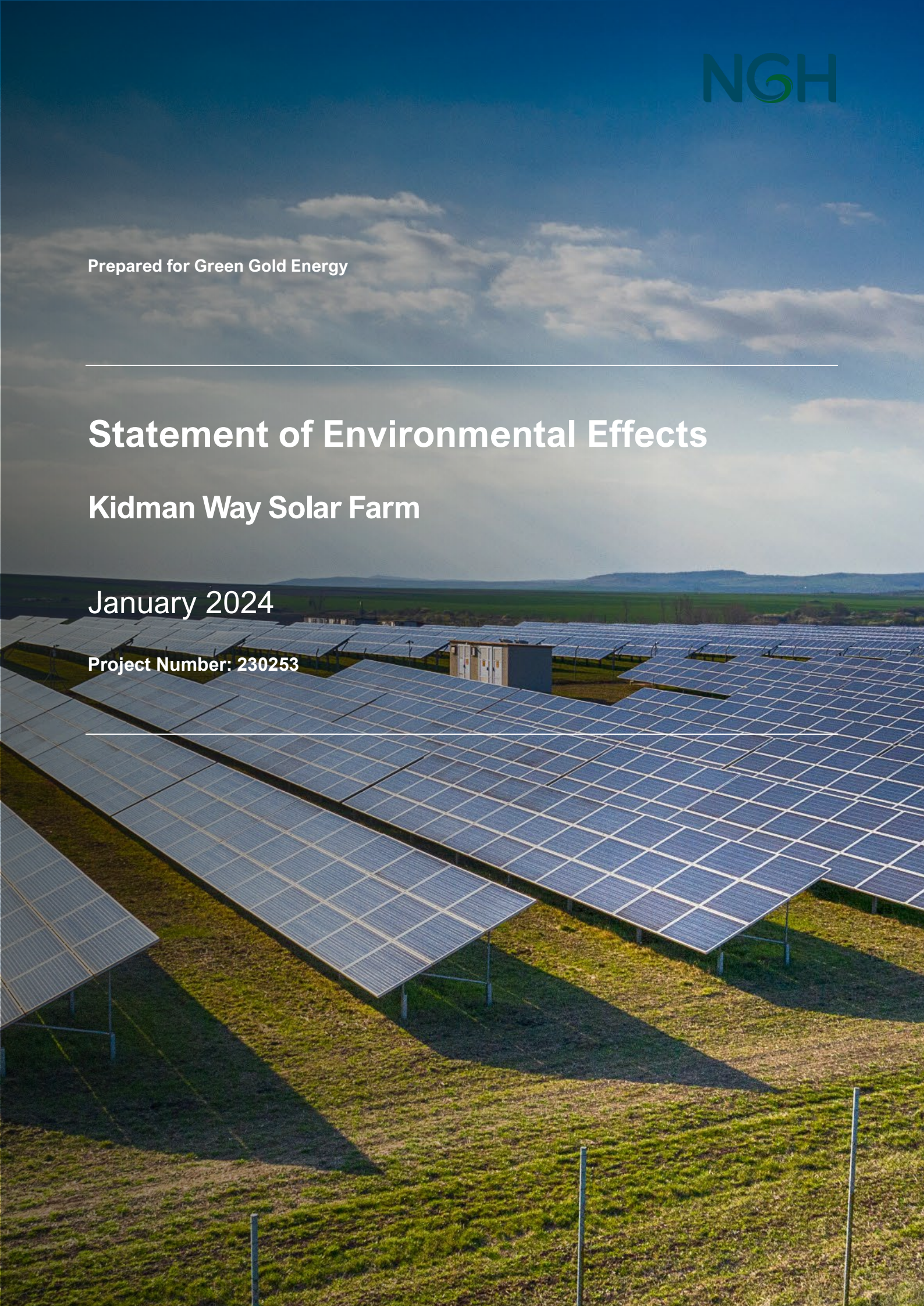


Prepared for Green Gold Energy

Statement of Environmental Effects

Kidman Way Solar Farm

January 2024

Project Number: 230253

Document verification

Project Title:	Kidman Way Solar Farm
Project Number:	230253
Project File Name:	230253 Kidman Way Solar Farm SEE Final V1.0.docx

Revision	Date	Prepared by	Reviewed by	Approved by
Draft V1.0	13/11/2023	A.Conley, M. Wyburn	S. Kurta	S. Kurta
Final V1.0	29/01/2024	A.Conley, M. Wyburn	S. Kurta	S. Kurta

NGH Pty Ltd is committed to environmentally sustainable practices, including fostering a digital culture and minimising printing. Where printing is unavoidable, NGH prints on 100% recycled paper.

Table of contents

Figures

Tables

Appendices

Acronyms and abbreviations

AHIMS	Aboriginal Heritage Information Management System
BC Act	*Biodiversity Conservation Act 2016* (NSW)
CLEP	Carrathool Local Environmental Plan 2012
Cth	Commonwealth
DPE	Department of Planning and Environment (NSW)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
EP&A Act	*Environmental Planning and Assessment Act 1979* (NSW)
ESD	Ecologically Sustainable Development
ha	hectares
km	kilometres
LEP	Local Environment Plan
LGA	Local government area
m	metres
MW	Megawatt
POI	Point of Interconnection
SEE	Statement of Environmental Effects
SEPP	State Environmental Planning Policy
TEC	Threatened ecological community

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 farm (the proposed development), at Kidman Way, Hillston.

The applicant, Green Gold Energy Pty Ltd (GGE), proposes the change of land use, construction, operation and future decommissioning of the solar farm within the western portion of Lot 1 DP626213 (the subject land). The proposed development would have direct access onto Kidman Way from an existing farm access track located along the northern boundary of the subject land.

The subject land has an area of 62.66 hectares (ha), whilst the proposed development site (footprint) would comprise an area of 12.35ha. About half of the subject land comprises remnant vegetation with generally exotic and weedy groundcovers, whilst the remainder (the proposed development site) has been historically cleared for cropping activities (Figure 1-1).

The proposed development (operational layout) would include:

- Use of the existing site access off Kidman Way including intersection treatment as necessary.
- Installation of solar infrastructure including approximately11,000 solar photovoltaic (PV) cells with a 4.95 MW export capacity on a ground-mounted tracking system of pole driven steel posts.
- Two inverter station, including the inverter and transformer.
- High voltage (HV) switchboard.
- A new power pole supporting an 33-kilovolt (kV) overhead powerline, with easement, running south from the HV switchboard to the proposed Point of Interconnection (POI). This is located along the southern boundary of the subject land, where there is an existing 33kV line.
- A fenced (security) enclosure, approximately 2 metres (m) in height around the solar farm, and security features such as closed-circuit television (CCTV) and lighting.
- Temporary site amenities and laydown area would be established during construction.

1.2. Subject land and locality, site selection and design

This development application relates to land identified as Lot 1 DP626213, addressed to Kidman Way, Hillston (referred to as the subject land within this SEE). The proposed solar farm would be located on the western portion of the subject land, which is void of native vegetation and has historically been used for cropping. There are no existing dwellings on the subject land.

This allotment is situated on the western side of Kidman Way, a State Highway through the western Riverina and outback NSW, from the Newell Highway near Jerilderie in the south through to Bourke in the north. There is an active freight rail line on the eastern side of Kidman Way.

The town of Hillston is located approximately 3.5km to the north of the subject land. The development site is surrounded by rural land that is used for a variety of agricultural activities such as wheat, cotton, fruit and wool production. 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 adjoins Hillston and is located

about 2.5km west of the subject land at its closest point. The Hillston Aerodrome is located 1.7km to the north of the subject land. The development site and surrounds are shown in Figure 1-2 and Figure 1-3 below.

The development site was selected based on analysis of landscape and topographical conditions (including solar characteristics); biodiversity values; agricultural values; distance from sensitive receivers, urban areas and designated growth areas, distance from other solar facilities; access to the electricity grid network; access to the road network; and the absence of hazards.

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 environmental effects of the proposed development.

Figure 1-1 View of the proposed solar farm site (currently a cropped paddock)

1.3. Applicant and land ownership

The applicant for the proposed development is Green Gold Energy Pty Ltd.

The landowner is C Yerbury. The applicant would enter a long-term lease arrangement with the landowner as needed.

1.4. SEE structure and supporting plans and documents

This SEE has been prepared by NGH Pty Ltd (NGH) on behalf of the applicant, GGE.

This SEE has been informed by the plans prepared by GGE as well as reports prepared by NGH and other specialist consultants.

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 on the following page.

Table 1-1 Accompanying plans and documents

Appendix	Title/Description	Prepared by
A	Development Design Plans	Green Gold Energy
B	Traffic Impact Assessment	Amber
C	Biodiversity Assessment	The Environmental Factor
D	Flood Risk Assessment	Cumulus Engineering
E	Background searches	NGH
F	Noise modelling results	NGH

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 proposed development would be funded by the applicant and the calculated Capital Investment Value (CIV) is approximately $5.7 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 to be Regionally Significant Development (RSD) where the CIV exceeds $5 million but is less than $30 million. Accordingly, the DA would be assessed by Carrathool Shire Council and referred to the Regional Planning Panel for determination.

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.

Further details are provided in section 4 of this report.

Hillston

Kidman Way

Lachlan Valley Way

Kidman Way

LEGEND

- Subject Land
- Development Site
- Development Footprint
- Roads

0 0.5 1 km

Datum: GDA94 / MGA zone 55

NGH

Kidman Way Solar Farm

Locality

Kidman Way

LEGEND

- Subject Site
- Development Site
- Road
- Access Road and Laydown area
- Development Footprint

Datum: GDA94 / MGA zone 55

NGH

0 0.1 0.2 km

Kidman Way 5MW Solar Farm

Subject Site

2. The development

2.1. General overview

The construction and operation of the solar farm is proposed approximately 3km to the south of the township of Hillston in the Carrathool Local Government Area (LGA). The subject site has historically been used for cropping (cotton, corn, and wheat) and livestock grazing. Surrounding area is predominantly rural land used for a variety of agricultural activities including similar cropping. The selection of the proposed development site has sought to avoid sensitive environmental features.

The proposed project would have a 5MW capacity, providing energy to the National Electricity Market (NEM) grid. Grid connection would be via a short overhead powerline connection directly south to the existing Essential Energy distribution line along the southern boundary of the subject land.

2.2. Proposed development (summary table)

Key features of the proposed development are summarised in Table 2-1 below. Note that component specifications are subject to further detailed design and final product selection subject to rapid technological improvements.

Table 2-1 Summary of Proposed Development

Element	Description
Development	Kidman Way Solar Farm
Capacity of the solar farm	6.15 MWp DC / 4.95 MW AC Note: the capacity is based on products and technology available at the time of the SEE but may change through the life of the solar facility as advances in technology occur.
Development site	Approximately 12 hectares solar farm infrastructure area.
Solar array	Approximately 11,178 solar PV cells (or panels) ground-mounted in rows on tracker tables and approximately 1,300 array posts.
Electrical infrastructure	2 x SMA2660HV-MV inverter station or similar, including the inverter and transformer. HV switchboard. Trenched cabling.

Grid connection infrastructure	New power poles supporting an 33kV overhead powerline, running from the HV switch board immediately south to the proposed Point of Interconnection (POI), where there is an existing 33kV line that runs in an east-west direction. The proposed connection works are shown on the development plans provided at Appendix A.
Temporary construction site compound	A laydown area (approximately 600sqm) would be established at the commencement of construction, containing control facilities, storage areas, temporary site office and portable amenities. This would be removed, and groundcovers reestablished after the completion of construction.
Fencing, CCTV, and lighting	Standard security wire mesh fencing installed around the site perimeter would be approximately 2m high. Security features such as CCTV and lighting would be installed on posts around the perimeter fence and on the main access track.
Landscaping	Landscape screening is not considered required based on the results of visual impact assessment.
Construction hours	Standard daytime construction hours would be 7.00am to 6.00pm Monday to Friday and 8.00 am to 1.00 pm on Saturdays. Construction would not occur on Sundays or public holidays.
Construction timing	Approximately 6-9 months.
Workforce	Construction – approximately 40 workers in total at peak construction; however, only 20 workers on site at any one time. Operation – 1 worker located off-site with occasional maintenance crews on-site of around 2 personnel.
Operation period	Up to 40 years.
Decommissioning	The site would be returned to a state suitable for agriculture. All above ground infrastructure would be removed to a depth of 1m, with some exceptions. The site would be rehabilitated in consultation with the landowner, consistent with future land use requirements.

Capital investment value	Calculated at approximately $5.7 million. A cost summary report has been provided in support of this application.

2.3. Construction phase

The construction phase is expected to last approximately 6-9 months. The main construction activities would include:

- Site establishment and construction of temporary facilities (fencing, ground preparation, upgrade of existing access points/intersections, preliminary civil works, and drainage, weed management).
- Installation of steel post and framing system for the solar panels.
- Installation of PV panels.
- Installation of underground cabling.
- Installation of substation equipment – power and inverter station.
- Removal of temporary construction facilities and rehabilitation of disturbed areas.

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 (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 around 20 at any one time.

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

Construction wastes would generally 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. 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 and would be diverted from landfill. This percentage is increasing as further recycling and reuse opportunities are developed as the industry advances in Australia.

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. This would not be discharged to the land.

Further details are provided in section 3.13 of this report.

2.4. Permanent infrastructure

2.4.1. Solar array

The solar facility is proposed to have a maximum output of 6.15MW DC / 4.95MW AC.

2.4.2. Solar modules/inverters/transformers/switching station

Approximately 11,178 solar modules are proposed for installation in approximately 1,300 mounting structures forming the solar arrays for the facility.

Two Sungrow SMA2660HV-MV inverters (or similar) would be installed centrally within the solar array.

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. The SVG would be connected to the MV switchgear to provide reactive power compensation into the grid.

2.4.3. Onsite cabling, distribution line, and external connection

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

The inverter 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 running east-west along the southern boundary of the subject land. The Point of Interconnection (POI) would be to a new power pole adjacent the southern boundary of the subject land, as shown on the development plans provided at Appendix A.

2.4.4. 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 to a height of 2.4m around the perimeter fence and on the main access track.

2.4.5. 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 3,000 kilolitres of water would be required during construction, mostly for dust suppression, but also for cleaning, concreting and on-site amenities. 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 2-2.

Table 2-2 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
Grader (access track construction)	1
Smooth drum roller (access track construction)	1
15t excavators for shallow trenches	2

2.4.6. Personnel and work hours

At the peak construction period, the solar farm is expected to require approximately 40 workers. Where workers are non-local, they would be encouraged to use accommodation within the local area.

Construction activities would be undertaken during standard construction hours:

- 7.00 am to 6.00 pm Monday to Friday,
- 8.00 am to 1.00 pm on Saturdays.
- No work on Sundays or public holidays

Construction activities would be restricted to the hours indicated above, construction required outside of these hours would only be undertaken 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.

2.5. Operation phase

2.5.1. General 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.
- Pest plant and animal management and control, as required.

2.5.2. 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 if replacement of large or numerous components is required.

2.5.3. Water use

As discussed in 2.4.5, 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 during construction would be provided for staff using imported supplies.

During operation, regular panel cleaning is typically not necessary, depending on prevailing weather. Should it be 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.

2.5.4. 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.

2.5.5. Lighting

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

2.5.6. Refurbishment and upgrading

The solar farm operator may replace or upgrade solar panels or other infrastructure, within the existing development site during the projected minimum 40-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.

2.6. Decommissioning and rehabilitation

At the time of decommissioning, the site would be returned to its pre-developed state. 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. All areas of soil disturbance would be rehabilitated during decommissioning, consistent with land use requirements.

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. Decommissioning would be carried out in accordance with best practice or the prevailing legislative requirements at the time of decommissioning, in approximately 40 years. 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.

2.7. Justification for the proposed development

2.7.1. Strategic need

National renewable energy targets

Renewable energy currently contributes to 21 percent of total electricity generation in Australia (0.8 percent of which is generated by large-scale solar PV) and represents the lowest-cost type of new energy generation that can be constructed (CEC, 2019).

The proposed development would support long term and stable energy policies such as the Renewable Energy Target (RET) identified in **Australia's whole-of-economy Long-Term Emissions Reduction Plan** (LTERP) (Australian Government Department of Industry, Science, Energy and Resources, 2021).

LTERP identifies that solar, wind and other renewable technologies are being installed at a world-leading rate and would provide over half of Australia's total generation by 2030. Solar will lead the way for the share of renewables to be the foundation for a near zero emissions grid by 2050.

Additionally, solar farms such as this provide an alternative power generation source resulting in the potential to benefit the Australian community by reducing average household electricity bills and power disruptions.

Specific to Australia's commitments, the proposed development would provide the following benefits:

- Reduced greenhouse gas emissions, contributing to meeting our international climate commitments.
- Aid the transition towards cleaner electricity generation.
- Direct contribution to help in meeting the RET.

NSW goals and policies

Various NSW goals and strategies are guided by the overarching **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. The proposed development aids in meeting the net-zero emissions by the 2050 target.

The NSW Net Zero Plan Stage 1: 2020-2030 is the foundation for NSW's action on climate change and goal to reach net zero emissions by 2050.: It sets out how the NSW Government will deliver on objectives and is focused on the short term, because rapid changes in technology make identifying the lowest cost path to net zero difficult.

The Net Zero Plan notes the extended period of change the national electricity system is undergoing, as existing power stations retire, and new forms of generation come online. The NSW Government is committed to ensuring consumers are provided with reliable and affordable electricity during this time, while also protecting the environment.

The proposed development would contribute approximately 12,000 MWh each year to power around 2,000 average NSW households (based on average annual consumption of 5,662 MWh). If this displaces NEM-average emissions intensity of 820kg/1000MWh, then the project will abate approximately 9,840 tonnes of

C02-e emissions annually. The subject land has been carefully selected for the proposed development and avoids sensitive environmental features entirely.

The **NSW Electricity Infrastructure Roadmap**, builds on the 2019 NSW Electricity Strategy and the 2018 NSW Transmission Infrastructure Strategy, and outlines the plan to transition the electricity sector to cheaper, cleaner and more reliable. Enabled by the *Electricity Infrastructure Investment Act*, 2020 (EII), the Roadmap aims to:

- Achieve the target of zero net emissions by 2050.
- Attract up to $32 billion in private investment for regional energy infrastructure by 2030.
- Support the private sector to deliver at least 12 gigawatts of renewable electricity generation.
- Support an estimated 9,000 jobs, mostly in regional NSW.

The proposed development would support the aims of the Roadmap.

The NSW Government's **Electricity Strategy** aims to:

- 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 developments 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 when they arise.

The proposed development 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 proposed to local employment and economy is set out in this SEE.

Riverina Murray Regional Plan 2041

The proposed development would contribute to the realisation of the vision for the Riverina Murray, specifically that:

- 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 proposed 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.

Carrathool Shire Council's Local Strategic Planning Statement 2040

The Carrathool Shire Council's Local Strategic Planning Statement 2040 (LSPS) states:

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 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."*

As foreshadowed in the LSPS, the Carrathool Shire is host to important transmission lines, substations and infrastructure. According to the LSPS, the Shire is keen to play its role in the transition to net zero by attracting investment in renewable energy projects, such as the proposed development.

Through detailed analysis and thoughtful site selection and design, the proposal avoids land use conflicts in agricultural land, avoids impacts on native vegetation and is well shielded from surrounding residents. It therefore balances the LSPS goals around attracting renewable energy whilst protecting important values to the Carrathool Shire community.

2.7.2. Socio-economic benefits

Broader benefits

Benefits that would be associated with the proposed development include:

- Reduced GHG emissions, assisting 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 12,000 MWh of renewable electricity per year.
- Supply enough power each year to service around 2,000 average NSW households (based on average annual consumption of 5,662 MWh).

Local benefits

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

The development would support 40 direct jobs over the peak construction period, and 1 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.

Benefits for the landowner

The development provides diversification of land use and economic benefits for the farmer. G would continue around the solar farm, during the construction and operation. The land would be rehabilitated and returned to productive cropping, post decommissioning

3. Site and environmental analysis

3.1. Site analysis

Potential development sites for small scale solar farms are identified through detailed analysis across the whole of New South Wales. The location and scale of this proposed development has been influenced by the following matters:

- Demand for new renewable electricity generation to meet generation targets.
- Commercial investment and viability considerations.
- Electricity grid capacity.
- Site accessibility.
- Landscape and topographical conditions (including solar characteristics)
- Environmental constraints on the subject land.
- Location of surrounding receptors.
- Landholder interest and availability of land for long-term lease.

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

Small scale solar farms have many advantages compared with utility scale projects and form an important part of the Australia's legislated transition to a 43 percent reduction in emissions by 2030 and Net Zero by 2050. Small-scale solar farms can more easily be accommodated by the existing electricity network and located close to the consumption centres as is necessary for greatest benefit.

3.2. Subject land

This development application relates to land described as Lot 1 DP626213, addressed to Kidman Way, Hillston (this is the land referred to as the subject land within this SEE). The subject land is generally rectangular in shape and comprises approximately 62 hectares, whilst the proposed development footprint would be around 12 hectares of the total site.

The land is situated on the western side of Kidman Way, a State Highway through the western Riverina and outback NSW, from the Newell Highway near Jerilderie in the south through to Bourke in the north. The proposed solar farm would use an existing access road to that connects to Kidman Way along the northern boundary (Figure 3-1). The Kidman Way is a two-way sealed highway with one lane in each directly.

The proposed solar farm would be located on the western portion of the subject land, which is void of native vegetation and has historically been used for cropping (Figure 3-2). There are no existing dwellings on the subject land. The eastern portion of the land comprises of remnant native vegetation, mostly PCT 15 Black Box open woodland wetland with chenopod understorey and PCT 105 Poplar Box grassy woodland on flats and this area also comprises floodplain wetlands during major flood events and/or periods of heavy rainfall. A man-made drainage channel is located along the western boundary. The subject land is generally considered flat in nature, with a subtle fall from a sand hill on the western side of the site to a lower point on the eastern side of the site (refer Figure 3-8).

The development site has a rural open character with limited views across a generally flat landscape, where remnant native (generally Black Box) vegetation comprises a reasonable proportion of the landscape in the vicinity of the proposed development site. The site is well screened from the east, north, south and majority of the west by existing vegetation. Changes in landform and distance to potential receivers to the west are sufficient to minimise visual impacts.

Figure 3-1 View along the internal access road towards Kidman Way

Figure 3-2 View of the cropped paddock, the proposed solar farm site

Figure 3-3 View of the cropped paddock, the proposed solar farm site

Figure 3-4 View along the southern boundary of the site where the solar farm would connect to existing powerline

Figure 3-5 View across typical vegetation in the eastern portion of the subject land

Figure 3-6 View south to neighbouring Hillston Sun Solar Farm

Figure 3-7 View east to neighbouring Essential Energy zone substation

3.3. Surrounding area and land use character

Directly south of the subject land is the established Hillston Sun Solar Farm, which is understood to have a capacity of approximately 85MW. Land to the east includes cropping land including some irrigated crops. Land to the north is also rural in nature and appears to be used for grazing. To the east of the subject land is an existing substation owned by Essential Energy (Figure 3-7). The Kidman Way also forms the eastern boundary of the site (Figure 3-9). Similar agricultural practices and ancillary farm dwellings are located on adjacent properties within the RU1 Primary Production zone.

An approved (yet to be constructed) solar farm, referred to as the Daisy Hill Solar Farm is located further to the northwest of the development site, off Norwood Lane. This is understood to comprise of two x 5MW solar farms together. Essential Energy transmission and distribution powerlines are also present in the landscape, which service the Hillston Sun Solar Farm, would serve the approved Daisy Hill Solar Farm and the subject proposal.

A freight rail line is located on the opposite side of the Kidman Way. The Hillston cemetery, aerodrome and showgrounds are located approximately 3km to the north of the development site, with the Hillston township located beyond.

Hillston

Kidman Way

Lachlan Valley Way

Kidman Way

LEGEND

- Subject Land
- Development Site
- Development Footprint
- Roads

0 0.5 1 km

Datum: GDA94 / MGA zone 55

NGH

Kidman Way Solar Farm

Locality

Figure 3-9 View along the Kidman Way from frontage of the site

Figure 3-10 Irrigated cropping on neighbouring land to the west

Figure 3-11 Typical landscape views in the area

Figure 3-12 View of Essential Energy substation from the Kidman Way

3.4. Access and traffic

A Traffic Impact Assessment (TIA) has been prepared for the proposed development, by Amber Organisation. The assessment has been summarised below and is appended in full in Appendix B.

3.4.1. Existing conditions

The proposed development would use an existing farm access road along the northern boundary of the site, as indicated in . The internal access road approximately 750m in length, between the proposed solar farm and the Kidman Way. The existing access road continues to be built up and graded every few years to enable suitable access, consistent with normal farming practices in area, in response to general wear and any overland flow impacts from time to time. The existing access road comprises an unsealed carriageway, approximately 5m in width.

The existing access road intersects with the Kidman Way approximately 3km south of the township of Hillston. The Kidman Way is approximately 7.0m wide two-lane carriage way (one in each direction) and has a speed limit of 100km/hr. It runs generally north-south across NSW, from the Newell Highway near Jerilderie in the south through to Bourke in the north. The Kidman Way (in the vicinity of the subject land) is under the management of Transport for NSW (TfNSW).

Traffic volumes for the TIA were taken from the Kidman way 100m south of Griffith Road, Hillston, collected in 2006 and represented traffic volumes of 581 vehicles per day (vpd) with an estimated current volume of 760vpd. Overall, the results indicate the surrounding road network currently accommodates a low level of traffic for the respective road classifications and is able to accommodate an increase in vehicle movement. The Kidman way is an approved 25/26m B-double Route. Travel conditions for this road are outlined in the TIA.

3.4.2. Potential impacts

Construction

Table 3-1 Anticipated traffic volumes and types during construction phase (Source: Amber, 2023)

Vehicle type	Vehicle size	Average vehicle movements per day		Peak vehicle movements per day	
		Daily (vpd)	Peak Hour (vpd)	Daily (vpd)	Peak Hour (vpd)
Light Vehicle	Light Vehicle (car/4wd)	20	10	40	20
Heavy Vehicle	MRV/HRV	4	0	6	0
	AV/B-Double	2	0	4	0
Total		26	10	50	20

Broadly, the proposed development is expected to generate approximately 20 vehicle movements during the morning and evening peak hours during the peak construction period, reducing to 10 vehicle movements over the typical construction periods. No oversize or overmass (OSOM) vehicles would be necessary for the proposed development.

According to the TIA and assessment against the RTA Guide to Traffic Generating Developments, there are no expected impacts on the Level of Service for Kidman Way users as a result of the proposed development. Additionally, the proposed development is not envisaged to result in cumulative traffic impacts, given approved projects in the area and the available capacity of the Kidman Way.

Operation

During operation, the proposed development would generate minimal traffic associated with maintenance and operation services. The solar farm is expected to be operated by up to 2 staff resulting in up to 4 vehicle movements per day, involving negligible change to traffic environment. There would also be occasional light commercial vehicles delivering parts to the site as required for maintenance. The TIA considers the operational phase of the proposal would have negligible impact on the traffic environment in the area.

Route assessment

The access routes from Port (both Port Botany and Melbourn have been assessed) utilise roads that are designated for B-Double vehicles as outlined within the TfNSW Restricted Access Vehicle Map and Vic Roads Heavy Vehicle Map. Whilst the Kidman Way and other state roads in the area are not affected, it is noted that other land surrounding Hillston is designated by TfNSW an *Approved Area with Travel Conditions* (Figure 5 of the TIA).

The TIA concluded that the surface and widths of the proposed haulage roads are suitable to accommodate the future light and heavy vehicle traffic volumes generated by the proposed development.

Intersection assessment

The intersection of the internal access road and the Kidman Way would require a Basic Right Turn (BAR) and Basic Left Turn (BAL) treatment, with the proposed indicative layout provided in the TIA Appendix A. The requirement to provide turn facilities at the intersection of Kidman Way and the unnamed road is primarily generated during the morning peak hour when staff would access the site form 6:00 am to 7:00 am.

A Safe Intersection Sight Distance (SISD) assessment was conducted via site inspection by Amber Organisation. Given Kidman Way has a speed limit of 100km/hr, a design speed of 110km/hr was adopted, which required SISD of 300m based on a 2.5 second reaction time. The image extracted below from the TIA show the clear sight distance from the position of a driver approaching the site from each direction along Kidman Way. Accordingly, vehicles are expected to be able to safely access the Kidman Way from the proposed access point and the requirements for SISD are met.

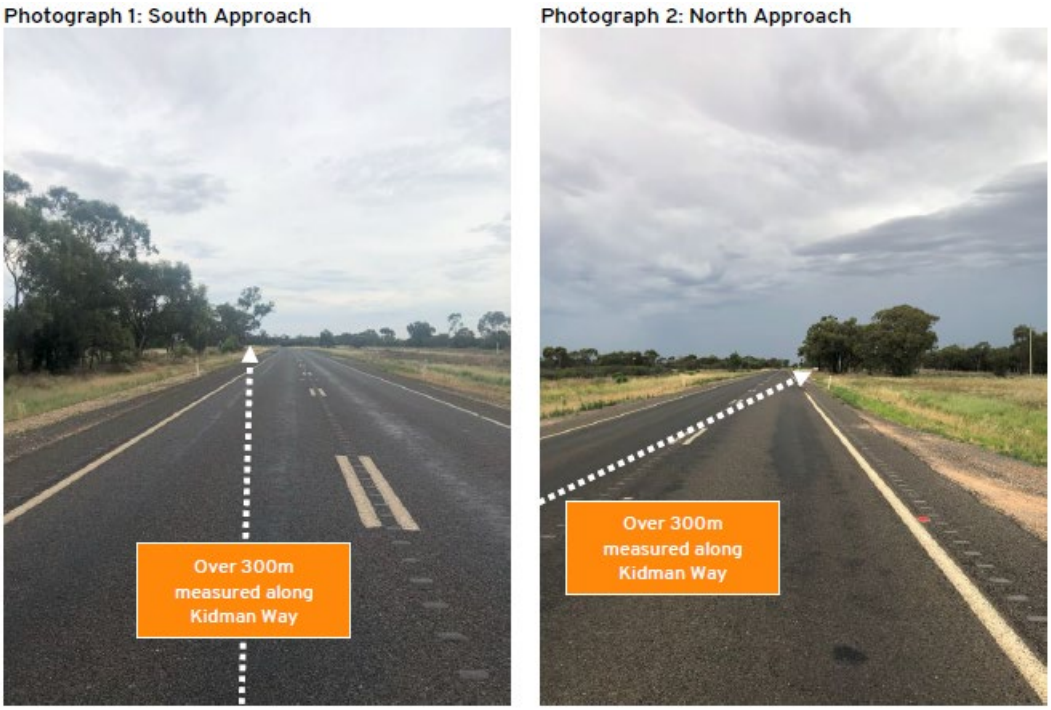


Figure 3-13 SISD assessment for south bound and north bound approach to the site (Source: Amber, 2023)

Internal access road

The traffic volumes along the internal access road during peak construction are expected to be less than the recommended loading for gravel roads. Unsealed roads would typically be considered for sealing when they accommodate between 200 and 500 vehicle movements per day. Given the expected traffic volume on the unsealed internal access road is in the order of 40 vehicles per day and the increase in traffic is only temporary it is considered acceptable to remain unsealed. The internal access road would be regularly surveyed and managed with a water cart if necessary.

The access point to Kidman Way would be sealed as indicated in the TIA Appendix A, to ensure no adverse impacts on the condition of the state road and its users.

The TIA concluded that the surface and width of the internal access road is suitable to accommodate the future light and heavy vehicle traffic volumes generated by the proposed development.

3.4.3. Conclusion and mitigation measures

The proposed development site was specifically identified for its accessible location. It avoids the use of local or rural roads and associated nearby dwellings. The proposed development is also set back from the road and would not be discernible to road users.

However, the use of an existing access point to the Kidman Way, a state road, and the anticipated vehicle movements generated does create a requirement to upgrade the proposed intersection with the Kidman Way to ensure user safety and continued functioning of the state road.

The proposed development would involve mitigation measures to avoid and minimise traffic impacts. Foremost, this would include the provision of a Basic Right Turn (BAR) and Basic Left Turn (BAL) treatment

generally in accordance with the proposed layout provided in the TIA Appendix A and subject to the requirements of TfNSW.

A Construction Traffic Management Plan (CTMP) would be prepared for the proposed development prior to construction. The full list of recommended measures is provided in the TIA; however, the CTMP would generally address the following matters:

- Notification to neighbours if traffic control is required and may disrupt access.
- Management and coordination of the timing of heavy vehicle movements.
- Loading and unloading areas.
- All vehicles to enter and exit the site in a forward direction.
- Utilisation of only the designated transport rules
- Proactive management of roads, hardstands and laydown areas.
- Obtaining all relevant road permits from the relevant authority.

As summarised above and detailed in the TIA accompanying this application, the proposed development would have an acceptable impact on the road network and associated users.

3.5. Biodiversity

A Biodiversity Assessment (Preliminary Biodiversity Assessment Report – PBAR) was prepared for the proposed development by The Environmental Factor. It is summarised below and included in Appendix C of this report.

3.5.1. Approach

A desktop assessment was initially undertaken to determine the threatened flora and fauna species, populations and ecological communities listed under the *Biodiversity Conservation Act 2016* (BC Act) and *Fisheries Management Act 1994* (FM Act), and Matters of National Environmental Significance (MNES) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), that could occur in the area based on previous records, known distribution ranges and habitats present. Relevant databases and literature were reviewed as outlined in section 4 of the PBAR.

Site assessment was conducted across two site visits in June and October 2023. The site assessment included ground-truthing of mapped vegetation communities, flora transect surveys, incidental fauna recording, identification of habitat values and assessment of the connectivity, composition and quality of vegetation (particularly the percentage of native groundcover and understory stratum to determine impact areas contributing to the BOS clearing threshold).

The assessment and reporting was conducted by a Biodiversity Assessment Method (BAM) Accredited Assessor and other qualified ecologists from The Environmental Factor.

3.5.2. Existing conditions

The assessment considered the prevailing land use to be agricultural paddocks, with scattered stands of native vegetation and species habitat in the surrounding area. The subject land was considered to comprise of a relatively large patch of remnant woodland in the eastern portion, with the remainder being a cleared and sown agricultural paddock (of cereal crops and some weeds) surrounded by small sections of partially cleared woodland contained to the property boundaries. No waterways, wetlands or soaks were considered present; however, an irrigation channel was noted along the western boundary of the land as well as evidence of periodic inundation on existing trees.

Native vegetation covers the eastern side of the site, which was identified and classified as PCT 15 Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains (dark purple layer in Figure 3-19) and associated derived native grassland (DNG) (light purple layer).

PCT 105 Poplar Box grassy woodland on flats was also identified including three condition types, a derived native grassland (lightest green layer), a woodland component (mid green layer) and a woodland component conforming to the EPBC Act Threatened Ecological Community (TEC) listing (darker green layer), Poplar Box Grassy Woodland on Alluvial Plains (Poplar Box Woodland). Around 23ha of the TEC was identified as present across the subject land.

The proposed development footprint would be in the western portion of the site, largely comprising an area of non-native vegetation.

A total of ninety-one (91) flora species were recorded both incidentally and within the vegetation integrity plots (flora plots) undertaken across the site. Species composition consisted of fifty-eight (58) native species and thirty-three (33) exotic species. No threatened flora species were recorded or were considered likely to occur owing to historic clearing and current disturbances associated with the site's agricultural land use.

A total of thirty-two (32) fauna species were incidentally recorded during the surveys. This included thirty (30) native bird species, including Galah (*Eolophus roseicapillus*), Australian Ringneck (*Barnardius zonarius*) and Noisy Miner (*Manorina melanocephala*), one (1) native mammal (Eastern Grey Kangaroo; *Macropus giganteus*) and one (1) native reptile (Eastern Brown Snake; *Pseudonaja textilis*). The site contained a high diversity and abundance of native fauna with evidence of bird activity primarily within the remnant woodland patch in the east of the subject land.

Three (3) species of threatened fauna were recorded within the subject land during field surveys. Nine (9) Grey-crowned Babbler (*Pomatostomus temporalis temporalis*) individuals and two (2) Major Mitchell Cockatoo (*Lophochroa leadbeateri*) were recorded within the large remnant woodland patch in the eastern portion of the subject land. Eight (8) White-fronted Chats (Epthianura albifrons) were observed foraging and flying within agricultural land and along the irrigation channel along the western boundary.

Figure 3-14 PCT 15 Black Box open woodland within the subject land (Source: The Environmental Factor, 2024)

Figure 3-15 PCT 105 Poplar Box grassy woodland within the subject land (Source: The Environmental Factor, 2024)

Figure 3-16 Non native vegetation comprising most of the proposed development footprint (Source: The Environmental Factor, 2024)

Figure 3-17 Native vegetation in the area of the proposed overhead powerline connection (Source: The Environmental Factor, 2024)

3.5.3. Potential Impacts

Impacts to threatened species considered likely to occur, consisting of Brown Treecreeper (eastern subspecies) (Climacteris picumnus victoriae), Diamond Firetail (*Stagonopleura guttata*), Superb Parrot (*Polytelis swainsonii*), Turquoise Parrot (Neophema pulchella), White-fronted Chat (Epthianura albifrons) and Grey-crowned Babbler (Pomatostomus temporalis temporalis) were assessed pursuant to Section 7.3 of the BC Act (5-part test). The assessment determined the proposed development would be unlikely to have a significant impact on threatened biota.

The subject land comprises a total area of 62.66 ha with a total direct impact area of 12.35 ha. This includes impacts to 11.27 ha of entirely non-native vegetation, comprised of sown cereal crop and exotic weeds and 0.01 ha of native vegetation (PCT 15 Black Box open woodland).

The minimum lot size for the subject land is 40 ha; subsequently the clearing threshold according to the provisions of the BC Act, the for the site based on the minimum lot size, is 0.5 ha. The proposed development would result in the removal of 0.01 ha of native vegetation. Subsequently, as per the requirements of the BOS, the clearing threshold for native vegetation would not be exceeded by this proposed development.

No areas of high biodiversity as identified on the Biodiversity Values Map (BVM) occur within the subject land, therefore no impacts to mapped BVM areas would occur as a result of the proposed development. Additionally, as the development would not impact significantly on any threatened species, ecological communities or their habitats occurring within the subject land, it is determined that participation in the BOS will not be required.

3.5.4. Conclusion and mitigation measures

The proposed development site was specifically identified for its lack of native vegetation and habitat values and therefore negligible biodiversity impact. The proposed development would generate no Biodiversity Offsets Scheme (BOS) obligation under the BC Act due to its low impact.

In response to constraints assessment, the proposed solar farm infrastructure has been constrained to that portion of the site containing only non-native vegetation. This is with the exception of an essential overhead powerline connection that is unable to avoid clearing of 0.01 ha of native vegetation due to Essential Energy connection parameters and requirements; however, avoids the higher value native vegetation within the subject land.

The following mitigation strategies were recommended to further mitigate or manage impacts of the proposed development:

- Clearly demark the approved area for clearing.
- Communicate to all contractors the area for clearing and other biodiversity controls.
- Proactive pathogen, weed and pest management.
- Preclearance surveys are recommended to be undertaken prior to removal of any native vegetation or habitat on the site and the presence of a fauna spotter during the removal. Where possible, vegetation removal should occur outside of key breeding seasons.
- Erosion, sediment and contamination control during construction.

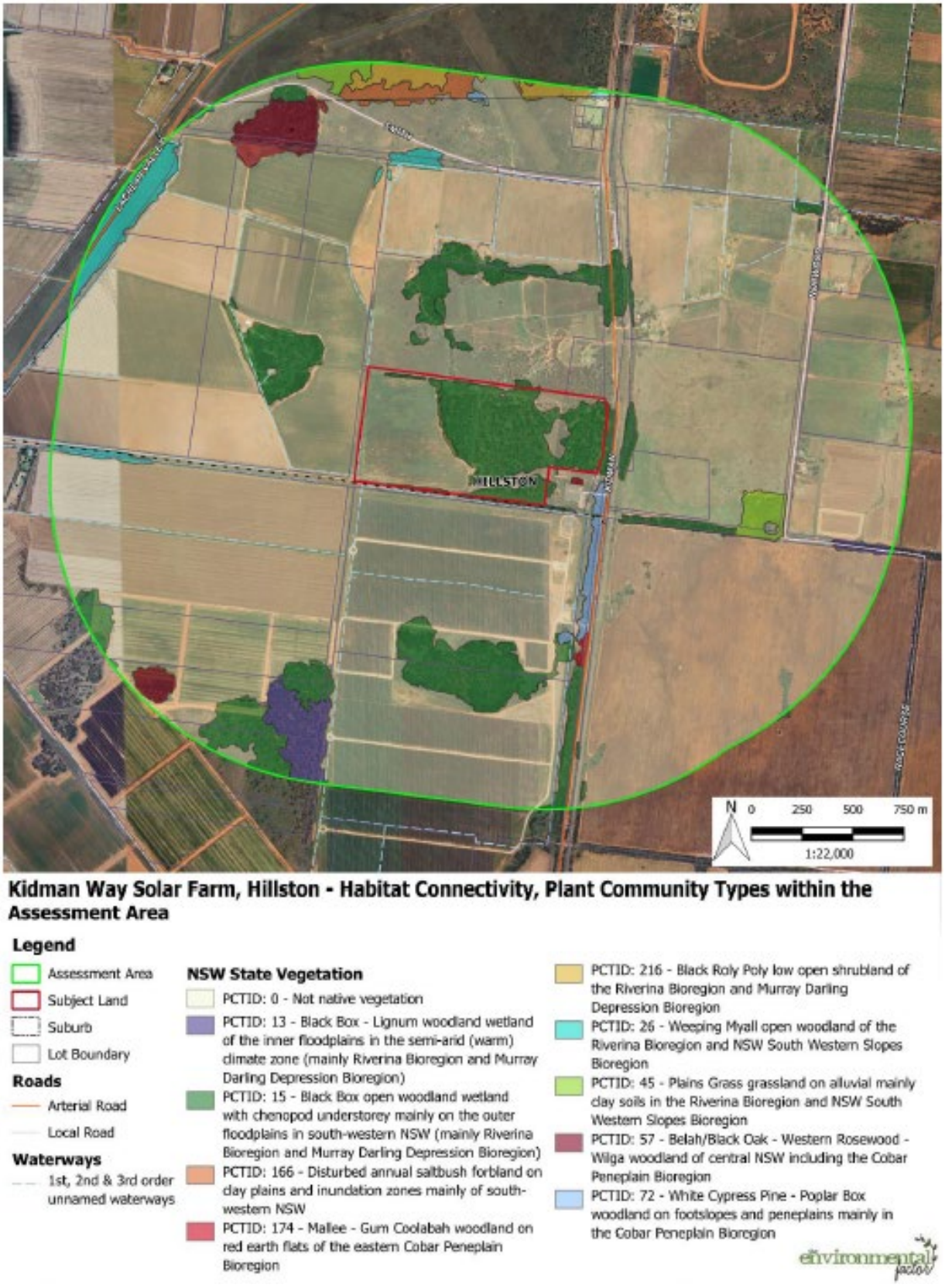


Figure 3-18 Plant Community Types (PCT) in the wider investigation area (Source: The Environmental Factor, 2024)

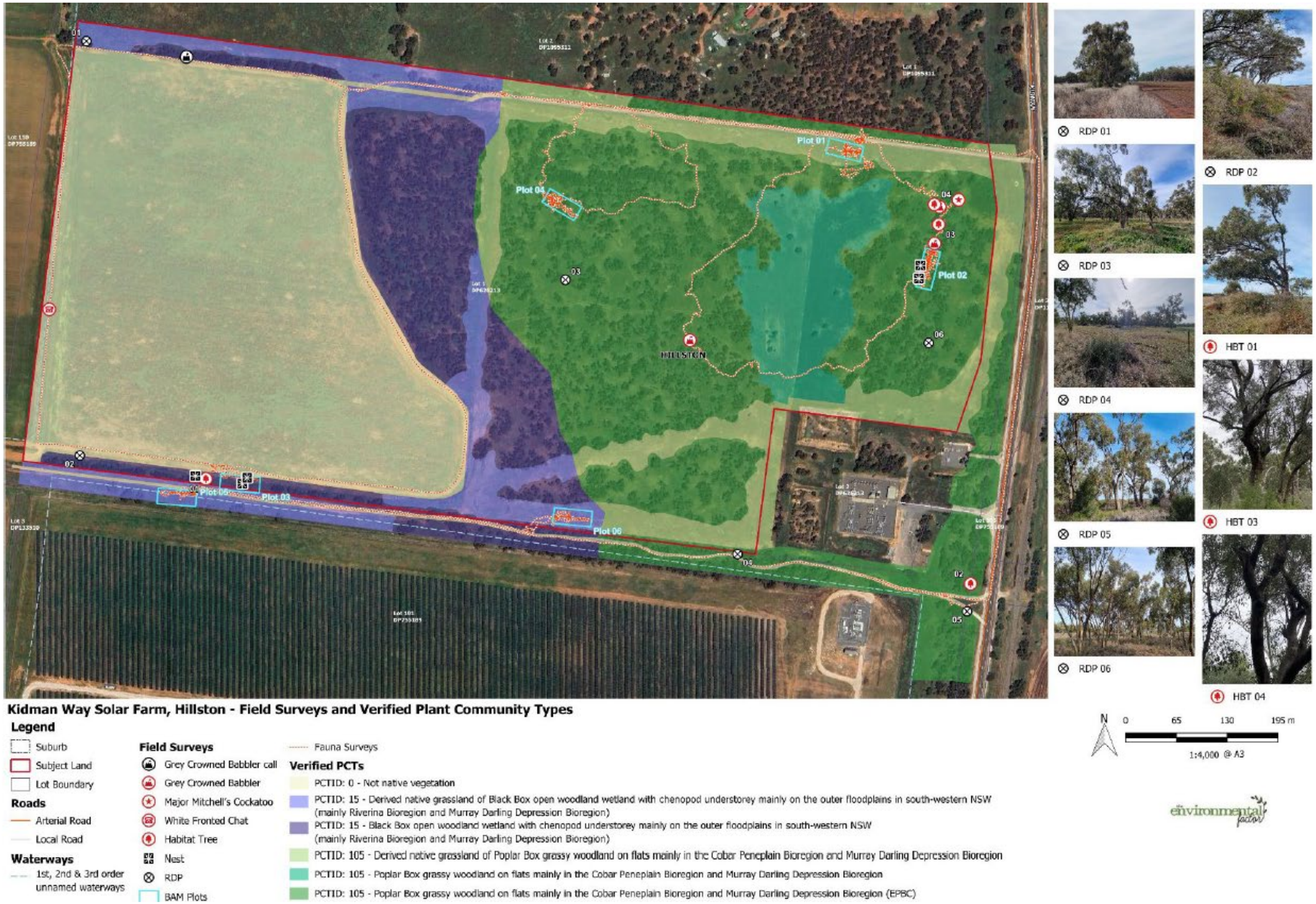


Figure 3-19 Field survey results and Plant Community Types (PCT) across the subject land (Source: The Environmental Factor, 2024)

3.6. Visual Impact

3.6.1. Approach

This Visual Impact Assessment (VIA) has been prepared by NGH in accordance with the parts of the Technical Supplement - Landscape and Visual Impact Assessment - Large-Scale Solar Energy Guideline 2022 (DPIE, 2022). Due to the small scale of the development and its limited visual impacts, the area within 2 km of the proposed development site has been considered for this visual impact assessment.

The visual impact of the proposed development on key sensitive receivers would be measured based on the combination of the sensitivity of the sensitive receivers and the magnitude (scale, contrast, quality, distance) of the development on each sensitive receiver. The potential visual impact of the proposed development would be assessed in relation to the view analysis and key viewpoints as per the community and stakeholder consultation.

Preliminary assessment included identifying all sensitive revivers and viewpoints and creating a viewshed analysis map using GIS. This provides a better understanding on where the impact is the most, and which viewpoints will have minimal or low impact. Viewshed analysis is only based on terrain features and does not take into account vegetation or structures that could potentially block the views.

Visual Magnitude The visual magnitude of a development is its apparent size determined by the volume of the horizontal and vertical fields of view occupied. Any sensitive receiver warranting a detailed investigation is classified as high visual magnitude for this assessment. If a receiver does not warrant a detailed investigation, it is deemed as low visual magnitude.

Viewpoint Sensitivity relates to the relative importance of viewpoints and the value that the community or visitors may place on landscapes viewed from public use areas, public travel ways and private viewpoints such as dwellings. For example, a view from a residence is more sensitive to change than from a local road where views are more intermittent and less frequent. Similarly, a view from a rural residence is more sensitive if it is from principal living spaces and the front and rear of the dwelling than from other areas. Viewpoint sensitivity is classified into four different classes namely:

- Very low viewpoint sensitivity
- Low viewpoint sensitivity
- Moderate viewpoint sensitivity
- High viewpoint sensitivity

Scenic quality refers to the relative scenic, cultural, or aesthetic value of the landscape within the viewshed based on the presence or absence of key landscape features known to be associated with community perceptions of low, moderate, or high scenic quality.

Visual sensitivity Once the viewpoint sensitivity and scenic quality are determined, these can be combined using the visual sensitivity matrix to determine the overall visual sensitivity of each assessable viewpoint. The matrix is adopted from the Technical Supplement – Landscape and Visual Impact Assessment and provided in the table below.

Table 3-2 Viewpoint sensitivity matrix

	High scenic quality	Moderate scenic quality	Low scenic quality
High viewpoint sensitivity	High	High	Moderate
Moderate viewpoint sensitivity	High	Moderate	Moderate
Low viewpoint sensitivity	Moderate	Low	Low
Very low viewpoint sensitivity	Low	Very low	Very low

The combination of sensitivity and magnitude then provides an overall visual impact on individual sensitive receivers, according to the parameters of the Technical Supplement – Landscape and Visual Impact Assessment and provided in the table below.

Table 3-3 Overall impact on sensitive receivers

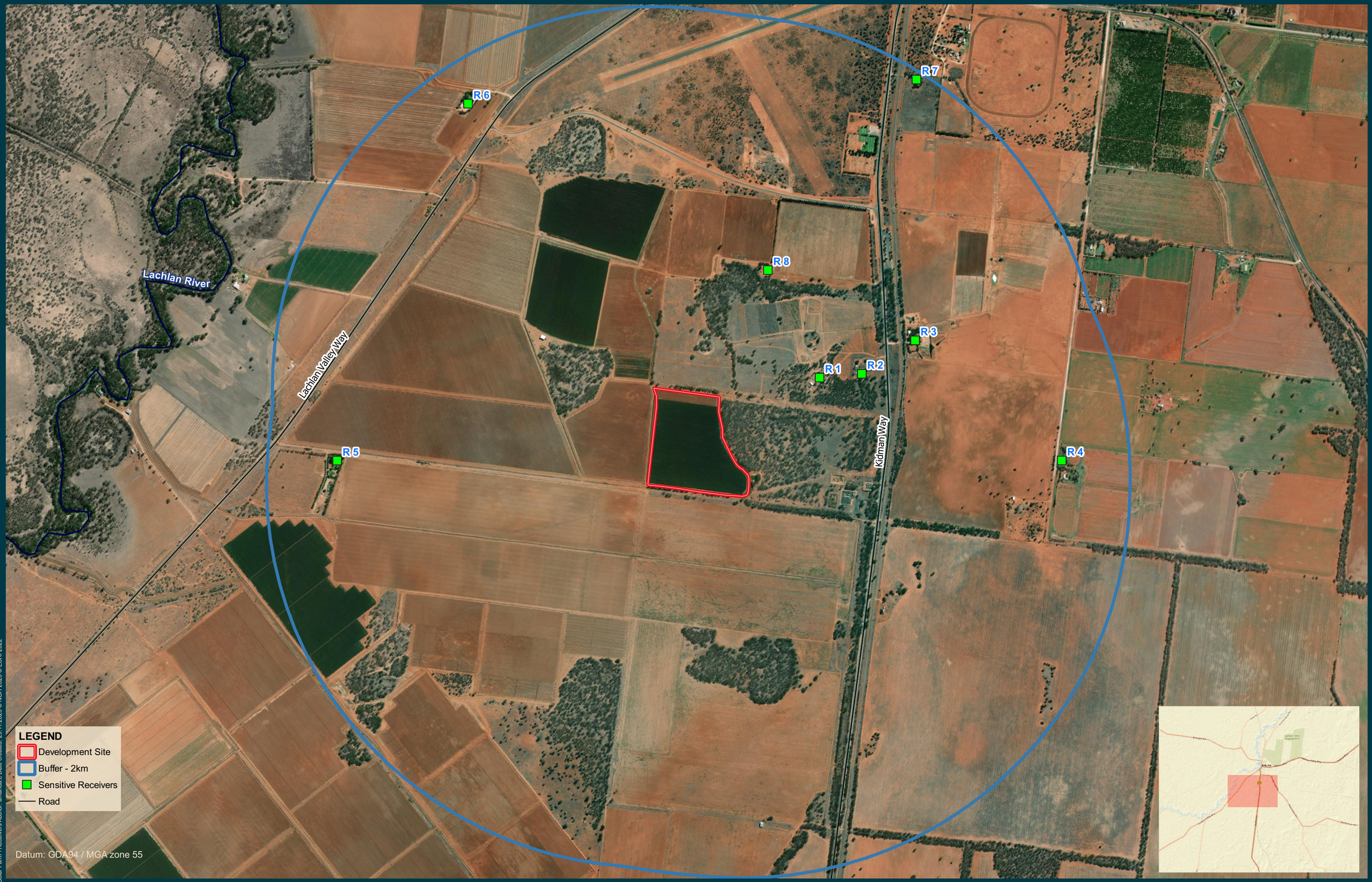
	High visual sensitivity	Moderate visual sensitivity	Low visual sensitivity	Very low visual sensitivity
Very high magnitude	High	High	Moderate	Moderate
High magnitude	High	Moderate	Moderate	Low
Moderate magnitude	Moderate	Moderate	Low	Low
Low magnitude	Moderate	Low	Low	Very low
Very low magnitude	Low	Low	Very low	Very low

Receivers/dwellings within 2km of the proposed development site were identified through background searches, and aerial imagery, and are shown in the figure on the following page.

Viewshed mapping

Viewshed mapping (refer Figure 3-21) was conducted in order to identify the receivers with a possibility of view the proposed development. The results of viewshed mapping is based only on the terrain and does not take into consideration any vegetation or man-made structures. The viewshed mapping has assumed infrastructure height of up to 4m on within the development site, as an over-estimation. The result of viewshed mapping helps to narrow down the number of receivers for additional assessment.

The viewshed map indicates that R7 would not have a field of view of the proposed solar farm. This was confirmed through site inspection of this location as well. Other receivers may have a view of the solar farm according to the viewshed mapping..



0 0.25 0.5 0.75 1 km

Kidman Way 5MW Solar Farm

Sensitive Receivers

R 6
R 7
R 8
R 3
R 1
R 2
R 5
R 4

LEGEND

- Subject Land
- Proposal Area
- Sensitive Receivers
- Development Footprint

Potential View

%

100

0

0 1 2 km

Datum: GDA94 / MGA zone 55

NGH

Kidman Way Solar Farm

Viewshed and sensitive receivers

Field of view calculation

The Technical Supplement – Landscape and Visual Impact Assessment provides two calculations for vertical and horizontal field of view. The vertical field of view shown in Figure 3-22 takes the highest and lowest points of the proposed development and compares that with the elevation of the viewpoint. The horizontal field of view is calculated and the viewing angle of the proposed development from the viewpoint as shown in Figure 3-23. These two measures are then plotted in accordance with the matrix from the Technical Supplement – Landscape and Visual Impact Assessment, and provided in the table on the following page, to determine whether further detailed assessment is required.

Figure 3-22 Relative height difference (DPIE, 2022)

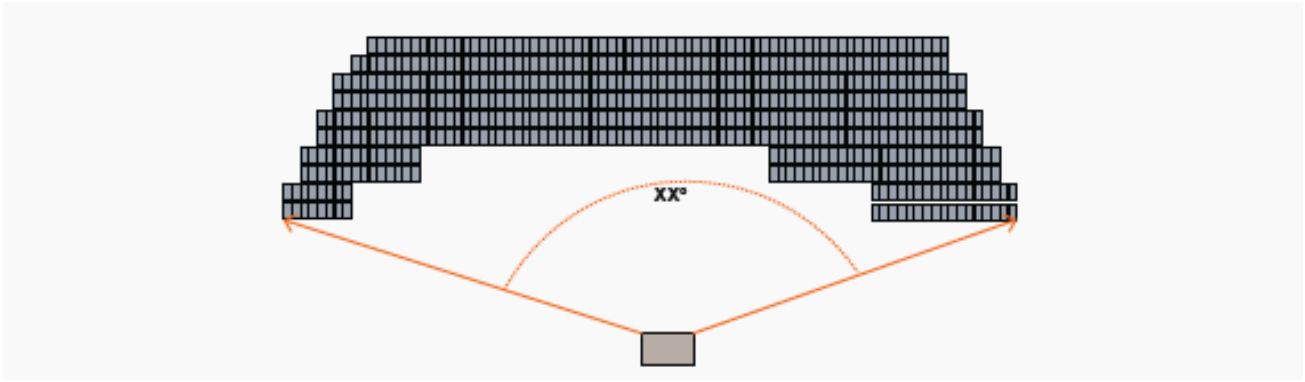


Figure 3-23 Horizontal field of view (DPIE, 2022)

Table 3-4 Preliminary visual assessment requirements (DPIE, 2022)

Horizontal field of view of development	1º vertical field of view	2º vertical field of view	3º vertical field of view	4º+ vertical field of view
1-10º	No assessment required	No assessment required	No assessment required	No assessment required
11-20º	No assessment required	No assessment required	No assessment required	Assessment required
21-30º	No assessment required	No assessment required	Assessment required for all viewpoints except road/rail	Assessment required
31-40º	No assessment required	Assessment required for all viewpoints except road/rail	Assessment required for all viewpoints except road/rail	Assessment required
41-50º	No assessment required	Assessment required for all viewpoints except road/rail	Assessment required	Assessment required
51-60º	No assessment required	Assessment required for all viewpoints except road/rail	Assessment required	Assessment required
61-70º	No assessment required	Assessment required	Assessment required	Assessment required
71-130º	Assessment required for all viewpoints except road/rail	Assessment required	Assessment required	Assessment required
130º+	Assessment required	Assessment required	Assessment required	Assessment required

3.6.2. Existing conditions

The subject land sits on almost flat terrain ranging from 120m ASL on the eastern boundary to 119m ASL on the western boundary. A peak of 122m is located on both the sand hills within the subject land but outside the proposed development footprint.

The north/south aspect is relatively flat with a peak of 117m at both the northern and southern boundaries and a low of 115m towards the centre of the development. While there is only low relief, the view from the Kidman Way is obscured by the slight elevation changes in the landscape from 116m at the development site to a peak of 119m at a slight rise (sand hill) to the west of the project (refer Figure 3-25).

The development is about It is about 2.5km south of the township of Hillston and sits on a rural landscape surrounded by farmlands, rural roads, the Lachlan River, and two state roads. Generally flat landform and some substantial patches of remnant woodlands help to naturally shield and minimise the visual impact of the proposed development on wider surroundings.

There are 3 identified public viewpoints in the investigation area, from the Kidman Way, Smith Road (a HV bypass north of the subject land) and the Lachlan Valley Way (further west of the subject land).

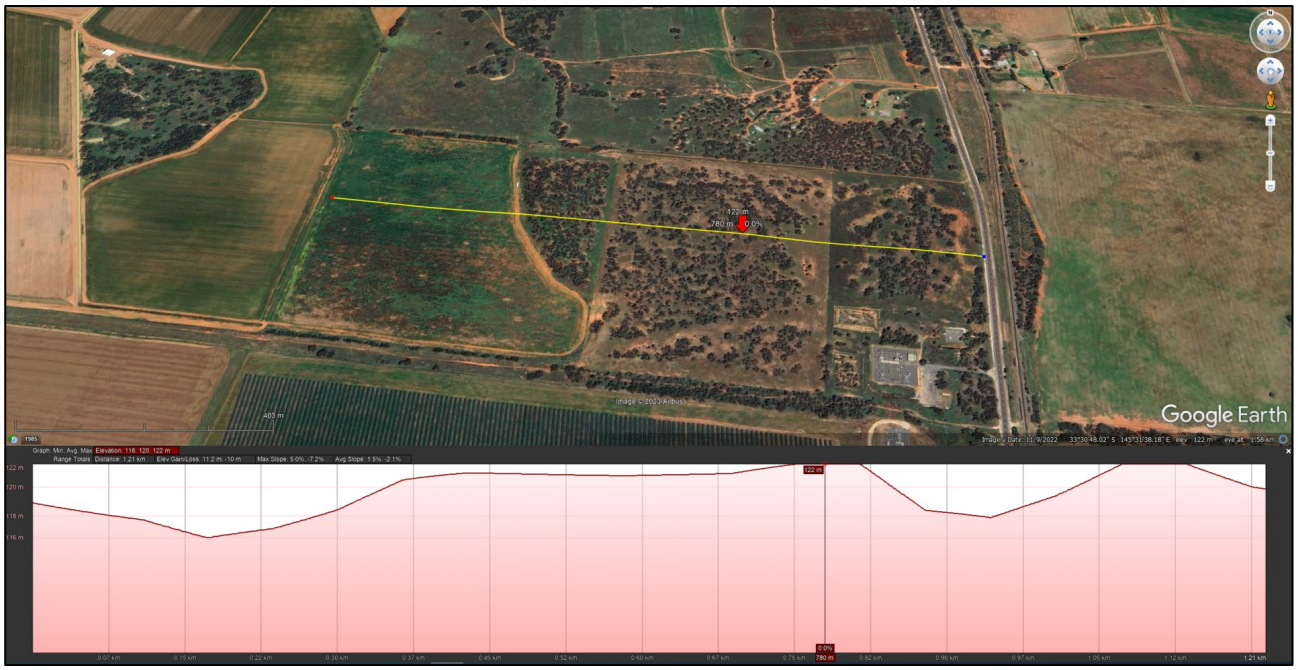


Figure 3-24 East/West elevation profile (Source Goole Earthpro, 2023)

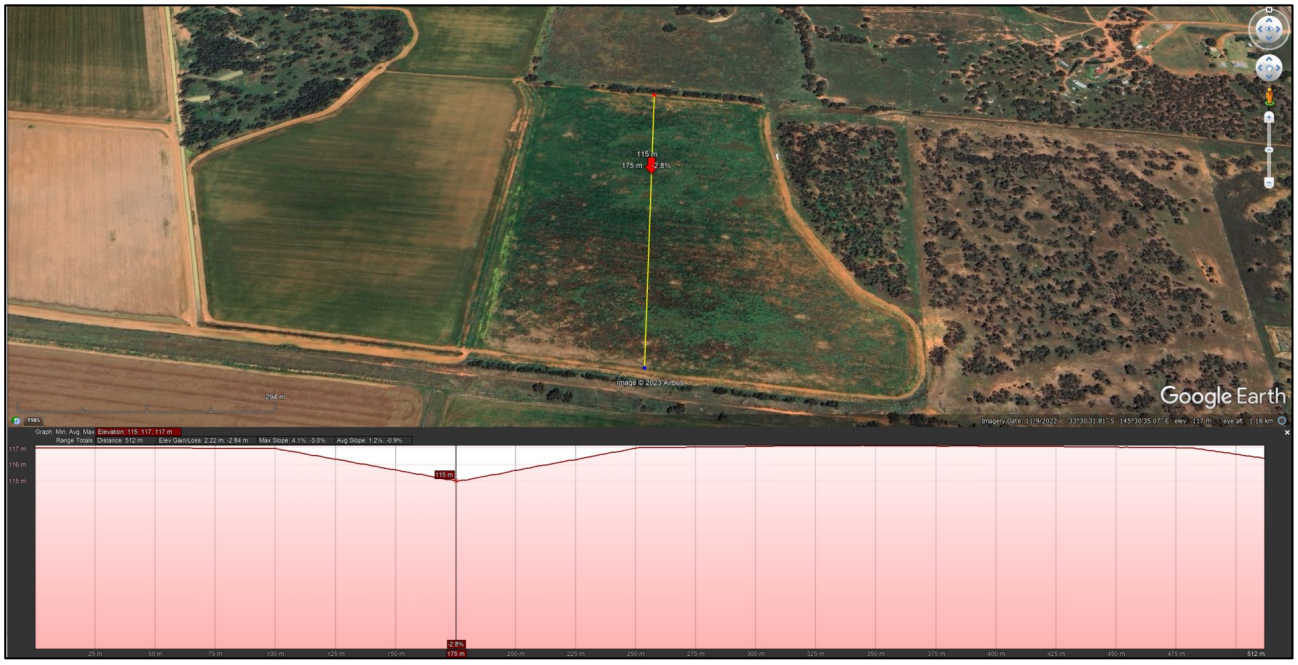


Figure 3-25 North/South elevation profile (Source Goole Earthpro, 2023)

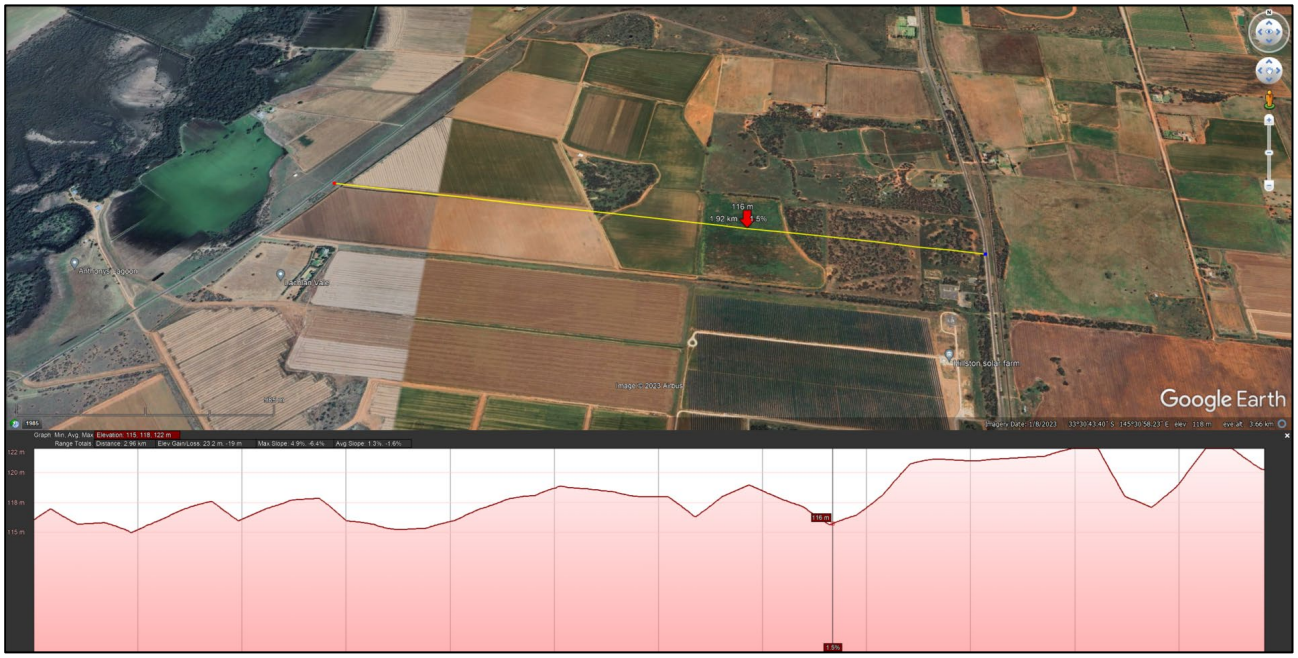


Figure 3-26 East/West elevation profile from Kidman Way through the development site to Lachlan Valley Way (Source Goole Earthpro, 2023)

3.6.3. Potential impacts

The preliminary assessment tool adopted from the Technical Supplement – Landscape and Visual Impact Assessment was used to identify receivers that require further detailed assessment. The results are presented in Table 3-5.

Table 3-5 Results of preliminary visual assessment

Receiver	Horizontal field of view	Vertical field of view	Distance from Development area (m)	Detailed assessment required?
1	54°	1°	540	**No**
2	42.5°	1°	764	**No**
3	32°	1°	1068	**No**
4	16°	0°	1659	**No**
5	17.6°	0°	1639	**No**
6	15.3°	0°	1826	**No**
7	8.5°	0°	1974	**No**
8	38°	1°	664	**No**

According to the assessment tool, there are no receivers that require further assessment, given the combination of horizontal and vertical field of view and the distance to the proposed development footprint. The vertical field of view is particularly limited in the subject area, given the low relief across the landscape.

As a precautionary approach and to substantiate the preliminary visual assessment above, photos of the surrounding area are provided on the following pages. During a site inspection, photos were taken from public viewpoints, viewpoints representative of receiver sight lines and, where representative viewpoints were not available, from the proposed development site with views towards receivers on neighbouring land Figure 3-27. Views of the proposed development would be obscured by the considerable distance to the proposed infrastructure and intervening remnant vegetation, both scattered and more substantial stands.

Kidman Way Solar Farm

View Points

Viewpoint 1
Views of the proposed solar farm are entirely obscured from Viewpoint 1 on the Kidman Way due to substantial stands of intervening vegetation and a distance from the highway of approximately over 850m.

Figure 3-28 Viewpoint 1 from the Kidman Way looking west along the 800m long access road (NGH, 2023)

Viewpoint 2
Views between Receiver 8 and the proposed solar farm are significantly obscured due to stands of intervening vegetation and a distance of over 690m.

Figure 3-29 Viewpoint 2 from north-eastern corner of development site to Receiver R8 690m north (NGH, 2023)

Viewpoint 3
Views between Receiver 1 and the internal access road to the proposed solar farm are available. Some intervening vegetation, farm structures and a distance of 150m from the northern boundary of the subject land.

Figure 3-30 Viewpoint 3 from north side of internal access road to Receiver R1 150m north (NGH, 2023)

Viewpoint 4
Representative views from Receiver 3 south-west to the proposed solar farm. Views of the proposed solar farm are entirely obscured from Viewpoint 4 on the Kidman Way due to substantial stands of intervening vegetation and a distance from the highway of approximately over 1000m. Receiver 2 can also be seen in the centre of the image, which shows the views from Receiver 2 to the proposed solar farm are also entirely obscured due to substantial stands of intervening vegetation.

Figure 3-31 Viewpoint 4 showing representative views from Receiver 3 and vegetation obscuring line of sight from Receiver 2 to the proposed solar farm (NGH, 2023)

Viewpoint 5
Views between Receiver 5 and the proposed solar farm are obscured given a distance of over 1600m. Aerial imagery also indicates there is substantial vegetation surrounding Receiver 5. Receiver 5 is just perceptible in the background centre of the image immediately on the tree line.

Figure 3-32 Viewpoint 5 from the south-western corner of the development site looking west towards Receiver 5 1600m away (NGH, 2023)

Viewpoint 6
Views of the proposed solar farm are entirely obscured from Viewpoint 6 on the Kidman Way due to the Essential Energy zone substation, substantial stands of intervening vegetation and a distance from the highway of approximately over 800m. The Essential Energy zone substation is not considered an affected receiver.

Figure 3-33 Viewpoint 6 from the Kidman Way looking at the Essential Energy zone substation (NGH, 2023)

Viewpoint 7
Views of the proposed solar farm would be obscured from the Smith Road heavy vehicle bypass due to stands of intervening vegetation and a distance of approximately 1000m. The substantial stand of vegetation located to the west of the subject land can be seen in the right background of this image, also a distance of 1000m from the viewpoint.

Figure 3-34 Viewpoint 7 from the Smith Road HV bypass looking south to the proposed development site 1000m away (NGH, 2023)

Viewpoint 8-14 are each photographs of the proposed development site from the perimeter

Viewpoint 8	Viewpoint 9
	
Viewpoint 10	**Viewpoint 11**
	
Viewpoint 12	**Viewpoint 13**
	

Viewpoint 15
Views of the proposed solar farm would be obscured from Kidman Way (northbound) due to roadside vegetation. Viewpoint 15 on the Kidman Way is located approximately 1000m south-east from the proposed development footprint.

Figure 3-35 Viewpoint 15 looking north-west to the proposed development site approximately 1000m away (NGH, 2023)

Viewpoint 16
Views of the proposed solar farm would be obscured from the Lachlan Valley Way due to a distance of approximately 1800m.

Figure 3-36 Viewpoint 16 looking directly east to the proposed development site approximately 1800m away (NGH, 2023)

3.6.4. 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.

3.6.5. Conclusion and mitigation measures

Due to the comparatively small scale of the proposed development, the visual impacts are considered low and manageable. The result of visual assessment did not show any need for detailed assessment including photomontages.

Pictures were taken from the surrounding area to show the nature of view one would be presented with. These photographs are shown on the preceding pages. These photographs show that any visibility of the proposed development from these distances is at a considerable distance from the proposed solar farm site and/or is obscured by existing vegetation.

Receiver 1 is the closest receiver to the proposed development; however, the line of sight to the proposed solar farm site is obscured by existing remnant vegetation on the subject land and surrounding the receiver on neighbouring land. There would be no change to the visual environment in this regard, nor opportunity for glint and glare. Receiver 1 is located in close proximity to the internal access road, which is existing, but proposed to be used to access the proposed solar farm site. The access road would be generally visible, at a distance of 150m south from the receiver, but is partially obscured by vegetation and farm structures. The access road would be used regularly throughout the construction phase and intermittently throughout the operational phase. The access road would not comprise of any infrastructure and is not considered to have any altered visual impact on the receiver's environment. No mitigation measures are considered necessary for this.

The view from Receiver 5 to the proposed solar farm site is not obscured by the remnant vegetation surrounding the site; however, it is considered the receiver's view is obscured by existing vegetation surrounding the dwelling. It is also located around 1600m from the proposed solar farm site. There would be no change to the visual environment in this regard, nor opportunity for glint and glare. No mitigation measures are considered necessary for this.

The proposed development would also not be visible to users of the Kidman Way and therefore would pose no risk of distraction or glint/glare for motorists.

To summarise, the visual impact of the proposed development would be negligible. As such, no specific mitigation measures are considered necessary to address the expected visual impacts.

3.7. Noise

3.7.1. Approach

The noise and vibration assessment have been prepared by NGH in accordance with the relevant 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) 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).

The TfNSW Construction and Maintenance Noise Estimator is a tool used to estimate the construction noise impacts to nearby receivers. A distance-based assessment (construction and operational scenarios) was prepared.

3.7.2. Existing conditions

The existing noise sources are typical of a rural environment. Noise sources include, light vehicles (4WD), tractors, ATV's, light and heavy vehicles on the nearby Kidman Highway. Additionally, noise is associated with train movement and noise from seasonal farm activities, including tractors used for cultivation, spraying sowing and harvest activities.

Background noise monitoring has not been conducted for the proposed development. NGH adopted the recommended background levels from the NPI as a conservative approach. The NPI describes the typical existing background Rural noise levels, which are also indicated in the table. These background noise levels were adopted as the RBLs for the purpose of this noise assessment.

Table 3-6 Average background A weighted sound pressure level (NSW EPA, 2017)

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

Noise management levels for the proposed development have been determined in accordance with the NSW ICNG described below and summarised in the table below.

- 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.

Construction and operational activity would only be carried out during day time hours, unless there was an emergency/work required to ensure safety.

Table 3-7 Noise management levels for the proposed 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)

3.7.3. Potential impacts

The predicted noise level for the proposed construction activities were calculated using the Transport for NSW Services Construction Noise Estimator Tool (CNET). The following scenario was modelled.

- Use and maintenance of internal access road (minimum 150m to nearest receiver).
- Roadworks for the intersection with Kidman Way (minimum 210m to nearest receiver).
- Construction of the proposed solar farm infrastructure (minimum 530m to nearest receiver).
- Operation of the proposed solar farm (minimum 530m to nearest receiver).

The road works for the intersection treatment with the Kidman Way would potentially create the greatest noise impacts. To provide a worst case scenario, the modelling assumes all plant listed in Table 3-8 under Scenario 2 could be operating within the works site, simultaneously and continuously, and would be the minimum distance from the closest receiver. However, in actual fact, the noise sources would likely vary within the works site depending on specific plant involved and specific work occurring, and may be further than the minimum distance to the receiver than modelled.

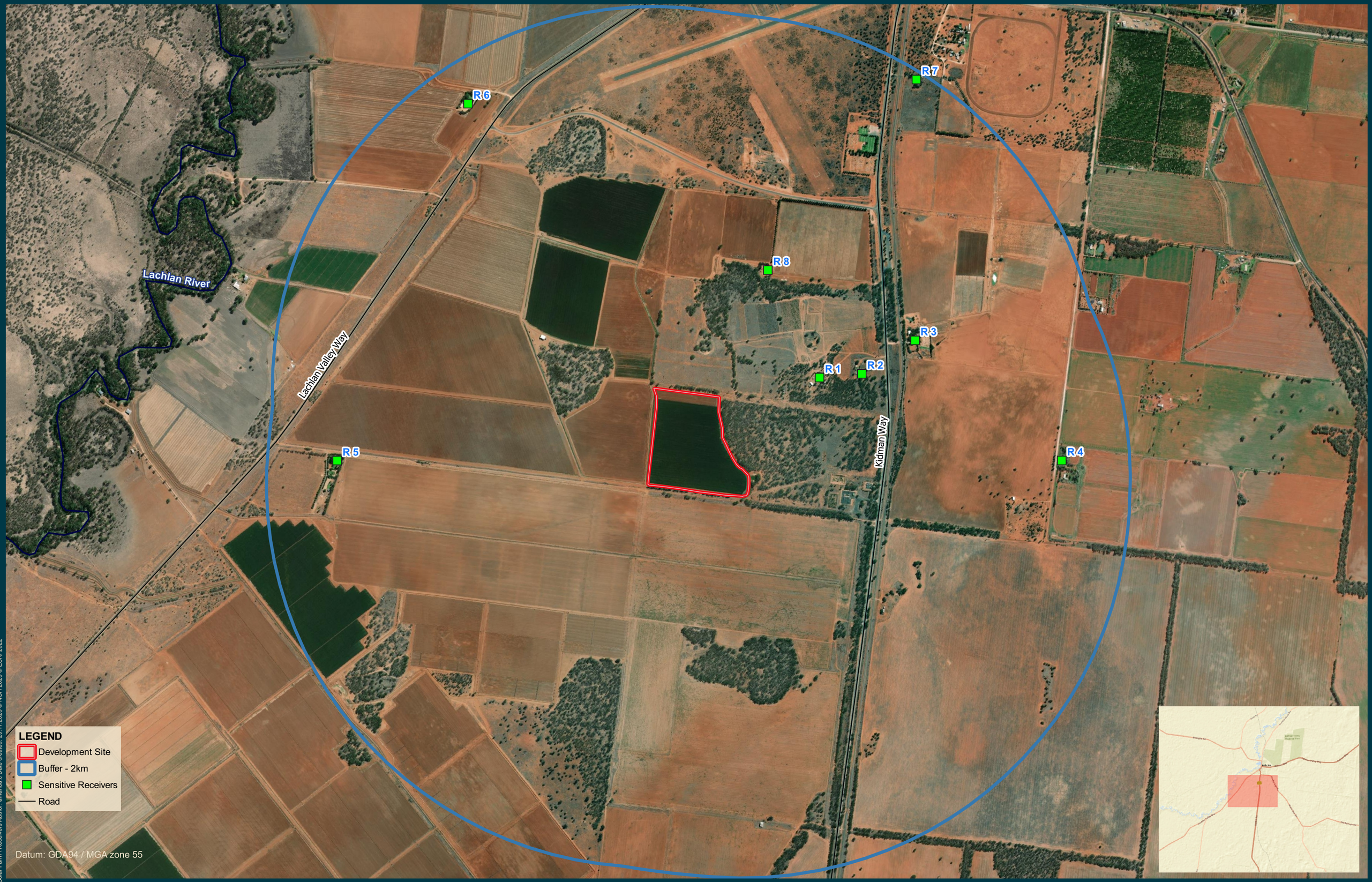
All other scenarios are considered to over-estimate impacts as well and the modelling assumes all plant indicated is operating simultaneously and continuously, and at the minimum distance to the receiver at any one time. In actual fact, this would be unlikely.

With regard to operation of the solar farm, light vehicles and personal testing and/or replacement of minor components would typically be expected. The scenario modelled over-estimates a situation where many components requiring replacing simultaneously and involve machinery/equipment that would not be required on a day to day basis.

Table 3-8 Construction equipment modelled with scenarios

Construction equipment	Sound power level (dB(A))	No. of units
Scenario 1: Use and maintenance of internal access road		
Light vehicles (4WD)	78	2
Delivery truck	83	2
Water cart	82	1
Scenario 2: Roadworks at the intersection with Kidman Way		
Bulldozer D9	91	1
Chainsaw 4-5hp	89	2

Tub grinder/ mulcher 40-50hp	91	1
Front end loader	87	1
Scraper 651	85	1
Compactor	81	1
Dump truck	85	4/hr
Road truck	83	4/hr
Water cart	82	1
Scenario 3: Construction of solar farm infrastructure		
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 4: Operation of solar farm		
Light Vehicles (4WD)	78	4
Welding equipment	80	4
Generator	78	2
Delivery Truck	83	1
Compactor	88	1
Front End Loader	88	1



0 0.25 0.5 0.75 1 km

Kidman Way 5MW Solar Farm

Sensitive Receivers

In respect of the following scenarios, R1 was selected as the closest receiver to the works:

- Use and maintenance of internal access road (minimum 150m to receiver).
- Construction of the proposed solar farm infrastructure (minimum 530m to receiver).
- Operation of the proposed solar farm (minimum 530m to receiver).

In respect of the following scenarios, R2 was selected as the closest receiver to the works:

- Roadworks for the intersection with Kidman Way (minimum 210m to receiver).

The result of the scenario is provided in the table below and in Appendix F.

Table 3-9 Modelled construction and operational 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***
Scenario 1: Use and maintenance of internal access road (standard day time hours)					
R1 at 150m	50	50	0	No exceedances	N/A
Scenario 2: Roadworks at the intersection with Kidman Way (standard day time hours)					
R2 at 210m	50	53	3	Clearly audible	The assessment tool does not consider additional mitigation measures to be required due to minimal exceedance.
Scenario 3: Construction of solar farm infrastructure (standard day time hours)					
R1 at 530m	50	40	0	No exceedances	N/A
Scenario 4: Operation of solar farm					
R1 at 530m	50	45	0	No exceedances	N/A

** *Exceedance of NML*

- *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*

3.7.4. Conclusion and mitigation measures

Scenarios 1, 3, and 4 would not result in exceedance of the relevant project noise management levels. Scenario 2 would potentially result in an exceedance of 3dBA. This is defined by the modelling tool as an exceedance that would be clearly audible at the receiver but do not trigger the need for additional mitigation measures. However, as a precautionary measure, mitigation measures are proposed below, generally to reduce noise wherever possible and to provide notification to R2 during the temporary road works proposed to upgrade the intersection. Excepting R2, no other receivers would be affected in relation to Scenario 2.

As discussed above, modelling assumes all plant listed in the table under Scenario 2 could be operating within the works site, being the area of works requiring a BAL and BAR treatment at the intersection of the internal access road with the Kidman Way. It is noted the proposed road work would be temporary and should only comprise a short period of time. The modelling provides a worst possible case scenario, assuming all listed plant is operating simultaneously and continuously, and at the minimum distance from the closest receiver. However, in actual fact, the noise sources would likely vary within the works site depending on specific plant involved and specific work occurring, and may be further than the minimum distance to the receiver than modelled.

Though not expected to exceed the relevant noise criteria (excepting potentially the road works in proximity to R2), the following mitigation strategies have been recommended to minimise impacts on receivers in the area during the construction and operation of the solar farm.

- Avoid any unnecessary noise when carrying out construction or operational work.
- Any equipment not in use should be switched off.
- Avoid reversing and associated alarms wherever possible.
- Management and coordination of the timing of heavy vehicle movements to manage use of the internal access road.
- Any complaints are to be resolved promptly via a Complaints Management System.
- In relation to intersection upgrade works, R2 is to be notified of the proposed works at least 48 hours' prior to commencement.

3.8. Flood and overland flow

The land has been identified as being subject to flood risk. A Flood Risk Assessment has been prepared by Cumulus Engineering for the proposed development. The report is summarised below, and provided at Appendix D. The flood risk at the site was assessed based on flood data provided by Carrathool Shire Council.

Flood depths across the subject land during a 1% Annual Exceedance Probability (AEP) flood event are indicated in the figure below. It shows that the land is subject to varying levels of flooding, primarily resulting from localised rainfall during short-duration storms lasting up to 6 hours. The deepest flooding, reaching up to 1.35 metres, is observed in a low-lying area in the eastern part of the site, which would be avoided entirely by the proposed solar farm and access road.

Notably, the proposed infrastructure for the solar farm is strategically positioned outside the 1% AEP flood extent, in response to constraints assessment of the subject land. The proposed solar farm would not be affected nor have any impacts in this regard.

The existing internal access track along the northern boundary, leading to Kidman Way (depicted in Figure 2-1), experiences flooding over 900mm deep in the design flood event. This depth renders the track impassable during a 1% AEP flood event.

However, given the nature of the proposed development, this potential access issue can be easily managed through a Site Emergency Response Plan. Should any major flooding be anticipated, construction works can be halted for however long is necessary for access to the solar farm to be re-established. In the western rivers area, such as the Lachlan River related to the subject site, major flood events occur with significant advance warning time. Additionally, the proposed solar farm would largely be remotely operated and should access be unavailable for a period of time due to flooding, this would not cause any issues. The Site Emergency Response Plan would be developed prior to the commencement of the proposed operation of the solar farm and be approved by Council.

The Flood Risk Assessment concludes that the proposed development has been designed in a satisfactory manner and flood risk can be appropriately managed for the construction, operation and decommissioning of the proposal. The CLEP controls related to flooding are addressed in detail in section 4.3 of this report.

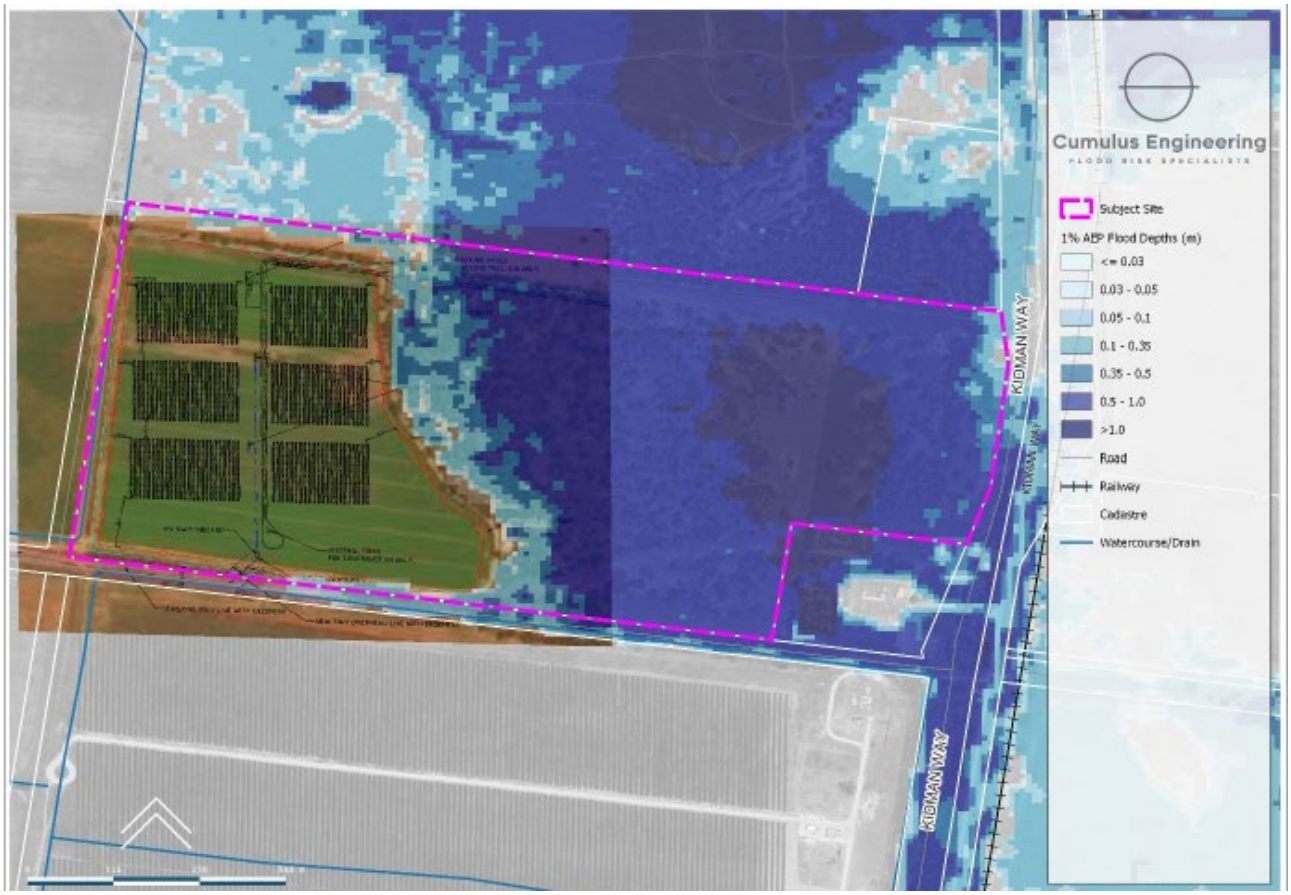


Figure 3-38 1% AEP flood event affectation of the subject land (Source: Cumulus Engineering, 2023)

3.9. Bushfire

The subject land is not mapped as Bushfire Prone Land (BPL) (refer figure on the following page). The proposed solar farm footprint does not contain any woody vegetation as the land has been used for cropping; however, stands of remnant native vegetation and other grasslands are present across the landscape and may pose a bushfire hazard.

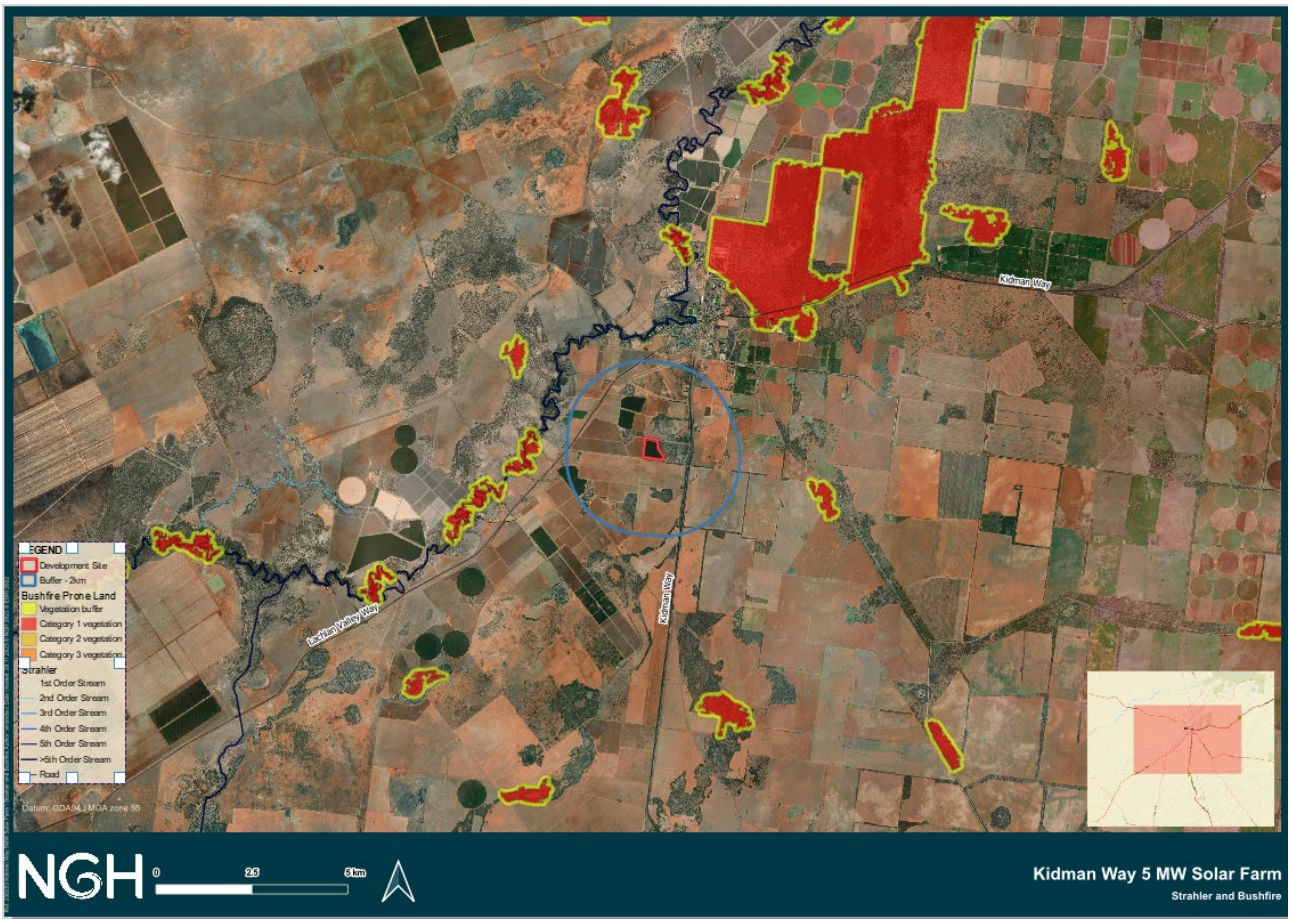


Figure 3-39 Bushfire Prone Land in the surrounding area (NGH, 2023)

The NSW Rural Fire Service (RFS) Planning for Bushfire for Protection 2019 (PBP) aims and objectives 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, specific to solar farms, into its design and operational plans.

Asset Protection Zones

In accordance with Section 8.3.5 of PBP a minimum 10m wide area surrounding the proposed solar array footprint shall be managed in perpetuity as an APZ to the Inner Protection Area standards of PBP.

Landscaping

Any 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 proposed development.

Access

Property access and internal access arrangements would 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.

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 associated with a solar farm. 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.

3.10. Land use and resources

3.10.1. Potential impacts

Land and soil capability

Land capability is the inherent physical capacity of the land to sustain a range of land uses and management practices in the long term without degradation to soil, land, air, and water resources (OEH 2012). The NSW land and soil capability assessment scheme (OEH 2012) describes and maps eight land and soil capability classes. The classification is based on various biophysical features of the land and soil, as well as its susceptibility to a range of hazards.

The subject land is mapped as Class 5 (refer Figure 3-40) within the Land and Soil Capability scheme (LSC). Land identified as Class 5 is described as Moderate–low capability land with high limitations for high-impact land uses. Class 5 land 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 (NSW OEH, 2012). This is reflected in the surrounding land uses. The proposed development would not affect prime agricultural land.

The proposed development is not expected to adversely affect any of the biophysical factors or hazards which determine land and soil capability. During any broad area or trench excavations at the site, topsoil would be removed, stockpiled separately, and replaced to restore the original soil profile. Following construction, the perennial grass cover would be re-established to protect soils and landscape function. Some soil nutrients may run down over time with the cessation of any pasture fertiliser regime.

During the operation of the solar farm, soils would be protected, and perennial grass cover would be maintained. Some agricultural production may continue from grazing sheep on the site. All risks to agricultural land use values (including weeds, soil degradation, pollutants) can be adequately managed and are covered by specific mitigation measures in this SEE.

The proposed development would eventually be decommissioned. As outlined earlier in this report, the site would be returned to state suitable for agricultural activities (cropping) to recommence.

Biophysical Strategic Agricultural Land (BSAL)

There is no mapped BSAL land in or near the development. The closest BSAL land is mapped approximately 184km northeast between Condobolin and Forbes. The development will not impact on any BSAL.

Land use in the surrounding area

The current mapped land use is irrigated cropping. Other surrounding land uses include cropping (dryland), irrigated perennial horticultural crops, irrigated seasonal horticultural crops and grazing native vegetation with a limited number of residential and farm infrastructure.

For the duration of the operation of the development, there will be a cessation of irrigated cereal crops being produced on the subject land. However, there may be potential to graze improved pastures underneath the panels as part of agri-voltaics and vegetation management plan.

Generous setbacks are provided to surrounding productive agricultural activities to ensure no impacts on neighbouring land.

Soil impacts

The soil disturbance has the potential to result in the following impacts:

- Reduce soil stability and increased susceptibility to erosion due to vegetation removal or soil exposure, especially if the subsoil is sodic and dispersive.
- Loss of topsoil and impacts on waterways due to increased erosion and sedimentation hazard.
- Reduced soil permeability and increased run-off as a result of soil compaction for internal access roads and hardstand areas.

Soil disturbance and removal of vegetation cover is anticipated to be minimal; noting that it currently is minimal cover due to regular ploughing and sowing of the proposed development site. Earthworks would be minor. The pile driving of steel posts associated with installation of the arrays would have a small discrete

footprint at the pole locations and is unlikely to result in substantial soil disturbance. Ground cover would be maintained where possible during the pre-construction and construction stages of the proposed development and would be rehabilitated upon decommissioning. Erosion and sedimentation impacts that may arise as a result of construction and decommissioning works can be minimised by carrying out the activities in accordance with the provisions of the Managing Urban Stormwater: Soils and Construction series, in particular:

- Managing Urban Stormwater: Soils and Construction, Volume 1, 4th edition (Landcom, 2004) known known as 'the Blue Book.'.
- Volume 2A Installation of Services (DECC, 2008).
- Volume 2C Unsealed Roads (DECC, 2008).

Soil compaction occurring as a result of hardstand areas, infrastructure and vehicle movements would reduce soil permeability; this may increase runoff and the potential for marginal increases in flows across the proposed development site. Groundcover would be maintained beneath solar panels to protect soils during heavy rainfall events.

Land use conflict

The DPI Land Use Conflict Risk Assessment (LUCRA) system is intended to identify and assess the potential for land use conflict between neighbouring land uses (DPI, 2011). Primefact 1134 Land Use Conflict Risk Assessment Guide (DPI, 2011) identifies common issues that can lead to land use conflict. The issues and their reference in this report are identified below:

Rural amenity issues

- Impacts to air quality – refer Section 3.12
- Noise interfering with the use and enjoyment of neighbouring land – refer Section 3.7
- Visual amenity – refer Section 3.6.
- Traffic (construction and operation) – refer to Section 3.4.

Environmental protection issues

- Soil erosion and water pollution – refer Section 3.8.
- Clearing of native vegetation – refer Section 3.5.

Direct impacts

- Changes to stormwater flows or water availability – refer Section 1.1
- Management of pest animals and weeds – refer to Section 3.5.

Collectively, the assessments conclude that any risk of impact to surrounding properties is considered acceptable, and generally manageable using standard consultation and notification, best practice works methods and identified mitigation measures., as the case may be.

3.10.2. Safeguards and mitigation measures

The following mitigation strategies have been developed to minimise the potential for long term degradation of the soil during construction and operation.

- Develop a groundcover management protocol to minimise soil disturbance and rehabilitate disturbance as soon as practicable.
- Manage erosion and sediment control in accordance with the provisions of the Managing Urban Stormwater: Soils and Construction series.:
- Development of a satisfactory Decommissioning Plan in consultation with Council and the landholder.

Hillston

Lachlan Valley Way

Kidman Way

3

4

5

6

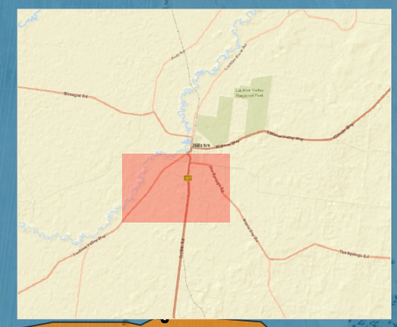
LEGEND

- Development Site
- Buffer - 2km

Land and Soil Capability

- LSC 3
- LSC 4
- LSC 5
- LSC 6
- Road

Datum: GDA94 / MGA zone 55

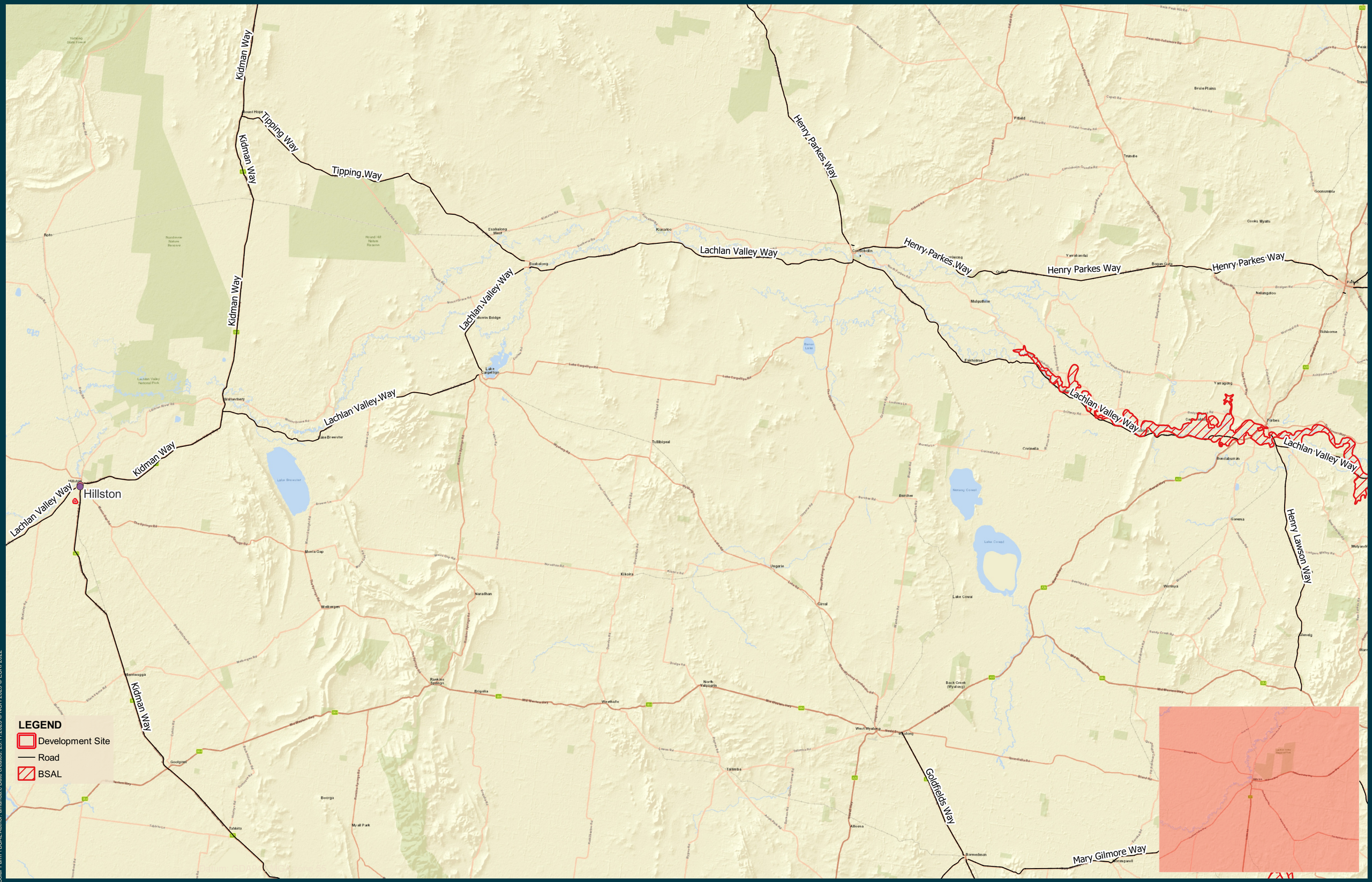


NGH

0 0.25 0.5 0.75 1 km

Kidman Way 5 MW Solar Farm

Soil Capability



NGH

0 25 50 km

Kidman Way 5 MW Solar Farm

BSAL

Lachlan River

Lachlan Valley Way

Kidman Way

LEGEND

Development Site

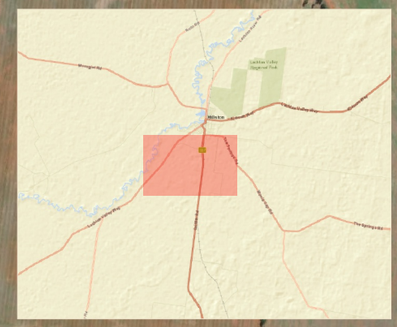
Landuse Clipped

- 1.2.0 Managed resource protection
- 1.3.2 Stock route
- 2.1.0 Grazing native vegetation
- 3.2.0 Grazing modified pastures
- 3.3.0 Cropping
- 4.2.0 Grazing irrigated modified pastures
- 4.3.0 Irrigated cropping
- 4.4.0 Irrigated perennial horticulture
- 4.5.0 Irrigated seasonal horticulture
- 5.4.0 Residential and farm infrastructure
- 5.5.0 Services
- 5.5.2 Public services
- 5.6.0 Utilities
- 5.7.1 Airports/aerodromes
- 5.7.2 Roads
- 5.8.0 Mining
- 6.4.1 Supply channel/aqueduct
- Road

Electricity Transmission Line

- 132kV
- 330kV
- 66kV

Datum: GDA94 / MGA zone 55



NGH

0.5 1 km

Kidman Way 5MW Solar Farm

Landuse

3.11. Heritage

Aboriginal cultural heritage

An Aboriginal Heritage Information Management System (AHIMS) search conducted on 17 July 2023 (Appendix E) indicated there are 75 Aboriginal sites recorded and no Aboriginal places declared within 10km radius of the subject land. The closest site was approximately 770m from the proposed development site. There are no works proposed that would be in proximity to the recorded site.

The AHIMS search results confirmed there are no Aboriginal sites or declared Aboriginal places recorded within or near the subject land, noting this does not constitute a due diligence assessment in accordance with the Code.

If any items suspected of being Aboriginal in origin are discovered during the construction of the proposed development, all work in the immediate vicinity would cease. The find would be assessed by a qualified archaeologist and if found to be an Aboriginal object, the NSW Environment Line (1300 361 967) would be notified. An Aboriginal Heritage Impact Permit (AHIP) would be required.

Non-Aboriginal heritage

There are no State or local non-Aboriginal heritage items within or near the subject land. Under the Carrathool LEP, there are 20 listed items within the township of Hillston, with the closest being the Hillston Cemetery, approximately 1.5 km north of the site. No non-Aboriginal heritage items would be impacted by the proposed development.

3.12. Air quality

3.12.1. Existing conditions

The access road is currently unsealed, and the subject site is currently worked and cropped. Both activities would create seasonal dust from crop production sowing, and harvesting.

The development site is located within a rural zone with rural residential settlement density, with the town of Hillston located approximately 2.5km to the north of the subject land. Air quality in the study area is typical of the surrounding rural region. In general, air quality is high. However, raised dust during the drier months contributes to sporadic reductions in air quality. During autumn, the level of particulate matter in the air increases due to the burning of agricultural residues and soil cultivation for cropping. In winter, the burning of wood in solid fuel fires contributes to elevated levels of particulate matter in the atmosphere.

3.12.2. Potential impacts and mitigation measures

Air quality would be affected during the construction phase by vehicle and machinery exhaust emissions, although the emissions would be readily dispersed and any impacts to residents or workers at the site are expected to be transient and minor.

Construction and decommissioning traffic accessing the site may produce dust on the internal access road as it is unsealed. However, the access road would be actively managed and monitored to ensure no adverse impacts on neighbouring land.

Temporary, and permanent internal site tracks may generate dust. Dust has the potential to cause nuisance for neighbouring residents and affect water supplies and pasture. Dust can also adversely affect the natural terrestrial and aquatic ecosystems which occur at the site. The condition of internal tracks and movement areas would be monitored regularly, and a water cart would be used as required for dust suppression.

During the operation phase, soils at the site would be stable and vegetated with perennial grass cover. Dust generation would be closely managed as it would be harmful to the effectiveness of the solar array to generate electricity and cause nuisance to surrounding receivers and ecosystems.

Subject to mitigation measures, any dust or other air quality impacts are likely to be minor, temporary, and highly localised. To minimise dust emissions from proposed development:

- A reduced speed limit would be enforced on the internal access road and on the internal tracks of the solar farm.
- A water cart would be used to supress dust during peak movements both on the internal access road and on internal tracks of the solar farm.
- During the operation of the solar farm, soils are to be protected, and perennial grass cover is to be maintained.

3.13. Waste

Legal requirements for the management of waste are established under the POEO Act and the POEO (Waste) Regulation 2005. Unlawful transportation and deposition of waste is an offence under section 143 of the POEO Act. Waste management would be undertaken in accordance with *the Waste Avoidance and Resource Recovery Act 2001* (NSW) (WARR Act).

A Waste Management Plan (WMP) would be developed and implemented during construction, operation and decommissioning to minimise wastes. The WMP would be provided to Council prior to the commencement of construction. The Plan would include but not be limited to:

- Identification of opportunities to avoid, reuse and recycle, in accordance with the waste hierarchy.
- Quantification and classification of all waste streams.
- Provision for recycling management onsite.
- Provision of toilet facilities for onsite workers and how sullage would be disposed of (i.e., pump out to local sewage treatment plant).
- Tracking of all waste leaving the site.
- Disposal of waste at facilities permitted to accept the waste
- Requirements for hauling waste (such as covered loads).

Preliminary details are provided below.

The following waste streams may be generated across the phases of the proposed development:

Construction and operation

- Excavation wastes, including rock and soils.
- Vegetation wastes, from construction (clearing) and maintenance of the facility.
- Packaging materials associated with items delivered to site such as pallets, crates, cartons, plastics and wrapping materials.
- Wastes produced from the cleaning, repairing and maintenance of various heavy construction equipment, including liquid hazardous wastes.
- General wastes including office wastes, scrap materials, broken machinery and biodegradable wastes.
- Chemicals and oils.

Decommissioning

- Solar panels and mounting systems.
- Metals from posts and fences.
- Cabling.
- Inverters, transformers and similar components.
- Demolition wastes, such as concrete.
- Wastes produced from the cleaning, repairing and maintenance of various heavy construction equipment, including liquid hazardous wastes.
- General wastes including office wastes, scrap materials, broken machinery and biodegradable wastes.
- Chemicals and oils

The waste management hierarchy would be adopted throughout the proposed development:

1. Unnecessary resource consumption will be avoided as a priority.
2. Generation of excess materials will be avoided as a priority.
3. Avoidance will be followed by resource recovery (including the reuse of materials, reprocessing, recycling, and energy recovery).
4. Disposal will only occur as a last resort in accordance with the WARR Act.

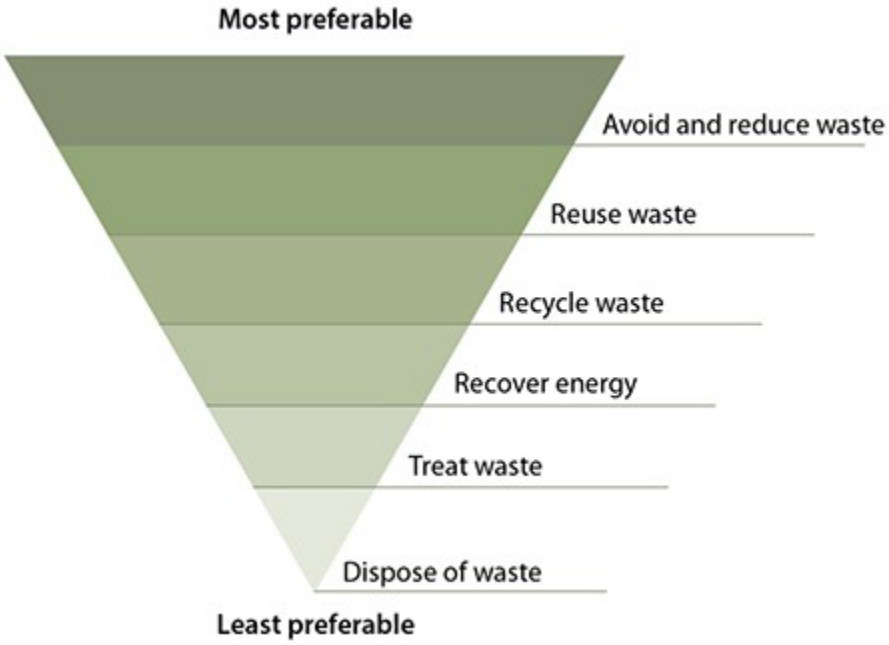


Figure 3-41 Waste management hierarchy

Avoid and reduce waste

The waste management hierarchy nominates avoidance of waste as the most important priority. During the proposed development, the following measures will be implemented to avoid creation of waste:

- Ensuring that the necessary planning is undertaken to enable efficient management of the delivery and storage of materials to avoid spoilage.
- Wherever possible, establishing agreements with suppliers for 'take back' arrangements for packaging/pallets/drums.
- Minimisation of packaging as an important factor in the product procurement process.
- Ensuring correct types and quantities of materials are ordered to avoid excess waste.
- Coordinating site activities to minimise waste through utilisation of unused materials.
- Employing trained plant and machinery operators to avoid damage to materials and to reduce wastage of consumables during plant and machinery operation and maintenance.
- Ensure that stored supplies are properly protected from the weather.

Reuse and recycling

Waste separation and segregation will be promoted on-site to facilitate reuse and recycling as a priority of the waste management program as indicated below. Suitable recycling facilities are generally located in Griffith or Wagga Wagga, being major nearby centres.

- Waste segregation onsite – waste materials will be separated onsite into dedicated bins / areas for either reuse onsite or collection by a recycling contractor and transported to off-site facilities.
- Waste separation off-site – where waste is deposited in one bin because space is not available for multiple bins the waste is to be sorted off-site by a waste contractor
- Reuse recyclable packaging where practicable.

Waste handling and storage

Waste that is handled and stored onsite prior to onsite reuse or off-site recycling / disposal will have applied the following measures:

- Spoil, topsoil and mulch are to be stockpiled onsite in allocated areas, and mitigation measures for dust control and surface water management will be implemented as per the Erosion and Sediment Control Plan
- Liquid wastes are to be stored in appropriate containers in covered and bunded areas until transported off-site. Bunded areas will have the capacity to hold 110% of the liquid waste volume for bulk storage or 120% of the volume of the largest container for smaller packaged storage.
- All other recyclable or non-recyclable wastes are to be stored in appropriately covered receptacles (e.g., bins or skips) in appropriate locations onsite and contractors commissioned to regularly remove / empty the bins to approved disposal or recycling facilities.

Waste disposal

Waste disposal is to be in accordance with the POEO Act and WARR Act. Wastes that are unable to be reused or recycled will be disposed of off-site to an EPA approved waste management facility following classification. Where possible, wastes will be removed off-site by a licenced transporter to a recycling facility or will be disposed of at a licensed waste facility.

The closest facility is the Hillston landfill. There are some restrictions on the types of waste accepted at this facility and the contractor would ensure the necessary requirements are followed. A waste transfer station is also located at Goolgowi.

Table 3-10 Preliminary waste details

Activity / material	Waste Type	Waste Classification	Approx. annual quantity	Storage and treatment onsite	Proposed reuse /recycling/disposal methods	Reuse/ Recycle target
Construction and/or operation						
Office / staff operations	Paper, cardboard, recyclable plastic, soft plastic	General solid waste (non-putrescible)	800L	Separate Bins emptied into secured comingled bulk bins.	Resource recovery off-site - reprocessing at an appropriately licensed waste facility in accordance with the *Waste Classification Guidelines*.	100%
	Glass and aluminium	General solid waste (non-putrescible)	200L	Separate Bins emptied into secured comingled bulk bins.	Resource recovery off-site - reprocessing at an appropriately licensed waste facility in accordance with the *Waste Classification Guidelines*.	100%
	Food waste	General solid waste (non-putrescible)	600L	Separate Bins emptied into secured comingled bulk bins.	Disposal off-site at an appropriately licensed waste facility in accordance with the *Waste Classification Guidelines*.	0%
	Effluent	Liquid	300L	Holding tank	Off-site disposal, collected with bulk effluent tanker	0%
Site establishment	Removal of existing fences/ boundary features	General solid waste (non-putrescible)	0.2t	Stockpile	Off-site recycling. Loaded into tipper or flatbed truck	100%
Earthworks	Excavated material VENM/ENM	Classification based on soil tests carried out during construction and in accordance with Waste Classification Guidelines: Part 1 and 2 (EPA 2014)	<10 m3	Stockpile	Reused on-site. Topsoil to be segregated for reuse in rehabilitation. Excavated material may be used as aggregate for fill, footings, construction pads or road base. Where required, disposal off-site at an appropriately licensed waste facility in accordance with the *Waste Classification Guidelines*.	100%
	Vegetation clearing and grubbing	General solid waste (non-putrescible)	<4t	Stockpile	Resource recovery off-site - reprocessing at an appropriately licensed waste facility in accordance with the *Waste Classification Guidelines*.	100%
	Weed material	General solid waste (non-putrescible)	<1t	Skip bin	Weeds removed during work will be managed in accordance with the DPI requirements that relate to its classification status.	0%
Construction	Timber	General solid waste (non-putrescible)	Approx. 25t	Skip bin	Resource recovery off-site - Reuse, recycling, reprocessing or energy recovery at an appropriately licensed waste facility in accordance with the *Waste Classification Guidelines*.	100%
	Concrete waste	General solid waste (non-putrescible)	<100 m3	Stockpile	Resource recovery off-site - Reuse, recycling, reprocessing or energy recovery at an appropriately licensed waste facility in accordance with the *Waste Classification Guidelines*.	100%
	Packaging materials	General solid waste (non-putrescible)	< 7t	Skip bin	Resource recovery off-site - Reuse, recycling, reprocessing or energy recovery at an appropriately licensed waste facility in accordance with the *Waste Classification Guidelines*.	100%
Plant and equipment maintenance	Liquid wastes - waste oil, coolants, lubricants.	Liquid waste	Dependent on contamination levels of vehicles and containers to be washed.	Containerised in covered bunded storage	Disposal off-site at an appropriately licensed waste facility in accordance with the *Waste Classification Guidelines*.	0%

Activity / material	Waste Type	Waste Classification	Approx. annual quantity	Storage and treatment onsite	Proposed reuse /recycling/disposal methods	Reuse/ Recycle target
	Tyres	Special waste	<200L	Stockpile	Resource recovery off-site - Reuse, recycling, reprocessing or energy recovery at an appropriately licensed waste facility in accordance with the *Waste Classification Guidelines*.	100%
	Batteries	Hazardous waste	<10t	Covered bunded storage	Resource recovery off-site - Reuse, recycling, reprocessing or energy recovery at an appropriately licensed waste facility in accordance with the *Waste Classification Guidelines*.	100%
	Spill kit waste	General solid waste (non-putrescible)	<200L	Covered bunded storage	Disposal off-site at an appropriately licensed waste facility in accordance with the *Waste Classification Guidelines*.	0%
Decommissioning						
PV Panels	Supporting poles and mounts	General Solid Waste (non-putrescible)	Approx. 600 tonnes	Covered bunded storage	Resource recovery off-site - Reuse, recycling, reprocessing or energy recovery at an appropriately licensed waste facility in accordance with the *Waste Classification Guidelines*.	90%
	Glass		Approx. 250 tonnes			
	Silicon wafers		Approx. 40 tonnes			
Inverter	Electrical grade paper	Special waste	<1t	Covered bunded storage	Resource recovery off-site - Reuse, recycling, reprocessing or energy recovery at an appropriately licensed waste facility in accordance with the *Waste Classification Guidelines*.	65 – 90%
	Coated cloths					
	Laminates / tapes					
	Magnetic wire					
	Lead pads					
	Phase separators					
Electrical cables	Copper / aluminium	General Solid Waste (non-putrescible)	Approx. 25t	Covered Bunded storage	Resource recovery off-site - Reuse, recycling, reprocessing or energy recovery at an appropriately licensed waste facility in accordance with the *Waste Classification Guidelines*.	100%
	Polyvinyl chloride (PVC)					
	Rubber					
Concrete waste	Concrete	General Solid Waste (non-putrescible)	<500 m3	Stockpile	Resource recovery off-site - Reuse, recycling, reprocessing or energy recovery at an appropriately licensed waste facility in accordance with the *Waste Classification Guidelines*.	100%
Fencing	Metal	General Solid Waste (non-putrescible)	<5t	Stockpile	Resource recovery off-site - Reuse, recycling, reprocessing or energy recovery at an appropriately licensed waste facility in accordance with the *Waste Classification Guidelines*.	100%

3.14. Consideration of other hazards

3.14.1. Electromagnetic fields

Electromagnetic fields (EMFs) consist of electric and magnetic fields and are produced whenever electricity is used. Fields of different frequencies interact with the body in different ways. EMF field sources to which people may be exposed are predominantly in three frequency ranges. The Extremely Low Frequency (ELF) range of 0-300 Hz incorporates the 50 and 60 Hz frequencies of the electric power supply and of electric and magnetic fields generated by transmission lines and other electrical devices and infrastructure (Repacholi, 2003).

While it is accepted that short-term exposure to very high levels of electromagnetic fields can be harmful to health, the International EMF Development, established by the World Health Organisation, has thus far concluded that there are no substantive health consequences from exposure to ELF electric fields at the low levels generally encountered by the public (World Health Organization, 2007), such as those that would be produced by electricity generation in connection with the proposed development. The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA, 2015) advises that 'the scientific evidence does not establish that exposure to ELF EMF found near power lines is a hazard to human health'.

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) published Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300GHz) in 1998, updated 2020. The objective was to establish guidelines for limiting EMF exposure that would provide protection against known adverse health effects. ICNIRP recommends limiting exposure to these fields so that the threshold at which the external electric and magnetic field causes adverse effects inside the body is never reached.

The exposure limits, called basic restrictions, are related to the threshold showing adverse effects, with an additional safety factor. The exposure limits outside the body are called reference levels. These are derived using worst-case exposure assumptions, such that, remaining below the reference levels (in the air) implies that the basic restrictions would also be met (in the body) (ICNIRP, 2020).

Research into electric and magnetic fields undertaken at utility scale photovoltaic installations in California by Chang and Jennings (1994), indicated that magnetic fields were significantly less for solar arrays than for household applications. Chang and Jennings (1994) found magnetic fields from solar arrays were not distinguishable from background levels at the site boundary, suggesting the health risk of EMFs from solar arrays is minimal.

Potential impacts

The assessment focuses on the potential for health impacts. The EMFs emitted by the solar farm would not be likely to interfere with local mobile phone, radio, or television reception. These devices operate at a much higher frequency than the AC electrical equipment that would be used at the solar farms, and any EMFs produced would dissipate rapidly with distance from the source.

Potential for EMF impacts occurs only during the operational phase of the solar farm when electrical infrastructure generating EMFs. In relation to potential occupational exposure for solar farm personnel, the

electromagnetic fields would vary in different locations at the site. The development includes the following components that could generate EMFs:

- 2 x inverter stations or similar, including the inverter and transformer.
- the solar array (operating at a voltage of up to 1.5kV DC).

Typical and maximum EMF levels for these types of infrastructure are discussed below. As noted above, strength attenuates with distance from the infrastructure.

The closest non-associated receiver is approximately 530 metres northeast of the development footprint. The solar farm would be fenced, with no public access. During the operation phase, the solar farm would require one offsite contractor to attend the site on occasion.

Overhead powerlines

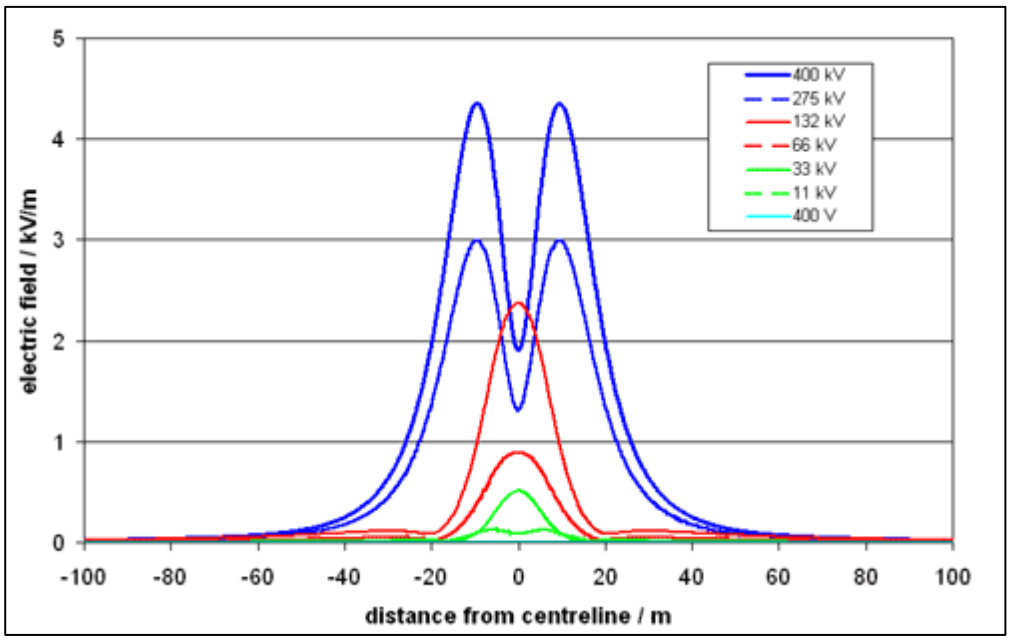


Figure 3-42 Typical electric fields from overhead powerlines (Source: EMFs.info 2017)

Figure 3-42 and Figure 3-43 and Table 3-11 show a range of magnetic field levels measured by the ARPANSA around powerlines and substations. The recommended 200μT and 1000μT limits are not exceeded, even if directly underneath the powerline. Only a short overhead powerline connection is proposed, to connect to the solar farm to the existing 33kV powerline.

Table 3-11 Typical magnetic fields near overhead powerlines and substations

Source	*Location of measurement*	*Range of measurement*	
		(mG)	**(μT)1**
HV Transmission line	Directly underneath	10 - 200	1 - 20
HV Transmission line	At edge of easement	2 - 50	0.2 - 5
Substation	At substation fence	1 - 8	0.1 – 0.8

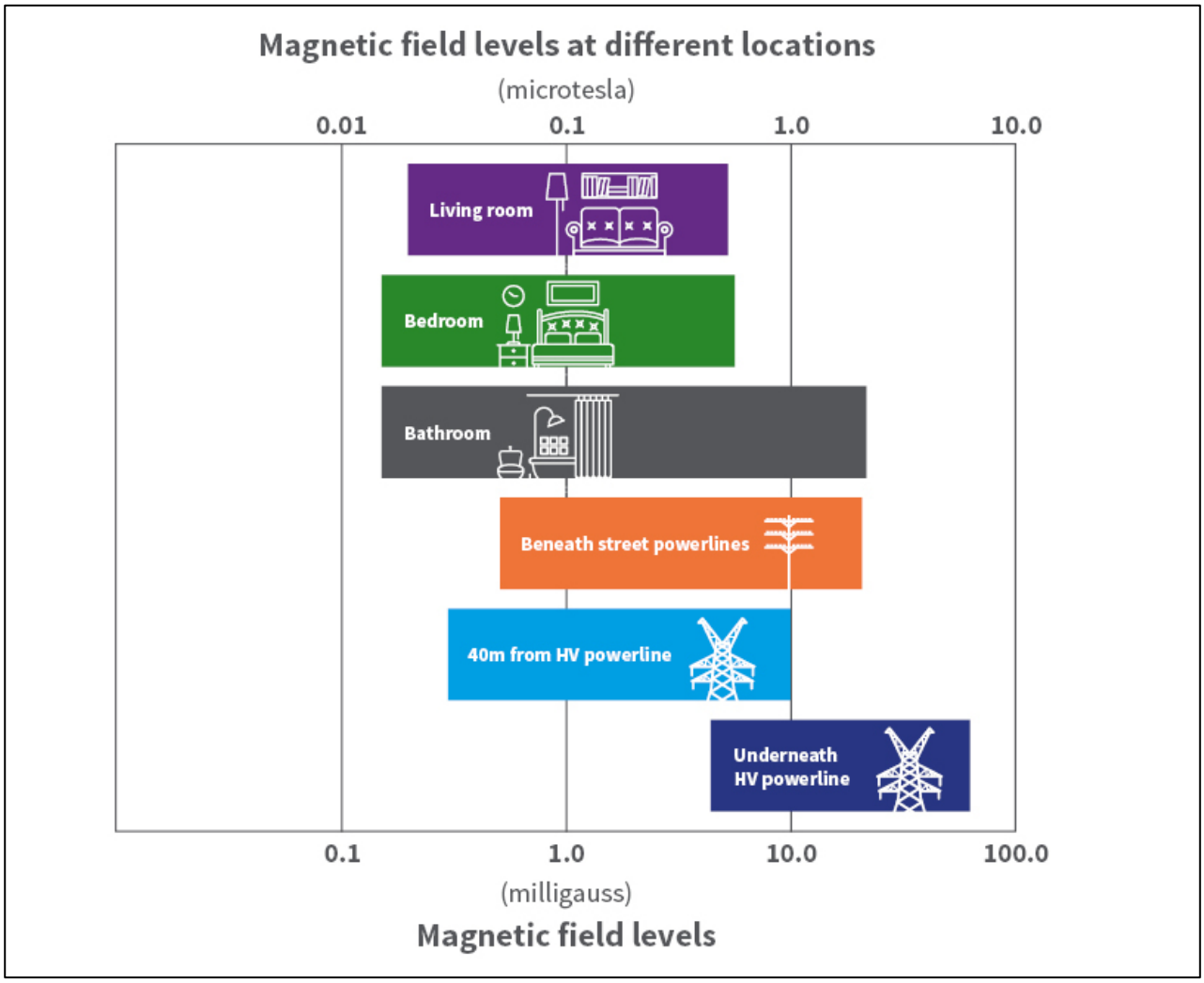


Figure 3-43 Magnetic field levels at different locations (Source: ARPANSA 2015)

[1] Converted from mG where 1 mG = 0.1 μT.

Underground cabling

The proposed development would require the installation of underground cables (of varying voltages up to 11 kV) within the solar array External electric fields from underground cables are attenuated by the soil.

National Grid (EMFs.info 2020) provides typical magnetic field data for a single 11kV underground cables at 0.5m depth. As illustrated in the table below, the magnetic fields generated by underground cabling would be considerably less than the recommended limits of 200 µT and 1000 µT.

Table 3-12 Magnetic field levels from underground 11kV cabling (National Grid, n.d.)

Magnetic Field (µT) at distance from centreline			
0 m	5 m	10 m	20 m
0.75	0.22	0.11	0.06

Inverters and transformers

Based on the current design, two inverters would be installed on site. The inverters would have a total output of up to 5 MVA (AC). The inverter would typically have an AC power frequency range between 47 and 63 Hz and fall into the Extremely Low Frequency (ELF) range of 0-300 Hz. Within this range, EMFs are not considered to be hazardous to human health.

Additionally, the inverters would be containerised and located within the fenced solar farm site with no public access. It would produce power only during the daytime, reducing the total time that EMFs are generated by the infrastructure.

Solar array

The solar farm would require installation of DC cables between the solar panels and inverter. This wiring would typically conduct less than 500A and 1500V. The potential for electromagnetic interference as a result of the aboveground or underground cable is considered to be negligible.

3.14.2. Microclimate

Several studies have shown that photovoltaic (PV) panels convert incident solar radiation into heat, and this can alter the airflow and temperature profiles within and adjacent to the panels. This is referred to as the Photovoltaic Heat Island (PVHI) Effect.

Whether such changes may subsequently affect the thermal environment of near-by populations of humans and other species have been questioned (Fthenakis & Yu, 2013). To date there are limited empirical studies on the potential for a heat island effect in utility scale solar plants. Published papers relevant to this issue include:

- Armstrong A, Ostle N and Whitaker J, Solar park microclimate and vegetation management effects on grassland carbon cycling, 2016 (Armstrong, Ostle, & Whitaker, 2016).
- Barron-Gafford, GA, Minor, RL, Allen, NA, Cronin, AD, Brooks, AE & Pavao-Zuckerman, MA 2016, 'The photovoltaic heat island effect: Larger solar power plants increase local temperatures' Scientific Reports, vol 6, 35070. DOI: 10.1038/srep35070 (Barron-Gafford, et al., 2016).
- Fthenakis, V.,& Yu, Y., 2013, Analysis of the potential for a heat island effect in large solar farms, Photovoltaic Specialists Conference (PVSC), 2013 IEEE 39th (Fthenakis & Yu, 2013).
- Yang L, Gao X, Lv F, Hui X, Ma L, and Hou X, Study on the local climatic effects of large photovoltaic solar farms in desert areas Solar Energy 144, 244–253, 2017 (Yang, et al., 2017).

The issue has also been subject to consideration previously 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 (Planning 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 G. , 2018).

Studies completed indicate conflicting results, which may reflect site and development design differences. 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, et al., 2016). Other studies conclude that whilst air temperatures may increase within the solar plant itself, they rapidly decrease to the ambient temperature beyond the perimeter of the solar plant (Fthenakis & Yu, 2013).

Armstrong et al (2016) focussed on microclimate and ecosystem processes directly under the panels. They found:

- PV arrays caused seasonal and diurnal variation in air and soil microclimate. These varied between summer (cooling of up to 5.20c) and winter (cooling up to 1.70c).
- Drying occurred under the PV arrays compared with gap and control areas.
- Differences in the above ground plant biomass and species diversity, with both lower under the PV array.
- Photosynthesis and net ecosystem exchange in spring and winter were also lower under the PV array.

Yang et al (2017) looked at air and soil temperature within a solar farm and at a control site without PV. This found that at a height of 2m in the two sites studied the daytime temperature was essentially the same during winter, while during the other seasons the daytime air temperature in the PV array is higher than that in the control without PV, with the maximum difference appearing in summer. At a height of 2m, the night-time air temperatures during the four seasons in the solar farm are higher than the control outside of the PV array. It also found that the annual range of soil temperatures at depths of 5–180 cm in the solar farm was larger than that in the region without PV. The soil temperature at different depths during winter at the solar farm was clearly lower than that in the region without PV, indicating that the PV farm is a cooling system.

Fthenakis and Yu (2013) undertook an analysis of the potential for large solar plants to generate a PVHI effect and increase air temperature within the solar plant area. The study found at the centre of the solar plant the annual average air temperature at a height of 2.5m increased by up to 1.90C. However, this increase in temperature dissipated at a height of 5m. Additionally, the solar plant completely cooled overnight, so the effect was limited in duration.

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 a distance of 30 m from the edge of the PV array (Figure 3 13). 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'.

In conclusion of the Victorian Planning Panel Report (Planning Panel Report, 2018), the panel accepted that solar arrays would affect air and soil temperatures within the solar array perimeter, and that in relation to outside of the solar array perimeter a heat island effect is unlikely to occur. It identified that any temperature increase within the solar array would be marginal and recommended a 30-metre setback from any neighbouring property.

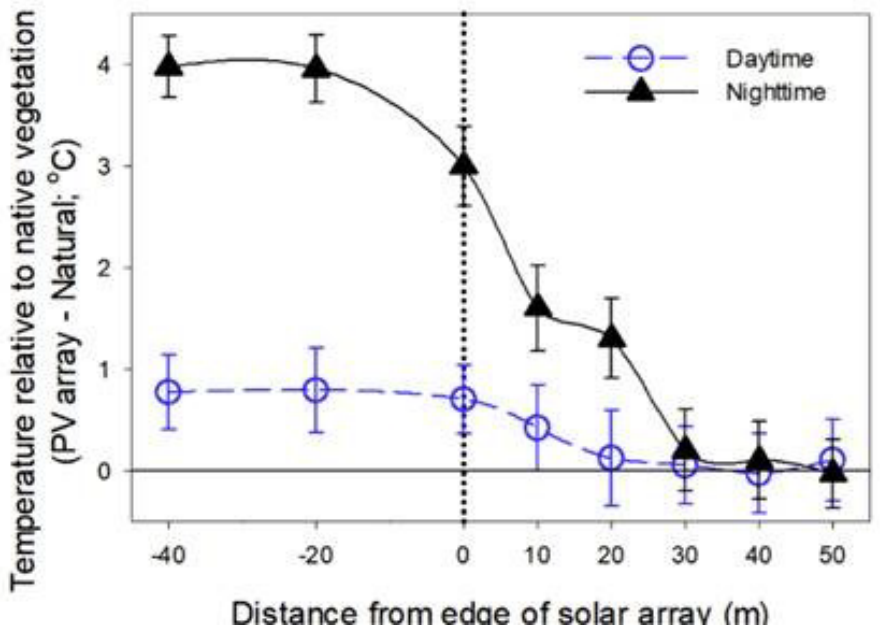


Figure 3-44 Measures of air temperature within and outside of the PV array (Source:- Barron-Gafford 2018)

The research indicates a small potential effect on climate within the solar array. Negligible impacts on adjacent properties and agricultural activities such as plant growth and health of cattle would occur. It is also unlikely that the heat would be carried offsite by the wind. Where sensitive land use occurs adjacent to solar panels, consideration to maintaining a 30 m buffer could be made.

There are no sensitive land uses surrounding the proposed development site. Surrounding land is also used for agricultural activities. The closest neighbouring dwelling is located approximately 530m north-east of the proposed solar array. Satisfactory buffers are provided, and the proposed development would have no heat island effects on surrounding neighbours.

4. Statutory framework

4.1. Commonwealth legislation

4.1.1. Environment Protection and Biodiversity Conservation Act 1999

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) is administered by the Commonwealth Department of the Environment and Energy (DEE). 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').

In the preparation of the PBAR, database searches and site surveys were undertaken to determine the presence and likelihood of impact to threatened species and communities of relevant under the EPBC Act. As outlined earlier in this report, and in further detail in the PBAR (Appendix B), the proposed development is not likely to have a significant impact on threatened species and communities, migratory bird species and marine species listed under the EPBC Act.

4.1.2. Renewable Energy (Electricity) Act 2000

The Renewable Energy (Electricity) Act 2000 (RE Act) aims to:

- Encourage the additional generation of electricity from renewable sources.
- Reduce emissions of greenhouse gases in the electricity sector.
- Ensure that renewable energy sources are ecologically sustainable.

Section 17 of the RE Act defines renewable energy sources eligible under the Commonwealth Government's RET; this includes solar energy. Certificates for the generation of electricity are issued using eligible renewable energy sources. The proposed development would need to be accredited as a Renewable Energy Generator to create Renewable Energy Certificates.

4.2. State legislation

4.2.1. 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.

Integrated Development

The proposed development is understood to be integrated development. The proposed development includes works on a regional road under the control of Transport for NSW (TfNSW). An approval under the *Roads Act 1993* is required.

4.2.2. Biodiversity Conservation Act 2016

Development assessed under Part 4 of the EP&A Act must also address the relevant requirements of the *Biodiversity Conservation Act 2016* (BC Act).

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 biodiversity development assessment report (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. The proposed development would have a low impact on biodiversity values and would not generate a Biodiversity Offsets Scheme (BOS) offset obligation. Further detailed assessment is not required according to the BC Act.

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

4.2.3. State Environmental Planning Policy (Planning Systems) 2021

The proposed development is funded by the proponent and the calculated capital investment value (CIV) is $5.7 million. According to Schedule 7 of the State Environmental Planning Policy (Planning Systems) 2021, 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 and referred to the Regional Planning Panel for determination.

4.2.4. 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 using 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 non-residential zone.*

The development site is zoned RU1 Primary Production, which is a prescribed non-residential zone according to section 2.35. 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.

2.119 Development with frontage to a classified road

The provisions of section 2.119 of the SEPP must be considered as the proposed development would have frontage to a classified road and access is proposed from this road (Kidman Way, a regional road under the control of TfNSW).

> *(2) The consent authority must not grant consent to development on land that has a frontage to a classified road unless it is satisfied that—*
>
> *(a) where practicable and safe, vehicular access to the land is provided by a road other than the classified road, and*
>
> *(b) the safety, efficiency and ongoing operation of the classified road will not be adversely affected by the development as a result of—*
>
> *(i) the design of the vehicular access to the land, or*
>
> *(ii) the emission of smoke or dust from the development, or*
>
> *(iii) the nature, volume or frequency of vehicles using the classified road to gain access to the land, and*
>
> *(c) the development is of a type that is not sensitive to traffic noise or vehicle emissions, or is appropriately located and designed, or includes measures, to ameliorate potential traffic noise or vehicle emissions within the site of the development arising from the adjacent classified road.*

Matters relevant to the classified road are addressed in detail in the accompanying TIA (Appendix B) and summarised in section 3.4 of this report.

2.122 Traffic generating 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 TIA, 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 10 heavy vehicle movements.

4.2.5. 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 considered conclusive within itself. The potential hazardousness and offensiveness of the proposed development is discussed below.

According to the Department of Planning and Environment's Large-Scale Solar Energy Guideline, a solar farm would not typically be considered offensive or hazardous development, unless a battery energy storage system exceeding 30MW is involved. The proposed development would not involve such an element.

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 that contamination associated with cropping present on the site. No physical evidence of contamination was observed by NGH during a site inspection, nor identified in any specialist supporting assessments completed for the proposed development.

A search of the EPA contaminated sites register on 29 November 2023 indicates that there is one listed site, located in Hillston township itself, being the Former BP Depot located in Cowper Street Hillston. No other sites were listed at or near the subject land.

A search of the EPA contaminated s land record of notices on 29 November 2023 for the Carrathool Shire Council did not find any records in the current database.

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 (as an electricity generating facility) would not be considered a more sensitive land use than agriculture. Livestock grazing may also continue on the development site to assist with management of groundcover across the solar array.

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.

4.2.6. Roads Act 1993

The proposed development includes upgrades to the existing access point from Kidman Way at the north-eastern corner of the subject land. TfNSW is the roads authority for the Kidman Way, as a state road.

A permit under section 138 of the Roads Act and Works Access Deed (WAD) would be sought from TfNSW prior to the release of the construction certificate for the proposed development.

4.3. Local planning instruments

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 indicated in Figure 4-1.

Figure 4-1 LEP Land Use Zoning

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 4-2, it is considered the proposed development would contribute to the achievement of relevant objectives of the RU1 Primary Production zone.

Table 4-1 LEP RU1 Zone Objectives

RU1 Primary Production Zone Objectives	Assessment
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 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 trigger restrictions on 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 proposed development would increase the diversity of permitted uses in the RU1 zone, though not strictly a primary industry enterprise. The development would complement grazing and other existing

the area.	agricultural activities on adjacent properties. The development would not restrict primary industry in the surrounding area.
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 surrounding the development site is also zoned RU1. The proposed development is considered to be relatively passive and is a permitted use in the zone. The impacts of the proposed development are compatible with the continued use of the surrounding area for agriculture as summarised in the LUCRA assessment in this report. Suitable buffers are provided to adjoining productive agricultural lands. Land use conflict is not anticipated as result of the proposed development.
To facilitate farm adjustments.	A boundary adjustment or subdivision is not proposed.
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 horticultural production potential of land in the locality.	The development would complement grazing and other existing agricultural activities on adjacent properties. The development would not restrict agricultural and horticultural production potential in the surrounding area.
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.

Section 5.21 Flood planning

The subject land has been identified as being subject to flood risk and the provisions of section 5.21 Flood Planning apply to proposed development. A flood risk assessment has been prepared by Cumulus Engineering and included as Appendix D.

The findings are summarised earlier in this report and the relevant LEP controls are addressed below.

Table 4-2 LEP Flood planning matters for consideration

Matters for consideration	Comment
(2) Development consent must not be granted to development on land the consent authority considers to be within the flood planning area unless the consent authority is satisfied the development—	
(a) is compatible with the flood function and behaviour on the land, and	Flood mapping shows that the site of the proposed development is partially impacted by inundation in the 1% AEP event, however based on the current site layout, solar farm infrastructure would be located outside of the 1% AEP flood extent. A flood response plan is recommended for the site to ensure evacuation of the site in advance of a flood event. Accordingly, it is considered the proposed development is compatible with the flood function and behaviour on the land.
(b) will not adversely affect flood behaviour in a way that results in detrimental increases in the potential flood affectation of other development or properties, and	The solar farm infrastructure is located outside of the flood extent aside from the access track to Kidman Way. There is no fill proposed within the flood extent and therefore there will be no adverse impacts resulting in detrimental increases in the potential flood affectation of other development or properties.
(c) will not adversely affect the safe occupation and efficient evacuation of people or exceed the capacity of existing evacuation routes for the surrounding area in the event of a flood, and	The proposed development would not involve any works that would prevent the safe occupation and efficient evacuation of people or exceed the capacity of existing evacuation routes. The proposed development is of a nature where there would be no concerns or issues, should access to the site be unavailable for a period of time during major flooding.
(d) incorporates appropriate measures to manage risk to life in the event of a flood, and	The proposed development is of a nature where there would be no concerns or issues, should access to the site be unavailable for a period of time during major flooding. A flood response plan would be prepared for the proposed development to further detail such arrangements and to ensure evacuation of the site in advance of a flood event. The solar farm infrastructure within the site is not flood-affected in the 1% AEP event. The risk to life is considered minimal.
(e) will not adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.	The subject land is significantly separated from river banks and watercourses and would be unlikely to cause associated erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses. Groundcover would be managed, and most likely improved in comparison to existing agricultural ploughing and sowing practices, to ensure any erosion and sedimentation is avoided and minimised.

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 4-3 LEP Earthworks matters for consideration

Matters for consideration	Comment
The likely disruption of, or any detrimental effect on, drainage patterns and soil stability in the locality.	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 about 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.	Earthworks associated with the proposed development would not be expected to have any effect on the existing and likely amenity of adjoining properties, given the nature and extent of proposed earthworks and buffers to adjoining properties.
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 generally remain on-site.
The likelihood of disturbing relics.	Given the nature and extent of any proposed earthworks, it is considered the likelihood of disturbing relics is low.
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.

Section 6.6 Wetlands

The subject land is partially mapped as wetlands under section 6.6 of the CLEP. The mapping generally aligns with flood mapping. The proposed development would not involve any permanent infrastructure within the mapped area; however, the existing internal access road through the mapped area would be used.

The potential impacts of the proposed development on matters of biodiversity were considered in detailed in a PBAR prepared and included in Appendix C. The assessment indicated the proposed development would not have a significant adverse impact on the condition and significance of the existing native fauna and flora on the land, the provision and quality of habitats on the land for indigenous and migratory species, nor the surface and groundwater characteristics of the land, including water quality, natural water flows and salinity.

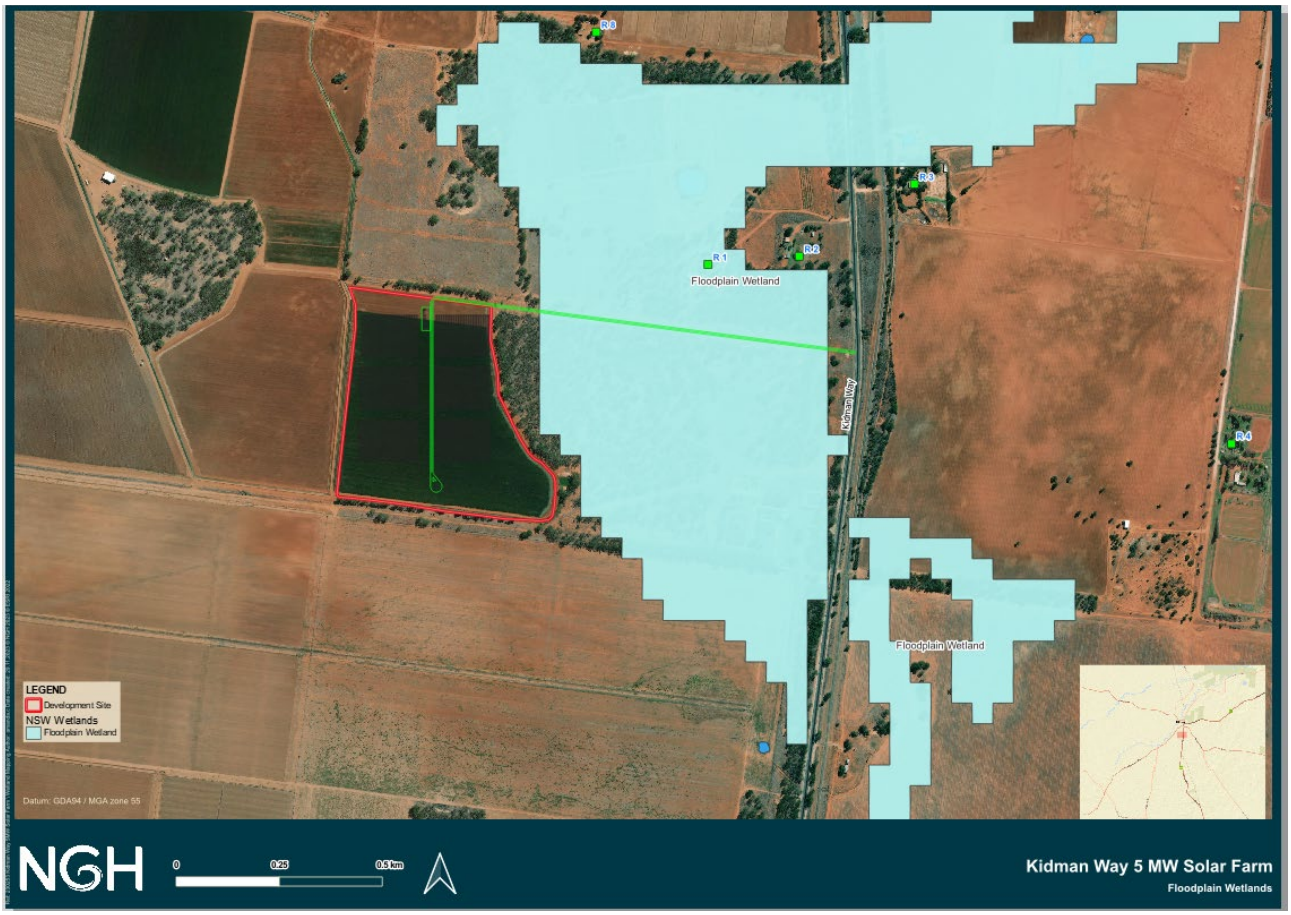


Figure 4-2 Wetland LEP map of subject land and surrounds

4.4. 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 EP&A Act and Regulation and the POEO Act.

Based on the likely costs and benefits of the proposed solar farm, the development is considered to comply with the principles of ESD. ESD principles and their relationship to the design, construction and ongoing operations of the development are addressed in the following table.

Table 4-4 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 40 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.	The design of the proposed development has been developed in response to a variety of matters include biodiversity considerations. Further to this, 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 all high value biodiversity features on the site and provided generous buffers. 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,*	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

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 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.*	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 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.

5. Conclusion

The proposed Kidman Way 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 proposed development site has been carefully selected and the infrastructure layout designed in response to various considerations including environmental and amenity factors relevant for renewable energy facilities and the rural setting the proposed would be carried out within.

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

The development would provide the following benefits:

- Producing approximately 12,000 MWh of renewable electricity per year.
- Supply enough power each year to service around 2,000 average NSW households.
- It would diversify income and increase revenue to related contractors and suppliers as well as 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 1 FTE staff during operation over the life of the development.
- The development is consistent with the Carrathool Local Strategic Planning Statement, Riverina Murray Regional Plan and NSW and Federal Government legislation and strategies.

Surrounding receivers would not be negatively impacted by the proposal. The visual impacts are minimised by existing remnant vegetation and separation from existing receivers. Noise during construction and operation would have an acceptable impact. Importantly, no remnant native vegetation or sensitive biodiversity features would be impacted by the proposed development. The impacts of the proposed development would be managed to ensure the amenity of surrounding properties and their productive agricultural capacity were not affected.

This SEE and all supporting documents have shown that there are reasonable grounds for the Planning Panel to consider granting consent for the development. The safeguards and mitigation measures committed to by the proponent in this SEE would enable a development that avoids and minimises environmental, and amenity impacts and would provide for passive renewable energy generation suitable for the proposed location.

6. References

Armstrong, A., Ostle, N. J., & Whitaker, J. (2016). Solar park microclimate and vegetation management effects on grassland carbon cycling. *Environmental Research Letters, 11*(7), 074016. doi:10.1088/1748-9326/11/7/074016

ARPANSA. (2015). *Electricity and health.* Australian Radiation Protection and Nuclear Safety Agency. Retrieved from https://www.arpansa.gov.au/understanding-radiation/radiation-sources/more-radiation-sources/electricity

Australian Government Department of Industry, Science, Energy and Resources. (2021). *Australia's whole-of-economy Long-Term Emissions Reduction Plan.* Australian Government Department of Industry, Science, Energy and Resources.

Barron-Gafford, G. (2018). *Statement of evidence by Greg Barron-Gafford on solar heat islanding issues.* Barron-Gafford Research Group.

Barron-Gafford, G. A., Minor, R. L., Allen, N. A., Cronin, A. D., Brooks, A. E., & Pavao-Zuckerman, M. A. (2016). The Photovoltaic Heat Island Effect: Larger solar power plants increase local temperatures. *Scientific Reports, 6*(1), 2045-2322. doi:10.1038/srep35070

Chang, G., & Jennings, C. (1994). Magnetic field survey at PG&E photovoltaic sites. *Office of Scientific and Technical Information U.S. Department of Energy*.

DPI. (2011). *Land Use Conflict Risk Assessment (LUCRA) Guide.* Retrieved from NSW Government Department of Primary Industries: https://www.dpi.nsw.gov.au/agriculture/lup/development-assessment/development-assessment2/lucra

DPIE. (2022). *Technical Supplement - Landscape and Visual Impact Assessment - Large-Scale Solar Energy Guideline.* DPIE.

EPA. (2017). *Noise policy for industry*. Retrieved from Environmental Protection Authority: https://www.epa.nsw.gov.au/your-environment/noise/industrial-noise/noise-policy-for-industry-(2017)

Fthenakis, V., & Yu, Y. (2013). Analysis of the potential for a heat island effect in large solar farms. *Conference Record of the IEEE Photovoltaic Specialists Conference*, (pp. 3362-3366). doi:10.1109/PVSC.2013.6745171

ICNIRP. (2020). *RF EMF Guidelines 2020.* Retrieved from International Commision on Non-ionizing Radiation Protection: https://www.icnirp.org/en/activities/news/news-article/rf-guidelines-2020-published.html#:~:text=The%20ICNIRP%20Guidelines%20on%20Limiting,100%20kHz%20to%20300%20GHz.

National Grid. (n.d.). *33 kV*. Retrieved from EMFs.info: http://www.emfs.info/sources/overhead/specific/33-kv/

NSW EPA. (2014). *Waste Classifying Guidelines Part 1: Classifying Waste.* Retrieved from NSW EPA: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.epa.nsw.gov.au/~/media/EPA/Corporate%20Site/resources/wasteregulation/140796-classify-waste.ashx

NSW EPA. (2017). *Noise Policy for Industry (2017).* NSW EPA.

NSW OEH. (2012). *The land and soil capability assessment scheme. Second approximation. A general land evaluation system for New South Wales.* Sydney: Office of Environment and Heritage Department of Premier and Cabinet NSW.

Planning Panel Report. (2018). *Greater Shepparton Solar Energy Facility Planning Permit Applications 2017-162, 2017-274, 2017-301 and 2017-344.* Victoria State Government.

Repacholi, M. H. (2003). *An overview of WHO's EMF Project and the Health Effects of EMF Exposure Generation.* Dresden, Germany: 21st European Photovoltaic Solar Energy Conference.

World Health Organization. (2007). *Electromagnetic fields and public health: Exposure to extremely low frequency fields*. Retrieved June 4, 2020, from https://www.who.int/peh-emf/publications/facts/fs322/en/

Yang, L., Gao, X., Lv, F., Hui, X., Ma, L., & Hou, X. (2017). Study on the local climatic effects of large photovoltaic solar farms in desert areas. *Solar Energy, 144*, 244-253. doi:10.1016/j.solener.2017.01.015

Appendix A Development design plans

Appendix B Traffic Impact Assessment

Appendix C Biodiversity Assessment

Appendix D Flood risk assessment

Appendix E Background searches

SENSITIVE INFORMATION. IF REPORT IS PUBLISHED, THIS INFORMATION SHOULD BE REDACTED.

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Kidman

Client Service ID : 801056

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
41-3-0009	Hillston Canoe;TSR 3023;Cowl Cowl;	AGD	55	357700	6291060	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	
	Contact	**Recorders**	Mr.M Harris					**Permits**		
41-3-0008	Chief Hunthawang;Bobbys Grave;Cowl Cowl;	AGD	55	357710	6291120	Open site	Valid	Burial : -, Modified Tree (Carved or Scarred) : -	Burial/s,Scarred Tree	
	Contact	**Recorders**	Mr.M Harris,E.S Bowden					**Permits**		
41-3-0107	MF-ST9	AGD	55	358440	6295510	Open site	Valid	Modified Tree (Carved or Scarred) : 1		97728,98203
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0002	Multi-Scar Box Tree;T.S.R.2633;Hillston;	AGD	55	363160	6294360	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	
	Contact	**Recorders**	Mr.M Harris					**Permits**		
42-1-0017	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0015	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0014	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0023	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0012	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0046	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0220	HB-ST-2 (Hillston)	GDA	55	363300	6295110	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Mills Archaeological & Heritage Services Pty Ltd					**Permits**		
42-1-0231	HIllston Bridge Scarred Tree Site 6	GDA	55	363327	6295333	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Mr.Josh Symons					**Permits**		

Report generated by AHIMS Web Service on 17/07/2023 for Kirwan Williams for the following area at Datum :GDA, Zone : 55, Eastings : 357500.0 - 367500.0, Northings : 6286000.0 - 6296000.0 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 70

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Kidman

Client Service ID : 801056

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
42-1-0230	Hillston Bridge Scarred Tree Site 5	GDA	55	363373	6295353	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Mr.Josh Symons					**Permits**		
42-1-0034	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0236	Hillston Central School Scar Tree 2	GDA	55	364569	6294648	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Mr.Mark Saddler					**Permits**		
42-1-0032	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0020	HN - ST 10	AGD	55	364617	6293283	Open site	Valid	Modified Tree (Carved or Scarred) : 46		
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0030	HN - ST20	AGD	55	364618	6293718	Open site	Valid	Modified Tree (Carved or Scarred) : 46		
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0028	HN - ST18	AGD	55	364630	6293674	Open site	Valid	Modified Tree (Carved or Scarred) : 46		
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0029	HN - ST19	AGD	55	364630	6293686	Open site	Valid	Modified Tree (Carved or Scarred) : 46		
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0041	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-4-0015	Hillston 3	GDA	55	362489	6287534	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats,Mrs.S					**Permits**		
42-4-0016	Hillston 4	GDA	55	363246	6287993	Open site	Valid	Artefact : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats,Mrs.S					**Permits**		
42-1-0219	HB-ST-1 (Hillston)	GDA	55	363330	6295080	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Mills Archaeological & Heritage Services Pty Ltd					**Permits**		

Report generated by AHIMS Web Service on 17/07/2023 for Kirwan Williams for the following area at Datum :GDA, Zone : 55, Eastings : 357500.0 - 367500.0, Northings : 6286000.0 - 6296000.0 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 70

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Kidman

Client Service ID : 801056

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
42-1-0016	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0024	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0021	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0035	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0043	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0039	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-4-0013	Hillston 1	GDA	55	362632	6289856	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats,Mrs.S					**Permits**		
42-1-0019	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0036	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0026	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0038	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0040	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0049	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0056	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			

Report generated by AHIMS Web Service on 17/07/2023 for Kirwan Williams for the following area at Datum :GDA, Zone : 55, Eastings : 357500.0 - 367500.0, Northings : 6286000.0 - 6296000.0 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 70

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Kidman

Client Service ID : 801056

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0033	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0025	HN - ST15	AGD	55	364579	6293579	Open site	Valid	Modified Tree (Carved or Scarred) : 46		
	Contact Mr.Chris Johnston	**Recorders**	Steven Meredith					**Permits**		
42-1-0031	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0050	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-4-0014	Hillston 2	GDA	55	362091	6288003	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats,Mrs.S					**Permits**		
42-1-0232	Hillston Bridge Scarred Tree Site 7	GDA	55	363304	6295323	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Mr.Josh Symons					**Permits**		
42-4-0017	Hillston 5	GDA	55	363509	6290055	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Biosis Pty Ltd - Wollongong,Biosis Pty Ltd - Wollongong,Mrs.Samantha Keats,Mrs.S					**Permits**		
42-1-0053	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0048	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0047	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0044	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0058	Hillston Carved Tree	AGD	55	365053	6293893	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	**Recorders**	Steven Meredith					**Permits**		

Report generated by AHIMS Web Service on 17/07/2023 for Kirwan Williams for the following area at Datum :GDA, Zone : 55, Eastings : 357500.0 - 367500.0, Northings : 6286000.0 - 6296000.0 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 70

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Kidman

Client Service ID : 801056

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
42-1-0229	Hillston Bridge Scarred Tree Site 4	GDA	55	363513	6295530	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Mr.Josh Symons					**Permits**		
42-1-0057	Hillston/Cowper St.1	AGD	55	364437	6294434	Open site	Valid	Modified Tree (Carved or Scarred) : 2		
	Contact Mr.Chris Johnston	**Recorders**	Steven Meredith					**Permits**		
42-1-0022	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0013	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0018	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0042	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0054	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0055	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0045	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0218	HB-ST-3 (Hillston)	GDA	55	363330	6295090	Open site	Valid	Modified Tree (Carved or Scarred) : 1		
	Contact	**Recorders**	Mills Archaeological & Heritage Services Pty Ltd					**Permits**		
42-1-0233	Hillston Bridge Scarred Tree Site 8	GDA	55	363416	6295200	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Mr.Josh Symons					**Permits**		
42-1-0234	Hillston Bridge Scarred Tree Site 9	GDA	55	363429	6295189	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Mr.Josh Symons					**Permits**		

Report generated by AHIMS Web Service on 17/07/2023 for Kirwan Williams for the following area at Datum :GDA, Zone : 55, Eastings : 357500.0 - 367500.0, Northings : 6286000.0 - 6296000.0 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 70

AHIMS Web Services (AWS)

Extensive search - Site list report

Your Ref/PO Number : Kidman

Client Service ID : 801056

SiteID	SiteName	Datum	Zone	Easting	Northing	Context	Site Status **	SiteFeatures	SiteTypes	Reports
42-1-0235	Hillston Central School 1	GDA	55	364538	6294620	Open site	Valid	Modified Tree (Carved or Scarred) : -		
	Contact	**Recorders**	Mr.Mark Saddler					**Permits**		
42-1-0027	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0037	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0010	H-ST-02	AGD	55	364740	6294200	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	4350
	Contact	**Recorders**	Central West Archaeological and Heritage Services Pty Ltd					**Permits**		
42-1-0052	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0051	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		
42-1-0008	H-St=-01	AGD	55	364840	6294200	Open site	Valid	Modified Tree (Carved or Scarred) : -	Scarred Tree	4350
	Contact	**Recorders**	Central West Archaeological and Heritage Services Pty Ltd					**Permits**		
42-1-0011	Restriction applied. Please contact ahims@environment.nsw.gov.au.					Open site	Valid			
	Contact	**Recorders**	Steven Meredith					**Permits**		

**** Site Status**

Valid - The site has been recorded and accepted onto the system as valid

Destroyed - The site has been completely impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There is nothing left of the site on the ground but proponents should proceed with caution.

Partially Destroyed - The site has been only partially impacted or harmed usually as consequence of permit activity but sometimes also after natural events. There might be parts or sections of the original site still present on the ground

Not a site - The site has been originally entered and accepted onto AHIMS as a valid site but after further investigations it was decided it is NOT an aboriginal site. Impact of this type of site does not require permit but Heritage NSW should be notified

Report generated by AHIMS Web Service on 17/07/2023 for Kirwan Williams for the following area at Datum :GDA, Zone : 55, Eastings : 357500.0 - 367500.0, Northings : 6286000.0 - 6296000.0 with a Buffer of 0 meters.. Number of Aboriginal sites and Aboriginal objects found is 70

Background

A strategy to systematically prioritise, assess and respond to notifications under Section 60 of the ***Contaminated Land Management Act 1997*** (CLM Act) has been developed by the EPA. This strategy acknowledges the EPA's obligations to make information available to the public under ***Government Information (Public Access) Act 2009***.

When a site is notified to the EPA, it may be accompanied by detailed site reports where the owner has been proactive in addressing the contamination and its source. However, often there is minimal information on the nature or extent of the contamination.

After receiving a report, the first step is to confirm that the report does not relate to a pollution incident. The Protection of the Environment Operations Act 1997 (POEO Act) deals with pollution incidents, waste stockpiling or dumping. The EPA also has an incident management process to manage significant incidents (https://www.epa.nsw.gov.au/reporting-and-incidents/incident-management).

In many cases, the information indicates the contamination is securely immobilised within the site, such as under a building or carpark, and is not currently causing any significant risks for the community or environment. Such sites may still need to be cleaned up, but this can be done in conjunction with any subsequent building or redevelopment of the land. These sites do not require intervention under the CLM Act, and are dealt with through the planning and development consent process. In these cases, the EPA informs the local council or other planning authority, so that the information can be recorded and considered at the appropriate time (https://www.epa.nsw.gov.au/your-environment/contaminated-land/managing-contaminated-land/role-of-planning-authorities).

Where indications are that the contamination could cause actual harm to the environment or an unacceptable offsite impact (i.e. the land is 'significantly contaminated'), the EPA would apply the regulatory provisions of the CLM Act to have the responsible polluter and/or landowner investigate and remediate the site. If the reported contamination could present an immediate or long-term threat to human health NSW Health will be consulted. SafeWork NSW and Water NSW can also be consulted if there appear to be occupational health and safety risks or an impact on groundwater quality.

As such, the sites notified to the EPA and presented in the list of contaminated sites notified to the EPA are at various stages of the assessment and remediation process. Understanding the nature of the underlying contamination, its implications and implementing a remediation program where required, can take a considerable period of time. The list provides an indication, in relation to each nominated site, as to the management status of that particular site. Further detailed information may be available from the EPA or the person who notified the site.

The following questions and answers may assist those interested in this issue.

Frequently asked questions

Why does my land appear on the list of notified sites?

Your land may appear on the list because:

- the site owner and/or the polluter has notified the EPA under section 60 of the CLM Act
- the EPA has been notified via other means and is satisfied that the site is or was contaminated.

If a site is on the list, it does not necessarily mean the contamination is significant enough to regulate under the CLM Act.

Does the list contain all contaminated sites in NSW?

No. The list only contains contaminated sites that EPA is aware of. If a site is not on the list, it does not necessarily mean the site is not contaminated.

The EPA relies on responsible parties and the public to notify contaminated sites.

How are notified contaminated sites managed by the EPA?

There are different ways the EPA can manage notified contaminated sites. Options include:

• regulation under the CLM Act, POEO Act, or both
• notifying the relevant planning authority for management under the planning and development process
• managing the site under the Protection of the Environment Operation (Underground Petroleum Storage Systems) Regulation 2014.

There are specific cases where contamination is managed under a tailored program operated by another agency (for example, the Resources & Geoscience's Legacy Mines Program).

What should I do if I am a potential buyer of a site that appears on the list?

You should seek advice from the seller to understand the contamination issue. You may need to seek independent contamination or legal advice.

The information provided in the list is indicative only and a starting point for your own assessment. Land contamination from past site uses is common, mainly in urban environments. If the site is properly remediated or managed, it may not affect the intended future use of the site.

Who can I contact if I need more information about a site?

You can contact the Environment Line at any time by calling 131 555 or by emailing info@environment.nsw.gov.au.

List of NSW Contaminated Sites Notified to the EPA

Disclaimer

The EPA has taken all reasonable care to ensure that the information in the list of contaminated sites notified to the EPA (the list) is complete and correct. The EPA does not, however, warrant or represent that the list is free from errors or omissions or that it is exhaustive.

The EPA may, without notice, change any or all of the information in the list at any time.

You should obtain independent advice before you make any decision based on the information in the list.

The list is made available on the understanding that the EPA, its servants and agents, to the extent permitted by law, accept no responsibility for any damage, cost, loss or expense incurred by you as a result of:

1. any information in the list; or
2. any error, omission or misrepresentation in the list; or
3. any malfunction or failure to function of the list;
4. without limiting (2) or (3) above, any delay, failure or error in recording, displaying or updating information.

Site Status	Explanation
Under assessment	The contamination is being assessed by the EPA to determine whether regulation is required. The EPA may require further information to complete the assessment. For example, the completion of management actions regulated under the planning process or *Protection of the Environment Operations Act 1997*.
Under Preliminary Investigation Order	The EPA has issued a Preliminary Investigation Order under s10 of the *Contaminated Land Management Act 1997*, to obtain additional information needed to complete the assessment.
Regulation under CLM Act not required	The EPA has completed an assessment of the contamination and decided that regulation under the *Contaminated Land Management Act 1997* is not required.

Regulation being finalised	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the *Contaminated Land Management Act 1997*. A regulatory approach is being finalised.
Contamination currently regulated under CLM Act	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation under the Contaminated Land Management Act 1997 (CLM Act). Management of the contamination is regulated by the EPA under the CLM Act. Regulatory notices are available on the EPA's Contaminated Land Public Record.
Contamination currently regulated under POEO Act	Contamination is currently regulated under the Protection of the Environment Operations Act 1997 (POEO Act). The EPA as the appropriate regulatory authority reasonably suspects that a pollution incident is occurring/ has occurred and that it requires regulation under the POEO Act. The EPA may use environment protection notices, such as clean up notices, to require clean up action to be taken. Such regulatory notices are available on the POEO public register.
Contamination being managed via the planning process (EP&A Act)	The EPA has completed an assessment of the contamination and decided that the contamination is significant enough to warrant regulation. The contamination of this site is managed by the consent authority under the *Environmental Planning and Assessment Act 1979* (EP&A Act) planning approval process, with EPA involvement as necessary to ensure significant contamination is adequately addressed. The consent authority is typically a local council or the Department of Planning and Environment.
Contamination formerly regulated under the CLM Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation under the *Contaminated Land Management Act 1997* (CLM Act). The contamination was addressed under the CLM Act.
Contamination formerly regulated under the POEO Act	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed under the *Protection of the Environment Operations Act 1997* (POEO Act).

Contamination was addressed via the planning process (EP&A Act)	The EPA has determined that the contamination is no longer significant enough to warrant regulation. The contamination was addressed by the appropriate consent authority via the planning process under the *Environmental Planning and Assessment Act 1979* (EP&A Act).
Ongoing maintenance required to manage residual contamination (CLM Act)	The EPA has determined that ongoing maintenance, under the Contaminated Land Management Act 1997 (CLM Act), is required to manage the residual contamination. Regulatory notices under the CLM Act are available on the EPA's Contaminated Land Public Record.

Suburb	SiteName	Address	ContaminationActivityType	ManagementClass	Latitude	Longitude
HEXHAM	14 Sparke St Hexham	14 Sparke STREET	Metal Industry	Under assessment	-32.85394328	151.6960863
HILLSTON	Former BP Depot Hillston	141-143 Cowper STREET	Other Petroleum	Regulation under CLM Act not required	-33.48823546	145.5381623
HOLBROOK	Caltex Truckstop	Hume HIGHWAY	Service Station	Regulation under CLM Act not required	-35.71332625	147.3207237
HOMEBUSH	Ausgrid Mason Park Substation	1 Underwood ROAD	Other Industry	Regulation under CLM Act not required	-33.85674677	151.0747044
HOMEBUSH BAY	SUEZ Waste Recycling Centre (WRC) and Cleanaway Liquid Waste Treatment Plant (LWTP)	Corner Pondage Link and Hill ROAD	Landfill	Regulation under CLM Act not required	-33.84359299	151.0593656
HOMEBUSH WEST	Caltex Service Station Homebush West	334-336 Parramatta ROAD	Service Station	Regulation under CLM Act not required	-33.8581543	151.0681261
HOMEBUSH WEST	Former Ford Landfill and Adjacent Land	22 Mandemar AVENUE	Landfill	Regulation under CLM Act not required	-33.86142424	151.0625556
HORNSBY	Midas Car Care Centre Hornsby	2A Linda STREET	Other Industry	Regulation under CLM Act not required	-33.70052215	151.1004786
HORNSBY	Coles Express Hornsby	194- 206 Pacific HIGHWAY	Service Station	Contamination currently regulated under CLM Act	-33.7071993	151.0991452
HORNSBY	Hornsby Train Maintenance Centre	1B Stephen STREET	Other Industry	Regulation under CLM Act not required	-33.69370022	151.1035939
HOXTON PARK	Endeavour Energy Hoxton Park	490 Hoxton Park ROAD	Other Industry	Regulation under CLM Act not required	-33.92766437	150.8689069
HUNTERS HILL	Coles Express Hunters Hill	4 Ryde ROAD	Service Station	Regulation under CLM Act not required	-33.8317985	151.141655
HUNTERS HILL	Foreshore Land	Rear of 7, 9 & 11 Nelson PARADE	Other Industry	Contamination currently regulated under CLM Act	-33.84248362	151.1649249
HUNTERS HILL	7, 9 and 11 Nelson Parade Hunters Hill	7, 9 and 11 Nelson PARADE	Other Industry	Regulation under CLM Act not required	-33.84220148	151.1649724
HURLSTONE PARK	Former Telstra Depot	82 Canterbury ROAD	Service Station	Regulation under CLM Act not required	-33.90803171	151.1258121

Appendix F Noise modelling results

Construction Noise Estimator

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Kidman Way Solar Farm
Scenario name	Use and maintenance of internal access road
Receiver address	R1 at 10867 Kidman Way, Hillston
Select area ground type	Rural
Select type of background noise level input	Representative Noise Environment

Steps:
1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - hard ground (for a conservative assessment or across the river/valley), urban or rural.
5. Select the type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
   (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ,' provides a number of examples to help select the noise area category.
   (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Is all plant at the same representative distance to the receiver? Select Y or N (cell C24):
   (a) where Y is selected - enter the representative distance in cell C25.
   (b) where N is selected - go to step #7
7. For the scenario (e.g. shallow excavation), select plant from the drop-down list in cells A28 to A47 (e.g. dump trucks + excavator).
   (a) enter quantity for each selected plant in cells D28 to D47.
   (b) where N is selected from step #6 - enter the distance to receiver for each individual plant in cells E28 to E47.
   (c) is there line of sight to receiver? select from drop down list in cells F28 to F47.
8. Identify the level above background and/or noise mangement level (see rows 57 to 62).
9. Identify and implement the relevant additional mitigation measures (see rows 63 to 65).
9. Document a summary report detailing:
   (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.).
   (b) background noise levels.
   (c) noise management levels .
   (d) predicted noise levels for each time period.
   (e) sleep disturbance mitigation distance for night works.
   (f) mitigation measures.
   (g) Team member responsible for implementing mitigation measures and managing noise and vibration.

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	N
Representative distance (m)	150

Using Individual Distances!

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Delivery Truck	108	83	1	150	Obstructed line of sight	0	-5	150	46
Water cart	108	83	1	150	Obstructed line of sight	0	-5	150	46
Light Vehicles (eg 4WD)	103	78	1	150	Obstructed line of sight	0	-5	150	41
Delivery Truck	108	83	1	220	Obstructed line of sight	0	-5	220	41
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888

Total SPL $L_{Aeq(15minute)}$ (dB(A))	***50***

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	**Standard hours**	***50***	**55**	**65**	**55**	**65**	**60**	**75**	**70**
	Day (OOHW)	***45***	**55**	**65**	**55**	**65**	**60**	**75**	**70**
	OOHW Period 1	***40***		**65**	**55**	**65**	**60**	**75**	**70**
	OOHW Period 2	***35***		**65**	**55**			**75**	**70**
Level above background (dB(A))	**Standard hours**	***10***							
	Day (OOHW)	***10***							
	OOHW Period 1	***15***							
	OOHW Period 2	***20***							
Level above NML (dB(A))	**Standard hours**	***0***							
	Day (OOHW)	***5***							
	OOHW Period 1	***10***							
	OOHW Period 2	***15***							
Additional mitigation measures	**Standard Hours**	**-**	-	-	-	-	-	-	-
	Day (OOHW)	***N, R1, DR***	-	-	-	-	-	-	-
	OOHW Period 1	***N, R1, DR***		-	-	-	-	-	-
	OOHW Period 2	***V, IB, N, PC, SN, R2, DR***		-	-			-	-

Abbreviation	Measure
N	Notification (letterbox drop or equivalent
SN	Specific notifications
PC	Phone calls
IB	Individual briefings
RO	Respite offer
R1	Respite period 1
R2	Respite period 2
DR	Duration respite
AA	Alternative accommodation
V	Verification

Construction Noise Estimator

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Kidman Way Solar Farm
Scenario name	Intersection treatment road works at Kidman Way
Receiver address	R2 at 10867 Kidman Way, Hillston
Select area ground type	Rural
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Representative distance (m)	210

Scenario	SWL L_{Aeq} (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Local road works	119	Obstructed line of sight	-5	210	53

Total SPL $L_{Aeq(15minute)}$ (dBA)	***53***

Steps:
1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - hard ground (for a conservative assessment or across river/valley), urban or rural.
5. Select type of background noise level input - Reprentative noise environment (to make assumptions) or user input (where noise monitoring data is available):
   (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
   (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
7. Select scenario from the drop-down list in cells A27.
   (a) is there line of sight to receiver? Select from drop down list in cells F27.
8. Identify the level above background and/or noise mangement level (see rows 36 to 41).
9. Identify and implement the relevant additional mitigation measures (see rows 42 to 44).
9. Document a summary report detailing:
   (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.).
   (b) background noise levels.
   (c) noise management levels .
   (d) predicted noise levels for each time period.
   (e) sleep disturbance mitigation distance for night works.
   (f) mitigation measures.
   (g) Team member responsible for implementing mitigation measures and managing noise and vibration.

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Estimator should be

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	**Standard hours**	***50***	**55**	**65**	**55**	**65**	**60**	**75**	**70**
	Day (OOHW)	***45***	**55**	**65**	**55**	**65**	**60**	**75**	**70**
	OOHW Period 1	***40***		**65**	**55**	**65**	**60**	**75**	**70**
	OOHW Period 2	***35***		**65**	**55**			**75**	**70**
Level above background (dB(A))	**Standard hours**	***13***							
	Day (OOHW)	***13***							
	OOHW Period 1	***18***							
	OOHW Period 2	***23***							
Level above NML (dB(A))	**Standard hours**	***3***							
	Day (OOHW)	***8***							
	OOHW Period 1	***13***							
	OOHW Period 2	***18***							
Additional mitigation measures	**Standard Hours**	***-***	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Day (OOHW)	***N, R1, DR***	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	OOHW Period 1	***N, R1, DR***		**-**	**-**	**-**	**-**	**-**	**-**
	OOHW Period 2	***V, IB, N, PC, SN, R2, DR***		**-**	**-**			**-**	**-**

Abbreviation	Measure
N	Notification (letterbox drop or equivalent
SN	Specific notifications
PC	Phone calls
IB	Individual briefings
RO	Respite offer
R1	Respite period 1
R2	Respite period 2
DR	Duration respite
AA	Alternative accommodation
V	Verification

Construction Noise Estimator

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Kidman Way Solar Farm
Scenario name	Construction of solar farm infrastructure incl. pile driving
Receiver address	R1 at 10867 Kidman Way, Hillston
Select area ground type	Rural
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Representative distance (m)	530

Scenario	SWL L_{Aeq} (dB(A))	Is there line of sight to receiver?	Shielding correction (dB(A))	Distance used in calculation (m)	Contribution SPL (dB(A))
Compound site establishment	119	Obstructed line of sight	-5	530	40

Total SPL $L_{Aeq(15minute)}$ (dBA)	***40***

Steps:
1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - hard ground (for a conservative assessment or across river/valley), urban or rural.
5. Select type of background noise level input - Reprentative noise environment (to make assumptions) or user input (where noise monitoring data is available):
   (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ.' provides a number of examples to help select the noise area category.
   (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Enter the representative distance in cell C24.
7. Select scenario from the drop-down list in cells A27.
   (a) is there line of sight to receiver? Select from drop down list in cells F27.
8. Identify the level above background and/or noise mangement level (see rows 36 to 41).
9. Identify and implement the relevant additional mitigation measures (see rows 42 to 44).
9. Document a summary report detailing:
   (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.).
   (b) background noise levels.
   (c) noise management levels .
   (d) predicted noise levels for each time period.
   (e) sleep disturbance mitigation distance for night works.
   (f) mitigation measures.
   (g) Team member responsible for implementing mitigation measures and managing noise and vibration.

(Note that suitable noise management levels for other noise-sensitive businesses not identified in the Construction Noise Estimator should be

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	**Standard hours**	***50***	**55**	**65**	**55**	**65**	**60**	**75**	**70**
	Day (OOHW)	***45***	**55**	**65**	**55**	**65**	**60**	**75**	**70**
	OOHW Period 1	***40***		**65**	**55**	**65**	**60**	**75**	**70**
	OOHW Period 2	***35***		**65**	**55**			**75**	**70**
Level above background (dB(A))	**Standard hours**	***0***							
	Day (OOHW)	***0***							
	OOHW Period 1	***5***							
	OOHW Period 2	***10***							
Level above NML (dB(A))	**Standard hours**	***-10***							
	Day (OOHW)	***-5***							
	OOHW Period 1	***0***							
	OOHW Period 2	***5***							
Additional mitigation measures	**Standard Hours**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	Day (OOHW)	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
	OOHW Period 1	**-**		**-**	**-**	**-**	**-**	**-**	**-**
	OOHW Period 2	***V, N, R2, DR***		**-**	**-**			**-**	**-**

Abbreviation	Measure
N	Notification (letterbox drop or equivalent
SN	Specific notifications
PC	Phone calls
IB	Individual briefings
RO	Respite offer
R1	Respite period 1
R2	Respite period 2
DR	Duration respite
AA	Alternative accommodation
V	Verification

Construction Noise Estimator

Please input information into yellow cells
Please pick from drop-down list in orange cells

Project name	Kidman Way Solar Farm
Scenario name	Worst case operational scenario
Receiver address	R1 at 10867 Kidman Way, Hillston
Select area ground type	Rural
Select type of background noise level input	Representative Noise Environment

		Representative Noise Environment	User Input
Noise area category		R1	
RBL or L_{A90} Background level (dB(A))	**Day**	40	
	Evening	35	
	Night	30	
$L_{Aeq(15minute)}$ Noise mangement level (dB(A))	**Day**	50	
	Day (OOHW)	45	
	Evening	40	
	Night	35	

Is all plant at the same representative distance to the receiver? Y/N	Y
Representative distance (m)	530

All at Representative Distance

Steps:
1. Enter project name (cell C9).
2. Enter scenario name (cell C10).
3. Enter receiver address (cell C11).
4. Select area ground type (cell C12) - hard ground (for a conservative assessment or across the river/valley), urban or rural.
5. Select the type of background noise level input - Representative noise environment (to make assumptions) or user input (where noise monitoring data is available):
   (a) where representative noise environment is selected - select the appropriate noise area category (cell C16). The worksheet titled 'Representative Noise Environ,' provides a number of examples to help select the noise area category.
   (b) where user input is selected - enter the measured background noise level for each time period (cells D17 to D19).
6. Is all plant at the same representative distance to the receiver? Select Y or N (cell C24):
   (a) where Y is selected - enter the representative distance in cell C25.
   (b) where N is selected - go to step #7
7. For the scenario (e.g. shallow excavation), select plant from the drop-down list in cells A28 to A47 (e.g. dump trucks + excavator).
   (a) enter quantity for each selected plant in cells D28 to D47.
   (b) where N is selected from step #6 - enter the distance to receiver for each individual plant in cells E28 to E47.
   (c) is there line of sight to receiver? select from drop down list in cells F28 to F47.
8. Identify the level above background and/or noise mangement level (see rows 57 to 62).
9. Identify and implement the relevant additional mitigation measures (see rows 63 to 65).
9. Document a summary report detailing:
   (a) project description (including location, duration, hours of work, construction methodology, plant , potentially impacted receivers, etc.).
   (b) background noise levels.
   (c) noise management levels .
   (d) predicted noise levels for each time period.
   (e) sleep disturbance mitigation distance for night works.
   (f) mitigation measures.
   (g) Team member responsible for implementing mitigation measures and managing noise and vibration.

Type/ model plant (See Sources Sheet)	SWL L_{Aeq} (dB(A))	SPL @7m (dB(A))	Quantity	Individual distance to receiver (m)	Is there line of sight to receiver? Y/N	Quantity correction (dBA)	Shielding correction (dBA)	Distance used in calculation (m)	Contribution SPL (dB(A))
Light Vehicles (eg 4WD)	103	78	4		Yes	6	0	530	35
Welding equipment	105	80	4		Yes	6	0	530	37
Generator	103	78	2		Yes	3	0	530	32
Delivery Truck	108	83	1		Yes	0	0	530	34
Compactor	113	88	1		Yes	0	0	530	39
Front End Loader	113	88	1		Yes	0	0	530	39
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888
					Yes	0	0		-888

Total SPL $L_{Aeq(15minute)}$ (dB(A))	***45***

		Residential receiver	*Non-residential receivers*						
			Classroom at schools and other educational institutions	*Hospital wards and operating theatres*	*Place of worship*	*Active recreation*	*Passive recreation*	*Industrial premise*	*Offices, retail outlets*
Noise Management Level (dB(A))	**Standard hours**	***50***	**55**	**65**	**55**	**65**	**60**	**75**	**70**
	Day (OOHW)	***45***	**55**	**65**	**55**	**65**	**60**	**75**	**70**
	OOHW Period 1	***40***		**65**	**55**	**65**	**60**	**75**	**70**
	OOHW Period 2	***35***		**65**	**55**			**75**	**70**
Level above background (dB(A))	**Standard hours**	***5***							
	Day (OOHW)	***5***							
	OOHW Period 1	***10***							
	OOHW Period 2	***15***							
Level above NML (dB(A))	**Standard hours**								
	Day (OOHW)	***0***							
	OOHW Period 1	***5***							
	OOHW Period 2	***10***							
Additional mitigation measures	**Standard Hours**	-	-	-	-	-	-	-	-
	Day (OOHW)	-	-	-	-	-	-	-	-
	OOHW Period 1	***N, R1, DR***		-	-	-	-	-	-
	OOHW Period 2	***V, N, R2, DR***		-	-			-	-

Abbreviation	Measure
N	Notification (letterbox drop or equivalent
SN	Specific notifications
PC	Phone calls
IB	Individual briefings
RO	Respite offer
R1	Respite period 1
R2	Respite period 2
DR	Duration respite
AA	Alternative accommodation
V	Verification

NGH Pty Ltd

NSW • ACT • QLD • VIC

ABN 31 124 444 622 ACN 124 444 622

E: ngh@nghconsulting.com.au

GOLD COAST

2B 34 Tallebudgera Creek Road
Burleigh Heads QLD 4220
(PO Box 424 West Burleigh QLD 4219)

T. (07) 3129 7633

SYDNEY REGION

Unit 17, 21 Mary Street
Surry Hills NSW 2010

T. (02) 8202 8333

BEGA

Suite 11, 89-91 Auckland Street
(PO Box 470)
Bega NSW 2550

T. (02) 6492 8333

MELBOURNE

Level 14, 10-16 Queen Street
Melbourne VIC 3000

T: (03) 7031 9123

TOWNSVILLE

Level 4, 67-75 Denham Street
Townsville QLD 4810

T. (07) 4410 9000

BRISBANE

T3, Level 7, 348 Edward Street
Brisbane QLD 4000

T. (07) 3129 7633

NEWCASTLE - HUNTER & NORTH COAST

Level 1, 31-33 Beaumont Street
Hamilton NSW 2303

T. (02) 4929 2301

WAGGA WAGGA - RIVERINA & WESTERN NSW

35 Kincaid Street (PO Box 5464)
Wagga Wagga NSW 2650

T. (02) 6971 9696

CANBERRA

Unit 8, 27 Yallourn Street
(PO Box 62)
Fyshwick ACT 2609

T. (02) 6280 5053

SUNSHINE COAST

Suite 101, Level 2/30 Main Drive
Birtinya QLD 4575

(07) 4410 9000

WODONGA

Unit 2, 83 Hume Street
(PO Box 506)
Wodonga VIC 3690

T. (02) 6067 2533