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A few words.

Daniel Keary

Director, Major Infrastructure Assessments

Department of Planning

23-33 Bridge Street

Sydney NSW 2000

15 October 2010

Dear Mr Keary,

Preliminary Environmental Assessment, Nyngan Solar Photovoltaic Power Project

AGL is pleased to provide the attached Preliminary Environmental Assessment (PEA) for the proposed Nyngan Solar Photovoltaic Power Project. This project is being developed as part of AGL's Stage 2 proposal to the Commonwealth Solar Flagships Program.

This PEA has been prepared in support of the Project Application and is seeking to provide the Department of Planning with sufficient information to adequately assess the likely benefits and impacts of the Nyngan PV power project. With this application AGL is formally seeking Director General requirements to assist in the preparation of an Environmental Assessment under Part 3A of the *Environmental Planning and Assessment Act 1979*.

If you have any further queries or seek additional information, please do not hesitate to contact me on 02 9921 2201.

Yours sincerely,

Doug Landfear
Manager Solar Development
AGL Energy Limited

Solar Flagships Program

PRELIMINARY ENVIRONMENTAL ASSESSMENT

NYNGAN SOLAR PHOTOVOLTAIC POWER PROJECT

15 October 2010

Prepared for:

AGL Energy Limited

Solar Flagships Program

PRELIMINARY ENVIRONMENTAL ASSESSMENT

NYNGAN SOLAR PHOTOVOLTAIC POWER PROJECT

■ 15 October 2010

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Contents

Executive Summary

The report provides a Preliminary Environmental Assessment (PEA) to support AGL's Project Application for the Nyngan Solar Photovoltaic Power Project (PV Power Project). The report identifies key environmental issues associated with the project and supports an application to the Minister for Planning under Section 75J(1) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for project approval. This PEA is intended to assist the Director-General of the Department of Planning (DoP) with the issuing of Environmental Assessment (EA) requirements under Section 75F of the EP&A Act.

The Australian Government has committed funding of $1.5 billion to the Solar Flagships program. The primary objective of the Solar Flagships program is to provide the foundation for large scale, grid-connected, solar power to play a significant role in Australia's electricity supply and to operate within a competitive electricity market. The Australian Government's aim is to establish up to 1,000 megawatts of solar power generation capacity.

AGL has been shortlisted as one of four solar PV projects for funding under the Solar Flagships program. AGL is developing up to five solar PV projects with a total capacity of up to 200 MW AC at multiple sites across Australia. The Nyngan PV Power Project has been selected as one of AGL's solar projects in NSW.

The preliminary desktop investigations undertaken for the proposed development indicate that the key environmental issues for the PV Power Project include:

- Surface hydrology;
- Contamination;
- Aboriginal heritage;
- Visual amenity;
- Noise; and
- Ecology.

This PEA provides discussion of the key environmental issues to demonstrate the proponent's existing understanding of the issues and the need for further environmental assessment of these key issues. The potential impacts and management of other issues such as soils and geology, groundwater, European heritage, access and traffic, alienation of resources, air quality, hazard and risk (EMF and bushfire), social and economic impacts, land use and waste management, and the reasons they have not been designated as key issues, are also discussed in the report.

The management of both key issues and other issues would be addressed through a Statement of Commitments and the Conditions of Approval of the project, which would determine the requirements for environmental management.

1. Introduction

1.1. Purpose of this Document

This Preliminary Environmental Assessment (PEA) has been prepared to support AGL Energy Limited's project application for the Commonwealth Solar Flagships Program. The report identifies key environmental issues associated with the project and ultimately supports an application to the Minister for Planning under Section 75J(1) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for project approval.

This report is intended to assist the Director-General of the Department of Planning (DoP) with the issuing of Environmental Assessment (EA) requirements under Section 75F of the EP&A Act.

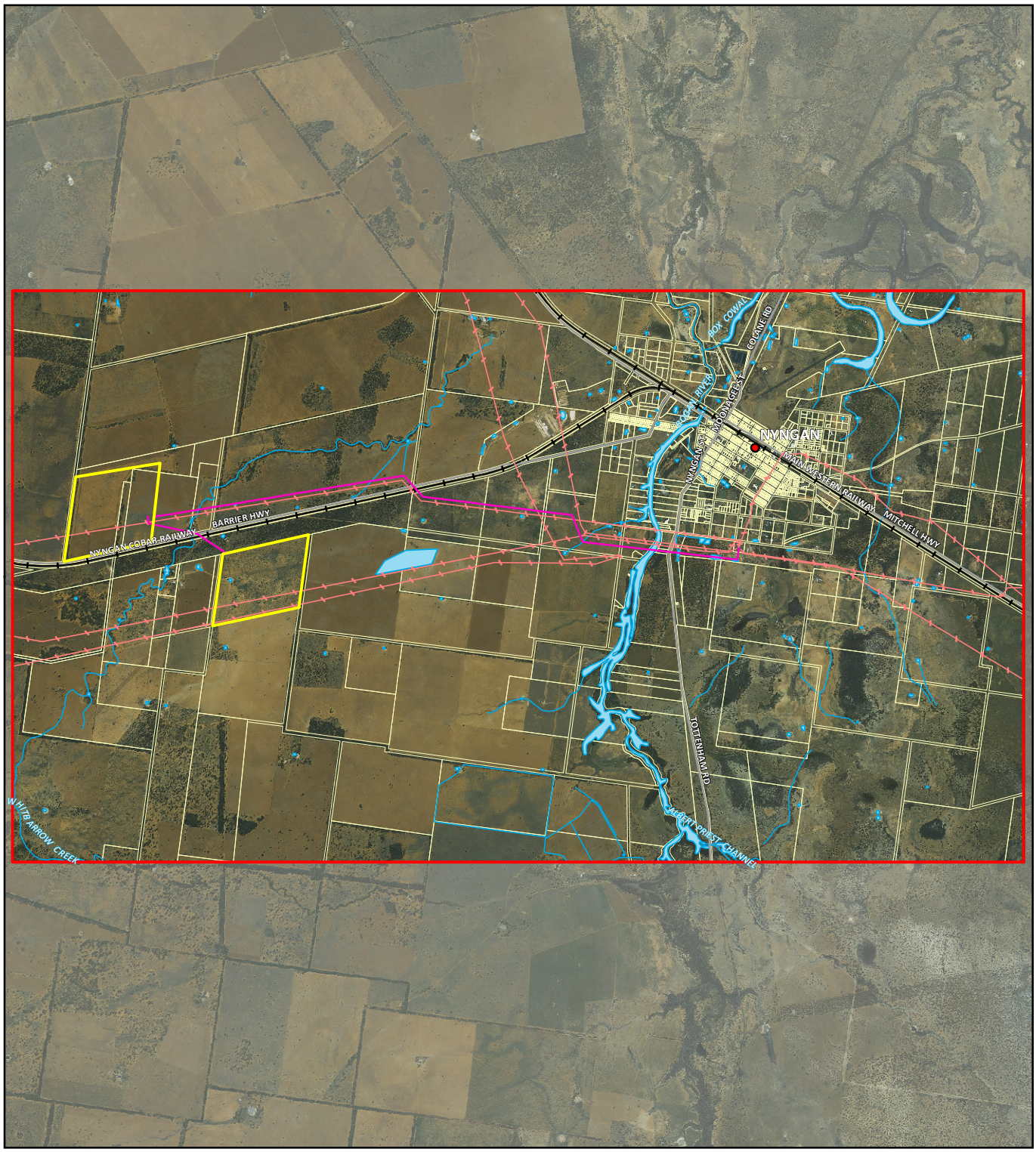
1.2. Background to the Project

The Solar Flagships program is part of the Australian Government's $4.5 billion Clean Energy Initiative, announced in the May 2009 Budget. The Government has committed $1.5 billion to support the construction and demonstration of up to four large-scale solar power plants in Australia, using solar thermal and photovoltaic (PV) technologies. The Government's aim is to establish up to 1000 megawatts (MW) of large-scale solar power generation capacity. Round 1 for the Solar Flagships program will select one solar thermal project and one PV project, with a target of up to 400 MW of combined generation capacity

AGL's Stage 1 submission proposed PV plants ranging from 30 to 50 MW in ACT, NSW, SA, VIC and QLD. This multi-state strategy was designed to leverage the benefits of solar PV as a distributed technology, and to leverage funding support from multiple state and territory sources. This approach offers the Commonwealth the opportunity to ensure that multiple stakeholders in multiple jurisdictions benefit from the Solar Flagships Program, providing jobs and economic growth and industry development across the country. Furthermore, the size of AGL's plants simplifies siting issues, allows easier and cheaper grid connections, and provides resource and time zone diversity.

The Nyngan PV Power Project has been selected as one of AGL's solar projects in NSW. The plant would be 100 megawatts (MW) in size. The project site and surrounding area is shown on **Figure 1-1**.

Figure 1-1 | Project area and surrounds



LEGEND

- Study area
- Site boundary
- Proposed transmission line
- Road
- Railway
- Transmission line
- Watercourse
- Water body
- Cadastre

GDA 1994 | MGA Zone 55
A4 1:100,000

0 2
Kilometres

October 15, 2010 | I:\HARB\Projects\HA01345\Technical\Spatial_Directory\ArcGIS\HA01345_004_Nyngan_StudyArea.mxd
Prepared by : DD
Checked by : JC

1.3. The Proponent

AGL Energy Limited (AGL) is the largest private owner, operator and developer of renewable generation in Australia and has invested well over $2 billion in renewable energy. AGL has major investments in hydro and wind, as well as ongoing developments in key renewable areas including solar, geothermal, biomass, bagasse and landfill gas. AGL also operates retail, merchant energy and upstream gas businesses and has over three million customer accounts.

1.4. Project Objectives

The primary objective of the Solar Flagships program is to provide the foundation for large scale, grid-connected, solar power to play a significant role in Australia's electricity supply and to operate within a competitive electricity market. The Australian Government's aim is to establish up to 1,000 megawatts of solar power generation capacity.

Other objectives of the Solar Flagships program, and hence the project, are to:

- Develop a solar industry in Australia;
- Encourage regional development;
- Provide research infrastructure;
- Develop Australian intellectual property in solar power generation; and
- Develop and share technical and economic knowledge from the Solar Flagships program.

1.5. Report Structure

A summary of the information contained within each chapter of this report is provided below.

Chapter 1 – provides the purpose of the report and the background of the project.

Chapter 2 – provides the need for the project and alternatives considered.

Chapter 3 – describes the project location, the key elements of the project and construction activities.

Chapter 4 –describes the legislative context and the planning approvals required for the project and consultation activities.

Chapter 5 – presents the preliminary environmental assessment of the key issues and other issues.

Chapter 6 – provides a conclusion to this report.

Chapter 7 – references.

2. Project Need

2.1. Project Need

In August 2009, the Australian Government implemented the Renewable Energy Target (RET) Scheme, which is designed to deliver on the Government's commitment to ensure that 20 per cent of Australia's electricity supply will be derived from renewable sources by 2020.

To assist in achieving this 20 per cent target and emphasise the need to invest in clean energy technologies, the Government has committed funding of $1.5 billion to the Solar Flagships program, which is part of the Clean Earn Energy Initiative (CEI). The Solar Flagships program has been designed to accelerate the delivery of large scale, grid-connected solar power into the National Electricity Market, show the Government's commitment to large scale solar projects and cleaner, greener electricity generation.

As part of the Solar Flagships program, AGL are seeking to construct and operate the Nyngan PV Power Project.

The main factors in determining the need for the project are to:

- Demonstrate that large scale solar power plants can be constructed and operated within major electricity grids in Australia;
- Optimise the business models for constructing, generating and wholesaling electricity generated from large scale solar power plants;
- Develop the solar power industry in Australia;
- Provide research infrastructure for solar power generation;
- Encourage regional development;
- Build initial infrastructure for further development of solar power;
- Develop Australian intellectual property and know-how in solar power; and
- Develop and share technical and economic knowledge of the operation of large scale solar power plants in a competitive energy market.

2.2. Alternatives Considered

During the development of the Nyngan PV Power Project, a number of alternative locations, layouts, and size on the site were considered.

Minimising environmental and social impacts and maximising efficiency have been major considerations in the evaluation of alternative options. Alternative options include building a

single 200 MW PV plant at one site rather than smaller PV plants across multiple sites in Australia. Multiple smaller PV plants were selected as the preferred option given that:

- Small PV plants would require a much smaller area of land which would have less impact on flora and fauna than a larger site;
- The local community is likely to be more accepting of a small PV plant than a large PV plant;
- It would allow for faster project development and construction times (again minimising environmental and social impacts during construction);
- Multiple small plants would provide the opportunity to better manage increasing peak demands during Summer in multiple locations, rather than one location;
- Geographic diversity would reduce weather risk as multiple smaller plants at multiple sites provides a natural hedge against transient cloud cover and weather systems since all sites are unlikely to be impacted simultaneously, whereas a single 200 MW plant can be negatively impacted from unfavourable weather; and
- Job creation, skills transfer, and economic development would occur in multiple locations, rather than one location.

The Nyngan site was identified as the preferred location for one of the PV plant sites, based on the following:

- Availability of an abundant solar resource;
- Access to connect to the electricity grid;
- Availability of appropriate land; and
- Suitability in terms of the interests of other stakeholders and the environment.

Further discussion of the alternatives considered would be included in the environmental assessment for the project.

The consequences of not proceeding would result in the loss of the benefits of the project including:

- Reduction in greenhouse gas emissions and a move towards cleaner electricity generation;
- Supply renewable energy which would assist the Australian and NSW Government to reach the Renewable Energy Target of 20 per cent by 2020;
- Provide additional electricity generation and supply into the Australian grid;
- Provide social and economic benefits through the provision of direct and indirect employment opportunities.

3. Description of the Project

3.1. Overview

This section of the PEA provides the context of the project location and a general description of the project. A more detailed description of the proposed Nyngan PV Power Project would be included in the environmental assessment.

3.2. Project Location

The project site is located in Central West NSW, approximately 7.6 km west of the Nyngan township. The location of the project site and immediate surrounds is shown in **Figure 1.1.** The project is entirely within the Bogan Shire local government area (LGA) and comprises rural land. The project site is split into two different sections, located either side of the Barrier Highway, Nyngan, and the Nyngan Cobar Railway within four lots – Lot 2 DP751328, Lot 3 DP751328 and Lot 24 DP751328 for the northern section, and Lot 36 DP 752891 for the southern section.

Approximately 385 hectares of land (approximately 205 ha for the northern section, and 180 ha for the southern section) is required for the 80 megawatt (MW) (40MW for each section) PV plant at Nyngan. The proposed PV Power Project site has an elevation of approximately 175 to 178 metres Australian Height Datum (AHD) across the site and is on a cleared, relatively flat area. The surroundings of the site comprise predominantly rural activities on large holdings. There are few rural residential properties scattered throughout the Bogan LGA.

Along with the PV plant, the proposed development would also include the installation and operation of a 132kV transmission line, approximately 11 km in length, to connect the plant to the Nyngan substation. The land that would be traversed by the 132kV transmission line consists of 11 properties of private rural land (and seven land parcels designated as road, not including the properties on which the PV Power Project is located,). The transmission line would also traverse the Bogan River, West Bogan Road, Tottenham Road, Barrier Highway and the Nyngan Cobar Railway to feed into Nyngan substation. It is assumed that an existing easement running east-west between the Bogan River and the Nyngan substation would be utilised for approximately 1 km of the transmission line. In addition, a 33kV underground transmission line would also be installed to connect the northern section of the site to the southern section. The transmission line would be approximately 1.6 km in length and would traverse two properties on rural land (not including the properties on which the PV Power Project is located).

3.3. Key Elements of the Project

3.3.1. Layout

The project would comprise the installation of a 100 megawatt PV plant with panel arrays. The project would comprise the following elements:

- PV solar panels and supporting infrastructure,
- DC collection system (including inverters, step up transformers and RMUs)
- 33kV collector system,
- 33kV/132kV transformer substation and switchgear,
- 132 kV transmission line,
- TNSP connection augmentation works (where applicable) and
- PV plant infrastructure including roads, fences and drainage.

3.3.2. Power Generation and Transmission

The solar panels (arrays) would be connected in series to form strings and then the strings connected together in parallel at the inverter input. This allows the regulation of the appropriate DC voltage and current to be provided as a DC power input into the inverter.

There are 630kW inverters at each local collection point which accept the DC power provided by the arrays. The inverters convert this to AC power (3 phase at 315 volts) and then this is transformed into 33kV by the transformer.

For Nyngan there would be two geographically separate sites (northern and southern sections) interconnected by a approximately 1.6 kilometre 33kV connection. The PV Power Project would be connected via a dedicated single circuit 132kV line connected to the Nyngan substation 132kv bus. Typically this would be with a single 3 phase 144 ACSR circuit, eight kilometres long, mounted on poles.

The approximate location of the 8 km transmission line is identified in Figure 1.1; however the final alignment of the transmission line may differ from that shown following detailed design. The land that would be traversed by the 132kV transmission line consists of 11 properties of private rural land (and seven land parcels designated as road, not including the properties on which the PV plant would be located,). The transmission line would also traverse the Bogan River, West Bogan Road, Tottenham Road, Barrier Highway and the Nyngan Cobar Railway to feed into Nyngan substation. It is assumed that an existing easement running east-west between the Bogan River and the Nyngan substation would be utilised for approximately 1 km of the

transmission line. In addition, a 33kV underground transmission line would also be installed to connect the northern section of the site to the southern section. The transmission line would be approximately 1.6 km in length and would traverse two properties on rural land (not including the properties on which the PV Power Project would be located).

3.4. Workforce and Hours of Operation

3.4.1. Construction

It is anticipated that during the construction period for the Nyngan PV Power Project, approximately 150 to 200 construction personnel would be required on site.

Construction activities would be undertaken during standard daytime construction hours (7.00am to 6.00pm Monday to Friday and 7.00am to 1.00pm on Saturdays). Any construction outside of these normal working hours would require prior approval from relevant authorities.

3.4.2. Operations

Once operational, the PV plant would be self sufficient with a minimal requirement for onsite personnel. Approximately two to three jobs would be created at the site to support ongoing plant day-to-day routine operations and maintenance.

3.5. Construction Phase

The overall construction works for the Nyngan PV Power Project is expected to take 12 months. The main construction activities would include:

- Site establishment and preparation for construction (preliminary civil works and drainage),
- Piling of steel posts to provide support for the PV panels,
- Attachment of tilt brackets and rails which hold the PV panels,
- Connection of the PV panel modules to the brackets,
- Installation of the inverters,
- Tenching and wiring of underground cabling (DC and AC),
- Construction of the transmission and connection assets,
- Installation of PV switchgear, transformers and connection to transmission infrastructure
- Commissioning and testing of the plant; and
- Removal of temporary construction facilities and completion of restoration works.

4. Planning Considerations and Consultation

4.1. Environmental Planning and Assessment Act 1979

Development in NSW is subject to the requirements of the *Environmental Planning and Assessment Act* 1979 (EP&A Act) and its associated regulation. Environmental planning instruments prepared pursuant to the Act set the framework for approvals under the Act.

The State Environmental Planning Policy (Major Development) 2005 (Major Development SEPP) identifies individual developments, or categories of developments which require assessment under Part 3A of the EP&A Act. Specifically, clause 24(a) of Schedule 1 applies to projects that involve:

> *"Development for the purpose of a facility for the generation of electricity or heat or their co-generation (using any energy source, including gas, coal, bio-fuel, distillate and waste and hydro, wave, solar or wind power), being development that:*
>
> *(a) has a capital investment value of more than $30 million, or…"*

As the capital investment for the 100 MW photovoltaic Power Project at Nyngan is greater than $30 million, the project meets the criteria for classification as a major development. The Minister for Planning is the relevant approval authority for assessing and determining project applications under Part 3A of the EP&A Act.

Critical Infrastructure Project

The Minister for Planning has declared under Section 75C of *the Environmental Planning and Assessment Act 1979* (EP&A Act), by order dated 27 November 2009 published in NSW Government Gazette (No. 184), that the following would be a critical infrastructure project under Section 75C of the EP&A Act:

> *"Development for the purpose of a facility for the generation of electricity derived from renewable fuel sources (that is, wind energy, solar energy, geothermal energy, hydro energy, wave energy and bio energy), being development that:*
>
> *(a) is the subject of an application lodged pursuant to section 75E or section 75M of the Environmental Planning and Assessment Act 1979 lodged after the date of this declaration; and*
>
> *(b) is the subject of an application that proposes a development with a capacity to generate at least 30 megawatts."*

Critical infrastructure projects under Section 75C of the EP&A Act are developments which, for economic, social and/or environmental reasons, are perceived to be essential to the State of NSW. The declaration has been made to provide increased certainty for industry and the community in the development of new renewable energy projects.

As the proposed development would have a generation capacity greater than 30 MW, the Nyngan photovoltaic plant would be assessed by the Minister for Planning as a critical infrastructure project under Part 3A of the EP&A Act. Whilst there are some differences which apply to the assessment of projects declared to be critical infrastructure projects under Part 3A (such as landowner consent is not required), the environmental assessment process is the same as that which applies to other Part 3A projects.

4.2. Environmental Planning Instruments

Section 75R of the EP&A Act excludes the application of the provisions of environmental planning instruments (other than SEPPs) to approved projects, including approved critical infrastructure projects. A SEPP only applies to critical infrastructure projects to the extent that the provisions of the SEPP expressly provide that they apply to the particular project (EP&A Act Section 75R(2)). There are no SEPPs that expressly relate to the Nyngan PV Power Project.

However, in deciding whether or not to approve the carrying out of a project, the Minister for Planning may (but is not required to) take into account the provisions of relevant environmental planning instruments (EPIs) that would not (because of Section 75R) apply to the project if approved. Such EPIs include the Bogan Local Environmental Plan 1991.

The proposed development would be located in the Bogan local government area (LGA) and is subject to the provisions of the Bogan Local Environmental Plan 1991. The development site is zoned 1(a) General Rural and the proposed works are permissible with consent. As the proposed development is subject to Part 3A of the EP&A Act, the Minister for Planning would be the approval authority.

4.3. NSW Environmental Approvals

4.3.1. Protection of the Environment Operations Act 1997

The *Protection of the Environment Operations Act 1997* (POEO Act) is administered by the Department of Environment, Climate Change and Water (DECCW). Under Section 48 of the POEO Act, premise-based scheduled activities (as defined in Schedule 1 of the Act) require an Environment Protection Licence (EPL). Although the works have a capacity to generate more than 30 megawatts of electrical power, electricity generation from solar power is not considered a scheduled activity, and therefore does not require an EPL under the POEO Act. Nevertheless,

any water pollution resulting from the proposed development that is not in accordance with an EPL would constitute a breach of the Act under Section 120. Under Section 148 of the Act, the proponent would be required to notify the DECCW of any pollution incidents that occur as a consequence of the construction or operation of the proposed development.

4.3.2. Roads Act 1993

The *Roads Act 1993* (Roads Act) provides for the classification of roads and for the declaration of the Roads and Traffic Authority (RTA) and other public authorities as roads authorities for both classified and unclassified roads. It also regulates the carrying out of various activities in, on and over public roads. Approval from the RTA or the local council would be required under Section 138 to erect a structure or carry out a work in, on or over a public road.

4.4. Commonwealth Legislation

4.4.1. Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is administered by the Commonwealth Department of the Environment, Water, Heritage and the Arts (DEWHA). Under the EPBC Act, approval is required for actions that are likely to have a significant impact on a matter of national environmental significance (NES) or Commonwealth land. The EPBC Act identifies seven matters of NES:

- World Heritage properties;
- National heritage places;
- Ramsar wetlands of international significance;
- Threatened species and ecological communities;
- Migratory species;
- Commonwealth marine areas; and
- Nuclear actions (including uranium mining).

The EPBC Act also requires assessment and approval for actions that are likely to have a significant impact on the environment of Commonwealth land, even if the subject action is taken outside Commonwealth land. When a person proposes to take an action that they believe may need approval under the EPBC Act, they must refer the proposal to the DEWHA for assessment.

A search of the Commonwealth DEWHA Protected Matters Search Tool indicates that there are no World Heritage or National Heritage areas or items within the study area. The proposed development is located in the same catchment as the Macquarie Marshes Nature Reserve Site, listed as a Ramsar Wetlands of international significance but is located approximately 100 km

from this site and is unlikely to affect the wetlands. The proposed development is not likely to have a significant impact on the environment of Commonwealth land. The 33kV underground transmission line between the northern and southern sections of the site would utilise an existing track; however it is possible that Commonwealth endangered ecological communities and threatened flora and fauna species could be affected. Further flora and fauna studies would confirm whether impacts to the woodland corridor would occur as a result of the proposed development, during the preparation of the environmental assessment.

4.4.2. Native Title Act 1993

The Commonwealth *Native Title Act 1993* provides a legislative framework for the recognition and protection of common law native title rights. Native title is the recognition in Australian law that Indigenous people had a system of law and ownership of their lands before European settlement. Where that traditional connection to land and waters has been maintained and where government acts have not removed it, the law recognises this as native title.

People who hold native title have a right to consult or continue to practise their law and customs over traditional lands and waters while respecting other Australian laws. This could include visiting to protect important places, making decisions about the future use of the land or waters, hunting, gathering and collecting bush medicines. Further, when a native title claimant application is registered by the National Native Title Tribunal, the people seeking native title recognition gain a right to consult or negotiate with anyone who wants to undertake a project on the area claimed.

Native title may exist in areas such as:

- Vacant Crown land;
- Some national parks, forests and public reserves;
- Some types of pastoral lease;
- Some land held for Aboriginal communities; and
- Beaches, oceans, seas, reefs, lakes, rivers, creeks, swamps and other waters that are not privately owned.

A native title search was undertaken for the area potentially impacted by the proposed development in August 2010 to determine whether it may be affected by a native title determination, application or indigenous land use agreement (ILUA). The results showed that there is a Native Title Claimant in the project area being the Barkandji Traditional Owners 8.

4.5. Stakeholder Consultation

The following stakeholders were identified as potentially being impacted by the PV plant development in Nyngan or possibly having an interest in the project itself. Adequate community consultation would be required with some or all of the following interested parties in **Table 4-1** during the environmental assessment.

Table 4-1 Key stakeholders

Category	Stakeholders
Directly impacted	■ Adjoining and nearest neighbours to the site, in particular residents of dwellings close to the proposed site
Communities	■ Local city (Nyngan) ■ Nyngan Local Aboriginal Land Council
Environmental non-government organisations (NGOs) and community based organisations	■ Local and regional groups (Lions club of Nyngan) ■ Police and community youth clubs ■ Local environmental groups
Government agencies and regulators	■ Local government (Bogan Shire Council) ■ Department of Environment, Climate Change and Water (DECCW) ■ NSW Office of Water (part of DECCW) ■ Industry and Investment NSW (I&I NSW) (including Department of Primary Industries) ■ NSW Department of Planning ■ NSW Roads and Traffic Authority (RTA) ■ Commonwealth Department of Environment, Water, Heritage and the Arts (DEWHA) ■ Central West Catchment Management Authority
Special interest groups	■ Emergency response groups (Rural Fire Service, State Emergency Service) ■ News media groups (ABC Radio, Nyngan Observer (local paper), Rural Press paper, Rebel FM radio, Outback Radio 2WEB) ■ Business - trade, retail sales and tourism committees

A Community Consultation Plan would be prepared to inform the community and project stakeholders of the project. The Plan may include:

- Preparation of material for distribution informing stakeholders about the project and newspaper advertisements to advertise the project.
- Establishment of a database, including all private stakeholders and potentially affected landholders; and
- Establishment of an information hotline and project email address.

Meetings would be held with stakeholders and concerned landholders as required. The consultation plan would aim to ensure that there is effective, ongoing liaison with the

community. Measures to reduce adverse impacts and promote positive impacts would be identified in the environmental assessment and appropriate management plans developed for the proposal. Agency consultation would also be undertaken in accordance with the requirements of the Director-General's requirements.

5. Preliminary Environmental Assessment

5.1. Preliminary Environmental Risk Analysis

A preliminary environmental risk analysis has been conducted to assist in the identification of key environmental matters that would require detailed assessment during the environmental assessment. The preliminary identification of key environmental risks has been undertaken in accordance to the general principles outlined in Australian Standard *AS/NZS 4360:2004 Risk Management* (Standards Australia, 2004) and *HB 203:2006 Environmental Risk Management – principles and process* (Standards Australia, 2006). Risks were identified for both the construction and operation phase of the project and analysed in relation to their possible consequence and likelihood of occurrence. From this analysis some environmental matters were deemed to be key issues on the basis that they had the potential, without appropriate mitigation measures, to have a significant impact on the environment.

A summary of the key environmental issues is provided in **Section 5.2**. The intent of the discussion is to demonstrate an understanding of the issues and the need for further environmental assessment and mitigation measures for these key issues. The potential impacts and management of other issues such as soils and geology, groundwater, European heritage, access and traffic, alienation of resources, air quality, hazard and risk, social and economic impacts, land use and waste management and the reasons they have not been designated as key issues, are discussed in **Section 5.3.**

5.2. Assessment of Key Issues

5.2.1. Surface Hydrology

The township of Nyngan is located in the Macquarie-Castlereagh catchment, which has an area of approximately 73,300 square kilometres, and is a sub-catchment within the Darling River Basin. Key watercourses within this catchment include the Macquarie River, Castlereagh River and the Bogan River. The Bogan River flows in a south-north direction through Nyngan. The proposed PV plant would be located approximately 5.7 km west of the Bogan River. The proposed transmission line would traverse the Bogan River. A drainage line also exists between the northern and southern sections of the site (approximately 430 metres to the south-west of the northern section of the site and 520 metres to the north-west of the southern section of the site), and runs in a south-west to north-east direction. A farm dam is also located inside the southern section of the site.

The proposed development would be located within the same catchment as the Macquarie Marshes Nature Reserve, listed as Ramsar Wetlands of international significance, approximately 100 km north-east of Nyngan. Due to the distance of the wetlands, and that the closest waterway

is located 430 metres from the site, it is unlikely that the proposed development would affect the Ramsar wetlands.

There is limited information available on flooding of the proposed PV Power Project site. It should be considered that there is a potential for flooding, however it is uncertain whether there is a high or low probability of flooding given that there is limited historical information available for the proposed site.

Conclusions and Need for Further Assessment

The proposed development would not result in any direct impacts to water courses. The Macquarie Marshes Nature Reserve listed as a Ramsar site is not likely to be affected by the proposed development, as it would be located approximately 100 km from the site. There would be a potential for water quality of the Bogan River to be affected during construction, as the transmission line traverses the river. There could be potential for flooding at the proposed PV plant site, given that there is limited information for the site.

A flood study would be undertaken as part of the environmental assessment.

5.2.2. Aboriginal Heritage

A search of the Department of Environment, Climate Change and Water (DECCW) Aboriginal Heritage Information Management System (AHIMS) database was undertaken to identify the locations of known Aboriginal heritage sites in the study area. The results of this search indicated that there is one previously recorded Aboriginal heritage sites within a 5 km radius of the proposed PV Power Project, being the Land Claim 7402 (Site ID 27-4-0235). The results also indicated that there were 26 other previously recorded Aboriginal heritage sites within a 5 km radius of the transmission line. The results of the AHIMS search are presented in **Table 5-1**.

- **Table 5-1 AHIMS search results within the study area**

Site ID	Site Name	Approximate distance to project boundary
27-4-0235	Land Claim 7402	4.4 km (1.6 km from the transmission line)
27-4-0001	Nyngan	2.9 km from the transmission line
27-4-0011	Mitchell Highway	2.6 km from the transmission line
27-4-0012	Mitchell Highway	2.6 km from the transmission line
27-4-0013	Mitchell Highway	3.0 km from the transmission line
27-4-0014	Mitchell Highway	3.14 km from the transmission line
27-4-0015	Mitchell Highway	3.1 km from the transmission line
27-4-0016	Mitchell Highway	3.1 km from the transmission line
27-4-0017	Mitchell Highway	3.1 km from the transmission line
27-4-0018	Mitchell Highway	3.5 km from the transmission line

Site ID	Site Name	Approximate distance to project boundary
27-4-0019	Mitchell Highway	4.1 km from the transmission line
27-4-0020	Mitchell Highway	4.8 km from the transmission line
27-4-0207	Nyngan Township 1	2.6 km from the transmission line
27-4-0208	Nyngan Township 2	2.5 km from the transmission line
27-4-0209	Nyngan Township 3	2.4 km from the transmission line
27-4-0210	Nyngan Township 4	2.4 km from the transmission line
27-4-0211	Nyngan Township 5	2.1 km from the transmission line
27-4-0212	Nyngan Township 6	2.1 km from the transmission line
27-4-0213	Nyngan Township 7	2.2 km from the transmission line
27-4-0214	Nyngan Township 8	2.2 km from the transmission line
27-4-0215	Nyngan Township 9	2.3 km from the transmission line
27-4-0216	Nyngan Township 10	2.3 km from the transmission line
27-4-0217	Nyngan Township 11	2.4 km from the transmission line
27-4-0218	Nyngan Township 12	2.3 km from the transmission line
27-4-0219	Nyngan Township 13	2.5 km from the transmission line
27-4-0220	Nyngan Township 14	2.5 km from the transmission line
27-4-0234	Land Claim 7397	2.8 km from the transmission line

There are no Aboriginal heritage sites listed on the Commonwealth Heritage List, Register of the National Estate, State Heritage Register, State Heritage Inventory or the Bogan Local Environmental Plan 1991 within 10 km of the project site.

None of the recorded Aboriginal heritage items is located within the project boundary. The closest Aboriginal heritage item is located approximately 1.6 km from the transmission line (and 4.4 km from the PV Power Project site), and would not be affected by the project.

Due to the extent of previous disturbance to the site, it is unlikely that any previously undiscovered Aboriginal artefacts or places would be encountered during construction of the proposed PV Power Project.

Conclusions and Need for Further Assessment

The PV plant and transmission line are proposed to be constructed on previously disturbed land. It is therefore unlikely that any undiscovered Aboriginal artefacts or places would be encountered during the construction phase.

An Aboriginal heritage assessment would be undertaken as part of the environmental assessment. Consultation with representatives of local Aboriginal groups would be also be undertaken as part of the assessment. The significance of any Aboriginal heritage sites that may

be potentially affected by the proposal would be determined. If any Aboriginal sites or items are considered to be of high significance, further intensive investigations would be conducted in consultation with relevant Aboriginal groups. Appropriate management measures would be developed prior to construction works, to ensure significant sites and items are salvaged, if necessary.

5.2.3. Visual Amenity

The proposed PV Power Project site would be located within a relatively flat landscape with an elevation of approximately 175 to 178 metres above sea level. The proposed PV Power Project would be located on private land, traversing four land holdings and located approximately 600 metres from the nearest sensitive receiver, which appears to be a residential dwelling. As the topography of the site is flat, receivers would not look down upon or up towards the proposed development. It is likely that the PV plant would be visible from the residential dwelling.

A 132kV transmission line would also be constructed as part of the development, which would connect the northern section of the PV plant to the Nyngan substation, located to the east of the site at the junction of Boundary Street East and Dandaloo Street. The majority of the proposed transmission line alignment traverses rural land. The 132kV transmission line would traverse 11 land holdings and pass within approximately 250 metres of sensitive receivers, which appears to be a residential dwelling. The 33kV transmission line would connect the southern and northern sections of the site, would traverse two land holdings and pass within 700 metres of sensitive receivers, which appears to be a residential dwelling. This would not be visible from sensitive receivers during operation, as it would be located underground. It is likely that the 132kV transmission line would be visible from the house (and potentially from other residential dwellings). The transmission line would be located parallel to other existing transmission lines, therefore would not generate any new visual impact to receivers. There are no significant tourist sites or facilities, scenic lookouts or public recreation areas in the vicinity of the proposed PV plant and transmission line.

Conclusions and Need for Further Assessment

The proposed PV plant and transmission line are likely to be visible from the nearest house (and potentially from other residential dwellings), and therefore it is possible that localised visual impacts could occur.

A visual impact assessment would be undertaken as part of the environmental assessment. The assessment would include an analysis of existing photographs, maps and drawings, a survey of sensitive locations, assessment of the visual impact and development of mitigation measures which would minimise the visual impact of the proposed PV plant and transmission line.

5.2.4. Noise

The project would be located on rural land that has very low ambient (background) noise levels. The main existing background noise sources are vehicle traffic on the Barrier Highway and local rural activities including farming machinery and equipment and intermittent vehicle movements through private properties and on local public and private roads. The study area generally contains few significant noise or vibration sources. There is no available information of existing background noise levels at the site.

The private land holdings adjacent to the proposed development site are sparsely populated and only a small number of people have the potential to be affected by construction noise. The majority of buildings including residences are located in the township of Nyngan approximately 7.6 km distant. The closest residential dwelling is approximately 600 metres distant.

Conclusions and Need for Further Assessment

The construction of the proposed PV Power Project would not anticipated to have a significant noise impact given that the closest residential dwelling would be greater than 600 metres from the proposed development site, and that noise would be minimised as far as practicable with the implementation of appropriate management measures. The construction of the transmission line may have a higher noise impact given that the closest residential dwelling would be approximately 250 metres from the 132kV transmission line and 700 metres from the 33kV transmission line. Construction of the transmission line would also be of relatively short duration at any one location as it would be undertaken in a progressive/staged manner along the length of the transmission line route. The operation of the PV plant and transmission line would not be expected to have any significant noise impacts.

A construction noise assessment would be undertaken as part of the environmental assessment to assess potential noise impacts. The assessment would be undertaken in accordance with the Interim Construction Noise Guideline (DECCW, 2009) and be of a qualitative nature.

5.2.5. Ecology

From an assessment of the aerial photography, the proposed PV Power Project would be located in an area that is largely devoid of vegetation, consisting of cleared farm land, with a distinct corridor of woodland present within the northern section of the proposed development area.

The potential ecological constraints within the study area have been identified based on the following information sources:

- Existing threatened species listings under the NSW *Threatened Species Conservation Act 1995* (TSC Act) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- Existing records of threatened species sightings in the study area, as recorded in the Atlas of NSW Wildlife (DECCW); and
- Department of Environment, Water, Heritage and the Arts (online) Protected Matters Search Tool (nationally threatened species listed on the EPBC Act).

There is limited threatened species data in the immediate locality probably due to a lack of past survey effort rather than a lack of species. Typically, a 10 km radius of the study area is undertaken to ascertain potential threatened flora and fauna species, endangered populations and ecological communities; however, given the lack of data available, a 25 km radius of the study area has been undertaken for this desktop assessment (defined as the study locality).

Endangered ecological communities

Seven endangered ecological communities have previously been recorded or may potentially occur within a 25 km radius of the study area (defined as the study locality) (refer to **Table 5-2**). Three of these endangered ecological communities are known to occur in the region and include:

- Brigalow within the Brigalow Belt South; Nandewar and Darling Riverine Plains Bioregion;
- Coolibah-Black Box woodland of the northern riverine plains in the Darling Riverine Plains and Brigalow Belt South bioregions; and
- Myall Woodland in the Darling Riverine Plains; Brigalow Belt South; Cobar Peneplain; Murray-Darling Depression; Riverina and NSW South western Slopes bioregions.

Another four endangered ecological communities may occur, or are predicted to occur within the area.

- **Table 5-2 Endangered ecological communities in the study locality**

Endangered ecological community	EPBC Act status	TSC Act status	Likelihood of occurrence	Risk of impact
Grey Box (*Eucalyptus macrocarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	-	Community may occur within the surrounding woodland areas	Moderate - woodland present to north of the site which could include this EEC and provide habitat for threatened flora and fauna.
Weeping Myall Woodlands	Endangered	-	Community may occur within study locality	Moderate - woodland present to north of the site which could include

Endangered ecological community	EPBC Act status	TSC Act status	Likelihood of occurrence	Risk of impact
				this EEC and provide habitat for threatened flora and fauna.
Artesian Springs Ecological Community	-	Endangered	Predicted to occur in the study locality	Low - habitat does not appear to be present.
Brigalow within the Brigalow Belt South; Nandewar and Darling Riverine Plains Bioregions	-	Endangered	Known in the study locality	Moderate - woodland present to north of the site which could include this EEC and provide habitat for threatened flora and fauna.
Coolibah-Black Box woodland of the northern riverine plains in the Darling Riverine Plains and Brigalow Belt South bioregions	-	Endangered	Known in the study locality	Moderate - woodland present to north of the site which could include this EEC and provide habitat for threatened flora and fauna.
Fuzzy Box on alluvials of South West Slopes; Darling Riverine Plains & the Brigalow Belt South	-	Endangered	Predicted to occur in the study locality	Moderate - woodland present to north of the site which could include this EEC and provide habitat for threatened flora and fauna.
Myall Woodland in the Darling Riverine Plains; Brigalow Belt South; Cobar Peneplain; Murray-Darling Depression; Riverina and NSW South western Slopes bioregions	-	Endangered	Known in the study locality	Moderate - woodland present to north of the site which could include this EEC and provide habitat for threatened flora and fauna.

The proposed development site appears to be located within cleared agricultural land, which is largely devoid of vegetation (except a strip of vegetation in the northern section), as determined by interpretation of aerial photography and a site fly-over. Heavily grazed grasslands are present with a high likelihood of introduced grass species abundant throughout the site. There are a small number of habitat trees remaining within the proposed development site which are unlikely to form any significant ecological community within the proposed development site but may provide significant habitat for threatened species.

There is a corridor of woodland located between the northern and southern sections of the proposed site. The 33kV underground transmission line would use an existing track through this corridor, and although direct impacts to this corridor should be avoided, there is a risk of indirect impacts through edge effects. There are six endangered ecological communities that may potentially occur within this woodland corridor. It is also assumed that an existing

easement running east-west between the Bogan River and the Nyngan substation would be utilised for approximately 1 km of the transmission line, which would reduce the area of vegetation to be cleared and/or disturbed.

Threatened flora species

Two threatened flora species have been previously recorded or have been identified as potentially occurring within 25 km of the study area (refer to **Table 5-3**). While the proposed 132kV transmission line would traverse mostly cleared cropping land, approximately 1 km of the transmission line would utilise an existing easement between the Bogan River and the Nyngan substation. The existing easement is currently 50 metres wide, and it is possible that clearing or disturbance of vegetation may be required during construction of the transmission line. In addition, a 33kV underground transmission line would connect the northern and southern sections of the site. Although the construction of the underground transmission line would be within an existing track, it is possible that disturbance to the vegetation may occur.

Table 5-3 Threatened flora species in the study locality

Scientific Name	Common Name	EPBC Act status	TSC Act status	Likelihood of occurrence	Risk of impact
Diuris sheaffiana	Tricolour Diuris	Vulnerable	-	Species or species habitat may occur within study locality	Moderate - woodland present in northern section of proposed development could provide habitat for this threatened species
Pterostylis cobarensis	Greenhood Orchid	-	Vulnerable	Species or species habitat may occur within study locality	Moderate - woodland present in northern section of proposed development could provide habitat for this threatened species

The proposed development site consists of cleared agricultural land, with a small number of habitat trees throughout the site. A corridor of woodland is present between the northern and southern section of the site, which may contain threatened flora species and may be affected by the construction of the 33kV underground transmission line. There is a moderate risk of impact to two identified threatened flora species due to potential impact on the woodland corridor and the scattered tree cover throughout the site, and the potential for native groundcover, grasses and threatened flora species to exist on the site.

Threatened fauna species

Twenty-nine threatened or migratory fauna species have been previously recorded or have been identified as potentially occurring within 25 km of the study area, including either species listed as endangered or vulnerable under the EPBC Act (refer to **Table 5-4**).

- **Table 5-4 Threatened and migratory fauna species in the study locality**

Scientific Name	Common Name	EPBC Act status	TSC Act status	Likelihood of occurrence	Risk of impact
Birds					
Leipoa ocellata	Mallefowl	Vulnerable Migratory	-	Species or species habitat likely to occur within study locality	Low - habitat does not appear to be present.
Polytelis swainsonii	Superb Parrot	Vulnerable	Vulnerable	Species or species habitat likely to occur within study locality	Moderate - may impact on woodland and isolated trees with hollows which provide habitat and potential nesting opportunities
Rostratula australia	Australian Painted Snipe	Vulnerable	-	Species or species habitat likely to occur within study locality	Low - habitat does not appear to be present.
Circus assimilis	Spotted Harrier	-	Vulnerable	Species or species habitat likely to occur within study locality	Low - habitat does not appear to be present.
Hieraaetus morphnoides	Little Eagle	-	Vulnerable	Species or species habitat likely to occur within study locality	Low - habitat does not appear to be present.
Cacatua leadbeateri	Major Mitchell's Cockatoo	-	Vulnerable	Species or species habitat likely to occur within study locality	Low - habitat does not appear to be present.
Calyptorhynchus banksii	Red-tailed Black-Cockatoo	-	Vulnerable	Species or species habitat likely to occur within study locality	Low - habitat does not appear to be present.

Scientific Name	Common Name	EPBC Act status	TSC Act status	Likelihood of occurrence	Risk of impact
Calyptorhynchus lathami	Glossy Black-Cockatoo	-	Vulnerable	Species or species habitat likely to occur within study locality	Low - habitat does not appear to be present.
Climacteris picumnus	Brown Treecreeper	-	Vulnerable	Species or species habitat likely to occur within study locality	Low - habitat does not appear to be present.
Stagonopleura guttata	Diamond Firetail	-	Vulnerable	Species or species habitat likely to occur within study locality	Moderate - may impact on woodland and isolated trees with hollows which provide habitat and potential nesting opportunities.
Grus rubicunda	Brolga	-	Vulnerable	Species or species habitat likely to occur within study locality	Low - habitat does not appear to be present.
Epthianura albifrons	White-fronted Chat	-	Vulnerable	Species or species habitat likely to occur within study locality	Low - habitat does not appear to be present.
Melanodryas cucullata	Hooded Robin	-	Vulnerable	Species or species habitat likely to occur within study locality	Low - habitat does not appear to be present.
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	-	Vulnerable	Species or species habitat likely to occur within study locality	Moderate - may impact on woodland and isolated trees with hollows which provide habitat and potential nesting opportunities.
Ninox connivens	Barking Owl	-	Vulnerable	Species or species habitat likely to occur within study locality	Moderate - may impact on woodland and isolated trees with hollows which provide habitat and potential nesting opportunities.
Haliaeetus leucogaster	White-bellied Sea-Eagle	Migratory	-	Species or species habitat likely to occur within study locality	Low - habitat does not appear to be present.

Scientific Name	Common Name	EPBC Act status	TSC Act status	Likelihood of occurrence	Risk of impact
Hirundapus caudacutus	White-throated Needletail	Migratory	-	Species or species habitat likely to occur within study locality	Moderate - may impact on woodland and isolated trees with hollows which provide habitat and potential nesting opportunities.
Merops ornatus	Rainbow Bee-eater	Migratory	-	Species or species habitat likely to occur within study locality	Low - habitat does not appear to be present.
Ardea alba	Great Egret, White Egret	Migratory	-	Species or species habitat likely to occur within study locality	Low - habitat does not appear to be present.
Ardea ibis	Cattle Egret	Migratory	-	Species or species habitat likely to occur within study locality	Low - habitat does not appear to be present.
Gallinago hardwickii	Latham's Snipe, Japanese Snipe	Migratory	-	Species or species habitat likely to occur within study locality	Low - habitat does not appear to be present.
Rostraluta benghalensis s. lat.	Painted Snipe	Migratory	-	Species or species habitat may occur within study locality	Low - habitat does not appear to be present.
Apus pacificus	Fork-tailed Swift	Migratory	-	Species or species habitat may occur within study locality	Low - habitat does not appear to be present.
Mammals					
Nyctophilus timoriensis (South-eastern form)	Greater Long-eared Bat, South-eastern Long-eared Bat	Vulnerable	-	Species or species habitat may occur within study locality	Moderate - may impact on woodland and isolated trees with hollows which provide habitat and potential nesting opportunities.
Antechinomys laniger	Kultarr	-	Endangered	Species or species habitat may occur within study locality	Low - habitat is not likely to occur due to grazing within the locality

Scientific Name	Common Name	EPBC Act status	TSC Act status	Likelihood of occurrence	Risk of impact
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	-	Vulnerable	Species or species habitat may occur within study locality	Moderate- may impact on woodland and isolated trees with hollows which provide habitat and potential nesting opportunities
Chalinolobus picatus	Little Pied Bat	-	Vulnerable	Species or species habitat may occur within study locality	Moderate - may impact on woodland and isolated trees with hollows which provide habitat and potential nesting opportunities
Ray-finned fish					
Maccullochella peelii pellii	Murray Cod	Vulnerable	-	Species or species habitat likely to occur within study locality	Low - habitat does not appear to be present.
Amphibians					
Crinia sloanei	Sloane's Froglet	-	Vulnerable	Species or species habitat likely to occur within study locality	Low - habitat does not appear to be present.

The proposed development site is largely devoid of significant vegetation communities which would provide habitat for threatened species, if present. However, the woodland corridor between the two sections of the proposed may contain endangered ecological communities and provide habitat for eight threatened fauna species, comprising woodland dependent birds. In addition, these eight threatened species may also use isolated habitat trees based within the cleared grazed paddocks.

Conclusions and Need for Further Assessment

Overall, although a number of endangered ecological communities, threatened flora and fauna species of national and state conservation significance have been recorded in the wider study locality or listed as possibly occurring within the area, some of these species or species habitats have a low risk of occurring within the proposed project site. Threatened fauna species are likely to occur in the woodland corridor surrounding the 33kV transmission line due to the presence of endangered ecological communities and threatened flora species. Direct impacts to these species are unlikely as the proposed transmission line would use an existing track; however indirect effects may occur due to the proximity of construction and the impact of edge effects. It is also assumed that an existing easement running east-west between the Bogan River

and the Nyngan substation would be utilised for approximately 1 km of the transmission line, which would reduce the area of vegetation to be cleared and/or disturbed. There are isolated habitat trees located throughout the cleared grazed paddocks which may provide habitat for threatened fauna species, and native groundcover and threatened flora may exist on the site.

A flora and fauna assessment (including a field investigation) would be undertaken during the preparation for the environmental assessment to assess potential impacts of the project on threatened species, populations or communities.

5.3. Other Environmental Issues

There are a range of potential environmental issues associated with the Nyngan PV Power Project that are not considered to be key issues. These issues are considered secondary issues given the characteristics of the project and the availability of appropriate safeguards for mitigation. These issues are outlined in **Table 5-5**.

It is proposed that these issues would be addressed in sufficient detail to assess the level of their impacts (if any). It is anticipated that any impacts identified would be able to be managed through appropriate mitigation measures and management plans.

Table 5-5 Other Environmental Issues

EXISTING ENVIRONMENT	POTENTIAL IMPACTS	MANAGEMENT AND MITIGATION MEASURES
Soils and Geology		
The study area would be located within the Great Artesian Basin. Soils in this region consist of weathered sedimentary rocks and alluvial silts and clays. It is likely that the study area consists of residual soil to a depth of approximately one metre. From interpretation of aerial imagery, there is low potential for gilgai soil to occur within the study area.	Construction activities such as excavation have the potential to cause soil erosion and sedimentation.	The adverse impacts on soils are expected be minimal and would be managed with the implementation of erosion and sedimentation control measures. A detailed geotechnical study would be undertaken as part of the environmental assessment.
Contamination		
A search of the DECCW contaminated site register found no records in the database for the Bogan local government area (LGA). The site would not be located on the contaminated site register. Although the site is not listed on the contaminated site register, contamination may still be present on the site. Due to the historical uses of the region for agricultural purposes, it is possible that further contaminated sites are present within the study area. Areas of contamination associated with agricultural activities include the use of fertilisers, fungicides and pesticides, stockyards, and chemical and fuel stores.	No contaminated sites are recorded on or adjacent to the proposed development. It is therefore unlikely that significant contamination exists on the proposed PV plant site. Construction activities associated with site preparation for the PV Power Project may, however, result in disturbance of potentially contaminated land associated with agricultural land use activities.	A contaminated land assessment would be undertaken to identify the potential for past and/or current sources of contamination in the study area. This would mainly involve a desktop assessment (and possible site visit) and would involve a review of historical information, contamination records and aerial photography.
Groundwater		
The study area would be located in the east of the Central West Water Management Area, Southern Recharge Groundwater Source. The Southern Recharge Groundwater Source forms part of the NSW Great Artesian Basin (GAB) Groundwater Source. The Southern Recharge Groundwater Source is characterised by better quality groundwater than other zones within the Great Artesian Basin and where water is stored within the Pilliga Sandstone aquifer (DWE, 2009).	It is unlikely that groundwater would be encountered given the minor excavation and earthwork requirements for the proposed PV plant and pole placements for the transmission lines. Contamination of groundwater would also be unlikely given that chemicals and fuels would be appropriately stored, and spills procedures would be implemented.	Groundwater impacts are expected to be minimal. Appropriate chemical and fuel handling as part of the Construction Environmental Management Plan (CEMP) would mitigate any potential contamination of groundwater.

European Heritage		
A search of the following heritage registers was undertaken as part of this assessment: ■ Register of the National Estate; ■ Commonwealth Heritage List; ■ State Heritage Register (SHR) ; and ■ Bogan Local Environmental Plan 1991 (LEP). The results of the heritage register searches indicated that there were four recorded cultural heritage items listed on the above registers located within a 5 km radius of the proposed PV plant and the transmission line. The four items include: ■ Nyngan Railway Station (Bogan LEP 1991); ■ Overhead footbridge & goods shed (Bogan LEP 1991); ■ Chinese Graves and Burner at Nyngan Cemetery (SHR); and ■ Nyngan Court House (SHR).	None of the recorded European heritage items would be located on, or adjacent to, the proposed development site and none would be affected by the proposed PV plant and transmission line. It is unlikely that any European heritage items would be affected during construction and operation of the proposed development at Nyngan.	If a potential European heritage site is uncovered during construction, works in that area would cease until the find could be assessed by an appropriately qualified archaeologist, and the NSW Heritage Branch would be consulted.
Access and Traffic		
The main road in the study area is the Barrier Highway. The Barrier Highway is an important east-west link in outback NSW, which commences in Nyngan and continues through the South Australian border to near Adelaide. The remaining public roads in the study area are minor roads that carry only minor volumes of traffic.	Access to the proposed PV plant site during the construction and operational phases has not yet been confirmed; however it is likely that access would be obtained via the following roads: ■ Barrier Highway - sealed, single carriageway public road. This road is suitable for use by heavy vehicles; ■ Rutherglen Road – unsealed, local road. This road is suitable for use by heavy vehicles; and The construction and operation of the proposed PV Power Project is not anticipated to have a significant impact on traffic flows, given that there would be a small increase in traffic volumes from vehicles.	Consultation would be undertaken before construction with the appropriate roads authority regarding the works that may affect roads or traffic. A Traffic Management Plan would be developed as part of the CEMP.

	The 132kV transmission line would cross the Barrier Highway, West Bogan Road and Tottenham Road which has the potential to disrupt traffic. This aspect of the works would require consent with the RTA or the local council under Section 138 of the *Roads Act 1993.* The 33kV underground transmission line would also cross the Nyngan Cobar Railway.	
Alienation of Resources		
The rural land in the study area is used primarily for agriculture, particularly sheep and cattle grazing and crop farming, with some mining. From interpretation of the aerial photography, it appears that the whole site is used for agricultural purposes. Information was obtained from Industry and Investment NSW (Department of Primary Industries branch) to determine current exploration titles and applications for minerals, coal and petroleum. There are no current mineral, petroleum or coal titles or applications over the site.	Although the proposed PV Power Project has the potential to impact on the viability of the proposed development site for agricultural purposes, the relatively small loss of productive land for the region is not considered likely to have a significant impact on the overall agricultural productivity of the region.	Overall, the adverse impacts on alienation of resources are expected to be minimal, and as such, are not considered to be a key environmental issue.
Air Quality		
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. Existing sources of air pollution in the study area include vehicle emissions, agricultural and manufacturing industries. During colder months, there is a minimal increase in air contaminants due to smoke emissions from the operation of solid fuel heating.	The construction of the proposed PV plant and transmission is not anticipated to have a significant impact on air quality. The potential impacts of dust generation during excavation and earthworks are considered to be minimal given that the closest residential dwelling to the proposed PV plant is 600 metres and the closest residential dwelling to the 132kV transmission line is 250 metres and to the 33kV transmission line is 700 metres.. Construction would be carried out in a progressive manner along the length of the transmission line route and would only affect localised areas at any one time. The operation of the proposed PV plant	A CEMP would be prepared to manage air quality impacts during excavation and construction of the project.

	would involve distribution of electricity generated by solar and would not generate any emissions. Annual maintenance activities would result in some localised, intermittent vehicle emissions and potentially some generation of dust from vehicles travelling across the access tracks. The impacts on local and regional air quality are expected to be negligible.	
Hazard and Risk - EMF		
A 132kV and a 33kV transmission line currently traverse the southern section of the project site in an east to west direction and a 66kV line traverses the northern section of the site, also in an east to west direction.	Considering that no dwellings or other facilities are intended to be built and occupied within the proposed 132 kV or 33kV transmission line easement and that the nearest potentially occupied building is located approximately 250 metres from the centreline, the electromagnetic fields (EMF) that would be generated by the proposed transmission line is expected to be below the guideline for public exposure and would not be expected to have an adverse impact on human health.	The EMF levels of the proposed transmission line would be calculated as part of the environmental assessment.
Hazard and Risk - Bushfire		
In terms of bushfire hazard and risk, the Central West region is characterised by mild to hot summers and cool to mild winters. There has been no recorded bushfire or wildfire activity in the area since 2007. The proposed site has been predominantly cleared for agricultural purposes. Moderately dense vegetation, approximately 180 hectares in area, is located between the northern and southern sections of the site.	The proposed PV Power Project is unlikely to be affected by bushfire, or pose a significant bushfire risk due to the lack of existing vegetation on and surrounding the site.	The proposed development would not result in an increased risk of bushfire for the site.
Social and Economic impacts		
The Bogan local government area (LGA) has a population of 2,883 people according to the 2006 Census (ABS, 2006). This represents a population decrease of 6.49 per cent since the 2001 Census (3,083 people). The percentage of people of	The construction of the PV Power Project at Nyngan would generate approximately 150 to 200 construction jobs. It is possible that construction workers would relocate their families to Nyngan during the	A detailed social and economic assessment would be undertaken as part of the environmental assessment.

Indigenous origin (11.7 per cent in 2006) is very high compared to the Australian average (2.3 per cent in 2006). Additionally, 92.2 per cent of the Bogan population were born in Australia compared to the Australian average of 70.9 per cent. The main industry of employment is sheep, beef cattle and grain farming with 27.6 per cent of the Bogan population. The unemployment rate for the Bogan Shire is 7.8 per cent which is higher in comparison to the overall Australian unemployment rate of 5.2 per cent. The local economy of the Bogan LGA mainly comprises agriculture including broadacre cropping and sheep and cattle production. Olive growing is a new primary industry in the Bogan area. Two underground copper mines operate 60 km from Nyngan. The mining operations have generated significant economic growth in the area, particularly in the housing sector.	construction period, and this may place pressures on services such as accommodation, schools and health services. Additional accommodation would be required for construction personnel during the construction period (approximate duration of 12 months). Due to the potential for accommodation shortage and pressures on community services, contingency measures such as temporary accommodation camps may be required.	
Land Use		

The proposed development is located entirely within the Bogan local government area (LGA). The LGA encompasses a total area of about 14,600 square kilometres. The Bogan LGA predominantly comprises rural land which is used primarily for agriculture, particularly sheep and cattle grazing and crop farming. The closest urban centre to the proposed development is the town of Nyngan, which is also the main township in the LGA and has a population of approximately 2,000 people (ABS, 2006). The proposed development is located largely on rural land and would be located over two properties. The surrounding area also comprises rural land. The Nyngan airport is located approximately 8.2 km to the north-east of the proposed site. There are no State forests or conservation areas in the vicinity of the project site. The 132kV transmission line connecting the PV Power Project to the Nyngan substation would traverse 11 land holdings not including the properties on which the PV plant is located) and pass within 250 metres of sensitive receivers. The majority of the transmission line would be located in parallel with existing transmission lines in the area to minimise disturbance to cropland and vegetation. The 66kV transmission line connecting the northern and southern sections of the site would traverse two land holdings and pass within 700 metres of sensitive receivers.	The change in land use from agricultural to power generation is not considered to be significant. Construction of the transmission line would result in temporary loss of access to land along the transmission line easement during the construction period. Construction impacts are not considered to be significant. An easement of 50 metres would need to be obtained for the 132kV transmission line and an easement of 6 metres for the 33kV line where it traverses private land holdings which would allow secure access to the transmission lines for their ongoing operation, maintenance and upgrade.	Overall, the adverse impacts on land use are expected to be minimal. The management of existing and proposed land use of the project area is not considered to be a key environmental issue.
Waste Management		
The project would generate a number of waste streams and utilise a variety of materials during the construction phase.	During construction, excavated material and green waste would be generated as waste. No operational waste would be associated with this project.	A Waste Management Plan (WMP) would be developed and incorporated in to the CEMP. This would incorporate the principles to avoid, re-use and recycle to minimise wastes.

6. Conclusion

This PEA has described the proposed Nyngan PV Power Project and established the strategic context of the project. The project meets the criteria for classification as a major development under the Major Development SEPP and would therefore be assessed under Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Potential environmental impacts associated with the project have been categorised as key issues or other issues. Based on this preliminary environmental assessment, an indicative scope for the environmental assessment has been developed, focusing on the key issues. The other issues can be readily addressed through appropriate mitigation and management measures and do not require detailed assessment. Following consideration of this PEA and consultation with other agencies, the Department of Planning would provide the Director-General's requirements for the environmental assessment.

The environmental assessment would be prepared in accordance with the Director-General's requirements under the provisions of Part 3A of the EP&A Act. A Statement of Commitments would be developed for inclusion in the environmental assessment and would address the management of key issues and other issues.

7. References

ABS, 2006. 'Bogan (A) (Local Government Area), viewed 2 August 2010, http://www.censusdata.abs.gov.au/. Australian Bureau of Statistics (ABS).

CSIRO, 2008, *Macquarie-Castlereagh regional report, Murray-Darling Basin Sustainable Yields Project*, March 2008. Australian Commonwealth Scientific and Research Organisation (CSIRO).

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