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STATEMENT OF ENVIRONMENTAL EFFECTS

APPLICATION FOR SOLAR FARM DEVELOPMENT

"Wathagar Solar Farm" 2910 Gwydir Highway, Wathagar NSW 2400
Lot 2 in Deposited Plan 773266

September 2021

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DOCUMENT CONTROL

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0	September 2021	Marie (SMK Consultants)	Initial Issue

EXECUTIVE SUMMARY

Applicant:	Sundown Pastoral Co Pty Ltd PO Box 6316 Queanbeyan East, NSW 2620
Subject Land:	2910 Gwydir Highway Wathagar NSW 2400 Lot 2 in Deposited Plan 773266 Owners: Sundown Pastoral Co Pty Ltd and Namoi Cotton Ltd Zoning: RU1 – Primary Production
Proposed Development:	Application for approval of solar farm development
Permissibility:	The proposed development is permissible with consent under the State Environmental Planning Policy (Infrastructure) 2007
Type of Development:	Regional Development under the State Environmental Planning Policy (State and Regional Development) 2011
Capital Investment Value:	\$12,000,000
Consent Authority:	The consent authority is the Northern Joint Regional Planning Panel

Proposal Summary

The development encompasses the construction and operation of a solar farm with a maximum transfer capacity of 4.95 MW AC. The development will consist of:

- 120 PEG EW structures (12 structures in each east/west row and 10 rows running north/south). Each structure is comprised of 20 PV modules east/west by 12 PV modules north/south. The structure dimensions are 22.14m (east/west) x 25.57m (north/south). The PV module will be sourced from a Global Tier 1 supplier.
- 3 combined inverter/transformer stations.
- 6 battery storage containers with a combined storage capacity of 15.5 MWh.
- Cabling and switchgear.
- 1.8m surrounding chain link fence with 2 x 6m double leaf gate.

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1 Introduction

SMK Consultants has been engaged by the proponent, Sundown Pastoral Co Pty Ltd to prepare this Statement of Environmental Effects (SoEE). This report will accompany a Development Application (DA) to Moree Plains Shire Council. The application seeks consent for the installation and operation of a Solar Farm to be located at 2910 Gwydir Highway, Wathagar (Lot 2 in Deposited Plan 773266).

This statement has been prepared to address the proposed development in accordance with the *Moree Plains Local Environment Plan 2011* (Moree LEP) and the *Moree Plains Development Control Plan 2013* (DCP). The SoEE addresses the matters for consideration outlined in Section 4.15 (1) (previously 79C) of the EP&A Act. This SoEE focuses on the key assessment requirements and recommends mitigation measures where possible to reduce potential environmental impacts.

1.1 Applicant Details

The applicant's contact details are summarised in Table 1.

Table 1: Applicant Details

Organisation	Sundown Pastoral Co Pty Ltd
ABN	86 000 334 190
Address	c/-PO Box 6316 Queanbeyan East NSW
Phone Number	0409 160 968
Contact Name	Dr Emma Mailler
Email	emma@kinelli.com.au

1.2 Authors

This Statement of Environmental Effects has been prepared by SMK Consultants. SMK Consultants is a well-established company operating out of Moree, NSW, and is a key player in providing for continued economic growth for many of NSW'S North-West Government areas. SMK Consultants has been actively involved in many developments in the commercial, industrial and retail sectors.

Persons involved in the preparation of this Statement of Environmental Effects and its appendices are:

- **Marie Duffy** B.Sc. Hons, M.Sc.
- **Peter Taylor** BSc MEIANZ CIAg LAA

2 Site Analysis

2.1 Site Location

The proposed development site is 2910 Gwydir Highway, Wathagar. The site is located approximately 30 kilometres south-west of Moree in north-west New South Wales. A locality plan showing the site in relation to the township of Moree has been included as Figure 1.



Figure 1: Solar Farm Site Location

2.2 Property Description

The real property description of the land is Lot 2 in Deposited Plan 773266. The subject lot is located within the Local Government Area of the Moree Plains Shire and covers an area of approximately 168 hectares. The subject lot is part of a larger property holding known as “The Wathagar Gin”. The subject land is currently zoned RU1 ‘Primary Production’ under the *Moree Plains Local Environmental Plan 2011*. The property is owned by Namoi Cotton and Sundown Pastoral Co Pty Ltd in equal shares.

The subject site is completely cleared of any structures or remnant vegetation as a result of an extensive history of cultivation and a cotton ginning operation. The surrounding locality is characterised by cropland to the north, east and west, and vegetation within Crown Land and along the Mehi River to the south. The development footprint will cover approximately 8.6 hectares and will be restricted to land which has previously been cleared in association with

the existing cotton gin. A plan outlining the subject site is included as Figure 2, this is also included in Appendix 1.



Figure 2: Proposed Development Site

The site has a frontage to the Gwydir Highway. The proposed development will utilise an existing site access to the Wathagar Gin.

2.3 Site Constraints

There is existing Essential Energy infrastructure located on the site, including the 22kV distribution power lines and the Wathagar Zone Substation (WTR8B3), which is located east of the proposed subject site. The proximity of this infrastructure is important with respect to reducing the resources required to deliver power from the solar farm to the grid.

There are no other services available to the site, however this does not constitute a constraint as no other services are required. The subject site is identified as both bushfire prone and subject to flooding within the Council mapping. This is further discussed in Section 5.14 of this report.

2.4 Adjoining Properties

The development land is bordered on all sides by land zoned RU1 Primary production, which is utilised for a combination of cropping and grazing. There is no concern regarding these

adjoining properties in respect to land use conflict. The nearest sensitive receptor (rural dwelling) to the proposed development is located approximately 1,525 metres north-west the subject site.

2.5 Site Suitability

The subject site is zoned RU1 – Primary Production and ‘Electricity Generating Works’ are permitted with consent under State Environmental Planning Policy (Infrastructure).

The specific site has been selected due to its proximity to the cotton ginning operation which provides a local load for the generation. It also has excellent on-site infrastructure to allow later connection to Essential Energy’s 22kV network. The area and region in general are also extremely well suited for solar farms due to the very high solar resource which increases PV electricity generation. The site also benefits from previous levelling and historical clearing which negates the need for significant earthworks or disturbance to any areas with high biodiversity value.

2.6 Climate

Global solar exposure is described on the Bureau of Meteorology website as being the total amount of solar energy falling on a horizontal surface. The daily global solar exposure is the total solar energy for a day. Typical values for daily global solar exposure range from 1 to 35 MJ/m² (megajoules per square metre). The values are usually highest in clear sun conditions during the summer, and lowest during winter or very cloudy days.

Figure 3 below shows average daily solar exposure for the 12-month period between the 1st of May 2019 and the 30th of April 2020. Moree Plains LGA has received on average between 18 and 20 MJ/m² each day, placing it within the second highest area receiving solar radiation in New South Wales.

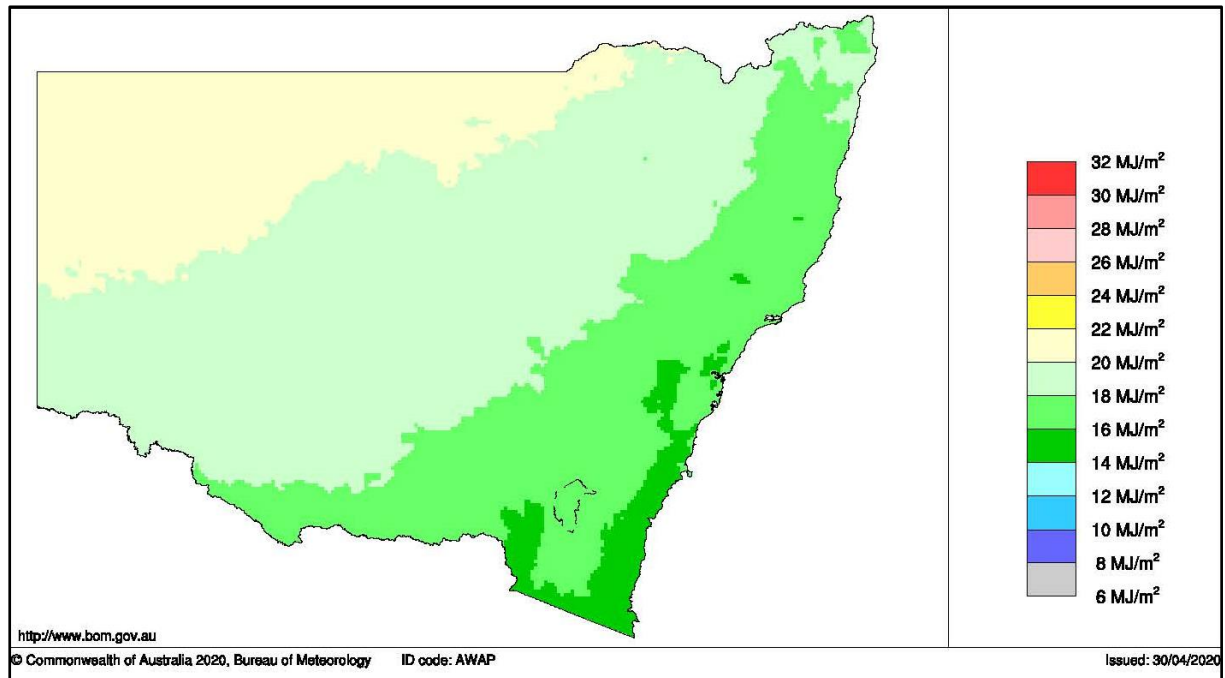


Figure 3: Average Daily Solar Exposure. Source: Australian Bureau of Meteorology (2021)

Table 2 provides the mean daily solar exposure measured at Moree Aero (Station number 053115), the closest measuring station to the proposed Wathagar Solar Farm site. The annual average is 19.6MJ/m² (1990-2021).

Table 2: Mean Daily Solar Exposure (MJ/m²) at Moree BOM Site

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
26.7	24.0	21.2	17.1	13.4	11.3	12.3	15.6	19.6	22.8	25.0	26.7

Source: Climate Statistics, BOM (May 2021).

The map below (Figure 4) shows the average daily hours of sunshine across Australia. Moree Plains LGA receives an average of 7 to 8 hours of sunshine each day.

Global solar exposure coincides with seasons – the longer the daylight hours the greater the solar radiation due to the tilt of the earth during summer months. Rainfall is spread relatively evenly across the year and as a result, does not appear to impact on the level of solar radiation.

Solar exposure estimates are important for a wide range of applications, including for agriculture, power generation and solar heating system design and use. This climatic information sourced from the Australian Bureau of Meteorology indicates that the global solar exposure, or solar radiation, is sufficient to support power generation in the proposed location which benefits from the presence of 22kV power lines transecting the development site.

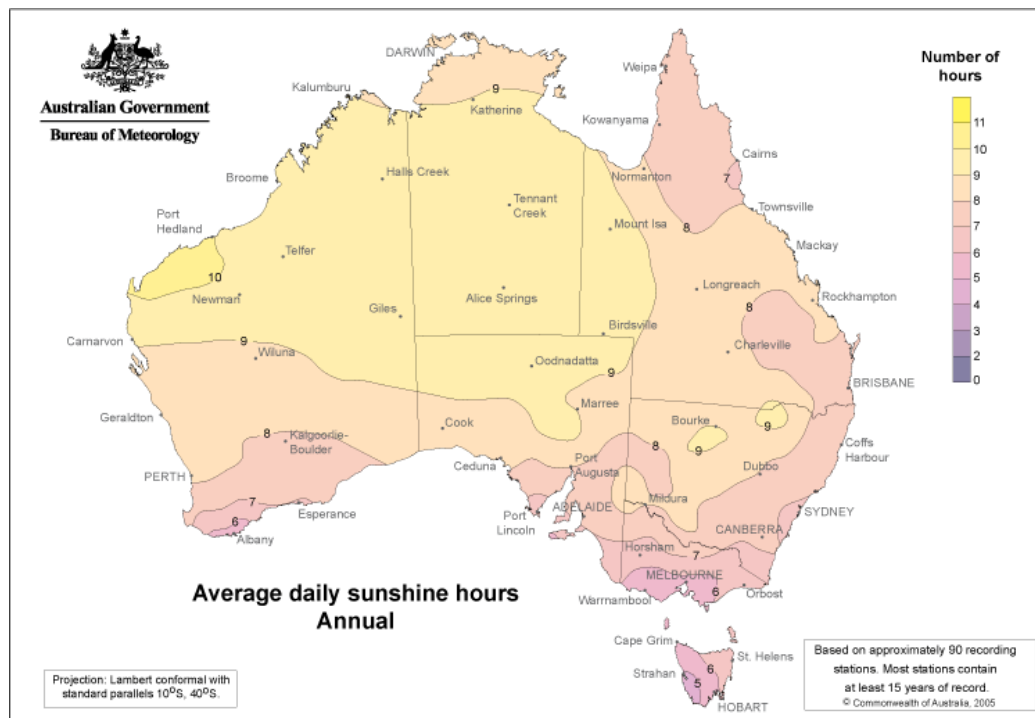


Figure 4: Average Daily Sunshine Hours. Source: Australian Bureau of Meteorology

3 Development Details

3.1 Proposal Description

The development involves the construction and operation of a solar farm which would initially be off-grid and supply energy to the co-located cotton gin. It is intended that the solar farm will connect to the grid after securing approval from Essential Energy, with a maximum transfer capacity of 4.95 MW AC. The necessary infrastructure to achieve grid connection will be installed as part of this development but cannot be connected until authority to energise and connect to the grid is given by Essential Energy. This is a separate process to this DA. The grid connection process is governed by the National Electricity Rules.

The development will consist of:

- 120 PEG EW structures (12 structures in each east/west row and 10 rows running north/south). Each structure is comprised of 20 PV modules East/West by 12 PV modules north/south. The structure dimensions are 22.14m (east/west) x 25.57m (north/south). The PV module will be sourced from a Global Tier 1 supplier.
- 3 combined inverter/transformer stations.
- 6 battery storage containers with a combined storage capacity of 15.5.
- Cabling and switchgear.
- 1.8m surrounding chain link fence with 2 x 6m double leaf gate.

Appendix 1 includes the proposed layout of infrastructure associated with the solar farm.

The proposal will utilise the existing site access to the property (located approximately 750m to the east of the development site).

Adequate erosion and sediment control devices will be established on site prior to, during and post construction works in accordance with the requirements of Council.

3.2 Infrastructure

The solar farm will utilise crystalline solar photovoltaic (PV) panel technology and have a dual East/West fixed configuration to assist in maximising higher yields in the morning and afternoon. This is in contrast to a single angle fixed-tilt alternative that can only maximise yields in the middle of the day and also in contrast to single and multi-axis trackers which can result in higher running costs.

The power conversion from direct-current (DC) to alternating-current (AC) will be through central inverters which will immediately step up to 22 kV and connect directly to the internal HV grid. This approach offers high conversion efficiencies and reduced AC reticulation losses.

The farm will be designed in accordance with all applicable standards as well as the requirements of Essential Energy and the National Electricity Rules (NER).

Key infrastructure associated with the solar farm includes:

- Photovoltaic (PV) panels mounted in a dual east-west static configuration.
- Inverters and step-up transformers to convert direct current (DC) electricity produced by the solar PV panels into alternating current (AC) capable of being connected to the electrical grid.
- Above-ground and underground electrical conduits and cabling to connect the solar PV panels to the inverters and transformer.
- Internal access tracks to allow for on-going site maintenance will be formed on an as-required basis.
- Perimeter security fencing.

A site layout and views of the framing system have been included as Appendix 1.

3.2.1 Photovoltaic Panels

The solar farm will utilise the latest solar panel and inverter technologies to ensure maximum efficiency and energy generation. The solar farm will utilise Global Tier 1 photovoltaic (PV) panels made of tempered glass with an anti-reflective coating.

3.2.1.1 Structure Height

The PV modules will be mounted on piers with a minimum height above ground level of 800mm and a maximum height of 950mm. A site-specific structural certificate will be prepared and included as part of the application for a Construction Certificate, if approval is granted.

3.2.2 Combined Inverter and Transformer Stations

The inverter stations convert DC power into AC power and feed into the site's HV grid, which in-turn supplies the local load at the cotton gin and will also be capable of feeding into Essential Energy's 22kV distribution network when a connection to that network is approved. This is achieved by connecting multiple strings of PV panels together via DC combiner boxes which are then connected to the inverter at the required DC input voltage.

A total of three inverter stations will be installed. Each central inverter station incorporates a step-up transformer which will increase the output voltage to 22 kV. The proposed combined inverter and transformer station will be similar to that displayed in Figure 5.



Figure 5: Inverter Station

With Essential Energy approval, the solar farm's substations and high voltage infrastructure will interface with Essential Energy's 22kV distribution network. The solar farm's infrastructure will include protection equipment (such as circuit breakers).

The high voltage switch gear will be controlled through a data communications and monitoring network allowing the farm to be managed remotely.

3.2.3 Battery Storage Containers

There will be a total of 6 battery storage containers with a combined storage capacity of 15.5 MWh. The containers would each be standard 12m containers, and the batteries would be lithium-iron-phosphate. The site is located within an approved levee which protects the assets of the solar farm from flooding.



Figure 6: Battery Storage

3.2.4 Security Fence

All infrastructure associated with the solar farm will be enclosed within a security fence. This fence will be a chain link fence. An indicative security fence is displayed in Figure 7.

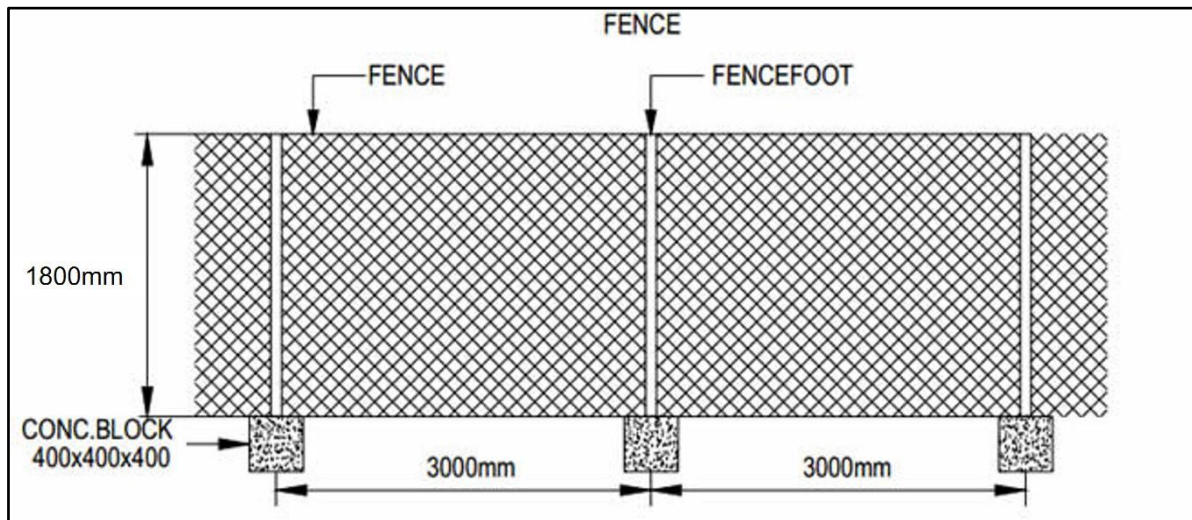


Figure 7: Indicative Security Fence

3.3 Construction

3.3.1 Installation Philosophy

The solar farm installation philosophy will feature cascading activities to construct each PEG EW structure comprised of mounting frame and PV modules. The intention is to roll-out the installation of structures in waves to maximise efficiency of installation activities, i.e. PEG EW uprights will be driven into the ground by one team and other teams will follow to install base and top plates, followed by PV modules.

3.3.2 Construction Timeline

Construction is estimated to take between 10-12 weeks. The intention is to maximise the use of local employment in various aspects of the construction subject to the required work health and safety (WHS) standards and skill requirements.

The key stages of the construction of the farm will include:

- Mobilisation/site establishment
- Construction
- Commissioning
- Site remediation/demobilisation

Site establishment activities will be required to prepare the site before the phases commence. Site establishment activities include establishment of the construction compound and laydown area, perimeter fencing, formation of internal roads and the installation of erosion and sediment controls.

The construction works will be phased according to the construction of each of the structures. The construction of each structure requires repetitive activities during rollout, such as the driving of PEG piers; the installation of base and top plates and PV modules; and cable tray installation. LV, MV and HV electrical works will be completed by specialist electricians.

The Inverter and Battery containers are preassembled prior to delivery. Their installation will include foundations, electrical interconnection and commissioning.

3.3.3 Construction Workforce

Teams will be rotate through the following activities to construct each structure:

- The framing team will install the PEG piers or PEG screws where they are required in accordance with standards and a design certified by a structural engineer.
- The assembly team will install the components that connect to the PEG piers or PEG screws, as well as the mounting of the PV modules.
- The electrical team requires qualified electricians to manage low, medium and high voltage activities as well as labourers to support with cable installation and electrical terminations and connections.

A separate civil team will be required for the construction of the cable trenches and foundational requirements for the inverters and transformer.

It is expected that the construction workforce at its peak will be around eighteen workers on-site.

3.3.4 Construction Hours

Construction activity will be restricted to the Interim Construction Noise Guideline (DECC, 2009) recommended standard hours. That is, works would be limited to 7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturday: with no works on Sundays or Public Holidays.

3.3.5 Construction Traffic

The construction traffic will consist of both light vehicles (such as utes to transport construction workers to and from the site), to standard heavy articulated vehicles. No over-mass or over-dimensional vehicle delivery will be required, and total numbers will be modest. Additional detail regarding traffic data is contained within section 5.18.

3.3.6 Site Preparation

Minimal earthworks will be required. The facility is located within a levelled field and site preparation prior to construction will include laser levelling to ensure appropriate drainage occurs. A 30mm layer of crusher dust will be added to the surface under the PV Field. This

provides a better working surface and reduces soil turmoil from rain. The field is already enclosed by a levee bank and the levee will protect all solar farm infrastructure.

3.4 Land Management

The development site has not been actively used or managed in recent years, and it therefore currently supports grassy and low shrub vegetation which has recolonised the site. The vegetation within the solar farm site will need to be cleared as part of site preparation activities, and any regrowth would be kept short as a fire control practice. Management will generally involve mowing where accessible and application of herbicide for weed management in areas not accessible by mowers or whipper-snippers. This management will be achieved through regular spraying, which is detailed within Section 5.13 of this report.

4 Planning Considerations

4.1 Required Approvals

The proposed development may be considered as regional development. Pursuant to Schedule 7 of the *State Environmental Planning Policy (State and Regional Development) 2011*, electricity generating works with a capital investment value of more than \$5 million are a development category for which a Joint Regional Planning Panel (JRPP) may be authorised to exercise the consent authority functions of Council.

The development as proposed has an estimated capital investment value of \$12 million and accordingly is considered “Regional Development”. The Northern Regional Planning Panel (NRPP) is therefore authorised to exercise the consent authority functions of Council.

4.2 Commonwealth Legislation

4.2.1 Environment Protection and Biodiversity Conservation Act

The Commonwealth Environment Protection and Biodiversity Conservation Act, 1999 (EPBC Act) requires the approval of the Commonwealth Minister for the Environment for actions on Commonwealth land or those that may have a significant impact on matters of national environmental significance. An Assessment of Significance on the Matters of National Environmental Significance has been included as Appendix 8. The conclusion of the assessment is that the proposal will have no significant impact on any listed Matters of National Environmental Significance.

4.3 State Legislation

4.3.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) and associated *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation) outline the overarching regulatory structure of environmental legislation within NSW. The EP&A Act and Regulation define development magnitude thresholds and outline assessment requirements for developments undertaken within the State. The following identifies the relevant consent and assessment requirements for the proposed development in accordance with this Act.

4.3.1.1 Designated Development

Schedule 3 of the EP&A Regulation indicates “Electricity generating stations” such as solar farms are considered designated development under the EP&A Act and associated regulations where the development generates more than 30 MegaWatts of electrical power.

The proposed development is predicted to generate a maximum of 4.95 MW AC. Therefore, the proposal is not considered designated development.

4.3.1.2 Integrated Development

The solar farm is not considered integrated development under Division 4.8 of the EP&A Act because the solar farm does not require any additional approval/permit/licence/authorisation under the:

- Fisheries Management Act 1994;
- Heritage Act 1977;
- Mine Subsidence Act Compensation Act 1961;
- Mining Act 1992;
- National Parks and Wildlife Act 1974
- Petroleum (Onshore) Act 1991;
- Protection of the Environment Operations Act 1997;
- Roads Act 1993;
- Rural Fires Act 1997; or
- Water Management Act 2000.

4.3.1.3 Assessment Requirements

Clause 4.15 of Division 4.3 of the EP&A Act outlines matters for consideration which require assessment for developments requiring consent. These matters include the provisions of:

- a) *any environmental planning instrument, and*
 - i. *any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved), and*
 - ii. *any development control plan, and*
 - iii. *any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4, and*
 - iv. *the regulations (to the extent that they prescribe matters for the purposes of this paragraph), and*
 - v. *any coastal zone management plan (within the meaning of the Coastal Protection Act 1979), that apply to the land to which the development application relates,*
- b) *the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality,*
- c) *the suitability of the site for the development,*
- d) *any submissions made in accordance with this Act or the regulations,*
- e) *the public interest.*

This Statement of Environmental Effects is considered to satisfy the requirements outlined in the above matters for consideration.

4.3.2 Biodiversity Conservation Act

The *Biodiversity Conservation Act* came into effect in August 2017 and replaced the *Threatened Species Conservation Act 1995*. The BC Act outlines requirements in relation to the listing of threatened species, biodiversity impact assessment, offsetting and related offences. The assessment of biodiversity values on land and the impacts of activities on those biodiversity values are to be carried out in accordance with the Biodiversity Assessment Method (BAM). The objective of the BAM is to adopt a standard approach that will result in no net loss of biodiversity in NSW.

The Act also outlined the Biodiversity Offset Scheme (BOS). Development that is subject to the BOS scheme includes development needing consent under Part 4 of the EP&A Act (excluding complying development), activities under Part 5 of the EP&A Act, State significant development and State significant infrastructure.

Where development or an activity is, “likely to significantly affect threatened species”, a Biodiversity Development Assessment Report (BDAR) must be prepared and consent authorities are required to consider the likely impact of the proposed development on biodiversity values before granting approval.

The threshold test of whether development or an activity is “likely to significantly affect threatened species” (and therefore whether a BDAR is required) is reached if:

- the test in section 7.3 of the BC Act is met;
- the BOS Threshold is met; and
- the development is carried out in a declared area of outstanding biodiversity value.

The subject lot was assessed using the online Biodiversity Offsets Scheme Entry Tool, which determines whether any proposed clearing would be above or below the area thresholds or lies within an area mapped as having high biodiversity value. According to BOS, the area clearing threshold for the subject site would be 1 Hectare of clearing of native vegetation. The site does not support native vegetation as per the available mapping (SEED Mapping), which was confirmed by the site assessment carried out on September 23, 2021. The proposed development site is not located within a declared area of outstanding biodiversity value (refer to Section 5.12.3 for further detail), and the proposal therefore does not involve any clearing that would exceed the BOS Threshold.

Proponents are also required to carry out a ‘test of significance’ for all development proposals that do not exceed the Biodiversity Offset Scheme Threshold. The required test of significance (as outlined in Section 7.3 of the BC Act) has also been included in Appendix 7. It was determined that the proposal is not likely to significantly affect threatened species, and that further assessment under the BAM and the preparation of a BDAR is not required.

4.3.3 State Environmental Planning Policies

Table 3 presents a summary and comment on current State Environmental Planning Policies and identifies their relevance to the proposed development.

Table 3: List of State Environmental Planning Policies

SEPP No. & Codes	Title	Relevance
No. 1	Development Standards	Not Relevant
No. 19	Bushland in Urban Areas	Not Relevant
No. 21	Caravan Parks	Not Relevant
No. 33	Hazardous & Offensive Development	Not Relevant
No. 36	Manufactured Home Estates	Not Relevant
No. 47	Moore Park Showground	Not Relevant
No. 50	Canal Estate Development	Not Relevant
No. 55	Remediation of Land	Refer following section for review
No. 64	Advertising and Signage	Not Relevant
No. 65	Design & Quality Residential Flat Development	Not Relevant
No. 70	Affordable Housing (Revised Schemes)	Not Relevant
	Affordable Rental Housing 2009	Not Relevant
	Building Sustainability Index: BASIX 2004	Not Relevant
	Exempt and Complying Development Codes 2008	Not relevant
	Housing for Seniors or People with a Disability 2004	Not Relevant
	State Significant Precincts 2005	Not Relevant
	Infrastructure 2007	Refer following section for review
	Kosciuszko National Park – Alpine Resorts 2007	Not Relevant
	Mining, Petroleum Production and Extractive Industries 2007	Not Relevant
	State and Regional Development 2011	Refer following section for review
	Educational Establishments and Child Care Facilities 2017	Not Relevant
	State Environmental Planning Policy (Coastal Management) 2018	Not Relevant
	Primary Production and Rural Development 2019	Not Relevant

SEPP No. & Codes	Title	Relevance
	Koala Habitat Protection 2020	Refer to following section for review

4.3.3.1 SEPP 55 - Remediation of Land

The Remediation of Land SEPP aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or other aspects of the environment. Under this SEPP, a consent authority must not consent to the carrying out of any development on land unless:

- i. It has considered whether the land is contaminated, and
- ii. If the land is contaminated, it is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for the purpose for which the development is proposed to be carried out, and
- iii. If the land requires remediation to be made suitable for the purpose for which the development is proposed to be carried out, it is satisfied that the land will be remediated before the land is used for that purpose.

The subject property is not listed as a contaminated site on the NSW EPA Contaminated Lands Record for the Moree Plains Shire. The proposed development site is not considered as contaminated land as it has not historically been subjected to any contaminating activities. A preliminary site contamination assessment was nevertheless undertaken at the site and this has been included within Appendix 3. The site is considered suitable for the proposed development of a solar farm.

4.3.3.2 Infrastructure SEPP

4.3.3.2.1 Permissibility

The Infrastructure SEPP (ISEPP) provides development controls for infrastructure and services. Clause 34 (7) of the SEPP provides provisions for development that is permitted with consent. It states:

“(7) Solar energy systems -

Except as provided by subclause (8), development for the purpose of a solar energy system may be carried out by any person with consent on any land.”

Subclause (8) limits the use of photovoltaic electricity generating systems with a capacity to generate more than 100 kW in residential zones. The development footprint for the project is not within a residential zone and, therefore, is not affected by this subclause.

Accordingly, the proposed solar farm is permissible with development consent.

4.3.3.2.2 Grid Connection

Clause 45 of ISEPP relates to the determination of a Development Application that has the potential to affect an electricity transmission line. Before determining a Development Application which meets the relevant criteria provided by cl.45 the consent authority must first notify the relevant electricity supply authority and take into consideration any comments made by the authority within 21 days of the notice.

Given the intention to connect the solar energy system to Essential Energy's existing 22kV line that traverses the site, Clause 45 is applicable. A connection application with Essential Energy has already been made, as such the electricity supply authority has been notified.

4.3.3.2.3 Traffic Generating Development

The subject proposal is not identified in Schedule 3 of the SEPP as traffic generating development to be referred to the Roads and Maritime Services as the proposal is defined as 'any other purpose' and will not generate 200 or more motor vehicle movements during its operational phase.

4.3.3.3 *State and Regional Development 2011*

Pursuant to Schedule 7 of the State Environmental Planning Policy (State and Regional Development) 2011, electricity generating works with a capital investment value of more than \$5 million in accordance with Part 5 'Private infrastructure and community facilities over \$5 million' are considered as Regional Development, a development category for which a Joint Regional Planning Panel (JRPP) may be authorised to exercise the consent authority functions of Council.

The development as proposed has an estimated capital investment value of \$12 million and accordingly may be assessed by the Moree Shire Council and determined by the Northern Regional Planning Panel (NRPP) under the State Environmental Planning Policy (State and Regional Development) 2011.

4.3.3.4 *State Environmental Planning Policy (Koala Habitat Protection) 2020*

The *State Environmental Planning Policy (Koala Habitat Protection) 2020* (KHP SEPP) commenced on 30 November 2020 to replace and repeal the *State Environmental Planning Policy (Koala Habitat protection) 2019*. The *Koala Habitat Protection SEPP 2020* replicates the objectives and provisions of SEPP 44, which was in force from 1995 through to 2019.

The Moree Plains Shire is included in Schedule 1 of the KHP SEPP, and the proposed development has an area of more than 1 Hectare, therefore an assessment of Koala Habitat is required, pursuant to Clause 7 of the SEPP. The assessment requires that the land be assessed for the presence of potential Koala habitat or core Koala Habitat.

The SEPP provides the following definitions:

- **Core Koala Habitat** means an area of land with a resident population of koalas, evidenced by attributes such as breeding females (that is, females with young) and recent sightings of and historical records of a population.
- **Potential Koala Habitat** means areas of native vegetation where the trees of the types listed in Schedule 2 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.

Comment

The Moree Plains Shire is included in Schedule 1 of the KHP SEPP, and the proposed development has an area of more than 1 Hectare, therefore an assessment of Koala Habitat is required, pursuant to Clause 7 of the SEPP. The assessment requires that the land is assessed for the presence of potential or core Koala Habitat.

The proposed development footprint is dominated by non-native grassland and low shrubs, with a small number of shrubs with a height of up to 4m. None of the feed tree species listed in Schedule 2 of the Koala SEPP were observed within the proposed development footprint or its vicinity. No mature trees will be cleared or modified in association with the proposed development.

Figure 8 includes a map of all the recorded koala sightings within the Moree Plains Shire. The red triangles indicate recorded sightings. There are no sightings within, or in close proximity (5km) to the proposed development site, and historical records within the Shire are concentrated around the eastern section of the Shire. No recent or historical records (within 18 years) of a “resident population” exist for the project area.

It is considered that the subject site does not constitute potential or core Kola Habitat, in accordance with the description provided above, for the following reasons:

- No Koalas were observed on-site during the site inspection;
- No Koalas have been observed within the subject site or the property by the Applicant since the Applicant’s acquisition of the property;
- There are no historical records of the species in the locality;
- No Koala scats or scratches that would indicate the presence of Koala within the site were observed during the site survey;
- There are no mature trees, including Koala feed tree species (listed in Schedule 2 of the KHP SEPP 2020), within the footprint of the subject site.

Given that the subject site neither consists of core or potential Koala habitat, the requirements of the KHP SEPP 2020 do not need any further consideration.

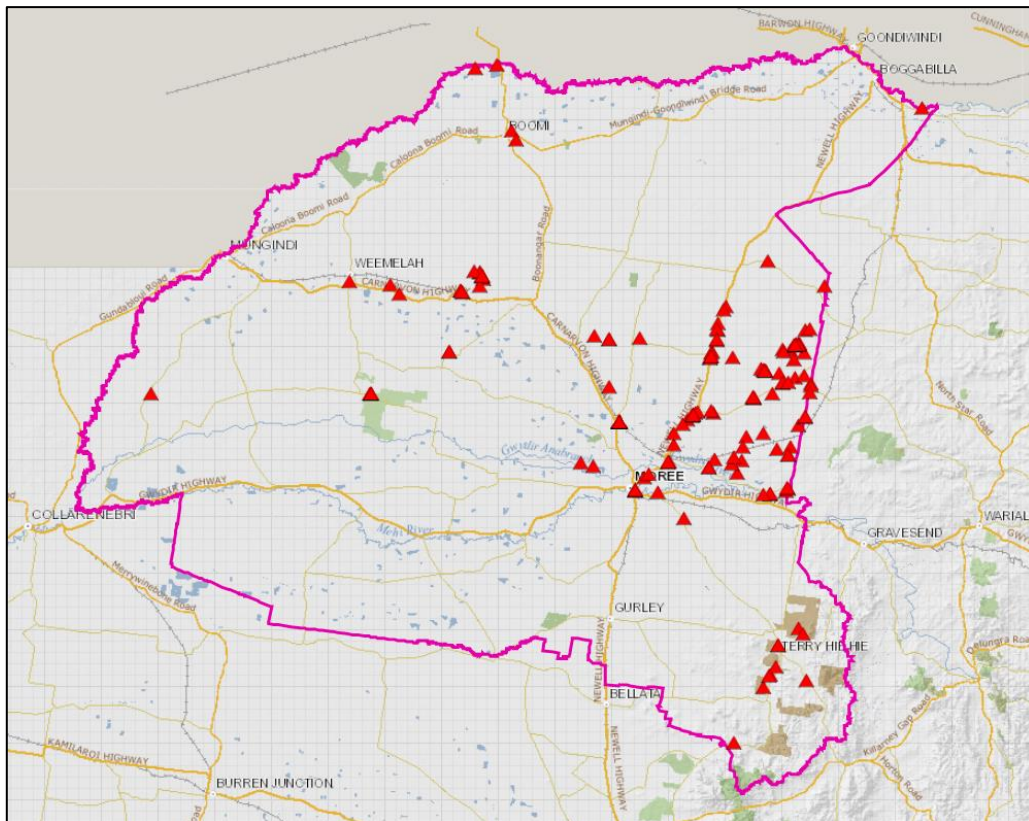


Figure 8: Distribution of Koala records within the Moree Plains Shire (Bionet, 2021).

4.4 Regional Plan

The New England North West Regional Plan 2036 (the Plan), published in 2017, recognises the potential for the growth of the renewable energy industry within the Moree Plains Shire and the surrounding region.

The Plan outlines a total of nine Strategic Directions for the North West Slopes and Plains region in NSW. Strategic Direction Number 5 is to 'Grow New England North West as the renewable energy hub of NSW'. The Plan encourages the following actions be taken to achieve this goal:

1. *Diversify the energy sector by identifying renewable energy resource precincts and infrastructure corridors with access to the electricity network; and*
2. *Facilitate appropriate smaller-scale renewable energy projects using biowaste, solar, wind, hydro, geothermal or other innovative storage technologies.*

The proposed development is considered to contribute to achieving the outcomes of Strategic Direction Number 5 of the Plan, as it will enable diversification and expansion of energy generation within the region by capitalising on high rates of regional solar penetration.

4.5 Strategic Plan

The NSW Renewable Energy Action Plan (REAP), prepared by the NSW Government in 2013 guides NSW's renewable energy development and supports the achievement of national renewable energy targets. The NSW Government's vision is for a secure, reliable, affordable and clean energy future for the State. The REAP positions NSW to increase the use of energy from renewable sources.

The REAP sets out a number of actions to achieve its vision, under the following three goals:

- Goal 1 – attract renewable energy investment;
- Goal 2 – build community support; and
- Goal 3 – attract and grow renewable energy expertise.

The proposed development will assist in achieving the NSW Government's goals of increasing renewable energy generation in NSW to help achieve renewable energy targets. Through creating new solar employment opportunities, the proposal will contribute to growing expertise in renewable energy technologies.

4.6 Local Environmental Plan

The development site is zoned RU1 Primary Production under the *Moree Plains Local Environmental Plan 2011* (Moree LEP). Under this local planning instrument, the development as an 'electricity generating works', is not specifically identified as a type of development that is either permissible with or without development consent.

Notwithstanding, pursuant to cl.34(7) of State Environmental Planning Policy (Infrastructure) 2007 (ISEPP), development for the purpose of a solar energy system may be carried out by any person with consent on any land.

Accordingly, the proposed solar farm (which is a photovoltaic electricity generating system) is permissible subject to securing development consent.

The proposal meets all objectives as prescribed by the Moree LEP for zone RU1 Primary Production which are:

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*
- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
- *To permit development for certain purposes if it can be demonstrated that suitable land or premises are not available elsewhere.*

Comment: The development serves to enhance current land use as it augments current agricultural operations. Accordingly, it increases sustainability and economic diversity, whilst not fragmenting any land or causing a conflict between neighbouring land uses.

4.7 Development Control Plan

The *Moree Plains Development Control Plan 2013* (DCP) applies to this development. The proposal is considered under this DCP as Rural Development. This application would be assessed under the Rural Development chapter. This development may be subject to the Notification Chapter of the DCP. In accordance with this chapter Council Officers will use their discretion in determining if the proposed development requires notification and whom is to be notified.

This chapter addresses various aspects of rural development including biodiversity, bushfire management, recreational vehicles, feedlots, access to rural properties and dwelling development.

Biodiversity: The proposed development has addressed each of the acceptable solutions as follows:

1. Proposals falling within areas mapped as Koala Habitat undertake a review of the potential impacts on Koala Habitat as required by SEPP 44.

Comment: SEPP 44 has been repealed and replaced by the SEPP Koala Habitat Protection 2020. This has been addressed in Section 4.3.3.4 of this report and it was determined that the subject area does not contain any potential or core koala habitat as defined within the provisions of the SEPP. On this basis, the requirements of the SEPP do not need any further consideration in this assessment.

2. Proposals are reviewed against the provisions of the NSW Threatened Species Conservation Act and the NSW Planning Guideline, Commonwealth Environmental Protection and Biodiversity Conservation Act 1999 Guide to implementation in NSW May 2007, by an appropriately qualified and experienced ecologist or environmental scientist, and, if necessary, appropriate additional environmental investigations are conducted.

Comment: The NSW Threatened Species Conservation Act was replaced by the Biodiversity Conservation Act 2016. The requirements of this Act have been addressed in Section 4.3.2 and Appendix 9.

3. Where proposals would significantly affect areas of native vegetation, a review by an appropriately qualified and experienced ecologist or environmental scientist is undertaken as to the potential impact on wildlife habitat corridors.

Comment: The proposed development does not involve any clearing of native vegetation. The proposal is therefore considered consistent with the performance outcome for biodiversity *“to address biodiversity issues when the development is proposed so as to ensure appropriate weight is given to management of the natural environment as part of the consideration of proposals”*.

Bushfire Management: The subject land is identified as bushfire prone land. The management of these risks have been addressed in Section 5.14.1 and Appendix 6.

Recreational Vehicles: Not applicable.

Feedlots: Not applicable.

Access to Rural Properties: The proposal has existing access from the Gwydir Highway which is a public road. The proposal is therefore considered consistent with the performance outcome for access to rural properties to ensure *“the development provides safe, convenient and readily maintainable access from a public road”*.

Access to Rural Properties – Land Subdivided for Agricultural Purposes: Not Applicable.

Rural Dwellings: Not applicable.

Flooding: The subject land is identified as flood prone, however the site will be located within an approved flood levee (Flood Work Approval 90FW833508). The site is therefore not considered to be impacted by or have an impact upon the flow of flood water. A copy of the Flood Work Approval and plan has been included as Appendix 7. The proposed development meets the ‘Performance Outcomes’ of the DCP. The proposal does not involve any habitable buildings and therefore will not materially increase the risk to life. Risk to property is managed by the sensitive infrastructure being located within an existing levee bank.

Overall, the proposed development complies with the requirements included within the Rural Development chapter of the Development Control Plan 2013.

4.8 Local Planning Strategies

4.8.1 Moree Plains Shire Growth Management Strategy

In 2009 Council finalised a Growth Management Strategy (GMS) for the Shire¹. The GMS is intended to provide guidance to Council, State government and others as plans are made for future development within the Shire.

The conclusions of the GMS refer to the need to ensure planning in the Shire is focused on future generations². The Project fits with the Moree strategy to diversify its economy and reduce its dependence on agriculture and water-based industries, particularly given recent government water sharing plan initiatives, and increasing evidence of extreme weather events.

Mindful of recent population decreases that partly seem to be a consequence of the changing structure of the local agricultural sector, Moree has real concerns about its future industry and the ability to maintain its population. This project provides an opportunity to diversify the economy and build local skills. The proposed development with its high initial capital investment and recurrent investment in local employment is supportive of Council's own strategic planning direction.

While the development would reduce the availability of land for agricultural purposes, the significance of this issue is very low given the scale and local aspirations for increased economic diversity, which this project would directly support.

4.9 Draft planning instruments

No draft environmental planning instruments are known to affect the site.

¹ Edge Land Planning and Moree Plains Shire Council, Moree Plains Shire Growth Management Strategy, January 2009.

² GMS, p56

5 Environmental Considerations

Items considered include matters set out under Clause 4.15 of Division 4.3 of the *Environmental Planning and Assessment Act 1979*. A summary of the major points of that consideration follows.

5.1 Land Use Conflict

The development poses no potential land use conflict as it is permissible within the current zoning, pursuant to cl.34(7) of State Environmental Planning Policy (Infrastructure) 2007 (ISEPP). The land use will change from rural industry (storage of cotton modules) to electricity generation but due to the unobtrusive nature of solar power generation there are no land use conflict concerns.

5.2 Services

The solar farm does not require connection to reticulated water, telephone or sewerage infrastructure. Accommodation for construction workers will be off-site in Moree. Post construction there will not be a permanent on-site presence or office building for amenities.

During the operation of the site, water may be procured as a service to clean the solar PV panel glass surfaces. It is anticipated that would be on an annual basis, however this will be monitored throughout the first year of operation and if necessary increased subject to on-site water availability .

5.3 Land Contamination

An assessment of the site has been carried out by SMK Consultants in accordance with SEPP 55. This assessment is attached to this report as Appendix 3. As a result of the preliminary contamination assessment, SMK Consultants have concluded that the presence of any potential contamination residue would not impact on the proposed development of a solar farm, as it is not considered a sensitive land use. Accordingly, no further investigation is required.

5.4 Acoustic Amenity

The site has been subjected to large farm machinery in the past, and there are several cotton gins in the locality. This has established the acoustic amenity of the area. Construction of the facility will involve large machinery such as cranes for delivery and installation of the inverters and batteries, but will no longer be required once the site is operational. No large machinery will be active on the site once the solar farm is in operation. The solar farm will generate minor noise emissions from inverter/transformer stations and battery enclosures. The remainder of the property will continue to be cultivated for cotton and as a ginning site. This source of noise is considered as seasonal.

5.4.1 Construction Noise

During the construction phase, the operation of earthmoving machinery will be a source of noise. This type of noise is considered consistent with the noise levels produced by existing activity on the farm. The equipment proposed for use during the works is similar to the types of plant commonly used for civil construction projects; and assumptions regarding plant Sound Power Levels (SWL) were obtained from *AS 2436 – 2010, Guide to noise and vibration control on construction, demolition and maintenance sites*, which is commonly used in assessment and management of noise from construction type works. This guidance presents a range of potential noise levels for plant commonly used in civil and construction activities, in recognition that not all items of plant will possess the same SWL; variations in equipment SWL will exist based on make, model, size and age of plant. Plant operating at the upper bound of the guidance range would typically include larger (or older) plant, while the lower band would represent smaller (or well maintained, or otherwise mitigated) plant. Equipment which would be used at the Wathagar Solar Farm consists of smaller equipment which has been regularly maintained; this equipment would therefore be in lower band. However, mid-range values were selected as a conservative estimate of sound power levels likely to be generated by the proposed development.

Table 4: Typical Sound Levels of Construction Plant and Equipment

Plant Description	A-weighted sound power levels L _{WA} dB ref: 10 ⁻¹² W		A-weighted sound pressure levels L _{pA} (mid-point) dB at 10m
	Typical Range	Typical (midpoint)	
Compactor	110-115	113	85
Compressor (silenced)	93-110	101	73
Crane (mobile)	95-113	104	76
Crane (tower) 10	105	105	77
Excavator	97-117	107	79
Forklift	106	106	78
Front end loader	110-115	113	85
Generator (diesel)	84-113	99	71
Grader	105-115	110	82
Hand tools (electric)	95-110	102	74
Loader (wheeled)	99-111	105	77
Truck (>20 tonne)	107	107	79
Truck (water cart)	106-108	107	79
Vehicle (light commercial e.g. 4WD)	100-111	106	78
Welder	100-110	105	77

The magnitude of off-site noise impacts associated with construction would be dependent upon a number of factors:

- The intensity and location of construction activities
- The type of equipment used
- Existing local noise sources
- Intervening terrain
- The prevailing weather conditions

During any given period, the machinery items to be used in the study area would operate at maximum sound power levels for only brief stages. At other times, the machinery may produce lower sound levels while carrying out activities not requiring full power. It is highly unlikely that all construction equipment would be operating at their maximum sound power levels at any one time and certain types of construction machinery would be present in the study area for only brief periods during construction.

Furthermore, all construction and operation of machinery would only occur during work hours and not during the evening or night periods, where sound can be potentially increased as a result of various factors, including inversion layers. Accordingly, the predictions should be considered as conservative estimates.

The NSW Noise Policy for Industry 2017 (NPI) presents a methodology for determining Project Noise Trigger Levels (PNTL) for industrial development. Ambient and background noise measurements are used to determine PNTL relevant to the proposed development. Table 5 provides the NPI minimum RBL for each period of the day, which were adopted for the site.

Table 5: Rating Background Noise Levels

Period	RBL dB(A)
Day	35
Evening	30
Night	30

Note: Day is defined as the period from 7am to 6pm (Monday to Saturday) and 8am to 6pm (Sundays and public holidays). Evening is defined as the period from 6pm to 10pm. Night is defined as the period from 10pm to 7am (Monday to Saturday), and 10pm to 8am (Sundays and public holidays).

Table 6 provides an analysis of both the intrusiveness and amenity noise levels for the purposes of establishing a PNTL for the proposed development.

Table 6: Assessment of PNTL in adjacent receiving environment

Metric	Day dB(A)	Evening dB(A)	Night dB(A)
Rating Background Level	35	30	30
Project Intrusiveness Criteria	40	35	35

Metric	Day dB(A)	Evening dB(A)	Night dB(A)
Recommended Amenity Level	50	45	40
Project Amenity Level	45	40	35
Project Noise Trigger Level	40	35	35

These levels of 40, 35 and 35 dB(A) for the respective noise periods are considered acceptable guideline ambient noise levels that can be received by sensitive receptors whilst being considered to protect environmental values, including health and well-being, for outside a dwelling.

Noise impacts associated with the project were estimated using the distance attenuation relationship described in the following equation:

$$L_2 = L_1 - 20\log(d_1/d_2)$$

(source: Noise Guide for Local Government - epa.nsw.gov.au)

Where:

- d_1 = distance (m) between source and receiver
- d_2 = distance (m) at which Sound Pressure (L_{pa}) measured
- L_2 = sound pressure level at the distance d_1 from the source
- L_1 = sound pressure level at distance d_2 from the source

Propagation calculations consider sound intensity losses due to hemispherical spreading, with additional losses such as atmospheric absorption, directivity, ground absorption and shielding ignored in the calculations.

5.4.1.1 Predicted Construction Noise Levels at Receptors

The closest receptor is approximately 1,525 metres to the north-west of the project site. At this distance, the loudest activity (compactor) is predicted to be:

$$\begin{aligned} L_2 &= 85 - 20\log(1,525/10) \\ &= 41.3 \text{ dB} \end{aligned}$$

Construction works will be confined to daytime hours, in which the acceptable noise threshold criteria is 40dB. The predicted maximum noise generated by the development therefore exceeds the PNTL. It is noted, however, that a compactor will most likely not be required. It has been used in this calculation as a 'worst-case scenario'.

5.4.1.2 Noise Mitigation Measures and Residual Noise Impact

The NPI notes that the PNTL should not be considered to be a mandatory threshold, yet rather a planning tool. The PNTL should be considered in conjunction with feasible and reasonable noise mitigation measures, and residual noise impacts. Residual noise impacts are defined as the best achievable noise level from a development, when the development noise emissions still exceed the PNTL (following implementation of noise mitigation measures).

It is noted that there are limited feasible and reasonable noise mitigation measures which may be adopted during the construction period which would result in lowering the PNTL. Therefore, the residual noise impact is equivalent to 1.3dB.

5.4.1.3 Determination of Significance of Residual Noise Impact

The proposed development has a residual noise impact of 1.3dB. The NPI identifies the significance of a residual noise impact of ≤ 2 dB as 'Negligible'. It is therefore considered that construction works associated with the proposed development will not have a significant impact upon the amenity of the surrounding location. It is further noted that construction works associated with the proposed development will be temporary in nature (10-12 weeks) and will not result in a lasting alteration to local amenity values.

Overall, it is considered that the potential noise related impacts of construction work upon the community is within an acceptable threshold.

5.4.2 Operational Noise

Sources of plant noise associated with the operation of the solar farm stem from the inverter stations and battery storage containers. It is noted that both the inverter stations and battery storage containers would be operated during daytime and night-time hours.

Ongoing maintenance requirements would be negligible and is likely to require no more than one or two technicians in a light utility occasionally using hand tools.

Whilst some plant and equipment selection with preferred suppliers has yet to be finalised, typical manufacturer noise specifications (based on sound power level test results) for the plant to be used is available. The LAeq Sound Power Level (SWL) of all the plant to be used is identified in Table 7.

Table 7: Typical Operational Sound Power Levels

Equipment	LAeqSWL (dB(A))	Source
Sungrow SC3450 PCS Inverter Station	80.5	SC3450 PCS (measured at 1m)
Battery Storage (BESS)	61.9	ST3727KWH(L) (measured at 1m)

5.4.2.1 Predicted Noise Levels at Receptors

The closest receptor is approximately 1,525 metres to the north-east of the project site. At this distance, the loudest activity (Sungrow Inverter Transformer Station) associated with the operation of the solar farm is predicted to be:

$$\begin{aligned}
 L_2 &= 80.5 - 20 \log(1,525/1) \\
 &= 16.8 \text{ dB}
 \end{aligned}$$

The acceptable noise threshold criteria is 40dB during the daytime period and 35dB during the night period. The predicted maximum noise generated by the operation of the solar farm is therefore below the PNTL during both periods.

5.4.3 Conclusion

Construction of the proposed development would result in negligible residual noise impacts at the closest sensitive receptor. Construction works will be temporary in nature (10-12 weeks) and will not result in a lasting or significant alteration to local amenity values.

Additionally, during construction, the proponent shall implement the following noise mitigation measures:

- Only using machinery fitted with compliant mufflers during the construction of the solar farm;
- Requesting that truck drivers do not use engine brakes when entering / exiting the property;
- Select plant and equipment where practical on acoustic performance; and
- Use plant and equipment in a manner which minimises noise impacts.

Provided the above-mentioned mitigation measures are implemented, the proposed development is considered to have minimal potential impact on the acoustic amenity of any nearby receptors.

During the operation of the proposed development, sound pressure generated at the project site is considered compliant with a 40dB daytime noise limit. The level of attenuation available over the distance between the source and the receptor is considered more than sufficient to ensure that the amenity of the receptor is not disturbed. The assessment would therefore suggest that the environmental value associated with the sensitive receptors will be adequately protected from potential noise impacts generated by the development. The intensity and frequency of noise emissions from the site are not considered to be sufficiently significant to create additional impact above acceptable criteria.

5.5 Visual Amenity

5.5.1 Landscape Setting

The properties surrounding the solar farm site are working agricultural properties. The topography of the area is relatively flat with some remnant vegetation. The site itself is zoned RU1 – Primary Production within a rural area and is located south-west of the township of Moree. The land is largely cleared and supports a range of infrastructure associated with a rural landscape. This includes fence lines, existing overhead power lines, residences, a site office and weighbridge, yards, sheds, a cotton gin and pockets/corridors of vegetation.

The following image shows the sheds and cotton gin which are present on the property north of the proposal site, as well as the existing landscape of the proposed development.



Figure 9: Cotton gin present north of the proposed solar farm location



Figure 10: Existing landscape across the development site facing north.



Figure 51: Existing landscape across the development site facing east.



Figure 62: Existing landscape across the proposal site facing south (towards Gwydir Highway).



Figure 73: Existing landscape across the development site facing west.

5.5.2 Landscape Values

Landscape value is concerned with the relative value that is attached to different landscapes. In a policy context the basis for recognising highly valued landscapes is through either registration or listing in a local, State or Commonwealth heritage register. Neither the development site nor any surrounding landscape is recognised through registration or listing as significant landscape value.

Notwithstanding, a landscape may be valued by different communities for many different reasons without any formal listing. There are intangible and emotive values associated with judgements about what makes the landscape important for different people and how sensitive it is to change. Whether the impact is considered acceptable or desirable is ultimately a subjective issue and opinions would differ between individuals. The values people place on the landscape varies, as will their opinions as to the significance of the visual impacts associated with the solar farm.

It is assumed that neighbours and landowners in the immediate locality undoubtedly value the landscape.

5.5.3 Visual catchment

A variety of visual receptors can reasonably be anticipated to see the solar farm. This includes local residents, those working outdoors on adjoining properties and motorists along the Gwydir highway. The facility as proposed, would be the only solar farm in the local area and therefore be considered as a change to the current visual amenity. The facility would be viewed as similar to other infrastructure sites such as telephone towers and sub-stations which are located along the highway.

5.5.3.1 Residents

It is generally accepted that local residents have a high level of sensitivity to changes in their landscape and visual environment. The most important views are those available from their own homes. Views from their own homes, whilst private, are judged to be the most sensitive as these are views which are consistently available and they may be views that residents dwell upon for longer periods of time and defines their home in terms of personal appeal.

The facility would not be visible from neighbouring houses.

5.5.3.2 Travelling Public

This category of visual receptor group includes both local residents and those who pass through the area along the Gwydir Highway.

Users of roads would vary in their level of sensitivity to the development, depending primarily upon the purpose for which they are travelling. For example, local residents may be more

preoccupied with achieving their destination than in enjoying the scenery along their trip. In contrast, day trippers and longer-term visitors to the area are likely to be more concerned with the views they enjoy as they travel.

5.5.4 Conclusion

The solar farm would have a visual impact and add a new feature to the landscape. No landscape feature associated with an area of local or regional conservation significance would be impacted. The solar farm would not obscure landscape features for any receptors nor detract from existing views from any residence. The farm would be visible but not intrusive.

While the solar farm would become a visible landscape feature, it would not result in the loss or major change to key elements, features or characteristics of the broader existing landscape such that the post development landscape character would be fundamentally changed.

5.6 Glare

5.6.1 Introduction

The issue of reflectivity from solar panels and associated potential safety and/or nuisance impacts for neighbours, motorists or pilots is consistently identified as an issue warranting consideration.

5.6.2 Reflectivity

The amount of light reflected by a PV panel depends on the amount of light hitting the surface, the time of year, amount of cloud cover, the surface reflectivity, and whether the array is fixed or tracking.

When the sun is at a right angle to a fixed PV array, the angle of incidence (AOI) is the lowest but increases as the angle of rays from the sun increase relative to the fixed panel angle.

The percentage of sunlight reflected by PV solar panels is similar to that of water and less than most other materials, as illustrated in Figure 14 and

15. The low reflectivity design of the solar PV panels maximises the absorption of solar energy and therefore minimises the extent of solar energy reflected.

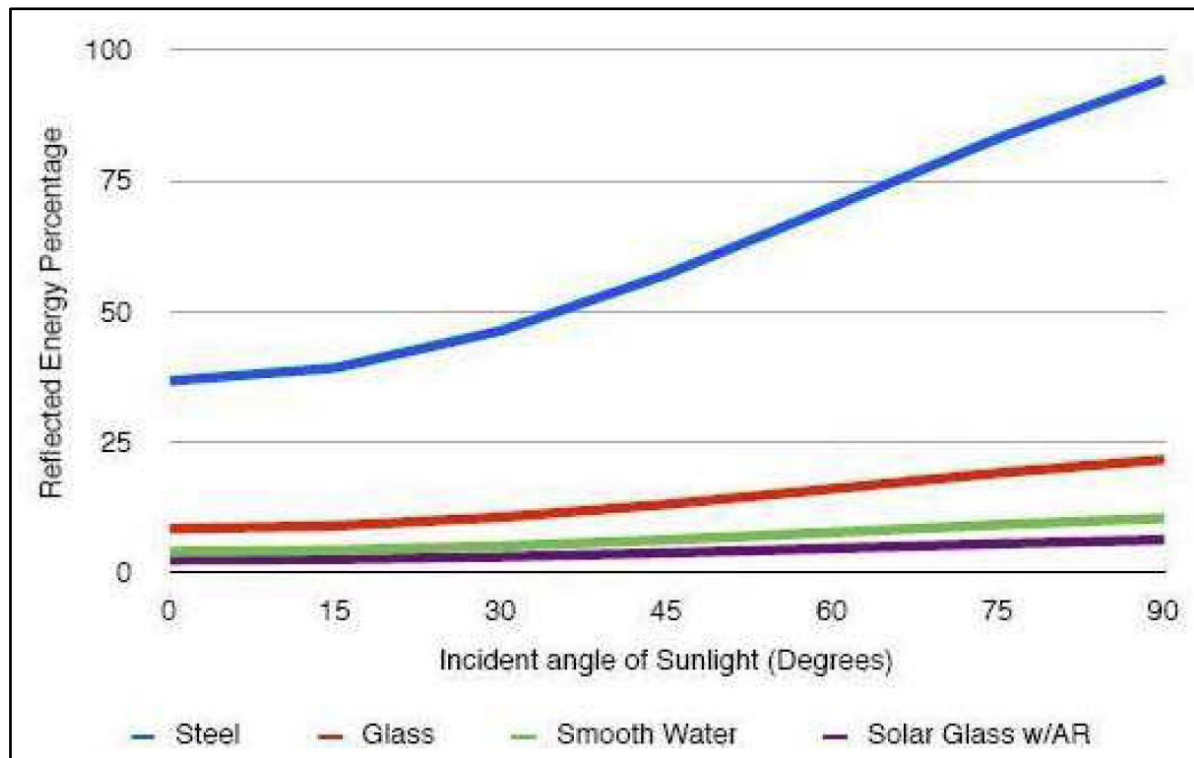


Figure 14: Typical Material Reflectivity with Sunlight Angle³

³ Spaven Consulting, 2012. *Proposed Solar Energy Facility, Manston, Kent: Manston Airport 'Glint and Glare' Study*

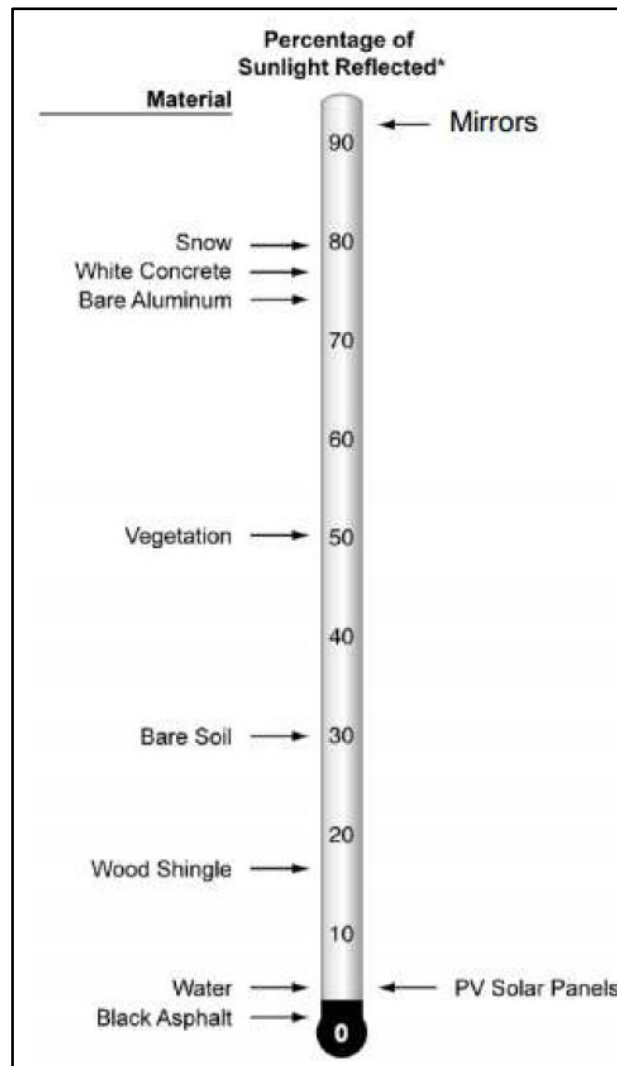


Figure 15: Comparative Reflection of PV Solar Panels⁴

5.6.3 Potential Impacts

Glare and glint are a potential hazard/nuisance generated by solar panels. Ho⁵ defines glint as a momentary flash of light, and glare as a more continuous source of excessive brightness relative to ambient lighting.

Glint is produced as a direct reflection of the sun in the surface of a PV solar panel. Glare is not a direct reflection of the sun, but rather a reflection of the bright sky around the sun. Glare is significantly less intense than glint⁶. The difference between glint and glare is depicted in Figure 16.

⁴ Sandia National Laboratories (Clifford K. Ho), n.d. *Overview Presentation of the Solar Glare Analysis Tool (SGHAT)* [ONLINE] Available at: http://share.sandia.gov/phlux/static/reference/glint-glare/SGHAT_Ho.pdf

⁵ Ho, C.K., 2013, *Solar Glare Hazard Analysis Tool (SGHAT)*. Sandia National Laboratories, Albuquerque, NM.

⁶ Power Engineers, 2010, *Panoche Valley Solar Farm Project Glint and Glare Study*, SolarGen Energy, May 21 2010

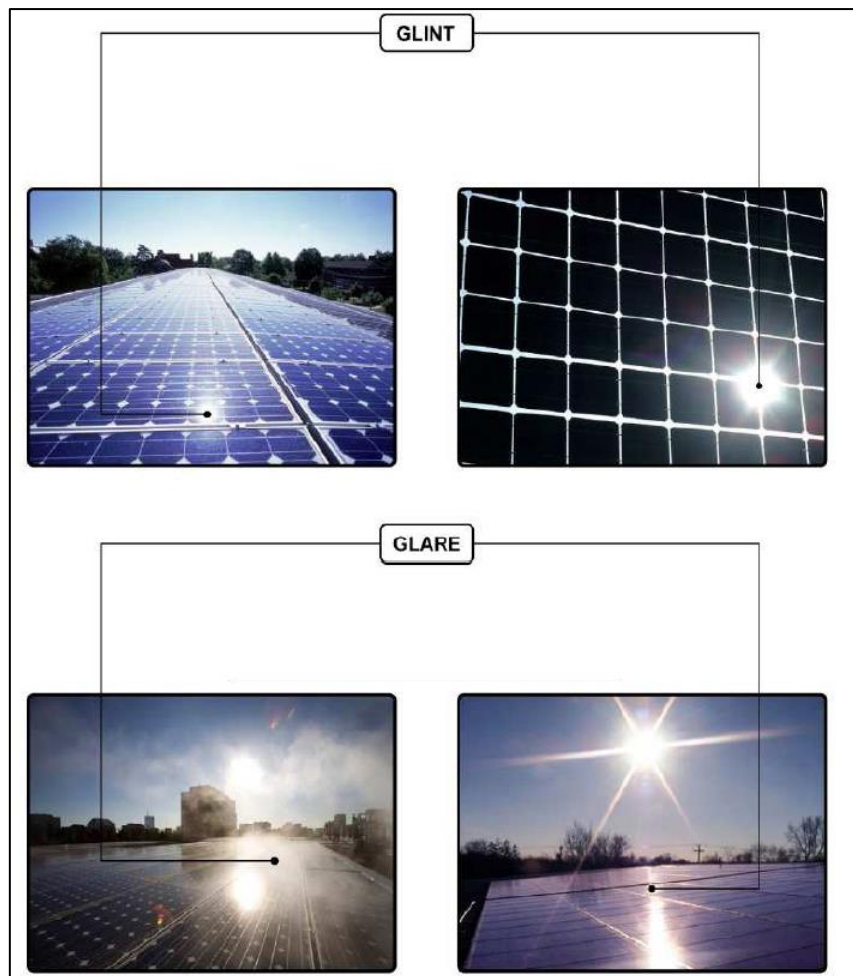


Figure 16: Visual Comparison of Glint and Glare⁷

5.6.4 Glare Hazard Analysis

Based on the results of previous assessments for PV solar power projects and studies carried out in the USA and Europe, the potential for sun glint and glare would not be expected to have a significant impact.

SMK Consultants find it unlikely that sun glint or glare reflection from components of the project will have any significant impact on people residing in or travelling through the landscape. The potential for reflectivity of sunlight from the PV panels is less than a number of commonly established materials in the surrounding rural landscape including steel and standard window glass.

⁷ Power Engineers, 2010, *Panoche Valley Solar Farm Project Glint and Glare Study*, SolarGen Energy, May 21 2010

5.6.5 Civil Aviation Safety Authority

Civil Aviation Safety Authority (CASA) was consulted in relation to the proposed development. The response provided by CASA indicated that due to recent guideline changes, CASA no longer assess approach paths to and from airports and now concentrates their concerns on impact to Air Traffic Control towers. As Moree does not have an ATC tower, CASA has no concerns and no objections regarding this proposal.

A copy of CASA correspondence is provided in Appendix 5.

5.7 Air Quality

5.7.1 Construction Impacts

The construction of the solar farm will not involve extensive earthworks and only pile driving for footings for the array framework and excavation for ancillary structures and access will be carried out. Along with the delivery of materials using heavy vehicles, the construction works may generate dust.

Internal dust management is a key construction measure to maintain good health of workers and maintenance of equipment and therefore dust emission control will occur by visual monitoring of dust emissions and the implementation of suitable mitigation measures. Such measures will include:

- Restricting vehicle movements and ground disturbance to the minimum areas that is safely practicable.
- Undertaking dust suppression through strategic watering or other means of suppression will form a key component in daily operations.
- Ensure minimal handling of any excavated materials.
- Temporary cessation of works during excessively dry and windy conditions.
- Re-establishing a groundcover vegetation on areas disturbed by construction but not needed post-construction, as soon as practicable.

It should be noted that the solar farm can be built without significant earthworks. No bulk earthworks or landform modifications are required.

5.7.2 Operational Impacts

The site manager has indicated that if the solar farm is not approved, the site would be stripped of vegetation and used for the storage of cotton modules in anticipation of a large harvest in the upcoming year. The change in land use from rural industry to electricity generation will reduce the potential for particulate emissions from this land. The principal source of dust is ground disturbance and wind exposure to un-vegetated ground surfaces. The area below the PV field will be layered with approximately 30mm of crusher dust that will reduce exposure of the soil to wind and rain. In this context bare, exposed ground provides a greater risk of exposure than the solar farm.

As a source of particulates and localised dust emissions, the solar farm will, in comparative terms, be a land use that has the potential to improve local air quality. The solar farm will also contribute to reduce greenhouse (GHG) emissions.

5.8 Electromagnetic Fields

5.8.1 Potential Radiation Sources

The generation, distribution and use of electricity can produce extremely low frequency (ELF) electromagnetic fields (EMF) from electrically charged particles. The electric field is produced by the voltage whereas the magnetic field is produced by the current. The strength of the electric field is measured in units of volts per metre whilst the strength of the magnetic field is expressed in units of tesla (T), microtesla (μ T), gauss (G) or milligauss (mG).

ELF EMF are present in a variety of natural and human-made sources. Naturally occurring ELF EMF is associated with atmospheric processes such as ionospheric currents, thunderstorms and lightning. Typical human-made equipment or appliance EMF sources include computers, refrigerators, mobile phones and televisions. The EMF strength varies according to the relative strength of both the voltage and current present in the source and degrades exponentially as the distance from the source increases. Artificial sources are the dominant sources of ELF EMF and are usually associated with the generation, distribution and use of electricity at the frequency of 50 or 60 Hz. The widespread use of electricity means that people are exposed to ELF EMF in the home, in the environment and in the workplace.

According to the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), which maintains continual oversight of emerging research into the potential health effects of EMF exposure, there is no established evidence of health effects from exposure to electric and magnetic fields from powerlines, substations, transformers or other electrical sources, regardless of proximity.

5.8.2 Mitigation Measures

The location of the proposed Wathagar Solar Farm and the distance separation between nearby dwellings and the site mean that any impacts on health are mitigated. No additional mitigation measures are proposed.

5.9 Soil Resources

The subject site consisted of heavy black clay soils consistent with Vertosols as classified by the Australian Soil Classification. The land and soil capability class of the surrounding area is Class 2 and is typically considered capable of a wide variety of agricultural uses that involve cultivation. The subject site is not considered to have any existing salinity issues and the development proposal, as designed, will not increase the risk of salinity on the property. There are no known acid sulphate soils present within the region and the area is not identified on acid sulfate soil risk mapping (eSPADE v2.1, 2021).

5.9.1 Geotechnical Investigation

The results of a geotechnical investigation will be delivered to council as part of an application for a construction certificate. The Geotechnical report will inform certification of designs by structural engineers and will provide detailed recommendations to ensure construction occurs in accordance with the soil requirements.

5.9.2 Erosion and Sediment Control

Land slope on the property varies across the site but is essentially located on flat land. Vertosols, the soil type present onsite, are typically considered at moderate risk of erosion when the soil is dry or vegetative cover is low. Given the nature of the proposed development, best practice drainage and sediment controls will be implemented on site. There is minimal physical alteration as result of this proposal and hence there is no chance of subsidence, slip or mass movement of the soil on site.

The following erosion control measures will be implemented:

- Adequate surface drainage will be provided to reduce surface and seepage water flows. The site will be laser levelled to produce an adequate slope draining towards existing drain to the south of the proposed development site. This directs stormwater into an existing borrow pit to the south-east of the subject site;
- Short term erosion measures such as silt fencing, hay bales etc., will be implemented during construction as required.

5.10 Water Resources

5.10.1 Potential Surface Water Impacts

The proposed development site is located approximately 1.4km north of the Mehi River and 3.7km south-east of the Tarran Creek. The development is located within the area covered by the *Water Sharing Plan for the Gwydir Unregulated and Alluvial Water Sources 2020*. No surface water extraction is proposed therefore the WSP is not relevant to the proposed development.

The proposed development will the removal of regrowth vegetation currently present within the site and the installation of solar panels and transformers with residual areas allowed to revegetate naturally. No grazing of livestock is proposed within the developed site with grassed areas being sprayed as required to reduce fire hazard. The proposed spraying is consistent with the herbicide application associated with the current land use.

Stormwater runoff at the site will be largely unchanged as a result of the proposed development. Although the water pattern hitting the ground will be altered slightly as each solar panel will divert the water into small channels running in-between each row, the volume of water hitting the existing footprint will remain unchanged.

5.10.2 Potential Groundwater Impacts

The site is located within the area covered by the *Water Sharing Plan for the Gwydir Alluvial Groundwater Sources 2020*. Given the largely passive nature of the solar energy system, impacts to groundwater environments in relation to ongoing operations is considered limited. No water is proposed to be extracted from groundwater sources for construction purposes for any project element. Accordingly, construction would not impact groundwater and the WSP is not relevant to the proposed development.

The subject site is mapped as supporting a Groundwater Dependent Ecosystem (GDE) with a low potential for groundwater interaction; the ecosystem is identified as 'Queensland Bluegrass +/- Mitchell Grass grassland on cracking clay floodplains and alluvial plains mainly the northern-eastern Darling Riverine Plains'. The proposed development does not currently support this vegetation type due to past disturbance and agricultural use; the proposal is therefore unlikely to impact on this GDE. Additional GDEs are mapped as being present within the property, however these have either been largely cleared, or are located outside of the levee bank. The proposal will therefore not impact any GDEs in the locality.

5.10.3 Mitigation Measures

The proposed works should not result in the pollution of land/waters so long as best management practices for erosion and sediment control are undertaken during construction, and appropriate remediation measures are implemented on a progressive basis. Priority will be given to achieving a high standard of erosion and sediment control and general site housekeeping throughout the construction period.

The way this is achieved is through developing and implementing construction activities in accordance with best practice⁸ and the following principles:

1. At all times, in all locations, the area of ground disturbance should be limited to that which is the smallest possible footprint that is practicably possible.
2. Erosion and sediment controls must be suitably maintained, including regular monitoring to ensure the measures and controls in place are effective.
3. Erosion and sediment control measures only to be removed once the area is successfully rehabilitated.

5.11 Waste Management

A desktop assessment of the waste generated during construction and operation of the proposed Wathagar Solar Farm has been carried out to determine the appropriate means of waste disposal and recycling. The assessment takes into account the requirements of relevant legislation and policy including the *Protection of the Environment Operations (POEO) Act*

⁸ Landcom, 2004. *Managing Urban Stormwater: Soils and Construction*, 4th Edition

1997, *POEO (Waste) Regulation 2014* and the *Waste Avoidance and Resource Recovery Act 2001*.

The largest amount of waste will be generated during the construction and module assembly phase and be classified as general solid waste (non-putrescible). Wastes would predominantly include wooden pallets, cardboard, plastics, green waste and domestic waste. Construction of a solar farm would not generate any putrescible waste products. Minimal waste would be generated when the farm is operational other than small amounts of replacement parts and packaging required for maintenance and repair works.

It is expected that the solar farm will be operational for at least 25 to 30 years. Upon decommissioning all infrastructure, including cabling and panels and mounting frames including footings and inverters would be disassembled and removed from the site. There are currently limited opportunities to recycle the components of solar panels, however, it is anticipated that the waste recycling industry will expand and develop new technologies and uses for those components by the time decommissioning occurs.

It is intended that timber and cardboard will be chipped and composted or recycled. Other waste will either be recycled or disposed of at the Moree Waste Management Facility and Community Recycling Centre, located on Evergreen Road on the southern outskirts of Moree. This is operated by the Moree Plains Shire Council.

Overall, waste management will be predicated on the international hierarchy of waste management to avoid/reduce, reuse, recycle, recover, treat and dispose of waste products to avoid or reduce waste materials where possible, and to re-use, recycle and recover the majority of waste materials generated during each of the construction, operational and decommissioning phases.

5.12 Flora and Fauna

5.12.1 Desktop Assessment

Initially, examination is required of the various threatened species databases to identify any known locations of threatened species, populations and ecological communities inside, or within close proximity to, the proposed impact area. This desktop assessment included searches of databases and a review of literature relevant to the site and local area, particularly:

- Office of Environment and Heritage (OEH) Atlas of NSW Wildlife database for records of threatened species and endangered ecological communities which have been recorded within a 10-kilometre radius (locality) of the subject site (accessed June 2020);

- Department of the Environment and Energy (DoEE) Protected Matters Search Tool for Matters of National Environmental Significance (MNES) listed under the EPBC Act within a 20 km radius from the site (accessed June 2020); and
- NSW Vegetation Information System (VIS) classification database (OEH, accessed June 2020).
- NSW Sharing and Enabling Environmental Data (SEED) portal (NSW Government, accessed June 2020).

Satellite imagery is also used to determine the presence and extent of broad habitat types for these species. Where it is determined the habitat of a species, population or community is not present, this species is culled from the list of potential occurrences. This list is further refined based on the habitat features identified during field surveys.

Figure 17 includes the modelled plant community types expected to occur within the area based on desktop information available on the SEED portal for vegetation mapping. The desktop assessment indicated that the property was likely to contain vegetation consistent with Plant Community Type (PCT) 39 “Coolabah-River Coobah-Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion” in the areas shown in orange in Figure 17. The majority of the property is classed as PCT 0 “Non-native” (shown in white in Figure 17), and the subject site is classed as PCT 1 “Candidate Native Grasslands”. This is shown as aerial imagery with no overlay in Figure 17.



Figure 87: SEED Plant Community Types modelled for the area.

5.12.2 Field Assessment

As previously mentioned, the site was historically cleared and used for the storage of cotton modules. The site has not been managed or used in recent years, allowing for natural revegetation to take place. The development footprint therefore now comprises regrowth of grassy vegetation and shrubs.

The high shrub layer is very sparse and consists of a small number (<10) of shrubs with a maximum height of 4m. Species present as shrubs within the site are *Acacia* sp. and Coobah (*Acacia salicina*).

The groundlayer and low shrub layer is heavily dominated by Field Mustard (*Brassica rapa*), a non-native species, with a localised dominance of Black Roly-poly (*Sclerolaena muricata*). A mixture of native and naturalised species are also present, including Windmill Grass (*Chloris truncata*), Bluegrass (*Dicanthium setosum*), Slender-fruited Saltbush (*Atriplex leptocarpa*), Fairy Grass (*Sporolobus caroli*), Rhodes Grass (*Chloris gayana*), Nardoo (*Marsilea drummondii*), *Enadia* sp., Golden Lily (*Bulbine bulbosa*), Common Storksbill (*Erodium cicutarium*) and Common Vervain (*Verbena officinalis*).

Weeds present include Fleabane (*Erigeron bonariensis*), *Asteraceae* sp., African Boxthorn (*Lycium ferocissimum*), Noogoora Burr (*Xanthium occidentale*) and Common Mallow (*Malva neglecta*).

Figure 18 shows the vegetation present within the proposed development site.



Figure 18: Non-native vegetation (PCT 0) within the subject site

The vegetation present east of the subject site, along the eastern boundary of the subject site and to the south of the Gwydir Highway is dominated by Coolabah (*Eucalyptus collabah*) in the overstorey layer. The shrub layer is sparse and the groundlayer is dominated by chenopods such as Galvanised Burr (*Sclerolaena birchii*) and Black Roly-poly (*Sclerolaena muricata*). The species composition of this vegetation community is consistent with PCT 39 'Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion', as identified in the desktop mapping. PCT 39 forms part of the threatened ecological community (TEC) Coolibah – Black Box Woodland. The conservation status of this community is Endangered Ecological Community both under the *Biodiversity Conservation Act 2016* and the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*. These areas of vegetation are outside of the development footprint and the vegetation will be retained and undisturbed by the proposed development.



Figure 19: PCT 39 along the eastern boundary of the subject property

The property also contains rows of planted trees which provide screening for the existing cotton gin development on the property. Adjacent properties are similarly extensively cleared for cultivation, and quality remnant vegetation is generally confined to Crown Land along the Gwydir Highway road corridor and along riparian corridors.

5.12.3 Biodiversity Values Map

The Biodiversity Values Map is given in Figure 20 below. This map identifies land with high biodiversity value as defined by clause 7.3(3) of the *Biodiversity Conservation Regulation 2017*. The Biodiversity Offsets Scheme applies to all clearing of native vegetation and other biodiversity impacts prescribed by the regulation on land identified on the map.

The Biodiversity Offsets Scheme is used to determine whether the Biodiversity Assessment Method is to be used to assess the impacts of a development proposal and applies to local development. The scheme is triggered based on threshold levels of clearing comprising the land area to be cleared and whether the area is mapped on the Biodiversity Values Map. The Mehi River (shown in purple) is located to the south of the subject property and the Tarran Creek is located to the north-west of the property. These areas are mapped as being of high biodiversity value. The proposal will not impact these areas of land. There are no other areas of land mapped as being of high biodiversity value in the locality.

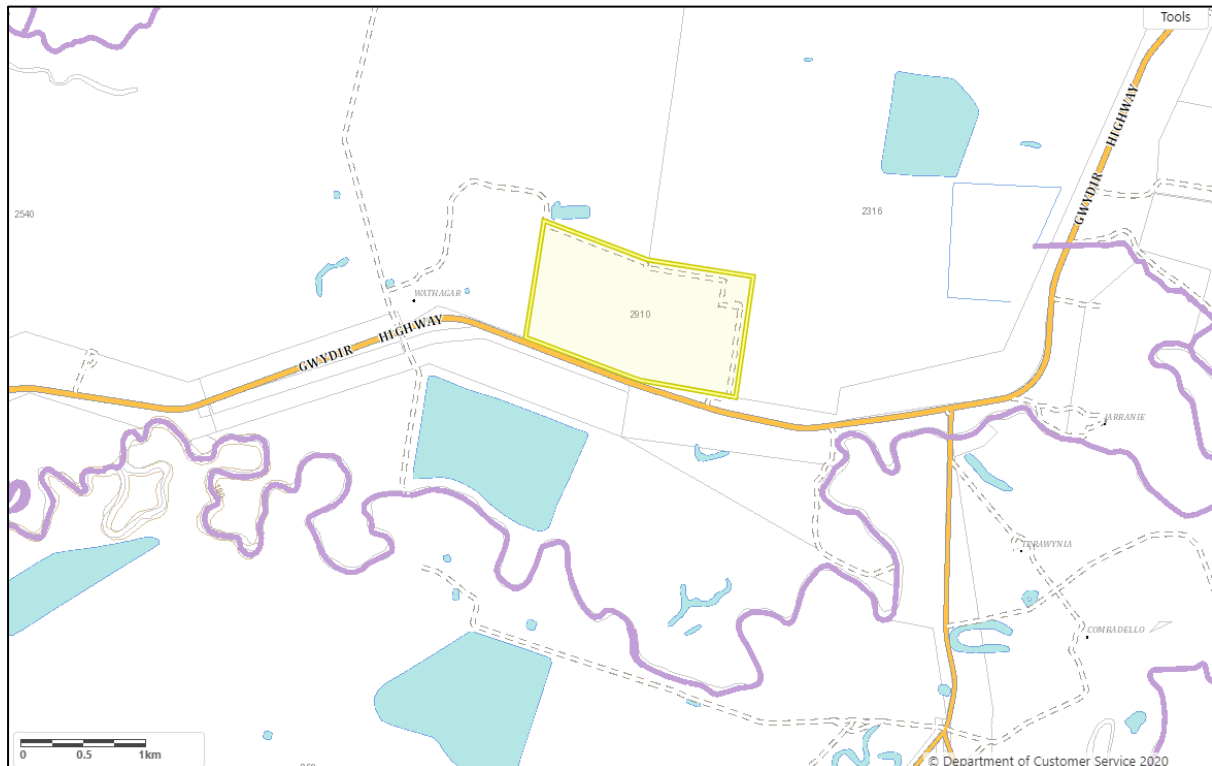


Figure 90: Biodiversity Values Map. Source: NSW Government, 2021.

A Test of Significance was undertaken to determine the potential impact of the proposal on threatened or endangered species, populations and habitat communities. The assessment is presented in Appendix 8. This assessment concluded that the proposal would be unlikely to have a significant impact on any threatened or endangered species and communities given the preferred siting of the development within a previously cleared and disturbed site.

An Assessment of Significance on the Matters of National Environmental Significance has also been included as Appendix 9. The conclusion of the assessment is that the proposal will have no significant impact on any listed Matters of National Environmental Significance.

5.13 Weed Management

African Boxthorn and Noogoora Burr are currently present as scattered individuals onsite and these are listed as Weeds of National Significance (WoNS) under the *Biosecurity Act*

2015. These weeds are regarded as the worst weeds in Australia because of their invasiveness, potential for spread, and economic and environmental impacts. It is the duty of the Applicant to ensure the risk associated with these weeds is prevented, eliminated or minimised, so far as is reasonably practicable.

Mitigation measures are recommended, specifically for the purpose of:

- controlling existing weeds that are present listed under the *Biosecurity Act 2015*; and
- ensuring that machinery is free from propagules before entering the site.

Weeds will be therefore controlled in accordance with the following principles:

- Prior to construction, the site will be prepared with an application of a knockdown herbicide with residual action to prevent the growth of any seeds that may germinate under the array. This application of a residual chemical is expected to inhibit growth over several seasons in the early life of the solar farm.
- All machinery, equipment and vehicles brought onto a property must be free of soil, seed or plant material. All soil and organic matter should be removed, including under the vehicle and in the cabin or trays.
- In areas outside of the immediate solar array footprint, stabilisation measures must be planned to optimise establishment of a healthy groundcover devoid of weeds.
- Spot spraying will also be used to control any weed species that emerge in the access lanes between the banks of panels.

During the operational phase, the area under the solar panels will be permanently shaded. The reduced daytime temperatures and limited available sunlight will impede plant growth under the array. Reduced insolation and the wind protection offered by the solar panels is likely to result in retained soil moisture. The environment created underneath the solar panels would therefore not favour vegetation growth once the solar farm is operational.

5.14 Natural Hazards

The land is not subject to geological hazard such as volcanism, earthquake, or soil instability such as subsidence slip or mass movement.

5.14.1 Bushfire

Bushfire Prone Land is land that has been identified by local council as capable of supporting a bushfire or being subject to bush fire attack. The NSW Planning Portal was accessed in September 2021 to assess whether the proposal is located in Bushfire Prone Land. Results of bush fire mapping indicates that the subject site is classified as 'Bushfire Prone Land', with a medium fire risk consistent with Vegetation Category 3. Vegetation Category 3 is defined as *"Vegetation Category 3 is considered to be medium bush fire risk vegetation. It is higher in bush fire risk than Category 2 (and the excluded areas) but lower than Category 1. It is represented as dark orange on a Bush Fire Prone Land map and will be given a 30 metre buffer."*

This category consists of: Grasslands, freshwater wetlands, semi-arid woodlands, alpine complex and arid shrublands”.

Infrastructure comprising electricity generating works is not a habitable building and is not listed as a *special fire protection purpose* under Section 100B of the *Rural Fires Act 1997*.



Figure 101: Bushfire Prone Land within and around Lot 2 DP773266 (Category 3 land is mapped in orange)

5.14.1.1 RFS Bushfire Planning Objectives

Fire protection objectives considered with regards to the development site are outlined in the Rural Fire Service (RFS) guideline “Planning for Bush Fire Protection” (PBP) (RFS 2019).

The proposed solar farm is considered as “Other Development – Solar Farms” per the PBP.

In order to comply with the PBP, the following conditions must be met:

- Satisfy the aims and objectives outlined in Chapter 1 of the PBP;
- Consider any issues listed for the specific purpose;
- Propose an appropriate combination of Bushfire Protection Measures (BPM).

Aims and Objectives of the PBP

The aims and objectives of PBP, as outlined in Chapter 1, are as listed and addressed below.

- **Afford occupants of any building adequate protection from exposure to a bushfire;**

A minimum buffer of 10m will be observed between any structures present or erected onsite and native vegetation. Workers and employees are not expected to defend the facility from fire and would be evacuated should a bushfire threaten the site. Given the extensively cleared nature of the landscape around the proposal and the open structure of vegetation present in the surrounds, the development is not considered to be at risk from bushfires.

This objective is satisfied.

- **Provide for a defensible space to be located around buildings;**

The proposal does not involve the construction of any buildings, however an Asset Protection Zone (APZ) of 10m will be established and maintained around the solar farm which will act as defensible space for the development. Access to the development is by an existing wide access route suitable for heavy vehicles. This road can be used by fire services to attend to fire at the facility.

This objective is satisfied.

- **Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent direct flame contact and material ignition;**

A minimum APZ of 10m will be maintained between all potential fire hazards and the proposed development. It is noted that the solar farm will be kept clear of vegetative growth and therefore the majority of the subject site will not support flammable materials.

This objective is satisfied.

- **Ensure that safe operational access and egress for emergency service personnel and residents is available;**

As the property is already developed for the operation of a cotton gin, existing site conditions provide for large truck movements and there is adequate access to the proposed solar farm for firefighting operations and for occupants of the dwelling on-site. The dwelling is occupied by the gin manager, which is a separate operation to the proposed solar farm development.

This objective is satisfied.

- **Provide for ongoing management and maintenance of bushfire protection measures, including fuel loads in the Asset Protection Zone (APZ); and**

A minimum APZ of 10m will be observed between fire supporting vegetation adjacent to the proposed development and flammable materials associated with the solar farm. The majority of the site will remain free of vegetation. Sufficient heavy machinery is available on-site to manage buffer zones in a fuel-reduced condition.

This objective is satisfied.

- **Ensure that utility services are adequate to meet the needs of fire fighters (and others assisting in bushfire fighting).**

The co-located cotton gin has its own fire suppression assets adjacent to the solar farm that would be available in an emergency. These include a reticulated water supply, fire reels and hydrants and 120,000L of water stored in tanks. All-weather access roads will provide suitable access for fire-fighting vehicles. Given the low risk of bushfire at the proposed development location, this is considered sufficient.

This objective is satisfied.

5.14.1.2 Solar Farms

Wind and solar farms require special consideration and should be provided with adequate clearances to combustible vegetation as well as firefighting access and water.

The PBP states that:

“the following should be provided for solar farms:

- *a minimum 10m APZ for the for the structures and associated buildings/infrastructure; and*
- *the APZ must be maintained to the standard of an IPA for the life of the development.*

Infrastructure for the purposes of requiring APZ excludes:

- *road access to the site; and*
- *power or other services to the site and associated fencing.”*

The PBP also states that a Bush Fire Emergency Management and Operations Plan should identify all relevant risks and mitigation measures associated with the construction and operation of the wind or solar farm.

Comment

A Bush Fire Emergency Management and Operations Plan can be prepared for the proposal if required. The proposed development will incorporate the establishment and maintenance of a 10m APZ around the perimeter of the solar farm. This will be maintained to the standard of an Inner Protection Area (IPA) for the lifetime of the proposal. The requirements for the establishment and maintenance of an IPA, in accordance with the PBP 2019, are set out below:

Trees:

- tree canopy cover should be less than 15% at maturity;
- trees at maturity should not touch or overhang the building;
- lower limbs should be removed up to a height of 2m above the ground;
- tree canopies should be separated by 2 to 5m;
- and preference should be given to smooth barked and evergreen trees.

Shrubs:

- create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards buildings should be provided;
- shrubs should not be located under trees;
- shrubs should not form more than 10% ground cover; and
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

Grass:

- grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and
- leaves and vegetation debris should be removed.

5.14.1.3 Proposed Bushfire Protection Measures

The Applicant has prepared a Draft Bushfire Management Plan for the proposal; this is included as Appendix 2. The Draft Plan includes an assessment of the potential risks in relation to bushfire at the site, and the proposed bushfire mitigation measures which would be implemented as part of the construction and operation of the solar farm. If development consent is issued for the solar farm, the Plan would be finalised and implemented as part of the proposed development.

5.14.2 Flooding

The subject land is identified as flood prone, being located within Management Zone C under the Gwydir Floodplain Management Plan for the Gwydir Valley Floodplain. Gwydir Management Zone C contains elevated areas or areas protected by existing flood work development. The subject property is contained within an approved flood levee (Flood Work Approval 90FW833508). The flood work approval remains current and was issued by Water NSW. A copy of the Flood Work Approval and plan has been included as Appendix 7.

All solar farm infrastructure to be installed as part of the proposed solar farm will be located within the levee which has a height of 2m above natural surface level. Furthermore, the solar

farm is located on the most elevated part of the property, at an approximate height of 188m ASL. The site is therefore not considered to be at risk of being impacted by flood water.

MPSC does not have a requirement for non-habitable structures to be built above the Probable Maximum Flood level. However, the PV modules will be mounted on piers with a minimum height above ground level of at least 800mm. In the unlikely event that the solar-farm infrastructure is affected by a flood event, no safety hazard is posed due to standard protection devices that disable circuits in the event of a fault.

Given that the proposed development will be sited within an existing approved levee structure, there will be no additional adverse impacts on the movement of floodwaters in the locality as a result of the proposal.

5.15 Heritage

5.15.1 European Heritage

No heritage sites are present within the boundaries of the development.

5.16 Indigenous Heritage

The proposed development and subject site were assessed in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW, 2010). In order to follow the guidelines, a due diligence assessment process was undertaken. This process involved the following steps:

- AHIMS Register Search – a search of the AHIMS to ascertain if there are any known sites within or adjacent to the subject area;
- Assessment of Landscape – assess the study area for the presence, nature and level of disturbance of landscape features that may contain heritage sites;
- Desktop Assessment and Visual Inspection – Physically inspect the proposed development site for artefacts or signs of aboriginal presence;
- If any aboriginal objects are located, further assessment required in conjunction with an archaeologist and the Local Aboriginal community representatives; and
- If disturbance to the area is considerable and no presence of aboriginal artefacts or other signs, a standard summary of the work is to be prepared and the development can proceed subject to approvals.

A search of the AHIMS was conducted to identify registered (known) Aboriginal sites or declared Aboriginal places within the subject lot (Lot 2 in Deposited Plan 773266) with a buffer of 200 metres around the lot. The search revealed zero (0) recorded Aboriginal sites, objects or places to have been recorded for the site. A copy of the search results has been included in Appendix 7.

The proposed development site does not contain landscape features such as caves, rock shelters and/or rock overhangs, waterholes and/or wetlands that are considered likely to contain Aboriginal objects. The site has been highly disturbed by native vegetation clearance and the levelling of land for cotton module storage. Remnant woodland and riparian zones in the locality may contain some artefacts, however these areas will not be disturbed by the proposed development.

During the site inspection, traverses carried out on foot across the area to be disturbed by earthworks for the proposal did not identify any objects of aboriginal origin such as artefacts. Give the site's history of disturbance, the proposal is unlikely to disturb any items of heritage significance.

The following presents a summary of the site investigation:

- An AHIMS search did not identify any objects or places of Aboriginal heritage significance within or adjacent to the site;
- Previous agricultural development activities would have affected the integrity of any deposit based archaeological sites within the proposed development site, if they had been present;
- The area to be impacted by the construction of the solar farm has been subjected to clearing and disturbance from vehicles and machinery;
- No cultural features or artefacts were noted within the development site;
- There are no landscape features which are likely to indicate the presence of Aboriginal objects (i.e. waterways or caves); and
- The potential for this site to contain sites of significance involves random scatters of artefacts that may have been dropped or discarded during hunting expeditions or whilst travelling and remains around the base of older trees. No such artefacts were identified, and no mature trees will be disturbed by the proposal.

The conclusion of this investigation is therefore that the likelihood of disturbing sites or objects of aboriginal cultural significance is relatively low on the area identified for the proposed development. It is recommended that the project proceed on the basis that if items or sites of cultural heritage are identified during the work to be undertaken, this work should cease until further investigation is undertaken in accordance with the recommendations of traditional owners. However, appropriate protocols should be adopted on the site. NSW OEH recommend that the following procedure is adopted:

If any Aboriginal object is discovered and/or harmed in, or under the land, while undertaking the proposed development activities, the proponent must:

- *Not further harm the object*
- *Immediately cease all work at the particular location*

- *Secure the area so as to avoid further harm to the Aboriginal object*
- *Notify OEH as soon as possible on 131555, providing any detailed of the Aboriginal object and its location*
- *Not recommence any work at the particular location unless authorised in writing by OEH.*

5.17 Traffic and Access

All project related traffic will utilise the Gwydir Highway to access the site. Traffic will include workers who will be accommodated in Moree, components which will be trucked from either Sydney, Melbourne or Brisbane, and locally sourced construction equipment and materials will come from the surrounding region.

The intended site construction hours are between 7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturday: with no works on Sundays or Public Holidays. The peak hourly traffic volumes are expected in the hour before and after the intended construction hours.

Due to the relatively small scale of the development, total vehicle movements are expected to be modest.

There will be, on average, about eighteen (18) people on site during the ten to twelve (10-12) week construction period. Accommodation will be sourced in Moree and there will be some carpooling when personnel travel to site. Amenities will be available on site and workers will not need to leave during the day. The workforce will generate twenty-eight (28) light-vehicle movements per day, on average fourteen (14) in the morning, and fourteen (14) in the afternoon.

Over the construction period, the development will require around thirty-seven (37) heavy-vehicles to deliver the required material – constituting seventy-four (74) heavy-vehicle movements. Accordingly, over the ten to twelve (10-12) week construction period, the development will require an average of approximately one (1) heavy vehicle movement per day.

No over-mass or over-dimensional vehicle delivery will be required.

Once operational, traffic would be limited to service personnel attending the site, with an average traffic volume of less than 1 light utility vehicle per day.

This volume of traffic is not expected to put any adverse stress on any local road network or traffic flows. Furthermore, no road upgrades or related works are required to accommodate construction traffic.

5.17.1 Access

The development will utilise the existing access to Lot 2 in DP773266, which is located approximately 750m east of the development site. An existing internal access road (bitumen seal and gravel) will then be utilised to provide direct access to the site. The existing property access receives road trains associated with the cotton gin, and the access is therefore considered suitable for the proposed development considering the limited construction timeframe. No driveway or intersection upgrade is proposed as part of this development.

Figures 23 to 25 show the existing property access. Existing sight distances are considered appropriate.



Figure 23: Existing property access from the Gwydir Highway



**Figure 24: Sight Distance – View west along the Gwydir Highway from existing site access.
Sight distance of over 1 kilometer.**



**Figure 25: Sight Distance – View east along the Gwydir Highway from existing site access.
Sight distance of over 500 metres.**

5.17.2 Parking

The site can accommodate sufficient parking and service areas for construction vehicles through as-required arrangements. There is no demand for parking facilities once the site is operational.

5.18 Social and Economic Impacts

5.18.1 Social Impact

The proposal will not have any adverse social impact on Moree Plains Shire. Overall, positive social benefits will result through the developments' support to increasing the efficiencies of local industry and the introduction of innovation.

5.18.2 Economic Impact

Positive economic benefits for the community will result from employment opportunities generated during the construction and operational phase. During the initial planning phase Sundown Pastoral Pty Ltd commissioned local and regional professionals to carry out the land survey and environmental reports. This initial expenditure generates flow on effects through the local economy through income and employment.

It is anticipated that there will be 18 personnel directly involved in construction on site which is expected to take up to 12 weeks. Varying levels of expertise will be required ranging from labourers to qualified electricians and project managers. In addition, personnel will be involved in transport and delivery of materials to the site. Some of this employment is to be sourced locally. This will bring direct economic benefits to the local economy through wages and salaries and indirect benefits through the need for accommodation and sustenance in the area for non-local employees.

Once operational the site will be unmanned, however, one to two personnel will be necessary to carry out maintenance every quarter or as required.

5.18.3 Summary and Positive Impacts

- Once connected to the grid, the proposed solar farm will contribute to the electricity grid in a sustainable manner that reduces greenhouse gas emissions and will assist the transition of our economy from reliance on fossil fuels to renewable sources to decarbonise electricity production;
- The solar farm will assist Commonwealth and NSW Governments to achieve targets and objectives relating to emissions and addressing climate change;
- The solar farm will generate community economic benefits through local employment opportunities during the planning and construction phases as well as limited maintenance and inspection jobs once operational. The development of a solar farm will create a new market for local contractors and expand diversity of income for the land holder; and
- The land surrounding panel arrays can continue to be utilised as a cotton gin during the operation of the solar farm.

5.19 Decommissioning

The solar farm is intended to operate for up to 30 years. A Decommissioning Environmental Management Plan (DEMP) would be submitted to council for approval two (2) years before decommissioning (if that is to occur). In broad principle, if decommissioning rather than upgrading is to occur in the future, the intention would be to remove all solar-farm infrastructure and return the land to agriculture production/prior industrial use.

5.20 Cumulative Impacts

The potential environmental impacts from the establishment and operation of the proposed solar farm have been detailed in their relevant sections throughout this report.

Potential cumulative impacts are those which are generated by the combined impacts on the local environment as a consequence of the project, together with other developments of a similar nature (both existing and proposed). For the purposes of this SoEE, the assessment of

cumulative impacts considers the impacts of existing and proposed solar farm developments in the local area. There are no known existing or proposed solar farms in the locality of the proposal, therefore no cumulative impacts are predicted.

It is noted that there are several cotton gins in the locality of the proposal, and potential cumulative noise and air quality impacts may occur. However, the construction and operation of the proposed development will not result in significant levels of particulate emissions to the existing environment provided mitigation measures (detailed in Section 5.7) are implemented during the construction period. The potential noise impacts associated with the construction and operation of the proposed solar farm are considered minor in comparison with noise levels produced by the operation of a cotton gin, and are therefore not considered to have a significant cumulative impact on the amenity of the locality.

The development will provide beneficial impacts to the environment by providing renewable energy as an alternative to energy sources reliant upon fossil fuels. The development will further contribute to the economy by allowing current on-site operations to increase their efficiency, and by contributing to economic diversification within the Shire.

6 Suitability of Site for Development and Report Summary

- The proposed development involves the construction of a solar farm on Lot 2 DP 773266.
- The site is zoned RU1 Primary Production under the provisions of *Moree Plains Local Environmental Plan 2011* (MPLEP 2011).
- The proposed solar farm has been preferentially sited on a previously cleared and heavily disturbed site that is considered suitable for the redevelopment to a renewable energy precinct.
- The site is rectangular in shape and maintains a total site area of approximately 8.6 hectares.
- Utility services are currently unavailable but are not required.
- The removal of a native Plant Community Type (PCT) is not required to accommodate the proposal.
- As-required vehicle access and parking to the site will be adequate throughout the construction phase and during operation.
- A preliminary contamination assessment concluded the risk of site contamination is assessed to be low and the site is suitable for the proposed development.
- A Traffic Impact Assessment is not required due to the brief and modest expected vehicle requirements.
- The development as proposed is considered to address the requirements of Sustainable Development being a key consideration under the provisions of the *Environmental Planning & Assessment Act 1979*.

6.1 Any submissions made in accordance with this Act or the Regulations

Public participation is addressed under Section 79A of the Environmental Planning and Assessment Act, 1979 for advertised development and other notifiable development. The consent authority must ensure a development application is advertised/notified in accordance with this clause and any relevant environmental planning instrument and/or development control plan.

6.2 Public and Public Authority Submissions

Where necessary for Integrated Development, Council must notify the appropriate authorities of the proposal, under the EP&A Act 1979. General Terms of Approval from notified government authorities should be included in the conditions of consent issued by the Council.

The proposed development is not identified as Integrated Development.

The public's interest will not be compromised by the proposed development and it is understood the application will be appropriately notified in accordance with Clause 4.13 of the *Environmental Planning and Assessment Act 1979*, any relevant environmental planning

instrument and development control plan to ensure the public are notified accordingly and given their right to be heard.

6.3 Justification for Approving the Proposal

The Commonwealth Government has recognised that Australia's reliance on carbon-based fuels is not a viable means of securing energy production into the future and that renewable energy alternatives can play a significant role. These renewable energy alternatives may include solar PV, solar concentrated thermal, geo-thermal and wind.

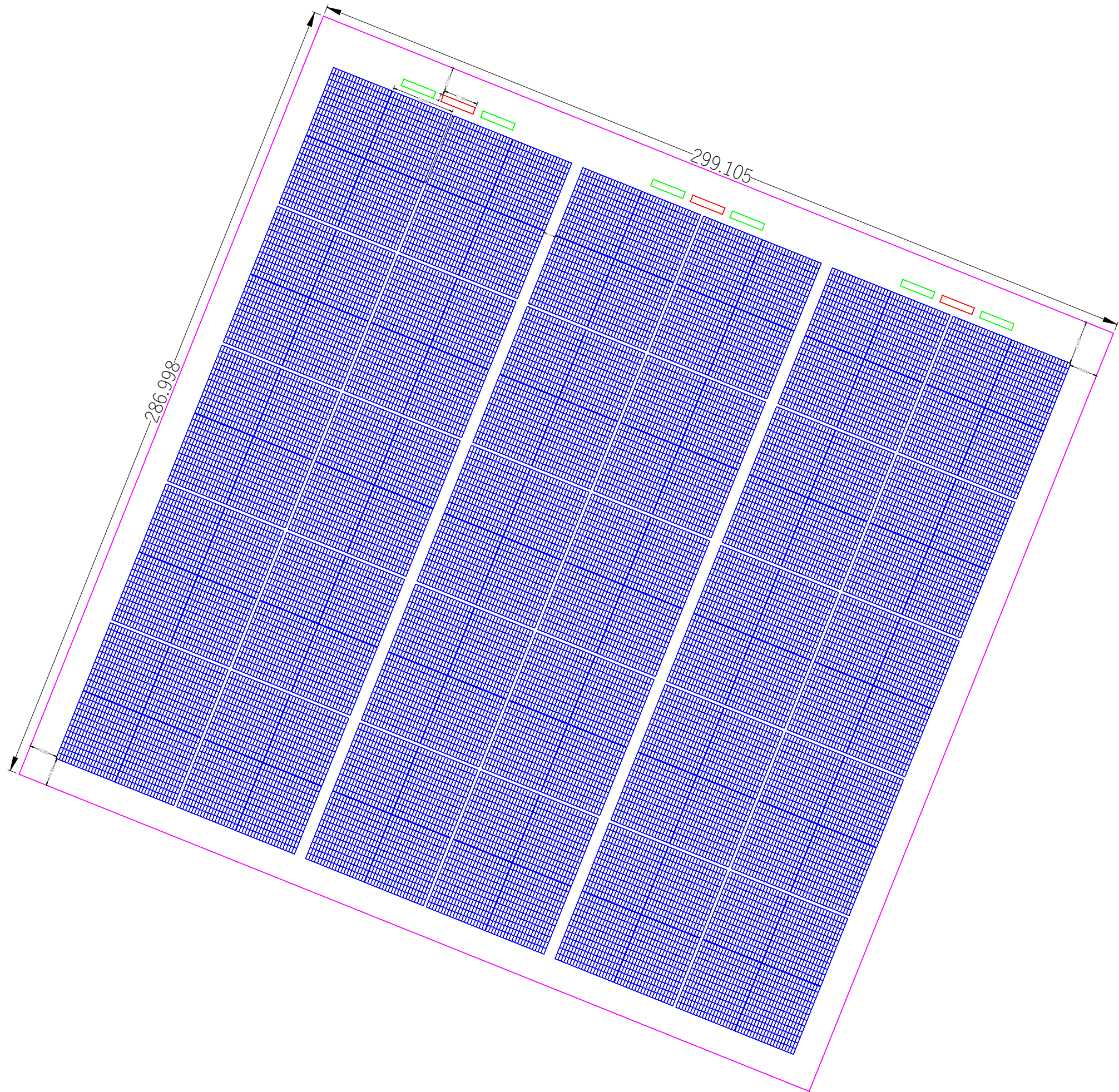
Solar energy is energy created by the heat and light of the sun. Solar power is produced when this energy is converted into electricity or used to heat air, water, or other substances. Australia has the highest average solar radiation per square metre of any continent in the world. The development of solar photovoltaic power is well underway in NSW and across Australia. This growth in the local solar PV sector continues to provide a significant boost for Australia's regional economy with renewable infrastructure development estimated to create upwards of 2,300 direct jobs plus indirect employment.

Renewable electricity generation options including solar PV are already influencing the electricity market. The emergence of battery storage options will become more prevalent in the next decade as technology development improves, opening up the possibility to transition from reliance on centralised electricity generation to distributed energy generation and storage. Private infrastructure projects such as the proposed solar farm are required to provide reliable energy to Australian consumers, while at the same time helping to meet Australia's emission reduction targets.

According to the Australian Renewable Energy Agency (ARENA), the deployment of household solar PV that generates about 5 kW is expected to continue and at the same time an increase in rooftop solar PV installations on commercial premises generating around (10-100 kW) is expected. Large scale solar PV is also rapidly expanding in Australia with several solar farms being constructed that will have the capacity to generate over 100MW. The proposed Wathagar Solar Farm aims to fill the gap in the mid-sized plants. It will generate 4.95MW of AC power and contribute to renewable energy supply to supplement electricity generation from coal, oil and gas and assist to reduce reliance on these unsustainable means of supply.

The proposed development is in accordance with relevant objects of the *Environmental Planning and Assessment Act 1979* in that it will assist to generate power to be distributed to the residents of NSW thereby promoting the social and economic welfare of the community in a manner that manages and conserves natural resources. The Wathagar Solar Farm will further the goals of sustainability, and the orderly and economic use of land. In conclusion, the proposed development will result in minimal environmental or amenity impacts and accordingly justifies a favourable determination by the consent authority.

Appendix 1 – Site Plans



Project: Wathagar Gin
Title: Site Layout

Date: 26 Sep 2021

Drawing: S092021-4

Sheet: 1 of 5

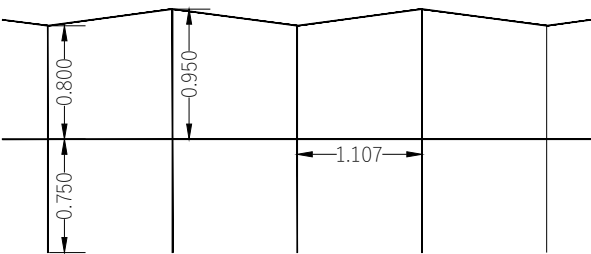
PROJECT DATA

FENCED AREA	8.584ha
DC TRUNK & BUS CABLE	150mm2
STRING LENGTH	24 modules
NO. OF BLOCKS	120
NO. OF PV MODULES	28800
PV MODULE	JAM72S20-MR
INVERTER	2 x Sungrow SC3450
SYSTEM AC RATING	4.95 MW
TRANSFORMER RATING	6.9 MVA

LOCATION

Gwydir Highway
Wathagar NSW
29.5556° S 149.5934° E

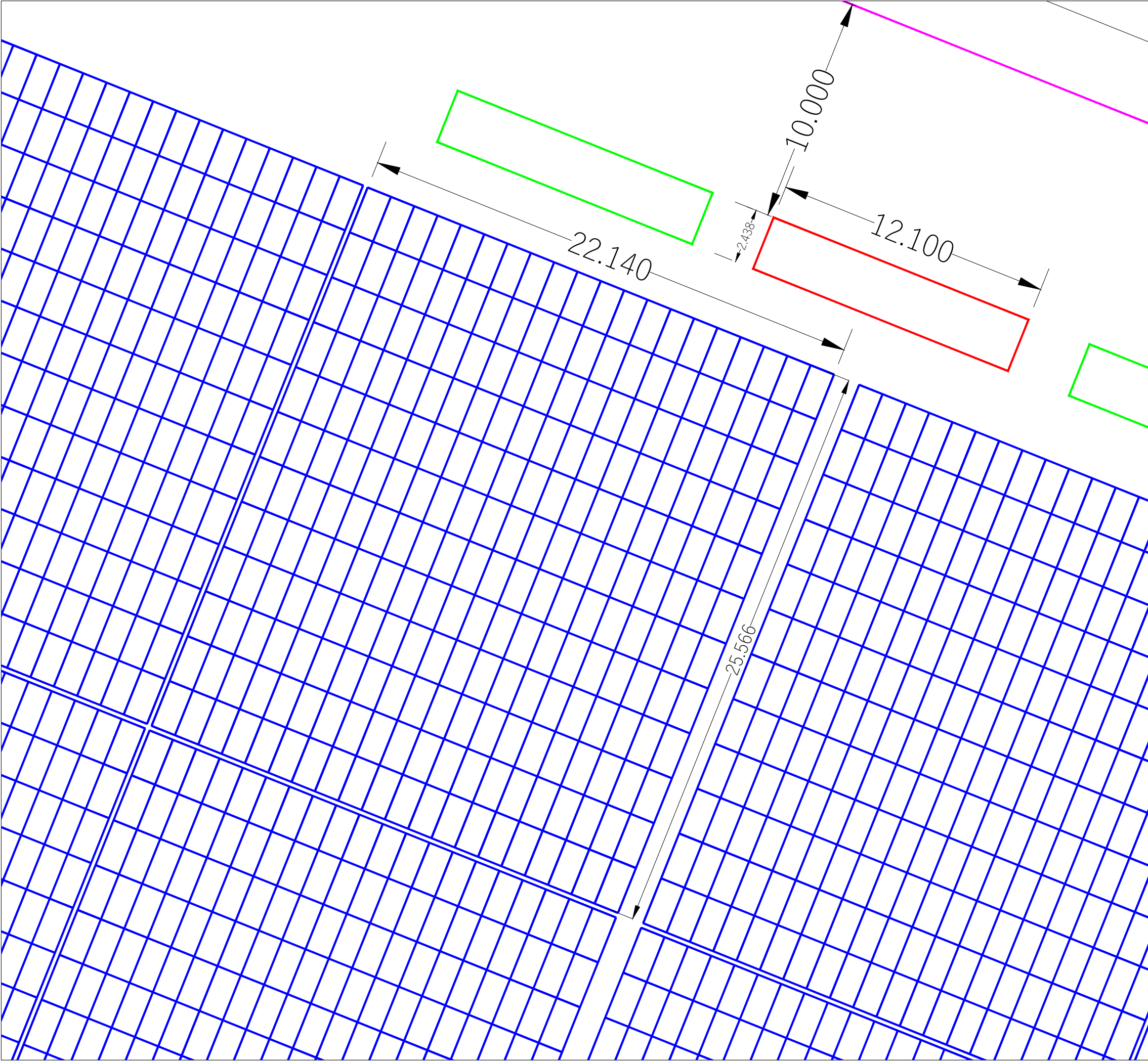
FRONT VIEW



LEGEND

BATTERY STORAGE	LOT BOUNDARY
INVERTER	ROAD
PV MODULES	HV LINE O/H & U/G
FENCE	DC ISO, 4 STR HARNESS

Rev	Description	Drawn	Checked	Date
A	PEG-EW Preliminary Site Layout	RLM		26/09/21



Project: Wathagar Gin
Title: Inverter View

Date: 26 Sep 2021

Drawing: S092021-4

Sheet: 2 of 5

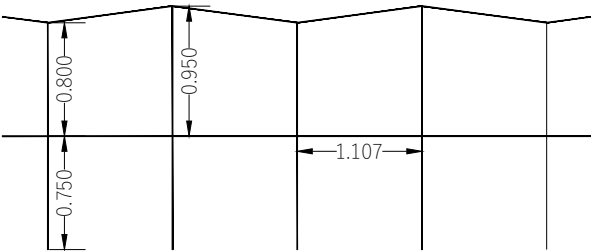
PROJECT DATA

FENCED AREA	8.584ha
DC TRUNK & BUS CABLE	150mm2
STRING LENGTH	24 modules
NO. OF BLOCKS	120
NO. OF PV MODULES	28800
PV MODULE	JAM72S20-MR
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LOCATION

Gwydir Highway
Wathagar NSW
29.5556° S 149.5934° E

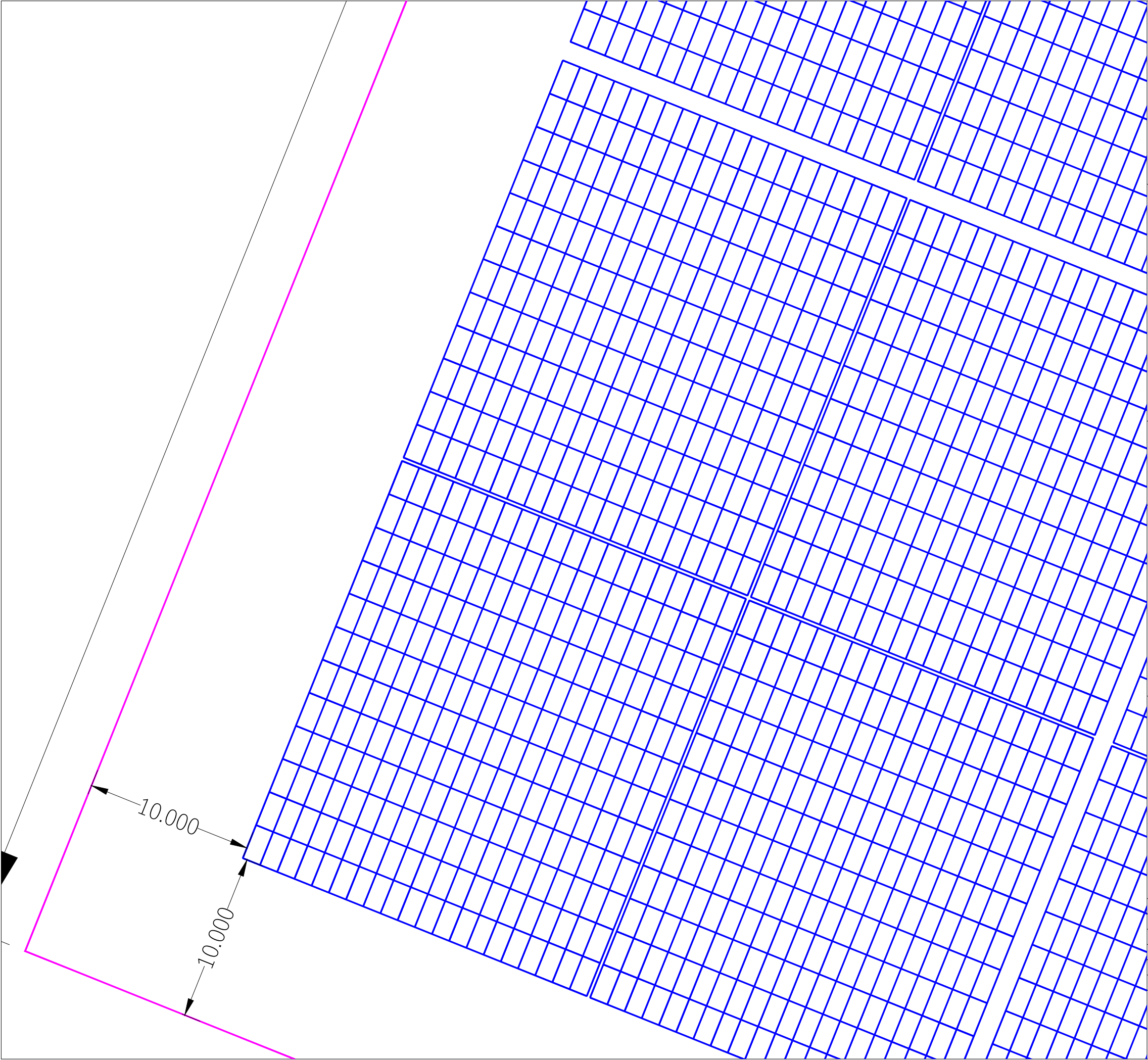
FRONT VIEW



LEGEND

BATTERY STORAGE	LOT BOUNDARY
INVERTER	ROAD
PV MODULES	HV LINE O/H & U/G
FENCE	DC ISO, 4 STR HARNESS

Rev	Description	Drawn	Checked	Date
A	PEG-EW Preliminary Site Layout	RLM		26/09/21



Project: Wathagar Gin
Title: South West Corner

Date: 26 Sep 2021

Drawing: S092021-4

Sheet: 3 of 5

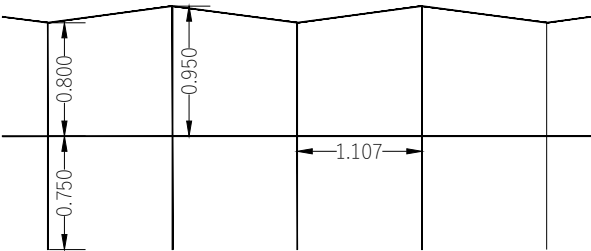
PROJECT DATA

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NO. OF PV MODULES	28800
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INVERTER	2 x Sungrow SC3450
SYSTEM AC RATING	4.95 MW
TRANSFORMER RATING	6.9 MVA

LOCATION

Gwydir Highway
Wathagar NSW
29.5556° S 149.5934° E

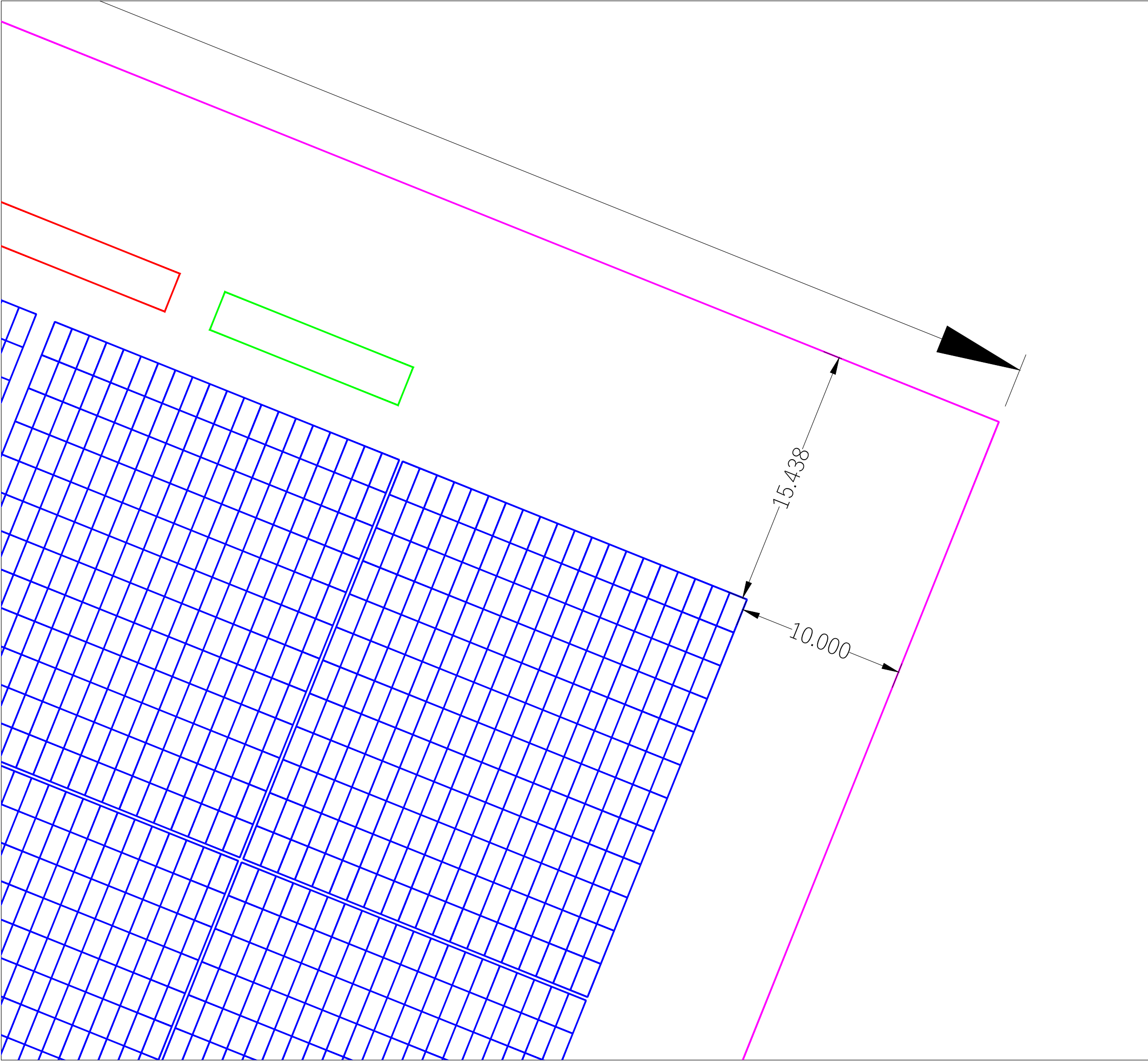
FRONT VIEW



LEGEND

BATTERY STORAGE	LOT BOUNDARY
INVERTER	ROAD
PV MODULES	HV LINE O/H & U/G
FENCE	DC ISO, 4 STR HARNESS

Rev	Description	Drawn	Checked	Date
A	PEG-EW Preliminary Site Layout	RLM		26/09/21



Project: Wathagar Gin
Title: North East Corner

Date: 26 Sep 2021

Drawing: S092021-4

Sheet: 4 of 5

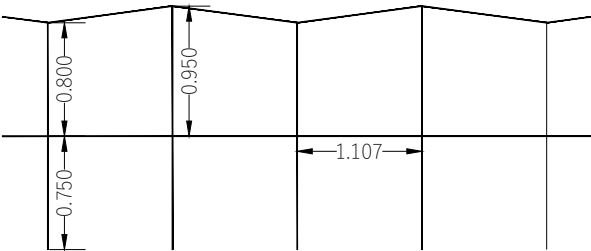
PROJECT DATA

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NO. OF BLOCKS	120
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INVERTER	2 x Sungrow SC3450
SYSTEM AC RATING	4.95 MW
TRANSFORMER RATING	6.9 MVA

LOCATION

Gwydir Highway
Wathagar NSW
29.5556° S 149.5934° E

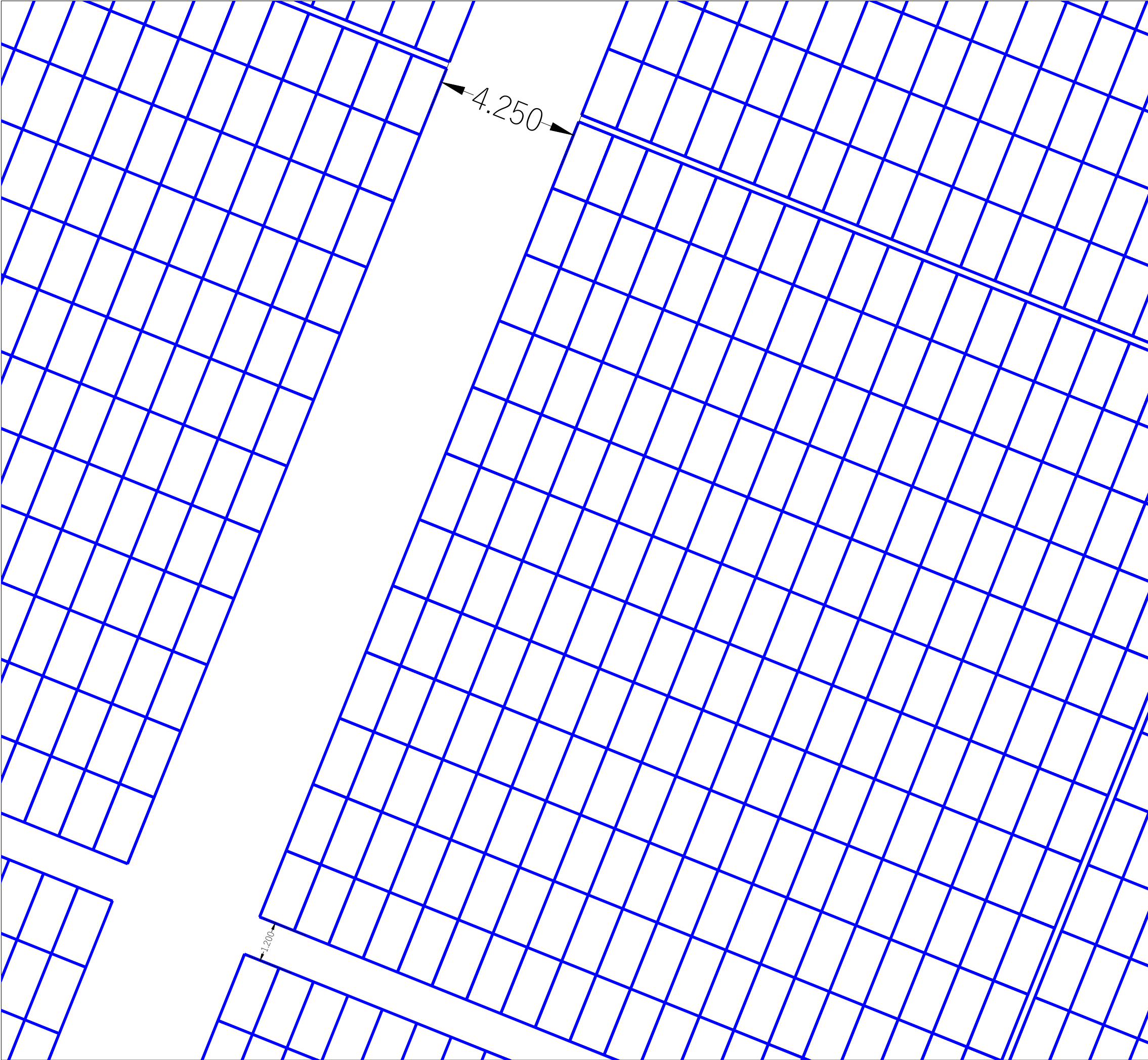
FRONT VIEW



LEGEND

BATTERY STORAGE	LOT BOUNDARY
INVERTER	ROAD
PV MODULES	HV LINE O/H & U/G
FENCE	DC ISO, 4 STR HARNESS

Rev	Description	Drawn	Checked	Date
A	PEG-EW Preliminary Site Layout	RLM		26/09/21



Project: Wathagar Gin

Title: Road

Date: 26 Sep 2021

Drawing: S092021-4

Sheet: 5 of 5

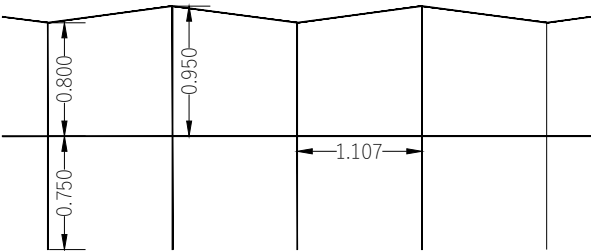
PROJECT DATA

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LOCATION

Gwydir Highway
Wathagar NSW
29.5556° S 149.5934° E

FRONT VIEW



LEGEND

BATTERY STORAGE	LOT BOUNDARY
INVERTER	ROAD
PV MODULES	HV LINE O/H & U/G
FENCE	DC ISO, 4 STR HARNESS

Rev	Description	Drawn	Checked	Date
A	PEG-EW Preliminary Site Layout	RLM		26/09/21

Sundown Pastoral Pty Ltd.

Wathagar Solar Farm
2910 Gwydir Hwy, Wathagar,
NSW 2400

Site Plan

Legend

- Inverters
- Batteries
- PEG
- Substation
- Security Fence
- Gwydir Highway

Google Satellite



0 20 40 60 80 100 m



Scale: 1:1,500 (A3)

Surveyed By: -
Prepared By: Tarrant Moss
Date: 30/09/2021

SMK
CONSULTANTS
surveying - irrigation - environmental

Disclaimer:
The information in this map has been provided in good faith. While all effort has been made to ensure the accuracy and completeness of the information the data providers take no responsibility for any errors or omissions that may occur or losses or damage that may result from the use of this information.

Sundown Pastoral Pty Ltd.
Wathagar Solar Farm
2910 Gwydir Hwy, Wathagar,
NSW 2400

Property Plan

Legend

- Inverters
- Batteries
- PEG
- Substation
- Security Fence
- Gwydir Highway
- Other Structures
- Access Track
- Lot Boundaries
- Google Satellite



0 100 200 300 400 m



Scale: 1:5,000 (A3)

Surveyed By: -
Prepared By: Tarrant Moss
Date: 30/09/2021

SMK
CONSULTANTS
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Appendix 2 – Draft Bushfire Management Plan

Wathagar Solar Farm

2910 Gwydir Highway

Wathagar

New South Wales



Draft Fire Risk Management Plan

REV A 2021

1. Existing Site Conditions

1.1. Location

The Wathagar Solar Farm (WSF) is located in Wathagar, NSW approximately 32 km southwest of Moree, NSW. The site is accessed from the Gwydir Highway and is co-located with the Wathagar Cotton Gin.



1.2. Adjoining Land Use

The land surrounding the site for several kilometres is zoned RU1- Primary Production under the Moree LEP 2011. This land is primarily used for farming, also featuring scattered dwellings, sheds and other agricultural infrastructure.

1.3. Topography

There are very minor variations in elevation across the site. The site can be described as flat in the context of bushfire risk.

1.1. Fire Suppression Assets

The co-located cotton gin has its own fire risk management plan and fire suppression assets adjacent to the solar farm that would be available in an emergency. These include a reticulated water supply, fire reels and hydrants and 120,000L of water stored in tanks.

2. Fire Risk Management

The Rural Fire Service of NSW publication “Planning for Bushfire Protection” (2019) provides specific guidelines for solar farms which are addressed in the following sections.

2.1. Asset Protection Zone

A 10m Asset Protection Zone (APZ) surrounds the structures that comprise the solar farm. The access road to the north of the solar farm where the most critical infrastructure is located, effectively extends the APZ by a further 10m.

2.2. Design

Critical equipment is designed and housed in such a way as to minimise the ingress or egress of fire during an emergency. Key design features are:

- Maintenance of a vegetation free ground surface;
- Mineral mulch surface across the whole site;
- The housings for major electrical equipment are non-combustible;
- The steel structure supporting the PV array is non-combustible; and
- Automatic cooling and fire suppression systems in the battery storage.

2.3. Fire Risk Management - Construction

Key strategies to mitigate fire risk during construction are:

- Adhere to restrictions on Total Fire Ban or days of high fire danger;
- Ensure that appropriate permits have been issued for work during the Fire Danger Period, and that any conditions on permits are adhered to;
- Carry fire extinguishers on pegging trailers and at the storage container;
- Keep to a minimum the storage of fuel or other flammable material. Only quantities that are required for a day (less than 10L of petrol and 20L of diesel) are stored on site. Fuel is kept in jerry cans in a 40 ft service container which only stores tools and other non-flammable materials. When on site, fuels and oils are only used in a well ventilated area outdoors.
- Carry telephones for emergency communications;
- Ensure vehicles keep to tracks whenever possible; and
- Restrict smoking to prescribed areas and provide suitable ash and butt disposal facilities.

2.4. Fire Risk Management - Operations Phase

Fire risk management is addressed during the operations phase in accordance with Table 1:

Table 1 - Fire Risk Management Strategies

Clearances	The 22kV network has good clearances, being largely surrounded by bare earth with abundant effective fire breaks. Wherever possible, HV cabling is underground. Where there are overhead electrical lines, vegetation is managed in accordance with the ISSC3 Guideline for Managing Vegetation Near Power Lines.
Levee Bank	The levee bank protecting the solar farm is up to 2m high and 4.5m wide.
Asset Protection Zones	The Asset Protection Zones around the solar farm are maintained free of vegetation.
Lightweight construction materials	The construction materials used at the site are lightweight materials with low combustion potential, such as metal and glass.
Access	The solar farm has highway access and a driveway unobstructed by trees or buildings. Tracks around the solar farm are straight and permit the carriage of firefighting appliances and two-wheel drive vehicles.
Fire extinguishers	CO ₂ and ABE fire extinguishers are installed and serviced by an appropriately qualified vendor. Fire extinguishers are located at the inverter and battery stations. Fire extinguishers are inspected and serviced at regular intervals.
Warning signs	Warning and operational signs located around the facility are checked periodically for signs of deterioration or damage.
Waste Disposal	Waste is disposed of correctly to ensure that no combustible materials are left on site.
Fuel management	The ground surface is covered with crusher dust. Routine and remedial inspection and treatment tasks is employed to manage the growth of vegetation. The ground below the PV modules is maintained vegetation free to negate ignition risk from electrical shorts.
Slope	The land upon which the electrical assets are located, and the surrounding terrain is unaffected by any significant slope.
Water Supply	The solar farm has access to a reticulated water supply with fire hydrants and fire reels that service the co-located cotton gin.
High Risk Activities	Smoking is prohibited on site. Total fire bans will be observed when scheduling any high-risk work. Vehicles are not to be driven through any grassland outside the site.

2.5. Fire Prevention

Prevention measures reduce the potential for fires to ignite on the site and to also reduce the impact of a fire impacting on the site from elsewhere. Good housekeeping is required in all work areas to prevent fires occurring (i.e. removing rubbish, removing oils and greases from surfaces, using and storing welding and cutting equipment and flammable liquids properly). All visitors to site must understand the location and use of all firefighting equipment and must know fire assembly points and evacuation procedures.

2.6. Fire-Fighting and Fire Suppression Equipment

Fire-fighting equipment is available at the site and is regularly serviced. The use of fire extinguishers for any other purpose than to fight a fire is strictly prohibited. The use of fire-fighting equipment must be reported to the supervisor immediately. Used extinguishers must be returned for filling and servicing immediately, regardless of whether the extinguisher is empty.

2.7. Access

Access to the site from the Gwydir Highway currently accommodates road trains and is therefore able to accommodate fire fighting appliances.

2.8. Fire Fighting and Bushfire Response Procedures

There are two choices in response to the impending threat of fire, and they are to stay and defend or evacuate.

2.8.1. Evacuation

Protection of human life is the most important consideration in the event of a fire emergency. For this reason, evacuation is always the preferred response where there is time to do so and the route is clear.

Evacuation always starts with gathering at the designated emergency assembly area. The supervisor will provide further evacuation instructions. Evacuation routes are via the main entrance and then travelling east to Moree, or west to Bullarah and Collarenebri along the Gwydir Highway.

2.8.2. Shelter in place and protect the facility

Given the characteristics of the surrounding land, the most likely fire threat is a fast-moving grass fire approaching from the south and west. In this situation, it may be unsafe to evacuate and a decision may be made to protect the facility and shelter in place.

The following procedures are to be followed during any fire-fighting activities:

- Only attempt to extinguish a fire if it is safe to do so.
- If there is a chance of chemicals or explosives being involved in the fire, evacuate the area.
- Do not aim the extinguisher or hose output nozzle at the centre of the fire as it may only serve to spread it. Work from the near edge and, with a sweeping motion, drive the fire to the far edge.

- Do not stand downwind of a fire - the smoke and flames can be dangerous. Machinery fires burn with great intensity. The air downwind may be superheated and could cause damage to lung tissue.

2.9. Training

During construction, the following toolbox talks and training should be undertaken on a regular basis or as required:

- Induction programs should address firefighting and bushfire response procedures and the location and use of firefighting equipment; and
- Fostering of basic bushfire awareness, particularly calling attention to the manner in which fire behaviour is affected by weather conditions.

2.10. Bushfire Danger Periods

During a bush fire danger period, the Solar Farm will notify the local NSW RFS Fire Control Centre in Moree (02 6752 2452) about any works that have the potential to ignite surrounding vegetation, and to confirm that weather conditions are appropriate.

No stored materials of any kind should obstruct the fire break areas.

2.11. Total Fire Bans

The Total Fire Ban Rules issued by the NSW Rural Fire Service will be adhered to. These are published at www.rfs.nsw.gov.au.

2.12. Bushfire Mitigation – Site Features

Table 2 - Bushfire Mitigation (Site Features)

	North	East	South	West
Vegetation structure	Cropland and Commercial Infrastructure	Cropland	Scattered trees Grassland	Cropland
Hazard slope	0 degrees	0 degrees	0 degrees	0 degrees
Asset protection zone	>10m	10m	10m	10m
Significant environmental features	Levee bank Commercial Infrastructure	Levee bank Commercial Infrastructure	Levee bank Mehi River tributary	Levee bank Commercial infrastructure
Bushfire attack level	Low	Low	Low	Low

2.13. Hazards specific to electricity-related fire

When considering fire risk, the key components of the site are:

- PV arrays
- Battery storage stations
- The inverter stations (with a transformer delivering energy at 22,000 V AC)
- Private pole and wires connecting to the Essential Energy network (carrying 22,000 V AC)

2.13.1. PV Arrays

The PV arrays operate at low voltage (1500 V). The predominant risk with the low-voltage component of the site is electrical arcing resulting from the misdirected flow of DC current which may cause a localised power discharge. Any potential fire risk because of DC arcing will as such be located directly around the PV array infrastructure. A wide exclusion zone exists around the PV array with no vegetation growth, and vegetation is eliminated under the PV arrays through herbicide application.

2.13.2. Batteries

The batteries operate at low voltage (1500 V). Similar comments apply as for the PV array (above). Additionally, the batteries themselves can potentially overheat and catch fire. They are enclosed in a fire-resistant housing and have automatic cooling and fire suppression systems that comply with international safety standards. The APZ extends >10m from the battery storage location.

2.13.3. Inverters

The inverter stations could potentially lead to a fire hazard in the event of a short-circuit that ignites flammable oil inside the transformer. There is a vegetation exclusion zone in all directions around the inverter stations for at least 10m, covered in crushed rock and gravel.

The vegetation exclusion zones prevent a fire from reaching any flammable material. Clearly marked firefighting equipment is also placed in several locations around the site and substations to assist in controlling any fire that breaks out.

2.13.4. Overhead Poles and Wires

Any collapse in the overhead HV electrical distribution infrastructure (i.e. the poles and wires) could also present a fire risk. This electrical infrastructure is in good condition and is designed to last for decades, so is unlikely to collapse spontaneously.

There is more than 100m separating any vehicular access from electricity poles carrying overhead wires. The risk of a vehicle colliding with a power pole and bringing it down is therefore very remote.

In the event of an HV line collapse triggered by an extreme weather event, the management of vegetation within the vicinity of the infrastructure reduces opportunities for a downed pole to be a source of ignition. In accordance with the vegetation management program, steps are regularly taken

to monitor and mitigate vegetation growth near any potentially hazardous assets, including the transmission infrastructure.

There is no auto-reclose functionality at this site, so if a fault is detected on the network or on Essential Energy's grid which trips an HV circuit breaker, the fault will be investigated before the circuit breaker is closed manually.

2.14. Bushfire Risk Management and the Private HV Network

According to the New South Wales Rural Fire Service, the land on which the solar farm is located is classified as bushfire prone. During the operations phase, the Wathagar Solar Farm will undertake an annual risk assessment in relation to bushfire. Any defects found upon inspection must be rectified at the earliest opportunity.

The electrical assets pose a low potential bushfire ignition risk, based on the following key factors:

- Combustible materials on site are extremely limited. The ground surface of the asset protection zone is mineral earth/mulch (crusher dust), maintained in a vegetation-free state, the array framing is made of steel and other components are fire resistant.
- There is no problematic vegetation in the vicinity of WSF's 22kV network.
- Being located on a floodplain, the land upon which the electrical assets are located, and the surrounding terrain is unaffected by any significant slope.
- The solar farm is also enclosed by a levee bank, which provides a further buffer.
- WSF will have a Vegetation Management Plan involving routine and remedial inspection and treatment tasks.
- WSF will have an Operations and Maintenance Program which involves routine and remedial inspection and maintenance tasks, including the fire extinguishers which are located at high risk areas around the plant.

3. Bushfire risk assessment and management

An assessment of the potential risks in relation to bushfire at the site is set out below:

Table 3 - Bushfire Risk Assessment and Management

Risk	Impact	Initial risk rating	Risk management strategies	Residual risk
Power infrastructure collapses due to natural events	<p>Private electrical infrastructure connected to Essential Energy assets fall or collapse.</p> <ul style="list-style-type: none"> - Could occur during a storm or other extreme weather event - Contact of live electrical assets with vegetation may cause fire - Considering the relevant infrastructure is designed as per Australian and Essential Energy standards to last decades, this would only occur in exceptional circumstances 	<p>Consequence: Severe</p> <p>Likelihood: Rare</p> <p>Risk rating: Medium</p>	<p>Vegetation growth will be restricted under the arrays and around the solar farm:</p> <ul style="list-style-type: none"> - Monitor Vegetation growth as part of the Operations and Maintenance Plan and Vegetation Management Plan. - Mitigate vegetation growth as necessary to comply with the ISSC3, including through mowing, tree removal and herbicide use 	<p>Consequence: Moderate</p> <p>Likelihood: Rare</p> <p>Risk rating: Low</p>
Power infrastructure collapses due to collision (especially with a vehicle)	<p>Private electrical infrastructure connected to Essential Energy assets fall or collapse due to collision with an external object</p> <ul style="list-style-type: none"> - Contact of live electrical assets with vegetation may potentially cause fire 	<p>Consequence: Severe</p> <p>Likelihood: Rare</p> <p>Risk rating: Medium</p>	<p>Vegetation growth will be restricted under the arrays and around the solar farm in accordance with the ISSC3</p> <p>The steel fence and levee around the site reduces the likelihood of vehicle collisions</p> <p>All operations on the site involving earth moving equipment, vehicles, slashers, and hot works are to be in accordance with RFS directives.</p>	<p>Consequence: Minor</p> <p>Likelihood: Rare</p> <p>Risk rating: Low</p>

Risk	Impact	Initial risk rating	Risk management strategies	Residual risk
Catastrophic failure of electrical equipment – general, including pole / wire failure due to ineffective maintenance program	High voltage equipment fails, in the worst case resulting in explosion or fire	<p>Consequence: Severe</p> <p>Likelihood: Rare</p> <p>Risk rating: Medium</p>	<p>A wide (>10m) vegetation management and exclusion zone is applied around the inverter stations, reducing the likelihood any fire within the site will come into contact with flammable material.</p> <p>Operations and Maintenance Plan is to be followed to ensure the integrity and safe operation of all electrical equipment through regular inspection and maintenance.</p> <p>Firefighting equipment is placed around the site in relevant locations.</p> <p>Protection systems are in place to avoid faults, including Connection Point Circuit Breakers, Generator Circuit Breakers and Inverter Energy Systems.</p> <p>Incident reporting is undertaken in the event of a failure to mitigate any future failures.</p>	<p>Consequence: Moderate</p> <p>Likelihood: Rare</p> <p>Risk rating: Low</p>

Risk	Impact	Initial risk rating	Risk management strategies	Residual risk
Ignition of transformer oil in the Inverter Station	Transformer in inverter stations short circuit, igniting flammable oil in transformers	Consequence: Severe Likelihood: Rare Risk rating: Medium	A wide (>10m) vegetation management and exclusion zone is applied around the inverter stations, reducing the likelihood any fire within the site will come into contact with flammable material. Firefighting equipment is placed around the site in relevant locations.	Consequence: Moderate Likelihood: Rare Risk rating: Low
Electrical fault leading to overheating in the Battery Energy Storage System (BESS)	Fire in the BESS	Consequence: Severe Likelihood: Rare Risk rating: Medium	In built cooling system and in built fire suppression system is installed in the battery storage containers. Protection systems will shut down the device in the event of overtemperature and failure of the cooling system.	Consequence: Moderate Likelihood: Rare Risk rating: Low
Electrical arcs forming in the DC portion of the site	DC current flowing from PV arrays causes electrical arcing	Consequence: Moderate Likelihood: Rare Risk rating: Low	The entire array field is covered in mineral mulch and kept weed-free. In addition, a wide exclusion zone is applied around the array and substations, reducing the likelihood any fire within the site will encounter flammable material. Vegetation growth (predominantly weeds) will be restricted under the arrays through the application of herbicides	Consequence: Minor Likelihood: Rare Risk rating: Low

4. Key to Risk Assessment Matrices

4.1. Likelihood of risks

Category	Example of Qualitative Measures
Almost Certain	The event is expected to occur in most circumstances
Likely	The event will probably occur in most circumstances
Possible	The event might occur at some time
Unlikely	The event is not expected to occur in most circumstances
Rare	The event will only occur in exceptional circumstances

4.2. Risk rating

		Consequences				
		Insignificant	Minor	Moderate	Major	Severe
Likelihood	Almost Certain	Medium	High	High	Extreme	Extreme
	Likely	Medium	Medium	High	High	Extreme
	Possible	Low	Medium	Medium	High	High
	Unlikely	Low	Low	Medium	Medium	High
	Rare	Low	Low	Low	Medium	Medium

4.4. Guide to consequence in risk rating

Description	Financial Impact	Safety	Business Interruption	Corporate Objectives
Insignificant	Minimal financial loss; Less than \$30,000	No or only minor personal injury; First Aid needed but no days lost	Negligible; Critical systems unavailable for less than one hour	Resolved in day-to-day management
Minor	\$30,000 to \$100,000	Minor injury; Medical treatment & some days lost	Inconvenient; Critical systems unavailable for less than one day	Minor impact
Moderate	\$100,000 to \$300,000	Injury; Possible hospitalisation & numerous days lost	Critical systems unavailable for less than 3 days	Significant impact
Major	\$300,000 to \$1M	Long-term impairment or disability, long-term illness or multiple serious injuries Any notifiable incident; Investigation by regulatory authorities	Critical systems unavailable for 7 days or more or a series of prolonged outages	Major impact
Severe	Above \$1M	Fatality(ies) or permanent disability or ill-health	Long-term cessation of core activities	Disastrous impact

Appendix 3 – SEPP 55 – Preliminary Site Investigation

Contamination Assessment

SEPP 55 - Preliminary Site Investigation

Introduction

The scope of this assessment involves a contamination assessment for the proposed construction and operation of a solar farm on Lot 2 in Deposited Plan 773266, off the Gwydir Highway in the Moree Plains Shire.

The proposal for the investigation was to initially carry out a 'Preliminary Site Investigation' to determine if any contamination existed on the subject site. If contamination was found to exist at a level that was considered unsuitable for the intended land use, the study should include recommendations for remediation and validation of the site to ensure the site is acceptable if the proposal is approved.

The proposed development site is zoned as RU1 – Primary Production and the proposed use is the construction and operation of a solar farm. Aside from minor earthworks for the construction of the solar farm, the contact with soil on site is limited as a permanent fence is to be constructed around the site. Other potential risks associated with surface spillage of hazardous compounds would include contamination from raised dust during dry conditions and workers during any demolition or reconstruction work on the site.

Past and Present Potentially Contaminating Activities

The subject site has been previously utilised for cultivation, grazing and, in more recent years, the storage of cotton modules. The remainder of the property is used for the operation of a cotton gin, including the storage of cotton modules and cultivation over a small area in the east of the property. The eastern section of the property also supports some native woodland vegetation to the east of the access road.

The site is located in a rural primary production zone to the south-west of the town of Moree. The site has been subject to extensive clearing for agriculture and grazing. More recently the site has been used for the storage of cotton modules as part of the operation of the cotton gin on the property. Historical and anecdotal evidence indicates that the site has not been used for indiscriminate disposal of waste or other potentially hazardous materials or dip sites.

Potential Contamination Types

Some chemicals such as herbicides are typically utilised as part of normal farming practices, such as cultivation, which was historically carried out on-site. These chemicals are generally unstable and biodegrade. If present, the current concentration of these potential residues would be low. The site has most recently been used for the storage of cotton modules, which

would not involve the use of chemicals or other materials which would potentially cause contamination.

Site Condition and Adjoining Land Use

The subject site has been extensively cleared with no remnant vegetation remaining, however given that the site has been fallow for several years, some groundcover and low shrubs have recolonised the site. The area has been historically utilised for grazing, cultivation and the storage of cotton modules. The surrounding land on the property has been similarly utilised for agricultural purposes, including cultivation, and commercial purposes, i.e. the operation of a cotton gin.

Surrounding properties are similarly extensively cleared and have been developed for farming, primarily cultivation. Crown Land present to the south of the subject site (directly adjacent to the Gwydir Highway) supports some areas of native open woodland, and the Mehi River and its riparian vegetation corridor are present further south, approximately 1.4km away from the subject site. No industries of concern are located within a potential contaminating range of the subject land.

Assessment of Site Contamination

The site investigation indicated that the property has been utilised for mainly cultivation, grazing and the operation of a cotton gin. Some chemicals such as pesticides and herbicides are utilised as part of normal farming and cotton processing practices on land in the vicinity of the proposed development area, and would also have historically been utilised on the subject land. Minor residues of these chemicals may remain in soil for a period of 12-18 months after application. Some of these residues tend to remain bound in the soil or biodegrade over time. The site has not been left fallow for several years, as indicated by the Applicant and evidenced by the presence of shrubs with a height of up to 4m-5m on site, such that the risk of chemicals being present in soil within the subject site is not cause for concern.

No spillage points were noted on the site that would produce concerning levels of these residues that may impact on the proposed land use or present a risk to the adjoining land, including local flora and fauna. No dip sites or historical dip or sheep spray yards were noted on the property.

In conclusion, the contamination that may be present on the land is considered as minor. The potential for impact on the local populace or the environment of low-level soil residues is considered minor.

On this basis, the results of this assessment indicate that contamination issues on the site should not impact the potential to construct and operate a solar farm.

Further Investigation Requirements

The investigation of the site has been carried out in accordance with the requirements of SEPP 55 and Guidelines published by the Environment Protection Authority. As a result of the preliminary contamination assessment, SMK Consultants have concluded that the presence of any potential contamination residue would not impact on the proposed development of a solar farm, as it is not considered a sensitive land use. Accordingly, no further investigation is required. If contamination or suspected contaminants are encountered on the site during the proposed works, it is recommended that the site should be appropriately restricted and advice sought from a suitably qualified and experienced consultant/supervisor to assess the material to determine appropriate action for its management and removal prior to any further work on the site.

Appendix 4 – CASA Correspondence

Marie@smk.com.au

From: Airspace Protection <Airspace.Protection@casa.gov.au>
Sent: Tuesday, 28 September 2021 3:28 PM
To: Marie@smk.com.au
Cc: 'Emma Mailler'; Airspace Protection
Subject: RE: Consultation re Proposed Solar Farm - Lot 2 in DP773266 [SEC=OFFICIAL]

Follow Up Flag: Follow up
Flag Status: Flagged

OFFICIAL

Good afternoon Marie,

Apologies for the delay in response. CASA assesses solar farm installations in line with the United States FAA guidelines. These guidelines recently changed. We no longer assess approach paths to and from airports, concentrating our concerns on impact to Air Traffic Control towers. As Moree does not have an ATC tower, CASA has no concerns and no objections regarding this proposal.

Regards

Matt

Matthew Windebank
Aerodrome Engineer | Aerodrome Developments and Airspace Protection
Air Navigation, Airspace & Aerodromes Branch
CASA Aviation Group
p: (02) 6217 1183 **m:** 0477 741 186
e: matthew.windebank@casa.gov.au



From: Marie@smk.com.au <Marie@smk.com.au>
Sent: Wednesday, 22 September 2021 7:39 PM
To: Windebank, Matthew <Matthew.Windebank@casa.gov.au>
Cc: 'Emma Mailler' <emma@kinelli.com.au>
Subject: Consultation re Proposed Solar Farm - Lot 2 in DP773266

Hi Matthew,

We are applying for development approval for a 4.95MW solar farm in northern NSW, about 26km south-west of the town of Moree and its airport. The proposal is located on Lot 2 in DP773266, off the Gwydir Highway.

As part of the development approvals process, we are required to consult with CASA to confirm there is no issue from your perspective. The attached shows the proposed development site location in relationship to the Moree township and Airport as well as a simple design layout. The detailed design may change slightly but will essentially be as is displayed within the attachments, that is, a fixed array oriented north with an 8 degree tilt off the horizontal plane.

Given the relatively small size of the development, we envisage no issue with respect to pilot safety.

If there is anything further you require to assist, please do not hesitate to give me a call on 0421 659 017. Thank you.

Kind regards,

Marie Duffy B.Sc. Hons, M.Sc.
Environmental and Resources Consultant
SMK CONSULTANTS
39 Frome Street | PO BOX 774
Moree NSW 2400
T 02 6752 1021 | F 02 6752 5070
marie@smk.com.au | www.smk.com.au

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Appendix 5 – Flood Work Approval

Information about a property

Use this tool to search a particular parcel of land to see if a [water licence](#) issued under the *Water Act 1912* or an [approval](#) issued under the *Water Management Act 2000* benefits the specified land.

[Water access licences](#) issued under the *Water Management Act 2000* are fully separated from land title and thus this search tool cannot be used to search for water access licences.

Note: Search by land reference may not return all licences that apply to a particular lot due to inaccuracies in land referencing information in WaterNSW's licence database. Land referencing information is currently in the process of being verified.

Search for either:

☐ [Water licences that benefit a specific land reference \(lot/DP\)](#)

☒ **Approvals that benefit a specific land reference (lot/DP)**

Plan (required)

DP ▼ 773266

Lot Number

2

Section Number

Notes:

The search results will list the conditions imposed on the approval and also list the number/s of any water access licence/s that nominate the water supply works associated with the approval.

Properties supplied water by approved works on adjacent properties under [basic landholder rights](#) will not be identified by this search. Also, this search tool does not include information about [controlled activity approvals](#). Information publicly available from a register of controlled activity approvals is available at our [local offices](#).

◀◀ Previous Search

Print Export

Search Results

◀◀ ◀ 1 to 1 of 1 rows ▶ ▶▶

Approval	Issue Date	Expiry Date	Kind of Approval	Water Source or Floodplain Management Plan or Land Declared to be a FloodPlain	Water Management Zone	Status
90FW833508	21-SEP-2015	24-DEC-2027	Flood Work Approval	Floodplain Management Plan For The Gwydir Valley Floodplain 2016		Current
Kind of Approval			Issue Date	Expiry Date	Approval Number	Status
Flood Work Approval			21-SEP-2015	24-DEC-2027	90FW833508	Current
Work Type	Description	Diameter	Status	Floodplain Management Plan or Land Declared to be Floodplain	Location (Lot/DP)	
Structures	Levee	NA	Active	Floodplain Management Plan For The Gwydir Valley Floodplain 2016	Lot 2, DP 773266	
- Conditions						
Plan Conditions						
NIL						
Other Conditions						
Water management works						
DK2631-00001	The location and specifications of the flood work authorised by this approval, as shown on the approved plan, must not be altered. A copy of the plan is held by the relevant licensor.					
DK2633-00001	The flood work authorised by this approval must be constructed and maintained in a way that will: A. ensure the work's safe construction and operation, and B. prevent the possibility of damage being caused by the work, or resulting from the work, to any public or private interest.					

Disclaimer: WaterNSW is making the information available on the understanding that it does not warrant that the information is suitable for any intended use. In using the information supplied, the user acknowledges that they are responsible for any deductions or conclusions arrived at from interpretation of the data.

Privacy: The information provided is limited to meet the requirements of section 57 of the *Privacy and Personal Information Act 1998*.

Exporting and printing: Search results show a maximum of 50 rows per page. Search results can only be printed page by page.

More information: Should you require further information or technical assistance, please submit your request to water.enquiries@waternsw.com.au or contact 1300 662 077

Appendix 6 – Aboriginal Heritage Information Management System Search Results

SMK Consultants Pty Ltd - Moree

Date: 23 September 2021

P O Box 774

Moree New South Wales 2400

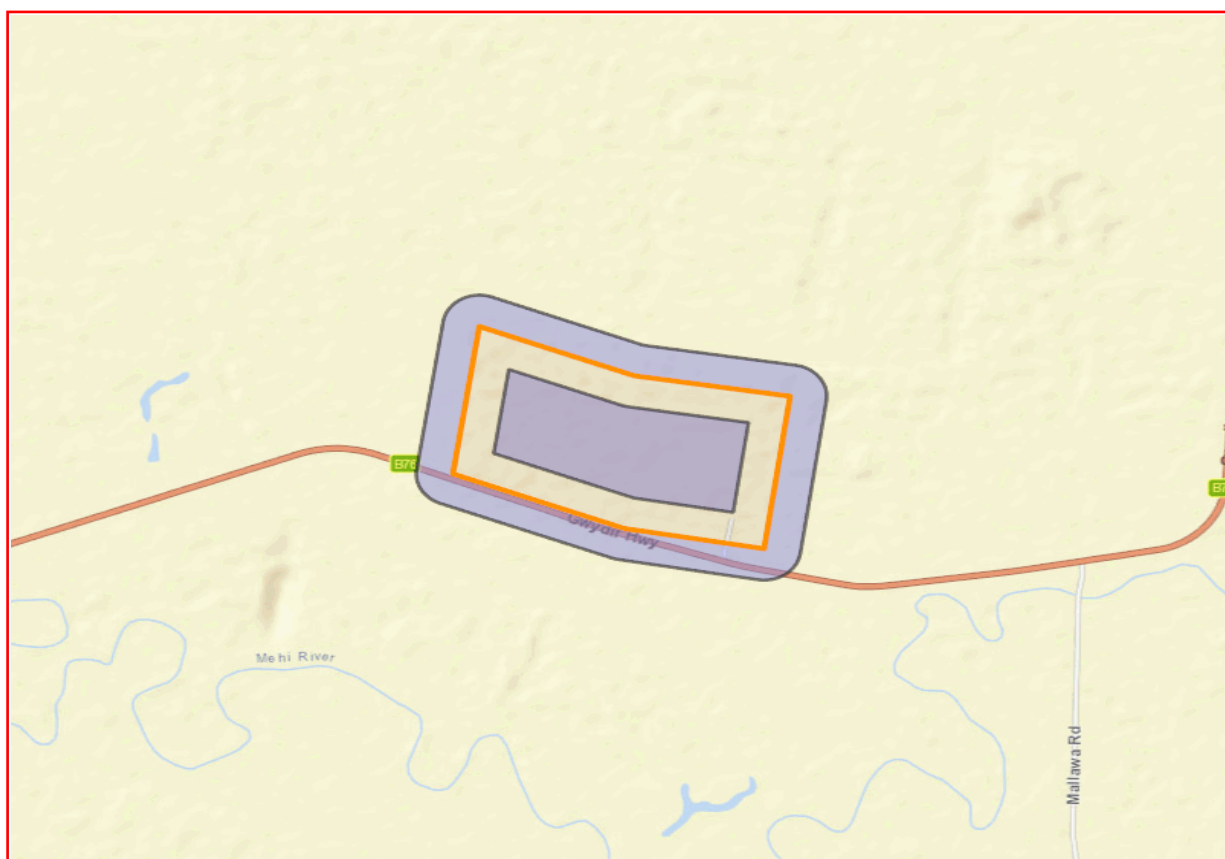
Attention: Marie Duffy

Email: marie@smk.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 2, DP:DP773266, Section : - with a Buffer of 200 meters, conducted by Marie Duffy on 23 September 2021.

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



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

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

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the [NSW Government Gazette \(https://www.legislation.nsw.gov.au/gazette\)](https://www.legislation.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Heritage NSW upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Heritage NSW and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

Appendix 7 – Biodiversity Act 2016 – Test of Significance

Introduction

Endangered Ecological Communities and threatened species that have the potential to be impacted by the proposed road upgrade have been assessed under the guidelines of Section 7.3 of the *Biodiversity Conservation Act 2016* and this is provided below in the form of a Test of Significance. The Test of Significance includes the assessment of the development against five parameters to determine whether there is likely to be a significant effect on the threatened species recorded at or likely to occur at the site. The assessment has been conducted in accordance with the Threatened Species Test of Significance Guidelines (OEH 2018).

The proposed development involves the construction of a solar farm within the Moree Plains Shire local government area. The subject site is located in Lot 2 on Deposited Plan 773266, approximately 30 kilometres south-west of the township of Moree. The site is zoned for rural (primary production) use.

The subject site has been historically cleared and disturbed as a result of previous agricultural activities on the site. The site is not currently utilised, however it has been utilised for the storage of cotton modules in recent years and, if development consent for the solar farm is not obtained, the site would be reconditioned for the storage of modules in anticipation of a high yield this year. The development footprint will cover approximately 7.2 hectares and is restricted to land which has been previously disturbed.

The works will involve the minor clearing of groundcover and shrubs to facilitate construction, allowing for site establishment activities. Site establishment activities include levelling of the site, perimeter fencing, formation of internal roads and the installation of erosion and sediment controls. The proposal will require minor grading to provide a level surface for the installation of the solar arrays.

The development, once operational, will not pose an environmental risk to the locality as it will not act as a source of pollutants. A weed management program will be implemented, such that the site does not become a source of weed populations which may propagate out from the development site. Overall, the development is not predicted to interfere with habitat values adjacent to the subject site.

The vegetation within the proposed subject site is limited to a few shrubs and groundlayer vegetation dominated by Field Mustard, a non-native species, in particular. Other native and naturalised species are also present, including Black Roly-poly (*Sclerolaena muricata*), Windmill Grass (*Chloris truncata*), Bluegrass (*Dicanthium setosum*), Slender-fruited Saltbush (*Atriplex leptocarpa*), Fairy Grass (*Sporolobus caroli*), Rhodes Grass (*Chloris gayana*), Nardoo (*Marsilea drummondii*), Enadia sp., Golden Lily (*Bulbine bulbosa*), Common Storksbill (*Erodium cicutarium*) and Common Vervain (*Verbena officinalis*). Weeds present include

Fleabane (*Erigeron bonariensis*), *Asteraceae* sp., African Boxthorn (*Lycium ferocissimum*), Noogoora Burr (*Xanthium occidentale*), Common Mallow (*Malva neglecta*).

The remnant vegetation to the east and south of the subject property with the Plant Community Type (PCT) 39– ‘Coolabah - River Coobah - Lignum woodland wetland of frequently flooded floodplains mainly in the Darling Riverine Plains Bioregion’.

Assessment of Potential Presence of Threatened Species

A search of the National Parks and Wildlife Atlas of NSW Wildlife (BioNet) identified five (5) species with recorded sightings within a 5km radius of the proposed development site. The complete search result for listed species is presented in Appendix A.

The project site is located within the Castlereagh-Barwon subregion of the Darling Riverine Plains Bioregion. A broader search for species, populations and communities that may occur within the locality of the development site was therefore conducted through investigating known and predicted species’ distributions within the Darling Riverine Plains Bioregion (Castlereagh-Barwon subregion). A copy of the search results for listed species is presented in Appendix B.

Species were considered with regards to their known distribution and habitat requirements, to assess whether the subject site is likely to serve as suitable habitat, and subsequently whether/how the development is likely to impact upon the species.

The availability of habitat on site was assessed using a number of factors including:

- Structural and floral diversity;
- Occurrence and extent of habitat types in the general vicinity;
- Continuity with similar habitat adjacent to the site, or connection with similar habitat off site by way of corridors;
- Key habitat features such as tree hollows, water bodies, crevices and rocky areas;
- Degree of disturbance and degradation; and
- Topographic features such as aspect and slope.

This information was used to evaluate the site as potential habitat for each of the threatened species considered and assign each species with a rating based on their likelihood to occur within the subject site. The ‘likelihood of occurrence’ categories are detailed in Table 1. The habitat assessment is provided in Appendix B. Species assigned with a rating of ‘Moderate’ or higher and are considered potentially impacted by the proposed works have been considered further under relevant legislation within the assessment of significance provided below.

Table 1: Likelihood of Occurrence Criteria

Likelihood Rating	Criteria
Known	The species was recorded within the study area during site surveys.
High	It is likely that a species would inhabit or utilise habitat within the subject site. Criteria for this category may include: <ul style="list-style-type: none"> Species recently and/or regularly recorded in contiguous or nearby habitat; High quality habitat types or resources present within study area; Species is known or likely to maintain a resident population surrounding the study area; and Species is known or likely to visit during migration or seasonal availability of resources.
Moderate	Potential habitat for a species occurs within the subject site. Criteria for this category may include: <ul style="list-style-type: none"> Species previously recorded in contiguous habitat albeit not recently (>10 years); Poor quality, depauperate or modified habitat types and/or resources present within study area; Species has potential to utilise habitat during migration or seasonal availability of resources; and Cryptic flora species with potential habitat available within the subject site that have not been seasonally targeted by surveys.
Low	It is unlikely that the species inhabits the area and would likely be considered a transient visitor if ever encountered. Criteria for this category may include: <ul style="list-style-type: none"> The subject site or study area lacks specific habitat types or resources required by the species; Non-cryptic flora species that were found to be absent during targeted surveys.
Unlikely	The habitat within subject site and study area is unsuitable for the species.

Only species that have the potential to be present within the available habitat are listed in Table 2 and assessed in this test of significance.

Table 2: Listed Species to be Assessed under the Test of Significance

Scientific Name	Scientific Name	Common Name	Common Name	Legal Status	Legal Status	Records	Records-1
Spotted Harrier	Spotted Harrier	<i>Circus assimilis</i>	Circus assimilis	V,P	BC Act: V, P	20	1
Black Falcon	Black Falcon	<i>Falco subniger</i>	Falco subniger	V,P	BC Act: V, P	19	
Turquoise Parrot		<i>Neophema pulchella</i>		V,P,3		4	
Barking Owl		<i>Ninox connivens</i>		V,P,3		47	

Scientific Name	Common Name	Legal Status	Records
Red-tailed Black Cockatoo (inland subspecies)	<i>Calyptorhynchus banksii samueli</i>	V, P	44
Five-clawed Worm-skink	<i>Anomalopus mackayi</i>	E1,P	4
Yellow-bellied Sheathtail-bat	<i>Saccolaimus flaviventris</i>	V,PBC Act: V,P	42
Creeping Tick-trefoil	<i>Desmodium campylocaulon</i>	E,P	18
Slender Darling Pea	<i>Swainsona murrayana</i>	V, P	8

Test of Significance - Assessment of Criteria and Discussion

The following is to be considered for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

- a) *in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,***

A viable local population of a threatened terrestrial flora or fauna species in this assessment is defined as a population that occurs within the study area and the connected habitat within the area.

Flora Species

Creeping Tick-trefoil, Slender Darling Pea

The site inspection did not reveal the presence of a local population of the above species. The cryptic nature of some threatened species, however, is such that the species may not have been visible during the time of the site visit, and therefore it must be assumed that viable populations of threatened flora species may be present within the region in accordance with the precautionary principle.

Potential habitat for the listed species is present in the footprint of the proposed works. The proposal development involves the removal of groundcover over an area of 7.2 Hectares. Areas of higher-quality habitat are present within the locality of the proposal. Should the above-mentioned species be present within the development footprint, they may be displaced in the short-term. However, given that adjoining vegetation retains the potential to support these species, it is considered that the risk of a viable population being placed at risk of extinction is minimal.

Megachiropteran Bats

Yellow-bellied Sheath-tail Bat

The species may use the project area for foraging on occasion, however the foraging habitat within the subject site is not considered optimal, due to historical clearing and the effects of disturbance from previous land use. Higher quality habitat is available in the area, including in Crown Land and along the Mehi River to the south of the development site. It is therefore considered that the subject site is unlikely to be regularly or heavily utilised by the Yellow-bellied Sheath-tail Bat. Additionally, no roosting and/or breeding habitat was identified within the proposed development footprint.

The risk to this species from the development is therefore limited to the loss of sub-optimal foraging habitat. It is therefore considered that no viable local population of any threatened species would be placed at risk of extinction due to the proposed development.

Birds of Prey

Barking Owl, Spotted Harrier, Black Falcon

These highly mobile species have relatively large home ranges (generally >200 Ha). The removal of a small habitat area is therefore insignificant at a landscape scale and it is considered that the proposal is unlikely to have a significant impact on birds of prey. Furthermore, the subject site comprises sub-optimal foraging habitat for these species, and it does not contain breeding habitat.

The proposal is therefore not deemed to pose a risk to viable local populations of the above-mentioned species.

Woodland Species

Turquoise Parrot, Red-tailed Black Cockatoo (inland subspecies)

The most common and/or significant threats for woodland species are habitat loss and/or degradation as a result of clearing, increased weed invasion, under-shrubbing, and removal of dead timber. Many other threats arise from habitat loss, including predation by introduced cats and foxes and increased salinity. It is noted that woodland habitat will not be cleared or disturbed by the proposed development, thus the above-mentioned species are not at risk of any direct impact from the proposed redevelopment.

The risk to these woodland species is therefore limited to indirect impacts, mainly potential habitat modification resulting from spread of weed species. It is recommended that Weeds of National Significance (WoNS) present onsite (e.g, African Boxthorn) be controlled prior to commencement of the works in order to prevent their spread. It is also recommended that weed control measures be implemented on an on-going basis within the site footprint to prevent the potential introduction and spread of weed species from the development to higher-quality habitat in adjoining areas. Provided these measures are implemented, the proposal is considered unlikely to place a viable population of the above-listed woodland bird species at risk of extinction.

Reptiles

Five-clawed Worm Skink

This species mainly occurs in woodland habitat, and may also occur in grassland areas and open paddocks with scattered trees. Should the above-mentioned species be present within the development footprint, they may be displaced in the short-term. However, given that adjoining vegetation retains the potential to support these species, it is considered that the risk of a viable population being placed at risk of extinction is minimal.

- b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:**
- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
 - (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

The subject site does not support an endangered ecological community or critically endangered ecological community.

The areas of remnant vegetation in the vicinity of the development site are consistent with PCT 39, which is associated with an endangered ecological community. This area is not included within the development footprint and will be avoided during construction activities.

The development proposal is therefore considered unlikely to impact on the extent or composition of any of the listed endangered or critically endangered ecological communities.

- c) in relation to the habitat of a threatened species, population or ecological community:**
- (i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and**

No Endangered Ecological Community would be subject to vegetation removal or modification as part of the proposed development.

The proposal will result in the removal of 7.2 Ha of predominantly non-native groundcover. The area also comprises a small number of native shrubs (*Acacia* sp. and Coobah).

- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

The subject site has been heavily cleared and disturbed as a result of historic land clearing and development of the site for previous activities. The site currently contains regrowth which consists of non-native vegetation with a small number of native shrubs. Given the existing site conditions, the proposed small-scale solar farm is not predicted to cause or promote any fragmentation of species or habitat within the area. Fauna species which may periodically utilise the subject site would disperse into adjoining areas of similar quality habitat and/or into higher quality habitat which is widespread in the locality. Therefore, the small-scale removal of groundcover vegetation would not result in the fragmentation or isolation of these mobile species. Threatened flora species, whilst not identified in the area, may be displaced in the short-term, however, regeneration is likely to occur once construction is finalised and

the similar adjoining vegetation is considered to provide sufficient germination so that these species are not at risk of extinction or long-term fragmentation.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

The entire subject site was historically cleared and subject to earthwork in association with the existing cotton gin, and the site has been in disuse and left to rehabilitate naturally in recent years. The site is currently dominated by groundcover consisting of a mixture of native and non-native species. A small area of this vegetation will be cleared as part of the proposed works, and this habitat area is not considered to have any particular importance to the threatened species which may occur in the locality.

The site is surrounded by similar and/or higher-quality, contiguous vegetation, thus the small-scale removal of such habitat is highly unlikely to result in fragmentation or isolation to a degree that would impact the short or long-term survival of any species or population in the area. Therefore, it is considered that no habitat will be significantly modified as a result of the proposed project.

No endangered ecological community will be removed, modified or fragmented as part of the proposed works.

The proposed project is therefore not considered to remove, modify, fragment or isolate habitat essential for the survival of a threatened species within the area.

d) whether the proposed development is likely to have an adverse effect on critical any declared area of outstanding biodiversity value (either directly or indirectly),

The development proposal is not located in or near an area of outstanding biodiversity value. It is therefore considered that no areas of outstanding biodiversity value will not be adversely affected (either directly or indirectly) by the proposed development.

e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The key threatening processes listed for the Darling Riverine Plains (Castlereagh-Barwon) Bioregion are included in Table 3. The table also includes a comment on the potential of the proposed development to contribute to each of the key threatening processes.

Table 3: Key Threatening Processes

Listing of Key Threatening Processes for Darling Riverine Plains Bioregion (Castlereagh-Barwon IBRA Subregion)	Comment
Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners (<i>Manorina melanocephala</i>)	No extensive woodland present.
Alteration of habitat following subsidence due to longwall mining	Not applicable
Alteration of habitat following subsidence due to longwall mining	Not applicable
Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands	The development is within an existing levee bank and will not exacerbate alteration to natural flow regimes or the flow of floodwaters.
Anthropogenic Climate Change	Scale of development would result in limited or no impact and is a source of renewable energy which aims to reduce Australia's carbon footprint.
Bushrock removal	Not applicable
Clearing of native vegetation	Site has been previously cleared.
Competition and grazing by the feral European Rabbit, <i>Oryctolagus cuniculus</i> (L.)	Rabbits not a pest at this location.
Competition and habitat degradation by Feral Goats, <i>Capra hircus</i> Linnaeus 1758	No goats present.
Competition from feral honey bees, <i>Apis mellifera</i> L.	Any feral bees will be eradicated if present.
Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners	No woodland remains on property. Majority of trees have been planted.
Herbivory and environmental degradation caused by feral deer	No deer present
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	Fires excluded from existing and proposed development
Importation of Red Imported Fire Ants <i>Solenopsis invicta</i> Buren 1972	No fire ants present.
Infection by Psittacine Circoviral (beak and feather) Disease affecting endangered psittacine species and populations	Not applicable
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	Very limited frog habitat available.
Infection of native plants by <i>Phytophthora cinnamomi</i>	<i>Phytophthora</i> not observed to be present.
Introduction of the Large Earth Bumblebee <i>Bombus terrestris</i> (L.)	Proposal unlikely to result in introduction of this species.
Invasion and establishment of exotic vines and scramblers	Proposal unlikely to result in introduction of this species.
Invasion and establishment of Scotch Broom (<i>Cytisus scoparius</i>)	Proposal unlikely to result in introduction of this species.
Invasion and establishment of the Cane Toad (<i>Bufo marinus</i>)	No suitable habitat available at present.
Invasion of native plant communities by African Olive <i>Olea europaea</i> subsp. <i>cuspidata</i> (Wall. ex G. Don) Cif.	Proposal unlikely to result in introduction of this species.

Listing of Key Threatening Processes for Darling Riverine Plains Bioregion (Castlereagh-Barwon IBRA Subregion)	Comment
Invasion of native plant communities by <i>Chrysanthemoides monilifera</i>	Proposal unlikely to result in introduction of this species.
Invasion of native plant communities by exotic perennial grasses	Discussed below.
Invasion of the Yellow Crazy Ant, <i>Anoplolepis gracilipes</i> (Fr. Smith) into NSW	Proposal unlikely to result in introduction of this species.
Invasion, establishment and spread of Lantana (<i>Lantana camara</i> L. sens. Lat)	Proposal unlikely to result in introduction of this species.
Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	No native habitat present
Loss of Hollow-bearing Trees	Land had been cleared – no mature trees present onsite.
Loss or degradation (or both) of sites used for hill-topping by butterflies	No hilltop sites present.
Predation and hybridisation by Feral Dogs, <i>Canis lupus familiaris</i>	The development would not increase the presence or impact of Feral Dogs.
Predation by <i>Gambusia holbrooki</i> Girard, 1859 (Plague Minnow or Mosquito Fish)	Not applicable
Predation by the European Red Fox <i>Vulpes Vulpes</i> (Linnaeus, 1758)	The development would not increase the presence or impact of European Red Fox.
Predation by the Feral Cat <i>Felis catus</i> (Linnaeus, 1758)	The development would not increase the presence or impact of Feral Cats.
Predation, habitat degradation, competition and disease transmission by Feral Pigs, <i>Sus scrofa</i> Linnaeus 1758	The development would not increase the presence or impact of Feral Pigs.
Removal of dead wood and dead trees	No remnant woodland supporting dead wood present within the subject site.

Invasion of Native Plant Communities by Exotic Perennial Grasses

Invasion of native plant communities by exotic species is listed as a key threatening process. Exotic perennial grasses have the capacity to invade native plant communities, competing with an excluding native species. The invasion of these grasses also reduces the habitat value for many native fauna species.

Whilst no exotic grass species were identified during the site inspection, some patches of exotic perennial grasses may be present within the groundcover vegetation within the project area. The risk posed to native plant communities is the risk of these grasses spreading into areas with better quality native groundcover. The proposed works will include soil disturbance and vegetation clearance, which may include exotic perennial grass species.

Pathogen control protocols should be developed and implemented in accordance with the

requirements of the *Biosecurity Act 2015*. Provided safeguards regarding weed management are implemented, the proposed works are unlikely to result in increased weed incursion. The proposed works are therefore considered unlikely to increase the impact of this key threatening process.

Conclusion

Flora, fauna and habitat studies have been undertaken to identify and assess the potential impacts resulting from the proposed project. The proposed project involves the construction of a solar farm. It is estimated that the total development footprint would be 7.2 hectares.

The proposal was assessed using the Test of Significance in accordance with the BC Act for the site which determined that given the site has previously been heavily disturbed and that vegetation present on-site at present is non-native, the project is not likely to significantly affect threatened species, ecological communities, or their habitats.

This assessment has determined that the potential adverse impacts of the proposed development on threatened species, populations or communities is considered minimal and no further investigation in the form of a Biodiversity Development Assessment Report is required.

Appendix A: Bionet Threatened Species, Populations and Communities Search Results for a 5-kilometre radius from the Subject Site

Scientific Name	Common Name	Legal Status	Records
<i>Anomalopus mackayi</i>	Five-clawed Worm-skink	E1,P	1
<i>Neophema pulchella</i>	Turquoise Parrot	V,P,3	1
<i>Ninox connivens</i>	Barking Owl	V,P,3	1
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V,P	2
<i>Pomatostomus temporalis</i> <i>temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V,P	1

Appendix B: Bionet Threatened Species, Populations and Communities Search Results for Darling Riverine Plains Bioregion (Castlereagh-Barwon IBRA Subregion)

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
Aves					
<i>Anseranas semipalmata</i> Magpie Goose	BC Act - V	Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges. Equally at home in aquatic or terrestrial habitats; often seen walking and grazing on land; feeds on grasses, bulbs and rhizomes. Activities are centred on wetlands, mainly those on floodplains of rivers and large shallow wetlands formed by run-off; breeding can occur in both summer and winter.	73	Unlikely There is no suitable habitat on the subject site or study area.	No
<i>Oxyura australis</i> Blue-billed Duck	BC Act - V	The Blue-billed Duck is widespread in NSW, but most common in the southern Murray-Darling Basin area. Birds disperse during the breeding season to deep swamps up to 300 km away. The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover. It will fly if disturbed, but prefers to dive if approached.	6	Unlikely There is no suitable habitat on the subject site or study area.	No
<i>Stictonetta naevosa</i> Freckled Duck	BC Act - V	This species prefers permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds.	18	Unlikely There is no suitable habitat on the subject site or study area.	No
<i>Geophaps scripta scripta</i> Squatter Pigeon (southern subspecies)	BC Act - E	Found from north Queensland to the North West Slopes of NSW and extending down to the Liverpool Plains and Dubbo. The species habitat is grassy woodlands and plains. It prefers sandy areas and usually close to water.	P	Unlikely There is no suitable habitat on the subject site or study area.	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
<i>Phaps histrionica</i> Flock Bronzewing	BC Act - E	Patchily distributed and rarely observed in NSW. It is likely to occur north of Broken Hill and west of Cobar when conditions are right. Observed in a variety of vegetation types, including grassy plains, saltbush, spinifex and open mulga. Its preferred habitat is tussock grassland, particularly Mitchell grassland. Fairly common; highly nomadic, this species was named because of its tendency to form huge flock.	1	Unlikely There is no suitable habitat on the subject site or study area.	No
<i>Ephippiorhynchus asiaticus</i> Black-necked Stork	BC Act - E	Floodplain wetlands (swamps, billabongs, watercourses and dams) of the major coastal rivers are the key habitat in NSW for the Black-necked Stork. Secondary habitat includes minor floodplains, coastal sandplain wetlands and estuaries.	58	Unlikely There is no suitable habitat on the subject site or study area.	No
<i>Botaurus poiciloptilus</i> Australasian Bittern	BC Act - E	In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.).	5	Unlikely There is no suitable habitat on the subject site or study area.	No
<i>Circus assimilis</i> Spotted Harrier	BC Act - V	In New South Wales, this species is widespread from coast to inland, including the western slopes of the Great Dividing Range and farther west. It is sparsely scattered in, or largely absent from, much of the Upper Western region. Primarily inhabits woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests. Generally, the understorey is open with sparse eucalypt saplings, acacias and other shrubs, including heath.	23	Moderate This species may hunt within the subject site.	Yes

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
<i>Erythrotriorchis radiatus</i> Red Goshawk	BC Act - E	The species is very rare in NSW, extending south to about 30°S, with most records north of this, in the Clarence River Catchment, and a few around the lower Richmond and Tweed Rivers. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus forest of coastal rivers.	1	Low The species is not known to occur in the region of the subject site.	No
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle	BC Act - V	The White-bellied Sea-eagle is distributed around the Australian coastline, including Tasmania, and well inland along rivers and wetlands of the Murray Darling Basin. In New South Wales it is widespread along the east coast, and along all major inland rivers and waterways. Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea.	81	Low The site is not considered important for this species due to the paucity of suitable habitat.	No
<i>Hamirostra melanosternon</i> Black-breasted Buzzard	BC Act - V	The Black-breasted Buzzard is found sparsely in areas of less than 500mm rainfall, from north-western NSW and north-eastern South Australia to the east coast at about Rockhampton, then across northern Australia south almost to Perth, avoiding only the Western Australian deserts. Lives in a range of inland habitats, especially along timbered watercourses which is the preferred breeding habitat. Also hunts over grasslands and sparsely timbered woodlands.	2	Low The site is considered unsuitable due to higher rainfall levels than that with which the species is associated. Mean annual rainfall in the locality exceeds 560mm.	No
<i>Hieraaetus morphnoides</i> Little Eagle	BC Act - V	The Little Eagle is found throughout the Australian mainland. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.	22	Low The site is not considered important for this species due to the paucity of suitable habitat.	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
<i>Lophoictinia isura</i> Square-tailed Kite	BC Act - V	In NSW, the species is a regular resident in the north, north-east and along the major west-flowing river systems. Found in a variety of timbered habitats including dry woodlands and open forests. Is a specialist hunter of passerines, especially honeyeaters, and most particularly nestlings, and insects in the tree canopy, picking most prey items from the outer foliage. Appears to occupy large hunting ranges of more than 100km.	8	Low The site is not considered important for this species due to the paucity of suitable habitat.	No
<i>Falco hypoleucos</i> Grey Falcon	BC Act - E	The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin. The breeding range has contracted since the 1950s with most breeding now confined to arid parts of the range. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey.	4	Low The site is not considered important for this species due to the paucity of suitable habitat.	No
<i>Falco subniger</i> Black Falcon	BC Act - V	The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres.	19	Moderate This species may hunt throughout the subject site.	Yes
<i>Grus rubicunda</i> Brolga	BC Act - V	The Brolga was formerly found across Australia, except for the south-east corner, Tasmania and the south-western third of the country. It is still abundant in the northern tropics, but very sparse across the southern part of its range. Though Brolgas often feed in dry grassland or ploughed paddocks or even desert claypans, they are	129	Low The site is not considered important for this species due to the paucity of suitable habitat.	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		dependent on wetlands too, especially shallow swamps, where they will forage with their head entirely submerged.			
<i>Ardeotis australis</i> Australian Bustard	BC Act - E	The Australian Bustard mainly occurs in inland Australia and is now scarce or absent from southern and south-eastern Australia. In NSW, they are mainly found in the north-west corner and less often recorded in the lower western and central west plains regions. Breeding now only occurs in the north-west region of NSW. Mainly inhabits tussock and hummock grasslands, though prefers tussock grasses to hummock grasses; also occurs in low shrublands and low open grassy woodlands; occasionally seen in pastoral and cropping country, golf courses and near dams.	25	Low There is no suitable habitat for this species within the subject site and it is therefore not considered important for the species.	No
<i>Burhinus grallarius</i> Bush Stone-curlew	BC Act - E	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber. Feed on insects and small vertebrates, such as frogs, lizards and snakes. Nest on the ground in a scrape or small bare patch.	24	Low There is no suitable habitat for this species within the subject site and it is therefore not considered important for the species.	No
<i>Rostratula australis</i> Australian Painted Snipe	BC Act - E	In NSW many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	9	Low There is no suitable habitat for this species within the subject site and it is therefore not considered important for the species.	No
<i>Limosa limosa</i> Black-tailed Godwit	BC Act - V	In NSW, it is most frequently recorded at Kooragang Island (Hunter River estuary), with occasional records elsewhere	3	Low	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		along the coast, and inland. Primarily a coastal species. Usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats.		There is no suitable habitat for this species within the subject site and it is therefore not considered important for the species.	
<i>Calyptorhynchus banksii samueli</i> Red-tailed Black-Cockatoo (inland subspecies)	BC Act – V	The Red-tailed Black-Cockatoo (inland subspecies) is known to occur around watercourses and overflows of the Darling, Paroo, Bogan, Macquarie and Barwon Rivers extending in an arc along the Darling River from Wentworth (though rare south of Menindee) in the south to Bourke and thence through to Brewarrina in the north. It extends east to Walgett and perhaps Boggabilla on the Barwon and south through to the Macquarie Marshes. Red-tailed Black-Cockatoos are found in a wide variety of habitats. Prefer Eucalyptus forest and woodlands, particularly river red gum and coolabah lined water courses. In the arid zone usually occur mainly near eucalypts along larger watercourses and associated Acacia and Casuarina woodlands nearby. Also utilise grasslands, scrublands, wetlands and vegetation on floodplains.	44	Moderate The species may utilise scrubland in the subject site adjacent to eucalypt woodland in the study area.	Yes
<i>Calyptorhynchus lathami</i> Glossy Black-Cockatoo	BC Act - V	Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak and Forest Sheoak are important foods. Inland populations feed on a wide range of sheoak. Belah is also utilised and may be a critical food source for some populations. Feeds almost exclusively on the seeds of several species of she-oak (<i>Casuarina</i> and <i>Allocasuarina</i> species), shredding the cones with the massive bill.	74	Low There is no suitable habitat for this species within the subject site and it is therefore not considered important for the species.	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		Dependent on large hollow-bearing eucalypts for nest sites.			
<i>Lophochroa leadbeateri</i> Major Mitchell's Cockatoo	BC Act - V	Found across the arid and semi-arid inland. In NSW it is found regularly as far east as about Bourke and Griffith, and sporadically further east than that. Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water. Feeds mostly on the ground, especially on the seeds of native and exotic melons and on the seeds of species of saltbush, wattles and cypress pines.	5	Low The subject site is not considered to have sufficient suitable foraging habitat/flora species to sustain individuals of this species.	No
<i>Neophema pulchella</i> Turquoise Parrot	BC Act - V	Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Prefers to feed in the shade of a tree and spends most of the day on the ground searching for the seeds or grasses and herbaceous plants, or browsing on vegetable matter. Nests in tree hollows, logs or posts, from August to December.	4	Moderate This species may forage within the subject site, given the subject site constitutes a clearing adjacent to suitable habitat. Furthermore, there is a record for this species in the search area.	Yes
<i>Polytelis swainsonii</i> Superb Parrot	BC Act - V	The Superb Parrot is found throughout eastern inland NSW. On the South-western Slopes their core breeding area is roughly bounded by Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west. Birds breeding in this region are mainly absent during winter, when they migrate north to the region of the upper Namoi and Gwydir Rivers. The species inhabits Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. Feed in trees and understorey shrubs and on the ground and their diet consists mainly of grass seeds and	79	Low There is no suitable habitat for this species within the subject site and it is therefore not considered important for the species.	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		herbaceous plants. Also eaten are fruits, berries, nectar, buds, flowers, insects and grain.			
<i>Ninox connivens</i> Barking Owl	BC Act - V	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey on these fertile riparian soils.	48	Moderate This species may hunt throughout the subject site.	Yes
<i>Tyto longimembris</i> Eastern Grass Owl	BC Act - V	Eastern Grass Owls are found in areas of tall grass, including grass tussocks, in swampy areas, grassy plains, swampy heath, and in cane grass or sedges on flood plains. They rest by day in a 'form' - a trampled platform in a large tussock or other heavy vegetative growth. Always breeds on the ground. Nests are found in trodden grass, and often accessed by tunnels through vegetation.	6	Low There is no suitable habitat for this species within the subject site.	No
<i>Tyto novaehollandiae</i> Masked Owl	BC Act - V	Extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides.	1	Low There is no forest habitat in the locality or the subject site.	No
<i>Climacteris picumnus victoriae</i> Brown Treecreeper (eastern subspecies)	BC Act - V	The Brown Treecreeper is endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands	94	Low There is no suitable habitat for this species within the subject site.	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species. When foraging in trees and on the ground, they peck and probe for insects, mostly ants, amongst the litter, tussocks and fallen timber, and along trunks and lateral branches. Hollows in standing dead or live trees and tree stumps are essential for nesting.			
<i>Amytornis modestus inexpectatus</i> Thick-billed Grasswren (central NSW subspecies)	BC Act - E	Formerly occurred in central and western NSW, from the lower reaches of the Namoi River, south to Mossgiel. The species is presently considered extinct.	P	Low The species is considered extinct in NSW.	No
<i>Chthonicola sagittata</i> Speckled Warbler	BC Act - V	The Speckled Warbler has a patchy distribution throughout the eastern half of NSW. There has been a decline in population density throughout its range, with the decline exceeding 40% where no vegetation remnants larger than 100ha survive. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. The diet consists of seeds and insects, with most foraging taking place on the ground around tussocks and under bushes and trees. The rounded, domed, roughly built nest of dry grass and strips of bark is located in a slight hollow in the ground or the base of a low dense plant, often among fallen branches and other litter.	4	Low The subject site is not considered important habitat for the species, which is dependent on woodland/forest for nesting and foraging. The few scattered, immature shrubs on the subject site are not considered important habitat for the species.	No
<i>Certhionyx variegatus</i> Pied Honeyeater	BC Act - V	Widespread throughout acacia, mallee and spinifex scrubs of arid and semi-arid Australia. Occasionally occurs further east, on the slopes and plains and the Hunter Valley,	K	Low There is no suitable habitat for this species within the subject site.	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		typically during periods of drought. Inhabits wattle shrub, primarily Mulga (<i>Acacia aneura</i>), mallee, spinifex and eucalypt woodlands, usually when shrubs are flowering; feeds on nectar, predominantly from various species of emu-bushes (<i>Eremophila</i> spp.); also from mistletoes. Highly nomadic, following the erratic flowering of shrubs.			
<i>Epthianura albifrons</i> White-fronted Chat	BC Act - V	In NSW, it occurs mostly in the southern half of the state, in damp open habitats along the coast, and near waterways in the western part of the state. Gregarious species, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground.	6	Low There is no suitable habitat for this species within the subject site.	No
<i>Grantiella picta</i> Painted Honeyeater	BC Act - V	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. Inhabits Boree/ Weeping Myall (<i>Acacia pendula</i>), Brigalow (<i>A. harpophylla</i>) and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus <i>Amyema</i> .	60	Low The subject site is not considered important habitat for the species. No mistletoe was recorded during the site visit and the scattered shrubs present on site are not deemed to provide suitable habitat.	No
<i>Melithreptus gularis</i> <i>gularis</i> Black-chinned Honeyeater	BC Act - V	The Black-chinned Honeyeater has two subspecies, with only the nominate (<i>gularis</i>) occurring in NSW where it is widespread, with records from the tablelands and western slopes of the Great Dividing Range to the north-west and central-west plains and the Riverina. Occupies mostly upper levels of drier open forests or woodlands	21	Low There is no suitable habitat for this species within the subject site.	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		dominated by box and ironbark eucalypts. Feeding territories are large making the species locally nomadic. Recent studies have found that the Black-chinned Honeyeater tends to occur in the largest woodland patches in the landscape as birds forage over large home ranges of at least 5 hectares.			
<i>Pomatostomus halli</i> Hall's Babbler	BC Act - V	It occurs in central-eastern Australia, from Cobar north into south-western Queensland, particularly along or west of the Warrego Rive. Inhabits dry Acacia scrub, mainly Mulga, with a grassy understorey including spinifex, on ridges and plains with either sandy or stony soils. Occasionally occurs in open dry Eucalyptus (Bimblebox) woodland, and mulga- or eucalypt-lined watercourses.	P	Low There is no suitable habitat for this species within the subject site.	No
<i>Pomatostomus temporalis temporalis</i> Grey-crowned Babbler (eastern subspecies)	BC Act - V	In NSW, the eastern sub-species occurs on the western slopes of the Great Dividing Range, and on the western plains reaching as far as Louth and Balranald. Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Woodlands on fertile soils in coastal regions. Feed on invertebrates, either by foraging on the trunks and branches of eucalypts and other woodland trees or on the ground, digging and probing amongst litter and tussock grasses.	287	Low The subject site is not considered important habitat for the species, which is dependent on woodland/forest habitat. The few scattered shrubs on site are not considered important habitat for the species.	No
<i>Daphoenositta chrysoptera</i> Varied Sittella	BC Act - V	Inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy.	10	Low There is no suitable habitat for this species within the subject site.	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
<i>Pachycephala inornata</i> Gilbert's Whistler	BC Act - V	The Gilbert's Whistler is sparsely distributed over much of the arid and semi-arid zone of inland southern Australia, from the western slopes of NSW to the Western Australian wheatbelt. The Gilbert's Whistler occurs in a range of habitats within NSW, though the shared feature appears to be a dense shrub layer. It is widely recorded in mallee shrublands, but also occurs in box-ironbark woodlands, Cypress Pine and Belah woodlands and River Red Gum forests, though at this stage it is only known to use this habitat along the Murray, Edwards and Wakool Rivers.	P	Low There is no suitable habitat for this species within the subject site.	No
<i>Artamus cyanopterus cyanopterus</i> Dusky Woodswallow	BC Act - V	Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. Primarily eats invertebrates, mainly insects, which are captured whilst hovering or sallying above the canopy or over water. Most breeding activity occurs on the western slopes of the Great Dividing Range.	28	Low The subject site does not support woodland habitat or suitable foraging habitat required to support this species and is therefore not considered important habitat for the species.	No
<i>Melanodryas cucullata cucullata</i> Hooded Robin (south-eastern form)	BC Act - V	The south-eastern form (subspecies <i>cucullata</i>) is found from Brisbane to Adelaide and throughout much of inland NSW, with the exception of the extreme north-west, where it is replaced by subspecies <i>picata</i> . Two other subspecies occur outside NSW. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	41	Low The subject site is not considered important habitat due to the limited structural diversity and the modified nature of grassland onsite.	No
<i>Petroica boodang</i> Scarlet Robin	BC Act - V	In NSW, it occurs from the coast to the inland slopes. After breeding, some Scarlet Robins disperse to the lower	2	Low	No

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		valleys and plains of the tablelands and slopes. Some birds may appear as far west as the eastern edges of the inland plains in autumn and winter. The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. The Scarlet Robin breeds on ridges, hills and foothills of the western slopes, the Great Dividing Range and eastern coastal regions.		There is no suitable habitat for this species within the subject site.	
<i>Petroica phoenicea</i> Flame Robin	BC Act – V	In NSW, the Flame Robin breeds in upland areas and in winter, many birds move to the inland slopes and plains. It breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. The species prefers clearings or areas with open understoreys. The groundlayer of the breeding habitat is dominated by native grasses and the shrub layer may be either sparse or dense.	P	Low There is no suitable habitat for this species within the subject site.	No
<i>Stagonopleura guttata</i> Diamond Firetail	BC Act - V	Found in grassy eucalypt woodlands, including Box-Gum Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Prefers clearings or areas with open understoreys. Feeds exclusively on the ground, on ripe and partly-ripe grass and herb seeds and green leaves, and on insects. Nests are globular structures built either in the shrubby understorey, or higher up, especially under hawk's or raven's nests. Birds roost in dense shrubs or in smaller nests built especially for roosting.	37	Low There is no suitable habitat for this species within the subject site.	No
Mammalia					

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
<i>Antechinomys laniger</i> Kultarr	BC Act - E	Widespread across arid and semi-arid NSW but present in very low numbers. Recent records have come primarily from the Cobar and Brewarrina region. A terrestrial insectivore that inhabits open country, especially claypans among Acacia woodlands.	P	Low The subject site is not considered important habitat for the species due to a paucity of suitable habitat.	No
<i>Dasyurus maculatus</i> Spotted-tailed Quoll	BC Act - V	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. Females occupy home ranges of 200-500 hectares, while males occupy very large home ranges from 500 to over 4000 hectares.	6	Low The species may travel through or rest within the site given its very large home range, however it is not considered important habitat for the species. No potential den sites were observed on site.	No
<i>Sminthopsis macroura</i> Stripe-faced Dunnart	BC Act - V	The species is rare on the NSW Central West Slopes and North West Slopes with the most easterly records of recent times located around Dubbo, Coonabarabran, Wyallda and Ashford. Found in native dry grasslands and low dry shrublands, often along drainage lines where food and shelter resources tend to be better. Co-occupies areas with the more common Fat-tailed Dunnart, but prefers relatively ungrazed habitats with greater diversity and healthier understorey vegetation.	6	Low The subject site is not considered important habitat for the species given the species preference for ungrazed, native grasslands with a healthy species and structural diversity.	No
<i>Phascolarctos cinereus</i> Koala	BC Act - V	Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.	125	Unlikely There is no suitable habitat for the species within the subject site.	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
<i>Bettongia lesueur graii</i> Boodie, Burrowing Bettong (mainland)	BC Act - E	The mainland subspecies (<i>graii</i>) is now extinct; however, two subspecies occur on islands off the coast of Western Australia; one undescribed subspecies on Boodie and Barrow Islands off the Pilbara coast; the other (<i>lesueur</i>) on Bernier and Dorre Islands off Shark Bay.	1	Unlikely This species is not known to occur in the locality of the subject site.	No
<i>Lagorchestes leporides</i> Eastern Hare-wallaby	BC Act - E	This species is presumed extinct.	2	Unlikely This species is presumed extinct.	No
<i>Saccolaimus flaviventris</i> Yellow-bellied Sheathtail-bat	BC Act - V	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	42	Moderate This species may forage within the open areas of the subject site.	Yes
<i>Ozimops lumsdenae</i> Northern Free-tailed Bat	BC Act - V	Widely distributed across northern Australia from Western Australia to Queensland, extending south to the north-east corner of NSW. The only confirmed record in NSW is of a colony found in the roof of a house in Murwillumbah, however, calls have been detected from a few other locations in the far north east of the State. A range of vegetation types in northern Australia, from rainforests to open forests and woodlands, and are often recorded along watercourses.	2	Unlikely There is no suitable habitat for the species within the subject site.	No
<i>Setirostris eleryi</i> Bristle-faced Free-tailed Bat	BC Act - E	In NSW, the species has been recently recorded from only three disjunct locations: thirteen individuals from Gundabooka National Park, south of Bourke; one individual from Dhinnia Dthinawan Nature Reserve	K	Low Given the rarity of the species and the lack of suitable habitat on the subject	No

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		(formerly Bebo State Forest), north of Warialda two individuals near Bonshaw. Appears to be extremely rare throughout its range. Nationally, it has been recorded from only 15 locations. Knowledge of the ecology of the Hairy-nosed Freetail Bat is limited, however evidence suggests that the species depends on hollows and tree fissures for roosting sites. In the Brigalow Belt South bioregion, the species mainly occurs in woodlands, forests and arid shrublands.		site, it is not considered important habitat for the species.	
<i>Chalinolobus picatus</i> Little Pied Bat	BC Act - V	Occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine forest and mallee and Bimbil box woodlands. Roosts in caves, rock outcrops, mine shafts, tunnels, tree hollows and buildings. Feeds on moths and possibly other flying invertebrates.	32	Unlikely There is no suitable habitat for the species within the subject site.	No
<i>Nyctophilus corbeni</i> Corben's Long-eared Bat	BC Act - V	Inhabits a variety of vegetation types, including mallee, bulloke and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation. Roosts in tree hollows, crevices, and under loose bark. Slow flying agile bat, utilising the understorey to hunt non-flying prey - especially caterpillars and beetles - and will even hunt on the ground.	P	Unlikely There is no suitable habitat for the species within the subject site.	No
<i>Vespadelus baverstocki</i> Inland Forest Bat	BC Act - V	There are relatively few records of any <i>Vespadelus</i> species in the north west of NSW and so whether this species does occur here is unknown. Some of the gaps in knowledge on the distribution of this and other bat species in western NSW probably reflects the lack of survey effort in most of this region. Roosts in tree hollows and abandoned buildings. Known to roost in very small hollows in stunted trees only a few metres high. The habitat requirements of	1	Unlikely There is no suitable habitat for the species within the subject site.	No

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		this species are poorly known but it has been recorded from a variety of woodland formations, including Mallee, Mulga and River Red Gum. Most records are from drier woodland habitats with riparian areas inhabited by the Little Forest Bat. However, other habitats may be used for foraging and/or drinking.			
<i>Rattus villosissimus</i> Long-haired Rat	BC Act - V	The species has been recorded over vast areas of western NSW. Eats roots, stems and leaves of grasses and herbs, especially the more succulent species. Seeds, flowers and insects (e.g. locust) which become available in better seasons stimulate reproduction. Sustained in mesic, densely vegetated sites.	2	Unlikely The subject site is not considered important habitat for the species given the paucity of suitable habitat (densely vegetated habitat).	No
Reptilia					
<i>Anomalopus mackayi</i> Five-clawed Worm-skink	BC Act – E	The species has a patchy distribution on the North West Slopes and Plains of north-east NSW. Occurs close to or on the lower slopes of slight rises in grassy White Box woodland on moist black soils, and River Red Gum-Coolibah-Bimble Box woodland on deep cracking loose clay soils. May also occur in grassland areas and open paddocks with scattered trees.	4	Moderate The species may occur throughout the subject site, given the availability of broadly suitable habitat within and adjacent to the subject site.	No
<i>Aspidites ramsayi</i> Woma	BC Act – V	The Woma occurs in north-western NSW, east to about Louth and Bourke. It was last recorded in these eastern districts in the late 1890s, and in 1983 from the Tibooburra region. Its range and abundance in south-eastern Australia is considered to be undergoing serious decline. The species is terrestrial, inhabiting subtropical to temperate deserts and sandy plains, as well as dunefields and deep cracking black soil plains in semi-arid areas. It	P	Low The subject site is not considered important for this species given the paucity of suitable habitat. Further, there are no confirmed records of the species in the subject IBRA subregion.	No

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		also occurs in hummock grasslands, shrublands or woodlands and shelters in animal burrows, hollow logs or under grass hummocks.			
<i>Furina dunmalli</i> Dunmall's Snake	BC Act – Not listed	Preferred habitat is Brigalow forest and woodland with fallen timber and ground litter, growing on cracking clay soils and clay loam soils. Also occurs in eucalypt and <i>Callitris</i> woodland with fallen timber and ground litter.	P	Low The subject site is not considered important for this species given the paucity of suitable habitat.	No
<i>Hoplocephalus bitorquatus</i> Pale-headed Snake	BC Act - V	A patchy distribution from north-east Queensland to the north-eastern quarter of NSW. In NSW it has historically been recorded from as far west as Mungindi and Quambone on the Darling Riverine Plains, across the north west slopes, and from the north coast from Queensland to Sydney. Found mainly in dry eucalypt forests and woodlands, cypress forest and occasionally in rainforest or moist eucalypt forest. In drier environments, it appears to favour habitats close to riparian areas.	12	Low The subject site is not considered important for this species given the paucity of suitable habitat.	No
Insecta					
<i>Jalmenus eubulus</i> Pale Imperial Hairstreak	BC Act – E	In NSW, the species is found only in brigalow-dominated open forests and woodlands in northern areas of the state. Only known to breed in old-growth forest or woodland and does not appear to colonise regrowth habitats following clearing or other major disturbance.	P	Low The subject site is not considered important for this species due to the lack of suitable habitat.	No
Amphibia					
<i>Crinia sloanei</i> Sloane's Froglet	BC Act – V	Sloane's Froglet has been recorded from widely scattered sites in the floodplains of the Murray-Darling Basin, with the majority of records in the Darling Riverine Plains, NSW South Western Slopes and Riverina bioregions in	1	Low The subject site is not considered important for this species due to the lack of suitable habitat.	No

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		New South Wales. It has not been recorded recently in the northern part of its range and has only been recorded infrequently in the southern part of its range in NSW. It is typically associated with periodically inundated areas in grassland, woodland and disturbed habitats.			
Flora					
<i>Tylophora linearis</i>	BC Act – V	Grows in dry scrubland that may have a eucalypt, <i>Callitris glaucophylla</i> and/or <i>Allocasuarina luehmannii</i> overtopping the scrub, in the Barraba, Mendooran, Temora and West Wyalong districts.	P	Low The subject site is outside of the species' known distribution. It is therefore not considered important habitat for the species.	No
<i>Lepidium monoplocoides</i> Winged Peppergrass	BC Act – E	Widespread in the semi-arid western plains regions of NSW. Collected from widely scattered localities, with large numbers of historical records but few recent collections. There is a single collection from Broken Hill and only two collections since 1915, the most recent being 1950. Occurs on seasonally moist to waterlogged sites, on heavy fertile soils, with a mean annual rainfall of around 300-500 mm. Predominant vegetation is usually an open woodland dominated by <i>Allocasuarina luehmannii</i> (Bulloak) and/or eucalypts, particularly <i>Eucalyptus largiflorens</i> (Black Box) or <i>Eucalyptus populnea</i> (Poplar Box). The field layer of the surrounding woodland is dominated by tussock grasses.	1	Low The subject site does not constitute suitable habitat for the species. Therefore the subject site is not considered important habitat for the species.	No
<i>Atriplex infrequens</i> A saltbush	BC Act – V	Confined to the NSW far western plains. North western records recorded from east of Tibooburra, south east of Brewarrina and near Wilcannia with isolated collections from the Pooncarie area in the south. <i>Atriplex infrequens</i> is associated with broad drainage tracts, clay flats and	2	Low Given its history of disturbance, the subject site is not considered important habitat for this species.	No

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		possibly occasionally inundated habitats. Very little ecological information is available for this species so its critical habitat components can only be speculated as relatively undisturbed and ungrazed drainage lines and flats.			
<i>Convolvulus tedmoorei</i> Bindweed	BC Act – E	This species has been recorded from northern inland areas of South Australia, south-western Queensland and western NSW. There are few known records from NSW: two areas on the Murrumbidgee and Darling River floodplains in central-western NSW (from Toganmain Station, Darlington Point, and from a locality 8km north-west of Louth); and two other records from east of Broken Hill on the road to Wilcannia, and from the Menindee Road, Scarsdale. Grows in self-mulching grey clay soils on the floodplains of the Darling and Murrumbidgee Rivers.	P	Unlikely The species has a very restricted known distribution and is only known to occur in a limited number of sites; these are all at distance from the subject site.	No
<i>Stenopetalum velutinum</i> Velvet Thread-petal	BC Act – E	<i>Stenopetalum velutinum</i> is currently distributed in Queensland, Western Australia, South Australia, and the Northern Territory. It is presumed extinct in NSW.	P	Unlikely The species is considered extinct in NSW.	No
<i>Cyperus conicus</i>	BC Act – E	Occurs rarely in the Pilliga area of NSW and is also found across the tropics in in Qld, WA and the NT, including central deserts north of Alice Springs. Grows in open woodland on sandy soil. In central Australia, the species grows near waterholes and on the banks of streams in sandy soils. Recorded from Callitris forest in the Pilliga area, growing in sandy soil with <i>Cyperus gracilis</i> , <i>C. squarrosus</i> and <i>C. fulvus</i> .	1	Low Within NSW, this species is not known to occur outside of the Pilliga forest. The subject site is therefore not considered important habitat for the species.	No
<i>Desmodium campylocaulon</i> Creeping Tick-trefoil	BC Act – E	Occurs chiefly in the Collarenebri and Moree districts in the north-western plains of NSW. Creeping Tick-Trefoil is	18	Moderate This species was not observed during the site visit. The subject site contains	Yes

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		confined to clay soils, usually with <i>Astrelba</i> and <i>Iseilema</i> species. In NSW <i>Desmodium campylocaulon</i> grows on cracking black soils in the Narrabri, Moree and Walgett local government areas. The species is said to be hardy, but grazed where sheep have regular access. Plants are strongly stoloniferous and well-cropped by cattle.		suitable habitat for the species however, and it is therefore considered in this assessment.	
<i>Swainsona murrayana</i> Slender Darling Pea	BC Act – V	Found throughout NSW, it has been recorded in the Jerilderie and Deniliquin areas of the southern riverine plain, the Hay plain as far north as Willandra National Park, near Broken Hill and in various localities between Dubbo and Moree. Grows in a variety of vegetation types including bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with <i>Maireana</i> species. Plants have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated.	8	Moderate This species was not observed during the site visit. The subject site contains broadly suitable habitat for the species however, and it has been recorded in Moree. It is therefore considered in this assessment.	Yes
<i>Swainsona recta</i> Small Purple-pea	BC Act – E	Small Purple-pea was recorded historically from places such as Carcoar, Culcairn and Wagga Wagga where it is probably now extinct. Populations still exist in the Queanbeyan and Wellington-Mudgee areas. Over 80% of the southern population grows on a railway easement. It is also known from the ACT and a single population of four plants near Chiltern in Victoria. Before European settlement Small Purple-pea occurred in the grassy understorey of woodlands and open-forests dominated by Blakely's Red Gum, Yellow Box, Candlebark Gum and Long-leaf Box.	2	Low The subject site is not considered important for this species due to a paucity of suitable habitat.	No

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<i>Acacia jucunda</i> Yetman Wattle	BC Act – E	Yetman Wattle is found in the Yetman district near the Queensland border on the North West Slopes of NSW. It also occurs in Queensland where it is reasonably common.	P	Unlikely This species is not known to occur in the locality of the subject site.	No
<i>Myriophyllum implicatum</i>	BC Act – E	This species was previously thought to be extinct in NSW; however the plant was recently discovered in the Pilliga National Park, south of Narrabri. Occurs in moist environments, extending away from fresh water.	P	Unlikely There is no suitable habitat within the subject site, and further the species is not known to occur in the locality of the proposed solar farm.	No
<i>Commersonia procumbens</i>	BC Act – V	Endemic to NSW, mainly confined to the Dubbo-Mendooran-Gilgandra region, but also in the Pilliga and Nymagee areas. Grows in sandy sites, often along roadsides.	2	Low The subject site is not considered important for this species due to a paucity of suitable habitat.	No
<i>Sida rohlenae</i> Shrub Sida	BC Act – E	In NSW it has been recorded south of Enngonia, south of Bourke and north-west of Coonamble with one collection north of Bourke which is likely to have been transported from Queensland. Shrub Sida grows on flood-out areas, creek banks and at the base of rocky hills. NSW specimens have been found along roadsides in hard red loam to sandy-loam soils.	7	Low The subject site is not considered important for this species due to a paucity of suitable habitat.	No
<i>Phyllanthus maderaspatensis</i>	BC Act – E	Recorded for the Brewarrina and Collarenebri districts in the north-western plains of NSW. Grows in floodplain areas on heavy soils and may rely on appropriate and intermittent rainfall and flooding events for its survival. The species is described as being a summer-growing annual and is thus dependent on seasonal conditions. Often associated with open grasslands and eucalypt	36	Low The subject site is not considered important for this species due to a paucity of suitable habitat.	No

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		woodlands in or near creek beds, and grassy flats and levees near watercourses.			
<i>Platyzoma microphyllum</i> Braid Fern	BC Act – E	Recorded in NSW only in the Yetman district. Grows in sandy or swampy soils, or in clay soils adjacent to streams and lagoons and subject to periodic flooding.	P	Low There is no suitable habitat for the species within the subject site. The species is therefore not considered in this assessment.	No
<i>Digitaria porrecta</i> Finger Panic Grass	BC Act – E	In NSW, the most frequently recorded associated tree species are <i>Eucalyptus albens</i> and <i>Acacia pendula</i> . Common associated grasses and forbs in NSW sites include <i>Austrostipa aristiglumis</i> , <i>Enteropogon acicularis</i> , <i>Cyperus bifax</i> , <i>Hibiscus trionum</i> and <i>Neptunia gracilis</i> . Common associated grasses and forbs in NSW sites include <i>Austrostipa aristiglumis</i> , <i>Enteropogon acicularis</i> , <i>Cyperus bifax</i> , <i>Hibiscus trionum</i> and <i>Neptunia gracilis</i> .	52	Low There is no suitable habitat for the species within the subject site. The species is therefore not considered in this assessment.	No
<i>Homopholis belsonii</i> Belson's Panic	BC Act – E	Occurs on the northwest slopes and plains of NSW, mostly between Wee Waa, Goondiwindi and Glen Innes. It also occurs in Queensland, mainly in the Brigalow Belt South bioregion. Grows in dry woodland (e.g. Belah) often on poor soils, although sometimes found in basalt-enriched sites north of Warialda and in alluvial clay soils.	P	Low This species was not observed during the site assessment, nor is the preferred habitat of the species found within the subject site or study area. Given the site's history of disturbance, it is not considered likely to support this species and is therefore not considered important habitat for the species.	No
<i>Polygala linariifolia</i> Native Milkwort	BC Act – E	North from Copeton Dam and the Warialda area to southern Queensland. The species has been recorded	P	Low	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		from the Inverell and Torrington districts growing in dark sandy loam on granite in shrubby forest of <i>Eucalyptus caleyi</i> , <i>Eucalyptus dealbata</i> and <i>Callitris</i> , and in yellow podsollic soil on granite in layered open forest.		This species is not recorded in the Moree locality, nor does the subject site contains suitable habitat for the species. It is therefore not considered important habitat for the species.	
Communities					
Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions	BC Act – EEC	The Brigalow community is a low woodland or forest community dominated by Brigalow (<i>Acacia harpophylla</i>), with pockets of Belah (<i>Casuarina cristata</i>) and Poplar Box (<i>Eucalyptus populnea subsp. bimbil</i>). Scattered remnants on the North West Slopes and Plains and Darling River Plains in NSW. This community has been extensively cleared for agriculture, with most surviving remnants along roadsides and paddock edges.	K	Low This EEC does not occur on the subject site, and the site is thus not considered important habitat.	No
Brigalow-Gidgee woodland/shrubland in the Mulga Lands and Darling Riverine Plains Bioregions	BC Act – EEC	This community occurs north of Bourke between the Culgoa and Warrego Rivers on soft red earths and heavy grey clays on level to slightly undulating plains. The structure of Brigalow-Gidgee ranges from woodland to shrubland and scrub depending on local conditions. The canopy is dominated by either Brigalow <i>Acacia harpophylla</i> or Gidgee <i>Acacia cambagei</i> with the other species being co-dominant or part of the shrub layer, depending on site disturbance.	P	Low This EEC does not occur on the subject site, and the site is thus not considered important habitat.	No
Carbeen Open Forest Community in the Darling Riverine Plains and Brigalow	BC Act – EEC	This was previously an open forest community of flora and fauna that may now exist as woodland or as remnant trees. Carbeen Open Forest Community is a distinctive plant community on the riverine plains of the Meehi, Gwydir, MacIntyre and Barwon Rivers and in small	K	Low This EEC does not occur on the subject site, and the site is thus not considered important habitat.	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
Belt South Bioregions		remnants farther south. It is found on flats and gentle rises of alluvial or aeolian sandy soils derived from ancient watercourses (it also occurs on some clay alluvial soils but is mostly restricted to well-drained sandy sites)			
Coolibah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penepplain and Mulga Lands Bioregions	BC Act – EEC	Abiotic factors that help define this community are that it typically occurs on grey self-mulching clays of periodically waterlogged floodplains, swamp margins, ephemeral wetlands and stream levees. The vegetative community provides characteristic habitat features of value to particular fauna, including a grassy understorey with scattered fallen logs, areas of deep-cracking clay soils, patches of thick regenerating Eucalyptus saplings, and large trees containing a diverse bark and foliage foraging resource and an abundance of small and large hollows.	K	Low This EEC does not occur on the subject site, and the site is thus not considered important habitat.	No
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	BC Act – EEC	This EEC occurs on alluvial soils of the South West Slopes, Brigalow Belt South and Darling Riverine Plains Bioregions. Mainly in the Dubbo-Narromine-Parkes-Forbes area. Tall woodland or open forest dominated by Fuzzy Box, often with Grey Box, Yellow Box, or Kurrajong.	K	Low This EEC does not occur on the subject site, and the site is thus not considered important habitat.	No
Marsh Club-rush sedgeland in the Darling Riverine Plains Bioregion	BC Act – EEC	Marsh Club-rush sedgeland is mainly restricted to the Gwydir wetlands but may occur elsewhere in the Darling Riverine Plains Bioregion. The community has a very highly restricted and fragmented geographic distribution. Its has suffered an extensive decline over past decades and the cumulative area remaining is much less than 800 ha. Marsh Club-rush sedgeland is associated with grey clay	K	Low This EEC does not occur on the subject site, and the site is thus not considered important habitat.	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		soils usually with a surface layer of organic matter several centimetres thick.			
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Penepplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	BC Act – EEC	This ecological community is scattered across the eastern parts of the alluvial plains of the Murray-Darling river system. Typically, it occurs on red-brown earths and heavy textured grey and brown alluvial soils within a climatic belt receiving between 375 and 500 mm mean annual rainfall. The structure of the community varies from low woodland and low open woodland to low sparse woodland or open shrubland, depending on site quality and disturbance history. The tree layer grows up to a height of about 10 metres and invariably includes <i>Acacia pendula</i> (Weeping Myall or Boree) as one of the dominant species or the only tree species present. The understorey includes an open layer of chenopod shrubs and other woody plant species and an open to continuous groundcover of grasses and herbs.	K	<p>Low</p> <p>This EEC does not occur on the subject site, and the site is thus not considered important habitat.</p>	No

Appendix 8 – Environmental Protection and Biodiversity Conservation Act 1999 – Assessment of Significance

EPBC Protected Matters Assessment

Matters of National Significance

The EPBC Act requires consideration of the effect of an action on the following 7 Matters of National Environmental Significance (MNES):

- World Heritage Properties
- National Heritage Places
- Ramsar wetlands of international importance
- Nationally threatened species and communities
- Migratory species protected under international agreements
- Nuclear actions, including uranium mining, and
- The Commonwealth marine environment.

The impact of an action on these matters is assessed under the criteria specified in: Matters of National Environmental Significance – Significant Impact Guidelines 1.1 (DoE 2013).

Consideration of EPBC Matters

A search was undertaken using the EPBC Protected Matters Search Tool (PMST) (DoEE 2020) to generate a list of World Heritage Properties, National Heritage Places, Ramsar wetlands and nationally threatened species, communities and migratory species protected under international agreements that may occur on or within a 5 kilometre radius of the proposed development (Figure 1).

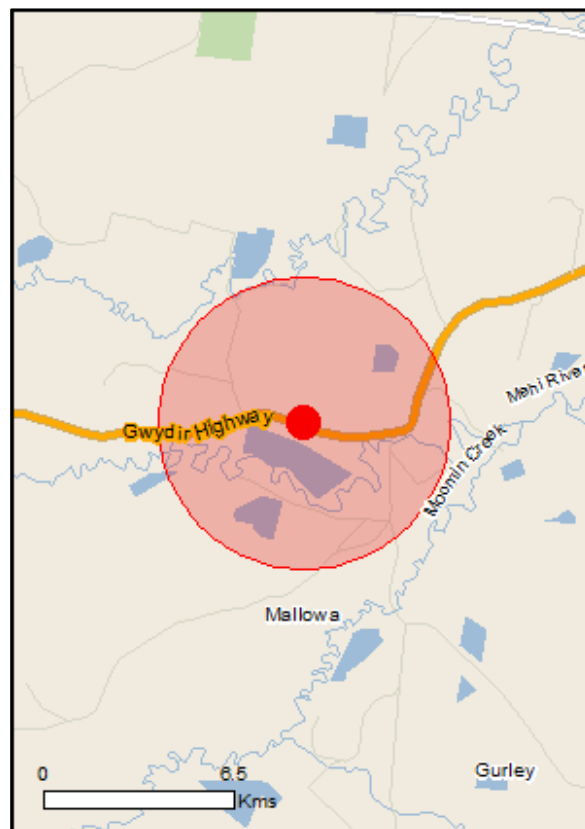


Figure 1: Region searched for MNES using the EPBC PMST

Results of Database Search

The EPBC PMST does not list any World Heritage Properties or National Heritage Places on or within the search area. The proposal is not considered to impact on this site or any other heritage matters. Further, the proposal does not involve nuclear actions or impact on the marine environment; consequently, these matters are also not relevant to this assessment.

Nationally threatened species and migratory species protected under international agreements have been initially defined within the search area outlined in Figure 1 using the PMST. These species are listed in Tables 1 and 2.

Table 1: Threatened flora and fauna species predicted or known to occur on the proposal area

Category	Scientific Name	Common Name	Legal Status
Birds	<i>Botaurus poiciloptilus</i>	Australasian Bittern	Engandered
	<i>Botaurus poiciloptilus</i>	Curlew Sandpiper	Critically Endangered
	<i>Falco hypoleucos</i>	Grey Falcon	Vulnerable
	<i>Geophaps scripta scripta</i>	Squatter Pigeon (southern)	Vulnerable
	<i>Grantiella picta</i>	Painted Honeyeater	Vulnerable
	<i>Hirundapus caudacutus</i>	White-throated Needletail	Vulnerable
	<i>Polytelis swainsonii</i>	Superb Parrot	Vulnerable
	<i>Rostratula australis</i>	Australian Painted Snipe	Endangered as <i>Rostratula australis</i> ; Listed Marine as <i>Rostratula benghalensis</i> (sensu lato)
Mammals	<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Vulnerable
	<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat, South-eastern Long-eared Bat	Vulnerable
	<i>Phascolarctos cinereus</i> (combined populations of NSW, QLD & ACT)	Koala (combined populations of NSW, QLD & ACT)	Vulnerable
Fish	<i>Maccullochella peelii</i>	Murray Cod	Vulnerable
Reptiles	<i>Anomalopus mackayi</i>	Five-clawed Worm-skink, Long-legged Worm-skink	Vulnerable
Plants	<i>Cadellia pentastylis</i>	Ooline	Vulnerable
	<i>Dichanthium setosum</i>	Bluegrass	Vulnerable
	<i>Lepidium monoplacoides</i>	Winged Pepper-cress	Endangered
	<i>Swainsona murrayana</i>	Slender Darling-pea, Slender Swainson, Murray Swainson-pea	Vulnerable

CAMBA = China Australia Migratory Bird Agreement; JAMBA = Japan Australia Migratory Bird Agreement; ROKAMBA = Republic of Korea Australia Migratory Bird Agreement; Bonn = Convention on the Conservation of Migratory Species of Wild Animals

*Only species listed as likely or known to occur within the area have been listed above. Species listed as may occur have been discounted from the list.

Table 2: Migratory species predicted to occur on the proposal area

Category	Scientific Name	Common Name	Legal Status
Migratory Marine Birds	<i>Apus pacificus</i>	Fork-Tailed Swift	Listed Migratory (CAMBA, JAMBA, ROKAMBA); Listed Marine
Migratory Terrestrial Species	<i>Hirundapus caudacutus</i>	White-throated Needletail	Vulnerable
	<i>Motacilla flava</i>	Yellow Wagtail	Listed Migratory (CAMBA, JAMBA, ROKAMBA); Listed Marine
	<i>Myiagra cyano-leuca</i>	Satin Flycatcher	Listed Migratory (Bonn); Listed Marine
Migratory Wetland Species	<i>Actitis hypoleucos</i>	Common Sandpiper	Listed Migratory (Bonn, CAMBA, JAMBA); Listed Marine as <i>Actitis hypoleucos</i> Listed Migratory (ROKAMBA) as <i>Tringa hypoleucos</i>
	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Listed Migratory (Bonn, CAMBA, JAMBA, ROKAMBA); Listed Marine
	<i>Calidris ferruginea</i>	Curlew Sandpiper	Critically Endangered; Listed Migratory (Bonn, CAMBA, JAMBA, ROKAMBA); Listed Marine
	<i>Calidris melanotos</i>	Pectoral Sandpiper	Listed Migratory (Bonn, CAMBA, JAMBA, ROKAMBA); Listed Marine
	<i>Gallinago hardwickii</i>	Latham's Snipe, Japanese Snipe	Listed Migratory (Bonn, JAMBA, ROKAMBA); Listed Marine
	<i>Tringa nebularia</i>	Common Greenshank, Greenshank	Listed Migratory (Bonn, JAMBA, CAMBA, ROKAMBA); Listed Marine

CAMBA = China Australia Migratory Bird Agreement; JAMBA = Japan Australia Migratory Bird Agreement; ROKAMBA = Republic of Korea Australia Migratory Bird Agreement; Bonn = Convention on the Conservation of Migratory Species of Wild Animals

*Only species listed as likely or known to occur within the area have been listed above. Species listed as may occur have been discounted from the list.

The PMST also identified a range of threatened ecological communities which have the potential to be present within the study area. However, no threatened ecological communities were identified within the proposed development site during site inspection and therefore it is considered that the proposed development will not pose a risk to ecological communities protected under the EPBC Act.

The PMST identified four Ramsar wetlands downstream of the proposed development:

- Banrock Station Wetland Complex located 1000-1100km downstream;
- The Coorong, Lake Alexandrina and Albert wetland located 1100-1200km downstream from the subject site.

The distance between the source and receptor is considerable, in particular when taking the small-scale nature of the proposed into account. The proposal has minimal potential for impact on these wetlands.

Study Area Delineation

The potential impacts of the proposed development are predicted to be minimal. The proposed works will be undertaken in accordance with best practice work methods to protect environmental values, which will include measures such as minimising the footprint of site disturbance and the implementation of erosion and silt control measures. A weed management program will also be implemented to ensure that the site does not become a source of weed populations which may propagate out from the development site. Overall, the development is not predicted to interfere with habitat values adjacent to the site.

Therefore, it is considered that the extent of impact of the proposed development is limited to the footprint of disturbance on site (i.e. the subject site).

Assessment of Significance

Vulnerable Species

An action has, or will have, or is likely to have a significant impact on a vulnerable species if it does, will or is likely to:

- ***Lead to a long-term decrease in the size of an important population of species***

The proposed development will involve the removal of a small number of native shrubs, and 7 Ha of non-native groundcover vegetation. The site has been preferentially selected due to its history of clearing and disturbance. The subject site is not considered to constitute preferred habitat for any of the listed vulnerable species.

Bluegrass is the only vulnerable species which was noted on site during the site inspection. This was recorded as occasional in the groundlayer. The removal of groundcover over 7Ha, which would contain a limited number of individuals, is not considered likely to lead to a decrease in the size of an important population of Bluegrass, as the site is not considered to support an important population of the species, and higher-quality woodland habitat in the vicinity of the site also provides potential habitat for the species. Continued germination of Bluegrass in the area would sustain the local population of the species in the area.

It is possible that a range of fauna species may forage or otherwise utilise the site. However, the habitat value of the subject site is not considered to be significant, as the site is heavily disturbed, with existing weed presence. The long-term impact of the proposed development upon threatened flora and fauna species is therefore considered to be minimal, as there would be no long-term decrease in habitat availability or quality for these species.

- ***Reduce the area of occupancy of an important population***

Overall, the total area to be disturbed by the solar farm development will be small (approximately 7 Ha) and will occur on a previously disturbed site, currently dominated by non-native flora species. The disturbance associated with the development is therefore not

considered to pose a risk to the long-term survival of any threatened species or ecological community within the locality.

- ***Fragment an existing important population into two or more populations***

The study area of the proposed development consists of land which has been previously cleared and heavily disturbed. The habitat value of this land for threatened species is considered to be limited and is already considered to contribute to the fragmentation of the landscape by having been historically cleared.

- ***Adversely affect habitat critical to the survival of a species***

It is unlikely that the habitat area to be impacted consists of critical habitat for any of the species identified above. The groundcover to be impacted by the proposed development is considered heavily disturbed, with the area mix of native and non-native species, including the presence of invasive weed species. Therefore, the site is not considered to be critical habitat for any of the listed vulnerable species.

Further, implementation of mitigation measures during the construction period (including erosion and sediment controls) will minimise the risk of any off-site impacts which may occur in association with the proposed development.

- ***Disrupt the breeding cycle of an important population***

The study area does not offer any critical habitat features, such as water bodies or tree hollows, which are of ecological significance for the breeding cycle of the identified threatened species. None of the listed threatened species are likely to breed or reside long-term within the subject site and are only predicted to utilise the area during times of duress (i.e. when food cannot be found in more suitable habitats). Given the modified nature of the site and the small area of vegetation to be impacted, the proposal is not considered likely to disrupt the breeding cycle of any important population within the study area.

- ***Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline***

The footprint of the proposed works is deemed to be minor. Disturbance of such a limited area of habitat is not predicted to result in a decline of vulnerable species populations within the locality and/ or region.

- ***Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat***

Construction machinery may also transport weed seeds onto the site, and may promote the propagation of existing weeds onsite. Weed management strategies will be implemented on site to minimise the risk of weed establishment and proliferation as a result of construction

activities on site. Examples of weed management strategies include adoption of proper hygiene procedures to minimise the potential for seed transport onto and off the work site.

Once the site is operational, the site will be regularly maintained to minimise the occurrence of weeds within the disturbance footprint of the site. The site is therefore not considered to increase the risk of establishment of invasive species.

- ***Introduce disease that may cause the species to decline, or***

The development relates to the construction of a solar farm and therefore does not involve introduction of disease vectors into the locality, the development is not considered to pose a disease risk to native species.

- ***Interfere substantially with the recovery of the species***

Ensuring the recovery of a species generally involves the protection and enhancement of existing populations and habitat, by preventing further clearing and modification of native vegetation communities and protecting water quality values.

The proposed development footprint is located on an area which consists of previously cleared and disturbed native and non-native groundcover. Given the small-scale nature of the proposed works and the availability of higher quality habitat with the area, the proposal is not considered to have the potential to cause significant impacts on existing flora and fauna populations or habitat.

Overall, the development is not considered to pose a risk to the recovery of vulnerable species within the region.

Critically Endangered and Endangered Ecological Communities

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

- ***Reduce the extent of an ecological community***
- ***Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines***
- ***Adversely affect habitat critical to the survival of an ecological community***
- ***Modify or destroy abiotic (non-living) factors (such as water, nutrients or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns***
- ***Cause substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting***
- ***Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:***

- *Assisting invasive species, that are harmful to the listed ecological community, to become established, or*
- *Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or*
- *Interfere with the recovery of an ecological community*

No Endangered Ecological Communities (EECs) were identified within the proposed development site, such that no direct impacts shall occur to EECs. The impacts of the proposed development will be limited to the proposed development footprint (as discussed above), through the implementation of best practice management measures such as silt and erosion measures and weed management measures. As a result, the proposed development will not impact upon threatened ecological communities which may be present within the region.

The area of remnant vegetation located in the vicinity of the proposal site was consistent with PCT 39, which is associated with a threatened ecological community. This area is not included within the development footprint and should be avoided during construction activities.

Critically Endangered and Endangered Species

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- ***Lead to a long-term decrease in the size of a population***

Similarly, to vulnerable species, the proposed development site is not considered to constitute preferred habitat for endangered or critically endangered species. It should be noted that no endangered or critically endangered flora species were observed on site during the site inspection. It is possible that a range of fauna species may forage or otherwise utilise the site. However, the habitat value of the subject site is not considered to be significant, as the site is heavily disturbed, with existing weed presence. Therefore, it is unlikely that the proposed development will lead to a long-term decrease in populations of endangered or critically endangered species within the region.

- ***Reduce the area of occupancy of the species***

Overall, the total area to be disturbed by the solar farm development will be small and has been preferentially located on a previously cleared and disturbed site. Modification of the site as a result of the proposed development is therefore unlikely to reduce the area of occupancy of identified species.

- ***Fragment an existing population into two or more populations***

As outlined above, the development will not result in habitat fragmentation, and is therefore not considered to pose a risk of fragmenting populations of endangered or critically endangered species which may be present within the locality.

- ***Adversely affect habitat critical to the survival of a species***

There is no critical habitat for identified endangered and critically endangered species on the proposed development site.

- ***Disrupt the breeding cycle of a population***

The subject site is not considered to contain suitable breeding habitat for endangered or critically endangered species.

- ***Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline***

Whilst modification of potential habitat may occur as a result of the proposed development, this modification will occur on a small scale. Further, the habitat values within the zone of impact of the proposed works are considered limited due to the previous historical clearing. The development is therefore not predicted to result in a decline of endangered or critically endangered species within the region.

- ***Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the critically endangered or endangered species' habitat***

Weed management strategies will be implemented on site to minimise the risk of weed establishment and proliferation as a result of construction activities on site. Once the site is operational, the site will be regularly maintained to minimise the occurrence of weeds within the disturbance footprint of the site. The site is therefore not considered to increase the risk of establishment of invasive species.

- ***Introduce disease that may cause the species to decline, or***

The development relates to the construction of a solar farm and therefore does not involve introduction of disease vectors into the locality, the development is not considered to pose a disease risk to native species.

- ***Interfere substantially with the recovery of the species***

Ensuring the recovery of a species generally involves the protection and enhancement of existing populations and habitat, by preventing further clearing and modification of native vegetation communities and protecting water quality values.

The proposed development footprint is located on an area which consists of previously cleared and disturbed native and non-native groundcover. Given the small scale nature of the

proposed works and the availability of higher quality habitat with the area, the proposal is not considered to have the potential to cause significant impacts on existing flora and fauna populations or habitat.

Overall, the development is not considered to pose a risk to the recovery of vulnerable species within the region.

Listed Migratory Species

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- ***Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for migratory species***

Important habitat for a migratory species is defined as habitat which is:

- Utilised by migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species, and/or
- Of critical importance to the species at particular life cycle stages, and/or
- Utilised by a migratory species which is at the limit of the species range, and/or
- Within an area where the species is declining.

The definition of an ecologically significant proportion of a migratory species varies depending on the characteristics of each species. Factors which should be considered in determining an ecologically significant proportion include the species' population status, genetic distinctiveness and species-specific behavioural patterns (such as site fidelity and dispersal rates).

The subject site is heavily cleared and does not offer important habitat features for migratory species (such as suitable trees for roosting, or water-based habitats such as swamps or marshes for foraging). It is therefore unlikely that migratory species would utilise habitat available within the study area.

Whilst it is possible that migratory species could forage at the subject site whilst enroute during migration, this is considered to be unlikely.

The development will therefore not negatively impact upon migratory species.

- ***Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or***

As outlined above, weed management strategies will be implemented prior to and upon completion of the proposed works to minimise the risk of weed establishment and

proliferation as a result of soil disturbance and movements on site. Provided these measures are implemented in an appropriate manner, the proposed development is unlikely to result in the establishment of an invasive species on the site. The proposed development will therefore not impact upon important habitat for migratory species, either directly or indirectly.

- ***Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species***

The proposal is not considered a risk to the lifecycle of the listed migratory species.

Assessment of Significance Conclusions

The proposed development site is not considered to constitute important habitat for identified species. Disturbance of such a small area is considered unlikely to have a significant impact on flora and fauna, given the presence of higher quality vegetation within the area.

It is the conclusion of this assessment that there will be no significant long-term impacts on any listed ecological community, threatened or migratory species of national environmental significance as a consequence of the proposed development, provided:

- No clearing of vegetation is carried out outside of the proposed development footprint, and the area of adjacent remnant vegetation consistent with PCT 39 is avoided;
- The construction and operation of the proposed solar farm are carried out in accordance with best management practices and relevant guidelines;
- Appropriate erosion and sediment controls are implemented during construction, to ensure that construction works occur in accordance with environmental best practice and that off-site impacts are minimised; and
- Environmental management measures, such as a weed management program, are implemented throughout the project life cycle to minimise adverse impacts and to ensure that works are conducted in accordance with environmental best practice.