmental Advisor as required to resolve Environmental Incidents
- Directing corrective action if required

#### First Solar Site Environmental Advisor

- Completion of Worker Environmental Awareness and Compliance Training
- Advising the First Solar Project Manager of the details of the environmental incident to facilitate notification requirements to AGL Project Manager
- Completion of Incident Register (**Form-Q01**) and Incident Report (**Form-Q02**) for submission to AGL with five days of the Incident
- Follow up and sign off of Incident Report
- Maintenance of incident records
- Directing corrective action if required

#### **Supervisors**

- Completion of Worker Environmental Awareness and Compliance Training
- Immediate onsite containment of spills as far as practicable
- Referring all incidents to the Site Environmental Advisor

#### **Construction Personnel, Contractors and Sub-contractors**

- Completion of Worker Environmental Awareness and Compliance Training
- Immediate onsite containment of spills as far as practicable
- Referring all incidents to the relevant supervisor

## 5 Records

- Worker Environmental Awareness and Compliance Training Form-S01 (refer to CEMP-S Worker Environmental Awareness and Compliance Training).
- Incident Register Form-Q01 (attached).
- Incident Report Form-Q02 (attached).





### FORM Q01 – Incidents Register

| Incident<br>No. | Date | Nature of Incident |
|-----------------|------|--------------------|
|                 |      |                    |
|                 |      |                    |
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Issued By:

### FORM Q02 (Rev D) Event Notification and Investigation Report

Date of Issue:

| Site Name:     | Company Involved: |  |
|----------------|-------------------|--|
| Location:      | Reported By:      |  |
| Date of Event: | Time of Event:    |  |
|                |                   |  |

|                 | Event Classification   |             |                |              |                      |                            |                |        |                     |                         |          |  |
|-----------------|--|-------------|----------------|--------------|----------------------|----------------------------|----------------|--------|---------------------|-------------------------|----------|--|
| Class 1 Class 2 |  |             |                |              | С                    | lass 3                     |                | Class  | s 4                 |                         | Class P1 |  |
|                 | Incident (Check one below) – Event that resulted in personal injury, vehicle or equipment damage   |             |                |              |                      |                            |                |        |                     |                         |          |  |
|                 | Personal Injury (check one)  |             | )              |              | Plant/Ve<br>Complete | hicle Damage<br>Appendix B | 2              |        | Equipme<br>Complete | nt Damage<br>Appendix B |          |  |
|                 |  | First Aid   |                |              | Damage               |                            |                |        | Dama                | ge                      |          |  |
|                 | Medical Treatment  |             |                | description: |                      |                            |                | descri | ption:              |                         |          |  |
|                 |  | Lost Tim    | e              |              | \$ estim             | ate                        |                |        | \$ estir            | mate                    |          |  |
|                 | <b>Near Miss</b> – Actions occurring which had the potential, but did not result in personal injury or equipment damage (complete App C) |             |                |              |                      |                            |                |        |                     |                         |          |  |
|                 | Envi   | ronmental - | - Actions that | t resulted   | d in an a            | adverse in                 | npact to the e | enviro | nment               |                         |          |  |

Event Description (initial information summary)

#### **Initial Corrective Actions Taken**

| Corrective Action Taken (include Work Order Number, if applicable): | Responsible Person | Completion Date | Date Completed |
|---|--------------------|-----------------|----------------|
|   |                    |                 |                |
|   |                    |                 |                |
|   |                    |                 |                |
|   |                    |                 |                |
|   |                    |                 |                |
|   |                    |                 |                |



Issued By:

Date of Issue:

| Personnel Notified (notify Site Construction Manager and Site Safety Manger) |           |           |  |  |  |
|--|-----------|-----------|--|--|--|
| Name   | Job Title | Date/Time |  |  |  |
|  |           |           |  |  |  |
|  |           |           |  |  |  |
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|  |           |           |  |  |  |
|  |           |           |  |  |  |

Based on the type of event, additional information may be required. **GO TO** the appropriate Appendix and follow instructions.



Issued By:

Date of Issue:

#### Detailed Events Sequence Immediately Before, During and After the Incident

| Time | Event |
|------|-------|
|      |       |
|      |       |
|      |       |
|      |       |
|      |       |
| Time | Event |
|      |       |
|      |       |
|      |       |
|      |       |
| Time | Event |
|      |       |
|      |       |
|      |       |
|      |       |
|      |       |
|      | Time  |



Issued By:

Date of Issue:

| Event Photos<br>Provide photos of accident scene if applicable |  |  |  |  |
|--|--|--|--|--|
| Photo Date:  |  |  |  |  |
| Time of Day:   |  |  |  |  |
| Location:  |  |  |  |  |
| Brief Description:   |  |  |  |  |
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| Photo Date:  |  |  |  |  |
| Time of Day:   |  |  |  |  |
| Location:  |  |  |  |  |
| Brief Description:   |  |  |  |  |
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Issued By:

Date of Issue:

|                     | Direct Cause and Causal Factors:<br>Utilize Root Cause Analysis method in determining causal factors |
|---------------------|--|
| Direct Cause:       |  |
| •                   |  |
| Causal Factors:     |  |
| 1. Name factor here |  |
| 1. Description      |  |
| 2. Name factor here |  |
| 1. Description      |  |
| 3. Name factor here |  |
| 1. Description      |  |

| Corrective Actions Plan – to prevent reoccurrence                        |                    |                 |                |  |  |
|--|--------------------|-----------------|----------------|--|--|
| Corrective Action To Be Taken (include Work Order Number if applicable): | Responsible Person | Completion Date | Date Completed |  |  |
|  |                    |                 |                |  |  |
|  |                    |                 |                |  |  |
|  |                    |                 |                |  |  |
|  |                    |                 |                |  |  |

| This investigation form is intended to ensure the employee is cared for properly, all steps are followed, causal factors are determined and actions are identified to prevent recurrence. When complete please return to the EHS Department. |  |       |  |
|--|--|-------|--|
| Supervisor (Print/Sign):   |  | Date: |  |
| Site Manager (Print/Sign):   |  | Date: |  |
| Safety (Print/Sign):   |  | Date: |  |



# CEMP-R Community Consultation Plan Nyngan Solar PV Power Station





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| С          | 04/12/13 | Issued as Final                         | First Solar |                    |       |                              |                    |
|            |          |   |             |                    |       |                              |                    |

Cited Cross References within Document:

- Appendix CEMP-E Soil and Water Management Plan
- Appendix CEMP-N Air Quality Management Plan
- Appendix CEMP-P Complaints Management Protocol



## 1 Purpose

This Community Consultation Plan for the Nyngan Solar PV Power Station and associated access tracks has been prepared to meet the requirements of:

- The Nyngan Solar PV Power Station Development Consent (SSD-5355)
  - Condition C10
  - Condition C11
  - Condition C12
- The Nyngan Solar Plant Submissions Report (NGH Environmental, June 2013)
  - Mitigation Measure 46
  - Mitigation Measure 47
  - Mitigation Measure 49
  - Mitigation Measure 50
  - Mitigation Measure 51

## 2 Scope

#### 2.1 Overview

As required by Mitigation Measure 49 of the Nyngan Solar Plant Submissions Report, First Solar (Australia) Pty Ltd (First Solar) has developed the following Community Consultation Plan for the development as it relates to the activities of First Solar. Specifically this Community Consultation Plan relates to the Construction Phase of the power station and associated access tracks.

A second CEMP is being prepared for the power station's grid connection by a separate contractor. The grid connection for the Nyngan Solar PV Power Station is not under the mandate of First Solar (Australia) Pty Ltd (First Solar) and is therefore not included within the following document. Please refer to the separate grid connection / transmission line CEMP for information specific to the grid connection construction works.

Responsibility for Community Consultation remains with the Applicant (AGL) during the Construction Phase. First Solar has adapted the following Consultation Plan from the AGL *Community Consultation Plan Broken Hill and Nyngan Solar Plants*. First Solar will work closely with AGL during the Construction Phase for the Nyngan Solar PV Power Station to ensure compliance with the community consultation requirements set out in the Development Consent and the Nyngan Solar Plant Submissions Report.



### 2.2 Nyngan Solar PV Power Station Development

The Nyngan Solar PV Power Station will consist of a 102MW solar PV power station located approximately 10km west of Nyngan. The solar plant will occupy approximately 300 hectares of land to the north of the Barrier Highway.

First Solar (Australia) Pty Ltd have been engaged by AGL to provide engineering, procurement and construction (EPC) services. The Nyngan Solar PV Power Station will utilise First Solar's advanced cadmium telluride (CdTe) thin film photovoltaic modules. The solar modules generate electricity with no air emissions, no waste production, no water use and have one of the smallest carbon footprints of any current PV technology. Over 7,000MW of First Solar PV modules have been installed worldwide, including at many of the world's largest solar PV plants, since beginning commercial production in 2002. First Solar has been actively involved in the Australian market since mid-2008.

The construction of the Nyngan Solar PV Power Station project is expected to commence in early 2014 and will take approximately 18 months to complete. Once constructed the Nyngan Solar PV Power Station will generate an estimated 233,000 megawatt hours (MWh) of electricity annually.

### 2.3 Relevant Approval Conditions

The approval provisions for the Nyngan Solar PV Power Station relevant to the Community Consultation Plan are as follows:

Condition C10 of the Nyngan Solar PV Power Station Development Consent (SSD-5355) states:

C10. Subject to reasonable confidentiality requirements, the Applicant shall make all documents required under this consent available for public inspection on request.

Condition C11 of the Development Consent States:

- C11. Prior to the commencement of construction, the Applicant shall establish a dedicated website or maintain dedicated pages within its existing website for the provision of electronic information associated with the development. The Applicant shall publish and maintain up-to-date information on this website or dedicated pages including, but not necessarily limited to:
  - (a) The status of the development
  - (b) A copy of this consent and any future modification to this consent
  - (c) A copy of each relevant environmental consent, licence or permit required and obtained in relation to the development
  - (d) A copy of each plan, report, or monitoring program required by this consent; and



(e) Details of the outcomes of the compliance reviews and audits of the development.

Condition C12 of the Development Consent states:

- C12. Prior to the commencement of construction, the Applicant shall prepare and implement a Community Information Plan which sets out the community consultation and consultation processes to be implemented during construction and operation of the development. The Plan shall include but not be limited to:
  - (a) Procedures to inform the local community of planned investigations and construction activities, including blasting works (if any);
  - (b) Procedures to inform the relevant community of construction traffic routes and any potential disruptions to traffic flows and amenity impacts;
  - (c) Procedures to consult with local landowners / residents with regard to construction traffic to ensure the safety of livestock and to limit disruption to livestock movements;
  - (d) Procedures to inform the community where work outside the construction hours specified in condition B22, in particularly noisy activities, has been approved; and
  - (e) Procedures to inform and consult with the relevant landowner to rehabilitation impacted land.

Mitigation Measure 46 states:

- 46. Consultation with neighbouring landowners regarding any temporary impacts to access or risks to livestock. Additional specific mitigation may be required such as:
  - Additional fencing to protect livestock from collision risks
  - Vehicle speed restrictions on access roads
- 47. Consultation with mineral stakeholders would be undertaken to inform them of the timing of works and final infrastructure layout.
- 49. A Community Consultation Plan would be developed to manage impacts to community stakeholders, including but not limited to:
  - Protocols to keep the community updated about the progress of the project and project benefits.
  - Protocol to inform relevant stakeholders of potential impacts (haulage, noise etc)
  - Protocols to respond to any complaints received
- 50. Liaise with local industry representatives to maximise the use of local contractors, manufacturing facilities, materials.



51. Liaise with local representatives regarding accommodation options for staff, to minimise adverse impacts on local services.

## 3 Actions

### 3.1 **Provision of Electronic Information**

In order to facilitate AGL meeting its requirements under Condition C11 of the Development Consent, First Solar will provide AGL with the following information in order to meet this requirement:

- The status of the development
- Any additional licences or permits sought as part of the development of the Nyngan Solar PV Power Station
- A copy of each plan required to be provided by First Solar under the Development Consent
- Information on the outcomes of compliance reviews and audits of the Nyngan Solar PV Power Station development

The above information will be made available, at the discretion of AGL (in accordance with Condition C10 of the Development Consent), on the dedicated AGL Nyngan Solar PV Power Station website.

### 3.2 Community Information Plan

In accordance with Condition C12, AGL will implement a Community Information Plan. First Solar will provide AGL with the following information in order to meet this requirement:

- Information on construction traffic expectations and scheduling
- Information on construction traffic routes and potential disruptions to traffic flows
- Information (as required) to meet landowner notification requirements regarding work scheduling, including out of hours work

### 3.3 Key Stakeholders

In accordance with the AGL Community Consultation Management Plan, First Solar will provide suitable representatives from the project team to meet with key stakeholders as required by AGL.

Key stakeholders may include, but are not limited to, the following:

- Neighbouring landowners
- Bogan Shire Council



- Mineral Stakeholders (Mitigation Measure 47)
- Community groups, e.g. Chambers of Commerce, Service Groups and other community groups

In relation to Mitigation Measure 46, please refer to **CEMP-E** *Soil and Water Management Plan*, **CEMP-N** *Air Quality Management Plan* and the First Solar *Vehicle Movement Plan* (part of the First Solar *Project Site Safety Plan*) for further information relating to vehicle speeds on access roads during the Construction Phase for the Nyngan Solar PV Power Station.

### **3.4** Use of Local Companies and Accommodation

To minimise impact on local accommodation providers, First Solar will develop an appropriate construction camp to house works during the Construction Phase in accordance with Mitigation Measure 51.

In accordance with Mitigation Measure 50, First Solar is committed to engaging and utilising local contractors, manufacturing facilities and materials during the construction of the Nyngan Solar PV Power Station and associated access tracks.

### 3.5 Complaints Procedure

In accordance with Condition C13 of the Development Consent, AGL will provide the following:

- Project 24 hour telephone number
- Project postal address
- Project email address

This information will be publicly advertised by AGL in accordance with the requirements of the Development Consent.

During the Construction Phase First Solar will work with AGL to address any concerns / complaints raised by the public via the above contact mechanisms.

Further information on the First Solar Complaints Management Protocol is available in CEMP-P.

## 4 **Responsibilities**

#### Site Project Manager

- Attendance at key stakeholder meetings (as requested by AGL)
- Attendance at community meetings (as requested by AGL)
- Liaising with the AGL Project Manager with regards to AGL's Community Consultation Program


• Providing AGL with project information requested in accordance with the Development Consent

#### Site Construction Manager

- Attendance at key stakeholder meetings (as requested by AGL)
- Attendance at community meetings (as requested by AGL)
- Updating the Site Environmental Advisor with regards to construction timelines
- Advising the Project Manager and Site Environmental Advisor of upcoming activities that may require community consultation
- Complaints Management in accordance with the responsibilities outlined in **CEMP-P** Complaints Management Protocol

#### Site Environmental Advisor

- Attendance at key stakeholder meetings (as requested by AGL)
- Attendance at community meetings (as requested by AGL)
- Providing AGL with information pertaining to the development in accordance with the requirements of the Development Consent
- Complaints Management in accordance with the responsibilities outlined in **CEMP-P** Complaints Management Protocol

# 5 Records

- Complaints Register Form P01(refer to CEMP-P Complaints Management Protocol)
- Complaints Record Form P02 (refer to CEMP-P Complaints Management Protocol)





# CEMP-S Worker Environmental Awareness and Compliance (WEAC) Training Nyngan Solar PV Power Station





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#### **Document Control**

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| А          | 25/10/13 | Issued for FS review  | Geolyse     | SF                             | 25/11              | JS                           | 26/11              |
| В          | 26/11/13 | Issued for Beca review<br><br>Issued for AGL and<br>Project ER review | First Solar | Beca<br><br>Michael<br>Woolley | 02/12<br><br>29/11 | SF<br><br>Michael<br>Woolley | 02/12<br><br>02/12 |
| С          | 04/12/13 | Issued as Final   | First Solar |                                |                    |                              |                    |

Cited Cross References within Document:

- 1. Appendix CEMP-E Soil and Water Management Plan
- 2. Appendix CEMP-F Flora and Fauna Management Plan
- 3. Appendix CEMP-U Waste Management Plan
- 4. Appendix CEMP-V Dangerous Goods and Spill Response Plan



# 1 Purpose

This Worker Environmental Awareness and Compliance Training Procedure (WEAC Training) for the Nyngan Solar PV Power Station has been prepared to meet the requirements of:

- The Nyngan Solar PV Power Station Development Consent (SSD-5355)
  - Condition A10
  - Condition A11
  - Condition C16(f)
- Nyngan Solar Plant Submissions Report (NGH Environmental, June 2013)
  - Mitigation Measure 26

# 2 Scope

### 2.1 Overview

As required by the Development Consent (SSD-5355) for the Nyngan Solar PV Power Station, First Solar (Australia) Pty Ltd (First Solar) has developed the following WEAC Training Procedure for the development as it relates to the activities of First Solar. Specifically this WEAC Training Procedure relates to the Construction Phase of the power station and associated access tracks.

A second CEMP is being prepared for the power station's grid connection by a separate contractor. The grid connection for the Nyngan Solar PV Power Station is not under the mandate of First Solar (Australia) Pty Ltd (First Solar) and is therefore not included within the following document. Please refer to the separate grid connection / transmission line CEMP for information specific to the grid connection construction works.

### 2.2 Nyngan Solar PV Power Station Development

The Nyngan Solar PV Power Station will consist of a 102MW solar PV power station located approximately 10km west of Nyngan. The solar plant will occupy approximately 300 hectares of land to the north of the Barrier Highway.

First Solar (Australia) Pty Ltd have been engaged by AGL to provide engineering, procurement and construction (EPC) services. The Nyngan Solar PV Power Station will utilise First Solar's advanced cadmium telluride (CdTe) thin film photovoltaic modules. The solar modules generate electricity with no air emissions, no waste production, no water use and have one of the smallest carbon footprints of any current PV technology. Over 7,000MW of First Solar PV modules have been installed worldwide, including at many of the world's largest solar PV plants, since beginning



commercial production in 2002. First Solar has been actively involved in the Australian market since mid-2008.

The construction of the Nyngan Solar PV Power Station project is expected to commence in early 2014 and will take approximately 18 months to complete. Once constructed the Nyngan Solar PV Power Station will generate an estimated 233,000 megawatt hours (MWh) of electricity annually.

### 2.3 Relevant Approval Conditions

The approval provisions for the Nyngan Solar PV Power Station relevant to the WEAC Training Procedure are as follows:

Condition A10 of the Nyngan Development Consent states:

A10. The Applicant shall ensure that employees, contractors and sub-contractors are aware of, and comply with, the conditions of this consent relevant to their respective activities.

Condition A11 of the Development Consent states:

A11. The Applicant shall be responsible for environmental impacts resulting from the actions of all persons that it invites onto the site, including contractors, sub-contractors and visitors.

Condition C16(f) of the Development Consent states:

C16(f). Provisions for ensuring all employees, contractors and sub-contractors are aware of, and comply with, the conditions of this consent relevant to their respective activities.

Mitigation Measure 26 states:

26. The employee and contractor induction would inform all site personnel about noise management measures, construction hours and nearest sensitive receivers.

# **3** Objectives

The objectives of the First Solar Worker Environmental Awareness and Compliance Training (WEAC Training) programme are to:

- Ensure that all site personnel aware of, and comply with, the conditions of the Development Consent
- Ensure that all site personnel are aware of their responsibilities with respect to environmental compliance
- Meet the Development Consent requirements set out in Section 2.3 (above)



# 4 WEAC Training Targets

It is the aim of the First Solar WEAC Training programme to ensure that all employees, contractors and sub-contractors receive (where applicable):

- 1. Site specific Environmental Awareness Induction
- 2. Site specific Environmental Compliance Training

The purpose of the WEAC Training is to help First Solar meet the CEMP Objectives and Targets outlined in Section 5 of the CEMP parent document, with respect to environmental compliance.

# 5 WEAC Training

## 5.1 Onsite Personnel

As identified within Section 11 *Induction* of the First Solar *Project Site Safety Plan*, onsite personnel includes:

- Employees
- Contractors (including sub-contractors)
- Visitors
- Non-Inducted Delivery Drivers

Visitors are defined under the *Project Site Safety Plan* as:

"A person who attends the Project Site solely to conduct a site inspection, attend a meeting etc".

No visitor shall be permitted to conduct any form of physical labour whilst on site. Activities are restricted to office based work and observation whilst in the field.

Regular visitors to the site will be expected to be undertake a full site induction. Regular visitors may include office based employees.

## 5.2 Environmental Awareness Site Inductions

#### 5.2.1 Overview

The follow site inductions will be available:

- 1. Employee and Contractor Environmental Awareness
- 2. Visitor Environmental Awareness
- 3. Non-Inducted Delivery Driver Environmental Awareness



All inductions will be specific to the Nyngan site and will vary in content subject to the audience. For example, the Employee and Contractor Environmental Awareness will be more detailed than the induction for Visitors.

Site Environmental Awareness Inductions will be required to be undertaken prior to beginning work.

#### 5.2.2 Content

Site Environmental Inductions will include, but not be limited to, the following:

- Project environmental compliance obligations
- Potential consequences of non-conformance
- An overview of the CEMP and key requirements
- Specific emphasis on requirements / procedures relating to:
  - Aboriginal heritage
  - Air quality (dust) management
  - Complaints management
  - Fauna interactions
  - Ground cover management
  - Habitat disturbance
  - Historical heritage
  - Noise management (as required by Mitigation Measure 26)
  - Incident management and spill response
  - Soil and water management
  - Waste Management
- Emergency procedures, including site contacts
- Environmental risks associated with the construction activities (as identified in Section 3.5 of the CEMP parent document)
- The potential environmental impacts associated with specific construction activities

Onsite traffic management will form part of the Health and Safety Induction for the site. Onsite traffic management is captured within the First Solar *Vehicle Movement Plan* which forms part of the Nyngan *Project Site Safety Plan*.

All personnel completing the Worker Environmental Awareness Inductions will be asked to fill in **Form-S01**.



# 5.3 Environmental Compliance Training

Two types of training are captured under the Training component of the First Solar WEAC Training system.

- 1. General WEAC Training
- 2. Activity Specific WEAC Training

Environmental Compliance Training may be provided to onsite personnel in various ways, including:

- Daily pre-start meetings
- Toolbox meetings
- Activity specific training sessions with relevant personnel
- Notices or posters

Training will include both scheduled and non-scheduled training (e.g. in response to an incident).

Onsite activities will be monitored by the Site Environmental Advisor and training opportunities will be identified in consultation with the Site Construction Manager and relevant onsite personnel.

All personnel completing the Worker Environmental Compliance Training will be asked to fill in a **Form-S02**.

#### 5.3.1 General Environmental Compliance Training

General Compliance Training will be undertaken to a larger audience, e.g. at a pre-start or toolbox meeting. This training will include environmental compliance obligations that are relate to all onsite personnel.

General Compliance Training will be used to communicate changes to the Environmental Awareness Induction to ensure that this information is made available to existing onsite personnel.

#### 5.3.2 Activity Specific Environmental Compliance Training

In accordance with Condition C16(f), Activity Specific Compliance Training will be targeted. This type of training will be utilised ensure that onsite personnel are made aware of, and comply with, the conditions of the Development Consent that are relevant to their respective activities.

For example, personnel associated with vegetation removal will be made aware of the requirements within **CEMP-F** *Flora and Fauna Management Plan* with respect to fauna interactions, Hollow Bearing Trees and Coarse Woody Debris. Other Activity Specific Environmental Compliance Training may include:

- Erosion and sediment control (**CEMP-E** *Soil and Water Management Plan*)
- Waste management (CEMP-U Waste Management Plan)



- Spill response (CEMP-V Dangerous Goods and Spill Response)
- Storage of dangerous / hazardous substances (CEMP-V Dangerous Goods and Spill Response)

Specific training needs will be identified by the Site Environmental Advisor in consultation with the Site Construction Manager and Site Supervisors.

### 5.4 WEAC Training Review

The First Solar Site Environmental Advisor will be responsible for ensuring that the WEAC Training is up-to-date and relevant to onsite activities.

Circumstances that may require the WEAC Training will be reviewed and updated, include the following:

- Where there is a change to environmental controls and procedures outlined within the CEMP (e.g. in response to changes to the CEMP post a CEMP review under **CEMP-T** *CEMP Audit and Review*)
- Where there is a change to the construction layout or methodology
- In response to changes to the construction schedule
- In response to a change to the First Solar *Project Site Safety Plan* (where this impacts onsite environmental management controls and procedures).

The purpose of a review of the WEAC Training is to ensure that First Solar can continue to meet the Objectives for the WEAC Training (refer to Section 3).

# 6 **Responsibilities**

#### All Site Personnel

- Completion of Worker Environmental Awareness and Compliance Training
- Attendance at daily pre-start meeting and toolbox meetings
- Compliance with Development Consent Conditions relevant to their respective activities
- Request Activity Specific Environmental Compliance Training via the Site Supervisors, Site Construction Manager or directly with the Site Environmental Advisor

#### Site Environmental Advisor

- Lead / facilitate environmental inductions for all site personnel
- Lead / facilitate environmental training for all site personnel



- Update environmental inductions / training (as required)
- Work with the Site Construction Manager and Site Supervisors to identify Activity Specific Environmental Compliance Training opportunities
- Raise environmental awareness onsite
- Manage documentation for WEAC Training (Form-S01 and Form-S02).

# 7 Records

- Completion of Worker Environmental Awareness Induction recorded on Form-S01 (attached).
- Completion of Work Environmental Compliance Training recorded on Form-S02 (attached).





## FORM-S01: Environmental Awareness Induction Register

| Date | Name | Organisation | Signed<br>I confirm that I have received Environmental Awareness Induction |
|------|------|--------------|--|
|      |      |              |  |
|      |      |              |  |
|      |      |              |  |
|      |      |              |  |
|      |      |              |  |
|      |      |              |  |
|      |      |              |  |
|      |      |              |  |
|      |      |              |  |
|      |      |              |  |
|      |      |              |  |

Photocopy form as required.



## FORM-S02: Environmental Compliance Training Register

| Date | Name | Organisation | Training Topic | Signed<br>I confirm that I have received training |
|------|------|--------------|----------------|---|
|      |      |              |                |   |
|      |      |              |                |   |
|      |      |              |                |   |
|      |      |              |                |   |
|      |      |              |                |   |
|      |      |              |                |   |
|      |      |              |                |   |
|      |      |              |                |   |
|      |      |              |                |   |
|      |      |              |                |   |

Photocopy form as required.



# CEMP-T CEMP Auditing and Review Nyngan Solar PV Power Station





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| А          | 25/10/13 | Issued for FS review                    | Geolyse     | SF                 | 10/11 | JS                           | 11/11              |
| В          | 11/11/13 | Issued for Beca Review                  | First Solar | Веса               | 15/11 | SF                           | 15/11              |
| C          | 15/11/13 | Issued for AGL and<br>Project ER review | First Solar | Michael<br>Woolley | 21/11 | SF<br><br>Michael<br>Woolley | 29/11<br><br>29/11 |
| D          | 04/12/13 | Issued as Final                         | First Solar |                    |       |                              |                    |
|            |          |   |             |                    |       |                              |                    |

Cited Cross References within Document:

- 1. Appendix CEMP-B Environmental Management Activities
- 2. Appendix CEMP-Q Incident Management Protocol
- 3. Appendix CEMP-S Worker Environmental Awareness and Compliance Training



# 1 Purpose

Regular review and audit of the First Solar CEMP to ensure:

- Effective implementation of the CEMP
- Relevance of the environmental controls and procedures contained within the CEMP to the Construction Phase of the Nyngan Solar PV Power Station
- To identify opportunities to improve the controls and procedures contain within the CEMP
- To ensure that the CEMP audit and review is undertaken in accordance with the Applicant's Environmental Management Systems

# 2 Actions

## 2.1 CEMP Audits

- 1. An audit of the First Solar Nyngan CEMP implementation and effectiveness shall be undertaken:
  - After three months from the commencement of construction
  - Every 6 months thereafter until the conclusion of the Construction Phase
  - Voluntarily if required, e.g. following the implementation of corrective actions
- 2. The CEMP audits shall be undertaken by the First Solar Environmental Manager in consultation (as required) with:
  - First Solar National HSE Manager
  - First Solar Project Manager
  - First Solar Construction Manager
  - First Solar Site Environmental Advisor
  - AGL's Project Manager
  - AGL's Environmental Representative (engaged in accordance with Condition C1)
  - Relevant stakeholders (if applicable)
- 3. The audit shall include, but not be limited to, the following
  - Determine whether or not the First Solar CEMP has been effectively implemented and maintained.
  - Check and confirm that all actions listed in **CEMP-B** are being completed and signed off (refer to **CEMP-B** *Environmental Management Activities*) by the Site Environmental Advisor.



- Evaluate the implementation of the First Solar CEMP against the Objectives and Targets outlined in Section 5 of the CEMP (overarching document).
- Check that the routine site records are being maintained and filed by the Site Environmental Advisor.
- Review of the CEMP Review's being undertaken by the Site Environmental Advisor to ensure that the reviews are being undertaken in accordance with this plan.
- Review of Incident Management (**CEMP-Q** *Incident Management Protocol*) to ensure that reporting requirements, incident investigations and incident close outs are occurring in accordance with the CEMP.
- Review of compliance against the documentation identified in Condition A2 (as it relates to the Construction Phase and the activities of First Solar), including a review of compliance against the Development Consent Conditions.
- Discuss implementation of the CEMP with the First Solar Construction Manager and First Solar Environmental to confirm all elements of the CEMP remain applicable.
- Check that there are no outstanding follow-up actions that have yet to be closed off
- CEMP audits will be recorded on Form-T01 (see attached).
- 4. The final detail of the CEMP audit will be developed in consultation with the Project Environmental Representative.
- 5. Results of the CEMP audit shall be provided to the persons identified in bullet point 2 above.
- 6. Results of the CEMP audit shall be provided to the Site Environmental Advisor for site based implementation (where applicable).

### 2.2 CEMP Review

- 1. The Site Environmental Advisor shall undertake a review of the First Solar Nyngan CEMP in response to:
  - Each CEMP audit
  - As required, throughout the Construction Phase where there is a change to the construction schedule, the site layout or a change in the construction methodology.
  - As required, throughout the Construction Phase where site based conditions require a change to the environmental controls and procedures identified within the CEMP.
  - As required, throughout the Construction Phase in response to an environmental incident.
  - As required, throughout the Construction Phase when directed to by the First Solar National HSE Manager, the First Solar Environmental Manager or AGL's Environmental Representative.



- 2. The CEMP review shall consider the environmental controls and procedures set out within the First Solar CEMP (inclusive of the appendices) to make sure the environmental controls and procedures remain applicable to the activities being carried out.
- 3. Any recommendations from the review will be issued to the National HSE Manager and First Solar Environmental Manager for communication to relevant stakeholders.
- 4. A Change Management process will be put in place (where required) to ensure the effective communication of changes to the CEMP to relevant stakeholders, including onsite personnel and management.
- 5. If required, additional onsite Worker Environmental Awareness and Compliance Training will be conducted for existing onsite personnel. Where a change is made to the CEMP, **CEMP-S** *Worker Environmental Awareness and Compliance Training* will be updated to ensure the information within the Worker Environmental Awareness and Compliance Training is up to date.
- 6. Any changes to the CEMP or the CEMP appendices will be version controlled within each document (as applicable).
- 7. Updated versions of the CEMP (including relevant appendices) will be circulated to all CEMP holders via the approved document management system and communicated at tool box meetings.
- 8. CEMP reviews will be recorded on **Form-T01** (see attached).

# **3** Responsibilities

#### **Project Environmental Representative**

- Ensure that environmental auditing is undertaken by First Solar in accordance with the CEMP
- Signing off minor corrective actions identified during CEMP Audit or Review for inclusion in the CEMP (in accordance with Condition C1).
- Consult on the final detail for CEMP audit checklist

#### First Solar National HSE Manager

• Signing off corrective actions identified during CEMP Audit or Review for inclusion in the CEMP

#### First Solar Environmental Manager

- CEMP audits
- Consult with the Project Environmental Representative during the development of the CEMP audit checklist



- Providing results of audits to:
  - First Solar National HSE Manager
  - First Solar Site Project Manager
  - First Solar Site Construction Manager
  - First Solar Site Environmental Advisor
  - AGL's Project Manager
  - AGL's Environmental Representative (engaged in accordance with Condition C1)
  - Relevant stakeholders (if applicable)
- Signing off the implementation of corrective actions identified during CEMP Audit or Review

#### First Solar Site Environmental Advisor

- CEMP reviews.
- Undertaking updates to the CEMP
- Site based communication of CEMP updates
- Implementation of corrective actions identified during CEMP Audit or Review
- Implementation of actions in response to independent audits (i.e. external to AGL and First Solar)
- Undertaking additional site based Worker Environmental Awareness and Compliance Training (in accordance with **CEMP-S** *Worker Environmental Awareness and Compliance Training*) for onsite personnel

# 4 Records

• Records of CEMP reviews and audits are maintained on Form-T01 (attached)





## FORM T01 – CEMP Auditing and Review Record Form

| Date    | Type<br><sup>e</sup> Review Audit |   | Completed By   | Any Non-Compliances<br>(yes/no) | List CEMP<br>Sections | Actions Required |
|---------|-----------------------------------|---|----------------|---------------------------------|-----------------------|------------------|
|         |                                   |   |                |                                 |                       |                  |
| Date Ac | tions Closed:                     | : | Signed off By: |                                 | Position:             |                  |
|         |                                   |   |                |                                 |                       |                  |
| Date Ac | tions Closed:                     | : | Signed off By: |                                 | Position:             |                  |
|         |                                   |   |                |                                 |                       |                  |
| Date Ac | tions Closed:                     | : | Signed off By: |                                 | Position:             |                  |
|         |                                   |   |                |                                 |                       |                  |
| Date Ac | tions Closed:                     | : | Signed off By: |                                 | Position:             |                  |
|         |                                   |   |                |                                 |                       |                  |
| Date Ac | tions Closed                      | : | Signed off By: |                                 | Position:             |                  |



# CEMP-U Waste Management Plan Nyngan Solar PV Power Station





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| В          | 11/11/13                 | Issued for Beca review                  | First Solar | Веса               | 15/11 | SF                           | 15/11              |
| C          | 15/11/13                 | Issued for AGL and<br>Project ER review | First Solar | Michael<br>Woolley | 22/11 | SF<br><br>Michael<br>Woolley | 29/11<br><br>29/11 |
| D          | 04/12/13 Issued as Final |   | First Solar |                    |       |                              |                    |
|            |                          |   |             |                    |       |                              |                    |

Cited Cross References within Document:

- 1. **CEMP-D** Weekly Site Inspections
- 2. **CEMP-E** Soil and Water Management Plan
- 3. **CEMP-S** Worker Awareness and Compliance Training
- 4. CEMP-V Dangerous Goods and Spill Response Plan



# 1 Purpose

This Waste Management Plan for the Nyngan Solar PV Power Station and associated access tracks has been prepared to meet the requirements of:

 The Nyngan Solar PV Power Station Development Consent (SSD-5355) Condition B11 Condition B12 Condition B13
 The Nyngan Solar Plant Submissions Report (NGH Environmental, June 2013) Mitigation Measure 55 Mitigation Measure 56 Mitigation Measure 57

# 2 Scope

## 2.1 Overview

As required by Mitigation Measure 55 of the *Nyngan Solar Plant Submissions Report* for the Nyngan Solar PV Power Station, First Solar (Australia) Pty Ltd (First Solar) has developed the following Waste Management Plan for the development as it relates to the activities of First Solar. Specifically this Waste Management Plan relates to the Construction Phase of the power station and associated access tracks.

A second CEMP is being prepared for the power station's grid connection by a separate contractor. The grid connection for the Nyngan Solar PV Power Station is not under the mandate of First Solar (Australia) Pty Ltd (First Solar) and is therefore not included within the following document. Please refer to the separate grid connection / transmission line CEMP for information specific to the grid connection works.

The Waste Management Plan has been developed to address concerns raised by the Bogan Shire Council (as cited within the Nyngan Submissions Report) with respect to the potential implications on the local waste management facilities during the Construction Phase. As stated in the Submissions Report, the bulk of waste generated on site will have recycling value. Waste generated during the Construction Phase will be recycled as far as practicable to minimise waste entering the local Nyngan landfill.



# 2.2 Objectives

The objectives of this Waste Management Plan are to:

- Minimise the production of waste materials and maximise reuse and recycling in accordance with the waste hierarchy.
- Maintain the site in a clean and tidy state to reduce the attraction of pest species, impacts on the local environment and negative impacts on visual amenity.
- Dispose of regulated wastes (e.g. waste oil) in accordance with Australian legislative requirements and environmental best practice (see also **CEMP-V** Dangerous Goods and Spill Response Plan).

## 2.3 Nyngan Solar PV Power Station Development

The Nyngan Solar PV Power Station will consist of a 102MW solar PV power station located approximately 10km west of Nyngan. The solar plant will occupy approximately 300 hectares of land to the north of the Barrier Highway.

First Solar (Australia) Pty Ltd have been engaged by AGL to provide engineering, procurement and construction (EPC) services. The Nyngan Solar PV Power Station will utilise First Solar's advanced cadmium telluride (CdTe) thin film photovoltaic modules. The solar modules generate electricity with no air emissions, no waste production, no water use and have one of the smallest carbon footprints of any current PV technology. Over 7,000MW of First Solar PV modules have been installed worldwide, including at many of the world's largest solar PV plants, since beginning commercial production in 2002. First Solar has been actively involved in the Australian market since mid-2008.

The construction of the Nyngan Solar PV Power Station project is expected to commence in early 2014 and will take approximately 18 months to complete. Once constructed the Nyngan Solar PV Power Station will generate an estimated 233,000 megawatt hours (MWh) of electricity annually.

## 2.4 Relevant Approval Conditions

The approval provisions for the Nyngan Solar PV Power Station relevant to the Waste Management plan are as follows:

Condition B11 of the Nyngan Development Consent states:

B11. All waste materials removed from the site shall only be directed to a waste management facility or premises lawfully permitted to accept the material.

Condition B12 of the Development Consent states:



B12. Waste generated outside of the site shall not be received at the site for storage, treatment, processing, reprocessing, or disposal on the site, expect as expressly permitted by a licence under the Protection of the Environment Operations Act 1977, if such a licence is required in relation to that waste.

Condition B13 of the Development Consent states:

B13. All liquid and non-liquid waste generated on the site shall be assessed and classified in accordance with Waste Classification Guidelines (Department of Environment, Climate Change and Water, 2009), or any superseding document.

Mitigation Measure 55 states:

- 55. A Waste Management Plan (WMP) would be developed to minimise wastes. It would include but not be limited to:
  - Identification of opportunities to avoid, reuse and recycle, in accordance with the waste hierarchy.
  - Quantification and classification of all waste streams.
  - Provision for recycling onsite
  - Provision of toilet facilities for onsite workers and how sullage would be disposed of (i.e. pump out to local sewage treatment plant)
  - Provision of disposal facilities permitted to accept the waste.

Mitigation Measure 56 states:

56. Excess subsoil would be removed from the site and disposed of at an appropriate fill storage site.

Mitigation Measure 57 states:

57. Excess topsoil would be retained and used in site rehabilitation.

# 3 Nyngan Waste Management Facility

The Bogan Shire Council provides local waste and recycling facilities at the Nyngan Waste Management Facility. Services include:

- 1. Recycling (e.g. glass, plastics, aluminium)
- 2. Oil recycling facility
- 3. Green waste disposal
- 4. General waste (e.g. putrescible waste)
- 5. Special waste (e.g. waste tyres)



Where practicable First Solar will use local facilities to minimise transportation and to ensure the regular removal of waste from site. First Solar will work with the Bogan Shire Council to manage onsite waste to ensure consistency of approach and to minimise impact on the Council's provision of local waste services.

# 4 Waste Types and Management

## 4.1 Overview

The following section identifies the types of waste expected to be generated from the Construction Phase of the Nyngan Solar PV Power Station, and the intended methods of disposal.

Effective onsite waste management and control is an important facet in managing:

- Onsite pests, e.g. rodents
- Human health and hygiene
- Contamination risk, e.g. from waste oils associated with plant and equipment
- Presence of onsite combustible fuel loads

Further information relating to waste management and the control of the above items will be captured in the First Solar Nyngan Site Risk Assessment (refer to the First Solar *Project Site Safety Plan*).

## 4.2 Waste Types and Disposal

**Table U1** summarises the waste types that will be generated during the Construction Phase for the Nyngan Solar PV Power Station and associated access tracks. Table U1 also lists the waste classification for each waste type in accordance with *Waste Classification Guidelines* (Department of Environment, Climate Change and Water, 2009) and how each waste type will be managed.

As required by Condition B11 of the Development Consent, First Solar has identified only waste management facilities that are lawfully permitted to accept the nominated waste type.

The disposal facilities that have been cited are indicative. Where First Solar identifies a more 'environmentally friendly' alternative to the cited disposal option these alternatives will be investigated and utilised as far as practicable.



#### Table U1 – Waste types and management

| Waste Type  | Waste<br>Classification                      | Generated from   | How managed<br>on-site  | End use  |
|---|--|--|---|--|
| Mixed putrescible<br>waste  | General solid<br>waste<br>(putrescible)      | Site personnel   | <ul> <li>Collected in<br/>strategically located<br/>mixed putrescible<br/>waste bins around<br/>the site.</li> <li>Collected on a weekly<br/>basis or as required.</li> </ul> | Nyngan Waste<br>Management<br>Facility                 |
| Dry recyclables<br>(plastic, glass<br>bottles,<br>aluminium and<br>steel cans,<br>cardboard, paper) | General solid<br>waste (non-<br>putrescible) | <ul><li>Site personnel</li><li>Construction office</li></ul>   | <ul> <li>Collected in<br/>strategically located<br/>recycling bins around<br/>the site.</li> <li>Collected on a weekly<br/>basis or as required.</li> </ul>                   | Bogan Shire Council recycling collection               |
| Cardboard   | General solid<br>waste (non-<br>putrescible) | <ul> <li>Packaging from the<br/>PV panels</li> </ul>   | <ul> <li>Compressed and<br/>bound on site using a<br/>compactor.</li> <li>Collected on a weekly<br/>basis or as required.</li> </ul>  | Recycling<br>contractor / TBC                          |
| Steel   | General solid<br>waste (non-<br>putrescible) | <ul> <li>Excess steel from post<br/>and tilt tray<br/>construction.</li> <li>Packaging straps.</li> <li>Metal brackets.</li> </ul> | <ul> <li>Stored in segregated<br/>stockpiles in laydown<br/>areas.</li> <li>Removed by steel<br/>recycling contractor<br/>on a 6 monthly basis<br/>or as required.</li> </ul> | Steel recycler   |
| Timber/wood   | General solid<br>waste (non-<br>putrescible) | • Pallets  | <ul> <li>Stored in segregated<br/>stockpiles in laydown<br/>areas.</li> <li>Removed to landfill<br/>where it cannot be<br/>recycled</li> </ul>                                | Recycled where practicable                             |
| Electrical wastes   | General solid<br>waste (non-<br>putrescible) | <ul><li>Cabling offcuts</li><li>Cable reels</li></ul>  | <ul> <li>Stored in segregated<br/>stockpiles in laydown<br/>areas.</li> <li>Removed by steel<br/>recycling contractor<br/>on a 6 monthly basis.</li> </ul>                    | Steel recycler   |
| Equipment leaks<br>mixed with soil  | General solid<br>waste<br>(putrescible)      | • Spills/leaks of<br>hydraulic fluids,<br>diesel, transformer<br>oils or machinery oil   | <ul> <li>Contaminated area<br/>dug up and bagged in<br/>appropriate regulated<br/>waste bags.</li> <li>Stored in a regulated<br/>waste bin.</li> </ul>                        | Dispose of at a<br>suitably licensed<br>waste facility |



#### Table U1 – Waste types and management

| Waste Type  | Waste<br>Classification                      | Generated from  | How managed<br>on-site  | End use  |
|---|--|---|---|--|
| Used rags mixed<br>impregnated with<br>hydraulic fluids | General solid<br>waste<br>(putrescible)      | <ul> <li>Clean-up of<br/>spills/leaks of<br/>hydraulic fluids,<br/>diesel, transformer<br/>oils or machinery oil</li> </ul>   | <ul> <li>Deposited of in<br/>regulated waste bin.</li> </ul>  | Nyngan Waste<br>Management<br>Facility   |
| Spray cans  | General solid<br>waste<br>(putrescible)      | Construction     activities   | <ul> <li>Deposited in on-site<br/>bins.</li> </ul>  | Nyngan Waste<br>Management<br>Facility   |
| Vegetation  | General solid<br>waste<br>(putrescible)      | • Clearing  | <ul> <li>Stored in segregated<br/>stockpiles in laydown<br/>areas.</li> <li>Removed to landfill.</li> </ul>   | Used on site in<br>accordance with<br>MM6.<br>or<br>Nyngan Waste<br>Depot (green<br>waste)         |
| Building rubble   | General solid<br>waste (non-<br>putrescible) | <ul> <li>Building waste</li> <li>Broken module pieces<br/>mixed with soil</li> <li>Demolition waste –<br/>mowing, grubbing<br/>and construction<br/>debris waste<br/>(concrete/wood)</li> </ul> | <ul> <li>Stored in segregated stockpiles / bins in laydown areas.</li> <li>Removed to landfill as required.</li> </ul>  | Nyngan Waste<br>Management<br>Facility   |
| Used machinery<br>oils                                  | Regulated                                    | On-site machinery<br>maintenance  | <ul> <li>Collected in drums /<br/>storage containers.</li> <li>Stored in bunded<br/>areas within the<br/>laydown area.</li> <li>Deposited of in<br/>regulated waste bin.</li> </ul> | Nyngan Waste<br>Management<br>Facility   |
| Batteries   | General solid<br>waste                       | <ul> <li>Lead acid and NiCd<br/>batteries</li> </ul>  | <ul> <li>Segregated on site<br/>and removed to<br/>landfill facility.</li> </ul>  | Nyngan Waste<br>Management<br>Facility   |
| Domestic effluent                                       | Liquid                                       | Site amenities  | <ul> <li>On-site effluent<br/>management system<br/>for main office.</li> <li>Portable chemical<br/>toilets regularly<br/>serviced under<br/>contract.</li> </ul>                   | <ul> <li>On-site disposal</li> <li>Pump out to<br/>Bogan Shire<br/>Council<br/>sewerage</li> </ul> |



## 4.3 External Waste

In accordance with Condition B12, waste generated outside of the Nyngan Solar PV Power Station site will not be received at the site for storage, treatment, processing, reprocessing, or disposal on the site.

No licence to manage external waste will apply to the project.

### 4.4 General Waste Management

- All site personnel will be advised of the Waste Management Plan in the *Worker Environmental Awareness and Compliance Training* (refer to **CEMP-S**)
- All site personnel will be encouraged to separate waste streams to maximise recycling opportunities.
- No waste burnt or buried on site.
- Combustible fuel loads will be managed onsite to ensure compliance with the *Bush Fire Management Plan* (refer to **CEMP-M**).
- Securely covered, clearly labelled segregated waste and recycling bins would be provided at strategic locations adjacent to the site construction site office(s) and amenities area.
- Site bins will be inspected weekly by the Site Environmental Advisor in accordance with **CEMP-D** Weekly Site Inspections.
- Onsite general waste and recycling bins will be emptied weekly, or as required.
- Onsite general waste and recycling bins will have lids.
- Specialist waste bins (e.g. steel, timber) will be emptied as required.
- Inspection for site litter is included in the weekly inspection checklist (refer to **CEMP-D** *Weekly Site Inspections*).
- All waste leaving the site (e.g. regulated waste) will be entered into a site waste register (Form-U01 attached). Form U01 will track the waste type, quantity etc of the waste removed from site.

## 4.5 Spoil Management

- Topsoil will be stockpiled and reused on-site for rehabilitation. Excess topsoil generated during the construction activities will be retained for use in rehabilitation in accordance with Mitigation Measure 57.
- Any excess subsoil will be removed from the site (in accordance with Mitigation Measure 56) and disposed of at the Nyngan Waste Management Facility. Excess subsoil will be recorded on Form U01.
- **CEMP-E** Soil and Water Management Plan details soil management measures.



## 4.6 Liquid Waste Management

- During the Construction Phase, flushing toilets will be available at the site buildings. The liquid waste from the flushing toilets will be captured within a holding tank and removed from site by an appropriately qualified sub-contractor for disposal at a licensed treatment facility.
- Chemical port-a-loo's will be provided at strategic locations around the site for use by Construction personnel during the day. Where possible these port-a-loo's will be located on a trailer to allow for easy redistribution. Waste from port-a-loo's will be disposed of off site at a licensed treatment facility.
- Onsite grey water generated from kitchen and shower facilities will be captured within a holding tank and removed from site by an appropriately qualified sub-contractor for disposal at a licenced treatment facility.
- Regulated liquid waste, e.g. waste oil, will be disposed of at an appropriately licenced facility (e.g. Nyngan Waste Management Facility).

### 4.7 Hazardous Wastes

Hazardous waste is pre-classified by the NSW Environmental Protection Agency and include the following:

- containers, having previously contained a substance of Class 1, 3, 4, 5 or 8 within the meaning of the Transport of Dangerous Goods Code, or a substance to which Division 6.1 of the Transport of Dangerous Goods Code applies, from which residues have not been removed by washing or vacuuming
- coal tar or coal tar pitch waste (being the tarry residue from the heating, processing or burning of coal or coke) comprising of more than 1% (by weight) of coal tar or coal tar pitch waste
- *lead-acid or nickel-cadmium batteries (being waste generated or separately collected by activities carried out for business, commercial or community services purposes)*
- lead paint waste arising otherwise than from residential premises or educational or child care institutions
- any mixture of the wastes referred to above.

As cited in the (**CEMP-V**), the only Class listed substances that will be onsite within the classes 1, 3, 4, 5 or 8 are:

- Diesel (Class 1)
- Petrol (Class 3)

Fuel containers will be reused as far as practicable. Where First Solar needs to dispose of a fuel container, the container will be disposed of in accordance with EPA guidelines for hazardous waste.



# 4.8 Demobilisation Waste Removal

At the conclusion of the Construction Phase, First Solar will removal all waste attributable to the construction of the power station, from the site.

# 5 Responsibilities

#### Site Construction Manager

- Completion of Worker Environmental Awareness and Compliance Training.
- Management of onsite waste generation associated with construction works to help avoid excessive generation where practicable.
- Management of onsite soils in accordance with **CEMP-E** Soil and Water Management Plan.
- Management of onsite combustible fuel loads in consultation with the Site Environmental Advisor.
- Compliance with the onsite waste separation systems in place.

#### Site Environmental Advisor

- Completion of Worker Environmental Awareness and Compliance Training.
- Weekly inspections in accordance with **CEMP-D** Weekly Site Inspections.
- Maintain the waste register on Form U01 (attached).
- Review waste management records and opportunities to avoid, reuse and recycle waste on a regular basis in consultation with the Site Construction Manager.
- Manage onsite waste management, including the management of waste pick-ups.
- Management of onsite combustible fuel loads in consultation with the Construction Manager.
- Compliance with the onsite waste separation systems in place.

#### Supervisors

- Completion of Worker Environmental Awareness and Compliance Training.
- Management of onsite waste generation associated with construction works to help avoid excessive generation where practicable.
- Notifying the Construction Manager of any activity that may generate a large amount of waste to allow appropriate controls to be put in place to manage waste generated.
- Compliance with the onsite waste separation systems in place.

#### **Construction Personnel, Contractors and Sub-contractors**

• Completion of Worker Environmental Awareness and Compliance Training.



- Compliance with the onsite waste separation systems in place.
- Notifying the Supervisors of any activity that may generate a large amount of waste to allow appropriate controls to be put in place to manage waste generated.

# 6 Records

- Worker Environmental Awareness and Compliance Training Form-S01 (refer to CEMP-S Worker Environmental Awareness and Compliance Training).
- Waste register **Form-U01** (attached).
- Weekly inspection Form-D01 (refer to CEMP-D Weekly Site Inspections).





## FORM-U01: Non-Regulated Waste Register

|      | Type of Waste<br>(place tick in appropriate column) |                    |           |                           | lumn)  | Quantity <sup>1</sup> |                   |          |        |       |   |                         |
|------|---|--------------------|-----------|---------------------------|--------|-----------------------|-------------------|----------|--------|-------|---|-------------------------|
| Date | Mixed<br>Putrescible                                | Mixed<br>recycling | Cardboard | Mixed Non-<br>putrescible | Liquid | (kg)                  | (m <sup>3</sup> ) | Recycled | Reused | Given | Disposed<br>(this includes<br>landfill and<br>sewerage) | Removal<br>Organisation |
|      |   |                    |           |                           |        |                       |                   |          |        |       |   |                         |
|      |   |                    |           |                           |        |                       |                   |          |        |       |   |                         |
|      |   |                    |           |                           |        |                       |                   |          |        |       |   |                         |
|      |   |                    |           |                           |        |                       |                   |          |        |       |   |                         |
|      |   |                    |           |                           |        |                       |                   |          |        |       |   |                         |
|      |   |                    |           |                           |        |                       |                   |          |        |       |   |                         |
|      |   |                    |           |                           |        |                       |                   |          |        |       |   |                         |
|      |   |                    |           |                           |        |                       |                   |          |        |       |   |                         |
|      |   |                    |           |                           |        |                       |                   |          |        |       |   |                         |

Notes: (1) where possible provide invoiced quantities; otherwise estimate either weight or volume - Photocopy form as required.



## FORM-U01: Regulated Waste Register

| Date | Type of Waste<br>(place tick in appropriate<br>column) |                 | Quantity <sup>1</sup> |        | Tick one end use |        |       |   |                      |
|------|--|-----------------|-----------------------|--------|------------------|--------|-------|---|----------------------|
|      |  |                 | Weight                | Volume |                  |        |       |   |                      |
|      | Solid Waste  | Liquid<br>Waste | (Kġ)                  | (111)  | Recycled         | Reused | Given | Disposed<br>(this includes<br>landfill and<br>sewerage) | Removal Organisation |
|      |  |                 |                       |        |                  |        |       |   |                      |
|      |  |                 |                       |        |                  |        |       |   |                      |
|      |  |                 |                       |        |                  |        |       |   |                      |
|      |  |                 |                       |        |                  |        |       |   |                      |
|      |  |                 |                       |        |                  |        |       |   |                      |
|      |  |                 |                       |        |                  |        |       |   |                      |
|      |  |                 |                       |        |                  |        |       |   |                      |
|      |  |                 |                       |        |                  |        |       |   |                      |
|      |  |                 |                       |        |                  |        |       |   |                      |

Notes: (1) where possible provide invoiced quantities; otherwise estimate either weight or volume - Photocopy form as required.


# CEMP-V Dangerous Goods and Spill Response Plan Nyngan Solar PV Power Station





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#### **Document Control**

| Doc<br>Rev | Date     | Reason                                  | Issued by   | Review             |       | Review                       |                    |
|------------|----------|---|-------------|--------------------|-------|------------------------------|--------------------|
| А          |          | Issued for FS review                    | Geolyse     | SF                 | 11/11 | JS                           | 11/11              |
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| D          | 04/12/13 | Issued as Final                         | First Solar |                    |       |                              |                    |

Cited Cross References within Document:

- 1. **CEMP-I** Ground Cover Management Plan
- 2. CEMP-M Bush Fire Management Plan
- 3. **CEMP-Q** Incident Management Protocol
- 4. CEMP-S Worker Environmental Awareness and Compliance Training



# 1 Purpose

This Dangerous Goods and Spill Response Management Plan for the Nyngan Solar PV Power Station and associated access tracks has been prepared to meet the requirements of:

- The Nyngan Solar PV Power Station Development Consent (SSD-5355)
  - Condition B5
- The Nyngan Solar Plant Submissions Report (NGH Environmental, June 2013)
  - Mitigation Measure 61

# 2 Scope

### 2.1 Overview

As required by the Development Consent (SSD-5355) for the Nyngan Solar PV Power Station, First Solar (Australia) Pty Ltd (First Solar) has developed the following Dangerous Goods Handling and Spill Response Management Plan for the development as it relates to the activities of First Solar. Specifically this Dangerous Goods Handling and Spill Response Management Plan relates to the Construction Phase of the power station and associated access tracks.

A second CEMP is being prepared for the power station's grid connection by a separate contractor. The grid connection for the Nyngan Solar PV Power Station is not under the mandate of First Solar (Australia) Pty Ltd (First Solar) and is therefore not included within the following document. Please refer to the separate grid connection / transmission line CEMP for information specific to the grid connection construction works.

### 2.2 Nyngan Solar PV Power Station Development

The Nyngan Solar PV Power Station will consist of a 102MW solar PV power station located approximately 10km west of Nyngan. The solar plant will occupy approximately 300 hectares of land to the north of the Barrier Highway.

First Solar (Australia) Pty Ltd have been engaged by AGL to provide engineering, procurement and construction (EPC) services. The Nyngan Solar PV Power Station will utilise First Solar's advanced cadmium telluride (CdTe) thin film photovoltaic modules. The solar modules generate electricity with no air emissions, no waste production, no water use and have one of the smallest carbon footprints of any current PV technology. Over 7,000MW of First Solar PV modules have been installed worldwide, including at many of the world's largest solar PV plants, since beginning commercial production in 2002. First Solar has been actively involved in the Australian market since mid-2008.



The construction of the Nyngan Solar PV Power Station project is expected to commence in early 2014 and will take approximately 18 months to complete. Once constructed the Nyngan Solar PV Power Station will generate an estimated 233,000 megawatt hours (MWh) of electricity annually.

### 2.3 Relevant Approval Conditions

The approval provisions for the Nyngan Solar PV Power Station relevant to the Dangerous Goods and Spill Response Plan are as follows:

Condition B5 of the Nyngan Development Consent (SD-5355) states:

- B5. Dangerous goods, as defined by the Australian Dangerous Goods Code, shall be stored and handled strictly in accordance with:
  - a) all relevant Australian Standards;
  - b) for liquids, a minimum bund volume requirement of 110% of the volume of the largest singled stored unit within the bund; and
  - c) the Environment Protection Manual for Authorised Officers: Bunding and Spill Management, technical bulletin (Environment Protection Authority, 1997).

In the event of an inconsistency between the requirements listed from a) to c) above, the most stringent requirement shall prevail to the extent of the inconsistency.

Mitigation Measure 61 states:

- 61. A Spill Response Plan would be developed to:
  - Manage the storage of any potential contaminants onsite.
  - Mitigate the effects of soil contamination by fuels or other chemicals (including emergency response and EPA notification procedures).
  - Prevent contaminants affecting adjacent pastures and dams.

# 3 Actions

### 3.1 Standards and Guidelines

Any fuels or chemicals will be stored on the Nyngan Solar PV Power Station site in accordance with the relevant Australian Standards, including:

- AS1940 The Storage and Handling of Flammable and Combustible Liquids
- AS/NZ4452 The Storage and Handling of Toxic Substances
- Storage and Handling Liquids: Environmental Protection Participants Manual, 2007
- Australian Dangerous Goods Code 7<sup>th</sup> Edition, October 2011



### 3.2 Dangerous Goods

The Construction Phase for the Nyngan Solar PV Power Station and associated access tracks will indicatively require the use of the following Dangerous Goods:

| Item:                        | Dangerous Goods Class:                     |
|------------------------------|--|
| Petrol                       | Class 3 – Flammable liquid                 |
| Welding Gas (e.g. Acetylene) | Class 2.2 – Non-flammable, non-toxic gases |
| Compressed air               | Class 2.2 – Non-flammable, non-toxic gases |
| LPG gas                      | Class 2.1 – Flammable Gas                  |
| Weed herbicides              | Class 6.1 – Toxic substances               |

Where practicable First Solar will avoid or minimise the storage of Dangerous Goods onsite.

Petrol kept onsite for use in site vehicles, plant and machinery.

With respect to weed herbicides, an appropriately qualified sub-contractor will be engaged to undertake weed control within the boundaries of the site in accordance with **CEMP-I** *Ground Cover Management Plan*. Weed herbicides will not be stored on site during the construction of the Nyngan Solar PV Power Station and associated access tracks.

### **3.3** Storage and Handling of Dangerous Goods

- Petrol will be stored on site for use in petrol operated equipment, e.g. generators.
- Any fuels stored on site shall be stored in accordance with:
  - A manner to prevent and contain spills
  - AS1940 The Storage and Handling of Flammable and Combustible Liquids
  - Bush Fire Management Plan (CEMP-M)
- Storage of Dangerous Goods will be tailored to suit both the type and volume to ensure compliance with AS1940. Bunding will be 110% of the volume or as dictated by AS1940.
- Storage and handling of Dangerous Goods to be undertaken at least 50m away from watercourses, drainage line or permanent water sources (i.e. the existing dam).
- As far as practicable Dangerous Goods will stored in a dedicated Dangerous Good store.
- Dangerous Goods shall be stored in approved containers (jerry cans) that are appropriately bunded. Bunding will be in accordance with AS1940.
- All containers shall be clearly marked and approved for the specific use.
- A mobile spill kit shall be located near the fuel storage area to deal with any spill outside of the bunded area.
- Mobile spill kit to contain at least the following:



- Absorbent pads, socks and pillows
- PPE equipment (goggles, gloves)
- Disposal bags
- Spills to be contained and treated in accordance with MSDS.

All site personnel will be advised of the type, location and use of Dangerous Goods in the *Worker Environmental Awareness and Compliance Training* (refer to **CEMP-S**).

#### **3.4 Hazardous Goods**

The Construction Phase for the Nyngan Solar PV Power Station and associated access tracks will indicatively require the use of the following Hazardous Goods:

| Item:                                     | Hazardous Goods Class:   |
|---|--------------------------|
| Diesel                                    | C1 – Combustible liquids |
| Lubricating oil (including hydraulic oil) | C2 – Combustible liquids |
| Transformer Oil                           | C2- Combustible liquids  |

Where practicable First Solar will avoid or minimise the storage or Hazardous Goods onsite.

Petrol, diesel and lubricating oil will be kept onsite for use in site vehicles, plant and machinery.

Transformers will be filled with biodegradable transformer oil. Where required, transformer oil will be stored on site in accordance with AS1940. Where practicable the holding time for transformer oil on site (prior to use in transformers) will be kept to a minimum.

### 3.5 Storage of Hazardous Goods

- Any fuels stored on site shall be stored in accordance with:
  - A manner to prevent and contain spills
  - AS1940 The Storage and Handling of Flammable and Combustible Liquids
  - Bush Fire Management Plan (CEMP-M)
- Storage of Hazardous Goods will be tailored to suit both the type and volume to ensure compliance with AS1940. Bunding will be 110% of the volume or as dictated by AS1940.
- Storage and handling of Hazardous Goods to be undertaken at least 50m away from watercourses, drainage line or permanent water sources (i.e. the existing dam).
- All Hazardous Goods shall be stored in approved containers that are stored in a secure and bunded enclosure/shed when not in use.
- All containers shall be clearly marked and approved for the specific use.



- A mobile spill kit shall be located near the Hazardous Goods storage area to deal with any spill outside of the bunded area.
- Mobile spill kit to contain at least the following:
  - Absorbent pads, socks and pillows
  - PPE equipment (goggles, gloves)
  - Disposal bags
- Spills to be contained and treated in accordance with MSDS.

#### **3.6 Handling of Dangerous and Hazardous Goods**

Employees using dangerous or hazardous substances shall be given information, instruction, supervision or training in the following:

- Identification, properties and potential hazards of Dangerous and Hazardous Goods including access to the Materials Safety Data Sheets (MSDS)
- Correct use, fitting and storage of personal protection equipment
- Correct procedures for safe storage and handling of dangerous or hazardous substances
- Emergency procedures in case of a spill, leak, fire or explosion.

All site personnel will be advised of the type, location and use of Dangerous and Hazardous Goods in the *Worker Environmental Awareness and Compliance Training* (**CEMP-S**).

### 3.7 Equipment Refuelling

- Refuelling to be undertaken at least 50m away from watercourses, drainage line or permanent water sources (i.e. the existing dam).
- Funnels or extended nozzles shall be used to minimise fuel spillage when fuelling equipment.
- Drip trays will be used when filling machinery outside of bunded areas.
- One wheelie bin type spill kit will be available during refuelling activities.
- Any spills will be managed as detailed in Section 3.9.

#### 3.8 Filling Transformers with Transformer Oil

- Drip trays / spill containment units will be used during the filling of transformers.
- One wheelie bin type spill kit will be available during transformer filling activities.
- The temporary earth bund will be removed one day following the filling operations.



### 3.9 Spill Response

The following process will generally be followed by onsite personnel in the event of a spill of a Dangerous or Hazardous Goods:

- 1. Ensure the safety of self and others in the area
- 2. If safe to do so, shut down/isolate the spillage source
- 3. Report the incident to your Supervisor. Supervisor to report incident to Site Environmental Advisor
- 4. Contain the contaminant of spillage using, spill kits, earth or other available measures if safe to do so
- 5. Prevent the spill from entering drainage lines or permanent water sources (including the existing onsite dam and the dust water suppression pond) using spill kits, diversion drains or other method appropriate to prevent the flow of a Dangerous or Hazardous Goods.
- 6. For spills of Dangerous or Hazardous Goods that present a combustion risk:
  - Identify potential ignition sources in the surrounding area
  - Secure potential sources of ignition either by removal or isolation
  - Shut down non-essential plant in the immediate area
  - Stop hot work in the immediate area
  - Do not smoke or cause sparks adjacent to spills
- Remain at the scene until made safe:
  - Provide further help if required
  - If a witness to incident provide information to the Site Environmental Advisor for incident report

The affected area should not be hosed down. Clean-up of contaminant to be undertaken as a priority once it has been contained and it is safe to do so. Clean-up of contaminated areas will be undertaken under the supervision of an appropriately experienced person (e.g. the Site Environmental Advisor).

Both "mobile" and "wheelie bin" style spill kits will be available on site. All onsite spill kits will be "general purpose" kits, except where the need for specialist kits is identified. General spill kits are suitable for use for the following:

- General workshop liquids
- Oils, fuels and solvents
- Agricultural chemicals

Based on the Dangerous and Hazardous Goods anticipated to be on site (as cited in Sections 3.2 and 3.4), it is not expected that specialist spill kits will be required. Should First Solar need to store a Dangerous or Hazardous Good that cannot be controlled with a "general purpose" spill kit, a specialist kit will be procured.



General Purpose "wheelie bin" sized spill kits will indicatively include:

- Absorbent pads
- Spill containment booms
- General purpose absorbent
- PPE
- Contaminated waste bags and ties
- Instruction sheets

Reporting of the incident will be undertaken by the Site Environmental Advisor in accordance with **CEMP-Q** *Incident Management Protocol*.

Spills of Dangerous or Hazardous Goods, where the spills trigger notification under Condition C8 of the Development Consent, notification will be in accordance with **CEMP-Q** *Incident Management Protocol.* 

# 4 **Responsibilities**

#### **AGL Project Manager**

In the event of a spill that triggers notification under Condition C8 *Incident Reporting*, the AGL Project Manager will be responsible for the items outlined in **CEMP-Q** *Incident Management Protocol*.

#### First Solar Site Project Manager

In the event of a spill that triggers notification under Condition C8 *Incident Reporting*, the AGL Project Manager will be responsible for the items outlined in **CEMP-Q** *Incident Management Protocol*.

#### **First Solar Site Construction Manager**

- Completion of Worker Environmental Awareness and Compliance Training (CEMP-S)
- Advising the Site Environmental Advisor of an environmental incident
- Working with the Site Environmental Advisor as required to resolve environmental incidents
- Directing corrective action if required
- Management of Dangerous Goods inventory
- Maintenance of MSDS Register

#### First Solar Site Environmental Advisor

• Completion of Worker Environmental Awareness and Compliance Training (CEMP-S)



- Where notification is required, advising the First Solar Project Manager of the details of the environmental incident to facilitate notification requirements to AGL Project Manager
- Completion of Incident Register (Form-Q01) and Incident Report (Form-Q02)
- Follow up and sign off of Incident Report
- Maintenance of incident records
- Directing corrective action if required / supervision of site clean up
- Undertaking environmental investigations required if Dangerous Goods or Hazardous Substances are released to the environment
- Site Inspections in accordance with the Weekly Site Inspections (CEMP-D)

#### First Solar Site Supervisors

- Completion of Worker Environmental Awareness and Compliance Training (CEMP-S)
- Ensuring works are undertaken in accordance with the CEMP to minimise the potential for spills.
- Notifying the Site Environmental Advisor of any spills or incidents with Hazardous or Dangerous Goods.
- Immediate onsite containment of spills as far as practicable
- Reviewing relevant MSDS's prior to use of Dangerous Good or Hazardous Substances

#### First Solar Site Construction Personnel, Contractors and Sub-contractors

- Completion of Worker Environmental Awareness and Compliance Training (CEMP-S)
- Ensuring works are undertaken in accordance with the CEMP to minimise the potential for spills.
- Reviewing relevant MSDS's prior to use of Dangerous Good or Hazardous Substances
- Notifying their supervisor of any spills or incidents with Hazardous or Dangerous Goods.
- Immediate onsite containment of spills as far as practicable

# 5 Records

- Worker Environmental Awareness and Compliance Training Form-S01 (refer to CEMP-S).
- Incident Register Form-Q01 (refer to CEMP-Q Incident Management Protocol)
- Incident Report Form-Q02 (refer to CEMP-Q Incident Management Protocol)
- MSDS (refer to First Solar Project Site Safety Plan)





# CEMP-W CEMP Checklist Nyngan Solar PV Power Station





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#### **Document Control**

| Doc<br>Rev | Date     | Reason  | Issued by   | Review             |          | Review                       |                    |
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| А          | 25/10/13 | Issued for FS review  | Geolyse     | SF                 | 17/11    | JS                           | 17/11              |
| В          | 24/11/13 | Issued for AGL and<br>Project ER review                     | First Solar | Michael<br>Woolley | 29/11    | SF<br><br>Michael<br>Woolley | 02/12<br><br>02/12 |
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| E          | 22/02/14 | Final re-issued to<br>included responses<br>to DPI comments | First Solar |                    |          |                              |                    |



# 1 Purpose

This CEMP Checklist for the Nyngan Solar PV Power Station has been prepared to list where each Development Consent Condition and Nyngan Solar Plan Mitigation Measure is addressed within the First Solar Construction Environmental Management Plan (CEMP).

The CEMP has been developed in accordance with Development Conditions A2 and C2(h).

The following document has been updated to include responses to comments received from the Department of Planning and Infrastructure (DPI) on 15 January 2014.

# 2 Scope

### 2.1 Overview

First Solar (Australia) Pty Ltd (First Solar) has developed the CEMP for the development as it relates to the activities of First Solar. Specifically this CEMP Checklist relates to the Construction Phase of the solar power station and associated access tracks.

Specifically, the following CEMP Checklist will include reference to the following:

- The Nyngan Solar PV Power Station Development Consent (SSD-5355)
  - Conditions relevant to the Construction Phase for the power station
  - Conditions relevant to the activities of First Solar (Australia) Pty Ltd
- The Nyngan Solar Plant Submissions Report (NGH Environmental, June 2013)
  - Mitigation Measures relevant to the Construction Phase for the power station
  - Mitigation Measures relevant to the activities of First Solar (Australia) Pty Ltd

The checklist has been developed in accordance with the AGL Nyngan Solar PV Power Station CEMP Staging Document.

A second CEMP is being prepared for the power station's grid connection by a separate contractor. The grid connection for the Nyngan Solar PV Power Station is not under the mandate of First Solar (Australia) Pty Ltd (First Solar) and is therefore not included within the following document. Please refer to the separate grid connection / transmission line CEMP for information specific to the grid connection works.



### 2.2 Nyngan Solar PV Power Station Development

The Nyngan Solar PV Power Station will consist of a 102MW solar PV power station located approximately 10km west of Nyngan. The solar plant will occupy approximately 300 hectares of land to the north of the Barrier Highway.

First Solar (Australia) Pty Ltd have been engaged by AGL to provide engineering, procurement and construction (EPC) services. The Nyngan Solar PV Power Station will utilise First Solar's advanced cadmium telluride (CdTe) thin film photovoltaic modules. The solar modules generate electricity with no air emissions, no waste production, no water use and have one of the smallest carbon footprints of any current PV technology. Over 7,000MW of First Solar PV modules have been installed worldwide, including at many of the world's largest solar PV plants, since beginning commercial production in 2002. First Solar has been actively involved in the Australian market since mid-2008.

The construction of the Nyngan Solar PV Power Station project is expected to commence in early 2014 and will take approximately 18 months to complete. Once constructed the Nyngan Solar PV Power Station will generate an estimated 233,000 megawatt hours (MWh) of electricity annually.

# **3 Development Consent Conditions Checklist**

**Attachment W01** identifies where each of the Development Consent Conditions relevant to the construction of the Nyngan Solar PV Power Station features within the First Solar CEMP. Where Conditions fall outside of the CEMP or outside of the First Solar Scope this has been identified.

In accordance with Condition C2(h) of the Development Consent, specific consideration has been made to the Development Consent Conditions within the First Solar CEMP.

Where 'CEMP' is cited in the reference, this relates to the whole First Solar CEMP. Where 'CEMP (main)' is cited this relates to the parent document to the First Solar CEMP Appendices.

The Development Consent Condition Checklist has been updated to reflect a request for further information from the DPI on Monday 9<sup>th</sup> December 2013. Section, page and paragraph / bullet point references have been added to the table.

# 4 Mitigation Measure Checklist

**Attachment W02** identifies where each of the Mitigation Measures relevant to the construction of the Nyngan Solar PV Power Station features within the First Solar CEMP. Where Mitigation Measures fall outside of the CEMP or outside of the First Solar Scope this has been identified.



Compliance with the Mitigation Measures set out in the Nyngan Solar Plant Submissions Report (NGH Environmental, June 2013) is required by Development Consent Condition A2. In accordance with Condition C2(h) of the Development Consent, specific consideration has been made to the Mitigation Measures within the First Solar CEMP.

Where 'CEMP' is cited in the reference, this relates to the whole First Solar CEMP. Where 'CEMP (main)' is cited this relates to the parent document to the First Solar CEMP Appendices.

The Mitigation Measure Checklist has been updated to reflect a request for further information from the DPI on Monday 9<sup>th</sup> December 2013. Section, page and paragraph / bullet point references have been added to the table.



# Attachment W01 – Nyngan Solar PV Power Station Development Consent Condition Checklist

| Development<br>Consent<br>Condition | Brief Description:                             | CEMP Reference                                | CEMP Document Reference  |
|-------------------------------------|--|---|--|
| Part A – Admini                     | strative Conditions                            |   |  |
| A1                                  | Obligation to minimise harm to the environment | CEMP<br>CEMP-S                                | Generally contained within CEMP<br>Requirement is linked to CEMP-S Worker<br>Environmental Awareness and Compliance<br>Training      |
| A2                                  | Terms of Development Consent                   | СЕМР  | Generally contained within CEMP  |
| A3                                  | Terms of Development Consent                   | CEMP  | Generally contained within CEMP  |
| A4                                  | Terms of Development Consent                   | CEMP  | Generally contained within CEMP  |
| A5                                  | Staging  | CEMP  | Generally contained within CEMP  |
| A6                                  | Structural adequacy                            | Design consideration<br>Outside of CEMP scope | Subject to BCA certification process   |
| A7                                  | Decommissioning                                | Outside of CEMP scope                         | AGL  |
| A8                                  | Decommissioning                                | Outside of CEMP scope                         | AGL  |
| A9                                  | Decommissioning                                | Outside of CEMP scope                         | AGL  |
| A10                                 | Compliance                                     | CEMP-S  | CEMP-S<br>- Section 1, page 4<br>- Section 2.3, page 5<br>- Section 3, page 5<br>- Section 5.2, page 6-7<br>- Section 5.3, pages 8-9 |
| A11                                 | Compliance                                     | CEMP-S  | CEMP-S   |

|                 |                                    |                              | - Section 1, page 4  |
|-----------------|------------------------------------|------------------------------|--|
|                 |                                    |                              | - Section 2.3, page 5  |
|                 |                                    |                              | - Section 3, page 5  |
|                 |                                    |                              | - Section 5.2, page 6-7  |
|                 |                                    |                              | - Section 5.3, pages 8-9   |
| A12             | Dispute                            | Outside of First Solar Scope | AGL  |
| Part B – Genera | I Conditions                       |                              |  |
| B1              | Ancillary Facilities               | Design consideration         | CEMP-E   |
|                 |                                    | Where applicable:            | - Section 1, page 5  |
|                 |                                    | - CEMP-E                     | - Section 2.3, page 6  |
|                 |                                    |                              | - Section 3.8.2, page 20, paragraph 3  |
|                 |                                    |                              | - Section 3.8.2, page 20, paragraph 4  |
|                 |                                    |                              | - Section 3.8.2, page 20, last paragraph   |
| B2              | Decommissioning and rehabilitation | Outside of CEMP scope        | AGL  |
|                 |                                    |                              | Rehabilitation of temporary facilities associated<br>with Construction will be undertaken in<br>accordance with CEMP-H |
|                 |                                    |                              | СЕМР-Н   |
|                 |                                    |                              | - Section 3, page 6, item 1  |
|                 |                                    |                              | - Section 3, page 7, third to last paragraph   |
| B3              | Bushfire risk                      | Design consideration         | CEMP-M   |
|                 |                                    | Where applicable CEMP-M      | - Section 1, page 4  |
|                 |                                    |                              | - Section 2.2, page 5, bullet point 1  |
|                 |                                    |                              | - Section 2.4, pages 5-6   |
|                 |                                    |                              | - Section 2.6, pages 7-8   |
| D/              | Bushfire risk                      | Outside of CEMP scope        | AGL  |

| -  |   |                |   |
|----|---|----------------|---|
| B5 | Dangerous goods                         | CEMP-V         | CEMP-V  |
|    |   |                | - Section 1, page 4   |
|    |   |                | - Section 2.3, page 5   |
|    |   |                | - Section 3.1, page 5   |
|    |   |                | - Section 3.3, page 6, bullet point 3   |
|    |   |                | - Section 3.5, page 7, bullet point 2   |
| B6 | Dust generation                         | CEMP-E         | CEMP-E  |
|    |   | CEMP-I         | - Section 1, page 5,  |
|    |   | CEMP-N         | - Section 2.3, page 8   |
|    |   |                | - Section 3.7, page 14, bullet point 15   |
|    |   |                | CEMP-I  |
|    |   |                | - Section 2.1, page 5, last paragraph   |
|    |   |                | - Section 3.3, page 8, bullet point 2   |
|    |   |                | - Section 3.3, page 8, bullet point 3   |
|    |   |                | - Section 3.3, page 8, bullet point 4   |
|    |   |                | - Section 3.3, page 9, bullet point 10  |
|    |   |                | CEMP-N  |
|    |   |                | - Section 1, page 4   |
|    |   |                | - Section 2.4, page 5   |
|    |   |                | - Section 3.1.1, page 7, last bullet point  |
|    |   |                | - Section 3.2, page 9, paragraph 1  |
| В7 | Water quality impact                    | Not applicable | The closest watercourse is Whitbarrow Creek, 500m South-East of the boundary of the power   |
|    |   |                | station site.   |
|    |   |                | Groundwater pollution at the power station site is not identified as a risk within the EIS. |
| B8 | Water quality impact                    | Not applicable | The closest watercourse is Whitbarrow Creek.  |
| _  | , |                | 500m South-East of the boundary of the power  |

|     |                           |                  | station site.  |
|-----|---------------------------|------------------|--|
| В9  | Soil and water management | CEMP-E<br>CEMP-N | CEMP-E - General - Section 1, page 5 - Section 2.3, page 6 - Section 3.5, page 11, bullet point 3 - Section 3.7, page 14, bullet point 15 CEMP-N - Section 1, page 4 - Section 2.4, page 5 - Section 3.1.1, page 7, bullet point 4 - Section 3.1.1, page 7, bullet point 7 - Section 3.1.1, page 7, bullet point 8 |
| B10 | Waterways                 | Not applicable   | The closest watercourse is Whitbarrow Creek, 500m South-East of the boundary of the power station site.  |
| B11 | Waste management          | CEMP-U           | CEMP-U<br>- Section 1, page 4<br>- Section 2.4, page 5<br>- Section 4.2, page 7, paragraph 2   |
| B12 | Waste management          | CEMP-U           | CEMP-U<br>- Section, page 4<br>- Section 2.4, page 6<br>- Section 4.3, page 10   |
| B13 | Waste management          | CEMP-U           | CEMP-U<br>- Section, page 4<br>- Section 2.4, page 6<br>- Section 4.2, pages 7-9   |

| B14 | Utilities and services          | Design consideration<br>Where applicable CEMP<br>(main) | CEMP (main)<br>- Section 8.4.1, pages 33-34   |
|-----|---------------------------------|---|---|
| B15 | Flora and fauna                 | CEMP-F  | CEMP-F<br>- Section 1, page 5<br>- Section 3, page 7<br>- Section 5, pages 9-10<br>- Section 6.2.1, page 10<br>- Section 6.2.6, page 13   |
| B16 | Flora and fauna                 | CEMP-F  | <ul> <li>CEMP-F</li> <li>Section 1, page 5</li> <li>Section 3, page 7</li> <li>Section 6.2.3, page 12</li> <li>Section 7.1.1, page 19, bullet point 1</li> <li>Section 8, page 21, bullet point 2 under<br/>Site Environmental Advisor</li> <li>Section 8, page 21, bullet point 3 under<br/>Project Ecologist</li> </ul> |
| B17 | Flora and fauna                 | Outside of First Solar Scope                            | Refer to separate transmission route CEMP   |
| B18 | Visual amenity                  | Outside of CEMP scope                                   | AGL<br>Visual amenity from the road is covered in part<br>by the landscape planting (required by Section<br>6.6.4 of the EIS) identified in CEMP-G.   |
| B19 | Visual amenity                  | Outside of CEMP Scope                                   | AGL   |
| B20 | Visual amenity                  | Outside of CEMP Scope                                   | AGL   |
| B21 | Rehabilitation and revegetation | CEMP-E<br>CEMP-H  | CEMP-E<br>- Section 3.7.1, page 14, bullet point 17<br>CEMP-H   |

| -   |                    |        | <ul> <li>Section 1, page 4,</li> <li>Section 2.1, page 4, paragraph 1</li> <li>Section 2.3, page 5</li> <li>Section 3, page 6, paragraph 1</li> </ul> |
|-----|--------------------|--------|---|
|     |                    |        | <ul> <li>Section 3, 1.2, page 8, third to last paragraph</li> </ul>   |
|     |                    |        | - Section 4, page 9, last paragraph   |
| B22 | Construction noise | CEMP-L | CEMP-L  |
|     |                    |        | - Section 1, page 4   |
|     |                    |        | - Section 2.3, page 6   |
|     |                    |        | - Section 3.3, page 9, paragraph 1  |
|     |                    |        | <ul> <li>Section 4.2.3, page 12, second to last<br/>paragraph</li> </ul>  |
|     |                    |        | - Section 5.1.2, page 13, paragraph 1   |
| B23 | Construction noise | CEMP-L | CEMP-L  |
|     |                    |        | - Section 1, page 4   |
|     |                    |        | - Section 2.3, page 6   |
|     |                    |        | - Section 3.3, page 9, paragraph 1  |
|     |                    |        | - Section 3.3, page 10, paragraph 4   |
|     |                    |        | - Section 3.3, page 10, paragraph 6   |
|     |                    |        | - Section 3.3, page 10, last paragraph  |
|     |                    |        | <ul> <li>Section 4.2.3, page 12, second to last<br/>paragraph</li> </ul>  |
|     |                    |        | <ul> <li>Section 5.1.4, page 14, first paragraph<br/>under the bullet points</li> </ul>   |
|     |                    |        | <ul> <li>Section 6.3, page 17, second list of<br/>bullet points, bullet point 6</li> </ul>  |
|     |                    |        | <ul> <li>Section 7, page 18, second bullet point<br/>under Site Project Manager</li> </ul>  |

|     |                                      |                              | - Section 7, page 18, second bullet point under Site Construction Manager |
|-----|--------------------------------------|------------------------------|---|
| B24 | Construction noise                   | CEMP-L                       | CEMP-L  |
|     |                                      |                              | - Section 1, page 4   |
|     |                                      |                              | - Section 2.3, page 6   |
|     |                                      |                              | - Section 4.2.2, page 12, second to last paragraph                        |
|     |                                      |                              | - Section 5.1.4, page 15, first paragraph under the bullet points         |
| B25 | Construction noise                   | CEMP-L                       | CEMP-L  |
|     |                                      |                              | - Section 1, page 4   |
|     |                                      |                              | - Section 2.3, page 7   |
|     |                                      |                              | - Section 6.3, page 17, bullet point 1                                    |
| B26 | Operational noise                    | Outside of CEMP Scope        | AGL   |
| B27 | Operational noise, transmission line | Outside of CEMP Scope        | AGL   |
| B28 | Traffic and transport                | Outside of CEMP Scope        | CEMP (main)   |
|     |                                      |                              | - Section 4.2, page 19, final paragraph                                   |
| B29 | Traffic and transport                | Outside of CEMP Scope        | AGL   |
| B30 | Heritage impacts                     | CEMP-J                       | СЕМР Ј  |
|     |                                      |                              | - Section 1, page 4   |
|     |                                      |                              | - Section 2.3, page 5   |
|     |                                      |                              | - Section 4.1.3, page 8, bullet point 1                                   |
| B31 | Heritage impacts                     | СЕМР-К                       | СЕМР-К  |
|     |                                      |                              | - Section 1, page 4   |
|     |                                      |                              | - Section 2.3, page 5   |
|     |                                      |                              | - Section 3.1, page 6   |
| B32 | Easement                             | Outside of First Solar Scope | AGL   |

| B33              | Fencing  | Outside of First Solar Scope              | AGL   |
|------------------|--|---|---|
| Part C – Environ | mental Management, Reporting and Auditing      |   |   |
| C1               | Environmental Representative                   | Outside of First Solar Scope              | AGL   |
| C2               | Construction Environmental Management Plan     | CEMP (main)                               | CEMP (main)<br>- Section 2.4  |
| C2(a)            | Description of relevant activities             | CEMP (main)<br>CEMP-B<br>CEMP-E           | CEMP (main) <ul> <li>Section 2.4, page 11</li> <li>Section 3.5, page 16</li> </ul> <li>CEMP-B <ul> <li>Section 2, pages 5-7</li> </ul> </li> <li>CEMP-E <ul> <li>Section 3.6, page 12</li> </ul></li> |
| C2(b)            | Identification of cumulative impacts           | CEMP (main)                               | CEMP (main)<br>- Section 8.4, pages 33-34   |
| C2(c)            | Details of construction sites, mitigation, etc | CEMP (main)<br>CEMP-H                     | CEMP (main)<br>- Section 2.4, page 11<br>CEMP-H<br>- Section 3, page 6, bullet point 1<br>- Section 3, page 7, paragraph 1  |
| C2(d)            | Statutory obligations                          | CEMP (main)                               | CEMP (main)<br>- Section 7.3, page 24   |
| C2(e)            | Evidence of consultation                       | CEMP (main)<br>CEMP-E<br>CEMP-F<br>CEMP-M | CEMP (main)<br>- Section 4.3.2, page 19-20<br>- Attachment CEMP-01<br>CEMP-E<br>- Section 3.7.8, page 19, bullet point 6  |

| •     |  |             | - Section 3.8.2, page 20, last paragraph |
|-------|--|-------------|--|
|       |  |             | CEMP-F                                   |
|       |  |             | - Section 7.1.2, page 19, bullet point 1 |
|       |  |             | - Section 7.1.3, page 20, bullet point 1 |
|       |  |             | CEMP-M                                   |
|       |  |             | - Section 4.1, page 11                   |
| C2(f) | Descriptions of roles and responsibilities | CEMP (main) | CEMP (main)                              |
|       |  | CEMP-B      | - Section 7.2.1, page 22-23              |
|       |  | CEMP-D      | - Section 7.2.2, page 23-24              |
|       |  | CEMP-E      | CEMP-B                                   |
|       |  | CEMP-F      | - Section 2, table column 2              |
|       |  | CEMP-G      | CEMP-D                                   |
|       |  | CEMP-H      | - Section 4, page 6                      |
|       |  | CEMP-I      | CEMP-E                                   |
|       |  | CEMP-J      | - Section 3.9, page 21-22                |
|       |  | СЕМР-К      | CEMP-F                                   |
|       |  | CEMP-L      | - Section 8, page 21-22                  |
|       |  | CEMP-M      | CEMP-G                                   |
|       |  | CEMP-N      | - Section 8, page 11                     |
|       |  | CEMP-O      | СЕМР-Н                                   |
|       |  | CEMP-P      | - Section 5, page 9                      |
|       |  | CEMP-Q      | CEMP-I                                   |
|       |  | CEMP-R      | - Section 7, page 15                     |
|       |  | CEMP-S      | CEMP-J                                   |
|       |  | CEMP-T      | - Section 5, page 9-10                   |
|       |  | CEMP-U      | СЕМР-К                                   |
|       |  | CEMP-V      | - Section 4, page 6-7                    |
|       |  |             | CEMP-L                                   |

|       |   |             | - Section 7, page 18-19               |
|-------|---|-------------|---------------------------------------|
|       |   |             | CEMP-M                                |
|       |   |             | - Section 5, page 12-13               |
|       |   |             | CEMP-N                                |
|       |   |             | - Section 4, page 10-11               |
|       |   |             | CEMP-O                                |
|       |   |             | - Section 4, page 8                   |
|       |   |             | - Attachment O1, Section 4.1, page 12 |
|       |   |             | CEMP-P                                |
|       |   |             | - Section 4, page 8-9                 |
|       |   |             | CEMP-Q                                |
|       |   |             | - Section 3.2, page 6                 |
|       |   |             | - Section 4, page 8-9                 |
|       |   |             | CEMP-R                                |
|       |   |             | - Section 4, page 8-9                 |
|       |   |             | CEMP-S                                |
|       |   |             | - Section 6, page 9-10                |
|       |   |             | CEMP-T                                |
|       |   |             | - Section 3, page 6-7                 |
|       |   |             | CEMP-U                                |
|       |   |             | - Section 5, page 12-13               |
|       |   |             | CEMP-V                                |
|       |   |             | - Section 4, page 10-11               |
| C2(g) | Details on monitoring of environmental    | CEMP (main) | CEMP (main)                           |
|       | performance                               | CEMP        | - Section 2.4, pages 11-12, item G    |
|       |   |             | - Section 7.4, page 24-28             |
|       |   |             | - Section 9, pages 37-39              |
| C2(h) | Specific consideration of A2(b) and A2(c) | CEMP (main) | CEMP (main)                           |

| •     |  | CEMP                     | - Section 2.4, page 12, item H   |
|-------|--|--------------------------|--|
|       |  |                          | СЕМР   |
|       |  |                          | - Generally contained within CEMP  |
| C2(i) | Additional requirements of this consent                              | CEMP (main)              | CEMP (main)  |
|       |  | CEMP-W                   | - Section 2.4, page 12, item I   |
|       |  |                          | CEMP-W   |
|       |  |                          | Compliance with the Mitigation Measures (as required by Condition A2) is outlined within each CEMP document (where applicable) and the following table (CEMP-W). |
| C2(j) | Complaints handling procedure  | CEMP (main)              | CEMP (main   |
|       |  | CEMP-P                   | - Section 2.4, page 12, item J   |
|       |  |                          | CEMP-P   |
|       |  |                          | - General (Complaints Handling<br>Procedure)   |
|       |  |                          | - Section 1, page 4  |
|       |  |                          | - Section 2.3, page 5  |
| C2(k) | Register of construction work hazards                                | CEMP (main)              | CEMP (main)  |
|       |  | CEMP-A                   | - Section 2.4, page 12, item K   |
|       |  | First Solar Project Site | - Section 8.1, page 32   |
|       |  | Safety Plan (PSSP)       | CEMP-A   |
|       |  |                          | - General (Environmental Risk Register)  |
| C2(I) | Measures to monitor soil and water impacts, including rehabilitation | Where applicable CEMP-H  | Waterway crossing requirement not relevant to power station.   |
|       |  |                          | Groundwater impact associated with the construction of the power station is not identified as a risk within the EIS.   |
|       |  |                          | Rehabilitation measures are as defined within CEMP-H:  |

| •     |  |             | - Section 3.1.2 nage 8 second to last     |
|-------|--|-------------|---|
|       |  |             | bullet point                              |
|       |  |             | - Section 4, pages 8-9                    |
| C2(m) | Measures to monitor flood impacts      | CEMP (main) | CEMP (main)                               |
|       |  | CEMP-E      | - Section 2.4, page 12, item M            |
|       |  |             | - Section 7.8, pages 30-31                |
|       |  |             | CEMP-E                                    |
|       |  |             | - Section 2.4, pages 8-9                  |
|       |  |             | - Section 3.7.8, page 19, bullet point 6  |
|       |  |             | - Section 3.8.2, page 20                  |
| C2(n) | Measures to monitor dust impacts       | CEMP (main) | CEMP (main)                               |
|       |  | CEMP-E      | - Section 2.4, page 12, item N            |
|       |  | CEMP-N      | - Section 8.3, page 32, bullet point 1    |
|       |  |             | - Section 8.6, page 35,                   |
|       |  |             | CEMP-E                                    |
|       |  |             | - Section 3.7.1, page 14, bullet point 12 |
|       |  |             | - Section 3.7.3, page 16, bullet point 2  |
|       |  |             | - Section 3.7.5, page 16, bullet point 6  |
|       |  |             | - Section 3.8.1, page 19                  |
|       |  |             | CEMP-N                                    |
|       |  |             | - Section 1, page 4                       |
|       |  |             | - Section 2.2, page 4, bullet point 3     |
|       |  |             | - Section 2.4, page 5                     |
|       |  |             | - Section 3, page 7                       |
|       |  |             | - Section 3.1.1, page 7, bullet point 3   |
|       |  |             | - Section 3.1.2, page 8                   |
|       |  |             | - Section 3.2, page 9-10                  |
| C2(o) | Emergency measures including bushfires | CEMP (main) | CEMP (main)                               |

|   | CEMP-M  | - Section 2.4, page 13, item O  |
|---|---|---|
|   | First Solar Project Site  | - Section 7.6, page 29  |
|   | Safety Plan (PSSP)  | - Section 7.7, page 30  |
|   |   | - Section 7.8, page 30-31   |
| Information on water sources            | CEMP (main)   | CEMP (main)   |
|   | CEMP-E  | - Section 2.4, page 13, item P (revised)  |
|   |   | - Section 8.3, page 32-33 (revised)   |
|   |   | CEMP-E  |
|   |   | - Section 3.8.1, pages 19-20 (revised)  |
| Water sources                           | CEMP (main)   | CEMP (main)   |
|   | CEMP-E  | - Section 2.4, page 13, item Q  |
|   |   | - Section 8.3, page 32-33   |
|   |   | CEMP-E  |
|   |   | - Section 3.8.1, pages 19-20  |
| Incorporation of plans identified in C3 | CEMP  | Flora and Fauna Management Plan (CEMP-F)  |
|   |   | Ground Cover Management Plan (CEMP-I)   |
|   |   | Landscape Plan ( <b>CEMP-G</b> )  |
|   |   | Construction Noise Management Plan (CEMP-L)   |
|   |   | Traffic Management Plan (CEMP-O)  |
|   |   | Aboriginal Heritage Management Plan (CEMP-J)  |
| Flora and Fauna Management Plan         | CEMP-F  | CEMP-F  |
|   |   | (i) Section 5, pages 9-10 (revised)   |
|   |   | (ii) Section 6, pages 10-15   |
|   |   | (iii) Section 6.3.2, page 16  |
|   |   | (iv) Section 7, pages 19-20   |
| Ground Cover Management Plan            | CEMP-I  | CEMP-I  |
|   |   | (i) Section 3.2, page 7-8   |
|   | Information on water sources Water sources Incorporation of plans identified in C3 Flora and Fauna Management Plan Ground Cover Management Plan | CEMP-M<br>First Solar Project Site<br>Safety Plan (PSSP)Information on water sourcesCEMP (main)<br>CEMP-EWater sourcesCEMP (main)<br>CEMP-EIncorporation of plans identified in C3CEMPFlora and Fauna Management PlanCEMP-FGround Cover Management PlanCEMP-I |

|       |                                    |  | (ii)   | Section 3.3, pages 8-9              |
|-------|------------------------------------|--|--------|-------------------------------------|
|       |                                    |  | (iii)  | Section 4, pages 9-12               |
|       |                                    |  | (iv)   | Section 5, page 13                  |
|       |                                    |  | (v)    | Section 6, page 13-14               |
| C3(c) | Landscape Plan                     | CEMP-G   | CEMP-G |                                     |
|       |                                    |  | (i)    | Section 2.3, page 6                 |
|       |                                    |  | (ii)   | Section 4, page 7                   |
|       |                                    |  | (iii)  | Section 6, page 8-10                |
|       |                                    |  | (iv)   | Section 7, page 10-11               |
| C3(d) | Construction Noise Management Plan | CEMP-L   | CEMP-L |                                     |
|       |                                    |  | (i)    | Section 3.1, page 8                 |
|       |                                    |  |        | Section 3.3, page 9-10              |
|       |                                    |  |        | New attachment L02                  |
|       |                                    |  | (ii)   | Section 3.2, page 9                 |
|       |                                    |  | (iii)  | CEMP-L                              |
|       |                                    |  | (iv)   | Section 5, page 13-15               |
|       |                                    |  | (v)    | Section 3.3, page 9, paragraph 3    |
|       |                                    |  |        | Section 5.1.3, page 14, paragraph 4 |
|       |                                    |  |        | New section 6.2, page 17            |
|       |                                    |  | (vi)   | Section 3.3, page 9, paragraph 3    |
|       |                                    |  |        | Section 3.3, page 9, paragraph 4    |
|       |                                    |  |        | Section 3.3, page 9, last paragraph |
|       |                                    |  |        | New section 6.2, page 17            |
|       |                                    |  | (vii)  | Section 5.1.4, page 14-15           |
|       |                                    |  |        | New section 6.2, page 17            |
| C3(e) | Traffic Management Plan            | CEMP-O   | CEMP-O |                                     |
|       |                                    | First Solar Project Site<br>Safety Plan (PSSP) | - Ge   | eneral (Traffic Management Plan)    |
|       |                                    |  |        |                                     |

| •     |   |   |  |
|-------|---|---|--|
| C3(f) | Aboriginal Heritage Management Plan       | AGL<br>Where applicable CEMP-J                    | CEMP-J         (i)       Section 4.1.1, page 7         (ii)       Section 4.1.3, page 7         (iii)       Section 4.1.3, page 8         (iv)       Section 4.1.4, page 8-9         (v)       Section 4.1.5, page 9 |
| C4    | Operational Environmental Management Plan | Outside of CEMP Scope                             | AGL  |
| C5    | Biodiversity Offset Management Plan       | Outside of First Solar Scope                      | AGL  |
| C6    | Decommissioning Management Plan           | Outside of CEMP Scope                             | AGL  |
| C7    | Decommissioning road dilapidation         | Outside of CEMP Scope                             | AGL  |
| C8    | Incident reporting                        | CEMP-Q  | CEMP-Q - Section 1, page 4 - Section 2.1, page 4 - Section 2.3, page 5, item 4 of table - Section 2.3, page 5, last paragraph - Section 3.1, page 5, paragraph 1 - Section 4, page 8, paragraph 1                    |
| C9    | Regulator reporting                       | AGL<br>Where applicable CEMP<br>(main) and CEMP-R | CEMP (main)<br>- Section 7.4, pages 24-28<br>CEMP-R<br>- Section 3.1, page 7   |
| C10   | Document availability                     | AGL<br>Where applicable CEMP-R                    | CEMP-R<br>- Section 1, page 4<br>- Section 2.3, page 5-6<br>- Section 3.2, page 7  |
| C11   | Provision of electronic information       | AGL   | CEMP-R   |

|     |                             | Where applicable CEMP-R                | <ul> <li>Section 1, page 4</li> <li>Section 2.3, page 6</li> <li>Section 3.1 page 7</li> </ul>   |
|-----|-----------------------------|--|--|
| C12 | Community information plan  | AGL<br>Where applicable CEMP-R         | CEMP-R<br>- Section 1, page 4<br>- Section 2.3, page 6<br>- Section 3.2, page 7  |
| C13 | Complaints procedure        | AGL<br>Where applicable CEMP-P         | CEMP-P<br>- Section 1, page 4<br>- Section 2.3, page 5<br>- Section 3.1, page 6  |
| C14 | Complaints Procedure        | AGL<br>Where applicable CEMP-P         | CEMP-P<br>- Section 1, page 4<br>- Section 2.3, page 6<br>- Section 3.2, page 7, bullet point 5  |
| C15 | Complaints Procedure        | AGL<br>Where applicable CEMP-P         | CEMP-P <ul> <li>Section 1, page 4</li> <li>Section 2.3, page 6</li> <li>Section 4, page 8, bullet point 1 under AGL Project Manager</li> </ul> |
| C16 | Compliance Tracking Program | AGL<br>Where applicable CEMP<br>(main) | CEMP (main)<br>- Section 7.4, page 24-28   |

# Attachment W02 – Nyngan Solar PV Power Station Mitigation Measures (Nyngan Solar Plant Submissions Report)

| Mitigation<br>Measures | Brief Description:                        | CEMP Reference                                  | CEMP Document Reference   |
|------------------------|---|---|---|
| Biodiversity           |   |   |   |
| MM1                    | Supplementary flora surveys               | Outside of First Solar Scope                    | Refer to separate transmission route CEMP   |
| MM2                    | Impact on Grey-crowned Babbler nest sites | Design consideration<br>Where applicable CEMP-F | CEMP-F<br>- Section 1, page 5<br>- Section 3, page 7<br>- Section 6.2.4, page 12, bullet point 1  |
| MM3                    | Pre-clearance surveys                     | CEMP-F  | CEMP-F<br>- Section 1, page 5<br>- Section 3, page 7<br>- Section 6.2.2, page 11, bullet point 4<br>- Section 6.2.2, page 11, bullet point 5<br>- Section 6.2.4, page 12, bullet point 2<br>- Section 6.2.4, page 12, bullet point 3<br>- Section 6.2.4, page 12, bullet point 4<br>- Section 6.3.2, page 15-16 |
| MM4                    | Tree protection standards                 | CEMP-F  | CEMP-F<br>- Section 1, page 5<br>- Section 3, page 7<br>- Section 6.2.1, page 11, bullet point 2  |
| MM5                    | Removal of east-west vegetation           | CEMP-F  | CEMP-F<br>- Section 1, page 5<br>- Section 3, page 7<br>- Section 6.2.4, page 12, bullet point 3  |

# Attachment W02 – Nyngan Solar PV Power Station Mitigation Measures (Nyngan Solar Plant Submissions Report)

| MM6 | Restoration of habitat             | CEMP-F           | CEMP-F - Section 1, page 5 - Section 3, page 7 - Section 6.2.2, page 12, second to last bullet point - Section 6.2.3, page 12 - Section 6.2.4, page 12, bullet point 6 - Section 7.1.3, page 20, last paragraph of bullet point 1 |
|-----|------------------------------------|------------------|---|
| MM7 | Use of existing tracks             | CEMP-E<br>CEMP-F | CEMP-E - Table E3, page 13 - Section 3.7.1, page 14, bullet point 6 - Section 3.7.1, page 14, bullet point 11 CEMP-F - Section 1, page 5 - Section 3, page 8 - Section 6.2.1, page 11, second to last bullet point                |
| MM8 | Onsite traffic management measures | CEMP-E<br>CEMP-F | CEMP-E - Table E3, page 13 - Section 3.7.1, page 14, bullet point 6 - Section 3.7.1, page 14, bullet point 11 CEMP-F - Section 1, page 5 - Section 3, page 8 - Section 6.2.4, page 13, second to last bullet point                |
| MM9 | Topsoil storage                    | CEMP-E           | CEMP-E<br>- Section 1, page 5   |

# Attachment W02 – Nyngan Solar PV Power Station Mitigation Measures (Nyngan Solar Plant Submissions Report)

|      |   |                            | <ul> <li>Section 2.3, page 7</li> <li>Section 3.7.4, page 16, bullet point 4</li> </ul>   |
|------|---|----------------------------|---|
| MM10 | Site stabilisation, rehabilitation and revegetation | CEMP-E<br>CEMP-H           | CEMP-E<br>- Section 1, page 5   |
|      |   | CEMP-I                     | <ul> <li>Section 2.3, page 7</li> <li>Section 3.7.1, page 14, bullet point 17</li> <li>Section 3.7.7, page 17, bullet point 1</li> <li>Section 3.7.7, page 18, bullet point 5</li> <li>CEMP-H</li> </ul>  |
|      |   |                            | <ul> <li>Section 1, page 4</li> <li>Section 2.3, page 5</li> <li>Section 3.1.2, page 8, third to last paragraph</li> <li>CEMP-I</li> <li>Section 1, page 4</li> <li>Section 2.3, page 6</li> <li>Section 3.3, page 8, bullet point 2</li> </ul> |
| MM11 | Footprint minimisation                              | CEMP-E<br>CEMP-F<br>CEMP-I | CEMP-E - Section 1, page 5 - Section 2.3, page 7 - Table E3, page 13 - Section 3.7.1, page 14, bullet point 6 - Section 3.7.1, page 14, bullet point 11 CEMP-F - Section CEMP-I - Section 1, page 4   |
|      |                             |             | - Section 2.3, page 6                    |
|------|-----------------------------|-------------|--|
|      |                             |             | - Section 3.2, page 7, bullet point 6    |
| MM12 | Weed Management Plan        | CEMP-I      | CEMP-I                                   |
|      |                             |             | - Section 1, page 4                      |
|      |                             |             | - Section 2.1, page 4, paragraph 2       |
|      |                             |             | - Section 2.3, page 6                    |
|      |                             |             | - Section 4, page 9-12                   |
| MM13 | Perimeter security fence    | CEMP-F      | CEMP-F                                   |
|      |                             |             | - Section 1, page 5                      |
|      |                             |             | - Section 3, page 8                      |
|      |                             |             | - Section 6.2.8, page 14, bullet point 4 |
|      |                             |             | - Section 6.2.8, page 14, bullet point 6 |
| MM14 | Trenching, vegetation       | CEMP-E      | CEMP-E                                   |
|      |                             |             | - Section 1, page 5                      |
|      |                             |             | - Section 2.3, page 7                    |
|      |                             |             | - Section 3.7.2, page 15, last paragraph |
| MM15 | Onsite dam                  | CEMP (main) | CEMP (main)                              |
|      |                             | CEMP-E      | - Section 2.4, page 13, item Q           |
|      |                             | CEMP-F      | CEMP-E                                   |
|      |                             |             | - Section 3.8.1, last paragraph          |
|      |                             |             | CEMP-F                                   |
|      |                             |             | - Section 3, page 9, last paragraph      |
| MM16 | Trenching, fauna entrapment | CEMP-F      | CEMP-F                                   |
|      |                             |             | - Section 1, page 5                      |
|      |                             |             | - Section 3, page 8                      |
|      |                             |             | - Section 6.2.5, page 13, bullet point 2 |
|      |                             |             |  |

| MM17           | Ground Cover Management Plan          | CEMP-I                       | CEMP-I   |
|----------------|---------------------------------------|------------------------------|--|
|                |                                       |                              | - General (Ground Cover Management Plan)   |
|                |                                       |                              | - Section 1, page 4  |
|                |                                       |                              | - Section 2.3, page 6  |
| MM18           | Weed control between arrays           | Design consideration         | CEMP-I   |
|                | (Operational Phase)                   | Outside of CEMP Scope        | - Section 1, page 4  |
|                |                                       | Where applicable CEMP-I      | - Section 2.3, page 6  |
| MM19           | Nesting boxes and salvaged hollows    | CEMP-F                       | CEMP-F   |
|                |                                       |                              | - Section 1, page 5  |
|                |                                       |                              | - Section 3, page 8  |
|                |                                       |                              | - Section 6.2.2, page 12, last paragraph   |
| MM20           | Rehabiltation of native vegetation    | Outside of First Solar Scope | AGL  |
| MM21           | Offset Plan                           | Outside of First Solar Scope | AGL  |
| MM22           | Offset Plan validation                | Outside of First Solar Scope | AGL  |
| MM23           | Offset Plan management reporting      | Outside of First Solar Scope | AGL  |
| Aboriginal He  | ritage                                |                              |  |
| MM24           | Discovery of human skeletal remains   | AGL                          | CEMP-J   |
|                |                                       | Where applicable CEMP-J      | - Section 1, page 4  |
|                |                                       |                              | - Section 2.3, pages 5-6   |
|                |                                       |                              | <ul> <li>Section 4.1.3, page 8, second paragraph, bullet<br/>points 4 and 5</li> </ul> |
| Hydrological ( | surface and groundwater)              |                              |  |
| MM25           | Substation and office building design | Design consideration         | CEMP-E   |
|                |                                       | Where applicable CEMP-E      | - Section 1, page 5  |
|                |                                       |                              | - Section 2.3, page 7  |

|              |                                    |        | - Section 3.8.2, page 20, paragraph 3            |
|--------------|------------------------------------|--------|--|
|              |                                    |        | - Section 3.8.2, page 20, last paragraph         |
| Noise Amenit | у                                  |        |  |
| MM26         | Employee and contractor inductions | CEMP-L | CEMP-L   |
|              |                                    | CEMP-S | - Section 1, page 4                              |
|              |                                    |        | - Section 2.3, page 7                            |
|              |                                    |        | - Section 6.3, page 17, paragraph 2              |
|              |                                    |        | CEMP-S   |
|              |                                    |        | - Section 5.2, pages 6-7                         |
|              |                                    |        | - Section 5.3, pages 8-9                         |
| MM27         | Management of work activities      | CEMP-L | CEMP-L   |
|              |                                    | CEMP-S | - Section 1, page 4                              |
|              |                                    |        | - Section 2.3, page 7                            |
|              |                                    |        | - Section 6.3, page 17, bullet point 2           |
|              |                                    |        | - Section 6.3, page 18, last paragraph           |
|              |                                    |        | CEMP-S   |
|              |                                    |        | - Section 5.2, pages 6-7                         |
|              |                                    |        | - Section 5.3, pages 8-9                         |
| MM28         | Work hours                         | CEMP-L | CEMP-L   |
|              |                                    | CEMP-S | - Section 1, page 4                              |
|              |                                    |        | - Section 2.3, page 7                            |
|              |                                    |        | - Section 3.3, page 10, second to last paragraph |
|              |                                    |        | - Section 6.3, page 17, bullet point 3           |
|              |                                    |        | CEMP-S   |
|              |                                    |        | - Section 5.2, pages 6-7                         |
| MM29         | Work hours, noisy activities       | CEMP-L | CEMP-L   |

|         |                                    |          | - Section 1 mage 4                                  |
|---------|------------------------------------|----------|---|
|         |                                    |          | - Section 2.3 page 7                                |
|         |                                    |          | Section 2.3, page 7                                 |
|         |                                    |          | - Section 3.3, page 10, paragraph 5                 |
|         |                                    |          | - New section 6.2, page 17                          |
|         |                                    |          | CEMP-S  |
|         |                                    |          | - Section 5.2, pages 6-7                            |
|         |                                    |          | - Section 5.3, pages 8-9                            |
| MM30    | Construction Noise Management Plan | CEMP-L   | CEMP-L  |
|         |                                    |          | - Section 1, page 4                                 |
|         |                                    |          | - Section 2.3, page 7                               |
|         |                                    |          | - Section 6.2, page 16, paragraph 1                 |
| MM31    | Community consultation             | AGL      | CEMP-L  |
|         |                                    | CEMP-L   | - Section 1, page 4                                 |
|         |                                    | CEMP-R   | - Section 2.1, page 4, paragraph 1                  |
|         |                                    |          | - Section 2.3, page 7-8                             |
|         |                                    |          | - Section 6.1, page 15, paragraph 2                 |
| MM32    | Maintenance and use of equipment   | CEMP-L   | CEMP-L  |
|         |                                    | CEMP-S   | - Section 1, page 4                                 |
|         |                                    |          | - Section 2.3, page 8                               |
|         |                                    |          | - Section 5.1.1, paragraph 1                        |
|         |                                    |          | - Section 6.3, page 17, paragraph 3, bullet point 4 |
|         |                                    |          | CEMP-S  |
|         |                                    |          | - Section 5.2, pages 6-7                            |
|         |                                    |          | - Section 5.3, pages 8-9                            |
| N4N422  |                                    | CEMPL    |   |
| 1111133 | areas                              |          |   |
|         |                                    | CEIVIP-S | - Section 1, page 4                                 |

|               |                                 |        | - Section 2.3 nage 8   |
|---------------|---------------------------------|--------|--|
|               |                                 |        | Section 6.2, page 0<br>Section 6.2, page 17, paragraph 2, hullet point E |
|               |                                 |        | - Section 6.5, page 17, paragraph 5, builet point 5                      |
|               |                                 |        | CEMP-S   |
|               |                                 |        | - Section 5.2, pages 6-7   |
|               |                                 |        | - Section 5.3, pages 8-9   |
| MM34          | Position of plant and equipment | CEMP-L | CEMP-L   |
|               |                                 | CEMP-S | - Section 1, page 4  |
|               |                                 |        | - Section 2.3, page 8  |
|               |                                 |        | - Section 6.3, page 17, paragraph 3, bullet point 6                      |
|               |                                 |        | CEMP-S   |
|               |                                 |        | - Section 5.2, pages 6-7   |
|               |                                 |        | - Section 5.3, pages 8-9   |
| MM35          | Multi-frequency alarms          | CEMP-L | CEMP-L   |
|               |                                 |        | - Section 1, page 4  |
|               |                                 |        | - Section 2.3, page 8  |
|               |                                 |        | - Section 5.1.1, page 13, second to last bullet point                    |
| MM36          | Traffic noise management        | CEMP-L | CEMP-L   |
|               |                                 | CEMP-S | - Section 1, page 4  |
|               |                                 |        | - Section 2.3, page 8  |
|               |                                 |        | - Section 6.3, pages 17-18, second to last                               |
|               |                                 |        | paragraph  |
|               |                                 |        | CEMP-S   |
|               |                                 |        | - Section 5.2, pages 6-7   |
|               |                                 |        | - Section 5.3, pages 8-9   |
| Visual Amenit | ý                               | ·      |  |
| MM37          | Screening vegetation            | AGL    | The Construction Phase activities are outlined in CEMP-G.                |

|               |  | Where applicable CEMP-G                             |   |
|---------------|--|---|---|
|               |  |   | Management of plantings during Operational Phase will be the responsibility of AGL. |
| MM38          | Clearing of vegetation                   | CEMP-F  | CEMP-F  |
|               |  | Outside of First Solar Scope                        | - Section 5, pages 9-10   |
|               |  | (transmission line)                                 | - Section 6.2.6, page 13  |
| MM39          | Areas disturbed and natural regeneration | Outside of First Solar Scope                        | Refer to separate transmission route CEMP   |
| MM40          | Colour of above ground structures        | Design consideration                                | CEMP-G  |
|               |  | Outside of CEMP Scope                               | - Section 1, page 4   |
|               |  |   | - New Section 6.6, page 11  |
| MM41          | Placement of transmission poles          | Outside of First Solar Scope                        | Refer to separate transmission route CEMP   |
| Air Quality   |  |   |   |
| MM42          | Air quality mitigation                   | CEMP-N  | CEMP-N  |
|               |  |   | - Section 3.1.1, page 7   |
|               |  |   | - Section 3.1.2, page 8   |
|               |  |   | - Section 3.1.3, page 8   |
|               |  |   | - Section 3.1.4, page 11 (revised)  |
| Health and Sa | fety                                     |   |   |
| MM43          | Substation and transmission line         | Design consideration                                |   |
|               | locations                                | Outside of CEMP Scope                               |   |
|               |  | Outside of First Solar Scope<br>(transmission line) |   |
| MM44          | Design of electrical infrastructure      | Design consideration                                |   |
|               |  | Outside of CEMP Scope                               |   |

| MM45          | Fencing around substation                  | Outside of CEMP scope                           | AGL  |
|---------------|--|---|--|
| Land Use Impa | acts and Mineral Resources                 |   |  |
| MM46          | Consultation with neighbouring landowners  | AGL<br>Where applicable CEMP-R                  | CEMP-R<br>- Section 1, page 4<br>- Section 2.3, page 6<br>- Section 3.3, page 8, last bullet point |
| MM47          | Consultation with mineral stakeholders     | AGL<br>Where applicable CEMP-R                  | CEMP-R<br>- Section 1, page 4<br>- Section 2.3, page 6<br>- Section 3.3, page 8, bullet point 3    |
| MM48          | Payment for easement                       | Outside of First Solar Scope                    | AGL  |
| Socioeconomi  | c and Community Wellbeing                  |   |  |
| MM49          | Community Consultation Plan                | AGL<br>Where applicable CEMP-R                  | CEMP-R<br>- Section 1, page 4<br>- Section 2.3, page 6<br>- Section 2.1, page 4, paragraph 1       |
| MM50          | Liaise with local industry representatives | Design consideration<br>Where applicable CEMP-R | CEMP-R<br>- Section 1, page 4<br>- Section 2.3, page 6<br>- Section 3.4, page 8, second paragraph  |
| MM51          | Liaise with local accommodation providers  | Design consideration<br>Where applicable CEMP-R | CEMP-R<br>- Section 1, page 4<br>- Section 2.3, page 6<br>- Section 3.4, page 8, second paragraph  |

| Traffic, Transp | port and Road Safety   |                              |  |
|-----------------|--|------------------------------|--|
| MM52            | <ul> <li>Traffic Management Plan</li> <li>details of intersection<br/>improvement</li> <li>risk analysis for oversize vehicles</li> <li>repair of roads effected by<br/>oversize vehicles</li> <li>Pre-construction road assessment</li> <li>Community consultation</li> </ul> | CEMP-O                       | CEMP-O - RMS Approval 19-Dec-2013 appended, page 23 - Section 3.5, page 15 - Section 3.5, page 15 - Section 3.5, page 14 - Section 3.5, page 15                                    |
| MM53            | Barrier Highway road corridor upgrade  | Outside of First Solar Scope | AGL  |
| MM54            | Installation of gates and grids  | Outside of First Solar Scope | AGL  |
| Resource Use    | and Waste Management   |                              |  |
| MM55            | Waste Management Plan  | CEMP-U                       | CEMP U <ul> <li>General (Waste Management Plan)</li> <li>Section 1, page 4</li> <li>Section 2.4, page 6</li> </ul>   |
| MM56            | Excess subsoil disposal  | CEMP-E<br>CEMP-U             | CEMP-E - Section 1, page 5 - Section 2.3, page 7 - Section 3.7.1, page 14, bullet point 10 CEMP-U - Section 1, page 4 - Section 2.4, page 6 - Section 4.5, page 10, bullet point 2 |

|               | -                                 |        |   |
|---------------|-----------------------------------|--------|---|
| MM57          | Excess topsoil for rehabilitation | CEMP-E | CEMP-E  |
|               |                                   | CEMP-H | - Section 1, page 5   |
|               |                                   | CEMP-U | - Section 2.3, page 7   |
|               |                                   |        | - Section 2.4, page 6   |
|               |                                   |        | - Section 3.7.1, page 14, bullet point 9                          |
|               |                                   |        | СЕМР-Н  |
|               |                                   |        | - Section 1, page 4,  |
|               |                                   |        | - Section 2.3, page 5   |
|               |                                   |        | - Section 3, page 7, third to last bullet point                   |
|               |                                   |        | CEMP-U  |
|               |                                   |        | - Section 1, page 4   |
|               |                                   |        | - Section 4.5, page 10, bullet point 1                            |
| Fire and Bush | Fire                              |        |   |
| MM58          | Bush Fire Management Plan         | CEMP-M | CEMP-M  |
|               |                                   |        | - General (Bush Fire Management Plan)                             |
|               |                                   |        | - Section 2.6, page 7-8   |
|               |                                   |        | - Section 3.1.6, page 10  |
|               |                                   |        | - Section 4.4, page 12  |
|               |                                   |        | - Section 4.2, page 12  |
|               |                                   |        | - Section 4.3, page 12  |
|               |                                   |        |   |
|               |                                   |        | Operational procedures fall outside of the scope of First Solar.  |
|               |                                   |        | Post fire clean up procedure included in new Section 4.5, page 13 |

| Historic Herita | age  |                  |  |
|-----------------|--|------------------|--|
| MM59            | Unexpected Historical Heritage find                | CEMP-K<br>CEMP-Q | CEMP-K - Section 1, page 4 - Section 2.3, page 5 - Section 3.1, page 6, bullet point 2 - Section 4, page 7, item 1 under Site Environmental Advisor CEMP-Q - Section 2.3, page 5, last paragraph   |
| Soil and Wate   | r (includes water use)                             | I                |  |
| MM60            | Site specific Erosion and Sediment<br>Control Plan | CEMP-E           | CEMP-E - Section 1, page 5 - Section 2.3, page 7 - Section 3.7, page 13, paragraph 1   |
| MM61            | Spill Response Plan                                | CEMP-V           | CEMP-V <ul> <li>General (Dangerous Goods and Spill Response)</li> <li>Section 1, page 4</li> <li>Section 2.3, page 5</li> <li>Section 3.9, pages 9-10</li> </ul>   |
| MM62            | Water take access permissions                      | CEMP (main)      | <ul> <li>CEMP (main) <ul> <li>Section 8.3, page 33, paragraph below the second set of bullet points.</li> </ul> </li> <li>CEMP-E <ul> <li>Section 1, page 5</li> <li>Section 2.3, page 7</li> <li>Section 3.8.1, page 19, second to last bullet point</li> </ul> </li> </ul> |

| MM63          | Dust suppression activities                                   | CEMP-E      | CEMP-E                                     |
|---------------|---|-------------|--|
|               | (construction phase)  | CEMP-N      | - Section 1, page 5,                       |
|               |   |             | - Section 2.3, page 8                      |
|               |   |             | - Section 3.7, page 14, bullet point 15    |
|               |   |             | CEMP-N                                     |
|               |   |             | - Section 2.4, page 6, last paragraph      |
|               |   |             | - Section 3.1.1, page 7, bullet point 3    |
|               |   |             | - Section 3.1.1, page 7, bullet point 4    |
|               |   |             | - Section 3.1.1, page 7, bullet point 5    |
|               |   |             | - Section 3.1.1, page 7, bullet point 6    |
|               |   |             | - Section 3.1.1, page 7, bullet point 7    |
|               |   |             | - Section 3.1.1, page 7, bullet point 8    |
|               |   |             | - Section 3.1.1, page 7, last bullet point |
|               |   |             | - Section 3.1.2, page 8                    |
|               |   |             | - Section 3.1.4, page 8                    |
|               |   |             | - Section 3.2, pages 9-10                  |
| Cumulative In | pacts   |             |  |
| MM64          | Consultation with Nyngan Scandium                             | CEMP (main) | CEMP (main)                                |
|               | Project and EMC Metals Crop<br>regarding construction traffic |             | - Section 8.4.2, page 34                   |