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STATEMENT OF ENVIRONMENTAL EFFECTS

APPLICATION FOR SOLAR FARM DEVELOPMENT

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

May 2025

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DOCUMENT CONTROL

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Proponent	Hiringa Sundown Project Trust
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2	February 2025	Peter Taylor	Final Issue
3	7 May 2025	Peter Taylor	Revised traffic assessment

EXECUTIVE SUMMARY

Applicant:	Hiringa Sundown Project Trust Greenhouse Tech Hub, Level 2, Salesforce Tower, 180 George Street, Sydney, NSW 2094 ABN: 43 785 996 586
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 and storage
Permissibility:	The proposed development is permissible with consent under the State Environmental Planning Policy (Transport and Infrastructure) 2021
Type of Development:	Regional Development under the State Environmental Planning Policy (Planning Systems) 2022
Capital Investment Value:	\$28,876,458 (including GST)
Consent Authority:	The consent authority is the Northern Joint Regional Planning Panel

Proposed Development - Summary

Wathagar Solar Farm Stage 2 involves the construction and operation of a solar farm adjacent to the existing Stage 1 Solar Farm and will be the primary power supply for the Good Earth Green Hydrogen and Ammonia (GEGHA) Project to be constructed on the western side of this site. The GEGHA Project is the subject of a separate application for approval.

The Wathagar Solar Farm Stage 2 development will consist of:

- Civils to prepare the site;
- Fixed PV array structures. The PV module will be sourced from a global Tier 1 supplier;
- 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;
- Battery storage containers with up to 30 MWh of combined storage capacity;
- Associated cabling, communications, and switching infrastructure;
- Surrounding chain link fence with gates for access.

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1 Introduction

SMK Consultants has been engaged by the proponent, Hiringa Sundown Project Trust 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 with electrical storage 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 Environmental Planning and Assessment Act ('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	Hiringa Sundown Project Trust
ABN	43 785 996 586
Address	Greenhouse Tech Hub, Level 2, Salesforce Tower 180 George Street Sydney NSW 2094
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 in NSW and is a key Consultant in providing support for continued economic growth for many of NSW'S North-West Government regions. SMK Consultants has been actively involved in more than 20-solar farm development projects.

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

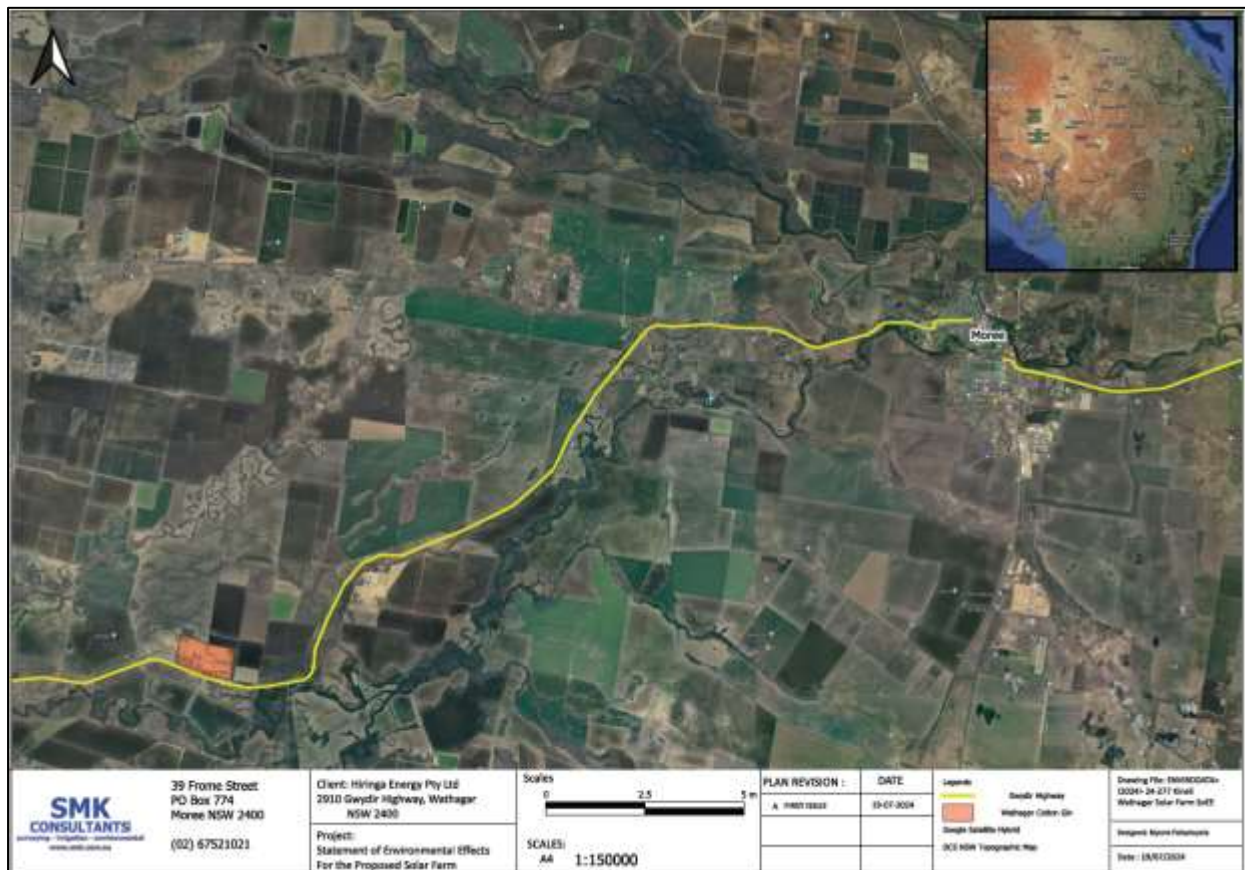
- **Peter Taylor** BSc MEIANZ CIAg LAA
- **Biyomi Plakadapela** BSc, MSc

2 Site Analysis

2.1 Site Location

The proposed development site is located off the Gwydir Highway adjacent to the existing Wathagar Cotton Gin. The site address is 2910 Gwydir Highway, Wathagar. The site is located approximately 33 kilometres south-west of Moree in north-west New South Wales. A locality plan showing the site in relation to the township of Moree is presented in Figure 1.

Figure 1: Solar Farm Site Location



2.2 Property Description and Background

The Wathagar Cotton Gin has been the property's central feature since the mid-1980s. In 2023, the Wathagar Solar Farm (referred to as Stage 1) was constructed to help decarbonise the energy-intensive cotton processing operations. This current application proposes a second stage expansion of the Wathagar Solar Farm, aimed at increasing the site's renewable generation and supporting the Good Earth Green Hydrogen and Ammonia (GEGHA) Project.

The GEGHA Project intends to establish an integrated solar energy-to-hydrogen and ammonia plant on a site adjacent to the Wathagar Cotton Gin. Its primary objective is to produce green hydrogen and ammonia to supply local and regional markets. The Wathagar Solar Farm Stage 2 will primarily supply the GEGHA plant whilst retaining the capacity to supply power into the grid.

This application focuses solely on the second stage of the Wathagar Solar Farm, which will involve the construction and operation of a 27 MW (DC) off-grid solar farm with associated battery storage.

This project is the first Phase of the GEGHA Project, and distinct from the second phase consisting of the ammonia and hydrogen production plant, with separate approval pathways, and regulatory requirements.

The second stage solar farm will be located on **Lot 2 in Deposited Plan 773266**, within the Parish of Wathagar in the Moree Plains Shire. The site covers approximately 168 hectares and has a long history of industrial use, beginning with the construction of the Wathagar Cotton Gin in the 1980s. The cotton gin, jointly owned by Namoi Cotton Corporation and Sundown Pastoral Company, continues to operate as the primary structure on the property.

The property owners support the solar farm expansion, as Stage 1 already supplies electricity to the cotton gin, and Stage 2 will expand renewable energy supply to the gin and provide renewable energy to the planned hydrogen and ammonia plant. Sundown Pastoral are also a Joint Venture partner in the GEGHA development. The subject land is zoned **RU1 – Primary Production** within the Moree Plains Local Environmental Plan 2011.

The solar farm construction site has historically been used for cotton product storage and was cleared of native vegetation in the mid-1980s during the construction of the cotton gin. The Wathagar Solar Farm Stage 2 will be located immediately west of the existing Stage 1 solar farm, within an area of approximately 31.5 hectares that has been previously cleared and developed.

The surrounding area consists primarily of cropland to the north, east, and west, with travelling stock routes along the Mehi River to the south. The site has frontage to the Gwydir Highway corridor but no direct highway access. Access to the development will utilise the existing entry point for the Wathagar Cotton Gin.

The proposed solar farm will feature:

- A development footprint limited to previously cleared land associated with the cotton gin.
- Renewable energy infrastructure designed to power the cotton gin and GEGHA Project, facilitating a broader transition to sustainable energy use.

A detailed plan illustrating the development footprint is included as Figure 2 with Stage 2 of the Wathagar Solar Farm highlighted in green.

Figure 2: Preliminary Layout.



2.3 Site Constraints

Essential Energy owns and operates the Wathagar Substation, which is located within Lot 2 DP773266. The substation is located immediately east of the existing solar farm.

The substation includes a 5 MVA 66/22 kV transformer and corresponding switchgear. The substation is connected to the Transgrid Moree 132/66 kV substation via Essential Energy's 66 kV transmission lines. The substation provides power to the cotton gin but can also be used to return any excess electricity from the solar farm to the transmission network.

The subject site is identified as both bushfire prone and subject to flooding under Local Environmental Plan mapping. The solar farm will be developed so that no vegetation can grow beneath the solar panels and will have a cleared zone around the panels as part of the asset protection zone.

The development site is flood protected by an approved levee bank which surrounds the Wathagar Cotton Gin and proposed solar farm development. The site is flood free as a result of this levee bank.

Bushfire and flooding are further discussed in Section 5.14.1 of this report.

The site is flat and at present has limited drainage. Drainage of the site is considered a constraint and therefore the proposal includes land levelling of the site to establish drainage.

No other constraints are present.

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 with respect to land use conflict. The closest permanent residence is the gin manager's residence, approximately 950 metres to the east. Four farm residences are located approximately 1100m west of the Solar Farm on the surrounding property of Wathagar (owned by Sundown Pastoral) The nearest farm residence not associated with the cotton gin or Sundown Pastoral land is located approximately 3.7 km southeast of the solar farm.

2.5 Site Suitability

The subject site is zoned RU1 – Primary Production. It currently supports a cotton gin, infrastructure for the cotton gin and stage 1 of the Wathagar Solar Farm.

The land available for construction of the Wathagar Solar Farm Stage 2 is relatively flat and has been developed for storage of cotton materials associated with the cotton gin. The area

is well drained and contained within the controlled drainage system of the Wathagar Cotton Gin. It is located within an approved floodwork bank and therefore the area is flood protected.

The site is presently connected to Essential Energy's 22kV network via the operational Stage 1. There is flexibility within Wathagar Solar Farm Stage 2 electrical design to export from Stage 2 to the grid via the existing Stage 1 connection (subject to Essential Energy approval of an updated connection agreement) as the expansion of grid infrastructure permits. This may require establishment of an additional dedicated connection point.

The area and region in general are 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 32 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 shows the average daily solar exposure for New South Wales for the 12-month period between July 1st, 2023 and June 30th, 2024. Moree Plains LGA received an average of between 18 and 20 MJ/m² each day, placing it within the second-highest area receiving solar radiation in New South Wales.

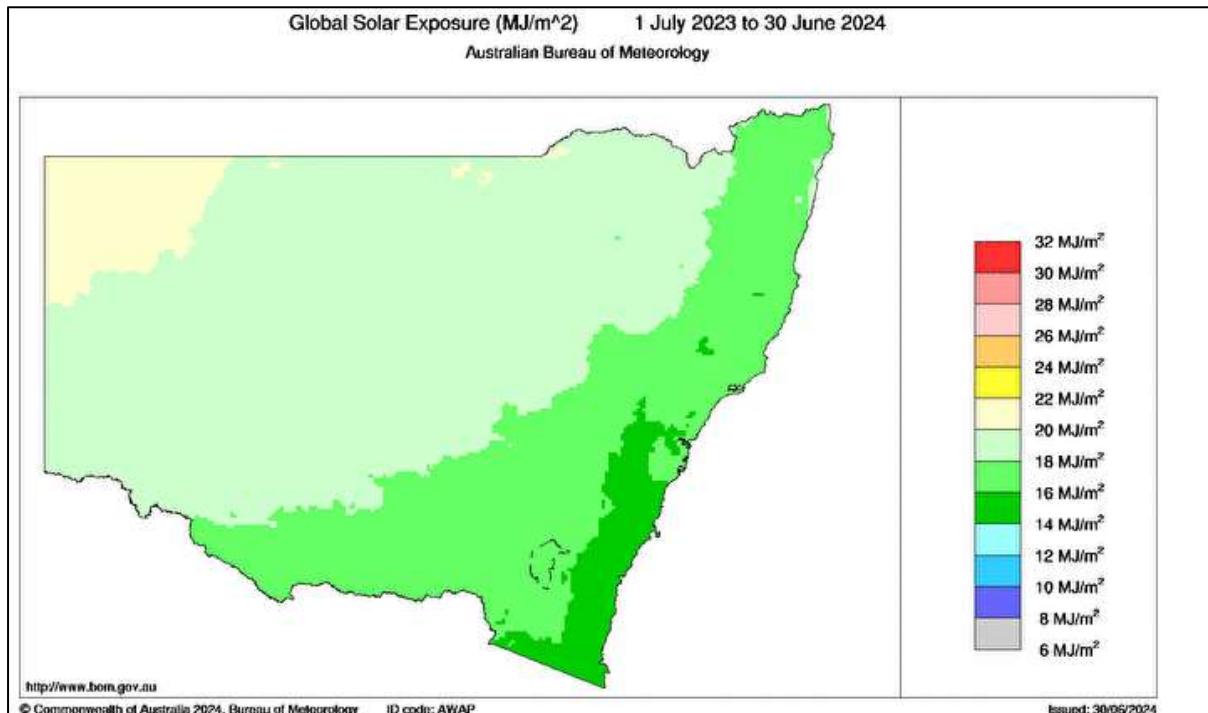
Figure 3: Average Daily Solar Exposure for NSW.

Table 2 Provides the mean daily solar exposure measured at Moree BOM site (Station number 053115), the closest measuring station to the proposed Wathagar Solar Farm site. The annual average is 19.6MJ/m² (1990-2023).

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

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
26.7	24.0	21.1	17.0	13.4	11.3	12.3	15.6	19.6	22.8	24.9	26.8	19.6

Source: Climate Statistics, BOM (July 2024).

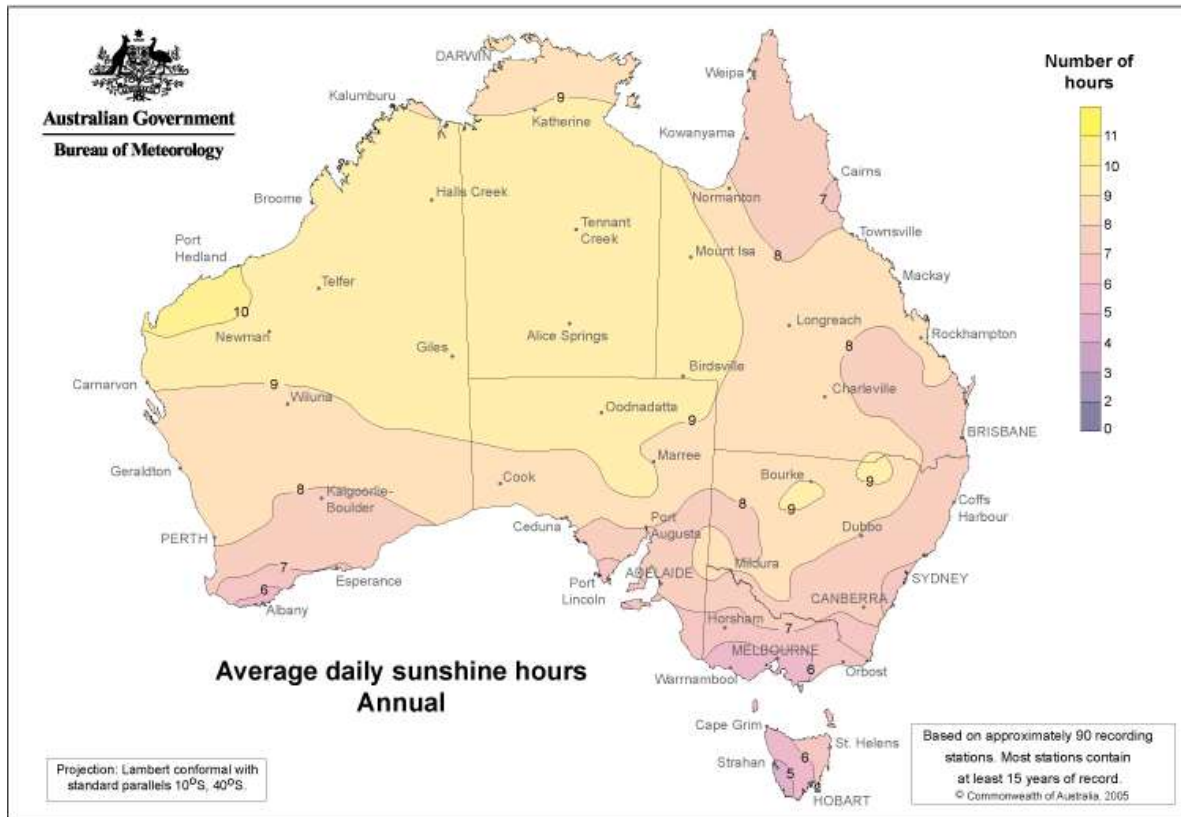
Figure 4 Shows the average daily hours of sunshine across Australia. Moree Plains LGA receives an average of 7 to 8 hours of sunshine each day.

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 proposed development involves the construction and operation of a **solar farm with integrated battery storage** to primarily support local energy loads, including the co-located cotton gin and a hydrogen and ammonia production facility.

This solar and storage proposal is an expansion or second stage of a solar farm development (Wathagar Solar Farm) which was constructed in 2023, and will leverage the existing grid connection with the network operator, Essential Energy.

The development will consist of:

- Photovoltaic (PV) panels mounted in a dual east-west static configuration using a PEG framing system;
- PV modules will be sourced from a global Tier 1 supplier;
- Inverter/transformer stations ;
- Battery storage containers with up to 30 MWh of combined storage capacity;
- Associated cabling, communications, and switching infrastructure, surrounding chain link fence with double leaf gate;
- Minor earthworks for site preparation and maintenance of existing roads within the cotton gin development;
- Associated cabling, communications, switching apparatus;
- Perimeter security fencing.

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

3.2 Project Access

Two access options are proposed to enable construction and operation of the Solar Farm, mainly:

1. Utilise the main access off the Gwydir Highway into the Wathagar Cotton Gin for the purposes of the project. This would be upgraded with a Basic Left Turn (BAL) and Basic Right Turn (BAR) turn treatment for a 26 metre long B-Double design vehicle. The upgrade will result in modest shoulder widening and a removal of up to two planted trees.

The timing of the works to upgrade the access are to be confirmed.

2. Access to site via Watercourse Road, Goonal Road and via internal roads on Sundown Pastoral Co's Keytah property. This option was used for the Wathagar Solar Farm Stage 1 and would be utilised if the Wathagar gin entry upgrade is not operational at the commencement of construction.

The solar farm development proposes to use the existing entrance/ exit off the Gwydir Highway into the Wathagar Cotton Gin. A relatively small upgrade is proposed to improve access.

The Project is entitled to a Right of Way over the Travelling Stock Route (7300/DP1161855) via s75 of the Local Land Services Act, 2013. This was constructed in the 1980s when the cotton gin was built. The project will be seeking a Crown land licence to authorise the upgrade of the intersection and entrance road across Crown Reserve R31046. The Crown land licence will include an assessment of Native Title during the application evaluation process.

Additionally, the Project will seek a Works Authorisation Deed via Transport for NSW to enable the upgrade of the intersection within the road corridor. Engagement has commenced with the dedicated case officer for the Project within the renewables team at Transport for NSW.

Local Land Services have been consulted and attended site in October 2023 for a joint inspection with the applicant's Planning and Engagement lead. Their primary interest in the upgrade is to ensure that the function of the travelling stock reserve is maintained and passage/ traversing of stock is not impeded by the upgrade. They also endorsed consultation with Crown lands. Crown lands have been engaged via the local Moree office who have been briefed on the Project and have provided detailed advice and support in relation to facilitating the upgrade.

The applicant has engaged a specialist traffic engineer who is experienced in design of road upgrades and facilitating Works Authorisation Deeds in NSW. They are being supported locally by SMK Consultants to ensure a fit-for-purpose design is delivered to an acceptable standard.

Existing internal access roads associated with the Wathagar gin will be used for the traffic generated by the Solar Farm prior to completion of the Wathagar gin entry upgrade. This would involve access via Watercourse road and Goonal road prior to entry on to private, internal roads.

No new internal roads are required. The applicant will enter into an agreement with the landowner to enable access to the Project footprint via these existing internal roads for the construction of the Wathagar solar farm stage 2. The construction access arrangement via Watercourse Road and Goonal Road was utilised effectively during construction of the Wathagar Solar Farm Stage 1.

Existing internal access tracks associated with the Wathagar gin will be utilised to deliver the containerised equipment for construction of the solar farm and by workers involved in the construction. There will be some upgrades to these internal roads.

3.3 Infrastructure

The solar farm will utilise solar photovoltaic (PV) panel technology mounted in 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 solar farm will be designed in accordance with all applicable standards as well as the requirements of Essential Energy and the National Electricity Rules (NER).

3.3.1 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.

3.3.1.1 Structure Height

The PV modules will be mounted on steel rods that will be pushed into the ground. The framing has a minimum height above ground level of 700mm and a maximum height of 1100mm. A site-specific structural certificate will be prepared and included as part of the application for a Construction Certificate following development consent.

3.3.2 Combined Inverter and Transformer Stations

The inverter stations convert DC power into AC power, which in turn supplies the local load at the cotton gin and later the GEGHA Plant. It will also be capable of feeding into Essential Energy's 22kV distribution network when a connection to that network is approved.

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: An example of an Inverter Station



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.

The Inverter and Transformer stations will be mounted on a skid above the 1-percent AEP flood level.

3.3.3 Battery Storage Containers

Battery Energy storage containers with a combined storage capacity of up to 30 MWh will be included in the development. The containers would each be standard sized shipping containers, and the battery chemistry will be lithium-iron-phosphate. The site is located within an existing approved levee which protects the assets of the solar farm from flooding.

An example of a battery storage container is shown **Figure 6**.

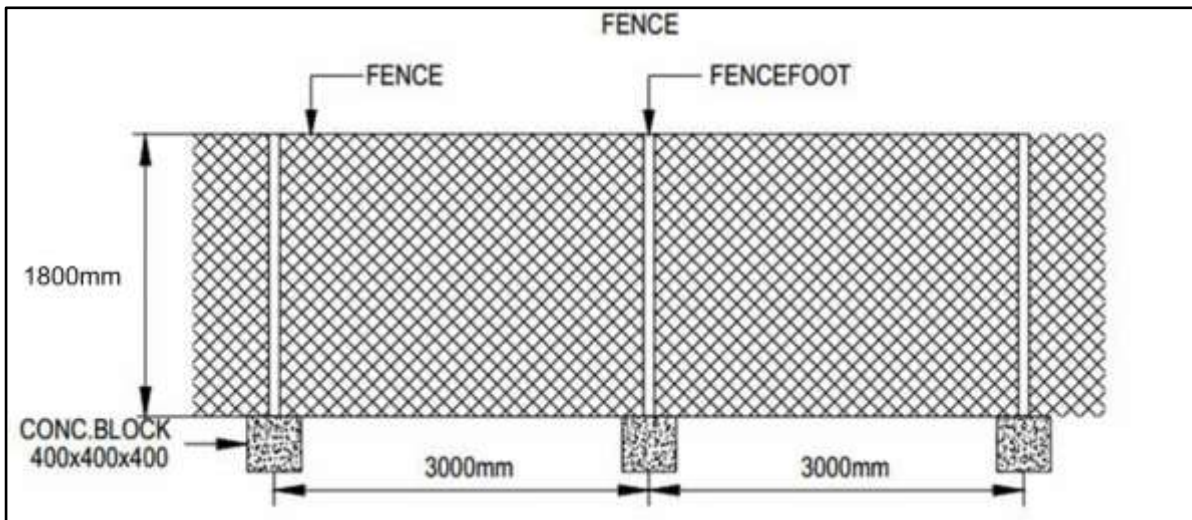
Figure 6: An example of a battery storage container.



3.3.4 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

This fence is required to control access into the solar farm.

Figure 7: Indicative Security Fence

3.4 Construction

3.4.1 Civil Works

The site to be occupied by the solar farm has previously been used for storage of raw cotton bales and cotton waste. The area has been subjected to minor land levelling which involved grading of the land to improve drainage.

The initial stage of construction will involve the removal of all cotton waste from the site. This cotton waste, a byproduct of the cotton ginning process, is a valuable source of organic matter and is primarily used to enhance soil quality in cultivation paddocks. Typically, the waste is redistributed across the original cotton paddocks where the cotton was grown and subsequently processed through the cotton gin. This practice ensures sustainable use of organic materials while preparing the site for development.

Following the removal of cotton waste, the solar farm area will be graded and shaped using a laser bucket. This process will utilise RTK GPS-controlled land leveling technology to establish a consistent slope across the site. The grading will be designed to promote effective drainage, directing stormwater runoff toward the southern and western boundaries of the site. The runoff will then be captured by the existing internal stormwater drainage system, which was originally developed to support the operations of the cotton gin. This approach ensures proper water management and integration with the site's existing infrastructure.

It is intended that upon completion of land leveling, a thin layer of gravel material, ranging in depth from 15mm to 25mm, will be applied across the site to establish a uniform base for the solar farm development. The gravel will be evenly distributed using either a land-leveling grader blade or an advanced grader equipped with RTK GPS technology and a machine control file. These methods ensure the gravel layer aligns precisely with the slope established during the land leveling process. Once the gravel is uniformly spread, the site will be fully prepared for the commencement of solar farm construction activities.

3.4.2 Installation Philosophy

The solar farm installation philosophy will feature cascading activities to construct each PEG EW block 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.

At the same time, the security fencing will be erected so that it is completed when the solar farm is completed and ready to be commissioned.

3.4.3 Construction Timeline

Construction is estimated to take approximately 20 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;
- Removal of waste and demobilisation of construction equipment.

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, 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. Electrical works will be completed by specialist electricians.

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

3.4.4 Construction Workforce

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

- Civil contractor to undertake site preparation;
- 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;
- Fencing contractor to install the security fencing.

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 up to thirty-three staff, including electricians on-site.

3.4.5 Construction Hours

Construction activity will be consistent with the Interim Construction Noise Guideline (DECC, 2009) recommended standard hours. Normal work hours will be limited to 7:00 am to 6:00 pm Monday to Friday and 8:00 am to 1:00 pm Saturday. Where possible work on Sundays and or Public Holidays will occur to allow specialists brought to the site to continue working. The use of heavy machinery will be restricted on Sundays and public holidays; however, the site is isolated and the adjoining cotton gin operates 24/7 during the ginning season which has established a precedent for site operations. Operations outside of these standard hours is not predicted to impact the surrounding residences as the adjoining farm operates on a 24/7 basis.

3.4.6 Construction Traffic

The construction traffic will consist of light vehicles (such as 4WD utilities to transport construction workers and tools to and from the site) and standard heavy articulated vehicles to deliver PV modules, framing, inverters, and BESS containers to site. The standard truck to be used for delivery of materials to this site and site operations will be a 26m long B-double unit.

The proposed development does not require any oversize deliveries. It is anticipated that approximately six over-mass vehicles may be utilised to transport battery containers to the site. These will consist of standard containers with an estimated weight of up to 41 tonnes.

Additional detail regarding traffic data is contained within section 5.17.

3.5 Land Management

Management of the site once the solar farm is constructed will involve keeping the site in a vegetation free state to the fullest extent possible. Mowing will occur where that is appropriate and where accessible. Biodegradable and quick knock-down type herbicide will be used 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 is considered as regional development. Electricity generating works with a capital investment value of more than \$5 million and less than \$30 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 \$28.8 million (including GST) and accordingly is considered “Regional Development”. The Northern Regional Planning Panel (NRPP) is therefore authorised to exercise the consent authority functions of Council to issue and approval.

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 5. 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 AC of electrical power.

The proposed new development will generate a maximum of 18 Megawatts AC of electrical power for off-grid use, and will deliver less than 5 Megawatts of AC power to the grid. Therefore, the proposal is not considered a 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.

The solar farm does not require an Environment Protection Licence under the POEO Act 1997.

The levee bank around this site has an existing flood work approval issued under the Water Management Act 2000. No changes are requested for this levee bank.

4.3.1.3 Assessment Requirements

Clause 4.15 of Division 4.3 of the EP&A Act outlines matters for consideration which a consent authority must take into consideration in determining an application. 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 addresses the factors in accordance with the EP&A Act.

4.3.2 Biodiversity Conservation Act

The Biodiversity Conservation ('BC') Act outlines requirements in relation to the listing of threatened species, biodiversity impact assessment, offsetting and related offences.

It provides a standard method of evaluating biodiversity impact and calculating any associated biodiversity offsets.

The subject Lot was assessed using the online Biodiversity Offsets Scheme (BOS) Entry Tool, which determines whether any proposed clearing would be above or below the standard native vegetation clearing area thresholds or lies within an area mapped as having high biodiversity value.

According to BOS, the native vegetation clearing threshold area for the subject site is 1 hectare. A minor area of less than 1 hectare of native vegetation will be disturbed to enable construction of the upgrade works for the Gwydir Highway intersection. The area of disturbance is less than the clearing threshold criteria and no native vegetation will be removed.

The solar farm site does not contain native vegetation, as indicated by the available SEED mapping and confirmed by the site assessment conducted on 26 July 2024. Therefore, the project does not require any land clearing that would exceed the Biodiversity Offsets Scheme (BOS) threshold of 1 hectare.

The proposed development site is not located within a declared area of outstanding biodiversity value (refer to Section 5.12.3 for further detail).

Proponents are required to carry out a 'test of significance' for all development proposals. The required test of significance (as outlined in Section 7.3 of the BC Act) is provided in Appendix 5. It was determined that the proposal is not likely to significantly affect threatened species, and that further assessment 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

State Environmental Planning Policy (SEPP) Title	Relevance
SEPP (Planning Systems) 2021	Review provided below

State Environmental Planning Policy (SEPP) Title	Relevance
SEPP (Biodiversity and Conservation) 2021	Review provided below
SEPP (Resilience and Hazards) 2021	Review provided below
SEPP (Transport and Infrastructure) 2021	Review provided below
SEPP (Industry and Employment) 2021	Not Relevant
SEPP (Resources and Energy) 2021	Not Relevant
SEPP (Primary Production) 2021	Not Relevant
SEPP (Precincts – Eastern Harbour City) 2021	Not Relevant
SEPP (Precincts – Central River City) 2021	Not Relevant
SEPP (Precincts – Western Parkland City) 2021	Not Relevant
SEPP (Precincts – Regional) 2021	Not Relevant

4.3.3.1 State Environmental Planning Policy (Planning Systems) 2021

Pursuant to Schedule 6 of the State Environmental Planning Policy (Planning Systems) 2021, electricity-generating works with a capital investment value of more than \$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 \$28.8 million (including GST) and accordingly may be assessed by the Moree Shire Council and determined by the Northern Regional Planning Panel (NRPP) under the provisions of the State Environmental Planning Policy (Planning System) 2021.

4.3.3.2 State Environmental Planning Policy (Biodiversity and Conservation) 2021

4.3.3.2.1 Koala Habitat

Chapter 4 of the *SEPP (Biodiversity and Conservation) 2021* applies to land within each local government area listed in Schedule 2 of the SEPP, with certain exceptions such as land zoned RU1 – Primary Production or land dedicated or reserved under the *National Parks and Wildlife Act 1974*, for example. The Moree LGA is included in this schedule, and none of the exceptions listed apply to the site. The proposal is therefore to be assessed pursuant to Chapter 4.

Clause 4.9 of the SEPP sets out the development assessment process where the proposal has an area of more than 1 Hectare and no approved Koala plan of management has been prepared for the land, which is the case for the current proposal. An excerpt is provided below:

- 3) *If the council is satisfied that the development is likely to have low or no impact on koalas or koala habitat, the council may grant consent to the development application.*

- 4) *If the council is satisfied that the development is likely to have a higher level of impact on koalas or koala habitat, the council must, in deciding whether to grant consent to the development application, take into account a koala assessment report for the development.*
- 5) *However, despite subsections (3) and (4), the council may grant development consent if the applicant provides to the council—*
- (a) information, prepared by a suitably qualified and experienced person, the council is satisfied demonstrates that the land subject of the development application—*
- (i) does not include any trees belonging to the koala use tree species listed in Schedule 2 for the relevant koala management area, or*
- (ii) is not core koala habitat, or*
- (b) information the council is satisfied demonstrates that the land subject of the development application—*
- (i) does not include any trees with a diameter at breast height over bark of more than 10 centimetres, or*
- (ii) includes only horticultural or agricultural plantations.*

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, being females with young, and recent sightings of and historical records of a population.
- **Potential Koala Habitat** means areas of native vegetation where trees of the types listed in Schedule 1 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 be assessed for the presence of potential or core Koala Habitat.

The proposed development footprint is dominated by non-native grassland. The footprint was utilised for the storage of cotton bales and cotton waste. Therefore, none of the feed tree species listed in Schedule 1 of the Koala SEPP are present 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.

Figure 8: Distribution of Koala records within the Moree Plains Shire (Bionet, 2024).

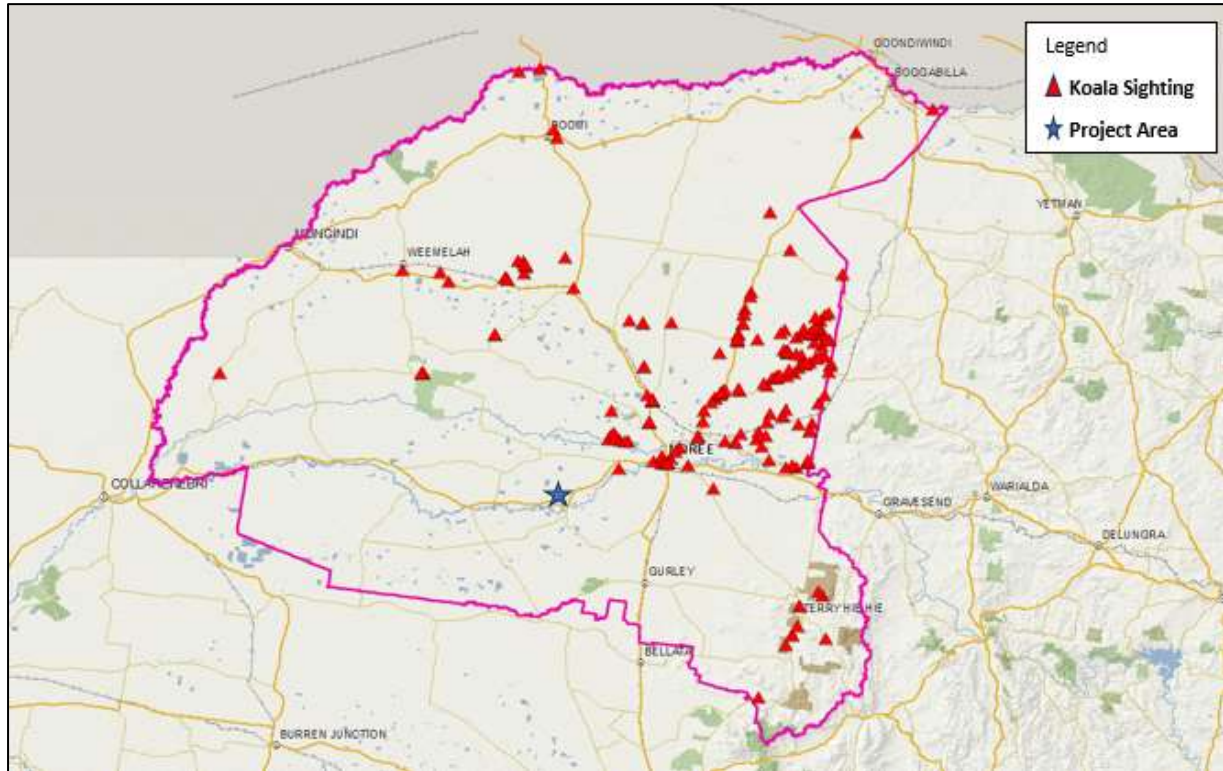


Figure 9 and Figure 10 comprises a map of Koala Habitat suitability as well as the Koala Tree Index within the outlined area for development. Both the northern and eastern sections display a colour-coded key indicating the suitability of the koala habitat and the tree index.

Figure 9: Koala Habitat Suitability, SEED Map 2024

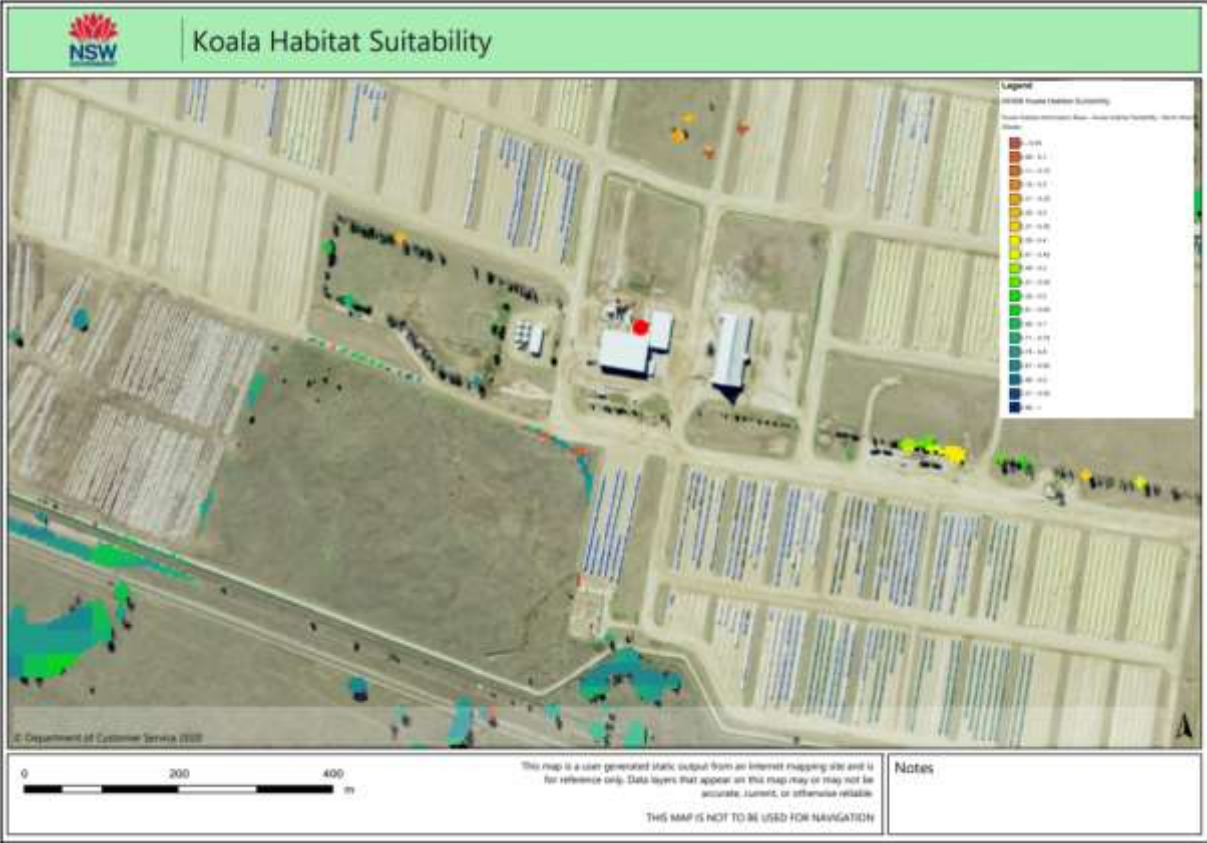
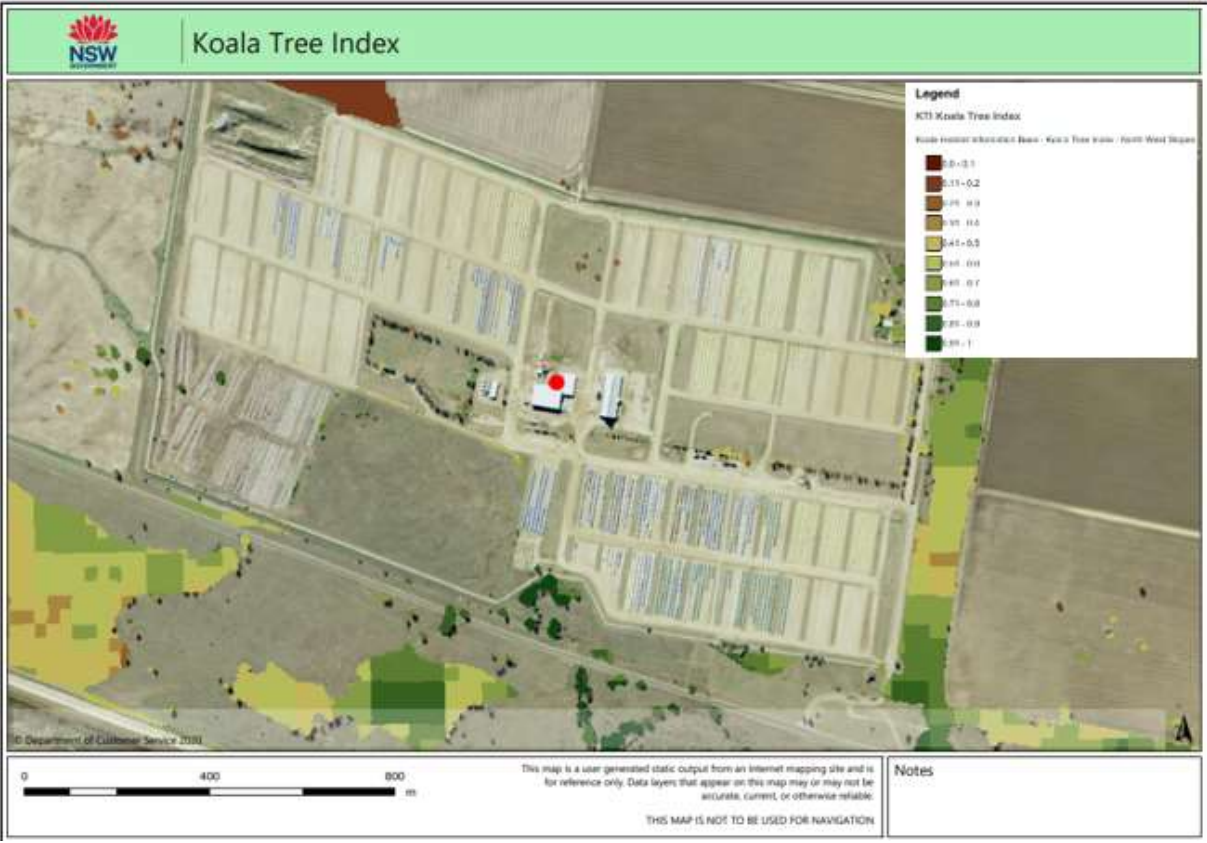


Figure 10: Koala Tree Index SEED Map 2024



It is considered that the subject site does not constitute potential or core Koala 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 1 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.

4.3.3.3 State Environmental Planning Policy (Resilience and Hazards) 2021

Chapter 4 of the Resilience and Hazards SEPP 2021 covers the remediation of land and 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 undertaken at the site and this has been included within Appendix 2. The site is considered suitable for the proposed development of a solar farm.

4.3.3.4 State Environmental Planning Policy (Transport and Infrastructure) 2021

The Transport and Infrastructure SEPP provides development controls for infrastructure and services.

4.3.3.4.1 Permissibility of Electricity generating works or Solar Energy Systems

Chapter 2.2, Division 4 covers development controls for electricity generating works / solar energy systems.

The SEPP details the applicable criteria for a solar energy system to be considered a development permitted without consent, as well as complying, prohibited and exempt development. The proposal does not meet any of the above criteria.

Clause 2.36 (9) of the SEPP states *“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 is permissible with development consent.

4.3.3.4.2 Grid Connection

Clause 2.48 of the SEPP relates to the determination of a Development Application that has the potential to affect electricity transmission lines. Before determining a Development Application, which meets the relevant criteria provided by cl.2.48 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.

A connection application with Essential Energy has already been made, and as such, the electricity supply authority has been notified.

4.3.3.4.3 Traffic Generating Development

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

4.4 Strategic Plan

The NSW Government strongly supports the ongoing development of a sustainable solar energy industry in NSW. Solar energy supports our transition away from fossil fuels and helps deliver a safe, stable and reliable energy supply.

NSW Government prepared the Large-Scale Solar Energy Guideline to assist developers to navigate the planning framework as part of the strategic plan for a sustainable solar energy industry in NSW.

4.5 Regional Plans

The **New England Northwest Regional Plan 2036** underwent its first five-year review, redefining priorities and extending its scope to 2041. Following a period of public exhibition, the updated **New England Northwest Regional Plan 2041** was finalised and officially published in September 2022.

Part 3 of the regional plan emphasizes the region's leadership in renewable energy, particularly through **Objective 09: Lead Renewable Energy Technology and Investment**. This objective recognizes the transformative role of technical innovation in energy generation and storage. The **NSW Government's Electricity Infrastructure Roadmap** provides a coordinated framework for developing a modern electricity system in NSW. By 2030, the Roadmap is expected to attract up to \$32 billion in private investment for regional energy infrastructure, contributing to the growth of the renewable energy sector.

The Plan also addresses the integration of renewable energy projects with agricultural uses. While wind farms have demonstrated compatibility with agricultural operations, there are growing concerns about the cumulative impact of large-scale solar farms on agricultural land. To address these concerns, the **Large-Scale Solar Energy Guideline** was introduced to promote best practices for impact assessment, encourage effective stakeholder engagement, and ensure community input into solar energy developments.

The Plan further emphasizes that land zoning should not inhibit environmental initiatives and infrastructure development. Recognizing the importance of balancing renewable energy growth with agricultural productivity, the **Minister for Energy** and the **Minister for Agriculture and Western NSW** announced the formation of a taskforce in March 2022 to review frameworks for managing the forecast growth in these sectors.

The site of the proposed solar farm forms part of the ongoing operations of the Wathagar Cotton Gin and the broader **GEGHA Project**. The site's current agricultural use is limited to activities associated with this industrial development. The proposed project includes the construction and operation of a new **27 MW (DC) solar farm with battery storage**, which will serve as the primary energy source for the electrolysis plant, ammonia plant, hydrogen storage, ammonia storage, and ancillary infrastructure. This initiative will significantly enhance the integration of renewable energy into the project's operations.

Importantly, the development of the solar farm will not lead to the cessation of agricultural production on the site, ensuring that renewable energy initiatives complement and support existing uses.

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. Electricity generating works is

considered to be referred to as “Any other development not specified” as permissible without consent or prohibited in an RU1 Zone under the Moree LEP.

Notwithstanding, pursuant to Clause 2.36 (9) 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: In accordance with the Local Environmental Plan (LEP), the proposed development enhances the current land use by complementing and augmenting existing agricultural operations. This development promotes sustainability and economic diversity without fragmenting land or causing any conflict with neighbouring land uses.

The site is part of the Wathagar Cotton Gin operations, and land use on this site will be managed within the scope of the ongoing GEGHA project. Therefore, the proposed use aligns with and supports the continued agricultural and industrial activities on the property.

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;

Comment: Assessment of the site for Koala habitat and presence of Koala has been undertaken in accordance with SEPP (Biodiversity and Conservation) 2021. The results of this investigation have been addressed in Section 4.3.3 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 5.

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 involves disturbance of an area of less than 1 Hectare for the upgrades to the Gwydir Highway intersection. This area of clearing is less than the BC Act BOS threshold. The area to be cleared is highly disturbed as it adjoins the existing intersection and has been subjected to extensive disturbance on a regular basis for maintenance of the intersection.

The solar farm is to be located on land that was cleared and used as part of the cotton ginning operations. At present, the land supports a range of weeds as the site has been left unused in the last cotton ginning season to enable the solar farm development to

proceed. The area is regularly mown under fire control policies required for the cotton gin.

Overall, 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 5.14.1.

Recreational Vehicles: Not applicable.

Feedlots: Not applicable.

Access to Rural Properties: The proposed solar farm is accessible from the Gwydir Highway and will be using an existing property access constructed in the mid-1980s for the Wathagar Cotton Gin.

Access to Rural Properties – Land Subdivided for Agricultural Purposes: No subdivision is required for the solar farm development. The existing access will be utilised.

Rural Dwellings: The proposal does not involve construction of a rural dwelling.

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 3. 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.

Overall, the proposed development complies with the requirements included within the Rural Development chapter of the Moree Plains Shire Development Control Plan 2013. More detailed reviews of natural hazards are presented in section 5.14 of this report.

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.

The project does not utilise land that is currently supporting agriculture and therefore no loss of regional production of commodities will occur as a result of the proposed development. The Solar Farm development will support a significant regional development in the form of a hydrogen and ammonia plant. This plant will benefit the local agricultural industry and the environment. The resulting enterprise which will benefit from the extended solar farm will provide economic diversity for the Moree Region which is highly beneficial.

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(b) 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.2.36 of Division 4 of State Environmental Planning Policy (Transport and Infrastructure) 2021 (SEPP). The land use will transition from Cotton Gin activities to solar power generation, which poses no land use conflicts due to its unobtrusive nature. The cotton gin will retain sufficient land to continue its operations.

Adjoining land uses include agricultural production and rural dwellings within a primary production area. Once construction of the solar farm is completed, minimal activity will occur on the site that may create noise or active nuisance to adjoining land uses.

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. The adjoining development of a Hydrogen and Ammonia Plant will result in construction of a control room and lunchroom on the eastern side of the existing solar farm. This will include a kitchenette and toilet as part of the building. Septic waste from this building will be disposed of via an onsite wastewater system. The system as proposed consists of a septic tank and absorption trench. This will be the subject of a Section 68 Application under the application to be lodged for the Hydrogen and Ammonia Plant.

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

A preliminary contaminated site assessment for the GEGHA Project has been undertaken by SMK Consultants to assess whether contamination exists on the site and if it does, whether it may impact the proposed development. This assessment is attached to this report as Appendix 2. The conclusion presented in the report identifies that the site has not been impacted by contamination. This does not present a contamination risk to the proposed development. Accordingly, no further investigation is required.

5.4 Acoustic Amenity

The site has been subjected to large 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 trucks for delivery and installation of the inverters and batteries. Construction traffic will be dominated by light vehicles. 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 surrounding farms in the form of tractors. 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 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)	
Crane (mobile)	95-113	104	76
Forklift	106	106	78
Generator (silenced)	84	84	71
Grader	105-115	110	82
Hand tools (electric)	95-110	102	74
Vehicle (light commercial)	100-111	106	78

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, where possible, 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. If after hours work is required, this will be restricted to unobtrusive low noise activities. 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 was adopted for the site. This assumes that the surrounding area is in rural residential, typical planning zoning is RU1 Primary production.

Table 5: Rating Background Noise Levels (Rural Residential within RU1 Zoning)

Period	RBL dB(A)
Day	40
Evening	35
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	40	35	30
Project Intrusiveness Criteria	45	40	35
Recommended Amenity Level	50	45	40
Project Amenity Level*	48	43	38
Project Noise Trigger Level	45	40	35

* Note: Project amenity level established as level equal to the Recommended Amenity Noise Levels minus 5dB(A) plus 3dB(A) to convert from a period level to a 15-minute level, in accordance with guidance established in Fact Sheet F of the NPfI.

These levels of 45, 40 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 950 metres to the east of the project site. At this distance, the loudest activity (compacter) is predicted to be:

$$\begin{aligned} L_2 &= 82 - 20\log(950/10) \\ &= 42 \text{ dB} \end{aligned}$$

Construction works will be confined to daytime hours, wherever possible, in which the threshold criteria is 45dB. Where after hours work is required, use of heavy vehicles and machinery will be restricted. The predicted maximum noise generated by the development therefore is less than the PNTL. This is considered acceptable when considering that large trucks operating within the cotton gin area are significantly closer to the residence than the solar farm and noise generated from these trucks will be more significant at the closest

residence. This closest residence is the cotton gin manager's residence and not on an adjoining property.

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. For this development, the proposed noise impact is considered to be less than the PNTL and therefore acceptable.

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 1,048 metres to the west 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:

$$\begin{aligned}
 L_2 &= 80.5 - 20 \log(1,048/1) \\
 &= 20.1 \text{ dB}
 \end{aligned}$$

The acceptable noise threshold criteria is 40dB during the evening period. The solar plant will not operate once the sun sets. The night period extends from 10pm through to 7am. The noise threshold criteria for night time is 35 dB which will not be exceeded by the equipment when the sun rises in the morning. The predicted maximum noise generated by the operation of the solar farm is therefore below the PNTL during both periods.

5.4.3 Predicted Noise 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 (~20 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;
- Use plant and equipment in a manner which minimises noise impacts;
- Limit construction activities to daylight where possible; and
- Restricting after hours activities, if required, to those of low noise and low impact.

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, Figure 11 and 12 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 11: Oblique view of Solar farm site, Solar farm stage 1 and Existing Properties



Figure 12: Cotton gin north of the proposed solar farm location.



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 place value in the existing landscape.

5.5.3 Visual Catchment

A variety of visual receptors are likely to observe the proposed solar farm, including local residents, individuals working outdoors on adjacent properties, and motorists traveling along the Gwydir Highway. Stage 1 has already been constructed to the east of the proposed Wathagar Solar Farm Stage 2.

The proposed solar farm, together with the existing Wathagar Solar Farm Stage 1, will represent the only solar farms in the immediate area. This development introduces an incremental shift in the visual landscape, aligning with the broader trend toward renewable

energy infrastructure. The proposed solar farm's design and appearance are consistent with Stage 1, ensuring visual cohesion across both stages of development.

Furthermore, the visual impact on the surrounding catchment is mitigated by the levee, which acts as an effective buffer, particularly shielding the most visually sensitive receptor—the nearby highway. This ensures that the visual character of the region is preserved while accommodating the integration of renewable energy infrastructure alongside existing structures such as telephone towers and substations located along the highway.

Travellers along the Gwydir Highway will have minimal direct line of sight to the solar farm. The surrounding levee bank which is between 1m and 2.5m high will block the view of the solar farm from the Gwydir Highway. This will be similar for farm workers on the surrounding farm. The levee bank surrounds the whole site and therefore reduces any direct line of sight to the solar farm.

It is also noteworthy that the Wathagar Solar Farm Stage 1 has been operational for two years without any visual-related complaints, indicating that the facility has integrated successfully into the surrounding environment. This positive track record suggests that the proposed development will similarly blend with the existing landscape without causing significant visual disruption.

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 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.

The solar panels have minimal effect on the visual aspect of the site. The panels are partly hidden to all car traffic on the Gwydir Highway and the side profile to trucks is minimal as a result of the surrounding levee bank.

The Cotton Gin building and seed shed are significant when compared to the minor visual profile of the panels which are only about 1m above the ground level within the gin yard. The profile of the panels is below the horizon and their profile are of a similar colour to the remainder of the gin yard.

The proposed solar panels will be the same height as the current panels at Wathagar Solar Farm Stage 1. Furthermore, the distance between the new solar farm and the Gwydir Highway will approximately be the same as that of the existing solar farm. Figure 13 and Figure 14 provide a visual representation of the visibility of solar farm stage 1 to Gwydir Highway users.

Figure 13: Visibility of Solar Farm Stage 1 From the Gwydir Highway to a Light Vehicle.



Figure 14: Visibility of Solar Farm Stage 1 From the Gwydir Highway to the Heavy Vehicle

The presence of an existing levee bank significantly reduces the solar farm's visual impact, making it largely inconspicuous to light vehicles. While it may be visible to some heavy vehicles, the overall visibility is limited to a small number of road users, resulting in minimal impact on the visual amenity of the local area.

Furthermore, solar farms are increasingly recognised as integral to the transition toward renewable energy, becoming characteristic features of the evolving modern landscape.

5.5.4 Visual Amenity Impact Conclusion

The solar farm will introduce a new element to the landscape; however, it will not impact any areas of local or regional conservation significance. The development will not obstruct key landscape features or alter existing views from any residence. While visible, it will not be intrusive.

The solar farm will be seen by a limited number of road users, primarily heavy vehicle drivers on the Gwydir Highway. However, it will not result in the loss or significant alteration of key landscape elements, features, or characteristics. As a result, the overall character of the post-development landscape will remain largely unchanged.

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

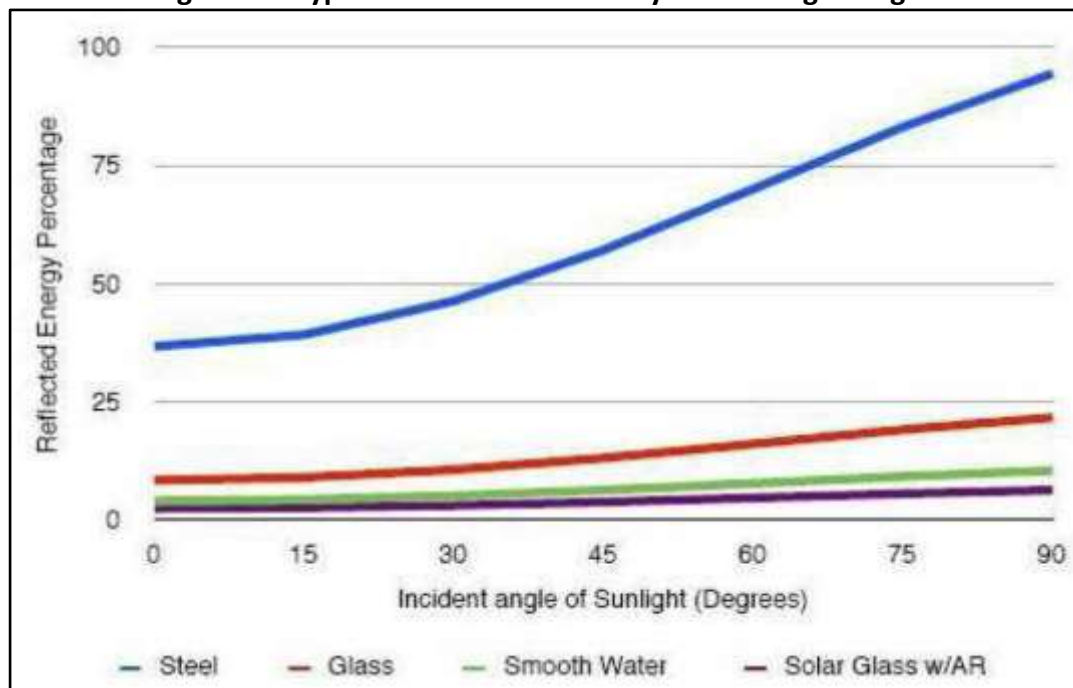
The amount of light reflected by a PV panel depends on the amount of light hitting the surface, the time of year, amount of cloud cover, the surface reflectivity, and whether the array is fixed or tracking.

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.

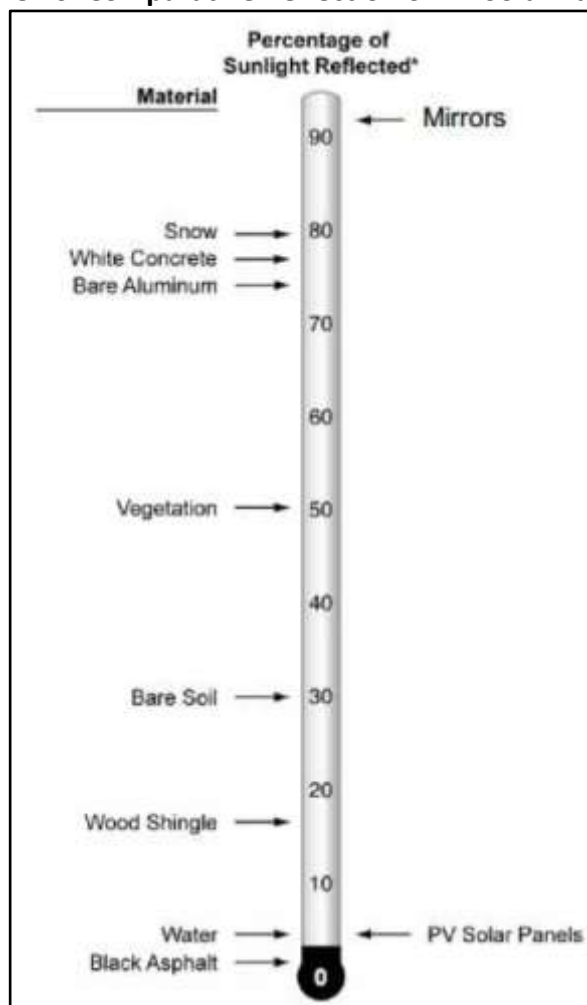
The percentage of sunlight reflected by PV solar panels is similar to that of water and less than most other materials, as illustrated in

Figure 15 and Figure 16. 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 15: Typical Material Reflectivity with Sunlight Angle³



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

Figure 16: Comparative Reflection of PV Solar Panels⁴

5.6.3 Potential Impacts

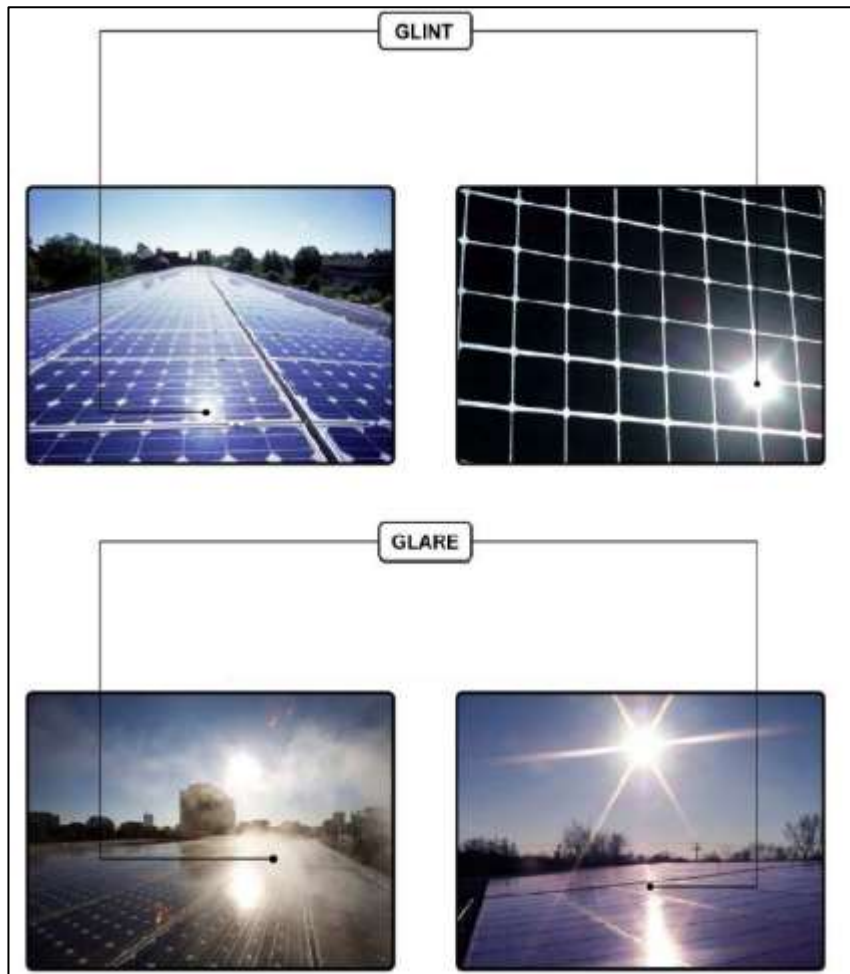
Glare and glint are a potential hazard/nuisance generated by solar panels. Ho⁵ defines glint as a momentary flash of light, and glare as a more continuous source of excessive brightness relative to ambient lighting.

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 17.

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 17: Visual Comparison of Glint and Glare⁷

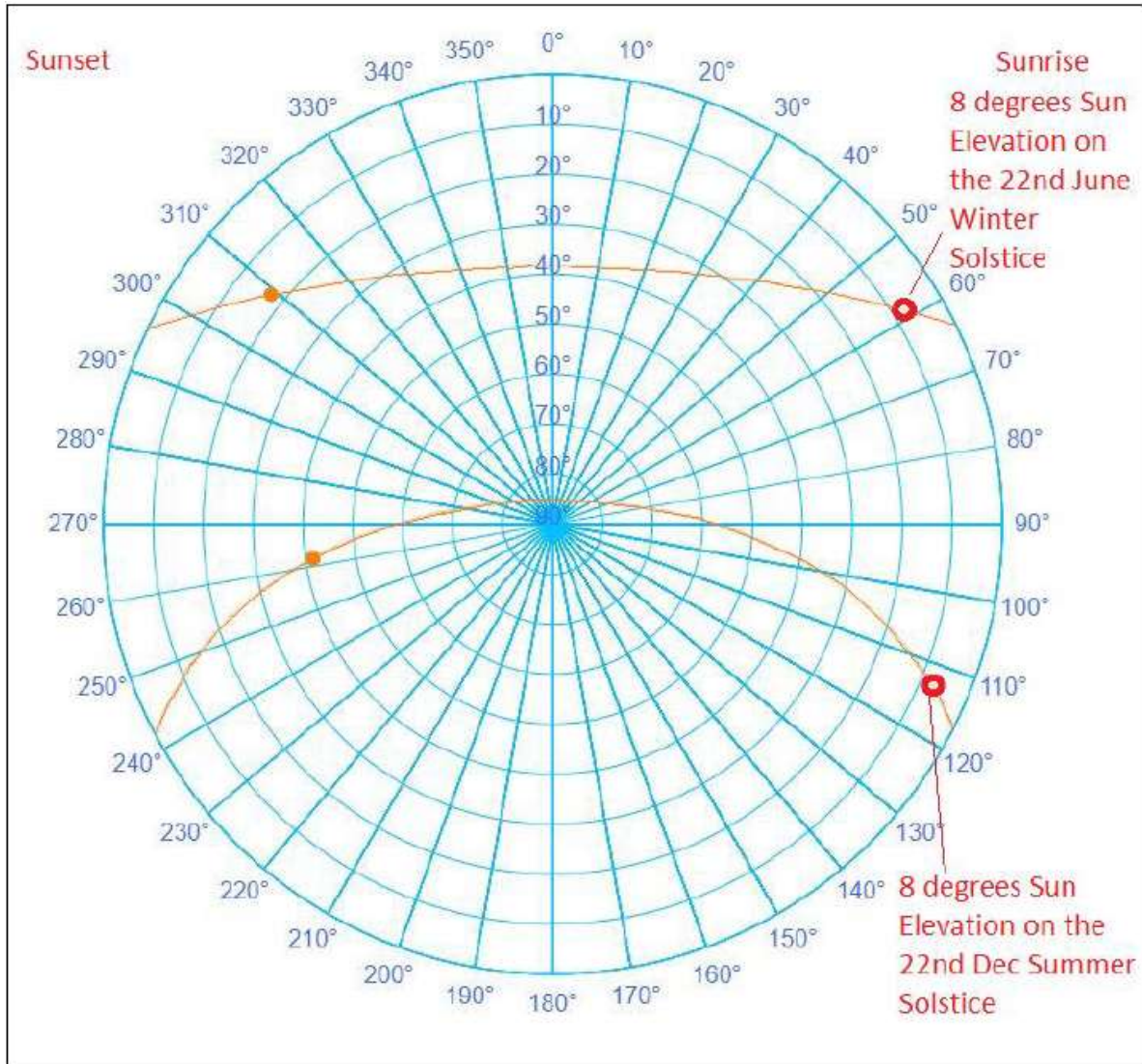
5.6.4 Glare Hazard Analysis

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.

Figure 18 below represents the angle of the sun above the horizon for both the summer and winter solstice.

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

Figure 18: Angle of the sun above the horizon for both the summer and winter solstice.

The angle of the sun above the horizon will determine the angle of incidence and reflectance, both being equal. The centre of the diagram is the location of the solar panels, and the outer circle is the direction from the sun to the reflective surface of the panel. The inner circles represent the angular height of the sun above the horizon during the day from sunrise to sunset.

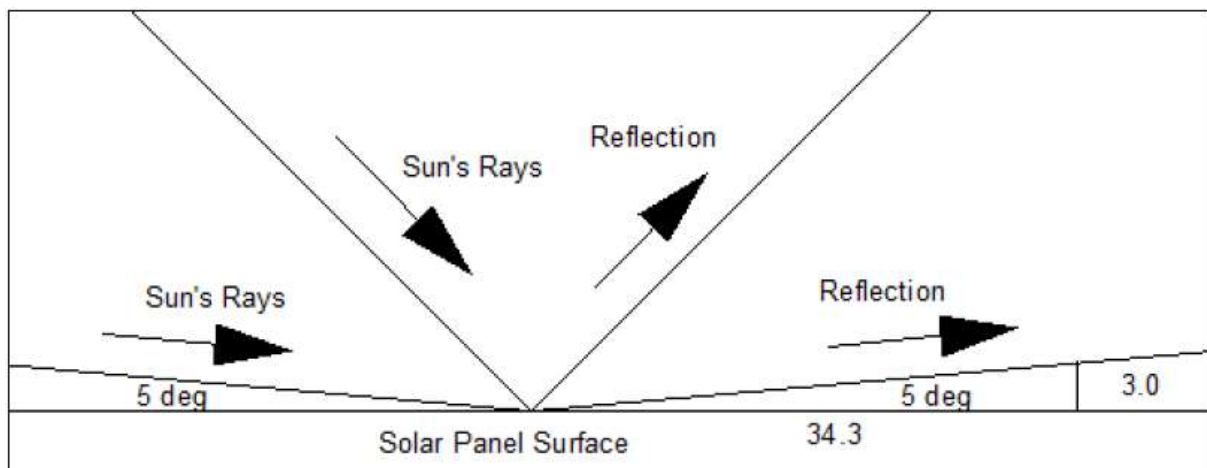
During the summer solstice the sun is south of the solar panels and any glare or glint would be directed to the north away from the Gwydir Highway, causing no effect to passing traffic. During the summer solstice the direction the glint and glare would be at a maximum around sunrise. The solar panels are fixed at alternating 8 degrees to the west and 8 degrees to the east. Because the panel is angled towards the west by 8 degrees this early morning glint at say 10 deg would be angled downwards at 6 degrees, the glint would hit the adjacent panel and have no effect on passing traffic. At this elevation, the glint would be angled in a north westerly direction away from the road which is to the south of the panels.

Examining the winter solstice, the direction of glint and glare will be in a southerly direction. The minimum angle to create glint is about 5 degrees of sun elevation, where the winter sunrise is slightly angled across the solar panels. The maximum height above road level for a car driver is 1.2m and for a truck driver, 3m, as shown in Table 8.

Table 8: Driver eye height (in metres) and vehicle type

Vehicle Type	Suggested eye height	Range of values	
		min	max
Cars	108	100	120
Trucks	233	180	300
Buses	180	175	250
Bicycles	150	100	220
Pedestrians	155	90	200
Equestrians	150	150	270

Figure 19: Reflection of sun's rays from solar panels at a minimum angle of 5 degrees.



Reflection from the solar panel surface at the minimum angle of 5 degrees will be above the eye level of a truck driver at a distance from the edge of solar array of 34.3m. The Gwydir Highway is about 85m away, and therefore, no effect on passing traffic will occur. At all other times of the day the reflected light will be more vertical and the 34.3m distance would be less, therefore no effect on traffic.

The glare and glint are not a problem for passing traffic as all reflected glare or glint is above the height of all vehicles traversing the highway.

5.6.5 Civil Aviation Safety Authority

The Civil Aviation Safety Authority (CASA) was previously consulted regarding the proposed Wathagar Solar Farm Stage 1 development. In their response, CASA clarified that due to recent changes in guidelines, they no longer assess approach paths to and from airports. Instead, CASA now focuses on impacts to Air Traffic Control (ATC) towers. Since Moree does not have an ATC tower, CASA raised no concerns or objections regarding the Stage 1 proposal.

Given that the proposed Wathagar Solar Farm Stage 2 is located within the same vicinity and presents no new issues regarding air traffic or ATC infrastructure, further consultation with CASA is not required.

5.7 Air Quality

5.7.1 Construction Impacts

The construction of the solar farm will not involve extensive earthworks. This will be a controlled activity where dust emissions can be limited and controlled by the use of a water truck to suppress dust. This will be available onsite as a water truck will form part of the essential civil construction equipment.

The construction of the solar array panels will not be a dust generating activity. The only source of dust from this project will be generated from traffic and mainly relate to trucks delivering the equipment.

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.

Adoption of these mitigation measures are considered to be an acceptable solution to avoiding nuisance dust emissions.

5.7.2 Operational Impacts

Once construction is completed, there will be minimal activity on the site. The surface beneath the solar panels will be a gravel base with minimal fines that could generate dust emissions.

The use of light vehicles to service the site are not considered to be a significant dust emission source.

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 EMFs 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 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, 2024).

5.9.1 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 water flows.
- The site will be laser levelled to produce an adequate slope draining towards existing drains to the south of the proposed development site. This directs stormwater into an existing storm drain. This is part of the existing drainage system constructed for management of storm water from the cotton gin which operates under a licence issued under the POEA Act;
- 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 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 (WSP)*.

No surface water extraction is proposed therefore the WSP is not relevant to the proposed development.

The cotton gin facility is required to manage stormwater discharges. Water discharged from the site is captured in an external drainage dam and then recycled for road watering on the site.

The solar farm will not contain any contaminants of concern that could impact the quality of water discharged from the site and therefore will not impact surrounding surface water.

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 deflect the rain onto the ground below. When runoff is generated, it will continue to be subject to ground conditions for absorption of some of the rain and then overland flow will be collected in existing channels and drains developed as part of the cotton gin stormwater management system. The overall volume of water generated from 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 or water so long as best management practices for erosion and sediment control are undertaken during construction.

Priority will be given to achieving a high standard of erosion and sediment control and general housekeeping throughout the construction period.

This will be achieved through implementing construction activities in accordance with best practices and the following principles:

- 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.
- Erosion and sediment controls must be suitably maintained, including regular monitoring to ensure the measures and controls in place are effective.
- 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 Solar Farm has been carried out to determine the appropriate means of waste disposal and recycling. The assessment considers the requirements of relevant legislation and policy including the *Protection of the Environment Operations (POEO) Act 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, 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 replacement parts and packaging required for maintenance and repair works.

The operational design life of the solar farm is a minimum of 25 years. Upon decommissioning all infrastructure, including cabling and panels and mounting frames, footings and inverters would be disassembled and removed from the site. There are emerging opportunities to recycle the components of solar panels, and 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 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. Cardboard is completely recycled and there is no charge for this waste. The timber pallets will be considered as sorted waste and is mainly considered as recyclable. A fee is payable to Council for disposal of the timber materials. The timber pallets are not considered a reusable pallet and therefore can be mulched, sold as building material or use for bioenergy production.

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

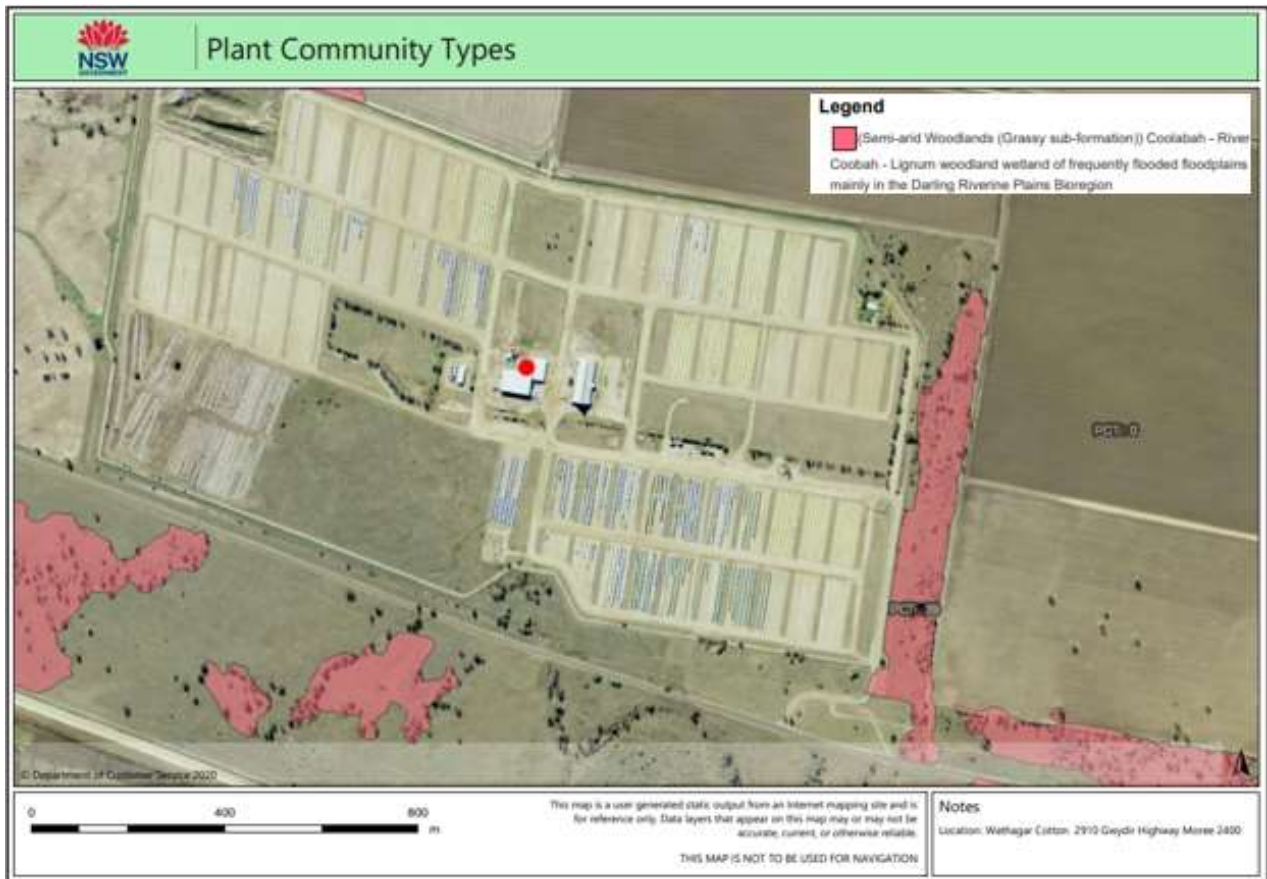
A desktop assessment was undertaken to identify any known locations of threatened species, populations and ecological communities inside, or within close proximity to, the proposed

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 August 2024);
- 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 August 2024); and
- NSW Vegetation Information System (VIS) classification database (OEH, accessed August 2024).
- NSW Sharing and Enabling Environmental Data (SEED) portal (NSW Government, accessed August 2024).

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 removed from the list of potential occurrences. This list is further refined based on the habitat features identified during field surveys.

Figure 20 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 majority of the property is classed as PCT 0 “Non-native” and 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 pink in Figure 20.

Figure 20: Plant Community Types modelled for the area, SEED Map

5.12.2 Field Assessment

The construction site was cleared in the 1980s and used for the storage of cotton modules and cotton waste. The site has primarily been used for storage and natural mulching of cotton waste. During the period of site investigation, the development footprint, has supported mainly weeds which are dominated by Field Mustard/Wild Turnip (*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*), Curly Mitchel grass (*Astrelba Lappacea*), 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*), Capeweed (*Asteraceae calendula*), African Boxthorn (*Lycium ferocissimum*), Noogoora Burr (*Xanthium occidentale*) and Common Mallow (*Malva neglecta*).

Figure 21 shows the vegetation present within the proposed development site.

Figure 21: Non-native vegetation (PCT 0) within the subject site.

The vegetation to the east of the subject site and along the eastern boundary, as well as to the south of the Gwydir Highway is dominated by Coolabah trees (*Eucalyptus coolabah*) in the overstory 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) Coolabah – 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 22: PCT 39 along the eastern boundary of the subject property.

Figure 23: PCT 39 adjacent to the stormwater collection dam.



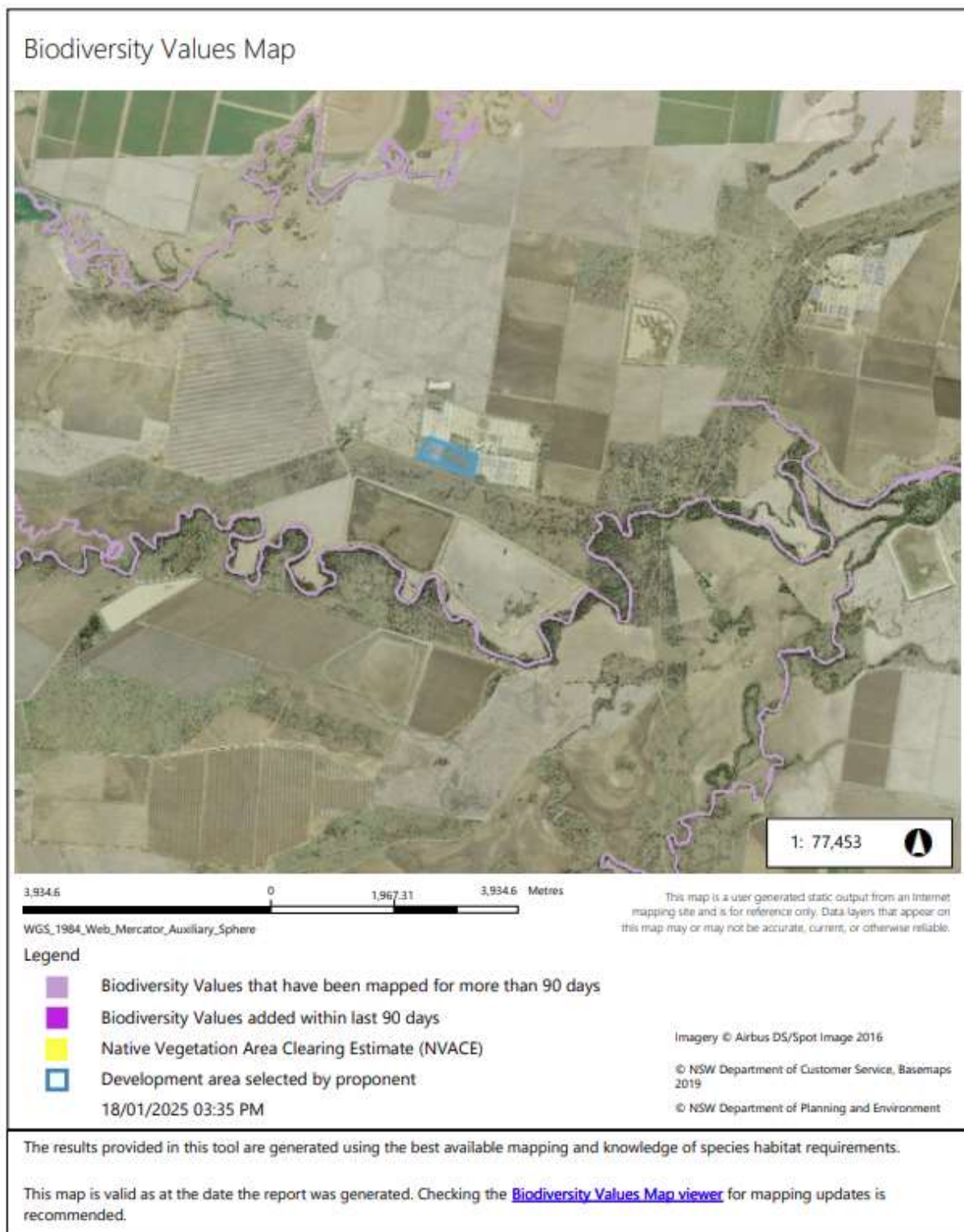
The property also contains rows of planted trees which provide screening for the existing cotton gin development on the property. Adjacent properties are similarly extensively cleared for cultivation, and quality remnant vegetation is generally confined to Crown land along the Gwydir Highway Road corridor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

5.12.3 Biodiversity Values Map

The Biodiversity Values Map is presented in Figure 24. 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 Tarran Creek is located to the northwest 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 24: Biodiversity Values Map. Source: NSW Government, 2024.

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 5. 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 6. 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 Common Prickly pear are currently present as scattered individuals onsite, and these are listed as Weeds of National Significance (WoNS) under the *Biosecurity Act 2015*. It is the duty of the Applicant to ensure the risk associated with these weeds is prevented, eliminated or minimised as far as 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. This may require cleaning of the vehicles offsite to allow entry to the site;
- 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 Rural fire service Planning Portal was

accessed in August 2024 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 fire risk consistent with Vegetation Category 3 as the surrounding vegetation is consistent with open grassland. 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.

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 25: Potential risk of the subjected site from Bushfire – Vegetation Category 3



5.14.1.1 RFS Bushfire Planning Objectives

Fire protection objectives considered with regard 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 and a ring road around the solar farm for 4wd and light truck access. These roads 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 fire 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. In addition, the Solar Farm will have access to the fire fighting facilities located in the adjacent ammonia and hydrogen plant.

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

The existing solar farm has a Bush Fire Emergency Management Plan. This will be updated for the extended solar farm facility once construction is completed. 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 maintained 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.

No trees will be present within the solar farm site.

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.

No shrubs will be present in the solar farm site.

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.

No grass will be allowed to grow beneath the solar panels or around the electrical infrastructure.

5.14.1.3 Proposed Bushfire Protection Measures

The Applicant has prepared a Draft Bushfire Management Plan for the proposal; This will be lodged as part of the construction certificate. 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.

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.

5.14.2.1 Flood Planning – Clause 5.21 of Moree Plains LEP

The flood work requirement for the proposed development is mentioned in Clause 5.21 of the Moree Plains Local Environmental Plan.

The objectives of Clause 5.12 of the Moree Plains LEP are as follows:

- a) to minimise the flood risk to life and property associated with the use of land,*
- b) to allow development on land that is compatible with the flood function and behaviour on the land, taking into account projected changes as a result of climate change,*
- c) to avoid adverse or cumulative impacts on flood behaviour and the environment,*
- d) to enable the safe occupation and efficient evacuation of people in the event of a flood.*

Further, Clause 5.12 (2) states:

Development consent must not be granted to development on land the consent authority considers to be within the flood planning area unless the consent authority is satisfied the development—

- a) is compatible with the flood function and behaviour on the land, and*
- b) will not adversely affect flood behaviour in a way that results in detrimental increases in the potential flood affectation of other development or properties, and*
- c) will not adversely affect the safe occupation and efficient evacuation of people or exceed the capacity of existing evacuation routes for the surrounding area in the event of a flood, and*
- d) incorporates appropriate measures to manage risk to life in the event of a flood, and*
- e) will not adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.*

The proposed development would be located within an existing levee. The levee is located within an area of Zone C in the FMP, as shown in Figure 26.

According to rules outlined in the FMP, floodworks are not exempt from requiring a floodwork approval within this Zone. Floodwork Approval 90FW833508 has been issued by Water NSW for the existing levee at Wathagar. This approval remains in place and therefore the levee will be retained to flood protect the site.

The existing levee has a height of between 1.5m and 2.5m above natural surface level. This height is based on previous floods in the surrounds and flood calculations undertaken to predict the 1% AEP flood height for the existing solar farm development.

The proposal is therefore considered compatible with flood function and behaviour in the locality and Water NSW in development of the Gwydir FMP have accepted the impact of this levee.

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. PV modules will be mounted on piers with a minimum height above ground level of at least 700mm. The inverters and batteries will be mounted above the calculated 1% AEP flood event.

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.

The proposal is considered to be in alignment with the objective of Clause 5.12 of the Moree Plains LEP.

Figure 26: Gwydir Valley Floodplain Management Plan 2016 - Management Zones, showing the proposal within Management Zone C



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.

5.16.1 Desktop Assessment

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 4.

5.16.2 Field Assessment

Aboriginal Cultural Heritage Due Diligence Assessment for the proposed site for the Wathagar Solar farm stage 2 and the site entry was conducted on 18th October 2023 by archaeologist Dr Matt Cupper with the involvement of Alfred Tighe and Dorothy Tighe (representing Gomeroi Native Title Applicant) and David Horton (Gomery Culture Consultants) on behalf of Landskape a division of ML Cupper Pty Ltd. A copy of the Aboriginal Cultural Heritage Due Diligence Assessment has been included in Appendix 4.

In accordance with the Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales (OEH 2011) and Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (DECCW 2010), an archaeological design and survey methodology, was prepared as a key component of the cultural heritage field assessment.

The results of the field investigation and survey methods found that no Aboriginal archaeological sites were located in the proposed solar PV array disturbance area or upgraded site entrance. Moreover, Modified trees were not identified. All old-growth trees had been

previously cleared. Quarry sites are also definitely not represented in the study area as rock outcrop is not present. Extensive previous earthworks could have destroyed stone arrangements had they previously occurred in the area. Given 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 remain 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 in the area identified for the proposed development. The recommendations for the field assessment by Landscape are as follows:

“Based on the results of this cultural heritage due diligence investigation it is concluded that the proposed solar PV array and associated site entry upgrade are located in areas where harm to Aboriginal cultural heritage would be avoided.

It is recommended that:

- If any previously unidentified Aboriginal objects are encountered during the course of activities, all work likely to affect the material must cease immediately, and NSW Heritage must be consulted about an appropriate course of action prior to commencement of work. It is an offence under the National Parks and Wildlife Act 1974 to disturb or destroy Aboriginal objects without written consent of Heritage NSW; and,
- If human skeletal remains are encountered during the course of the proposed activities all work in that area must cease. Remains must not be handled or otherwise disturbed except to prevent further disturbance. If the remains are thought to be less than 100 years old the Police or the State Coroner's Office (02 9552 4066) must be

notified. If there is reason to suspect that the skeletal remains are more than 100 years old and Aboriginal, the proponent should contact the Environmental Line (1300 361 967) for advice.

5.17 Traffic Assessment

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.

The impact of pre-construction minor-works is negligible and would represent up to one or two light vehicles per day, typically associated with surveyors or consultants visiting the site.

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, if possible. The peak hourly traffic volumes are expected in the hour before and after the intended construction hours for work vehicles arriving and leaving the site.

5.17.1 Roads to be used during Construction and Operation

Public roads in the locality of the Wathagar Solar Farm Stage 2 that would be used during construction include the Gwydir Highway, Goonal Road and Watercourse Road.

During operation, the Gwydir Highway would be used as the access and egress for the operational solar farm. The solar farm is anticipated to generate minimal traffic during its operational phase, primarily associated with routine maintenance activities. Scheduled maintenance is expected to occur on a monthly basis, typically involving up to two personnel and resulting in a maximum of four vehicle movements on those days. This level of activity is expected to have a negligible impact on the surrounding traffic environment. In addition, light commercial vehicles and heavy goods vehicles may occasionally access the site to deliver replacement parts or equipment, but only as required for maintenance purposes.

The Gwydir Highway is a State Road under the care and management of Transport for New South Wales (TfNSW). It runs in an east-west alignment from South Grafton and its termination with the Castlereagh Highway near Walgett. Within the vicinity of the site, it has a sealed carriageway width of approximately 6.5 metres accommodating one lane of traffic in each direction. It has a speed limit of 110 km/h with a relatively flat and straight alignment. The Gwydir Highway is an approved route for B-triple trucks up to 36.5m in length.

Watercourse Road is a local road that connects to the Gwydir Highway approximately 10 kilometres east of Moree. This road services a large area of broad acre farms and a Cotton Gin. Watercourse Road runs parallel to the Gwydir Highway for an extended length. Watercourse Road has a sealed carriageway width of 6.0 metres for a distance beyond the intersection of Goonal Road which services the property of Keytah. Watercourse Road has a

100 km/h speed limit and is approved for B-Triple trucks (under permits) servicing the farming industry. This includes grain and cotton trucks.

Goonal Road is a municipal local road that extends south from Watercourse Road then west to a connection with Gwydir Highway, providing access to properties in the area on the north side of the Gwydir Highway. A sealed carriageway width of approximately 6.0 metres accommodating two-way vehicle movement is provided on Goonal Road between Watercourse Road and private internal roads that access the site via the property of Keytah.

5.17.2 Traffic Users

Heavy goods vehicle movements along the Gwydir Highway vary substantially throughout the year and are heavily influenced by the grain and cotton harvest seasons. The grain harvest occurs in November and December. The cotton harvest occurs in April and May.

A large proportion of the grain harvest is trucked into Moree for storage and despatch via the rail network. As a result of a significant increase in on-farm grain storage facilities, grain is now relatively continuously trucked from farms and western (GrainCorp) receival centres throughout the year.

Three cotton gins operate in the local area in addition to two other cotton gins in around Moree. In addition to the Wathagar Cotton Gin, the North West Cotton Gin is located approximately 5.5km to the east of Wathagar Gin on the Gwydir Highway and the Brighann Cotton Gin operates off Watercourse Road to the immediate north of Keytah. These cotton gins operate for a period of between three (3) and six (6) months each year. Raw cotton is delivered, processed and packaged, with cotton seed and ginned cotton bales being trucked from the Gins for an extended period after the Gins cease ginning.

To gain an understanding of seasonal truck movements at Wathagar Gin, truck movement records from the Gin were analysed over the 2023 season with supplementary data for the 2024 season. The records show a defined increase in operational Gin truck movements from May to September which would be reflective across the region. In good seasons, this may stretch out from April to November with a contraction in less productive years.

Section 2.3 of the Traffic Impact Assessment (TIA) provides more information on detailed content on traffic volumes.

Light traffic is generated by farming activities which would include staff and a wide range of service providers such as agronomists and mechanical service providers.

No public transport services are provided in the vicinity of the Wathagar Cotton Gin. A school bus operates along Watercourse road and the Gwydir Highway closer to Moree (pick up and drop off) during term times.

The Gwydir highway is rarely utilised by recreational vehicles and cyclists due to its relative remoteness from Moree and 110km distance to the next town, Collarenebri, to the west.

The traffic survey data indicates that approximately half of traffic west of Moree is generated along the Watercourse Road and the remainder travels along the Gwydir Highway.

The volume of heavy traffic on the Gwydir Highway west of Watercourse Road forms a larger percentage of the overall traffic volume than what occurs on Watercourse Road. The Gwydir Highway is utilised extensively by interstate traffic between Queensland, South Australia and Western Australia as it provides a relatively flat route between these states and therefore highly suitable for large freight trucks.

The Gwydir Highway is an identified trucking route for interstate trucks between Brisbane, Adelaide and Perth.

The number of onsite staff varies according to the project stage. During the short duration peak of the 20-week construction period, there will be up to 33 staff on site. 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 ten (10) light-vehicle movements per day, on average five (5) in the morning and five (5) in the afternoon.

Over the construction period, the development will require delivery of equipment and materials to be undertaken by heavy vehicles. These will include a combination of truck and dog units, semi-trailers and B-doubles. The larger of the truck units will be 26m in length. The TIA provides details of specific movements of trucks.

Accordingly, over the twenty (20) week construction period, the development will require an average of two (2) heavy vehicle movements per day.

The proposed development does not require any over-dimensional deliveries. However, it is anticipated that up to 6 x over-mass vehicles may be utilised to transport battery containers to the site. The maximum load of the over-mass truck will be in the order of 41 tonnes.

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

The highest number of heavy vehicles along the Gwydir Highway were observed during the peak hour, from 4:00 pm to 5:00 pm, with 18 heavy vehicles per hour along the Gwydir Highway near the property access. It is assumed that the heavy vehicle movement due to the proposed project will be an average of one heavy vehicle per day. The volume of traffic is not expected to put any adverse stress on the local road network or traffic flows. Furthermore, no road upgrades or related works are required to accommodate construction traffic.

Table 9 sets out expected traffic generation during construction, operations, and decommissioning.

Table 9: Predicted traffic generation during construction, operations and decommission.

Vehicle Type		Average Construction Periods		Peak Construction Period	
		Vehicle Trips per Day (vpd)	Peak Hour Trips (vph)	Vehicle Trips per Day (vpd)	Peak Hour Trips (vph)
Light Vehicles		10	5	44	22
Heavy Vehicles	Rigid Trucks	0	0	0	0
	Truck and Dog	0	0	0	0
	Semitrailers	2	1	10	0
	B-Doubles	0	0	0	0
	Non High Risk OSOM	0	0	4	1
	<i>HV Subtotal</i>	2	1	14	1
Total		14	6	58	23

5.17.3 Traffic Safety Analysis

The TfNSW Centre for Road Safety Crash and Casualty Statistics provides the location and severity of all injury and fatal crashes for the five-year period from 2018 to 2022. A review has been undertaken of the database for crashes that occurred on the Gwydir Highway, Watercourse Road and Goonal Road near the site.

A total of three crashes have occurred in proximity of the Watercourse Road intersection. A review of the crashes shows that they are mixed in regard to location, road user group and type, without a clear pattern that would indicate a significant existing road safety issue.

Accordingly, given the road classification and use, it is concluded that the surrounding road network is currently operating in a relatively safe manner.

5.17.4 Access

The development proposes to use the existing entrance/ exit off the Gwydir Highway into the Wathagar Cotton Gin. The road will require a relatively small upgrade to improve access.

The Project is entitled to a Right of Way over the Travelling Stock Route (7300/DP1161855) via s75 of the Local Land Services Act, 2013. This was constructed in the 1980s when the cotton gin was built.

The project will be seeking a Crown land licence to authorise the upgrade on Crown Reserve R31046. The Crown land licence will include an assessment of Native Title during the application evaluation process.

Additionally, the Project will seek a Works Authorisation Deed via Transport for NSW to enable the works. Engagement has commenced with the dedicated case officer for the Project within the renewables team at Transport for NSW.

Local Land Services have been consulted and attended site in October 2023 for a joint inspection with the applicant's Planning and Engagement lead. Their primary interest in the upgrade is to ensure that the function of the travelling stock reserve is maintained and passage/ traversing of stock is not impeded by the upgrade. They also endorsed consultation with Crown lands. Crown lands have been engaged via the local Moree office who have been briefed on the Project and have provided detailed advice and support in relation to facilitating the upgrade.

The applicant has engaged a specialist traffic engineer who is experienced in design of road upgrades and facilitating Works Authorisation Deeds in NSW. They are being supported locally by SMK Consultants to ensure that a fit-for-purpose design is delivered to an acceptable standard.

Existing internal access roads associated with the Wathagar gin will be used for the traffic generated by the Solar Farm. No new internal roads are required.

The applicant will enter into an agreement with the landowner to enable access to the Project footprint via these existing internal roads for the construction and operation of the GEGHA facility and solar farm.

Figure 27 to Figure 29 Show the existing property access and sight distance from the property entrance. Existing sight distances are considered appropriate.

Figure 27: Existing property access from the Gwydir Highway



Figure 28: Sight Distance – View west along the Gwydir Highway from existing site access.
Sight distance of over 1 kilometre



Figure 29: Sight Distance – View east along the Gwydir Highway from existing site access. Sight distance of over 500 metres.



5.17.5 Parking

The site can accommodate sufficient parking and service areas for construction vehicles. A laydown area for the equipment will be created as part of the development site. Trucks will enter, unload and leave the site. Worker vehicles will remain mobile throughout the day as they will contain the tools and equipment for construction of the solar farm.

There is no demand for parking facilities once the site is operational as maintenance related vehicles will remain mobile within the site as their tools will be contained on the vehicles.

5.17.6 Access and Traffic – detailed assessment and mitigation measures

Detailed assessment of Access and Traffic is provided in the Wathagar Solar Farm Stage 2 TIA, including proposed mitigation measures to appropriately manage identified residual risks and uncertainties.

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

the proponent 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 33 personnel directly involved in construction on site which is expected to take up to 20 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 partially manned i.e. operations personnel will conduct regular visual checks and record necessary data, but will not be based on site full time. In addition, local contractors will be called in as required to carry out maintenance every quarter or on an event-response basis.

5.18.3 Summary and Positive Impacts

- The proposed solar farm will generate electricity 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 the 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 a minimum of 25 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 the cotton ginning operation.

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.

The first stage of the Wathagar solar farm has already been constructed near the proposed development. The existing solar farm has no cumulative negative impacts, such as noise and air quality reduction.

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 following provides a summary of the project development and comments on the suitability of the site for the proposed development.

- 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 development is permissible with consent;
- 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;
- Utility services are currently unavailable but are not required;
- The removal of a native Plant Community Type is not required to accommodate the proposal;
- The proposed development will use an existing access from the Gwydir Highway and existing internal roads developed for the Wathagar Cotton Gin. The intersection onto the Gwydir Highway will be modernised to suit the larger trucks available such as an AB-triple Road train which were not present when the cotton gin was constructed;
- A preliminary contamination assessment concluded the risk of site contamination is assessed to be low and the site is suitable for the proposed development.

6.1 Justification for Approving the Proposal

Solar energy harnesses the heat and light of the sun, converting it into electricity through photovoltaic (PV) technology or using it for thermal applications. Australia, with the highest average solar radiation per square meter of any continent, is uniquely positioned to capitalise on solar energy as a sustainable and efficient power source. The development of large-scale solar photovoltaic (PV) infrastructure is a critical component of Australia's transition to a cleaner energy future, with New South Wales (NSW) playing a leading role in this transformation.

The expansion of solar PV projects across Australia has already contributed significantly to regional economies. Renewable infrastructure projects, including solar farms, are estimated to create over 2,300 direct jobs, along with thousands of indirect employment opportunities through supply chains, construction, and ongoing operations. The continued investment in renewable energy not only strengthens Australia's energy security but also supports economic resilience in regional areas.

As renewable electricity generation gains greater prominence in the national energy market, technologies such as battery storage are expected to play an increasingly vital role in grid stability and energy reliability. Over the next decade, advancements in storage solutions will facilitate a shift from centralised electricity generation towards a distributed energy model,

improving energy independence and resilience. Private infrastructure projects such as the proposed solar farm are essential in delivering reliable, clean energy to Australian consumers while directly contributing to the nation's emissions reduction targets under both State and Commonwealth climate policies.

Utility-scale solar PV is experiencing rapid growth in Australia, with multiple projects now exceeding 100 MW in capacity. The proposed solar farm seeks to address the market gap for mid-sized solar generation facilities, serving as a crucial bridge between small-scale distributed generation and large-scale solar plants. The project will complement existing renewable energy generation, reducing reliance on fossil fuels and supporting the transition to a low-carbon economy.

In this particular case, the proposed Stage 2 expansion of the existing solar farm will supply renewable energy directly to the Wathagar Cotton Gin as well as the GEGHA Hydrogen and Ammonia Plant, further enhancing the sustainability of Australia's emerging hydrogen economy. The hydrogen and ammonia produced will be derived from 100% renewable sources, aligning with the strategic objectives of both the NSW and Federal Governments to decarbonise industrial processes and replace fossil-fuel-based electricity generation with clean energy alternatives.

The proposed development has been carefully designed to ensure minimal environmental and amenity impacts. The project will adhere to best-practice environmental management and planning frameworks, ensuring that biodiversity, land use, and community considerations are effectively addressed. Given the clear environmental, economic, and energy security benefits, the proposed solar farm expansion warrants a favourable determination by the consent authority as a critical step toward a more sustainable and resilient energy future.

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SMK CONSULTANTS
39 Frome Street
PO Box 774
Moree NSW 2400
(02) 67521021

Client: Hirling Energy Pty Ltd
2910 Gwydir Highway, Wathagar
NSW 2400

Project:
Statement of Environmental Effects
For the Proposed Solar Farm

Scales:
A4 1:7000

PLAN REVISION :
A FIRST ISSUE

DATE
19-07-2024

Legends

- Lot Boundaries
- Batteries
- Leaves Outer
- Inverters
- LV Stations
- PEG Section
- GECHA Plant Control Room
- GECHA Site Layout Footprint
- Google Satellite Hybrid

Drawing File: ENV/RODATA/12024-24-277 Kirell Wathagar Solar Farm SEI
Designed: Blynni Pakadapets
Date : 19/07/2024

Appendix 2 – Preliminary Contaminated Site Investigation

Appendix 2

Contamination Assessment

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 scope of works for this investigation involves a Preliminary Site Investigation to determine if any contamination existed on the subject site. If contamination were found to exist at a level that was considered unsuitable for the intended land use, a more detailed site investigation would be required. This detailed investigation would provide recommendations for remediation and validation of the site to ensure the site is acceptable if the proposed development 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 as construction will involve surface activity only.

Past and Present Potentially Contaminating Activities

The subject site has previously been used for storage of raw cotton and cotton waste materials. The remainder of the property is used for the operation of a cotton gin, including the storage of cotton modules and Wathagar solar farm stage 1 located immediately east of the stage 2 solar farm area.

The site is located in a rural primary production zone to the south-west of Moree.

The site has been subject to extensive clearing for development of the cotton gin. More recently the site has been used for the storage of cotton waste as part of the operation of the cotton gin. Historical and anecdotal evidence indicates that the site has not been used for indiscriminate disposal of waste or other potentially hazardous materials.

As part of this investigation, the land use history of the site was scrutinised using historical aerial images from 1991 to 2023. The images from 1991 to 1996 indicate that the site was cleared but supported a range of weeds and grasses. Cotton waste had been stored on the site since 2011.

Figure 1: Areal Image Of the Subjected site- 1991.



Figure 2: Areal Image Of the Subjected Site- 1996



Figure 3: Areal Image Of the Subjected Site- 2011



Potential Contamination Types

Agrochemicals, such as herbicides and pesticides, are typically used to control weeds and vegetation on a cotton gin site as part of standard practice to reduce the potential for grass fires that could impact the cotton stored onsite. Additionally, the vegetation is managed by slashing and mowing to a height of less than 100mm to reduce the risk of a fire in the ginning season.

Locally harvested unprocessed cotton is transported to the Wathagar cotton gin for processing. Historically, this raw cotton carried a range of residues from pesticides applied to the crop for insect control. The amount of pesticide applied to cotton has been significantly reduced over time with some crops not requiring any pesticide application in more recent years. One by-product of the cotton ginning process consist of cotton waste which is separated from the raw cotton and cotton seed. This consists of leaf and stalk matter as well as dust that is removed from the raw cotton. There is a minor risk that this cotton waste contains residues of pesticide. The majority of pesticides used on cotton are purposely unstable and biodegrade over time. If present, the current concentration of these potential residues would be low as they would related to chemicals that have been banned for more the 20-years such as endosulfan.

The cotton waste is stored onsite to allow it to breakdown and create a mulch. The mulch is then taken back to the farms for use as an organic matter additive to the soil.

Site Condition and Adjoining Land Use

The subject site has been cleared with no remnant vegetation remaining. Some groundcover and weed growth have recolonised the site. This is regularly mown and kept short during the cotton ginning season but allowed to regrow outside of the ginning season to stabilise the ground.

A large proportion of the cotton gin is gravelled to allow truck access. During the cotton season, the areas used for storage of the raw cotton can be covered in cotton that falls from the cotton bales brought to the site. This cotton decomposes and disappears between ginning seasons.

Surrounding properties are 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 that may generate contaminants are located within a potential contaminating range of the subject land.

Assessment Criteria

The National Environmental Protection Measure 2013 (NEPM) provides a nationally consistent approach for the assessment of site contamination. NEPM presents parameters for a range of soil parameters and contaminants thresholds in the soil before they have the potential to affect health or the environment. The guideline values or site criteria are referred to as Health-Based Screening Levels (HSL's). NSW EPA and National Authorities have prepared other similar documents to provide additional threshold levels for contaminants.

Schedule B (1) – Guidelines on Investigation Levels for Soil and Groundwater (NEPC 2011) were used to establish the appropriate threshold levels for contamination on this site.

The site is to be used for industrial activity which is the least stringent criteria.

HIL criteria adopted for this site are based on this classification of Level D – Commercial/industrial D from NEPM 2013.

Assessment of Site Contamination

The site investigation indicated that the property has been utilised for mainly storage of cotton trash 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.

In September 2023, SMK Consultants conducted soil testing for the development footprint of the GEGHA project. Two soil samples were extracted from the western boundary of the Stage 2 Solar Farm. The soil samples were obtained from an area which has had the same landuse as the solar farm site, mainly storage of cotton waste for an extended period. No other form of landuse has occurred other than the original use of this land which was grazing of stock prior to development of the cotton gin in the 1980's.

The soil samples were sent to a NATA Accredited laboratory for analysis.

A summary of the laboratory analysis is presented in the following Table. The HIL contaminant threshold levels for the criteria adopted for this site are included in the table. The Certificates of Analysis for these results are presented in Appendix 1.

Table 1: Summary of soil analysis with NEPM 2013 HSL D - Commercial/Industrial D Threshold Criteria

Analyte	Unit	LOR ¹	Commercial/Industrial HIL	23-345-5	23-345-6
Depth	mm		-	00-300	00-300
EG005(ED093) T: Total Metals by ICP-AES					
Arsenic	mg/kg	5	3000	<5	<5
Cadmium	mg/kg	1	800	<1	<1
Chromium	mg/kg	2	3000	26	23
Copper	mg/kg	5	25,000	22	19
Lead	mg/kg	5	1500	8	7
Nickel	mg/kg	2	4000	24	20
Zinc	mg/kg	5	400,000	46	29
EK057G: Nitrite as N by Discrete Analyser					
Nitrite as N (Sol.)	mg/kg	0.1	NL	0.3	0.7
EK058G: Nitrate as N by Discrete Analyser					
Nitrate as N (Sol.)	mg/kg	0.1	NL	40.8	67.8
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser					
Nitrite + Nitrate as N (Sol.)	mg/kg	0.1	NL	41.1	68.5
EP066: Polychlorinated Biphenyls (PCB)					

Analyte	Unit	LOR ¹	Commercial/Industrial HIL	23-345-5	23-345-6
Total Polychlorinated biphenyls	mg/kg	0.1	NL	<0.1	<0.1
EP068A: Organochlorine Pesticides					
alpha-BHC	mg/kg	0.05	NL	-	<0.05
Hexachlorobenzene (HCB)	mg/kg	0.05	85	-	<0.05
beta-BHC	mg/kg	0.05	NL	-	<0.05
gamma-BHC	mg/kg	0.05	NL	-	<0.05
delta-BHC	mg/kg	0.05	NL	-	<0.05
Heptachlor	mg/kg	0.05	50	-	<0.05
Aldrin	mg/kg	0.05	NL	-	<0.05
Heptachlor epoxide	mg/kg	0.05	7	-	<0.05
Total Chlordane (sum)	mg/kg	0.05	50	-	<0.05
trans-Chlordane	mg/kg	0.05	NL	-	<0.05
alpha-Endosulfan	mg/kg	0.05	NL	-	<0.05
cis-Chlordane	mg/kg	0.05	NL	-	<0.05
Dieldrin	mg/kg	0.05	NL	-	<0.05
4,4'-DDE	mg/kg	0.05	NL	-	<0.05
Endrin	mg/kg	0.05	100	-	<0.05
Endosulfan (sum)	mg/kg	0.05	2000	-	<0.05
beta-Endosulfan	mg/kg	0.05	NL	-	<0.05
4,4'-DDD	mg/kg	0.05	NL	-	<0.05
Endrin aldehyde	mg/kg	0.05	NL	-	<0.05
Endosulfan sulfate	mg/kg	0.05	NL	-	<0.05
4,4'-DDT	mg/kg	0.2	180	-	<0.2
Endrin ketone	mg/kg	0.05	NL	-	<0.05
Methoxychlor	mg/kg	0.2	2700	-	<0.2
Sum of DDD + DDE + DDT	mg/kg	0.05	4000	-	<0.05
Sum of Aldrin + Dieldrin	mg/kg	0.05	50	-	<0.05
EP068B: Organophosphorus Pesticides					
Dichlorvos	mg/kg	0.05	NL	-	<0.05
Demeton-S-methyl	mg/kg	0.05	NL	-	<0.05
Monocrotophos	mg/kg	0.2	NL	-	<0.2
Dimethoate	mg/kg	0.05	NL	-	<0.05
Diazinon	mg/kg	0.05	NL	-	<0.05
Chlorpyrifos-methyl	mg/kg	0.05	NL	-	<0.05
Parathion-methyl	mg/kg	0.2	NL	-	<0.2
Malathion	mg/kg	0.05	NL	-	<0.05
Fenthion	mg/kg	0.05	NL	-	<0.05
Chlorpyrifos	mg/kg	0.05	NL	-	<0.05
Parathion	mg/kg	0.2	NL	-	<0.2
Pirimphos-ethyl	mg/kg	0.05	NL	-	<0.05
Chlorfenvinphos	mg/kg	0.05	NL	-	<0.05
Bromophos-ethyl	mg/kg	0.05	NL	-	<0.05
Fenamiphos	mg/kg	0.05	NL	-	<0.05
Prothiofos	mg/kg	0.05	NL	-	<0.05
Ethion	mg/kg	0.05	NL	-	<0.05
Carbophenothion	mg/kg	0.05	NL	-	<0.05
Azinphos Methyl	mg/kg	0.05	NL	-	<0.05
EP234A: OP Pesticides					
Azinphos-ethyl	mg/kg	0.005	NL	<0.005	<0.005
Azinphos-methyl	mg/kg	0.005	NL	<0.005	<0.005
Chlorfenvinphos	mg/kg	0.005	NL	<0.005	<0.005
Coumaphos	mg/kg	0.002	NL	<0.002	<0.002
Diazinon	mg/kg	0.002	NL	<0.002	<0.002
Dimethoate	mg/kg	0.004	NL	<0.004	<0.004
Disulfoton	mg/kg	0.01	NL	<0.01	<0.01
Ethoprophos	mg/kg	0.002	NL	<0.002	<0.002

Analyte	Unit	LOR ¹	Commercial/Industrial HIL	23-345-5	23-345-6
Fenamiphos	mg/kg	0.002	NL	<0.002	<0.002
Fenitrothion	mg/kg	0.5	NL	<0.5	<0.5
Fensulfothion	mg/kg	0.005	NL	<0.005	<0.005
Fenthion	mg/kg	0.010	NL	<0.010	<0.010
Malathion	mg/kg	0.005	NL	<0.005	<0.005
Mevinphos	mg/kg	0.005	NL	<0.005	<0.005
Monocrotophos	mg/kg	0.005	NL	<0.005	<0.005
Omethoate	mg/kg	0.002	NL	<0.002	<0.002
Parathion	mg/kg	0.05	NL	<0.05	<0.05
Parathion-methyl	mg/kg	0.5	NL	<0.5	<0.5
Phorate	mg/kg	0.02	NL	<0.02	<0.02
Pirimiphos-methyl	mg/kg	0.002	NL	<0.002	<0.002
Sulfotep	mg/kg	0.001	NL	<0.001	<0.001
Tetrachlorvinphos	mg/kg	0.002	NL	<0.002	<0.002
Triazophos	mg/kg	0.001	NL	<0.001	<0.001
EP234B: Thiocarbamates and Carbamates					
Aldicarb	mg/kg	0.01	NL	<0.01	<0.01
Bendiocarb	mg/kg	1	NL	<1	<1
Benomyl	mg/kg	0.005	NL	<0.005	<0.005
Carbaryl	mg/kg	0.002	NL	<0.002	<0.002
Carbofuran	mg/kg	0.002	NL	<0.002	<0.002
3-Hydroxy Carbofuran	mg/kg	0.005	NL	<0.005	<0.005
Methiocarb	mg/kg	0.002	NL	<0.002	<0.002
Methomyl	mg/kg	0.002	NL	<0.002	<0.002
Molinate	mg/kg	0.02	NL	<0.02	<0.02
Oxamyl	mg/kg	0.002	NL	<0.002	<0.002
Thiobencarb	mg/kg	0.002	NL	<0.002	<0.002
Thiodicarb	mg/kg	0.002	NL	<0.002	<0.002
EP234D: Triazinone Herbicides					
Hexazinone	mg/kg	10	NL	<0.004	<0.004
Metribuzin	mg/kg	10	NL	<0.004	<0.004
EP234E: Conazole and Aminopyrimidine Fungicides					
Cyproconazole	mg/kg	mg/kg	NL	<0.004	<0.004
Flusilazole	mg/kg	mg/kg	NL	<0.004	<0.004
Hexaconazole	mg/kg	mg/kg	NL	<0.004	<0.004
Paclobutrazole	mg/kg	mg/kg	NL	<0.01	<0.01
Propiconazole		mg/kg	NL	<0.01	<0.01
Tebuconazole		mg/kg	NL	<0.002	<0.002
Cyprodinil		mg/kg	NL	<0.002	<0.002
Pyrimethanil		mg/kg	NL	<0.005	<0.005
EP234G: Chloracetanilides					
Metolachlor	mg/kg	0.2	NL	<0.002	<0.002
EP234H: Triazine Herbicides					
Ametryn	mg/kg	0.002	NL	<0.002	<0.002
Atrazine	mg/kg	0.002	NL	<0.002	<0.002
Cyanazine	mg/kg	0.005	NL	<0.005	<0.005
Prometryn	mg/kg	0.002	NL	<0.002	<0.002
Propazine	mg/kg	0.002	NL	<0.002	<0.002
Simazine	mg/kg	0.005	NL	<0.005	<0.005
Terbutylazine	mg/kg	0.002	NL	<0.002	<0.002
Terbutryn	mg/kg	0.1	NL	<0.1	<0.1
EP234I: Miscellaneous (ESI Positive Mode) Pesticides					
Fenarimol	mg/kg	0.005	NL	<0.005	<0.005

Analyte	Unit	LOR ¹	Commercial/Industrial HIL	23-345-5	23-345-6
Irgarol	mg/kg	0.001	NL	<0.001	<0.001

Notes:

- 1) LOR = Limit of Reporting
- 2) HSL for arsenic assumes 70% oral bioavailability. Site-specific bioavailability may be important and should be considered where proper.
- 3) NL – No HIL Level published. Must be assessed on a risk basis if chemical present.

The two soil samples (23-345-5, and 23-345-6) were obtained from the subject site during the site inspection and sent to the laboratory for analysis. The samples were analysed for multiple metals, hydrocarbons and a wide range of pesticides to provide a general screening of the samples for a range of contaminants that may be present.

The results from all the samples show normal background levels and no elevated levels of metals, hydrocarbons, pesticides or metals. Most of the parameters were recorded at the limit of recording and therefore it is suspected that no such contaminant was contained within the samples.

No isolated points of contamination 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 acceptable to the proposed industrial development of a Solar Farm.

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 standard contaminated site 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 to assess the material to determine appropriate action for its management and removal prior to any further work on the site.

Appendix 1: Certificate of Analysis for Soil Samples



CERTIFICATE OF ANALYSIS

Work Order	: ES2331376	Page	: 1 of 10
Client	: SMK CONSULTANTS PTY LTD	Laboratory	: Environmental Division Sydney
Contact	: MR PETER TAYLOR	Contact	: Customer Services ES
Address	: P.O.Box 774 39 FROME STREET MOREE NSW, AUSTRALIA 2400	Address	: 277-289 Woodpark Road Smithfield NSW Australia 2164
Telephone	: +61 02 8752 1021	Telephone	: +61-2-8784 8555
Project	: GEGHA-Water supply and Soil Samples 23-345	Date Samples Received	: 14-Sep-2023 11:30
Order number	: ---	Date Analysis Commenced	: 14-Sep-2023
C-O-C number	: ---	Issue Date	: 21-Sep-2023 11:04
Sampler	: ---		
Site	: ---		
Quote number	: EN333		
No. of samples received	: 3		
No. of samples analysed	: 3		



Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	Position	Accreditation Category
Ankit Joshi	Senior Chemist - Inorganics	Sydney Inorganics, Smithfield, NSW
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Inorganics, Smithfield, NSW
Franco Lentini	LCMS Coordinator	Sydney Organics, Smithfield, NSW
Wisam Marassa	Inorganics Coordinator	Sydney Inorganics, Smithfield, NSW

Page : 2 of 10
 Work Order : ES2331376
 Client : SMK CONSULTANTS PTY LTD
 Project : OEGHA Water supply and Soil Samples 23-345



General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contract for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
 LOR = Limit of reporting
 ^ = This result is computed from individual analyte detections at or above the level of reporting
 @ = ALS is not NATA accredited for these tests.
 ~ = Indicates an estimated value.

- EP234: Poor matrix spike recovery for particular compounds due to matrix interferences and high matrix spike recovery has been noted for particular compounds due to ion enhancement.
- EP068: Where reported, Total Chlordane (sum) is the sum of the reported concentrations of cis-Chlordane and trans-Chlordane at or above the LOR.
- EP068: Where reported, Total OCP is the sum of the reported concentrations of all Organochlorine Pesticides at or above LOR.
- As per QWI – EN55-3 Data Interpreting Procedures, Ionic balances are typically calculated using Major Anions - Chloride, Alkalinity and Sulfate; and Major Cations - Calcium, Magnesium, Potassium and Sodium. Where applicable and dependent upon sample matrix, the Ionic Balance may also include the additional contribution of Ammonia, Dissolved Metals by ICPMS and H⁺ to the Cations and Nitrate, SiO₂ and Fluoride to the Anions.
- EA016: Calculated TDS is determined from Electrical conductivity using a conversion factor of 0.65.
- Sodium Adsorption Ratio (where reported): Where results for Na, Ca or Mg are <LOR, a concentration at half the reported LOR is incorporated into the SAR calculation. This represents a conservative approach for Na relative to the assumption that <LOR = zero concentration and a conservative approach for Ca & Mg relative to the assumption that <LOR is equivalent to the LOR concentration.
- ED045G: The presence of Thiocyanate, Thiosulfate and Sulfite can positively contribute to the chloride result, thereby may bias results higher than expected. Results should be scrutinised accordingly.



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 Work Order : ES2331376
 Client : SMK CONSULTANTS PTY LTD
 Project : GEGHA Water supply and Soil Samples 23-345

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	23-345-5 00m-300mm	23-345-6 00m-300mm	----	----	----
Sampling date / time					12-Sep-2023 00:00	12-Sep-2023 00:00	----	----	----
Compound	CAS Number	LOR	Unit		ES2331376-002	ES2331376-003	-----	-----	-----
				Result	Result	----	----	----	----
EA002: pH 1:5 (Soils)									
pH Value	----	0.1	pH Unit		8.5	----	----	----	----
EA010: Conductivity (1:5)									
Electrical Conductivity @ 25°C	----	1	µS/cm		285	----	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)									
Moisture Content	----	1.0	%		9.2	11.0	----	----	----
EG005(ED093)T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg		<5	<5	----	----	----
Cadmium	7440-43-9	1	mg/kg		<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg		26	23	----	----	----
Copper	7440-50-8	5	mg/kg		22	19	----	----	----
Lead	7439-92-1	5	mg/kg		8	7	----	----	----
Nickel	7440-02-0	2	mg/kg		24	20	----	----	----
Zinc	7440-66-6	5	mg/kg		46	39	----	----	----
EK057G: Nitrite as N by Discrete Analyser									
Nitrite as N (Sol.)	14797-65-0	0.1	mg/kg		0.3	0.7	----	----	----
EK058G: Nitrate as N by Discrete Analyser									
Nitrate as N (Sol.)	14797-55-8	0.1	mg/kg		40.8	67.8	----	----	----
EK059G: Nitrite plus Nitrate as N (NOx) by Discrete Analyser									
Nitrite + Nitrate as N (Sol.)	----	0.1	mg/kg		41.1	68.5	----	----	----
EK071G: Reactive Phosphorus as P by discrete analyser									
Reactive Phosphorus as P	14265-44-2	0.1	mg/kg		28.2	19.8	----	----	----
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg		----	<0.05	----	----	----
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg		----	<0.05	----	----	----
beta-BHC	319-85-7	0.05	mg/kg		----	<0.05	----	----	----
gamma-BHC	58-89-9	0.05	mg/kg		----	<0.05	----	----	----
delta-BHC	319-86-8	0.05	mg/kg		----	<0.05	----	----	----
Heptachlor	76-44-8	0.05	mg/kg		----	<0.05	----	----	----
Aldrin	309-00-2	0.05	mg/kg		----	<0.05	----	----	----
Heptachlor epoxide	1024-57-3	0.05	mg/kg		----	<0.05	----	----	----
^ Total Chlordane (sum)	----	0.05	mg/kg		----	<0.05	----	----	----
trans-Chlordane	5103-74-2	0.05	mg/kg		----	<0.05	----	----	----
alpha-Endosulfan	959-98-8	0.05	mg/kg		----	<0.05	----	----	----



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 Work Order : ES2331376
 Client : SMK CONSULTANTS PTY LTD
 Project : GEGHA Water supply and Soil Samples 23-345

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	23-345-5 00m-300mm	23-345-6 00m-300mm	---	---	---
Sampling date / time					12-Sep-2023 00:00	12-Sep-2023 00:00	---	---	---
Compound	CAS Number	LOR	Unit		ES2331376-002	ES2331376-003	---	---	---
				Result	Result	---	---	---	---
EP068A: Organochlorine Pesticides (OC) - Continued									
cis-Chlordane	5103-71-9	0.05	m g/kg	---	<0.05	---	---	---	---
Dieldrin	60-57-1	0.05	m g/kg	---	<0.05	---	---	---	---
4,4'-DDE	72-55-9	0.05	m g/kg	---	<0.05	---	---	---	---
Endrin	72-20-8	0.05	m g/kg	---	<0.05	---	---	---	---
beta-Endosulfan	33213-65-9	0.05	m g/kg	---	<0.05	---	---	---	---
^ Endosulfan (sum)	115-29-7	0.05	m g/kg	---	<0.05	---	---	---	---
4,4'-DDD	72-54-8	0.05	m g/kg	---	<0.05	---	---	---	---
Endrin aldehyde	7421-93-4	0.05	m g/kg	---	<0.05	---	---	---	---
Endosulfan sulfate	1031-07-8	0.05	m g/kg	---	<0.05	---	---	---	---
4,4'-DDT	50-29-3	0.2	m g/kg	---	<0.2	---	---	---	---
Endrin ketone	53494-70-5	0.05	m g/kg	---	<0.05	---	---	---	---
Methoxychlor	72-43-5	0.2	m g/kg	---	<0.2	---	---	---	---
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	m g/kg	---	<0.05	---	---	---	---
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/50-2	0.05	m g/kg	---	<0.05	---	---	---	---
EP068B: Organophosphorus Pesticides (OP)									
Dichlorvos	62-73-7	0.05	m g/kg	---	<0.05	---	---	---	---
Demeton-S-methyl	919-86-8	0.05	m g/kg	---	<0.05	---	---	---	---
Monocrotophos	6923-22-4	0.2	m g/kg	---	<0.2	---	---	---	---
Dimethoate	60-51-5	0.05	m g/kg	---	<0.05	---	---	---	---
Diazinon	333-41-5	0.05	m g/kg	---	<0.05	---	---	---	---
Chlorpyrifos-methyl	5598-13-0	0.05	m g/kg	---	<0.05	---	---	---	---
Parathion-methyl	298-00-0	0.2	m g/kg	---	<0.2	---	---	---	---
Malathion	121-75-5	0.05	m g/kg	---	<0.05	---	---	---	---
Fenthion	55-38-9	0.05	m g/kg	---	<0.05	---	---	---	---
Chlorpyrifos	2921-88-2	0.05	m g/kg	---	<0.05	---	---	---	---
Parathion	56-38-2	0.2	m g/kg	---	<0.2	---	---	---	---
Pirimphos-ethyl	23505-41-1	0.05	m g/kg	---	<0.05	---	---	---	---
Chlorfenvinphos	470-90-6	0.05	m g/kg	---	<0.05	---	---	---	---
Bromophos-ethyl	4824-78-6	0.05	m g/kg	---	<0.05	---	---	---	---
Fenamiphos	22224-92-6	0.05	m g/kg	---	<0.05	---	---	---	---
Prothiofos	34643-46-4	0.05	m g/kg	---	<0.05	---	---	---	---
Ethion	563-12-2	0.05	m g/kg	---	<0.05	---	---	---	---
Carbophenothion	786-19-6	0.05	m g/kg	---	<0.05	---	---	---	---

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 Work Order : ES2331376
 Client : SMK CONSULTANTS PTY LTD
 Project : GEGHA-Water supply and Soil Samples 23-345



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	23-345-5 00m-300mm	23-345-6 00m-300mm	---	---	---
Sampling date / time					12-Sep-2023 00:00	12-Sep-2023 00:00	---	---	---
Compound	CAS Number	LOR	Unit		ES2331376-002	ES2331376-003	---	---	---
					Result	Result	---	---	---
EP068B: Organophosphorus Pesticides (OP) - Continued									
Azinphos Methyl	86-50-0	0.05	m g/kg		---	<0.05	---	---	---
EP234A: OP Pesticides									
Azinphos-ethyl	2642-71-9	0.005	m g/kg		<0.005	<0.005	---	---	---
Azinphos-methyl	86-50-0	0.005	m g/kg		<0.005	<0.005	---	---	---
Chlorfenvinphos	470-90-6	0.005	m g/kg		<0.005	<0.005	---	---	---
Coumaphos	56-72-4	0.002	m g/kg		<0.002	<0.002	---	---	---
Diazinon	333-41-5	0.002	m g/kg		<0.002	<0.002	---	---	---
Dimethoate	60-51-5	0.004	m g/kg		<0.004	<0.004	---	---	---
Disulfoton	298-04-4	0.01	m g/kg		<0.01	<0.01	---	---	---
Ethoprophos	13194-48-4	0.002	m g/kg		<0.002	<0.002	---	---	---
Fenamiphos	22224-92-6	0.002	m g/kg		<0.002	<0.002	---	---	---
Fenitrothion	122-14-5	0.5	m g/kg		<0.5	<0.5	---	---	---
Fensulfothion	115-90-2	0.005	m g/kg		<0.005	<0.005	---	---	---
Fenthion	55-38-9	0.010	m g/kg		<0.010	<0.010	---	---	---
Malathion	121-75-5	0.005	m g/kg		<0.005	<0.005	---	---	---
^ Mevinphos	7786-34-7	0.005	m g/kg		<0.005	<0.005	---	---	---
Monocrotophos	6923-22-4	0.005	m g/kg		<0.005	<0.005	---	---	---
Ormethoate	1113-02-6	0.002	m g/kg		<0.002	<0.002	---	---	---
Parathion	56-38-2	0.05	m g/kg		<0.05	<0.05	---	---	---
Parathion-methyl	298-00-0	0.5	m g/kg		<0.5	<0.5	---	---	---
Phorate	298-02-2	0.02	m g/kg		<0.02	<0.02	---	---	---
Pirimiphos-methyl	29232-93-7	0.002	m g/kg		<0.002	<0.002	---	---	---
Sulfotep	3689-24-5	0.001	m g/kg		<0.001	<0.001	---	---	---
Tetrachlorvinphos	22248-79-9	0.002	m g/kg		<0.002	<0.002	---	---	---
Triazophos	24017-47-8	0.001	m g/kg		<0.001	<0.001	---	---	---
EP234B: Thiocarbamates and Carbamates									
Aldicarb	116-06-3	0.01	m g/kg		<0.01	<0.01	---	---	---
Bendiocarb	22781-23-3	1	m g/kg		<1	<1	---	---	---
Benomyl	17804-35-2	0.005	m g/kg		<0.005	<0.005	---	---	---
Carbaryl	63-25-2	0.002	m g/kg		<0.002	<0.002	---	---	---
Carbofuran	1563-66-2	0.002	m g/kg		<0.002	<0.002	---	---	---
3-Hydroxy Carbofuran	16655-82-6	0.005	m g/kg		<0.005	<0.005	---	---	---
Methiocarb	2032-65-7	0.002	m g/kg		<0.002	<0.002	---	---	---
Methomyl	16752-77-5	0.002	m g/kg		<0.002	<0.002	---	---	---

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 Work Order : ES2331376
 Client : SMK CONSULTANTS PTY LTD
 Project : GEGHA Water supply and Soil Samples 23-345



Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	23-345-5 00m-300mm	23-345-6 00m-300mm	---	---	---
Sampling date / time					12-Sep-2023 00:00	12-Sep-2023 00:00	---	---	---
Compound	CAS Number	LOR	Unit		ES2331376-002	ES2331376-003	---	---	---
				Result	Result				
EP234B: Thiocarbamates and Carbamates - Continued									
Molinate	2212-67-1	0.02	m g/kg		<0.02	<0.02	---	---	---
Oxamyl	23135-22-0	0.002	m g/kg		<0.002	<0.002	---	---	---
Thiobencarb	28249-77-6	0.002	m g/kg		<0.002	<0.002	---	---	---
Thiodicarb	59669-26-0	0.002	m g/kg		<0.002	<0.002	---	---	---
EP234D: Triazinone Herbicides									
Hexazinone	51235-04-2	0.004	m g/kg		<0.004	<0.004	---	---	---
Metribuzin	21087-64-9	0.004	m g/kg		<0.004	<0.004	---	---	---
EP234E: Conazole and Aminopyrimidine Fungicides									
Cyproconazole	94361-06-5	0.004	m g/kg		<0.004	<0.004	---	---	---
Flusilazole	85509-19-9	0.004	m g/kg		<0.004	<0.004	---	---	---
Hexaconazole	79983-71-4	0.004	m g/kg		<0.004	<0.004	---	---	---
Paclobutrazole	76738-62-0	0.01	m g/kg		<0.01	<0.01	---	---	---
Propiconazole	60207-90-1	0.01	m g/kg		<0.01	<0.01	---	---	---
Tebuconazole	107534-96-3	0.002	m g/kg		<0.002	<0.002	---	---	---
Cyprodinil	121552-61-2	0.002	m g/kg		<0.002	<0.002	---	---	---
Pirimethanil	53112-28-0	0.005	m g/kg		<0.005	<0.005	---	---	---
EP234F: Phenylurea, Thidiazolurea, Uracil and Sulfonyleurea Herbicides									
Diuron	330-54-1	0.005	m g/kg		<0.005	<0.005	---	---	---
Fluometuron	2164-17-2	0.002	m g/kg		<0.002	<0.002	---	---	---
Tebuthiuron	34014-18-1	0.005	m g/kg		<0.005	<0.005	---	---	---
Bromacil	314-40-9	0.005	m g/kg		<0.005	<0.005	---	---	---
EP234G: Chloracetanilides									
Metolachlor	51218-45-2	0.002	m g/kg		<0.002	<0.002	---	---	---
EP234H: Triazine Herbicides									
Ametryn	834-12-8	0.002	m g/kg		<0.002	<0.002	---	---	---
Atrazine	1912-24-9	0.002	m g/kg		<0.002	<0.002	---	---	---
Cyanazine	21725-46-2	0.005	m g/kg		<0.005	<0.005	---	---	---
Prometryn	7287-19-6	0.002	m g/kg		<0.002	<0.002	---	---	---
Propazine	139-40-2	0.002	m g/kg		<0.002	<0.002	---	---	---
Simazine	122-34-9	0.005	m g/kg		<0.005	<0.005	---	---	---
Terbutylazine	5915-41-3	0.002	m g/kg		<0.002	<0.002	---	---	---
Terbutryn	886-50-0	0.1	m g/kg		<0.1	<0.1	---	---	---
EP234I: Miscellaneous (ESI Positive Mode) Pesticides									

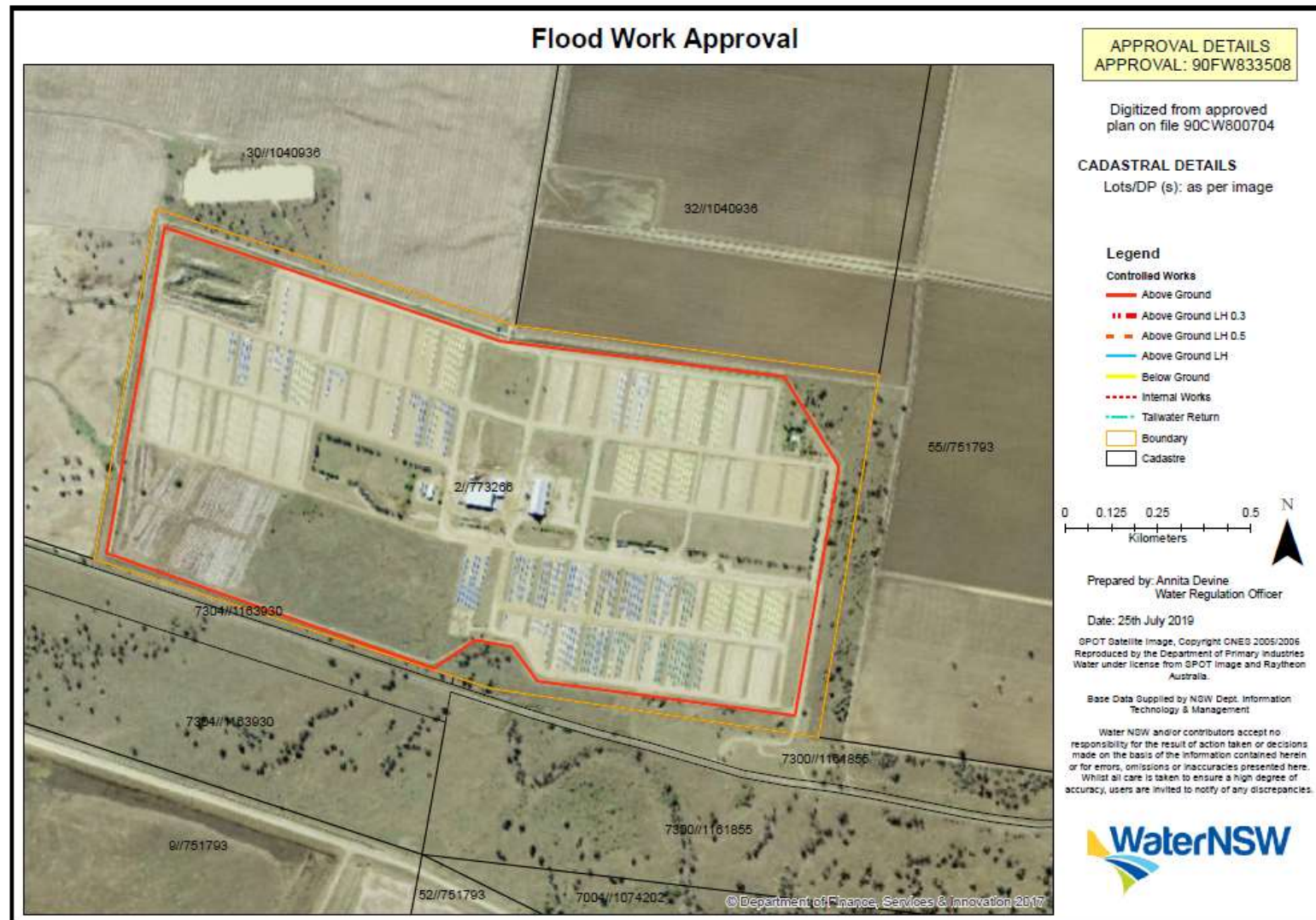


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 Work Order : ES2331376
 Client : SMK CONSULTANTS PTY LTD
 Project : GEGHA Water supply and Soil Samples 23-345

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Sample ID	23-345-5 00m-300mm	23-345-6 00m-300mm	---	---	---
				Sampling date / time	12-Sep-2023 00:00	12-Sep-2023 00:00	---	---	---
Compound	CAS Number	LOR	Unit		ES2331376-002	ES2331376-003	---	---	---
				Result	Result	---	---	---	---
EP234I: Miscellaneous (ESI Positive Mode) Pesticides - Continued									
Fenarimol	60168-88-9	0.005	mg/kg		<0.005	<0.005	---	---	---
Irgarol	28159-98-0	0.001	mg/kg		<0.001	<0.001	---	---	---
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE	21655-73-2	0.05	%		---	72.9	---	---	---
EP068T: Organophosphorus Pesticide Surrogate									
DEF	78-48-8	0.05	%		---	83.5	---	---	---

Appendix 3 – Flood Work Approval



Appendix 4 – Aboriginal Due Diligence Report

2910 Gwydir Highway, Wathagar
Wathagar Solar Farm Stage 2:
Solar PV Array and Upgraded Site Entry

Aboriginal Cultural Heritage Due Diligence Assessment



Report to Hiringa Sundown Project Trust

3 September 2024

Landskape

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**2910 Gwydir Highway, Wathagar
Wathagar Solar Farm Stage 2:
Solar PV Array and Upgraded Site Entry**

Aboriginal Cultural Heritage Due Diligence Assessment

**Report to Hiringa Sundown Project Trust
3 September 2024**



**Author: Dr Matt Cupper
Date: 3 September 2024**

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e-mail: landscape@telstra.com
tel: 0408 006 690

Executive Summary

Hiringa Sundown Project Trust propose to install Stage 2 of the solar PV array at the Wathagar Solar Farm, 2910 Gwydir Highway, Wathagar in the North West Slopes of NSW. Upgrade of the entry to the site is also proposed. The proposed works would generate electricity for the electrolysis plant and ammonia plant for the Good Earth Green Hydrogen and Ammonia Project, and secondarily for the Wathagar cotton gin and the national electricity grid.

In order to investigate the potential impact on Aboriginal cultural heritage places, items and values resulting from the proposed works, Landskape was engaged by Hiringa Sundown Project Trust to complete an Aboriginal cultural heritage due diligence assessment of the proposed infrastructure work areas.

The key objectives of the archaeological investigation were to:

- identify any Aboriginal cultural heritage within the proposed infrastructure work areas; and,
- recommend measures to avoid or mitigate any potential harm to cultural heritage.

No Aboriginal cultural heritage sites or Aboriginal objects have previously been recorded in the work areas for the solar PV array and associated site entry upgrade and the present survey did not encounter any additional Aboriginal cultural heritage.

Based on the results of this cultural heritage due diligence investigation it is concluded that the proposed solar PV array and associated site entry upgrade are located in areas where harm to Aboriginal cultural heritage would be avoided.

It is recommended that:

- if any previously unidentified Aboriginal objects are encountered during the course of activities all works likely to affect the material must cease immediately and the Environmental Line (tel: 131 555) consulted about an appropriate course of action prior to recommencement of work. It is an offence under the *National Parks and Wildlife Act 1974* to disturb or destroy Aboriginal objects without written consent of Heritage NSW; and,
- if human skeletal remains are encountered during the course of the proposed activities all work in that area must cease. Remains must not be handled or otherwise disturbed except to prevent further disturbance. If the remains are thought to be less than 100 years old the Police or the State Coroners Office (tel: 02 9552 4066) must be notified. If there is reason to suspect that the skeletal remains are more than 100

years old and Aboriginal, the proponent should contact the Environmental Line (tel: 131 555) for advice.

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1 Introduction

Hiringa Sundown Project Trust propose to install Stage 2 of the solar PV array at the Wathagar Solar Farm, 2910 Gwydir Highway, Wathagar in the North West Slopes region of central western NSW. Upgrade of the entry to the site is also proposed. The proposed works would generate electricity for the electrolysis plant and ammonia plant for the Good Earth Green Hydrogen and Ammonia Project, and secondarily for the Wathagar cotton gin and the national electricity grid.

In order to investigate the potential impact on Aboriginal cultural heritage places, items and values resulting from the proposed works, Landskape was engaged by Hiringa Sundown Project Trust to complete an Aboriginal cultural heritage due diligence assessment of the proposed infrastructure work areas.

The key objectives of the archaeological investigation were to:

- identify any Aboriginal cultural heritage within the proposed infrastructure work areas; and,
- recommend measures to avoid or mitigate any potential harm to cultural heritage.

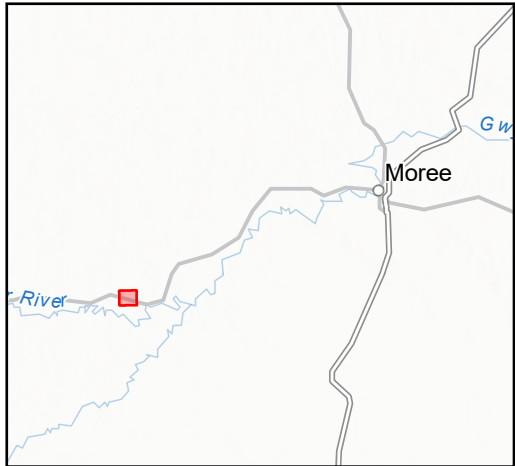
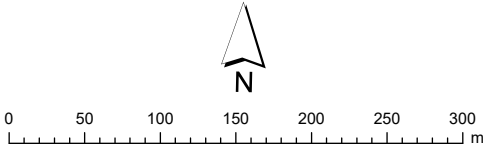
Preparation of this report involved collation of relevant archaeological and environmental information and the use of aerial photographs and topographic and geomorphic maps to identify areas likely to contain archaeological sites. Fieldwork was completed on 18 October 2023 by archaeologist Dr Matt Cupper with the involvement of Alfred Tighe and Dorothy Tighe (representing Gomeroi Native Title Applicant) and David Horton (Gomery Culture Consultants).



STAGE 2 OVERVIEW PLAN

PROJECT		
Good Earth Green Hydrogen and Ammonia (GEGHA) Wathagar Solar Farm - Stage 2		
DATE	STATUS	PRODUCED
29/07/2024	ISSUED FOR INFORMATION	AC
SCALE	DATUM	CHECKED
1:7,000	GDA2020 MGA Zone 55	IS
FILE		REV
GEG_006_A Stage 2 Overview		A

- Wathagar Solar Farm - Stage 2
- Site entrance additional disturbance
- Site Hut & Carpark
- Photovoltaic Panel Array (Planned)
- Property Boundaries



Disclaimer: Approved Consulting makes no warranty in relation to the accuracy, reliability, completeness or suitability of the data and does not accept liability for any loss, damage or costs, including consequential damage, in relation to any use of the data in this map.

2 Legislative Context

All registered and unregistered Aboriginal archaeological sites in New South Wales are protected by the State *National Parks and Wildlife Act 1974* and *Environmental Planning and Assessment Act 1979*. These Acts prohibit the wilful destruction or disturbance of any cultural heritage site, place or object, whether on private or public land. These places are considered to have significance according to the guidelines of the *Australia ICOMOS Charter for the Conservation of Places of Cultural Significance* (the Burra Charter).

Heritage NSW is the State Government agency that administers these Acts as they pertain to the Aboriginal heritage of NSW.

2.1 *National Parks and Wildlife Act 1974*

In NSW, the *National Parks and Wildlife Act 1974* (as amended 2010) provides legislative protection for all Aboriginal cultural heritage places and objects.

Section 86 of the *National Parks and Wildlife Act 1974* sets out a number of offences about 'harm' or desecration to an Aboriginal place or object. Harm means any act or omission that:

- Destroys, defaces or damages a place or object;
- Moves an object from the land on which it had been situated; or,
- Causes or permits a place or object to be harmed.

There are two types of offences for harming an Aboriginal place or object:

- An offence of harming or desecrating an object which a person knows is an Aboriginal object (a 'knowing offence'); or,
- An offence of harming a place or object whether or not a person knows it is an Aboriginal place or object (a 'strict liability offence').

Section 87 *National Parks and Wildlife Act 1974* provide several defences and exemptions for both types of offence. For example, a person who exercises due diligence in determining that their actions would not harm Aboriginal objects has a defence against prosecution for the strict liability offence if they later unknowingly harm an object. Accordingly, Heritage NSW has prepared a code of practice (*Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* [DECCW 2010]) to assist individuals and organisations who choose to exercise due diligence. The current study conforms to this due diligence code of practice.

It is also a defence if a person holds a current Aboriginal Heritage Impact Permit (AHIP) under section 90 *National Parks and Wildlife Act 1974* and complies with the conditions

of the AHIP.

In addition to the defences in the *National Parks and Wildlife Act 1974*, the general defence of ‘honest and reasonable mistake’ also applies to the strict liability offence.

2.2 *Environmental Planning and Assessment Act 1979*

The *Environmental Planning and Assessment Act 1979* also recognizes the need to protect the cultural and natural heritage of New South Wales. The heritage scope of this legislation is wider than that of the *National Parks and Wildlife Act 1974* and it protects sites of significance to contemporary communities.

2.3 *Australia ICOMOS Charter for the Conservation of Places of Cultural Significance (Burra Charter)*

The *Australia ICOMOS Charter for the Conservation of Places of Cultural Significance* (Burra Charter) was adopted at a conference at the historic mining town of Burra, South Australia, in 1979 (latest update 2013). This charter defines the procedures and basic principles to be followed in the preservation of all types of sites, for example, Aboriginal shell middens, ancient camp sites represented by stone artefact scatters, or historic mining shafts. These places are considered to have cultural significance either to Aboriginal people or to Australians in general. Cultural significance is a term used to encompass all the meanings and values that a particular place may have to people, beyond its utilitarian value. It refers to ‘aesthetic, historical, scientific or social value for past or present generations, or for its likely value to future generations’ (Marquis-Kyle and Walker 1992: 73).

Under the guidelines of the Burra Charter, any Aboriginal sites at Wathagar would have social value. According to the charter, social value is defined as:

...the qualities for which a place has become a focus of spiritual, political, national, or other cultural sentiment to a majority or minority group (Marquis-Kyle and Walker 1992: 73)

Any sites found at Wathagar could also have scientific value. This is assessed according to each particular site’s research or scientific potential to provide information about past Aboriginal or wider Australian culture, the environment, or human behaviour generally. According to *the Burra Charter*:

The scientific or research value of a place would depend upon the importance of the data involved or its rarity, quality or representativeness and on the degree to which the place may contribute further substantial information (Marquis-Kyle and

Walker 1992: 73).

While the scientific or research value of a place may vary, the Aboriginal community consider all Aboriginal archaeological sites to be significant. The Aboriginal people of central western NSW have an ancient and unique traditional culture, which is still very much alive today. These sites are important to the local Aboriginal people, and others, because they are a link to their ancestral lands and help keep their traditional culture alive.

3 Proposed Works and Potential Impacts

3.1 Type of Development

The project would involve the installation and operation of an additional 27MW of solar PV electricity generation at the existing Wathagar Solar Farm at Lot 2 DP773266, 2910 Gwydir Highway, Wathagar (Figure 1). This would occupy the area to the west of the current solar PV array, currently used for storing by-product from cotton processing (Figures 2-4). An upgraded site entrance off the Gwydir Highway forms part of the project (Figure 5).

3.2 Description of Proposed Works

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.

3.3 Construction Method

Construction of the solar PV array would involve:

- Installing PEG piers piles or screws (steel tubes) to a minimum height above ground of 800 mm and a maximum height of 950 mm.
- Installing the steel framework PV panels.
- Installing trenched and above-ground cabling.
- Constructing pads for inverters and transformers.

There is sufficient cleared land available for a work zone to store materials, vehicles and equipment.

The upgraded site entrance would involve earthworks to form the road base.



Figure 2. Proposed solar PV array work area.



Figure 3. Proposed solar PV array work area.



Figure 4. Proposed solar PV array work area.



Figure 5. Proposed site entry work area.

3.4 Flexibility of Design

The proposed locations of the proposed solar farm and upgraded site entrance are relatively inflexible within constrained optimal design locations, but it is possible the final design could be modified if engineering constraints allow to avoid any potential disturbance of Aboriginal cultural heritage places or items.

3.5 Identification of Direct and Indirect Impacts

Installation of the proposed solar farm and upgraded site entrance would involve further modification of an already heavily modified landscape (Figures 2-4). The entirety of the proposed work areas have been previously cleared and disturbed by earthworks during past hardstand, road and track construction and installation of other infrastructure and agricultural activities.

Direct impacts from the installation of the proposed solar farm include driving shallow PEG piers piles or screws (steel tubes), trenching for cabling and pads for inverters and transformers.

Construction of the upgraded site entrance would comprise earthworks to form the road base.

Components would be delivered to the work areas by trucks and unloaded using heavy rubber tyred machinery. Earthmoving equipment (excavators, graders, as required) would operate on tracks or rubber tyres.

Indirect impacts for the proposed development include possible machinery parking areas. These activities would be restricted to existing access tracks and cleared areas adjacent to the proposed work areas. Personnel involved in the construction phase would be trained in procedures to recognise and avoid disturbance to cultural heritage places and items.

4 Environmental Context

The Wathagar project area is located in the North West Slopes region of central western New South Wales. The project is approximately 1.5 km north of the Mehi River, a perennial stream course with associated wetland areas that flows into the Gwydir River, a tributary of the Barwon River. This river system lies within the Murray Basin. The surface geology of the region is mostly alluvial sediments (Brown and Stephenson 1991).

The solar PV array and upgraded site entry would be located on alluvial plains north of the Mehi River. This would have once supported a vegetation cover of Coolabah (*Eucalyptus collabah*) low-open woodlands with chenopod understoreys, but the original vegetation of the alluvial plain has been cleared for past agricultural development.

Overall, the environment of the study area has been substantially modified by past European land use practices. This includes earthworks during the construction of tracks and roads, including an existing site entrance off the Gwydir Highway (Figures 5 and 8). All of the area has been cleared and graded for storage of cotton processing by-product and other hardstands (Figures 6 and 7).



Figure 6. Existing hardstand adjacent to the Wathagar Solar Farm.



Figure 7. Cotton by-product stockpiled on hardstands at the work area.



Figure 8. Work area for the upgraded site entrance off the Gwydir Highway.

5 Cultural Heritage Context

5.1 Aboriginal Cultural Heritage Context

Aboriginal occupation of central western NSW is known to date from at least 29,000-34,000 years ago. The oldest ages have been obtained from the Pleistocene (Ice Age) sites of Cuddie Springs and Tambar Springs at the downstream end of the Macquarie River catchment, approximately 250 km southwest of Wathagar (e.g. Field and Dodson 1999). Early radiocarbon ages have also been obtained from cultural sequences for rock shelter sites in the ranges to the south. For example, Gaynor (1997) obtained a 20,000 year age from Crazy Man Rock shelter in the Warrumbungle National Park (250 km south of Wathagar).

Accounts of Aboriginal land use of the North West Slopes during the nineteenth century provide an insight into possible settlement patterns in the prehistoric period. Prior to European settlement, large localised clans of Aboriginal people inhabited the Barwon catchment encompassing the present project area (see Pearson 1984).

It has been speculated that there may have been several clan territories centred on different reaches of the rivers. Natural boundaries such as creek and river valleys may have separated these territories (see Pearson 1984).

During normal conditions, clans divided into bands of up to twenty people, who may have used a territory with a radius of 20-30 kilometres. These bands coalesced relatively quickly into groups of 80-150 people to take advantage of a guaranteed or desirable resource, such as seasonal food resources (see Pearson 1984).

The material record of this occupation is preserved in the archaeological sites of the North West Slopes, most of which probably date to the period since the last Ice Age (after around 18,000 years ago). All that remains at many of these sites are flakes of stone debris from the making and resharpening of stone tools. These were made both at Aboriginal open and closed habitation areas (campsites and rock shelters) or special work areas such as axe grinding groove sites.

As well as being the sites of manufacture and maintenance of stone implements, habitation areas usually contain evidence of domestic and other activities such as cooking and food preparation. Campfires or oven hearths are common, marked by charcoal and heat retaining stones or hearthstones. Organic remains consist of marsupial, rodent, bird, lizard, snake and fish bones, eggshell and freshwater mussel shell. Modified trees show where bark may have been removed by Aboriginal people to manufacture canoes, shelters and dishes.

Surface scatters of flaked stone artefacts are the most common site type in central western NSW. These stone assemblages are dominated by flakes and flaked pieces mostly struck from quartz, and less commonly, silcrete, chert and quartzite. Few formalized tool types have been recorded, but include ground-edged axes and grinding dishes. Eucalypt trees with scars possibly made by Aboriginal people are also well represented along creek lines of the North West Slopes and are particularly abundant on the adjacent plains of the Barwon River and its tributaries. Other site types on the plains include earthen features such as hearths and mounds. Rock shelters, rock art sites, axe-head grinding grooves, stone sources and stone arrangements also occur in the foothills of the North West Slopes.

5.2 Types of Aboriginal Cultural Heritage Sites in the Region

Based on the results and analytical conclusions of previous archaeological surveys in similar landscape contexts on the North West Slopes it is possible to predict the types and topographic contexts of Aboriginal cultural heritage sites in the project area. The occurrence and survival of archaeological sites is, however, dependent on many factors including micro-topography and the degree of land surface disturbance.

The types of Aboriginal cultural heritage sites previously recorded on the North West Slopes are described in Sections 6.3.1-6.3.11.

5.2.1 Stone Artefact Scatters

Scatters of stone artefacts exposed at the ground surface are one of the most commonly occurring types of Aboriginal cultural heritage site in the region. The remains of fire hearths may also be associated with the artefacts. In rare instances, sites that were used over a long period of time may accumulate sediments and become stratified. That is, there may be several layers of occupation buried one on top of another.

Stone artefact scatters are almost invariably located near permanent or semi-permanent water sources. Local topography is also important in that open campsites tend to occur on level, well-drained ground elevated above the local water source. On the North West Slopes, they are commonly located on river terraces and along creek-lines and also around the margins of lakes, swamps and claypans.

5.2.2 Hearths

Hearths consist of lumps of burnt clay or stone cobble hearthstones. Sometimes ash and charcoal are preserved. Other materials found in hearths include animal bone, freshwater mussel shell, Emu eggshell and stone artefacts. Hearths probably represent the remains of cooking ovens, similar to those described in ethnographic accounts by Major Thomas

Mitchell (1839) and Peter Beveridge (1869). These were lined with baked clay nodules and stone cobbles, possibly to retain heat. Hearths may be isolated or occur in clusters and may be associated with open campsites or middens. They are often located in dune swales, particularly on claypans, near soaks and on floodplain terraces.

5.2.3 Freshwater Shell Middens

Shell middens are deposits of shell and other food remains accumulated by Aboriginal people as food refuse. In inland NSW these middens typically comprise shells of the freshwater lacustrine mussel *Velesunio ambiguus* or the freshwater riverine mussel *Alathyria jacksoni*. Freshwater middens are most frequently found as thin layers or small patches of shell and often contain stone or bone artefacts and evidence of cooking. Such sites are relatively common along the rivers of the North West Slopes and their associated lakes and tributaries.

5.2.4 Earth Mounds

Earth mounds may have been used by Aboriginal people as cooking ovens or as campsites. They are common on the plains west of the North West Slopes. Originally they appear to have ranged from 3 to 35 metres in diameter and from 0.5 to 2 metres in height. Today, however, they may be difficult to recognize because of the effects of ploughing, grazing and burrowing rabbits. Earth oven material, stone artefacts, food refuse and the remains of hut foundations have been exposed in excavated earth mounds.

5.2.5 Quarry Sites

Quarries are locations where Aboriginal people obtained raw material for their stone tools or ochre for their art and decoration. Materials commonly used for making flaked stone tools include chert, silcrete, quartz and quartzite. At Wathagar stone sources are particularly scarce. Most stone was probably sourced from bedrock hills elsewhere on the North West Slopes.

5.2.6 Modified Trees

Slabs of bark were cut from trees by Aboriginal people and used for a variety of purposes including roofing shelters and constructing canoes, shields and containers. Scars also resulted from the cutting of toeholds for climbing trees to obtain honey or to capture animals such as possums. Some trees were carved, whereby Aboriginal people cut designs through the bark onto the wood beneath. Ethnohistoric records indicate that some carved trees were associated with burials whilst others may have been sacred or totemic sites.

In the North West Slopes River Red Gums, Coolabah and Black Box are the most commonly scarred species. The classification of scarred trees as natural, European or Aboriginal is often problematic. However, if the scar is Aboriginal the tree must now be more than ~150 years old.

5.2.7 Axe-grinding Grooves

Axe-grinding grooves result from Aboriginal people having rubbed the edges of stone axe-heads repeatedly against a soft abrasive rock in order to shape or sharpen them. Grinding grooves are normally located adjacent to creeks where suitable stone for grinding may be present. In most instances, sandstone outcrops provided the most suitable surface for grinding.

5.2.8 Rock Shelter Sites

Caves or shelters in cliff lines and beneath boulder overhangs were often used by Aboriginal people as campsites. Because of the confined area in these shelters and because of repeated Aboriginal occupation of such sites, the occupation deposits that they contain are often richer than open campsites and are usually stratified.

Rock shelters are only found where suitable geological formations are present. They may occur as overhangs, shelters beneath tors or as caves.

5.2.9 Rock Art Sites

Rock art consists of paintings, drawings and/or engravings on rock surfaces. In most instances in the wider region, rock art is related to the distribution of rock shelters but it may also be found on freestanding rocks.

5.2.10 Stone Arrangements, Ceremonial Rings and Ceremony and Dreaming Sites

Stone arrangements range from cairns or piles of rock to more elaborate arrangements such as stone circles or standing slabs of rock held upright by stones around the base. Some stone arrangements were used in ceremonial activities whilst others may represent sacred or totemic sites. Other features associated with the spiritual aspects of Aboriginal life are those now called 'ceremony and dreaming' sites. These can be either stone arrangements or natural features such as rock outcrops, which may be associated with initiation ceremonies or the activities of ancestral creators.

5.2.11 Burials

Aboriginal burial grounds may consist of a single interment or a suite of burials. Burials tend to be in areas of sandy soil that were easy to dig and above floodwaters. Burials are frequently located in source-bordering sand dunes, sand ridges, lunettes and levees

along watercourses (Bonhomme 1990; Hope 1993). Knowledge of Aboriginal burial grounds is best sought from local Aboriginal communities.

5.3 Previously Recorded Aboriginal Cultural Heritage Sites in the Project Area

There are no previously recorded Aboriginal cultural heritage sites recorded within the project area on the NSW OEH Aboriginal Heritage Information Management System (AHIMS) database (AHIMS search 915038, 30 July 2024).

The closest previously recorded Aboriginal cultural heritage site is at least 2 km to the northeast.

A copy of the AHIMS search results is provided in Attachment A.

6 Project Design and Survey Methodology

In accordance with the *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011) and *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010), an archaeological design and survey methodology was prepared as a key component of the cultural heritage field assessment.

6.1 Site Predictive Model

Previous archaeological studies indicate that the most frequently recorded Aboriginal cultural heritage places in the North West Slopes are stone artefact scatters and scarred trees. Burials, earthen features including mounds, ovens and hearths, quarries, stone features, rock wells, rockshelters and rock art sites are also represented in the archaeological record of the North West Slopes. Based on these observations of archaeological site types and their distribution and landscape setting, the following predictive model of Aboriginal cultural heritage site locations for the activity can be proposed. A summary of the predictive model is presented in Table 1.

Past Aboriginal occupation of the North West Slopes would have been heavily focussed on the major waterways and their associated wetlands because these areas offered a rich resource zone in an otherwise arid landscape. Consequently, most archaeological sites can be expected adjacent to freshwater sources. Although Aboriginal people would have regularly journeyed into the more-poorly watered hinterland to collect plants, hunt animals and exploit other resources, these areas including the work areas have a lower probability of containing Aboriginal cultural heritage places and items than the riverine corridors.

The landscape setting of the work areas therefore precludes the possibility of encountering some site types. For example, shell middens will not be encountered in the work areas, because these are normally restricted to within 100 m of permanent freshwater sources. Rockshelters, rock art, stone quarries or stone features will also definitely not occur because suitable rock outcrop is absent. Burials are unlikely, given that most occur in sandy dune deposits elevated above waterways.

The potential for encountering Aboriginal cultural heritage in the work areas of the project is also mitigated to a large extent by the high degree of previous disturbance of the area. For example, the past removal of all of the original vegetation means that culturally modified trees will not occur in the work areas. Similarly, modification of the original land surface during previous agricultural and pastoral land use including land clearing,

ploughed cultivation and earthworks would have destroyed earthen features including mounds and hearths, had they previously existed in this area. However, there is a low potential for Aboriginal stone artefacts to occur in the area, because these are dispersed, but not destroyed by ploughing and earthworks.

While predictive studies such as this can be expected to identify areas in which sites associated with economic or subsistence activities may be present, notably open habitation areas, other sites may fall outside such a predictive framework. For example, places associated with spiritual aspects of traditional Aboriginal society such as ceremony and dreaming sites are often located at topographically distinct or unique features, which cannot be identified from an examination of maps or other records. For this reason it is essential that local Aboriginal communities be consulted so that sites of significance to them can be identified.

Table 1. Desktop predictive model of encountering Aboriginal cultural heritage sites in the work areas.

Scarred trees	Stone artefacts	Earthen features	Stone features	Burials	Hearths	Shell middens
Negligible	Low	Negligible	Negligible	Negligible	Negligible	Negligible

6.2 Field Methodology

6.2.1 Logistics

Fieldwork was completed on 18 October 2023 by archaeologist Dr Matt Cupper with the involvement of Alfred Tighe and Dorothy Tighe (representing Gomeroi Native Title Applicant) and David Horton (Gomery Culture Consultants).

6.2.2 Survey Methods

The area surveyed was based on areas mapped by a civil engineer prior to the survey. The methods employed were consistent with standard archaeological practice and Heritage NSW's *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales* (OEH 2011) and *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (DECCW 2010),

The project archaeologist and Aboriginal community representatives inspected the proposed work areas with a pedestrian survey whereby they walked across them in a series of transects.

The team examined the ground surface for archaeological traces such as stone artefacts, hearths, hearthstones, shells and mounds. Any mature eucalypt trees near the work

areas were inspected for evidence of Aboriginal scarring. Particular attention was paid to areas with high ground surface visibility such as along graded vehicle tracks and in scalds.

6.2.3 Access to Survey areas and Weather Conditions

Access was available to the entire proposed work areas. Weather conditions during the survey were fine.

6.3 Survey Coverage Data

6.3.1 Conditions of Visibility

Conditions of ground surface visibility would affect how many sites are located. Visibility may also skew the results of a survey. If, for example, conditions of ground surface visibility vary dramatically between different environments, then this in turn would be reflected in the numbers of sites reported for each area. The area with the best visibility may be reported as having the most sites (because they are visible on the ground) while another area with less visibility but perhaps more sites would be reported as having very little occupation. It is important therefore to consider the nature of ground surface visibility as part of any archaeological investigation.

Table 2. Visibility conditions of the proposed infrastructure corridor.

Landscape setting	Vegetation	Visibility (%)	Exposures	Survey method
Alluvial plain	Cleared, grasses	80	Vehicle tracks, scalds, deflation hollows	Pedestrian

Conditions of ground surface visibility were typically around 80 % (Table 1, Figures 9 and 10). These excellent conditions of visibility were mainly due to the fact that the ground surface was widely exposed by erosion by vehicular traffic, scalding and wind deflation and grass and herbaceous plant growth was sparse.

6.3.2 Coverage Analysis

Coverage analysis is a useful measurement to allow cultural resource managers to assess surveys from adjacent areas and it also allows some meaningful calculation of the actual sample size surveyed. The *actual* or *effective* area surveyed by a study depends on the conditions of ground surface visibility. Conditions of surface visibility are affected by vegetation cover, geomorphic processes such as sedimentation and erosion rates and the abundance of natural rock that may obscure the remains of cultural activities.



Figure 9. Visibility conditions in the proposed solar PV array work area.



Figure 10. Excellent visibility conditions in the upgraded site entry work area.

An effective coverage of 20 % was achieved for the work areas (Table 3). Coverage was high due to the intensive nature of the survey, the smallness of the work areas and the generally excellent conditions of surface visibility.

Table 3. Effective coverage of the proposed infrastructure corridor.

Landscape setting	Area (ha)	Visibility (%)	Coverage		Effective coverage		Sites
			(ha)	(% area)	(ha)	(%)	
Alluvial plain	16	80	4	25	3.2	90	-
Total	16		4	(25 %)	3.2	(20 %)	-

7 Results

No Aboriginal archaeological sites were located in the proposed disturbance area of the solar PV array and upgraded site entrance. This negative result does not mean that Aboriginal people did not occupy these areas, or that ground surface visibility was inadequate. Rather, it is attributable to the high degree of land surface modification that has occurred since European settlement, as such past track construction, infrastructure installation and agricultural activities may have obliterated any archaeological sites, had they previously existed in the area. Moreover, archaeological surveys for small developments only rarely encounter Aboriginal cultural heritage sites.

Modified trees were not identified all old growth trees have been previously cleared. Quarry sites are also definitely not represented in the study area as rock outcrop is lacking. Extensive previous earth works could have destroyed stone arrangements, had they previously occurred in the area. Such past land use could have similarly destroyed earth mounds and hearths. Landforms such as lunettes or source-bordering sand dunes that might contain sensitive sub-surface archaeological material such as burials do not occur in the proposed infrastructure corridor. The sediments of the study area had been well enough exposed by previous hardstand and track construction, infrastructure installation and agricultural activities, vehicular traffic and wind and water erosion to determine that no archaeological material was present on the surface nor is likely to be buried beneath the soil.

8 Recommendations

Based on the results of this cultural heritage due diligence investigation it is concluded that the proposed solar PV array and associated site entry upgrade are located in areas where harm to Aboriginal cultural heritage would be avoided.

It is recommended that:

- if any previously unidentified Aboriginal objects are encountered during the course of activities all works likely to affect the material must cease immediately and the Environmental Line (tel: 131 555) consulted about an appropriate course of action prior to recommencement of work. It is an offence under the *National Parks and Wildlife Act 1974* to disturb or destroy Aboriginal objects without written consent of Heritage NSW; and,
- if human skeletal remains are encountered during the course of the proposed activities all work in that area must cease. Remains must not be handled or otherwise disturbed except to prevent further disturbance. If the remains are thought to be less than 100 years old the Police or the State Coroners Office (tel: 02 9552 4066) must be notified. If there is reason to suspect that the skeletal remains are more than 100 years old and Aboriginal, the proponent should contact the Environmental Line (tel: 131 555) for advice.

9 References

- Beveridge, P. (1869). On Aboriginal ovens. *Journal of the Anthropological Society of London* **7**, 187-189.
- Bonhomme, T. (1990). *Aboriginal burials and sand mining on the Riverine Plain, NSW*. Report to the NSW National Parks and Wildlife Service.
- Brown, C.M. and Stephenson, A.E. (1991). *Geology of the Murray Basin, southeastern Australia*. Bureau of Mineral Resources Bulletin 235.
- Department of Environment, Climate Change and Water (DECCW) (2010). *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales*. NSW Department of Environment, Climate Change and Water, Sydney.
- Field, J. and Dodson, J. (1999). Late Pleistocene megafauna and archaeology from Cuddie Springs, south-eastern Australia. *Proceedings of the Prehistoric Society* **65**, 275–301.
- Gaynor, P. (1997). The importance of quartz in stone artefact assemblage: a technological analysis of five Aboriginal sites of the Coonabarabran/Warrumbungle Region. MA Thesis, University of New England, Armidale, NSW.
- Hope, J. (1993). *Aboriginal Burial Sites in the Murray-Darling Basin*. Report to the Murray-Darling Basin Commission.
- Marquis-Kyle, P. and Walker, M. (1992). *The Illustrated Burra Charter*. Australia ICOMOS, Sydney.
- Mitchell, T.L. (1839). *Three expeditions into the interior of Eastern Australia*. T. and W. Boone, London.
- Office of Environment and Heritage (2011). *Guide to Investigating, Assessing and Reporting on Aboriginal Cultural Heritage in New South Wales*. Office of Environment and Heritage, Sydney.
- Pearson, M. (1984). Bathurst Plains and beyond: European colonisation and Aboriginal resistance. *Aboriginal History* **8**, 63-79.

Attachment A: AHIMS Search Results

LandScape - Natural & Cultural Heritage Management

Date: 30 July 2024

P O Box 246

Merbein Victoria 3505

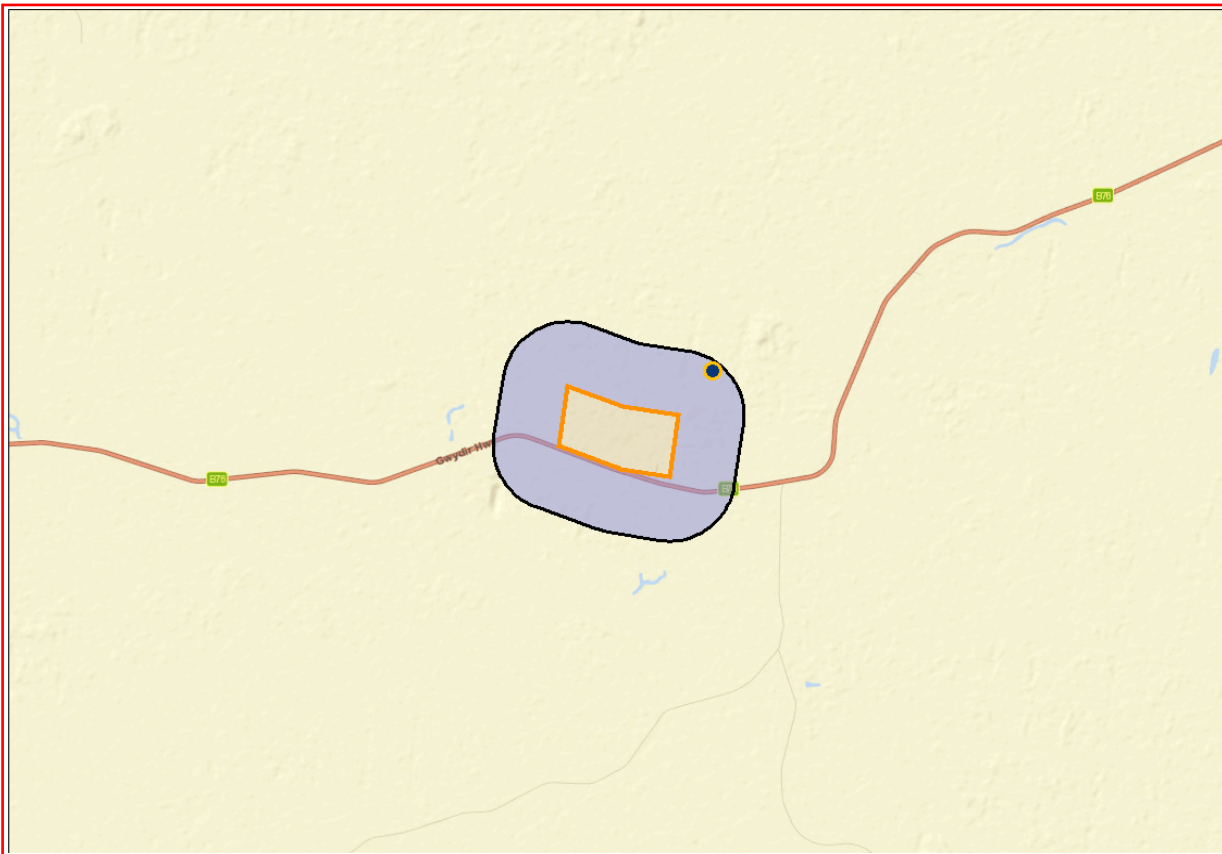
Attention: Matt Cupper

Email: landscape@telstra.com

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 2, DP:DP773266, Section : - with a Buffer of 1000 meters, conducted by Matt Cupper on 30 July 2024.

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:

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

Appendix 5 – Biodiversity Act 2016 – Test of Significance

NSW Biodiversity Act 2016 – Test of Significance

Introduction

Kinelli Pty Ltd engaged SMK Consultants to prepare a Test of Significance to be included as part of a statement of environmental effects for the proposed development of Wathagar Stage 2 Solar Farm.

Legislative Context

Section 7.2 of the Biodiversity Conservation Act 2016 (BC Act) requires that the significance of the impact of a development on threatened species and endangered ecological communities is assessed using a five-part test known as a Test of Significance. Where a significant impact is likely to occur, a Species Impact Statement (SIS) must be prepared in accordance with the Director-General's requirements, or a Biodiversity Development Assessment Report (BDAR) must be prepared by an accredited assessor in accordance with the Biodiversity Assessment Method (BAM).

The Test of Significance in this report has been prepared in accordance with requirements under Section 7.3 of the BC Act. It includes an assessment of the development against five parameters to determine whether there is likely to be a significant effect on the threatened species, ecological communities, or their habitats, which are 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). It investigates the effects of the development proposal on threatened species, populations, and ecological communities, as listed under the BC Act, pursuant to Section 1.7 of the Environmental Planning & Assessment Act 1979 (EPA Act).

Proposed Project Details

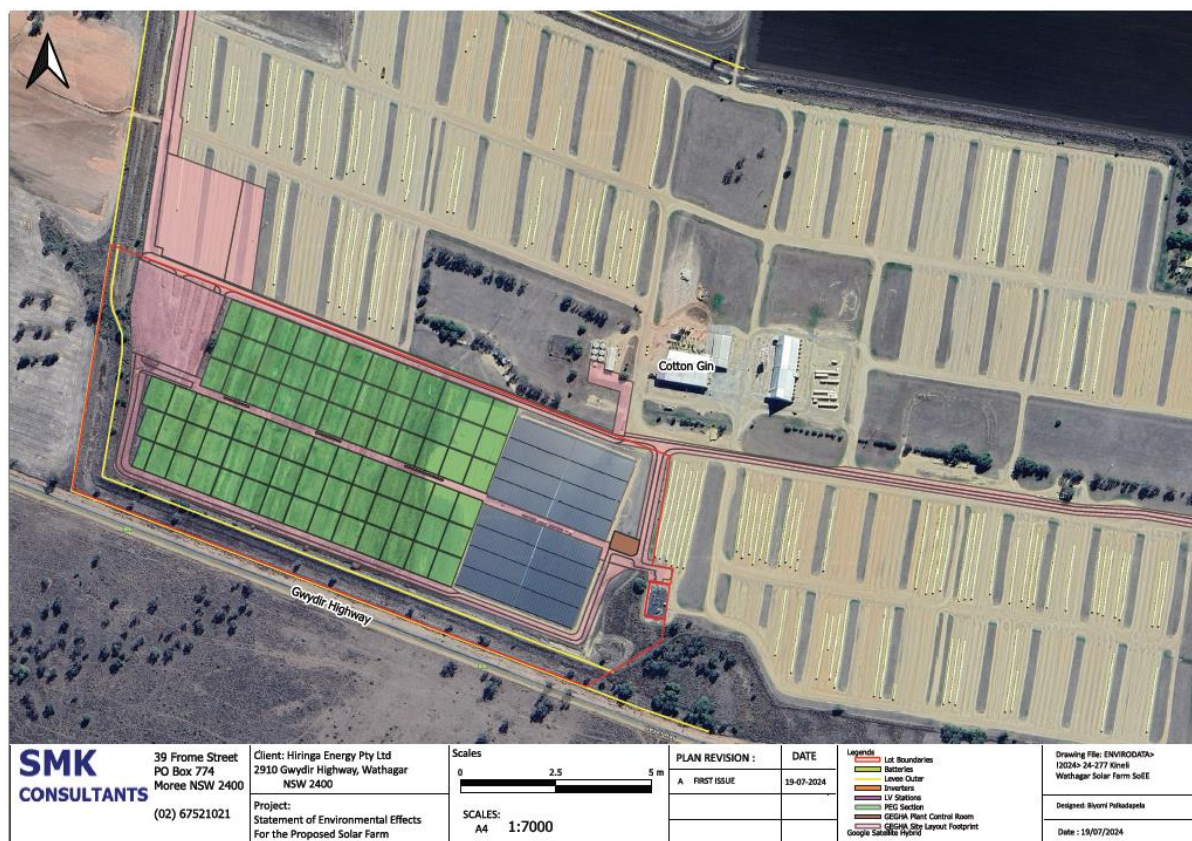
The proposed development involves the construction and operation of a solar farm with battery storage designed to provide renewable energy to a proposed hydrogen and ammonia production facility to be constructed on the existing site of the Wathagar Cotton Gin. The existing solar farm developed on this site is providing renewable energy to the cotton gin.

The site is located in Lot 2 on Deposited Plan 773266, within the Moree Plains Shire and is approximately 33 kilometres southwest of Moree.

The subject site has been historically cleared and disturbed as a result of development of the cotton gin in the mid-1980's. The solar farm site is currently set-aside from the cotton gin operation to allow development of the solar farm. Historically, the site has been utilised for the storage of cotton and byproducts of cotton ginning.

The development footprint will cover approximately 14 hectares and is restricted to land that has been previously disturbed.

Figure 1: Wathagar Solar Farm Stage 2 Site Plan



The works will involve the minor clearing of groundcover 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 from the development site.

Site Assessment

The vegetation within the proposed subject site is limited to a few shrubs and The ground 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*), Curly Mitchel

grass (*Astrelba Lappacea*), 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*), Capeweed (*Asteraceae calendula*), African Boxthorn (*Lycium ferocissimum*), Noogoora Burr (*Xanthium occidentale*) and 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’.

Study Area and Site Delineation

The following definitions are used throughout this report to refer to locations in the proposal area:

- The ‘subject site’ describes all areas that would be directly impacted by the works. This includes the approved footprint of the proposed solar farm.
- The ‘study area’ includes the site and the adjacent areas that may be indirectly impacted by the proposed works. This includes the property described as Lot 2 in DP 773266;
- The ‘search area’ refers to a 10-kilometre area surrounding the proposal for database searches.

Habitat Assessment for Significant Species

A search of the National Parks and Wildlife Atlas of NSW Wildlife (BioNet) identified thirteen (13) vulnerable and endangered 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 regard 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.

A site inspection was carried out on the August 2024 to inform this test of significance.

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: • 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: • 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:

Likelihood Rating	Criteria
	- 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.

Limitations

The effectiveness of a survey detecting a given species is influenced by a range of factors. For this type of survey, such limitations are related to the period of time in which the fieldwork was carried out during one season. Given that one half-day was spent on site, the detection of certain species may be limited by:

- Seasonal migration (particularly migratory birds);
- Seasonal flowering periods (some species are cryptic and are unlikely to be detected outside of the known flowering period);
- Seasonal availability of food such as blossoms;
- Weather conditions during the survey period (some species may go through cycles of activity related to specific weather conditions, for example, some micro chiropteran bats, reptiles, and frogs can be inactive during cold and very hot weather);
- Species lifecycle (cycles of activity related to breeding).

These limitations have been accounted for by applying the precautionary principle in all cases where the survey methodology may have given a false negative result. All species have been assessed based on the presence of habitat and the likely significance of that habitat to support a viable local population.

Assessment of Potential Presence of Threatened 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

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

Common Name	Scientific Name	Legal Status	Records ¹
Yellow-bellied Sheath-tail-bat	<i>Saccolaimus flaviventris</i>	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 14 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 involves removing 14 Ha of predominantly non-native ground cover. 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 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 unmanaged. Stage 1 of the Wathagar solar farm has already been constructed on the site adjacent to the proposed development footprint. 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>	Phytophthora not observed to be present.

Listing of Key Threatening Processes for Darling Riverine Plains Bioregion (Castlereagh-Barwon IBRA Subregion)	Comment
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 subsp. cuspidata</i> (Wall. ex G. Don) Cif.	Proposal unlikely to result in introduction of this species.
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 Gambusia holbrooki 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 14 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 are 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>Anseranas semipalmata</i>	Magpie Goose	V,P	2
<i>Stictonetta naevosa</i>	Freckled Duck	V,P	1
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E, P	1
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V,P	10
<i>Falco subniger</i>	Black Falcon	V,P	1
<i>Gallinago hardwickii</i>	Latham's Snipe	V,P	3
<i>Ninox connivens</i>	Barking Owl	V,P,3	2
<i>Calyptorhynchus lathami lathami</i>	South-eastern Glossy Black-Cockatoo	V,P	1
<i>Neophema pulchella</i>	Turquoise Parrot	V,P 3	1
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V,P	2
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V,P	2

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.	107	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.	7	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.	21	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 - V	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>Hirundapus caudacutus</i> White-throated Needletail	BC Act - V	Migratory and usually seen in eastern Australia from October to April. Most often seen in eastern Australia before storms, low pressure troughs and approaching cold fronts and occasionally bushfire. These conditions are often used by insects to swarm or tend to lift insects away from the surface which favours sighting of White-throated Needletails as they feed. More common in coastal areas, less so inland.	15	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.	70	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.).	7	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	29	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
		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.			
<i>Erythroriorchis 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.	93	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	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

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		breeding habitat. Also hunts over grasslands and sparsely timbered woodlands.			
<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.	32	Low The site is not considered important for this species due to the paucity of suitable habitat.	No
<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.	9	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 - V	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	21	Moderate This species may hunt throughout 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
		that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres.			
<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 dependent on wetlands too, especially shallow swamps, where they will forage with their head entirely submerged.	150	Low The site is not considered important for this species due to the paucity of suitable habitat.	No
<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	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

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		as frogs, lizards and snakes. Nest on the ground in a scrape or small bare patch.			
<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.	13	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 along the coast, and inland. Primarily a coastal species. Usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats.	3	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>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.	47	Moderate The species may utilise scrubland in the subject site adjacent to eucalypt woodland in the study area.	Yes

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
<i>Calyptorhynchus lathamii</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. Dependent on large hollow-bearing eucalypts for nest sites.	77	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>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 chrysostoma</i> Blue-winged Parrot	BC Act - V	The blue-winged parrot is found across southeastern Australia. In eastern South Australia, it is found north to the Flinders Ranges, and across Victoria. It is more sporadic across central and western New South Wales and into Queensland, as far north as Diamantina National Park. It lives in savannah woodland, grasslands, orchards, farmlands, marshes, heath, dunes, and other open habitats up to 1,200 m (3,937 ft) above sea level.	2	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
<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.	6	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 herbaceous plants. Also eaten are fruits, berries, nectar, buds, flowers, insects and grain.	82	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>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.	55	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,	8	Low	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		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.		There is no suitable habitat for this species within the subject site.	
<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 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.	94	Low There is no suitable habitat for this species within the subject site.	No
<i>Amytornis modestus inexpectatus</i>	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

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
Thick-billed Grasswren (central NSW subspecies)					
<i>Aphelocephala leucopsis</i> Southern Whiteface		The southern whiteface is endemic to Australia and typically inhabits arid open woodlands with a shrubby or grassy understory, as well as grass plains throughout much of the continent's south. This species prefers Acacia woodlands, particularly those dominated by mulga and drought-resistant chenopod shrub species, including saltbush and bluebush.	13	Low There is no suitable habitat for this species within the subject site.	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.	7	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, typically during periods of drought. Inhabits wattle shrub, primarily Mulga (<i>Acacia aneura</i>), mallee, spinifex and eucalypt woodlands, usually when shrubs are flowering;	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
		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.	8	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> .	65	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 dominated by box and ironbark eucalypts. Feeding territories are large making the species locally nomadic. Recent studies have found that the Black-chinned	23	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
		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.	342	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.	12	Low There is no suitable habitat for this species within the subject site.	No
<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	P	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
		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.			
<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.	34	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.	50	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 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	2	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
		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.			
<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.	42	Low There is no suitable habitat for this species within the subject site.	No
Mammalia					
<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	P	Low The subject site is not considered important habitat for the species due to a 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
		terrestrial insectivore that inhabits open country, especially claypans among Acacia woodlands.			
<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 - E	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.	167	Unlikely There is no suitable habitat for the species within the subject site.	No
<i>Bettongia lesueur graii</i>	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	1	Unlikely This species is not known to occur in the locality of 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
Boodie, Burrowing Bettong (mainland)		Barrow Islands off the Pilbara coast; the other (lesueur) on Bernier and Dorre Islands off Shark Bay.			
<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 Sheath-tail-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.	43	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 Dhinna Dthinawan Nature Reserve (formerly Bebo State Forest), north of Warialda two individuals near Bonshaw. Appears to be extremely rare throughout its range. Nationally, it has been recorded	p	Low Given the rarity of the species and the lack of suitable habitat on the subject site, it is not considered important habitat 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
		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.			
<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, bullock 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 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	1	Unlikely There is no suitable habitat for the species within the subject site.	No

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		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.	Yes
<i>Tympanocryptis lineata</i> Canberra Grassland Earless Dragon	BC Act – V	Historically, the Grassland Earless Dragon ranged from Bathurst to Cooma, including the ACT region. The only populations now known are in the ACT and adjacent NSW at Queanbeyan, and on the Monaro Basalt Plains between Cooma and south-west of Nimmitabel. Restricted to a small number of Natural Temperate Grassland sites dominated by wallaby grasses, spear grasses, Poa Tussock, Red Grass and occasionally Kangaroo Grass.	1	Unlikely The subject site is not considered important habitat for the species given the paucity of suitable habitat	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	P	Low The subject site is not considered important for this species given the	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
		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 dune fields and deep cracking black soil plains in semi-arid areas. It also occurs in hummock grasslands, shrublands or woodlands and shelters in animal burrows, hollow logs or under grass hummocks.		paucity of suitable habitat. Further, there are no confirmed records of the species in the subject IBRA subregion.	
<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

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
Amphibia					
<i>Crinia sloanei</i> Sloane's Froglet	BC Act – E	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 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.	1	Low The subject site is not considered important for this species due to the lack of suitable habitat.	No
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> (Bullock) 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

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
<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 possibly occasionally inundated habitats. Very little ecological information is available for this species so it's critical habitat components can only be speculated as relatively undisturbed and ungrazed drainage lines and flats.	p	Low Given its history of disturbance, the subject site is not considered important habitat for this species.	No
<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.	2	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	3	Low Within NSW, this species is not known to occur outside of the Piliga forest. The subject site is therefore not considered important habitat 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
		area, growing in sandy soil with <i>Cyperus gracilis</i> , <i>C. squarrosus</i> and <i>C. fulvus</i> .			
<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 confined to clay soils, usually with <i>Astrebla</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.	184	Moderate This species was not observed during the site visit. The subject site contains suitable habitat for the species however, and it is therefore considered in this assessment.	Yes
<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	2	Low The subject site is not considered important for this species due to a 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
		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.			
<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.	8	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.	147	Low The subject site is not considered important for this species due to a 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
		The species is described as being a summer-growing annual and is thus dependent on seasonal conditions. Often associated with open grasslands and eucalypt 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	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
				considered important habitat for the species.	
<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 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 podsolic soil on granite in layered open forest.	P	Low This species is not recorded in the Moree locality, nor does the subject site contain suitable habitat for the species. It is therefore not considered important habitat for the species.	No
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	BC Act – EEC	This was previously an open forest community of flora and fauna that may now exist as woodland or as remnant	K	Low	No

Species Name	Status	Habitat Description and Locally Known Populations	Local Records	Potential to Occur and Importance of Habitat Present	Assessment of Significance
the Darling Riverine Plains and Brigalow Belt South Bioregions		trees. Carbeen Open Forest Community is a distinctive plant community on the riverine plains of the Mehi, Gwydir, MacIntyre and Barwon Rivers and in small 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)		This EEC does not occur on the subject site, and the site is thus not considered important habitat.	
Coolibah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain 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. It has suffered an extensive decline over past decades and	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
		the cumulative area remaining is much less than 800 ha. Marsh Club-rush sedgeland is associated with grey clay 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	Low This EEC does not occur on the subject site, and the site is thus not considered an important habitat.	No

Appendix 6 – 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):

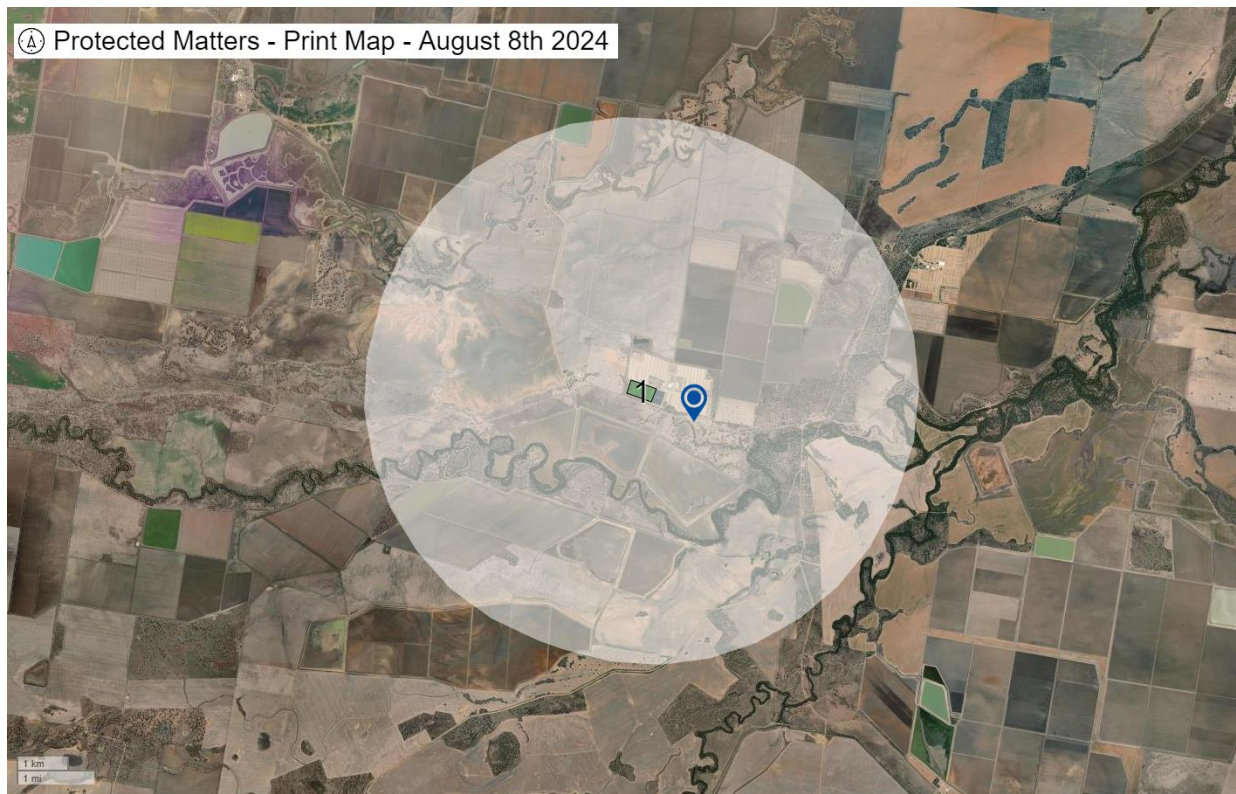
- World Heritage Properties;
- National Heritage Places;
- Ramsar wetlands of international importance;
- Nationally threatened species and communities;
- Migratory species protected under international agreements;
- Nuclear actions, including uranium mining; and
- The Commonwealth marine environment.

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: Protected Matters Search within 5 Km of the subject site



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>Aphelocephala leucopsis</i>	Southern Whiteface	Vulnerable
	<i>Botaurus poiciloptilus</i>	Australasian Bittern	Endangered
	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Vulnerable
	<i>Calidris ferruginea</i>	Curlew Sandpiper	Critically Endangered
	<i>Calyptorhynchus lathami lathami</i>	South-eastern Glossy Black-Cockatoo	Vulnerable
	<i>Falco hypoleucos</i>	Grey Falcon	Vulnerable
	<i>Gallinago hardwickii</i>	Latham's Snipe, Japanese Snipe	Vulnerable
	<i>Grantiella picta</i>	Painted Honeyeater	Vulnerable
	<i>Hirundapus caudacutus</i>	White-throated Needletail	Vulnerable
	<i>Melanodryas cucullata cucullata</i>	Major Mitchell's Cockatoo (eastern),	Endangered
	<i>Neophema chrysostoma</i>	Blue-winged Parrot	Vulnerable
	<i>Pedionomus torquatus</i>	Plains-wanderer	Critically Endangered
	<i>Polytelis swainsonii</i>	Superb Parrot	Vulnerable
	<i>Rostratila australis</i>	Australian Painted Snipe	Endangered
	<i>Stagonopleura guttata</i>	Diamond Firetail	Vulnerable
	<i>Tringa nebularia</i>	Common Greenshank, Greenshank	Endangered
Mammals	<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	Endangered
	<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)	Endangered
Fish	<i>Maccullochella peelii</i>	Murray Cod	Vulnerable
	<i>Bidyanus bidyanus</i>	Silver Perch, Bidyan	Endangered
Reptiles	<i>Anomalopus mackayi</i>	Five-clawed Worm-skink, Long-legged Worm-skink	Vulnerable
	<i>Hemiaspis damelii</i>	Grey Snake	Endangered
Plants	<i>Cadellia pentastylis</i>	Ooline	Vulnerable
	<i>Dichanthium setosum</i>	Bluegrass	Vulnerable

Category	Scientific Name	Common Name	Legal Status
	<i>Lepidium aschersonii</i>	Spiny Peppercross	Vulnerable
	<i>Lepidium monoplacoides</i>	Winged Pepper-cross	Endangered
	<i>Swainsona murrayana</i>	Slender Darling-pea, Slender Swainson, Murray Swainson-pea	Vulnerable

*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 cyanoleuca</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	Vulnerable
	<i>Calidris ferruginea</i>	Curlew Sandpiper	Critically Endangered
	<i>Calidris melanotos</i>	Pectoral Sandpiper	Listed Migratory (Bonn, CAMBA, JAMBA, ROKAMBA); Listed Marine
	<i>Gallinago hardwickii</i>	Latham's Snipe, Japanese Snipe	Vulnerable
	<i>Tringa nebularia</i>	Common Greenshank, Greenshank	Endangered

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 upstream from Ramsar site and 1360 downstream from the subjected site

- Riverland are located 900 - 1000km upstream from Ramsar site and 1350 downstream from the subjected site
- The Coorong, Lake Alexandrina and Albert wetlands are located 1100-1200km upstream from the Ramsar site 1360 km downstream from the subjected 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 involves construction of a solar farm on land which has been cleared and utilised as part of a cotton gin for the past 40-years or more. The site has been preferentially selected due to its history of clearing and disturbance and also closer to the proposed GEGHA site. The subject site is not considered to constitute preferred habitat for any of the listed vulnerable species.

During field survey of this site in 2022/2023, it was noted that bluegrass, the only vulnerable species, was identified to the east of the proposal Stage 2 of the solar farm site. Wathagar Solar Farm Stage 1 is situated to the east adjacent to the proposed solar farm. The occurrence of bluegrass was documented as occasional within the ground layer. Notably, bluegrass was not detected during the field survey conducted in August 2024, likely attributable to the cryptic nature of the plant life and normal maintenance of the Wathagar Cotton gin which involves slashing and grading as part of maintenance work for the cotton ginning operation.

However, The removal of groundcover over 14Ha, 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 14 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 does not constitute an important habitat for identified species. Given the presence of higher-quality vegetation within the area, disturbance of such a small area is unlikely to significantly impact flora and fauna.

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 practices 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 practices.