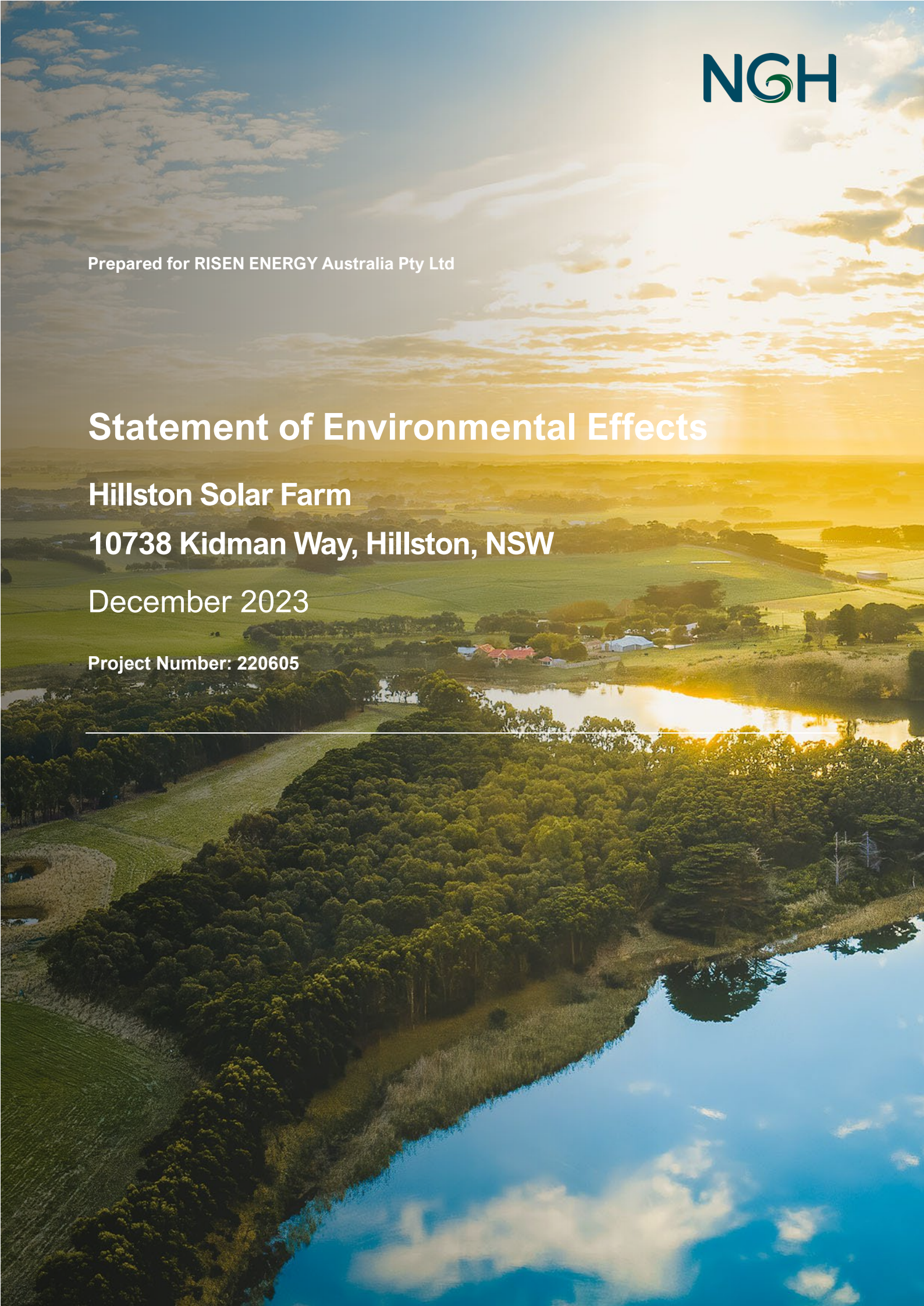

Prepared for RISEN ENERGY Australia Pty Ltd

Statement of Environmental Effects

Hillston Solar Farm

10738 Kidman Way, Hillston, NSW

December 2023

Project Number: 220605

Document verification

Project Title:	Hillston Solar Farm, 10738 Kidman Way, Hillston, NSW
Project Number:	220605
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Revision	Date	Prepared by	Reviewed by	Approved by
Draft V1.0	24/07/2023	J. Duck	L. Olesen-Jensen	J. Duck
Final 1.0	11/12/2023	J. Duck A. Gill	S. Kurta	S. Kurta

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Acronyms and abbreviations

AHIMS	Aboriginal Heritage Information Management System
BC Act	Biodiversity Conservation Act 2016 (NSW)
DA	Development Application
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cwth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
ha	hectares
km	kilometres
LEP	Carrathool Local Environment Plan 2012
m	metres
Regional Plan	Riverina Murray Regional Plan 2041
SEE	Statement of Environmental Effects
SEPP	State Environmental Planning Policy (NSW)

1. Introduction

1.1. Overview

This Statement of Environmental Effects (SEE) has been prepared to support a Development Application (DA) seeking Carrathool Shire Council's consideration of proposed electricity generating works, a 5 Megawatt (MW) solar facility (the proposed development), at 10738 Kidman Way, Hillston (the subject land).

The proponent, Risen Energy (Australia) Pty Ltd (Risen Energy), proposes the change of land use, including construction, operation and future decommissioning of the solar facility within Lot 63 DP664722 (the subject land), refer to Figure 1-1. Lot 63 comprises an area of 251.9 hectares (ha), being agricultural land with a history of clearing for cropping. Within Lot 63, the proposed development footprint would be approximately 17.9ha. The proposed development would be accessed from Norwood Lane.

The proposed development (operational layout) as shown in Appendix A would include:

- Upgrades to the southern end of Norwood Lane between the entry of the approved Daisy Hill Solar Farm and the subject property access point.
- Internal access roads.
- A fenced (security) enclosure, 2m in height around the solar facility, and security features such as CCTV, and security lighting.
- Installation of solar infrastructure including approximately 10,300 solar photovoltaic (PV) cells with a 7MW DC capacity/5MW AC export capacity, on a ground-mounted tracking system of pole driven steel posts.
- 2 SMA MVPS-2660 (or similar) inverters are proposed.
- BESS 5MW/ 10MWh.
- The proposed development would connect to the existing 33kV line that runs parallel to the northern boundary of Lot 63 at the identified Point of Interconnection (POI), via a new 33kV switching station and above-ground t-connection.
- Landscaping within the proposed landscape zones.

The estimated capital investment value (CIV) would be approximately $16 million. A quantity surveyor's report has been provided for Council's reference.

1.2. Subject land and locality, site selection and design

The town of Hillston is located approximately 3.5km to the north of the subject land. Hillston is surrounded by rural land (including cropping and orchards). Agriculture is one of the primary economic and employment land uses for the locality. The population of the locality of Hillston is 1,547 (ABS, 2021). The Lachlan River forms the western boundary of the town of Hillston. The Hillston Aerodrome, as shown in Figure 1-1, is located 1.7km to the north of the subject land.

This DA relates to land described as 10738 Kidman Way, Hillston. The wider property holding includes 5 allotments, Lot 63 DP664722 and Lots 35, 54, 69 and 78 of DP755189. There is no existing dwelling on the land, the only buildings being rural farm buildings (sheds) which are located adjacent to Kidman Way.

The proposed solar farm would be located on Lot 63 DP664722. The land is situated on the eastern side of the Kidman Way. The land is surrounded by rural land to the north, south and east and is mostly cropping land, with an active rail line adjoining the western boundary (within Lot 3431 DP1189389). A private level crossing provides access to the subject land from Kidman Way.

The proposed access to the solar farm would be via Norwood Lane using an existing rural access that connects to the site at the intersection of Norwood Lane and Racecourse Road. The proposed access point and part of Norwood Lane/Racecourse Road would be upgraded in support of the proposed development. Racecourse Road is generally a tree lined corridor, but also includes some access tracks to rural properties to the north. There is an existing access point to Kidman Way, which was originally considered as part of this proposed development. However, Norwood Lane was selected as the preferred access option.

The development site was selected based on analysis of the available land of suitable scale, landscape and surrounds, solar benefits, access to powerlines (electricity network) and proximity to a connecting substation, near access to the highway for construction and ease of delivery of infrastructure to the development site.

The design has been further analysed and adapted as necessary as part of the preparation of this SEE, consistent with the findings of associated supporting studies to avoid and minimise the potential environmental effects of the development.

The proposed development would generate approximately 13,600MWh each year to power around 1,300 households and offset greenhouse gases by 13,000 metric tons.

1.3. Applicant and land ownership

The proponent and applicant for the development is Risen Energy (Australia) Pty. Ltd.

The landowners are D J Robertson and N A Robertson. The proponent would enter a long-term lease arrangement with the landowner.

1.4. SEE structure and supporting plans and documents

This SEE has been prepared by NGH Pty Ltd on behalf of the applicant, Risen Energy.

This SEE has been informed by the plans prepared by Risen Energy as well as reports by NGH specialists and external specialists.

This SEE:

- Describes the proposed works, the development site, and the wider locality.
- Describes the planning context and statutory approval requirements.
- Identifies and assesses the effects on environmental values.
- Provides mitigation measures to avoid, minimise or mitigate identified impacts.

This SEE shall be read with the accompanying plans and documentation listed in Table 1-1.

Table 1-1 Accompanying plans and documents

Appendix	Title/Description	Prepared by
A	Development Plans Set	Risen Energy
B	Biodiversity Assessment	NGH
C	Heritage Due Diligence Assessment	NGH
D	Traffic Impact Assessment	Amber Organisation Pty Ltd
E	Flood Assessment	Cumulus Engineering

Note: some supporting assessments include consideration of both access options. As the supporting assessments and SEE evolved, Norwood Lane was selected as the preferred access option. Some potential impacts (impact areas) in the supporting assessments are therefore overestimated, compared with the final proposal.

1.5. Legislative context (summary)

Consent for the proposed development is sought under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The proposed development is defined as 'electricity generating works' under Carrathool Local Environmental Plan (CLEP) 2012. The proposed development site is zoned RU1 Primary Production and electricity generating works are not permitted in this zone according to the CLEP. As electricity generating works, the development is 'permitted with consent' under section 2.36(1)(b) of the State Environmental Planning Policy (Transport and Infrastructure) 2021 (TI SEPP). According to section 2.7 of the SEPP, it overrides any other environmental planning instrument to the extent of any inconsistency. Therefore, the proposed development is permitted with consent on the land.

The Capital Investment Value (CIV) of the proposed development is approximately $16 million. According to Section 5 of Schedule 6 to the State Environmental Planning Policy (Planning Systems) 2021, electricity generating works as private infrastructure are determined as Regionally Significant Development (RSD) where the CIV exceeds $5 million but is less than $30 million. The DA would be assessed by Carrathool Shire Council, whilst the determining authority is the Regional Planning Panel.

The proposed development is not deemed to be a Designated Development under the *Environmental Planning and Assessment Regulation 2021* (the Regulation). This is because the expected output would not exceed 30MW, as set out under Section 24 under Part 2 of Schedule 3 to the Regulation.

1.6. Pre-lodgement consultation

A pre-lodgement meeting was held with Carrathool Shire Council in late February 2023. The preliminary plans were presented and included a discussion of early background research, constraints assessment results, application, and assessment process. Feedback on local issues was sought. Council advised the following matters should be considered and addressed:

- traffic and access,
- the level rail crossing,
- potential for flooding during major events,
- potential for concerns by neighbours.

Issues raised have been addressed in this SEE.

Lachlan Street
High Street
Hillston
Boundary Road
Hillston Aerodrome
Lachlan Valley Way
Smith Road
Kidman Way
Norwood Lane
Jardines Road
Jardines Road
Jardines Road
Jardines Road
Lachlan Valley Way
Kidman Way
Norwood Lane
Lachlan Valley Way
Kidman Way
Racecourse Road
Kidman Way

LEGEND

- Subject Land
- Development Site
- Development Footprint
- Roads

0 0.5 1 1.5 2 km

Datum: GDA94 / MGA zone 55

220605 Hillston Solar Farm

Locality Map

2. The development

2.1. General overview

The construction of the solar farm, as described below, is proposed 3.6km south of the centre of the township of Hillston, in the Carrathool Local Government Area (LGA). The development site is within cleared rural farmland, currently used for cropping, avoiding where possible, sensitive environmental features.

The proposed solar farm would have a capacity of approximately 5MW providing energy directly into the grid. Connection would be via the Essential Energy distribution lines located directly north of the subject land.

2.2. Development details - Construction

The construction phase is expected to last up to 12 months. The main construction activities would include:

- Site establishment and construction of temporary facilities (fencing, ground preparation, construction of the internal track system, upgrade of existing access point, preliminary civil works, and drainage).
- Installation of steel post and framing system for the solar panels.
- Installation of PV panels.
- Installation of underground cabling.
- Installation of power and inverter stations, battery energy storage system (BESS) and switchgear and connection infrastructure.
- Removal of temporary construction facilities and rehabilitation of disturbed areas.
- Landscaping.

2.2.1. Temporary construction facilities

Temporary facilities established at the site during the construction phase would include:

- Material laydown areas.
- Construction site offices, generator and skip bins with wind shield and lid.
- Car and bus parking areas for construction workers.
- Staff amenities building and portable toilet/s.
- CCTV at construction compound.
- Waste management areas.

The proposed hardstand in the construction compound would comprise compacted stone / gravel to provide a clean, firm, level, and free draining surface suitable for cabins and heavy traffic. Temporary staff amenities would be designed to accommodate the proposed maximum number of workers simultaneously at the site at the peak of the construction period, being 30 workers.

The management of waste during the construction phase would observe the objectives of the *Waste Avoidance and Resource Recovery Act 2001* and would be addressed in a Construction Management Plan submitted to Council prior to the commencement of works.

Construction wastes would include:

- Packaging materials.
- Excess building materials, scrap metal and cabling materials.
- Masonry products, including concrete wash.
- Excavation of topsoils and vegetation clearing.
- Bio wastes facilities, hired from portable WC providers.

Waste produced during construction would be disposed of at an appropriately licensed waste facility.

Green waste, from vegetation clearing, would be mulched for use in rehabilitation at the site, or removed from the site.

In accordance with the POEO Act and associated waste classification guidelines, most waste would be classified as building and demolition waste within the class general solid waste (non-putrescibles). Based on the proponent's experience with other existing solar farms, approximately 80 percent of site waste is recyclable.

Ancillary facilities in the site compound would produce sanitary wastes classified as general solid waste (putrescibles) in accordance with the POEO Act. Toilet hire and maintenance services would be employed to remove sanitary wastes on a regular basis.

2.2.2. Site establishment and earthworks

Soils within the proposed development site have been disturbed by historic agricultural activities. Ground disturbance associated with the development would be limited to:

- The installation of the steel posts supporting the solar panels, cable trenches up to 1.5m deep.
- Construction of internal access tracks and access points and associated drainage.
- Ground preparation for structures buildings.
- The construction of perimeter security fencing, lighting and, potentially, infra-red technology and CCTV.
- Weed management and landscaping.

Weed treatment would be undertaken where required prior to the commencement of earthworks to reduce the potential for spread of weeds within the site.

The Visual Impact Assessment (VIA), see 4.2, has identified a landscape zone on the northern side of the solar array to complement existing plantings and native vegetation along Norwood Lane and Racecourse Road. The landscaping zone would provide additional plantings where gaps in roadside vegetation are present, specifically where views may be more likely from the dwelling located at 237 Norwood Lane. The landscape zone is located outside of the safety clearance zone for the distributions lines to comply with the *Electricity Supply Act 1995* and Essential Energy guidelines. For the 33kv distribution lines on site, a clearance width of 30m is required (measured as 15m either side from the centre line of the poles).

2.2.3. Solar facility

The proposed solar facility would have a maximum capacity of 7.2 MW DC/ 4.998MW AC.

A BESS would be installed with a 5MW/10MWh configuration.

Note: the capacity is based on products and technology available at the time of the development but may change through the life of the solar farm as advances in technology occur.

2.2.4. Solar modules/inverters/transformers/switching station

Approximately 10,000 solar modules are proposed for installation in approximately 170 mounting structures forming the solar arrays for the facility.

An estimated 2 SMA MVPS-2660 inverters (or similar) would be installed within the solar arrays, based on current technology.

The on-site switching station would comprise medium voltage (MV) switchgear which allows connection between inverters (MVPS) and transformers to the feeder line. Static volt-ampere reactive (VAR) generators (i.e., SVG) would also be installed to compensate reactive power to the grid. The MV switchgear would be configured with metering, protection, and other ancillary equipment prior to connection to the Essential Energy connection point.

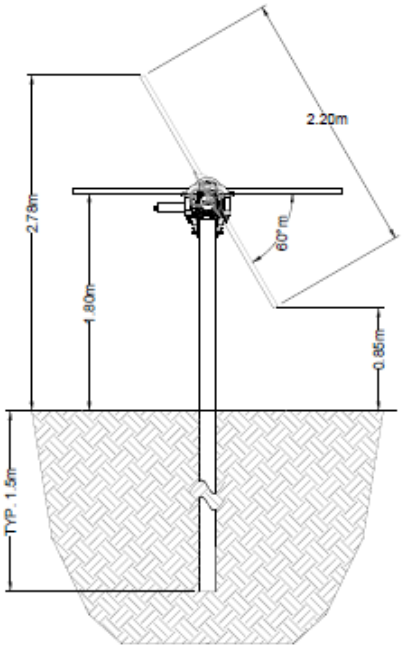


Figure 2-1 Typical solar panel elevation (Source: Risen, 2023)

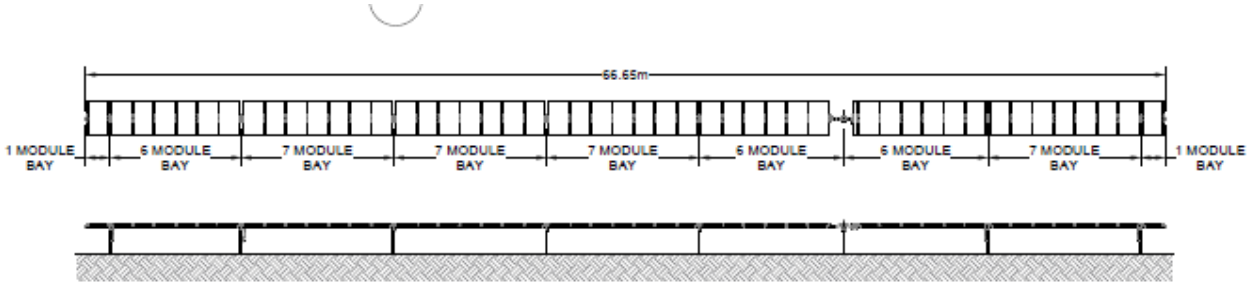


Figure 2-2 Typical tracker row elevation (Source: Risen, 2023)

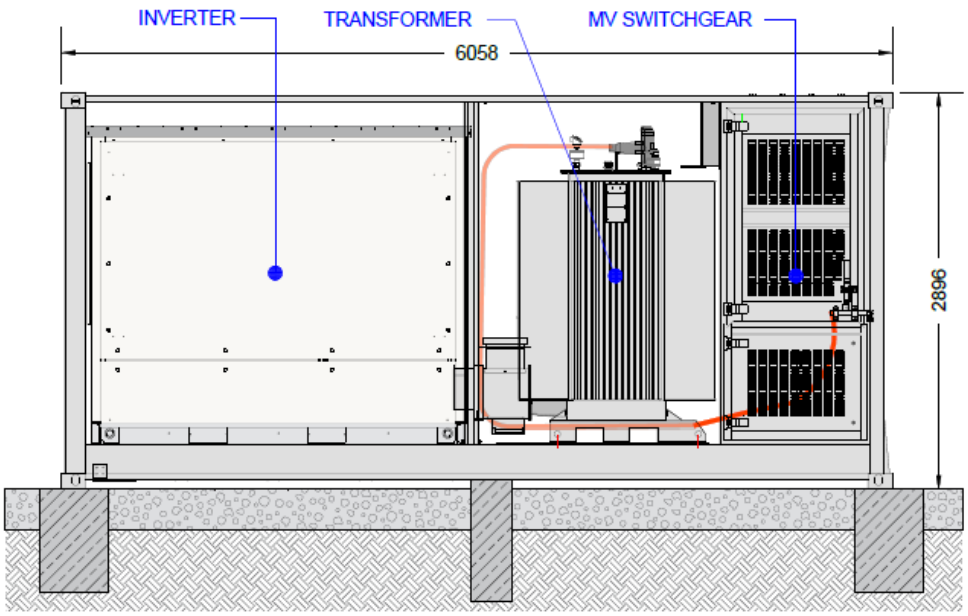


Figure 2-3 Typical inverter station side elevation (Source: Risen, 2023)

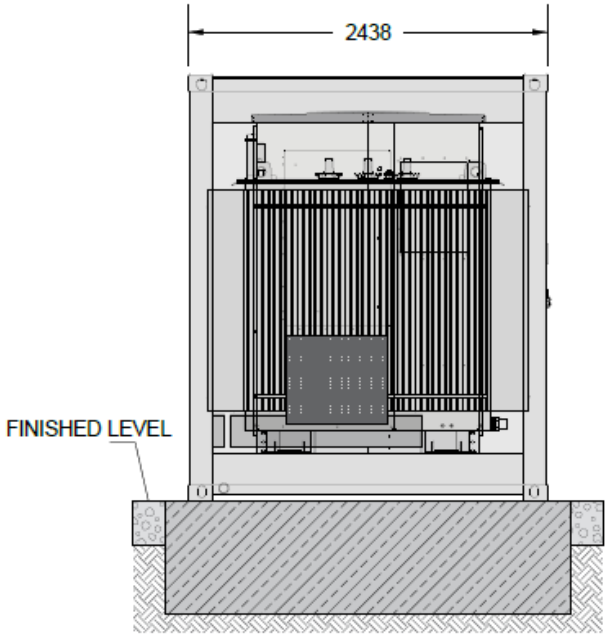


Figure 2-4 Typical inverter station front elevation (Source: Risen, 2023)

2.2.5. BESS

A BESS would form part of the development and would provide approximately 10MW hours of energy storage, allowing energy to be exported during the peak hours of community consumption, if required.

A proposed ground-mounted lithium-ion battery storage system with an anticipated capacity of 5MW / 10MWh. This would include shipping container style battery cabinets. The cabinets would be installed on a gravel surface or other fire-resistant material.

Figure 2-5 View of a BESS cabinet (Source: Risen, 2023)

2.2.6. Onsite cabling, distribution line, and external connection

Wiring of solar panels and DC combiner boxes would be via underground cabling to inverter MVPS.

The inverters would connect to the switching station. The development would connect from the switching station via an onsite overhead line directly to the Essential Energy 33kV powerlines within the subject land. The Point of Interconnection (POI) would be to one of the power poles located parallel to the northern boundary of the subject land, as shown on the development plans provided at Appendix A.

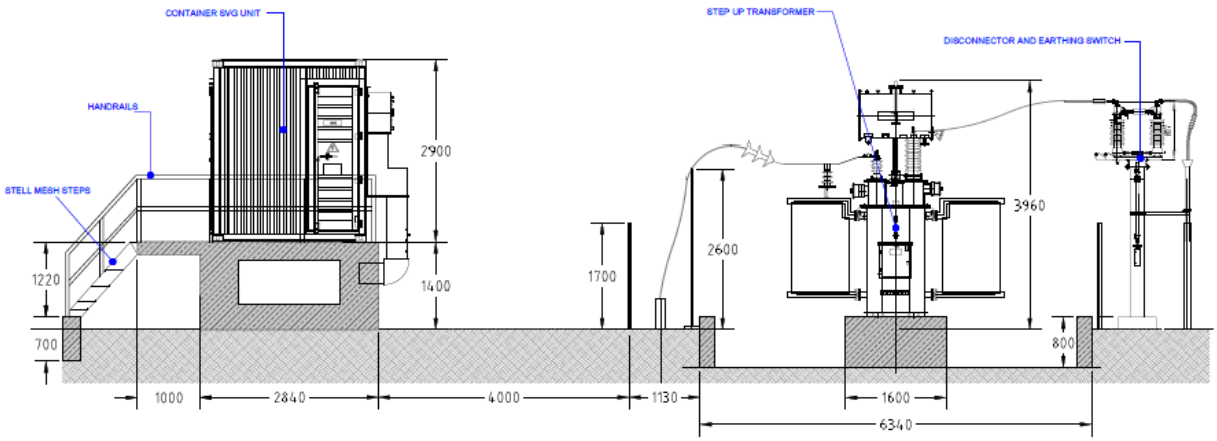


Figure 2-6 Typical switching station elevation (Source: Risen, 2023)

2.2.7. Perimeter fencing and security CCTV

Standard wire mesh fencing installed around the site perimeter would be approximately 2m high. Infra-red security technology and CCTV cameras may be installed on posts around the perimeter fence and on the main access track.

2.2.8. Access tracks

Internal access tracks constructed of engineered fill topped with crushed stone pavement would be used to access the solar farm infrastructure for maintenance, as per the accompanying site plan.

2.2.9. Materials and machinery and water use

Construction materials would be sourced locally wherever possible. Gravel would be imported to surface the access road and internal service track network and hardstand. Sand may be required for the bedding of underground cables, depending on ground conditions. Concrete would be required for the switching station equipment, inverter, and transformer foundations.

Approximately 3,600 kilolitres of water would be required during construction, mostly for dust suppression, but also for cleaning, concreting, on-site amenities, establishing and maintaining landscaping. Water would be sourced from town water supplies or would be trucked in and stored in temporary tanks if needed.

Additional water would be stored for firefighting purposes in a prefabricated non-combustible storage tank of no less than 20,000 litres, in accordance with Planning for Bush Fire Protection 2019 (RFS, 2019).

Indicative machinery/plant types and numbers, potentially in use at any one time across the site, are provided in Table 2-1.

Table 2-1 Estimated machinery and equipment

Plant description	Estimated number of items
Pile driving rig	3
Crane	1
Padfoot roller	3
Dump truck	2
30t excavator	2
Water truck	1
Bobcat tracked	2
Telehandler forklift	2
Scraper for topsoil stripping	1
Grader (access track construction)	1
Smooth drum roller (access track construction)	1
15t excavators for shallow trenches	2

2.2.10. Personnel and work hours

At the peak construction period, the solar farm is expected to require approximately 30 workers. Construction activities would be undertaken during standard construction hours:

- 7.00 am to 6.00 pm Monday to Friday, and 7.00 am to 1.00 pm on Saturdays.

Construction activities would be restricted to the hours indicated above, or with prior approval from relevant authorities and in accordance with the project's Construction Management Plan, or in the event of emergency circumstances i.e., to make work safe.

Where workers are not based in the area, they would be encouraged to use accommodation in Hillston or other nearby towns.

2.3. Operation

2.3.1. Operational activity

Following commissioning, the solar farm would commence the generation of electricity and exporting to the electricity grid. The proposed solar farm would be monitored remotely from an off-site location and contractors would visit the site on an as-needed basis.

Operational activities would generally include:

- Routine visual inspections, general maintenance and cleaning operations of the solar arrays, grid connection equipment and other infrastructure as required.
- Vegetation establishment and management, potentially involving managed grazing to control grass growth beneath the panels. Groundcover vegetation would be maintained over the site to minimise erosion, dust,

and weeds (subject to climatic conditions). Groundcover would be monitored and remediation (such as reseeding or soil protection) undertaken as required.
- Site security response (24hr) should this be required.
- Site operational response (24hr) should this be required.
- Replacement of equipment, cabling, communications, and monitoring infrastructure as required.
- Maintenance of landscaping and screening plantings, as required.
- Pest plant and animal management and control, as required.

2.3.2. Transport and access

Staff attending the site during the operation phase would primarily use light vehicles (4x4). Traffic associated with the operation and maintenance of the solar farm would use the routes specified for the construction phase. Occasional deliveries would occur using heavy vehicles when replacement of larger sized or quantities of components is required.

2.3.3. Water use

As discussed in 2.2.9, tanks would be installed around the site to store water for bushfire protection and other non-potable water uses, with a minimum of 20,000 litres dedicated to bush firefighting.

Potable water would be provided for staff using imported supplies.

During operation, non-potable water may be required for establishing and maintaining landscaping. Regular panel cleaning is typically not necessary. If required, panel cleaning water would be sourced from a commercial supplier and delivered by tanker to the site. Solar panel cleaning typically is expected to occur at a frequency of no more than 2-3 times per year. Up to 60,000 litres per year of water may be needed in years in which they need to be cleaned.

2.3.4. Personnel and work hours

The proposed solar farm would be monitored remotely from an off-site location and staff would visit the site on an as-needed basis. Staff would not be permanently stationed at the proposed facility, given the extensive electronic monitoring that would be in place.

Most of the infrastructure maintenance would be conducted by staff on a rotational basis with activities scheduled consistently throughout the year. Any required maintenance or other site management activities would be undertaken during standard working hours.

There would be some occasions, such as during a major plant shut down, that may require additional maintenance staff on site. Other than emergencies or major asset inspection or maintenance programs, night works and works on Sundays or public holidays would not be required.

The solar panels and tracker units would operate during daylight hours resulting in longer operational hours during summer and extended period during daylight-savings.

2.3.5. Lighting

There would be no permanently illuminated night lighting installed. Security lighting would operate around the inverters and site entry.

2.3.6. Refurbishment and upgrading

The solar farm operator may replace or upgrade solar panels or other infrastructure, within the existing development site during the projected 50-year life of the solar farm. Should upgrade works be proposed to alter the nature or scale of environmental impacts, the proponent would consult Council regarding the need for further assessment/approval.

2.4. Decommissioning and rehabilitation

At the time of decommissioning, the site would be returned to its pre-developed state. All areas of soil disturbance would be rehabilitated during decommissioning, consistent with land use requirements. All above ground infrastructure including the solar arrays, inverter stations and operations buildings would be removed. Cabling would be removed to a depth of 500mm so that future cultivation would not be affected.

Traffic required for decommissioning would be similar in type but of shorter duration than that required for the construction phase.

Waste during decommissioning would be handled in line with the objectives of the relevant legislation, policies, and strategies. Wherever possible and practicable, all materials removed would be sorted for re-use or recycling including solar panels and mounting system and metals from posts, cabling, and fencing. Buildings and major electrical equipment would be removed for resale or reuse. Items that cannot be recycled or reused, would be disposed of at relevant licensed waste facilities as required.

A Decommissioning Plan would be prepared and submitted to Council for approval prior to commencement of decommissioning of the facility. The Plan would include an indicative decommissioning phase timeline and waste management processes. It is estimated the decommissioning phase would extend for a period of approximately 6 months.

3. Justification for the development

3.1. Strategic context and project need

3.1.1. Riverina Murray Regional Plan 2041

The Hillston Solar Farm would contribute to the realisation of the vision for the Riverina Murray, specifically:

- *The region is a leader in both production and manufacturing, while helping to progress the state's goal of achieving net zero by 2050.*
- *The region will also generate renewable energy in the future within and outside a future Renewable Energy Zone* (DPE, 2023).

The development is consistent with the current goals and actions for renewable energy generation of the Riverina Murray Regional Plan 2041 and diversification of the economy, specifically:

OBJECTIVE 13:

- *Support the transition to net zero by 2050*
    - *Within 15 years, 75% of the state's coal powered electricity generation is expected to reach the end of its technical life. Replacing these energy sources and building the infrastructure needed to connect new energy sources is essential. The NSW Government has committed to net zero emissions by 2050, requiring greater renewable electricity generation, transmission and storage. Renewable energy is now the cheapest form of new electricity generation and is key to the net zero target.*
    - *It is expected electricity demand will increase as people change how they power homes, transport, industry and business.*

Although the development site is not located within the South West Renewable Energy Zone (REZ), the region supports utility scale solar developments and the Regional Plan notes that such proposals outside the REZ will also be needed if Net Zero targets are to be achieved. The proposed development would provide renewable energy to the grid to support various power uses like homes, transport, industry, and business.

3.1.2. Carrathool Shire Council's Local Strategic Planning Statement 2040

The Carrathool Shire Council's Local Strategic Planning Statement 2040 (LSPS) notes "The flat topography, climate and proximity to the electricity transmission lines and substations mean that Carrathool is strategically located to attract increased investment in renewable energy development, including solar energy and wind farms". The proposed development site is located outside of the renewable precinct identified on the structure plan in the LSPS, however, the LSPS states:

Outside of the precinct, Council generally supports renewable energy and will promote an "open for business" attitude around renewable energies in the LGA.

This application is seeking approval for a development, that is considered consistent with the LSPS Planning Priority 1.3, specifically the development, as described in this SEE:

- Avoids land use conflicts with surrounding agricultural land.
- Minimises impacts on the scenic rural landscape and visitor attractions in Carrathool LGA.

3.1.3. NSW Climate Change Policy framework

The NSW Climate Change Policy framework outlines NSW's long-term objectives to achieve net-zero emissions by 2050 and to make NSW more resilient to a changing climate. It guides the NSW Government's policy and programs, including the NSW Climate Change Fund and the NSW Electricity Infrastructure Roadmap. This Project aids in meeting the net-zero emissions by the 2050 target.

3.1.4. NSW Electricity Strategy

The three objectives of the NSW Government for the state's electricity system, as stated in the NSW Electricity Strategy, are Reliability, Affordability and Sustainability.

The NSW Government's Electricity Strategy would:

- Improve the efficiency and competitiveness of the NSW electricity market by reducing risk, cost, Government caused delays and by encouraging investment in new price-reducing generation and energy saving technology.
- Prompt Government to act if there is a forecast breach of the Energy Security Target which private sector Projects are unlikely to address. This should be done in a way that minimises costs to consumers and taxpayers and does not give rise to moral hazard risk.
- Ensure that there are appropriate powers available for Government to analyse and respond to electricity supply emergencies, should they arise.

The Hillston Solar Farm would contribute to the NSW government's plan to achieve the objectives for the electricity system which include reliability, affordability and economic growth and sustainability. The contribution of the Project to local employment and economy is set out in detail in 3.2.2.

3.2. Socio-economic benefits

3.2.1. Broader benefits

Benefits that would be associated with the proposed development include:

- Reduced greenhouse gas emissions, contributing to the transition towards cleaner electricity generation.
- Provision of a renewable energy supply that would assist the Australian and NSW Governments to reach Australia's energy and carbon mitigation goals.
- Embed electricity generation supply into the Australian grid, closer to identified consumption centres.
- Diversification of land use and economic activity in regional NSW.

Specifically, the development would:

- Generate approximately 13600MWh of renewable electricity per year.
- Supply enough power each year to service around 1300 households (assuming average household consumption of 10040 kWh per year).

3.2.2. Local benefits

The development would provide a local supply of renewable energy direct to the grid, as outlined above.

The development would support 40 direct jobs over the peak construction period, and 2-4 full-time equivalent position during operation.

The employment benefits extend through the local supply chains to fuel supply, vehicle servicing, uniform suppliers, hotels/motels, B&B's, cafés, pubs, catering and cleaning companies, tradespersons, tool and equipment suppliers and many other businesses.

3.2.3. Benefits for the landowner

The development provides diversification of land use and economic benefits for the farmer. Farming on the subject land (cropping) around the solar farm, would continue during the construction and operation of the solar farm and post decommissioning.

4. Environmental effects assessment

4.1. Site Analysis

The scale of the proposed development has been influenced by:

- Demand for new renewable electricity generation to meet generation targets.
- Commercial investment and viability considerations.
- Electricity grid capacity.
- Site accessibility.
- Environmental constraints on the subject land.
- Property boundaries.

The proposed scale of the solar farm responds to site constraints and opportunities. The design was developed in conjunction with the environmental assessment provided in this SEE to avoid or minimise potential impacts, where possible.

4.1.1. Site description

The wider property holding known as 10738 Kidman Way comprises 5 lots. The proposed development would be limited to Lot 63 DP664722 (the subject land), a square shaped lot, with the development site (area of works) comprising approximately 17.9ha in the north of the lot. The remaining area, approximately 234 hectares (ha), comprises agricultural land with a history of clearing for cropping. Some small groupings of paddock trees are present as well as existing sheds near the private level crossing.

The subject land is located approximately 3.5km from the town of Hillston and is located east of the rail line and Kidman Way. The land is within the Carrathool Shire LGA.

Racecourse Road, a crown paper road, lies along the eastern and southern boundaries of the land. Racecourse Road is partly tree lined in the north. Kidman Way road reserve and parallel rail corridor is partly tree lined, mostly adjacent to the south-west corner of the subject land.

Lot 63 is generally flat on an elevation of approximately 110m AHD; most of the surrounding land is on the same or similar elevation with very gradual change in elevation generally falling towards the west and north to the Lachlan River. The site has identified floodplain wetland areas subject to inundation in during extended heavy rainfall or flood events, see 4.6.1 for details and Appendix E for the full flood risk assessment.

4.1.2. Existing land use on the subject and surrounding lands

The subject land is currently used for agricultural purposes (cropping) and has been extensively cleared to facilitate farming activities. Similar agricultural practices and rural occupation occurs on adjacent properties within the RU1 Primary Production zone. An approved (yet to be constructed) solar farm is located to the northwest of the development site off Norwood Lane. An existing solar farm and Essential Energy substation are located opposite on the western side of Kidman Way. Essential Energy powerlines and a substation are

also present in the landscape. The Hillston cemetery, aerodrome and showgrounds are located approximately 2km to the northwest of the development site.

Non-associated dwellings are located within 2km of development site, to the north, northwest and northeast as mapped in Figure 4-8.

Figure 4-1 View across the subject land from near the existing entry off Norwood Lane (Source: NGH, 2023)

Figure 4-2 View east towards the development site from Kidman Way road reserve (Source: NGH, 2023)

4.1.3. Character and landscape

The proposed access road to the solar farm would be located off Norwood Lane (Figure 4-3), that connects to The Springs Road and Kidman Way. The development site has a rural open character with long views across a flat landscape. Norwood Lane is a gravel road changing to a dirt road at its southern end. The roadside vegetation is a mix of grasses, weeds, shrubs, and trees.

Norwood Lane provides access to 5 rural dwellings and farm buildings as well as agricultural land. A solar farm (Daisy Hill Solar Farm) has been approved with a site access proposed approximately 870m north of the subject site entry off Norwood Lane.

The Norwood Lane properties comprise small to medium-sized rural sites typically used for cropping and have associated rural dwellings and farm sheds/buildings present. The dwellings along Norwood Lane have some vegetation screening as part of landscaped gardens but are generally visible from the road. The dwellings appear to be single storey buildings. Large rural scale sheds and structures are typically grouped with the dwellings.

Development along the Springs Road is partly industrial and recreation land in character due to the grain storage, truck depot and the showgrounds present.

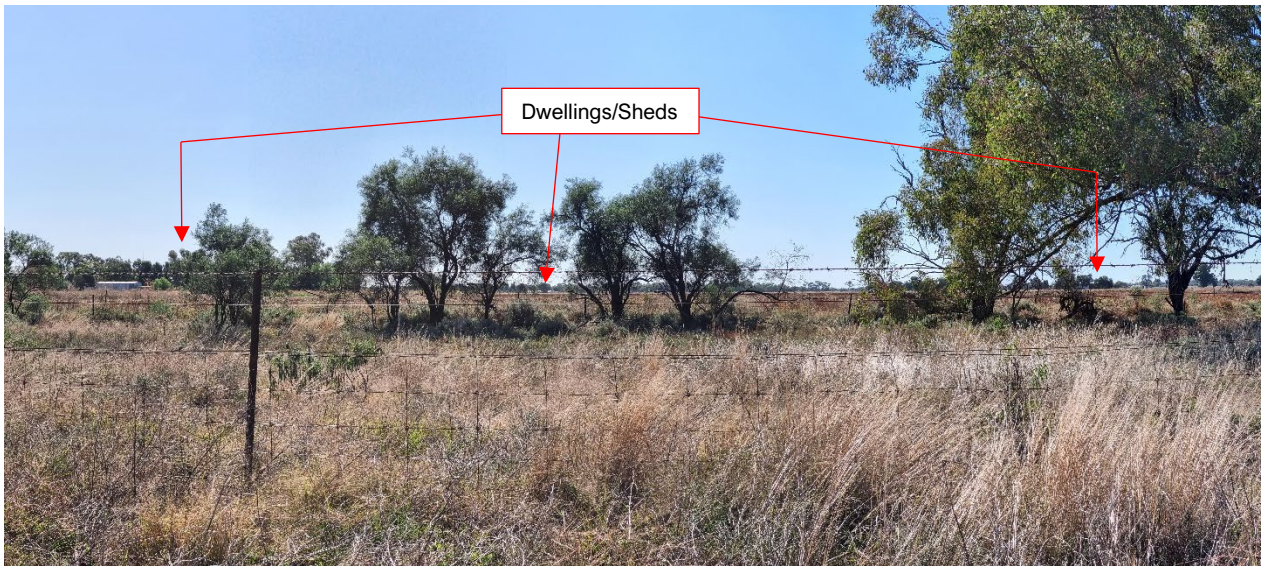


Figure 4-3 View north to dwellings/farm buildings (nearest is ~450m) from the northeast area of the development site, showing scale in the landscape (Source: NGH, 2023)

Figure 4-4 View from The Springs Road looking south to the development site (Source: NGH, 2023)

Figure 4-5 Views of the Hillston Sun Farm (approximately 170m from the road) and Essential Energy substation (approximately 120m from the road) both west of the development site (Source: NGH, 2023)

4.2. Visual

4.2.1. Introduction

A Visual Impact Assessment (VIA) has been prepared to assess the potential visual and glare impacts of the proposed development.

The development, refer to **Error! Reference source not found.**, includes the installation of approximately 17.9 hectares (ha) of solar energy generating and electricity storage infrastructure, including:

- Single axis (tracking) solar arrays.
- Inverters/ switching station (substation) and BESS.
- Electricity line connection.

Associated works include:

- Site entry.
- Public road upgrades, internal access roads and buffer areas.
- Fencing, lighting, and landscaping.

This VIA identifies and assesses the potential visual impacts associated with the construction, operation, and decommissioning of the development. The construction and decommissioning would result in temporary impacts, whereas the operation of the development having a 50-year life span may result in longer term impacts, specifically for near neighbours and road users with potential for direct or partial views. This assessment considers the design of the development in relation to the near neighbours, public road users (cars and trucks), train services and distant views (up to 2km from the development site).

The land is subject to the planning provisions of the Carrathool LEP. This VIA has considered the development against the objectives of the RU1 zone, specifically *to minimise conflict between land uses within this zone and land uses within adjoining zones*.

4.2.2. VIA approach

This VIA analyses the visual impact of the development, including:

- The sensitivity of the landscape and its ability to absorb change.
- The size, height, scale, spacing, colour and surface reflectivity of the facility's components.
- The number of solar energy facilities located close to each other another within the same landscape.
- The removal or planting of vegetation.
- The location and scale of other ancillary uses, buildings and works including transmission lines, battery storage units and associated access roads.
- The proximity to environmentally sensitive areas or sensitive land uses such as public land, water courses and the airport.

The VIA analysis included the following stages:

- Background investigations and mapping, defining where the development may be visible in the landscape, and identifying key viewpoints such as local and main roads, rail line and dwellings within proximity of the development. All 'potential dwellings' as identified in Figure 4-8 are conservatively treated as dwellings for assessment purposes.
- Photography of the landscape in the area near the development site.
- Impact assessment, describing the potential impact on visual amenity during construction and operation of the development, including potential for light spill and dust impacts.
- Consideration of the any required visual impact mitigation measures.

The impact assessment methodology used in this VIA for operational impacts is based around the Bureau of Land Management (BLM) Visual Resource Management System, developed by the BLM, US Department of the Interior (n.d.) and is consistent with similar VIA methods used by Australian State departments/agencies (including NSW government's Large-Scale Solar Energy Guideline used for SSD projects) and is therefore considered a best practice visual impact analysis method and acceptable for the purpose of this VIA. The BLM developed a systematic process to analyse the visual impact of proposed developments. The basic philosophy states that the degree to which a development affects the visual landscape depends on the visual contrast imposed by the project. Key steps undertaken to assess the visual impact are as follows:

- Define the landscape:
  - The scenic quality.
  - The expected sensitivity at viewpoints.
  - The proximity of viewpoints.
- Evaluate the degree of visual effect (magnitude).
- Determine the acceptability of the visual effect and sensitivity (Landscape Management Zones); this is the resultant visual impact, rated as high, medium, low (includes no impacts).

Terrain, character, and existing vegetation

The subject land, shown in Figure 4-6 and Figure 4-7, is located to the west of the Lachlan River, within an area of flat/gently sloping terrain. The development site on an elevation of approximately 110m AHD. The development site has a generally imperceptible fall from east to west. The development site is within a rural cropping area with lots/rural properties of varying size. The cropping in the area is generally a mix of irrigated and dry cropping land. The lot is within an area where subdivision is limited to lots with a minimum lot size of 40ha. The township of Hillston is 3km to the north, the Hillston Airport, Hillston Showground, and a cemetery are each located on the southern fringe of the town.

The nearest dwellings to the development site, within 2km, are an estimated 8 rural dwellings and are generally to the north, northwest, and northeast of the site. The dwellings are all single storey dwellings, include formalised gardens and are associated with cropping land. A recently constructed solar farm is to the west on the opposite side of Kidman Way, an approved solar farm is located directly north of the development site. Kidman Way is one of the three main roads leading to Hillston from the south and a rail line runs parallel to the development site and Kidman Way. Other than crops, vegetation around the development site is generally woodland with trees and shrubs.

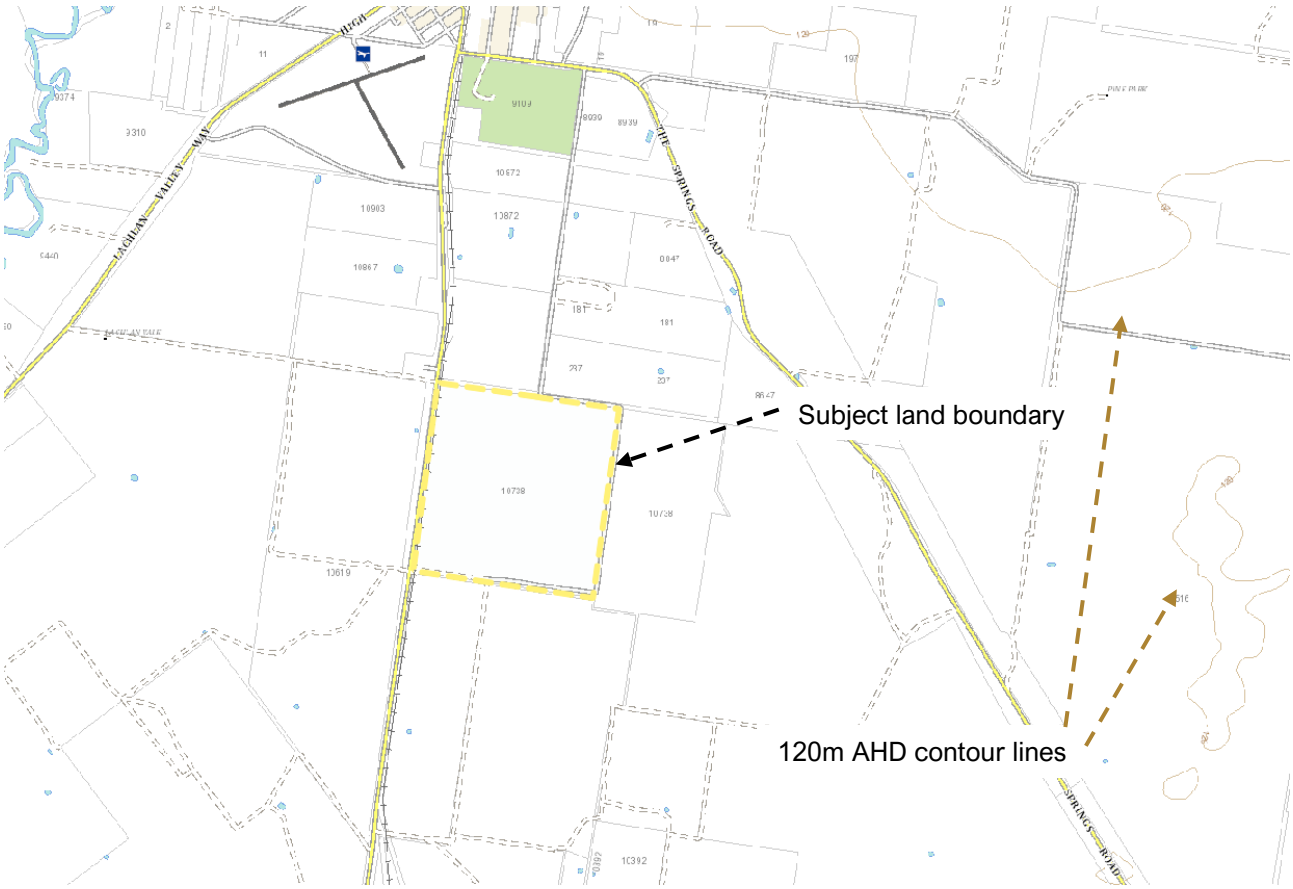


Figure 4-6 Topography of the surrounding land (Source: NSW Planning Portal, 2023)

Figure 4-7 View from the development site, north to the entry, showing power lines and existing vegetation (Source: NGH, 2023)

Community values

Community values were considered based on the submissions received for Daisy Hill Solar Farm, DA 2020/017, due to the proximity to the development site. There were 5 submissions received by Council for DA 2020/017.

The key issues summarised in the planning report relevant to the VIA were:

- The security fencing design.
- Glare potential.
- Change of character.

The Western Regional Planning Panel determined that consent would be granted for DA 2020/017, subject to conditions, including deferred commencement conditions.

Visual sensitivity

The predicted sensitivity of each viewpoint can be determined considering its proximity to the development site and factors such as use, scenic quality and regional significance.

Criteria for proximity are as follows:

- Foreground, 0 – 1km.
- Middle ground, 1 – 2km.
- Background, more than 2km.

Criteria for scenic quality are as follows:

- High sensitivity:
  - High use routes or areas.
  - Routes or areas of national or state significance.
  - Areas with high scenic quality (i.e., land subject to significant landscape overlay under the planning scheme).

- Moderate sensitivity:
  - Moderate use routes or areas.
  - Routes or areas of regional or local significance.
  - Areas with moderate scenic quality.
  - Dwellings.
- Low sensitivity:
  - Low use routes or areas.
  - Routes or areas of low local significance.
  - Areas with low scenic quality.

Landscape character and representative viewpoints

The BLM methodology requires identification of representative viewpoints in the study area. These may be along travel routes, near waterways and recreational areas, residential areas, tourist facilities, houses, and farmland.

Considering topography, vegetation, land use, and other distinct landscape features, subject and immediately surrounding land (up to 2km, see Figure 4-8) is described as:

- Gently sloped, generally between 120m AHD to 110m AHD, in the development area and on surrounding land the landscape appears flat due to the significant distances over the elevation changes.
- A mix of open modified agricultural (rural) landscape with some rural dwellings, irrigated, cropped land, and areas of woodland (natural low treed areas) in proximity and within Lot 63.
- The Kidman Highway and adjacent rail line is a key feature near the development site.
- Hillston township is located to the north and is sited along Kidman Way and the Lachlan River.
- Rural sealed roads with established roadside vegetation, with a mix of shrubs and trees.
- Rural gravel and unsealed roads with some roadside vegetation.
- Solar and electrical infrastructure.
- Showground/equine facilities to the north.

The scenic quality for land within 5km was identified as follows:

- A high scenic quality for natural landscapes (woodland/nature reserves, primary rivers, and river frontage, i.e., Lachlan River).
- A moderate scenic quality for modified landscapes (i.e., improved urban areas and landscaped public spaces, garden areas around dwellings on larger rural residential and in urban residential areas), general agricultural areas, modified grasslands grazing and cropped land etc, recreation areas, and areas of quality roadside vegetation.
- Lower scenic quality in areas of roads, industrial areas, sheds, larger areas of weeds/mismanaged land/roadsides.

The 5 viewpoints provide a representation of the landscape character within 2km and show the variations in scenic quality of the area and available views (see Figure 4-8 for the locations and Table 4-3 for photos, all ‘potential dwellings’ as identified in the map are conservatively treated as dwellings for assessment purposes).

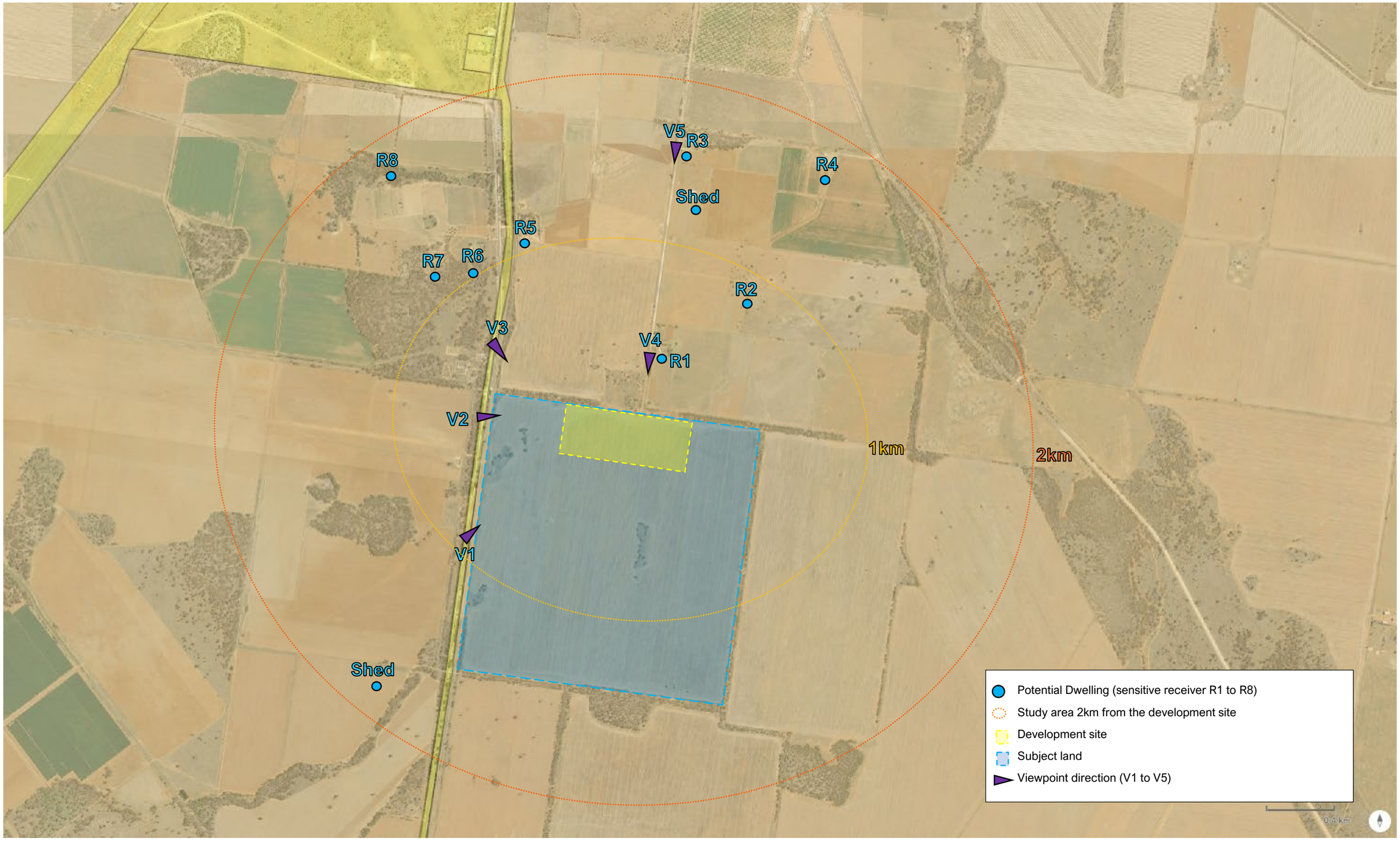


Figure 4-8 Rural dwellings within 2km of the development site and viewpoints (photo site and direction) (Source: NGH Adapted from NSW Planning Portal, 2023)

Definition of Landscape Management Zones (visual effect)

Visual Landscape Management Zones (LMZs) were assigned to each representative viewpoint. The zones were derived by combining scenic quality, viewer sensitivity and the distance to the development. Combined they produce a three-tiered management hierarchy: A – C, as shown in Table 4-1. The management priority for each viewpoint is listed in Table 4-3.

Table 4-1 Visual Landscape Management Zone decision matrix.

	Proximity / sensitivity							
		Fore-ground High	Middle ground High	Back-ground High	Fore-ground Moderate	Middle ground Moderate	Back-ground Moderate	Fore-ground Low
Scenic quality	High	A	A	A	A	B	B	B
	Moderate	A	B	B	B	B	C	C
	Low	B	B	B	B	C	C	C

Each zone has associated objectives to guide management of visual change and to help evaluate proposed project impacts. These are shown in Table 4-2.

Table 4-2 Visual Landscape Management Zone management objectives.

Management priority	**Management objectives**
A	Maximise retention of existing visual amenity. Landscapes are least able to absorb change. Developments may lead to a major change.
B	Maintain existing visual amenity, where possible. Protect dominant visual features. Developments may be allowed to be visually apparent.
C	Less importance for retaining existing visual amenity. Landscapes can absorb change. Developments may be allowed to dominate but should reflect existing forms and colours where possible.

The management zone and consideration of management objectives for each viewpoint is listed in Table 4-3.

4.2.3. Potential visual impacts analysis

A VIA for the operation stage of the development has been conducted considering:

- The specific elements of the development including the site access and internal roads, fencing, lighting, substation/inverter, ancillary buildings, battery system, solar panel array areas, and landscaping. Associated effects of light spill and dust impacts (that can also result in air quality impacts).
- The potential for the development to be viewed from representative viewpoints (dwellings, and road and rail users).
- The degree of contrast the development would have within the identified LMZ. LMZs were assigned to viewpoints based on the results of the field work, and the contrast at that viewpoint was evaluated based on evaluation criteria listed in Table 4-2.
- Glint and glare assessments completed for the near approved solar farm to the north and built solar farm to the west have shown there are no glare effects for dwellings, road, rail, or the Hillston aerodrome. Due to the following, there are unlikely to be any glint or glare effects for relevant receivers from the proposed development:
  - The low reflectivity design of the panels.
  - Similarities in construction and similarities in operation, and orientation, of the solar panels to the other near solar farms.
  - Vegetation surrounding the development site already providing some screening of the development site (see photos included in this chapter of the SEE and Figure 4-9).
  - Setbacks from Kidman Way, the rail line, views along path of travel and likely speeds of travel.
  - The very low use of the associated local roads (Norwood Lane and Racecourse Road).
  - Setbacks proposed from near dwellings, the low number of near dwellings, and their location generally to the north of the development site screened by existing vegetation.

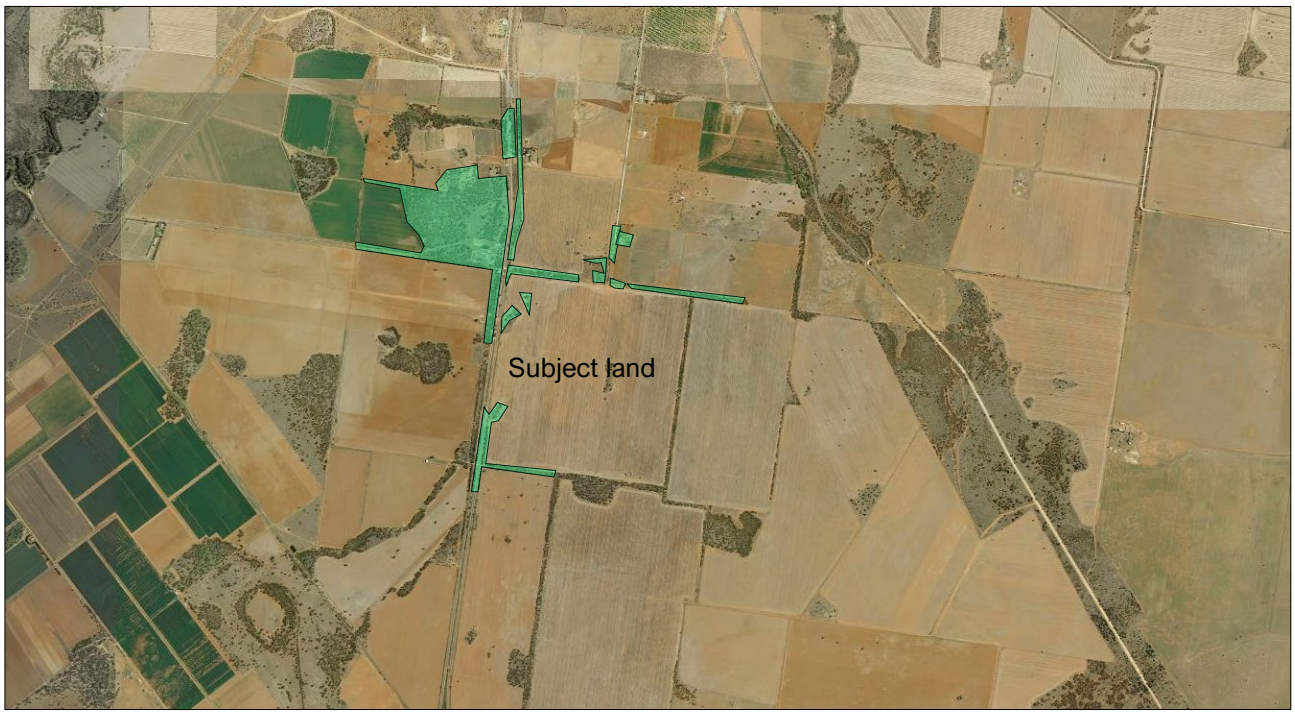


Figure 4-9 Screening vegetation surrounding the site for key vantage points (NGH adapted - NSW Planning Portal, 2023)

Evaluation criteria

The ratings for the degree of contrast created by the development at each viewpoint have the following definitions (U.S. Department of the Interior, n.d.):

- High contrast: the development would be dominant within the landscape and generally not overlooked by the observer; the visual change would not be absorbed.
- Medium contrast: the proposed activity would be moderately dominant and noticed; the visual change would be partially absorbed.
- Low contrast: the proposed activity would be seen but would not attract attention; the visual change would be well absorbed.
- Indistinct: contrast would not be seen or would not attract attention; the visual change would be imperceptible.

To determine if the objectives for the visual LMZ's are met, the contrast rating for the viewpoint is compared with the relevant management objectives to give a visual impact level. The visual impact level is consequently defined as:

- High impact: contrast is greater than what is acceptable.
- Medium impact: contrast is acceptable.
- Low impact: visual contrast is little or not perceived and is acceptable.

For high impact viewpoints, mitigation must be considered. Mitigation for moderately impacted receivers is considered on a case-by-case basis. No mitigation is warranted for low impacts.

Evaluation analysis table

Table 4-3 evaluates the expected level of visual impact from the 5 representative viewpoints, V1-V5, representing the rural dwellings and public viewpoints (roads/rail) within 2km of the development site.

The evaluation in Table 4-3 below considers the existing landscape factors at each viewpoint and potential for views of the development site without any mitigation measures, and then considered any necessary proposed mitigation measures giving the resulting (mitigated) visual impact rating for each viewpoint.

Table 4-3 Visual impacts at representative viewpoints and their associated receivers.

Viewpoint 1 and 2 (V1 and V2)		
Representing users of Kidman Way and rail line travelling north to Hillston and when directly opposite travelling in either direction.		
Summary of viewpoint		**Viewpoint description / impact**
Landscape	Rural, road of regional significance, rail, and roadside vegetation.	V1, identified Figure 4-8, representing views from Kidman Way and rail traffic travelling north towards the development site. This viewpoint is located towards the southern end of the

Scenic quality	Moderate	subject land located approximately 700m southwest from the development footprint/site. V2, identified Figure 4-8, representing views from Kidman Way and rail traffic opposite the development site, a minimum 400m distance. Travel speed along Kidman Way is 100km/h. Rail use is typically freight and therefore includes rail operators not patrons. The roadside vegetation and paddock trees would provide partial screening when travelling on the Kidman Way, alongside the subject land to the east. Part of the land has no screening vegetation, however the minimum setback distance of 400m, background vegetation and likely ground vegetation (grasses) would reduce contrast and visibility of the development. Contrast would also vary throughout the year depending on crop growth and harvest stages. The fencing, and posts etc would typically be galvanised or similar colour. The galvanised materials complement the rural setting and natural colour palette present. Impacts associated with construction may result in visual impacts including dust, similar to harvest and cropping operation currently occurring on site. The development would include relevant dust management measures. Additional traffic would be a short-term impact for construction. The development would include a management plan that would address traffic management.
Proximity	Foreground and middle ground	
Sensitivity	Moderate	
LMZ objective	A to B	
Contrast	Visible at a distance, some vegetation is present decreasing contrast.	
Inherent visual impact	Moderate	
Mitigated visual impact	No mitigation is considered necessary.	

V1 located adjacent to Kidman Way, view north along Kidman Way, the development site is located approximately 700m northeast from this viewpoint (Source: NGH, 2023)

V2 partially filtered and distant views to the development site from the rail line and Kidman Way (Source: NGH, 2023)

Viewpoint 3 (V3)		
Representing users of Kidman Way and rail line travelling south from Hillston and dwellings to the northwest of the development site.		
Summary of viewpoint		**Viewpoint description / impact**
Landscape	Rural including dwellings, road of regional significance, rail, and roadside vegetation.	V3, identified Figure 4-8, representing views from Kidman Way and rail traffic travelling south towards the development site and dwellings R5 to R8 located to the northwest of the development site. This viewpoint is located approximately 600m northwest of the development site. Travel speed along Kidman Way is 100km/h. Rail use is typically freight and therefore includes rail operators not patrons. The roadside vegetation and paddock vegetation screen most views to the development site, any minimal views possible are through stands of trees providing distant, broken, and filtered views. The proposed development, when visible from the road, rail or
Scenic quality	Moderate	
Proximity	Foreground and middle ground	
Sensitivity	Low - not visible from most road and rail.	

LMZ objective	C	dwellings, would have low contrast as the colour of trees and shrubs would be a similar (dark) colour to the solar infrastructure providing for good integration and ability of the landscape to absorb impacts from this viewpoint. This viewpoint was assessed as generally having a low sensitivity due to the minimal views possible. Impacts associated with construction may result in visual impacts including dust similar to harvest and cropping operation currently occurring on site. The development would include relevant dust management measures. Additional traffic would be a short-term impact for construction. The development would include a management plan that would address traffic management. No specific visual mitigation is considered necessary.
Contrast	Vegetation present along roadsides significantly decreases contrast.	
Inherent visual impact	Low	
Mitigated visual impact	No mitigation is considered necessary.	

View from V3 located northwest of the development site on Kidman Way (Source: NGH, 2023)

Viewpoint 4 and 5 (V4 and V5)		
Representing dwellings to the north and northeast of the development site and traffic using Norwood Lane		
Summary of viewpoint		**Viewpoint description / impact**
Landscape	Rural with associated dwellings with garden	V4 and V5, identified Figure 4-8, representing views from dwellings R1 to R4 located to the north and northeast of the

	and boundary plantings. Flat, open grazing land. Roadside vegetation and woodland. Local roads.	development site and traffic using Norwood Lane. This viewpoint is located approximately 450m north from the development site entry off Norwood Lane. No dwellings are located between this point and the development site. Travel speed along Norwood Lane is 60km/h. Speed varies as residents enter and leave properties. The roadside vegetation and paddock vegetation screen the majority of views to the development site, any minimal views possible are through tree lines providing distant, broken, and filtered views. The development would have low contrast as the colour of trees and shrubs would be a similar (dark) colour to the solar infrastructure providing for good integration and ability of the landscape to absorb impacts from this viewpoint. Use of galvanised fencing and structures having a matt finish effect limits reflectivity and generally has a low visual contrast with the vegetation and complements the natural colour palette of the rural environment. This viewpoint was assessed as generally having a moderate to low sensitivity due to proximity of dwellings but low numbers. Minimal to no view or very distant views are expected for most dwellings within the 2km study area. Views would be possible from Norwood Lane (typically within vehicles) the closer they are to the development site (approximately 400m). If there is a view of the development, the view duration could be expected to be longer due to the proximity to the site and lower speed of travel on local roads. The views, however, would not be entire views of the development. They would only be partial views where brakes in the tree line are present to accommodate the existing access point to the site or removal of vegetation has occurred to accommodate farm access tracks. Impacts associated with construction may result in visual impacts including dust similar to harvest and cropping operation currently occurring on site. The development would include relevant dust management measures. Additional traffic would be a temporary impact during construction. The development would include a management plan that would address traffic management. The ground vegetation should be restored within the fenced site post construction to minimise dust impacts during the operation
Scenic quality	Moderate.	
Proximity	Foreground and middle ground.	
Sensitivity	Moderate to Low.	
LMZ objective	A to C	
Contrast	Moderate to Low (not visible). Good contrast due to grass cover and tree lines along roadsides and within road reserves. Varying contrast with crop and harvest stages.	
Inherent visual impact	Moderate to Low	
Mitigated visual impact	Low	

		phase. A landscape zone is identified for R1 due to closeness to the development and limited vegetation directly between the dwelling location and the development, this would also have benefits for all dwellings north, northwest and northeast of the development site, see Figure 4-12

V4 View from Norwood Lane just south of R1 – Approximately 370m north of the development site (Source: NGH, 2023)

V5 View from Norwood Lane opposite R2 – Approximately 1.5km north of the development site (Source: NGH, 2023)

4.2.4. Glint and glare

Glint is a quick reflection that occurs when the sun is reflected on a smooth surface. Glare is a longer, sustained reflection. Infrastructure at the site that may cause glint or glare depending on the sun angle, include:

- Steel array mounting - array mounting would be steel.
- Temporary site offices, sheds, medium voltage power stations or inverter stations.
- Perimeter fencing.
- Permanent staff amenities.

PV solar panels are designed to absorb solar energy to generate the maximum amount of electricity and to reflect as little sunlight as possible. This results in the PV panels reflecting as little as 2 percent of the light they receive (FAA, 2010). The panels generally have an anti-reflective coating to further reduce the potential for glare and glint. Seen from an elevated position or above, such as from aircraft, they appear dark grey and do not cause a glare or reflectivity hazard.

Figure 4-10 shows the Hillston Sun Farm, west of the proposed development site, when viewed unobstructed from the north at approximately 3pm. It is noted this image was taken from approximately 60m to the solar array. In the instance of the proposed development, the closest dwelling would be located over 450m distance, see Figure 4-11 showing how distance affects views of the panels and angle of view changes light effects on the panels. For rail and Kidman Way users, and due to the setback of over 400m from the boundary, and vegetation present, views for the path of travel would not be direct towards the panels.

Figure 4-10 Example of solar farm opposite the development site (west of Kidman Way) (NGH, 2023)

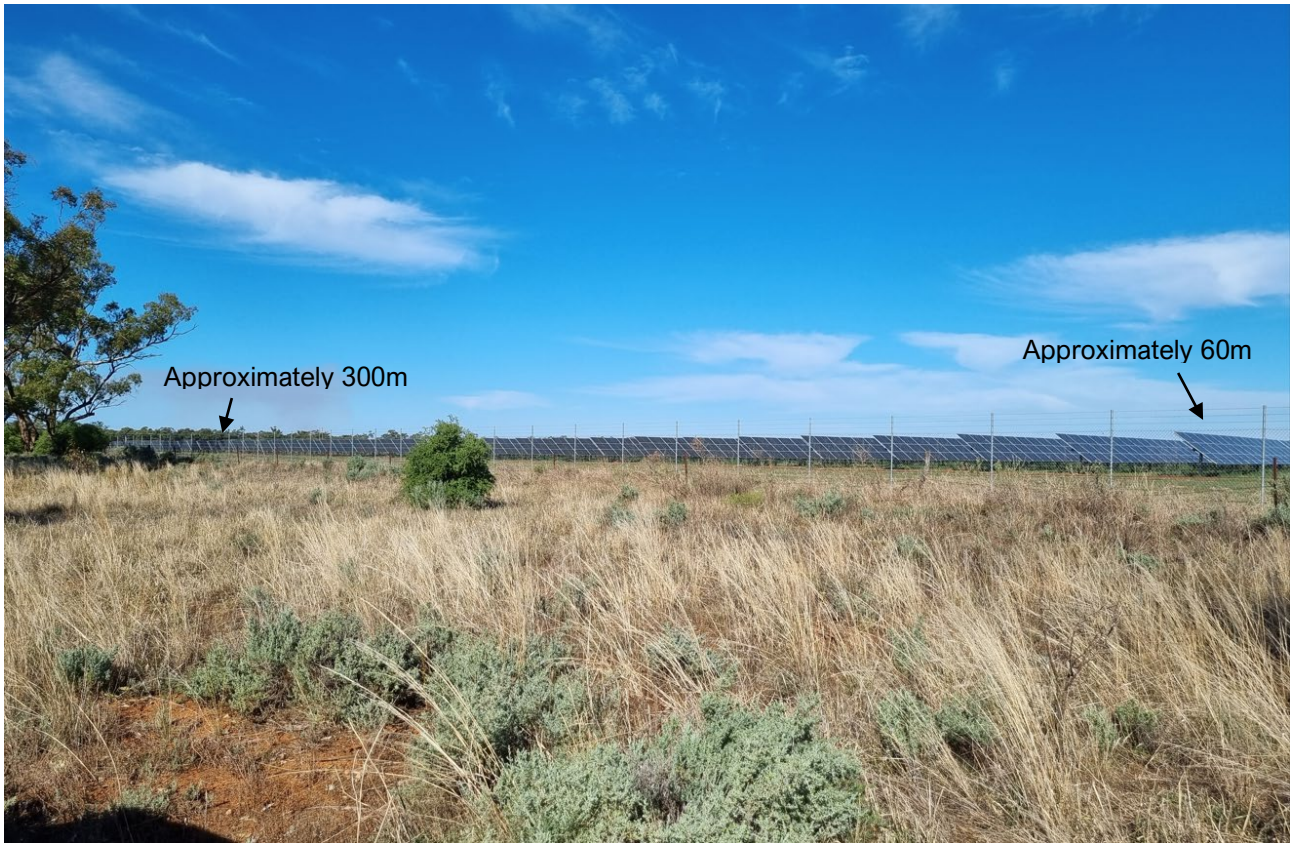


Figure 4-11 Difference between solar panels viewed at approximately 60m compared to 300m (NGH, 2023)

4.2.5. VIA results and mitigation summary

Moderate/Low to no residual impact

The character of the area is open rural land with associated dwellings, woodland, and paddock vegetation and infrastructure developments, roads, rail, and electrical facilities. Vegetation and the flat topography prevent and minimise views of the site, for most dwellings and road and rail users.

The closest dwellings to the north, northeast and northwest of the site generally have distant views or views of the proposed development site that are completely or partially screened by existing vegetation, farm buildings or garden landscaping. Gaps in the vegetation are present to the north and there is opportunity to improve the ability for the landscape to absorb views and retain similar views to what is existing. However, the nature of existing development in the area is that development is not hidden and therefore an expectation of partial views of structures or buildings is considered reasonable for new development. As such the recommended planting zone (see Figure 4-12) are limited in scale and location but are considered best placed to have the greatest impact in minimising visual effects of the development and minimise conflict between land uses and be consistent with the objectives of the RU1 zone.

Planting zones are to be 5m wide, with plantings 1-2 shrubs deep, use location suitable, preferably quick growing, shrubs. Planting zones are to be located a safe distance from the existing easement, up to 30m from poles as per Essential Energy guidelines and maintain 10m setback from panels. Planting zones are to be established and planted out at the commencement of construction to allow greatest time to establish. Planting zones must be protected during construction and a management plan should be developed

including details for maintenance including watering, and plant replacement as needed. Groundcover/grasses should be retained/established under the array areas to minimise dust and would minimise contrast when compared to paddocks that are bare of crops.

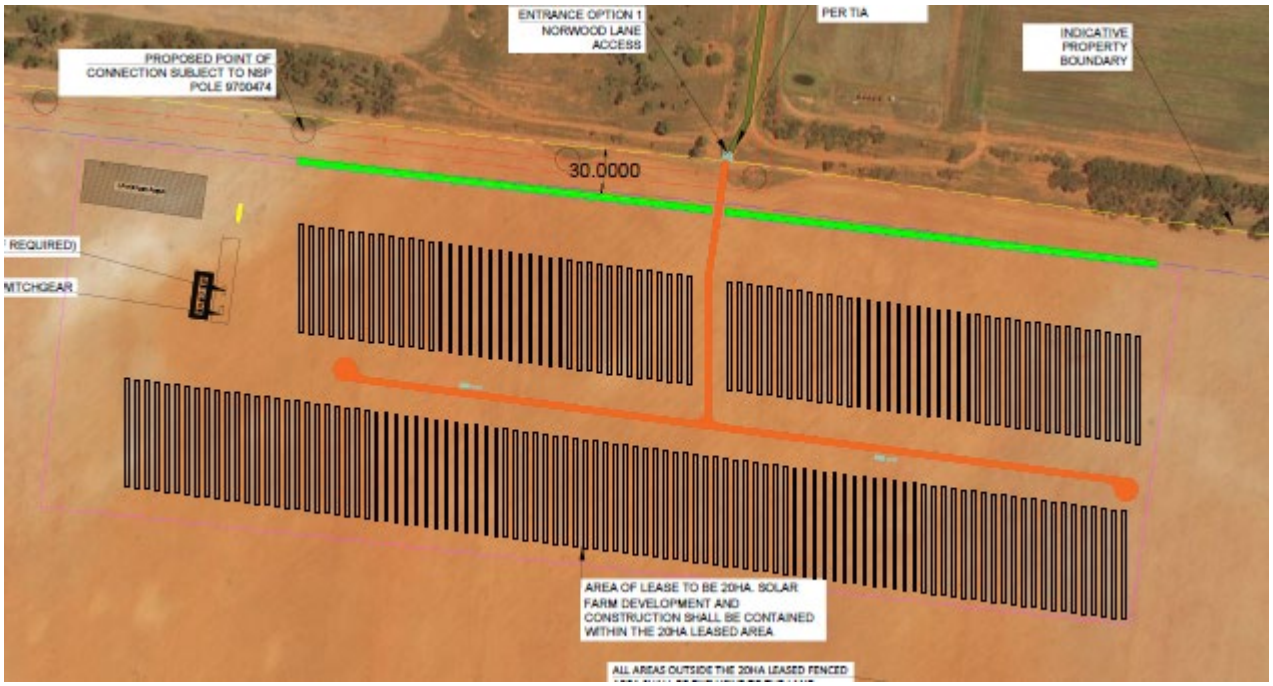


Figure 4-12 Recommended planting zones (NGH Adapted, Risen Energy, 2023)

This VIA has assessed the potential impacts of the proposed development.

The design including siting within the subject land, use of low contrast colours and materials, use of existing entry and construction impacts being temporary and low operational road use all minimise the potential visual and glare effects of the development. The setbacks, existing screening vegetation and proposed planting zone minimises visual impacts on the agricultural visual character and natural scenic qualities of the area. The design:

- Maximises the ability of the site to absorb the proposed changes.
- Maintains a reasonable standard of visual amenity.
- Is considered compatible with the rural landscape by having low contrast with existing forms and colours.

The development is consistent regarding the context of the LSPS encouraging renewable energy, and stating ‘Outside of the precinct, Council generally supports renewable energy and would promote an “open for business” attitude around renewable energies in the LGA’. The LSPS also states Councils desire to ‘proactively manage any potential impacts on productive agricultural land and the scenic landscape that is highly valued by the community and by visitors’. The development siting is considered to have minimal impact on amenity, agricultural practices and scenic landscape for surrounding dwellings and is located appropriately away from key visitor areas, i.e., along the Lachlan River and town areas, and is considered to have an acceptable level of impact for the rural / town edge setting.

4.3. Biodiversity

4.3.1. Approach

The proposed development has been evaluated against the Biodiversity Offset Scheme (BOS) thresholds pursuant to the *Biodiversity Conservation Act 2016* (BC Act). The full report is provided at Appendix B.

Site inspections were undertaken on 27 February 2023, as well as 6 and 7 June 2023. The site inspection focussed mostly on stratifying the existing vegetation within the surveyed area. The extent of the survey effort, including one Biodiversity Assessment Methodology (BAM) plot and multiple rapid assessment locations, is shown in **Error! Reference source not found.**.

4.3.2. Existing environment

As shown in Figure 4-13, vegetation within the surveyed area largely consists of exotic groundcovers. The surveyed area was approximately 265.7 ha in size. Of this, only 23.6 ha has been classified as a native Plant Community Type (PCT), with four PCTs present as follows:

- PCT 13 Black Box – Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
- PCT 15 Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
- PCT 57 Belah/Black Oak – Western Rosewood – Wilga woodland of central NSW including the Cobar Peneplain Bioregion
- PCT 103 Poplar Box – Gum Coolabah – White Cypress Pine shrubby woodland mainly in the Cobar Peneplain Bioregion

PCT 57 Belah/Black Oak – Western Rosewood – Wilga woodland is associated with a Threatened Ecological Community (TEC) listed under the BC Act: *Acacia loderi shrublands – Murray Darling Depression* which is predicted to occur in the Lachlan subregion of the Riverina bioregion. This TEC is not listed under the EPBC Act. The condition of PCT 57 in the survey area ranges from low to moderate; however, *Acacia loderi* was not noted as present. The majority of PCT 57 in the survey area is severely degraded with Wilga (*Geijera parviflora*) the dominant species. However, PCT 57 was the best fit for this vegetation given the IBRA subregion, landscape and soils.

Based on the habitat occurring within the survey area, two threatened flora species are considered to have a 'possible' occurrence, Mossgiel Daisy *Brachyscome papillosa* and Slender Darling-pea *Swainsona murrayana.*

Four threatened fauna species are considered to have a 'possible' occurrence based on the habitat occurring within the survey area:

- Spotted Harrier *Circus assimilis*
- Varied Sittella *Daphoenositta chrysoptera*
- Grey-crowned Babbler (eastern subspecies) *Pomatostomus temporalis temporalis*
- Corben's Long-eared Bat *Nyctophilus corbeni*

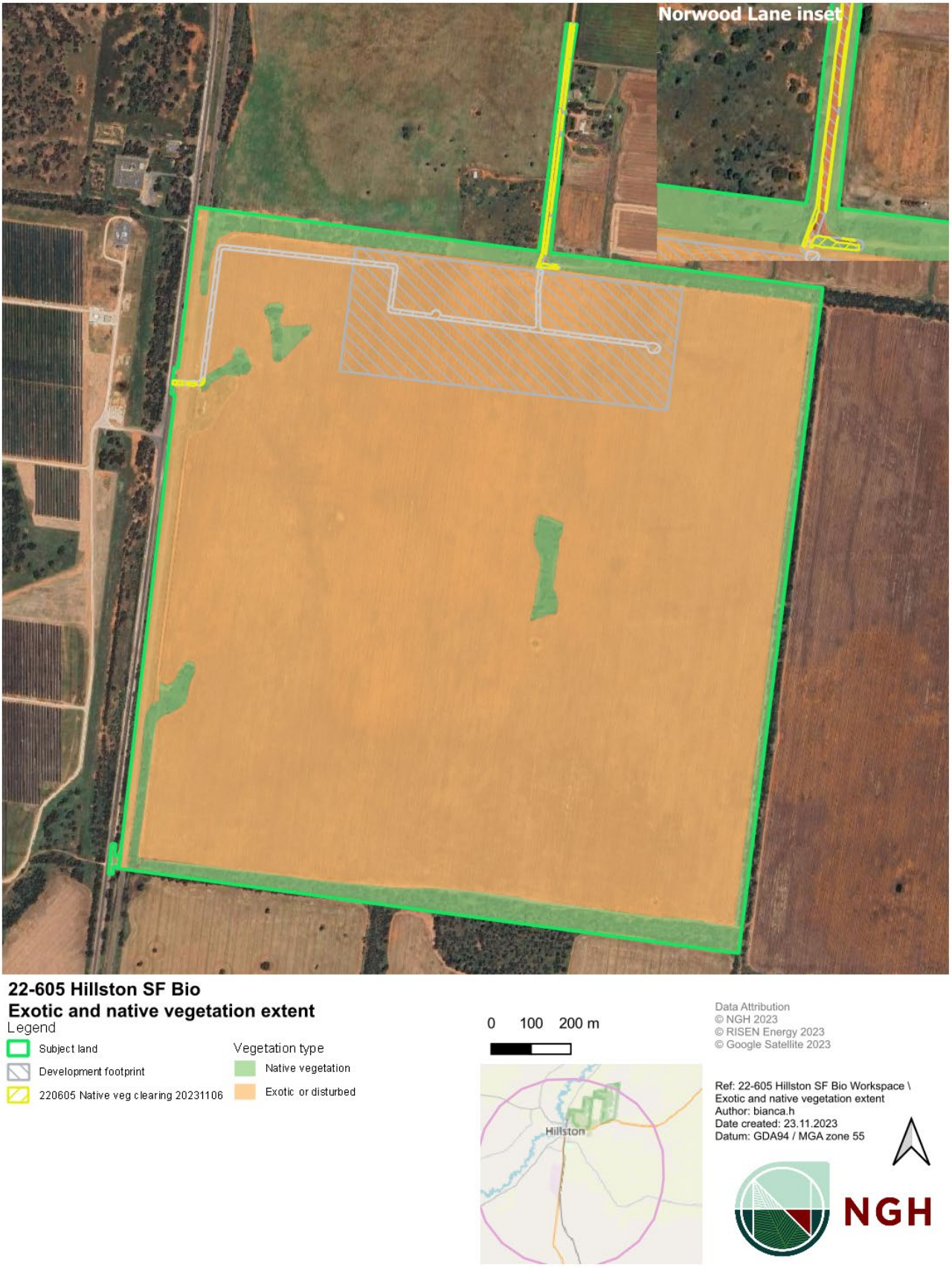


Figure 4-13 Extent of native and exotic vegetation within the surveyed area

4.3.3. Assessment of impacts

Approximately 0.21 ha of native vegetation would be cleared from within the development footprint during construction of the proposal. This would be comprised of:

- 0.02 ha of PCT 15 Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion).
- 0.17 ha of PCT 57 Belah/Black Oak – Western Rosewood – Wilga woodland of central NSW including the Cobar Peneplain Bioregion.
- 0.02ha PCT 103 Poplar Box – Gum Coolabah – White Cypress Pine shrubby woodland mainly in the Cobar Peneplain Bioregion.

The potential for impact on threatened species as a result is summarised in Table 4-4.

Table 4-4 Impacts on threatened species

Threatened species	Habitat clearing (ha)	Potential for impact
Mossgiel Daisy	0.02	Low – No records within subject land. Proposal unlikely to impact this species due to low magnitude of clearing in marginal habitat.
Slender Darling-pea	0.02	Low – No records within subject land. Proposal unlikely to impact this species due to low magnitude of clearing in marginal habitat.
Spotted Harrier	0.21	Low – No breeding habitat identified in development footprint. Proposal unlikely to impact this species due to low magnitude of clearing of foraging habitat.
Varied Sittella	0.21	Low – proposal unlikely to impact this species due to low magnitude and only one record in study area.
Grey-crowned Babbler	0.21	Moderate – proposal has potential to impact this species due to 14 records in study area, however the impacts are considered manageable. Test of Significance not required due to low magnitude of clearing along linear route.
Corben's Long-eared Bat	0.19	Low – No breeding habitat identified in development footprint. Proposal unlikely to impact this species due to low magnitude of clearing of foraging habitat.

The BOSE report has assessed each of the BOS threshold triggers and determined that a BDAR is not required due to the following:

- The proposal would result in the clearing of 0.21ha of native vegetation. This is below the 1ha threshold for clearing of native vegetation as relevant to the subject land.
- No land identified on the BV Mapping occurs within the subject land
- No significant impact to any threatened entity is anticipated.

4.3.4. Safeguards and mitigation measures

Standard mitigation measures have been proposed for the development.

Table 4-5 Recommended mitigation measures to minimise impacts to biodiversity

Purpose	Mitigation measure	Timing
Minimise unintentional impact to adjacent native vegetation	Clearly delineate approved clearing area with temporary fencing or flagging or similar. Ensure stockpile areas are within the development footprint.	Prior to clearing During construction
Foster regeneration of native species in temporary disturbance areas	Consider using woodchip mulch from cleared vegetation for site remediation rather than grass seeding. This would support natural regeneration of local species. However, if grass must be sown, it is recommended that a native grass seed mix be used.	During clearing (stockpile mulch) and after construction
Avoid importing weeds to subject land	Any imported topsoil should be certified weed free. Utilise weed quarantine measures such as cleaning down loose soil from machinery and vehicles entering and exiting site. A weed brush-down area should be identified for this purpose.	During construction During construction Prior to construction
Improve habitat connectivity for woodland birds	Revegetation along lot boundary parallel to Kidman Way with native shrubs and trees.	During or after construction

4.4. Heritage

4.4.1. Aboriginal heritage

An Aboriginal Heritage Due Diligence Assessment (NGH, 2023) has been prepared for the development. The findings are summarised below. The report is provided at Appendix C.

A visual inspection of the survey area was undertaken by two qualified NGH archaeologists on 6 March 2023. The Kidman Way road reserve area was inspected and the previously recorded modified tree site AHIMS# 42-4-0017/ Hillston 5 was relocated. No new Aboriginal sites were recorded within the Kidman Way road reserve area which was noted to have been highly disturbed by the construction and maintenance of the existing road and railway. It was concluded that the Kidman Way road reserve area within the surveyed area has negligible potential for subsurface material and/or Aboriginal objects beyond the relocated site AHIMS# 42-4-0017/ Hillston 5.

The proposed Norwood Lane road upgrade works are within the existing disturbed road corridor and were determined to have negligible potential for subsurface material and/or Aboriginal objects.

The majority of Lot 63 DP664722 had very high ground surface visibility (80 to 100%) as it had been recently ploughed. No new Aboriginal sites were recorded within Lot 63 DP664722 and in consideration of the very high ground surface visibility and absence of any close water sources, it was determined that Lot 63 DP664722 has negligible potential for subsurface material and/or Aboriginal objects.

The desktop and field assessment concluded that the surveyed area does not require further investigation and assessment. The previously recorded modified tree AHIMS# 42-4-0017/ Hillston 5 can be avoided by the proposed development and no other Aboriginal sites or area of potential archaeological deposit have been recorded within the surveyed area.

Based on an assessment of the survey area, the proposed work can proceed with caution with the following recommendations:

- All works must avoid the previously recorded modified tree AHIMS# 42-4-0017/ Hillston 5 with a minimum 10 m buffer to ensure no inadvertent impacts to the tree trunk, canopy and root system.
- All works must be limited to the area assessed by this document and any ground disturbance activity proposed outside of the current assessment area should also be subject to an Aboriginal heritage assessment. This includes road upgrades for site access and laydown areas.
- If any items suspected of being Aboriginal in origin are discovered during the work, all work in the immediate vicinity must stop. The find will need to be assessed by an archaeologist and if found to be an Aboriginal object the NSW Environment Line (1300 361 967) must be notified as an Aboriginal Heritage Impact Permit (AHIP) will be required.

4.4.2. Non-Aboriginal heritage

There is no local heritage identified within or near the subject land. The closest items of local heritage are the Hillston Cemetery and sites located within the township of Hillston. There would be no views of the development possible from these sites and there would be no impact to heritage values.

4.5. Traffic

A Traffic Impact Assessment (Amber, 2023) (TIA) has been prepared for the development in accordance with the RTA Guide to Traffic Generating Developments and relevant Austroads Guidelines. The findings are summarised below, and the report is provided at Appendix D.

Access to the development site would be using a proposed upgraded entry onto Norwood Lane, located in the north of the development site (Option 1 in the TIA). Use of Option 1 access onto Norwood Lane would allow for minimised impacts to Kidman Way and avoidance of impacts to the rail corridor. Option 2 originally considered in the TIA would not be used.

Staff are expected to be primarily housed in Hillston with all plant expected to be delivered from Port Botany. Heavy vehicles, up to 19m articulated trucks, would transport materials to the site. The applicant has advised that no B-Doubles or oversize/overmass (OSOM) vehicles would be utilised for the project.

Haulage would be via Kidman Way to The Spring Road to Norwood Lane and the northern site access. Norwood Lane is a Carrathool Shire Council managed road.

Kidman Way currently accommodates an estimated 64 vehicle movements in the morning peak hour, and 760 vehicles per day; traffic is evenly distributed between the peak hours. Norwood Lane is estimated to

carry less than 50 vehicle movements per day. Survey results indicate Kidman Way and Norwood Lane currently accommodate a low level of traffic and can manage increases in vehicle movements.

The construction is expected to take approximately 12 months, with the peak construction period expected to take 3 months.

A maximum of 30 staff would be on-site at any one time during peak construction periods. Shuttle buses are proposed to transport most staff, with the remaining staff to access the site using private vehicles. Below is a summary with breakdown of activities and staff numbers:

- Construction
  - During peak construction the proposal could generate up to 34 heavy and 16 light vehicle movements per day. A vehicle movement means a vehicle travelling in one direction (i.e., a truck accessing the site would generate one movement towards the site and one movement away from the site when it departs).
  - 15 vehicle movements are likely during the morning and evening peak hours during the peak construction period, which would reduce to 11 vehicle movements over the typical construction periods.
- Operations – based on 2 staff (emergency and refurbishment excluded)
  - 4 vehicle trips are the expected per day in normal operations when staff visit the site associated with maintenance and operation services. The operational phase would result in a negligible change to the traffic environment.

The proposed site access point is via the southern end of Norwood Lane. Swept path assessments demonstrate the access is designed to accommodate two-way vehicle movement for 19 metre Articulated Vehicles. The Safe Intersection Sight Distance (SISD) required at intersections is specified within the Austroads Guide to Road Design – Part 4A: Unsignalised Intersections. Based on the narrow width, unsealed surface and 90-degree bend, a design speed of 50 km/hr has been conservatively adopted for Racecourse Road which results in a sight distance requirement of 97 metres.

Swept path assessments also considered the intersection of The Springs Road and Norwood Lane. The assessment demonstrates the intersection is designed to accommodate one-way vehicle movement for 19 metre articulated vehicles. Where roadworks required as part of Daisy Hill Solar Farm have not been completed prior to the construction of the proposed development, and to allow for vehicles to pass, the intersection upgrades, widening of the eastern side of Norwood Lane would be needed.

Cumulative impacts have been considered due to proximity of the approved Daisy Hill Solar Farm and the potential for overlapping of construction activities. These vehicle movements are expected to have a minimal cumulative impact on the operation of the road network.

A Construction Traffic Management Plan (CTMP) would be prepared prior to construction commencing by the appointed contractor in accordance with the recommendations of the TIA.

4.6. Natural and built hazards

4.6.1. Flooding

The site has been identified as being subject to flood risk. A Flood Risk Assessment (Cumulus, 2023) (HA) has been prepared for the development, the findings are summarised below, and the report is provided at Appendix E. Cumulus Engineering has assessed the flood risk at the site using existing flood data. Existing flood data has been provided by Carrathool Shire Council.

It is noted, two site access options were originally considered in the HA. This summary addresses Option B results only, being the Norwood Lane option. Option A Kidman Way is not proposed to be used.

1% AEP Flood Depths have been assessed, refer to Figure 4-14. The proposed development's design has greatly reduced the depth of potential flooding. Only a small section of the southern row of solar panels on the western side experiences depths of up to 60mm, which is of no concern given the panels are elevated off the ground and the array posts would not be within the affected area. Furthermore, the solar farm infrastructure such as BESS, inverters, switchgear would be unaffected by flood flows.

Access to the site along Norwood Lane is impacted by moderate flood depths (up to 500mm). However, the Flood Risk Assessment proposes an Emergency Response Plan be prepared prior to operation. In the event of major flooding, sufficient advance warning is provided in this area via emergency services channels. The need to access the site during construction and operation can be postponed in the event of major flooding.

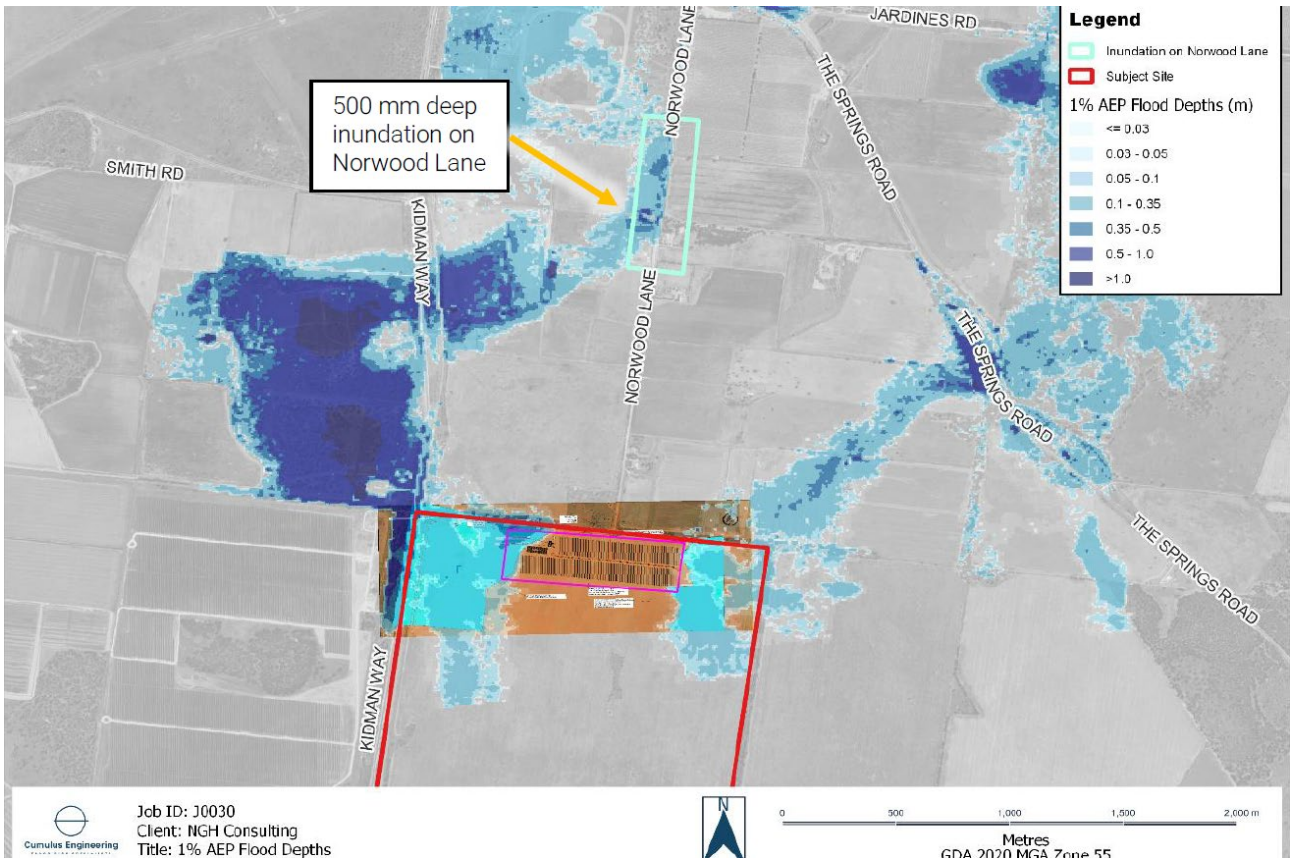


Figure 4-14 1% AEP Flood Depth for the proposed development (Source: Cumulus, 2023)

4.6.2. Bushfire

The land is not bushfire prone land, as identified in the figure on the following page, but may be affected by bushfire. As grassfires and electrical fires are possible within solar facilities, the NSW Rural Fire Service (RFS) Planning for Bushfire for Protection 2019 (PBP) aims and objectives and solar facility provisions have been addressed to aid in minimising risk to life, property, and the community.

The objectives are to:

- *Afford buildings and their occupants protection from exposure to a bush fire.*
- *Provide for a defendable space to be located around buildings.*
- *Provide appropriate separation between a hazard and buildings which, in combination with other measures, prevent the likely fire spread to buildings.*
- *Ensure that appropriate operational access and egress for emergency service personnel and occupants is available.*
- *Provide for ongoing management and maintenance of BPMs.*
- *Ensure that utility services are adequate to meet the needs of firefighters.*

The proposed development would incorporate the following bushfire protection measures into its design and operational plans.

Asset Protection Zones

With reference to Section 8.3.5 of PBP a minimum 10m wide area adjacent the proposed solar array footprint (as identified on the plans in Appendix A), in addition to an area provided around ancillary buildings, shall be managed in perpetuity as an APZ to Inner Protection Area standards, in accordance with Table 7.4a & Appendix 4 of PBP.

Landscaping

Future landscaping shall be in accordance with Appendix 4 of PBP, to ensure APZ specifications are not compromised. Plants specified should be fire resistant or retardant where possible.

Emergency Management

A Bush Fire Emergency Management and Operations Plan would outline appropriate management and maintenance of bushfire protection measures, for the life of the development. This plan should be developed in consultation with local NSW RFS or Fire & Rescue NSW.

In addition to the measures identified above, bushfire protection measures identified below are recommended to improve property protection measures and to ensure suitable access is provided for emergency services, in addition to facilitating the egress of the construction and/or operational workforce.

Access

Property access and internal access arrangements should comply with the design specifications of Table 7.4a of PBP, to ensure access to the site is suitable for emergency response vehicles.

Water and Utilities (Electricity)

Water supply requirements shall comply with Table 7.4a of PBP.

A water supply no less than 20,000L (stored in a non-combustible storage tank), shall be provided to improve property protection measures and/or to act as a static water supply for emergency services. Additional water may need to be provided at the site of the BESS.

Electricity, where provided within the defendable space, shall comply with Table 7.4a of PBP, where practicable.

Construction Standards

Construction standards prescribed under AS 3959 do not apply to ancillary buildings within the development site. Notwithstanding this, it is recommended that essential equipment be housed, or stored, so not to contribute to spreading fire to nearby vegetation.

The proposed development has been designed to satisfy the aim and objectives of the PBP.

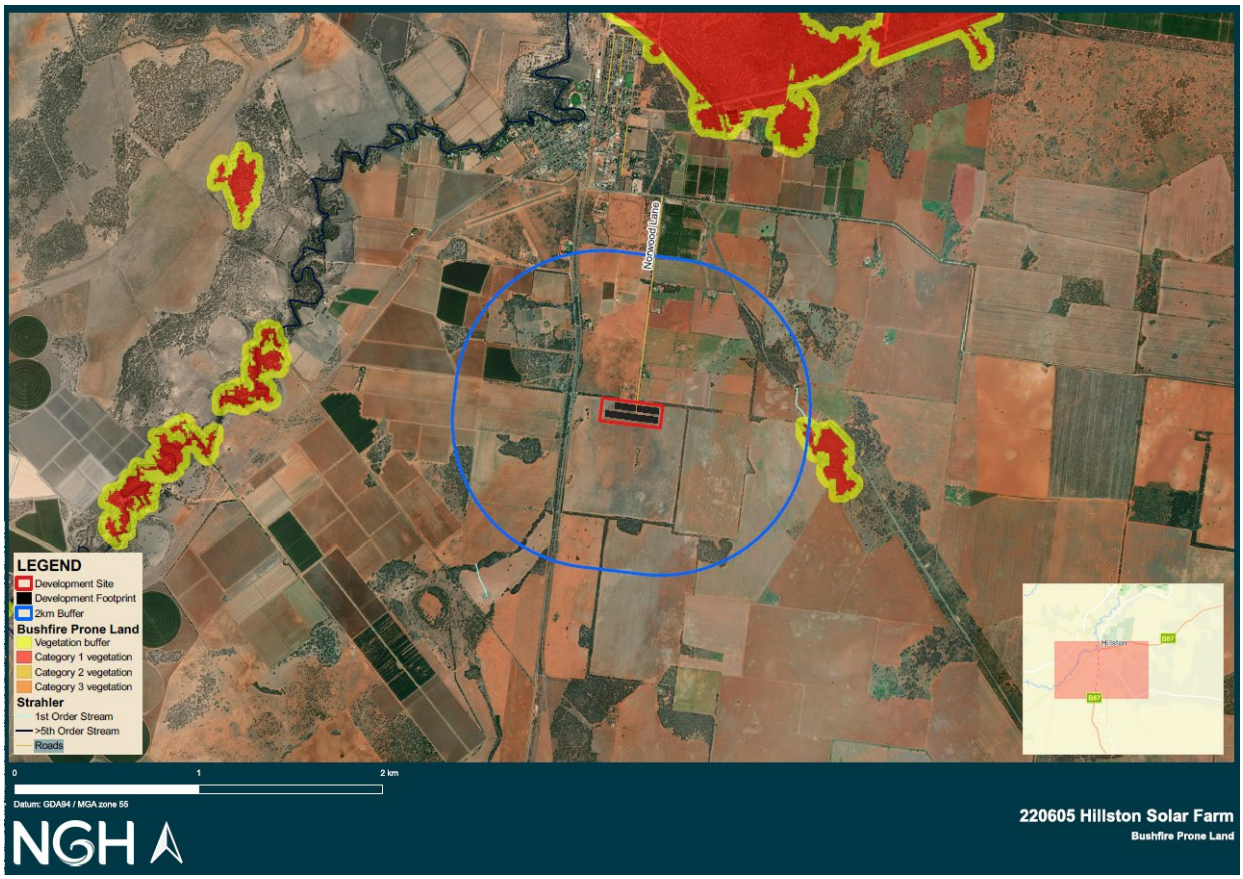


Figure 4-15 Bushfire prone land near the development site (NSW Planning Portal, 2023)

4.6.3. Agricultural considerations including potential for contamination

The development sites land and soil capability are mapped as having severe limitations with moderate–low capability land, defined by 'The land and soil capability assessment scheme' (OEH, 2012) as:

- *Land has high limitations for high-impact land uses. Will largely restrict land use to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation.*

The proposed solar farm would be managed including vegetation management. The development site would be decommissioned, and the development site would be returned to state suitable for agricultural use, similar to the existing.

The potential for contamination has been considered for the development site. The development site has been utilised for agricultural activities, specifically cropping. Agricultural activities are listed as a potentially contaminating land use activity according to Table 1 of the Managing Land Contamination Planning Guidelines. There may be a risk that contamination associated with cropping could be present on the development site.

Due to the proposed use and no plans to remove soil from the site and only minimal earthworks with soils not proposed to be dispersed. The site is likely suitable for the proposed development. No remediation works are proposed or considered required. Materials to be transported to site, including BESS components would be managed in accordance with relevant authorities' transport requirements, would be stored on site in identified laydown areas, and installed in accordance with manufacturers specifications. Management of the site would include securing and monitoring the site, maintenance and replacement of equipment and recycling or waste disposal to appropriately licenced facilities as needed.

4.6.4. Electromagnetic fields (EMF)

Radiation produced by transformers and inverters is reduced through performance standards that apply to standard components. The Australian Radiation Protection and Nuclear Safety Agency advises that the strength of this radiation would decrease with distance from the source, and it would become indistinguishable from background radiation within 50m of a high voltage power line and within 5m to 10m of a substation.

Electric and magnetic fields (EMFs) are produced whenever electricity is used. EMFs also occur naturally in the environment, such as the Earth's magnetic field and discharges during thunderstorms (WHO, n.d.).

Electric fields are produced by voltage and magnetic fields are produced by current. When electricity flows, EMFs exist close to the wires that carry electricity and close to operating electrical devices and appliances (WHO, 2007). Electric and magnetic field strength reduces rapidly with distance from the source.

Over decades of EMF research, no major public health risks have emerged, but uncertainties remain (WHO, 2007). While it is accepted that short-term exposure to very high levels of electromagnetic fields can be harmful to health, the International EMF Project, established by the World Health Organisation, has thus far concluded that there are no substantive health consequences from exposure to Extremely Low Frequency (ELF) electric fields at the low levels generally encountered by the public (WHO, 2007), such as those that would be produced by electricity generation from the development.

The development includes six main types of infrastructure that could create EMFs:

1. Solar arrays (up to 5MW).
2. Approximately 2 inverters.
3. Underground cables.
4. A connecting overhead transmission line.
5. Onsite substation (switching station etc).
6. Energy storage facility with a capacity of approximately 2MWh.

There is low potential for EMF impacts during the construction and decommissioning phases of the development. Staff would be exposed to EMFs over intermittent periods during works at and around the existing 33kV distribution line and relevant electrical equipment. Exposure to EMFs during the construction would be short term, therefore the effects are likely to be negligible.

During operation, EMF sources would include overhead transmission lines, underground cabling, and the solar array.

The site is surrounded by agricultural land, public and unformed roads, and rail lines. The closest dwelling is located over 450m from the development site. Access would be restricted by the development's location on private land and security fencing to be provided around the site during the construction and operational phases. Given the levels associated with the infrastructure components, and the distance to the site perimeter fence, EMFs from the development are likely to be indistinguishable from background levels at the boundary fence. The underground cabling would not produce external electric fields due to shielding from soil, and its magnetic fields are expected to be well within the public and occupational exposure levels recommended by ARPANSA (ARPANSA, 2015) and ICNIRP (ICNPR, 2020).

By prudently designing and siting infrastructure, exposure to EMFs and potential for adverse health impacts can be further reduced. Adverse health impacts from EMFs are therefore unlikely because of the development.

The potential risks associated with EMFs for the development can be reduced by designing the infrastructure in accordance with the codes and best practice standards by a suitable qualified person including:

- All electrical equipment would be designed in accordance with relevant codes and industry best practice standards in Australia. All design and engineering would be undertaken by qualified and competent person/s with the support of specialists as required.

Appropriate plans would be prepared prior to construction, showing measures to manage impacts associated with electrical equipment. All construction would be undertaken by appropriately qualified and licenced persons. The development has addressed the effect on the environment, human health, and amenity of the area. No adverse impacts from potential electromagnetic fields are anticipated.

4.6.5. Heat island effect

The PV heat island effect on sensitive vegetation (such as cold-climate horticultural cropping) describes the transfer of heat from built form to its surrounds, where the ambient temperature around the built form is higher than that of surrounding vegetated areas, particularly at night. While there are few studies of spatial heat dissipation from solar infrastructure, those that exist acknowledge the potential for ambient air temperatures within the perimeter of a solar energy facility to potentially increase by 3 to 4 degrees Celsius. However, those studies also found that the heat that was generated dissipated rapidly over a short distance. Some found that at 30m from the solar PV array, the air temperature variation was indistinguishable from ambient air temperature.

'Heat island' is defined as an area having higher average temperature than its surroundings owing to the greater absorption, retention, and generation of heat by buildings, pavements, and activities. This is usually used in reference to the impact of an urban area on its rural surroundings. Studies have shown that Photovoltaic (PV) panels convert incident solar radiation into heat, and this can alter the air flow and

temperature profiles near the panels. Whether such changes may subsequently affect the thermal environment of near-by populations of humans and other species have been questioned (Fthenakis and Yu, 2013). However, to date there have been limited empirical studies on the potential for a heat island effect in utility scale solar farms.

The limited studies that do exist also show results that can be seen as contradictory, as they are so site and project specific. Some studies suggest that PV systems can cause a cooling effect on the local environment, depending on the efficiency and placement of the PV panels while others demonstrate a warming effect (Barron-Gafford, Minor, Allen, Cronin, Brooks, and Pavao-Zuckerman, 2016). Other studies conclude that whilst air temperatures may increase within the solar farm itself, they rapidly decrease to the ambient temperature beyond the perimeter of the solar farm (Fthenakis and Yu, 2013).

Fthenakis and Yu (2013) undertook an analysis of the potential for large solar farms to generate a heat island effect and increase air temperature within the solar farm area. The study found at the centre of the solar farm, the annual average air temperature at a height of 2.5m increased by up to 1.9^{o}C. However, this increase in temperature dissipated at a height of 5m. Additionally, the solar farm completely cooled overnight.

The research suggested a small potential effect on climate within the development site. This effect may enhance retention of ground cover in very cold or hot conditions onsite. No impacts on adjacent properties and agricultural activities would occur.

The topic has also been subject to consideration by a Victorian Planning Panel for solar farms proposed in Greater Shepparton for solar farms proposed by Neoen and X-Elio. This is detailed in the *Panel Report for the Greater Shepparton Solar Energy Facility Planning Permit Application 2017-162, 2017-274, 2017-301 and 2017-344* (Panel Report, 2018). Neoen, in preparation of a response to key issues raised in objecting submissions, commissioned a *Statement of Evidence by Greg Barron-Gafford* from the Research Group Biography, Ecosystem Science (University of Arizona) (Barron-Gafford, 2018).

Barron-Gafford (2018), in his Statement of Evidence (SoE) to the Victorian Planning Panel included results on the radius of the measured heat effects. This identified that the PVHI effect was indistinguishable from air temperatures over native vegetation when measured at 30m from the edge of the PV array (Figure 4-16). In his SoE he states that:

'this pattern held true for both daytime and night-time conditions. Because the PV panels themselves trap the energy from diffuse sunlight that was able to reach the ground underneath them, air temperatures remain elevated within a PV array. As you leave this "overstorey" of PV panels, energy is able to radiate back towards the atmosphere, as it does in a natural setting, and the PVHI quickly dissipates'.

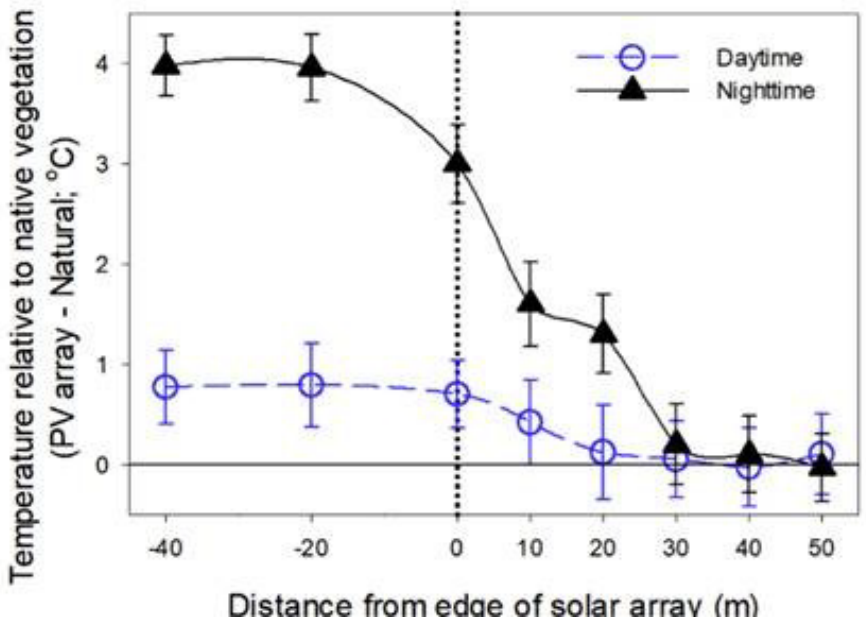


Figure 4-16 Measures of air temperature within and outside of the PV array (Barron-Gafford, 2018)

In conclusion, the Victorian Planning Panel Report (Panel Report, 2018), accepted that solar arrays would affect air and soil temperatures within the solar array perimeter, but that in relation to outside of the solar array perimeter a heat island effect is unlikely to occur, but where orchards or the like are present a 30m buffer should be maintained.

The potential risks associated with heat island effect for the development have been avoided by designing for reasonable setbacks of greater than 30 metres to adjoining properties. As such there are no likely potential heat island effects from the development on adjoining land. There are no sensitive receivers, orchards, or the like within relevant proximity to (30m of) the infrastructure. The development suitably considers and addresses potential heat island effect impacts. No adverse impacts from potential heat island effect are anticipated.

4.7. Noise

4.7.1. Approach

The noise and vibration assessment have been prepared in accordance with the policies and guidance, administered by the Environment Protection Authority (EPA):

- NSW Interim Construction Noise Guideline (ICNG) 2009.
- NSW Noise Policy for Industry (NPI) NSW EPA 2017.

The NSW Interim Construction Noise Guideline (ICNG) 2009 provides guidance on the measurement and management of construction noise impacts. The guideline requires, a quantitative assessment of noise impacts when works are likely to impact an individual or sensitive land use for more than three weeks in total.

The ICNG describes the 'noise management levels' (NMLs), for residences and other sensitive receivers. For works during standard working hours, residences are considered noise affected when construction noise is 10dB(A) above the rating background level (RBL) (as detailed in Table 4-6) and 'highly noise affected' when construction noise is above 75dB(A). Works outside standard working hours affect sensitive receivers when construction noise is 5 dB(A) above the RBL (EPA, 2017).

4.7.2. Existing environment

The existing noise sources are typical of a rural environment. Noise sources include tractors, headers, potentially motorbikes or quad bikes, light and heavy vehicles on Kidman Way and local roads, as well as noise associated with train movements. Noise from farm activities including cultivation, sowing, spraying, harvest typically occur at peak times of the year and are driven by seasonal conditions.

4.7.3. Background noise

Background noise monitoring has not been conducted for the Development. NGH has adopted the recommended background levels from the NPI (2017). The NPI in Table 4-6 describes typical existing background Rural Residential noise levels. These background noise levels were adopted as the RBLs for the purpose of this noise assessment.

Table 4-6 Average background A-weighted sound pressure level (EPA, 2017).

Setting	Daytime 0700-1800	Evening 1800-2200	Night-time 2200-0700
Rural Residential	40 dB(A)	35 dB(A)	30 dB(A)

Noise management levels for the proposed activity have been determined in accordance with the NSW ICNG described below and summarised in Table 4-7.

- Standard working hours - 10dB above background levels.
- Outside standard working hours - 5dB above background levels.
- Residences receiving noise levels over 75dB(A) during standard working hours are considered highly noise affected irrespective of the RBL.

Table 4-7 Noise management levels for the Development

Daytime NML (dB(A)) (RBL +10 dB(A))	Evening NML (dB(A)) (RBL +5 dB(A))	Night NML (dB(A)) (RBL +5 dB(A))	Highly Noise Affected Level (dB(A))
50 dB(A)	40 dB(A)	35 dB(A)	75 dB(A)

4.7.4. Potential noise impacts

The predicted noise level for the proposed work was calculated using the Transport for NSW Services' Construction Noise Estimator Tool (CNET). The following scenarios were modelled:

- Solar Farm Construction.
- Solar Farm Operation.
- Roadworks and truck movements.

Operational equipment is representative of the entire development (including some maintenance). Given the current noise environment of the highway and farming operations during daylight hours it is unlikely there would be considerable or discernible noise increase in the locality.

The road works and construction period would have the greatest potential for noise and there is potential that all the plant listed in Table 4-8 could be operating within the development site, however, the noise source would likely vary within the site depending on construction area and specific work occurring. The scenarios considered have predicted the 'worst case outcome' and assumed that all plant and machinery are operating continuously and concurrently.

Table 4-8 Construction equipment

Construction equipment	Sound power level (dB(A))	No. of units
Scenario: Construction		
Pile driving rig	87	3
Crane	78	1
Padfoot roller	84	3
Dump truck	85	2
30t excavator	85	2
Water truck	82	1
Bobcat tracked	73	2
Telehandler forklift	73	2
Scraper for topsoil stripping	85	1
Grader (access track construction)	88	1
Smooth drum roller (access track construction)	82	1
15t excavators for shallow trenches	85	2
Scenario: Roadworks (local)		
Bulldozer D9	91	1

Excavator (tracked) 35t	85	1
Chainsaw 4-5hp	89	1
Tub grinder/ mulcher 40-50hp	91	1
Front end loader	87	1
Scraper 651	85	1
Backhoe	86	1
Compactor	81	1
Dump truck	85	1
Road truck	83	1
Water cart	82	1

One representative location (R1) was chosen for the noise assessment due to proximity. As can be seen in Figure 4-8, R1 is located approximately 450m from the development site (construction and operation), truck movements and road works would occur directly opposite R1 (approximately 20m), and roadworks are proposed near R1. The results of the scenarios are provided in Table 4-9.

Table 4-9 Predicted construction noise levels

Approximate distance from the development	Daytime NML (dB(A))	Predicted Noise Level dB(A)*	NMLs Exceedance (dB(A))**	Description	Recommended additional mitigation measures***
Construction (standard hours)					
R1 – 450m	50	42	0	No exceedance	Not applicable
Operation (standard hours)					
R1 – 450m	50	37	0	No exceedance	Not applicable
Local roadworks (standard hours)					
R1 – 20m	50	69	19	Moderately intrusive**	Breaks (respite) from noise would be possible due to scheduling options for maintenance activities. Road works are temporary. Notification (phone call if possible and letter) of timing of works needed.

*** Noticeable 0 dB(A) above NML, Clearly audible = < 10 dB(A) above NML, Moderately intrusive = 10 – 20 dB(A) above NML, Highly intrusive = > 20 dB(A) above NML*

****Differences of 2dBA are indiscernible to the human ear*

It is unlikely that neighbouring properties would be impacted by noise during operation of the development. Receivers located more than 450m from the development would experience no exceedance of the daytime NML during operation or construction from noise made at the development site.

During construction receivers located directly adjacent to Norwood Lane would experience minor exceedance of up to 19dBA above the daytime NML due to road construction/upgrades and truck movements to and from the site along Norwood Lane. Noise exceedances, although audible, would be temporary and would be no greater than potentially experienced during harvest periods or during other road works in the area. Road works and frequency of heavy vehicle movements to and from the site would be managed as part of the traffic management plan and should incorporate delivery management and should consider noise impacts when scheduling deliveries. Deliveries by heavy vehicles would only be permitted within the approved hours of construction.

Vibration impacts dissipate with distance. Given the distance of 450m to the closest residential receiver (measured from the northern boundary of the subject land), vibration impacts are not expected for the proposed development.

4.7.5. Safeguards and mitigation measures

The proposed development is not expected to generate excessive noise; however, the following mitigation measures would be employed during road works:

- Time restrictions and/or providing periods of respite for near neighbours, where feasible and reasonable. For example, between 10am and 3pm, with a lunch break at 12pm. Alternatively, works may be undertaken as expeditiously as possible, to limit the duration of noise exceedances. Affected neighbours would be consulted to determine the best approach/ appropriate respite periods. The proposed arrangements are to be detailed in the Construction Environmental Management Plan (CEMP) and submitted to Council prior to commencement of works.
- Affected neighbours are to be notified of the road works and expected impacts at least 48 hours' before commencement.
- Traffic would be controlled to minimise speed, braking, and reversing of vehicles.
- Timing of deliveries would be scheduled to minimise noise disturbance where possible and provide respite as needed for dwellings directly adjacent to Norwood Lane.
- Avoid any unnecessary noise when carrying out manual operations and when operating plant.
- Any equipment not in use for extended periods during construction work should be switched off.
- Any complaints are to be resolved promptly via a Complaints Management System.

4.8. Cumulative impacts

The clustering of solar facilities in an area can result in efficiencies by sharing existing, or augmenting, electricity network infrastructure. However, grouping facilities in an area may:

- Reduce the availability and/or productivity of agricultural land.
- Result in landscape-scale visual impacts, due a concentration of built form in an area.
- Impact the area's biodiversity, habitat or wildlife, due to an overconcentration of built form.

The cumulative impacts of solar energy facilities on an area can be reduced by:

- Having a mix of land use activities including solar energy facilities in the area, providing the community an understanding of the impacts of such a development.
- Agrophotovoltaics — the dual use of a site with agriculture, maintaining a significant area of the subject land for farming.
- Having enough distance between solar energy facilities within an area to minimise or avoid environmental impacts and natural hazard risk exposure.

The closest solar facilities (constructed and approved) are:

- Constructed - Hillston Sun Farm, approximately 600m west from the development site. This project is connected to the HV 132kv transmission line.
- Approved - Daisy Hill Solar Farm, approximately 80m northwest from the development site. This project would be connected to the 33kv distribution network, as would the proposed development.

Despite proximity to the above solar facilities, the proposed development's siting minimises the potential built form cumulation or concentration. This is due to:

- Kidman Way providing separation avoiding continuous views or landscape visual impacts.
- The flat topography and quality screening provided by existing vegetation and proposed vegetation.
- Setbacks within the subject land away from the major road (Kidman Way) and rail line limiting views to glance views or indirect from line of travel views.
- Setbacks from near neighbours and limited traffic using Norwood Lane and established vegetation providing some immediate screening of the site.

Due to the small scale of the proposed development, it would not:

- Significantly reduce the availability and/or productivity of agricultural land because the land would be returned to agricultural land after decommissioning. During construction and operation, the land surrounding the development would continue to be available for agricultural purposes. There is significant land in the region to support agriculture as a primary strategic economic land use.
- Impact the area's biodiversity, habitat, or wildlife, because the impacts at site scale have been avoided and minimised as a priority, resulting in minimal to negligible impacts within the region.

The subject land would have a mix of land uses and maintain agricultural activities and has separation from solar energy facilities within the area avoiding or minimising environmental impacts and natural hazard risks as discussed in this SEE.

5. Statutory framework

5.1. Commonwealth legislation

5.1.1. Environment Protection and Biodiversity Conservation Act 1999

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) is administered by the Commonwealth. Under the EPBC Act, if the Minister determines that an action is a 'controlled action' then the action may not be undertaken without prior approval of the Minster.

Assessments of significance based on criteria listed in Significant Impact Guidelines 1.1 issued by the Commonwealth (Commonwealth of Australia 2013) are used to determine whether the proposed action is likely to have a significant impact (i.e. is likely to be considered a 'controlled action').

During the preparation of the Biodiversity Offset Strategy Evaluation (BOSE), see summary at **Error! Reference source not found.**, database searches and site surveys were undertaken to determine the presence and likelihood of impact to threatened species and communities.

Due to the low magnitude of the proposed works, Tests of Significance (ToS) were not required. Therefore, it is considered unlikely that the development will have a significant impact on threatened species and communities, migratory bird species and marine species listed under the EPBC Act.

5.2. State Legislation

5.2.1. Environmental Planning and Assessment Act 1979

The proposed development would be assessed under Section 4.2 of the Environmental Planning and Assessment Act 1979 (EP&A Act). This Statement of Environmental Effects report and supporting documentation addresses the matters to be considered under Section 4.15 of the Act.

The development is not considered to be integrated development. Specifically, the Council would also issue any Roads Act approvals and is therefore not considered to be integrated development for this purpose.

5.2.2. Biodiversity Conservation Act 2016

Development Applications (DAs) to be assessed under Part 4 of the *Environmental Planning and Assessment Act* must address the relevant requirements of the *Biodiversity Conservation Act 2016*.

The proposed development must be assessed in accordance with the provisions outlined in clause 7.2 of the BC Act, to determine whether the development is likely to significantly affect threatened species. According to clause 7.7(2) of the BC Act, if the proposed development is likely to significantly affect threatened species, the development application is to be accompanied by a BDAR. According to this clause, development is considered likely to significantly affect threatened species if:

(a) it is likely to significantly affect threatened species or ecological communities, or their habitats, according to the test in section 7.3, (5 part Test) or

(b) the development exceeds the biodiversity offsets scheme threshold if the biodiversity offsets scheme applies to the impacts of the development on biodiversity values, or

(c) it is carried out in a declared area of outstanding biodiversity value.

The proposed development would not trigger the BC Act thresholds. Further detailed assessment is not required according to the BC Act.

The accompanying BOSE, prepared by NGH, considers the biodiversity impacts of the proposed development. The proposed development would not significantly affect threatened species or ecological communities, or their habitats.

5.2.3. State Environmental Planning Policy (State and Regional Development) 2011

The proposed development is funded by the proponent and the calculated capital investment value (CIV) is approximately $16 million. According to Schedule 7 of the State Environmental Planning Policy (State and Regional Development) 2011, the development would be defined as private infrastructure development. The development has a CIV exceeding $5 million, and not exceeding $30 million and is therefore considered Regionally Significant Development.

The development application would be assessed by Carrathool Shire Council, whilst the determining authority is the Regional Planning Panel.

5.2.4. State Environmental Planning Policy (Transport and Infrastructure) 2021

The provisions of the State Environmental Planning Policy (Transport and Infrastructure) 2021 (TISEPP) are relevant to the proposed development. Under Section 2.36(1)(b), electricity generating works comprising solar as the fuel source are permitted with consent on land in prescribed non-residential zones.

2.36 Development permitted with consent

(1) Development for the purpose of electricity generating works may be carried out by any person with consent on the following land:

(a) in the case of electricity generating works comprising a building or place used for the purpose of making or generating electricity using waves, tides or aquatic thermal as the relevant fuel source—on any land,

(b) in any other case—any land in a prescribed rural, industrial or special use zone.

The development site is zoned RU1 Primary Production, which is a prescribed non-residential zone. According to Section 2.7 of the TISEPP, the above provisions prevail over any inconsistency in any other planning instruments, including the Carrathool LEP 2012. As such, the proposed development is permitted with consent under the provisions of the TISEPP.

2.48 Determination of development applications

Division 5 Electricity transmission or distribution, Section 2.48 Determination of development applications is also of relevance to the proposed development. The development is considered to affect an electricity transmission or distribution network. As such, the application must be referred by Council to the supply authority.

2.97 Development involving access via level crossings

The private level crossing would not be used for the purposes of the development. Section 2.97 is not considered to be relevant.

2.98 Development adjacent to rail corridors

The private level crossing would not be used for the purposes of the development. Section 2.98 is not considered to be relevant. The proposed development:

- Would not have an adverse effect on rail safety, as the development does not propose any works within or near the rail corridor, all traffic would use alternative access and there are no likely glare or visual impacts.
- Does not involve the placing of a metal finish on a structure and the rail corridor concerned is used by electric trains.
- Does not involve the use of a crane in air space above any rail corridor.
- Other than the connection point, is located greater than 5 metres from the overhead electricity power lines on site.

2.119 Development adjacent to classified roads

The subject land does not directly front a classified road (Kidman Way) as the rail corridor (Lot 3431 DP118938) lies between the subject land and the highway. No access is proposed directly onto Kidman Way. The provisions of Section 2.119 are not considered relevant to the proposed development.

The proposed development is not considered to be a traffic-generating development under Section 2.122 Traffic-generating development. The expected peak traffic movements, as listed in the Traffic Impact Assessment in Appendix D, would not exceed the thresholds outlined in Schedule 3 of the TISEPP, for Size or capacity—site with access to a road (generally) being 200 or more motor vehicles per hour. The project is expected to generate up to 50 vehicle movements per day during peak construction times, including 34 heavy vehicle movements.

5.2.5. State Environmental Planning Policy (Resilience and Hazards) 2021

Chapter 3 and 4 of the State Environmental Planning Policy (Resilience and Hazards) 2021 (RHSEPP) have been considered for the proposed development as follows:

Chapter 3 Hazardous and Offensive Development

Chapter 3 requires that consideration be given to the current circulars or guidelines relating to such development as published by the Department of Planning, when determining if the development is potentially hazardous or offensive.

Electricity generating works are not identified as a potentially offensive or potentially hazardous industry or storage facility in Appendix 3 of the Guidelines. However, this is not conclusive within itself. The potential hazard and offensiveness of the proposed development is discussed below.

All measures proposed to reduce or minimise its impact on the locality as shown on the plans, described in this SEE and as would be included in future management plans would minimise impacts and are not likely to have a significant adverse impact in the locality or on the existing or likely future development on other land in the locality. The preparation of a PHA is not considered to be required for the development.

Chapter 4 Remediation of Land

Chapter 4 requires the consent authority to consider whether land is contaminated, whether the land is in a suitable state for the proposed development and whether land requires remediation to reach a state that is suitable for that development.

The subject land has been used for agricultural activities, specifically, cropping. Agricultural activities are listed as a potentially contaminating land use activity according to Table 1 of the Managing Land Contamination Planning Guidelines. There may be a risk of contamination associated with cropping present on the site. No physical evidence of contamination was observed over the course of the site visits by NGH.

The proposed development is broadly consistent with the established activity pattern on the subject land, given the low intensity of operations that would occur. The proposed solar farm would be predominately constructed using vehicles and plant similar to existing farming machinery used. For operation the site would be remotely monitored for the most part, with staff dispatched as required for certain activities such as malfunction or emergency, or on a scheduled basis for routine site management or infrastructure monitoring and maintenance. The solar farm (energy generating facility) would not be considered a more sensitive land use than agriculture.

In addition to the low risk of residual agricultural contamination being present, the risk of exposure is considered low based on the proposed staffing arrangements and exclusion of public access from the site.

In consideration of these factors, it is considered that the site is suitable for the proposed purpose.

5.2.6. Roads Act 1993

Council is the roads authority for Norwood Lane. The proposed development includes upgrades to the existing access to Norwood Lane and proposes road upgrades to part of Norwood Lane.

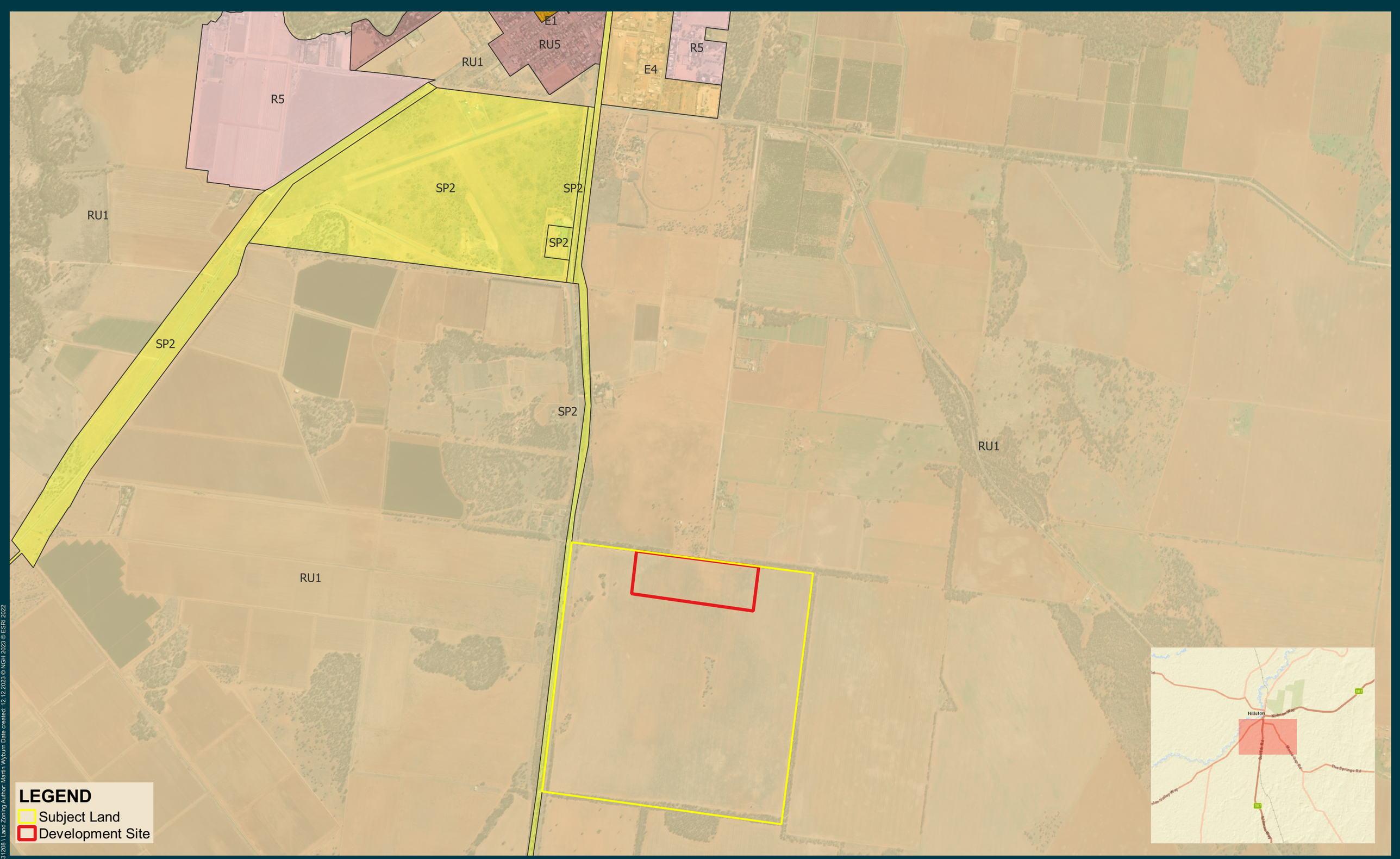
A permit under section 138 of the Roads Act would be sought from the Council prior to the release of the construction certificate for the proposed road and access upgrades.

5.3. Carrathool Local Environmental Plan 2012

The subject land is zoned RU1 Primary Production under the provisions of the Carrathool Local Environmental Plan 2012 (LEP), as shown in Figure 5-1.

5.3.1. Permissibility of the development

The proposed development would be defined as electricity generating works. Under the RU1 Primary Production land use table of the LEP, the development would be prohibited. The TISEPP provisions prevail over the LEP, refer to 5.2.4 for details, as such the proposed development is permitted with consent.



Datum: GDA94 / MGA zone 55

NGH

220605 Hillston Solar Farm

Land Zoning Map

5.3.2. Objectives of the zone

Section 2.3 of the LEP requires the consent authority to have regard to the objectives for development in a zone. As outlined in Table 5-1, the proposed development is not considered to be inconsistent with the objectives of the RU1 Primary Production zone.

Table 5-1 LEP RU1 Zone Objectives

RU1 Primary Production Zone Objectives	Comment
To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.	It is considered that the objective would be achieved. The development would not compromise the agricultural capability of the land for future use, nor would the development impinge on the ability to farm the subject or adjacent properties surrounding the solar farm. The impacts of the solar farm are considered broadly compatible with agriculture and would not introduce sensitive receivers that would cause concern farming practices for adjacent properties. Additionally, the development is not expected to have any significant impact on natural resources or affect the access to, or viability of, other natural resources in the locality.
To encourage diversity in primary industry enterprises and systems appropriate for the area.	The development would complement grazing and other existing agricultural activities on the subject land and adjacent properties. The development would not restrict development being applied for, as such, the objective would be achieved.
To minimise the fragmentation and alienation of resource lands.	It is considered that the objective would be achieved. The nature of the proposed development would not prevent access or use of resources on surrounding sites or the wider locality. Following the end of the life of the development, the land would be returned to a state suitable for use similar to current grazing activities.
To minimise conflict between land uses within this zone and land uses within adjoining zones.	Land adjacent to the development site is also zoned RU1. The proposed development is considered to be relatively passive. The impacts of the proposed development are compatible with the continued use of the surrounding area for agriculture. The development also has minimal impact on the residential developments located on the rural properties. It is considered that the objective would be achieved.
To facilitate farm adjustments.	Farming/agricultural practices on the land surrounding the development is expected to continue. The proposed development is not expected to restrict farm adjustments from occurring. After the projected 50-year operation period for the development, it is expected that it would be entirely decommissioned, or upgraded where possible. If decommissioned the land would be returned to agricultural use. It is considered that the objective would be achieved.
To enable agricultural support facilities to be carried out on land within the zone in a manner which does not significantly reduce the agricultural and	The development would not restrict development being applied for, as such, the objective would be achieved. Farming/agricultural practices on the land surrounding the development is expected to continue. The proposed development

horticultural production potential of land in the locality.	is not expected to restrict farm adjustments from occurring. After the projected 50-year operation period for the development, it is expected that it would be entirely decommissioned, or upgraded where possible. If decommissioned the land would be returned to agricultural use.
To encourage eco-tourist facilities and tourist and visitor accommodation that minimise any adverse effect on primary industry production and scenic amenity of the area.	The development is not for eco-tourist facilities or tourist and visitor accommodation. This objective is not applicable to the proposed development.

5.3.3. Section 5.10 Heritage conservation

The subject land is not within a heritage conservation area, does not contain an item of environmental heritage and is not within an Aboriginal place of significance.

5.3.4. Section 5.11 Bushfire hazard reduction

The development footprint is not mapped bushfire prone land. No clearing for the purposes of bushfire hazard reduction is proposed.

5.3.5. Section 5.21 Flood planning

The site has been identified as being subject to flood risk. As such, the proponent must demonstrate the proposed development complies with the objectives of Section 5.21 Flood Planning Provision. The Cumulus report has shown that the development:

- Is compatible with the flood function and behaviour on the land because of the location of the infrastructure outside of the areas of flow.
- Will not adversely affect flood behaviour in a way that results in detrimental increases in the potential flood affectation of other development or properties because of the location of the infrastructure outside of the areas of flow.
- 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 because an appropriate flood and evacuation management plan can be prepared prior to construction and could include early evacuation and site power down measures.
- Incorporates appropriate measures to manage risk to life in the event of a flood because an appropriate flood and evacuation management plan can be prepared prior to construction and could include early evacuation and site power down measures.
- Will not adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourses, because:
  - Of the site design including revegetation within the lease area.
  - A soil and water management plan if required could be prepared prior to construction.
  - The site has significant separation from riparian vegetation, riverbanks, and watercourses.

5.3.6. Section 6.1 Earthworks

The proposed development would involve minor earthworks during the construction phase associated with installing the solar array and ancillary infrastructure. Consent is being sought for the required earthworks.

Table 5-2 LEP Earthwork matters for consideration

Matters for consideration	Comment
The likely disruption of, or any detrimental effect on, drainage patterns and soil stability in the locality.	As outlined in 4.6.1 of this report, the proposed development is not expected to have a notable impact on stormwater runoff or infiltration patterns. The development would maintain and improve where possible the soil stability and water quality of stormwater leaving the site through civil works and erosion and sediment control measures designed specifically for the site conditions and through monitoring and maintenance of ground cover vegetation. With standard safeguards implemented, it is considered that soil stability would not be compromised by the proposed development.
The effect of the development on the likely future use or redevelopment of the land.	The proposed development is not expected to have any permanent impact on the likely future use or redevelopment of the land.
The quality of the fill or the soil to be excavated, or both.	The proposed development does not require the importation of fill material. Any excavated material would be minimal and would be used to backfill excavated trenches etc. There is no reason to suspect any concerns with the quality of the excavated material as it currently supports agricultural activity and would remain on-site.
The effect of the development on the existing and likely amenity of adjoining properties.	The SEE includes measures to minimise and avoid the potential impacts to amenity for adjoining properties. Construction phase impacts would be temporary and only occur during approved construction hours.
The source of any fill material or the destination of any excavated material.	The proposed development does not require the importation of fill material. Further, any excavated material would be minimal and would remain on-site.
The likelihood of disturbing relics.	There is low likelihood of disturbing relics or Aboriginal cultural heritage, the development can proceed with caution.
The proximity to, and potential for adverse impacts on, any waterway, drinking water catchment or environmentally sensitive area.	There are no waterways, drinking water catchments or environmentally sensitive areas in proximity to the proposed development site. The potential for flooding impacts and impacts to the mapped LEP wetland have been addressed in 5.3.8.

5.3.7. Section 6.3 Terrestrial biodiversity

The subject land is not mapped for Terrestrial biodiversity under the LEP.

5.3.8. Section 6.6 Wetlands

The subject land includes mapped wetlands under the LEP. The infrastructure except for fencing, is located outside of the mapped areas of sensitivity. The development is designed, sited, and would be managed to avoid any significant adverse environmental impact, including locating the infrastructure as much as possible outside the flood areas and natural water flows. Water quality and salinity impacts would not be envisaged to arise as a result of the proposed development.

According to the BOSE report (Appendix B), the proposed development would not have a significant impact on any native fauna and flora on the land; refer to earlier discussion regarding the clearing of not more than 0.21 ha of native vegetation and accordant impacts for any relevant threatened entities.

Figure 5-2 Carrathool LEP Wetlands Map (Source: NGH, 2023)

5.4. Other Relevant Section 4.15 Matters for consideration

Section 4.15 of the EP&A Act states that in determining a development application, a consent authority is to take into consideration other relevant matters. These matters are listed in the table below.

Table 5-3 Relevant s4.15 matters

Other relevant matters for consideration	
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…:	There are no known proposed instruments applicable to the development.
any planning agreement…:	There are no existing planning agreements applicable to the development.
the suitability of the site for the development…:	Based on the evidence provided and discussions in this report, the site is considered suitable for the development. The development would have positive social and environmental benefits through the wider contribution to renewable energy targets. The development would avoid adverse environmental impacts. The site can be returned to a suitable condition for the purpose of agriculture.
any submissions…:	The proponent has completed some public engagement and would consider any submissions made to Council during public notification.
the public interest…:	The public interest is supported with this DA as the development is in accordance with the publicly endorsed planning policies and guidelines. The development would not result in any significant adverse impacts and would minimise any changes to amenity for the surrounding community. The development would create positive economic impacts through the demand for goods, services and trades during the construction works given the estimated CIV of approximately $14 million. The development is also compatible with social objectives in terms of addressing climate change through renewable energy projects.

5.5. Ecologically Sustainable Development

Ecologically Sustainable Development (ESD) involves the effective integration of social, economic, and environmental considerations in decision-making processes. In NSW, the concept has been incorporated into legislation including the Environmental Planning and Assessment Act 1979 and Regulation and the Protection of the Environment Administration Act 1991.

Based on the likely costs and benefits of the proposed solar farm, the development is considered to comply with the principles of Ecologically Sustainable Development. ESD principles and their relationship to the design, construction and ongoing operations of the development are addressed in Table 4 6.

Table 5-4 Assessment of the development against the principles of Ecologically Sustainable Development

Principles of ESD	Assessment
(a) The precautionary principle—namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by: ***(i) careful evaluation to avoid, wherever practicable, serious, or irreversible damage to the environment, and*** ***(ii) an assessment of the risk-weighted consequences of various options.***	The impacts of the construction of the solar farm at the site are likely to be reasonably predictable and carry low levels of uncertainty and risk. Based on field assessments, the works would be unlikely to result in significant or irreversible environmental damage. The development would have an operational life of around 50 years and can be satisfactorily decommissioned. The precautionary principle has been observed in the assessment of impacts; all potential impacts have been considered and avoided or mitigated wherever possible where a risk is identified.
(b) Inter-generational equity—namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.	The proposed development is not expected to diminish long term ecological or biological resources or the agricultural productivity and future land use options at the site. At the end of the operating life of the solar farm, the above-ground infrastructure would be removed to restore land use potential, agricultural productivity, and land use options at the site. The development would provide a significant environmental benefit by producing sustainable energy, reducing the reliance on fossil fuels which threatens the well-being of current and future generations through climate change.
(c) Conservation of biological diversity and ecological integrity— namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.	Layout planning and mitigation measures have been adopted to avoid or mitigate any impacts which would affect the long-term viability of populations of all native species at and around the site, particularly threatened species and communities. The design of the proposed development has avoided the removal of paddock trees and minimised removal of other native vegetation. It is noted that climate change is a key global threat to many species and communities, and that the development would contribute to the abatement of carbon emissions from the electricity sector in Australia.
(d) improved valuation, pricing, and incentive mechanisms— namely, that environmental factors should be included in the valuation of assets and services, such as: *(i).* ***polluter pays—that is, those who generate pollution and waste should bear the cost of containment, avoidance, or abatement, and*** *(ii).* ***the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the***	The proposed development would provide for the increased penetration of renewable energy into the energy market. To date the environmental and social costs of electricity generation have not been fully measured or incorporated into wholesale or retail electricity pricing. The long-term external costs of carbon-intensive energy sources in terms of climate change in particular have not been factored into prices. However, photovoltaic solar plants produce approximately 40g CO2eq/kWh, while coal produces approximately 1,000g

use of natural resources and assets and the ultimate disposal of any waste, and *(iii).* ***environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.***	CO2eq/kWh (NREL 2012). This external cost differential is not reflected in electricity market prices. External costs are similarly not included in calculations of Levelised Cost of Electricity (LCOE) - the discounted lifetime cost of ownership and use of a generation asset expressed in cost per MWh. In terms life cycle energy consumption, the 'energy payback time' for PV modules has been estimated at two years for a solar installation.

6. Conclusion

The proposed Hillston Solar Farm meets the relevant provisions of the Carrathool Local Environmental Plan 2012. The SEE has addressed the requirements of Section 4.15 of the *Environmental Planning and Assessment Act 1979*. The development has taken into consideration environmental and amenity factors relevant for renewable energy facilities and the rural setting the development would be sited within.

The applicant commits to carrying out the development in accordance with the safeguards and mitigation measures outlined in this SEE. Overall, the development is expected to have minimal environmental and amenity impacts. The development would result in a positive impact for the community and local economy.

The development would provide the following benefits:

- Producing approximately 13,600MWh of renewable electricity per year.
- Supply enough power each year to service around 1,300 households.
- The BESS would aid peak energy needs and make more effective use of the energy generated.
- It would diversify income and increase revenue to ancillary services such as food, lodging and tourism for the local area during construction.
- It would create jobs – up to 40 staff on site at any time during construction (peak times) and up to 2 FTE staff during operation over the life of the development.
- The development is consistent with the Carrathool Local Strategic Planning Statement.
- The nature of the development would not negatively impact the character and amenity of the site and the adjoining land uses, specifically for dwellings in proximity to the development site.

This SEE and all supporting documents have shown that there are reasonable grounds for the Planning Panel to consider granting consent for the development.

Appendix A Development Plans set

Appendix B Biodiversity Assessment

Appendix C Due Diligence Assessment

Appendix D Traffic Impact Assessment

Appendix E Flood Risk Assessment

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