
STATEMENT OF ENVIRONMENTAL EFFECTS

Lot 103 DP 755189 Norwood Lane, Hillston NSW

Daisy Hill Solar Farm & two lot
subdivision

zenith
TOWN PLANNING

sustainable thinking

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Document Details & History

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1. INTRODUCTION

1.1 Overview

The purpose of this Statement of Environmental Effects is to support an application to Carrathool Shire Council to develop a solar farm at Lot 103 DP 755189 Norwood Lane, Hillston, referred to as the Daisy Hill Solar Farm. The facility is to comprise two stages and subdivision of the property is proposed so that each stage is accommodated on a separate lot. Please note that this application is not a concept development application under Part 4 Division 4.4 of the *Environmental Planning and Assessment Act 1979*.

The application is for regionally significant development that needs consent and is to be determined by the Western Regional Planning Panel. There are no other separate approvals required to be obtained under section 4.46 of the *Environmental Planning and Assessment Act 1979*. The application is therefore not integrated development.

This Statement has been prepared having regard to pre-lodgement advice provided by Carrathool Shire Council during discussions held during August 2019. Information has also been sourced from the Council's website, the NSW legislation website, SIX Maps, the website of the Office of Environment and Heritage, and the Department of Planning, Industry & Environment's Planning Portal. All information referenced in this Statement has been sourced from publicly available documents or websites and from expert reports produced to support the application.

1.2 Scope of the report

The scope of this report is to describe the location and physical characteristics of the site on which the development is proposed, identify relevant provisions of plans and policies applying to the land, and to discuss any potential environmental impacts of the development and proposed servicing arrangements.

The purpose of this report is to assist Council's assessment of the proposal against the matters for consideration listed in section 4.15 of the *Environmental Planning and Assessment Act 1979*.

1.3 The proponent

ITP (Development) Pty Ltd is the proponent for the proposed Daisy Hill Solar Farm. ITP (Development) is a private sector organization based in Canberra and Sydney, which was established in 2003. It is part of the IT Power Group which was formed in 1981 in the UK to bring together specialists in renewable energy, energy efficiency and carbon markets. IT Power offers expertise in renewable energy and energy efficiency, including research, development and implementation, managing and reviewing government incentive

programs, high level policy analysis (including carbon markets), engineering design and project management.

1.4 Justification

Solar energy is energy created by the heat and light of the sun. Solar power is produced when this energy is converted into electricity or used to heat air, water, or other substances. Australia has the highest average solar radiation per square metre of any continent in the world. Despite uncertainty regarding energy policy, the Commonwealth and NSW Governments have recognized the need to supplement energy derived from fossil fuels with energy generated from renewable sources. Alternative energy supply may be sourced from solar photovoltaic, geo-thermal, solar thermal, wave and tidal action, and wind.

The development of solar photovoltaic power is well underway in NSW and across Australia. This growth in the local solar PV sector continues to provide a significant boost for Australia's regional economy with renewable infrastructure development estimated to create upwards of 2,300 direct jobs plus indirect employment.

According to the Australian Renewable Energy Agency (ARENA), the deployment of household solar PV that generates about 5 kW is expected to continue and at the same time an increase in rooftop solar PV installations on commercial premises generating around (10-100 kW) is expected. Large scale solar PV is also rapidly expanding in Australia with several solar farms being constructed that will have the capacity to generate over 50MW. The proposed Daisy Hill Solar Farm aims to fill the gap in the mid-sized plants. It will generate 10MW of AC power and contribute to renewable energy supply to supplement electricity generation from coal, oil and gas and assist to reduce reliance on these unsustainable means of supply.

The proposed development is in accordance with relevant objects of the *Environmental Planning and Assessment Act 1979* in that it will assist to generate power to be distributed to the residents of NSW thereby promoting the social and economic welfare of the community in a manner that manages and conserves natural resources. The Daisy Hill Solar Farm will further the goals of sustainability, and the orderly and economic use of land.

2. SITE DESCRIPTION AND CONTEXT

2.1 Description

The site of the proposed Daisy Hill Solar Farm is described as Lot 103 DP 755189 Norwood Lane, Hillston, NSW. It is located approximately 3.5 kilometres south of the town centre of Hillston and is roughly square in shape with a total area of 70 hectares. The property has a frontage to Kidman Way along the western boundary and the Temora – Roto railway line separates the property from the road reserve. The rail line has been closed.

Access to the site is by way of an unsealed road known as Norwood lane which runs north-south along the eastern boundary. Norwood Lane intersects with The Springs Road about 1.9 kilometres to the north of the development site, which in turn connects to Kidman Way. Racecourse Road runs parallel to the southern boundary but is unformed. A secondary access point to the development site is located off Racecourse Road/Kidman Way at the south-western corner of the property.

The location of the site is shown in Figure 1 below. The site is shaded yellow.

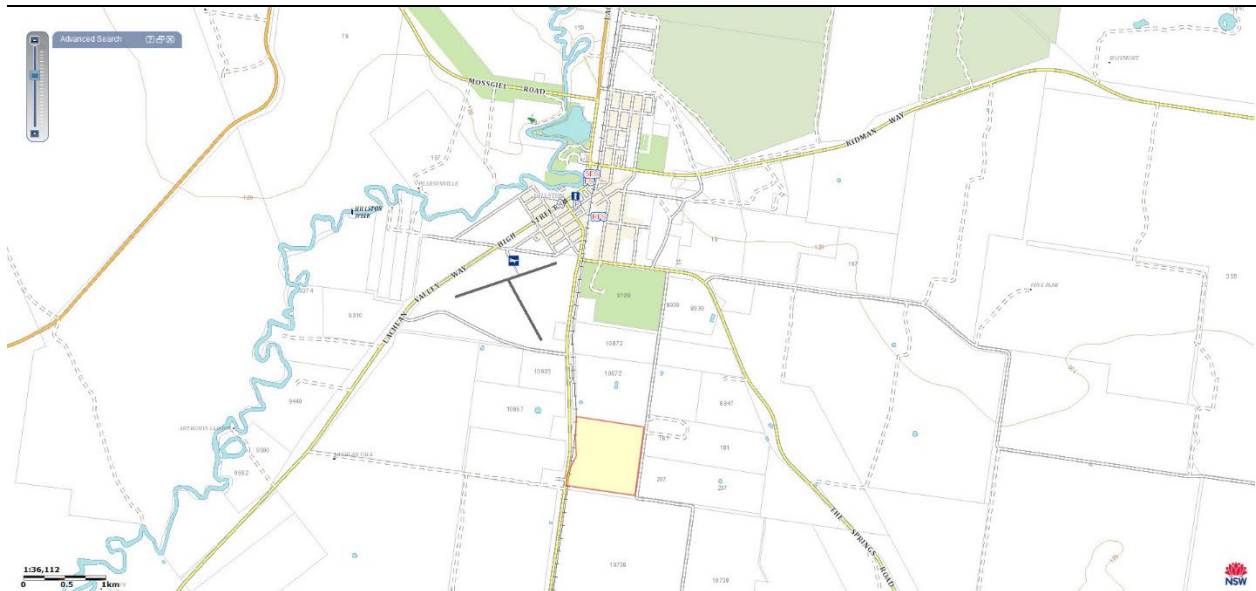


Figure 1: Locality map. Source: SIX Maps, 2019

The site has been cleared in the past for agricultural use other than scattered paddock trees in the south-eastern corner and remaining native vegetation parallel to the western boundary to Kidman Way. The land is flat. The site is used for dryland wheat cultivation and there are farm structures associated with that use in the south-east corner. An 'environmental area' at the south-eastern corner of the property has been fenced to facilitate regeneration of native vegetation.

2.2 Context

The site and surrounding countryside is generally flat. The majority of nearby land is used for agricultural purposes with some remnant native bushland on land to the west. Essential Energy Hillston Zone 132/33 sub-station is located on the western side of Kidman Way at the south-western corner of the property. An existing 33kV electricity line runs through a 30 metre wide easement running parallel to the southern and western boundaries that feeds into the sub-station.

An aerodrome exists to the north-west of the site at a distance of 875 metres at the closest points of each property. The airport is used by crop dusters, the Flying Doctor Service and ambulance flights. The site is located approximately 3.6 kilometres east of the Lachlan River.

An aerial image of the site and surrounding land is shown in Figure 2 below. The site is shaded yellow.



Figure 2: Aerial image showing the development site and surrounding land uses. Source: SIX Maps, 2019

Below is an extract from the NSW Topographic map for land in the vicinity of Hillston. This map shows the location of the settlement, services including transport infrastructure, dams, cadastre and waterways.

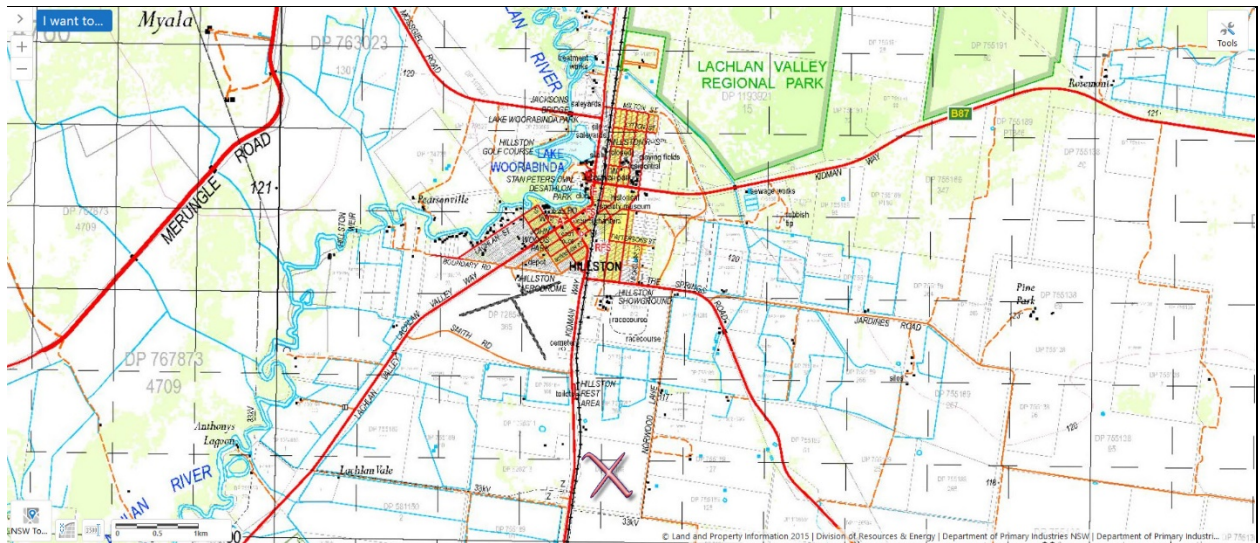


Figure 3: Extract from the NSW Topographic map. Source: Land & Property Information 2015

2.3 Climate

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

Figure 4 below shows average daily solar exposure for the 12 month period 1 November 2018 to 30 October 2019. Carrathool LGA has received an average of between 18 and 20 MJ/m² each day, placing it within the second highest area receiving solar radiation in New South Wales.

The mean monthly global solar exposure measured at Hillston Airport (station number 075032), the closest measuring station to the Daisy Hill Solar Farm, site, is given in Table 1 below. The annual mean for the 30-year period 1990-2019 was 18.8MJ/m².

Table 1: Mean monthly global solar exposure at Hillston Airport, 2018

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly mean	27.7	24.5	21.0	15.5	11.3	9.1	9.9	13.3	17.8	22.4	25.3	27.6

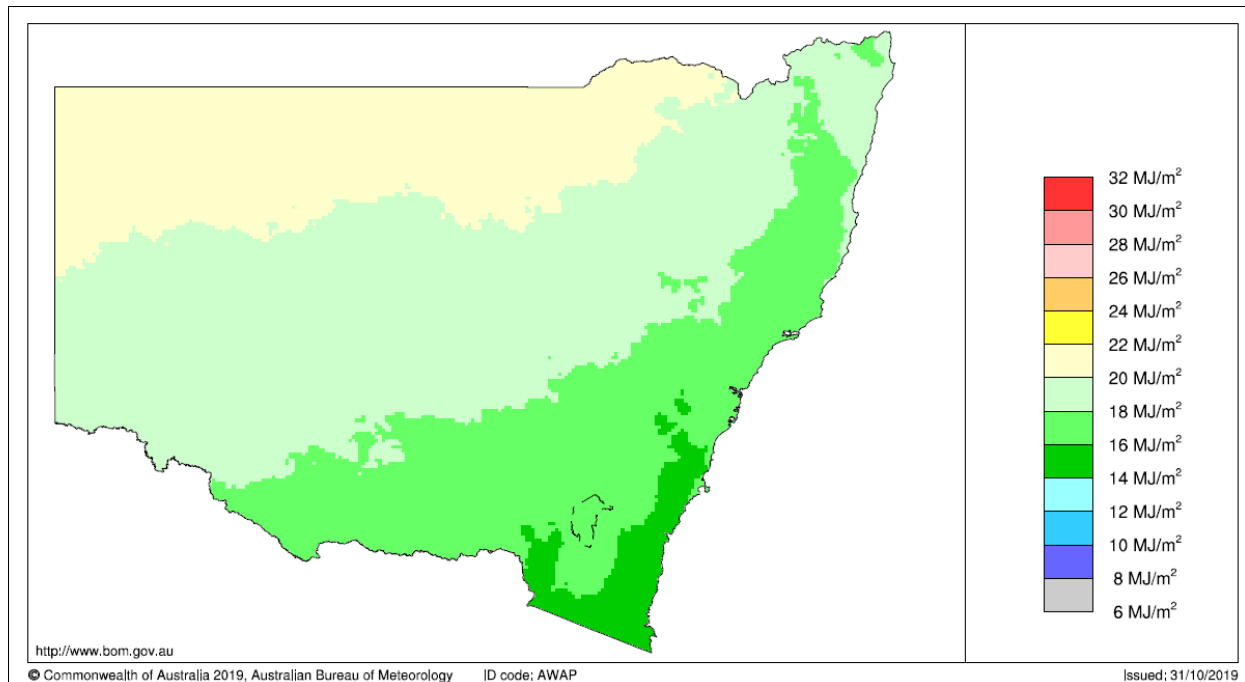


Figure 4: Average daily solar exposure. Source: Australian Bureau of Meteorology

The map below (Figure 5) shows the average daily hours of sunshine across Australia. Carrathool LGA receives an average of 8 to 9 hours of sunshine each day.

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

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

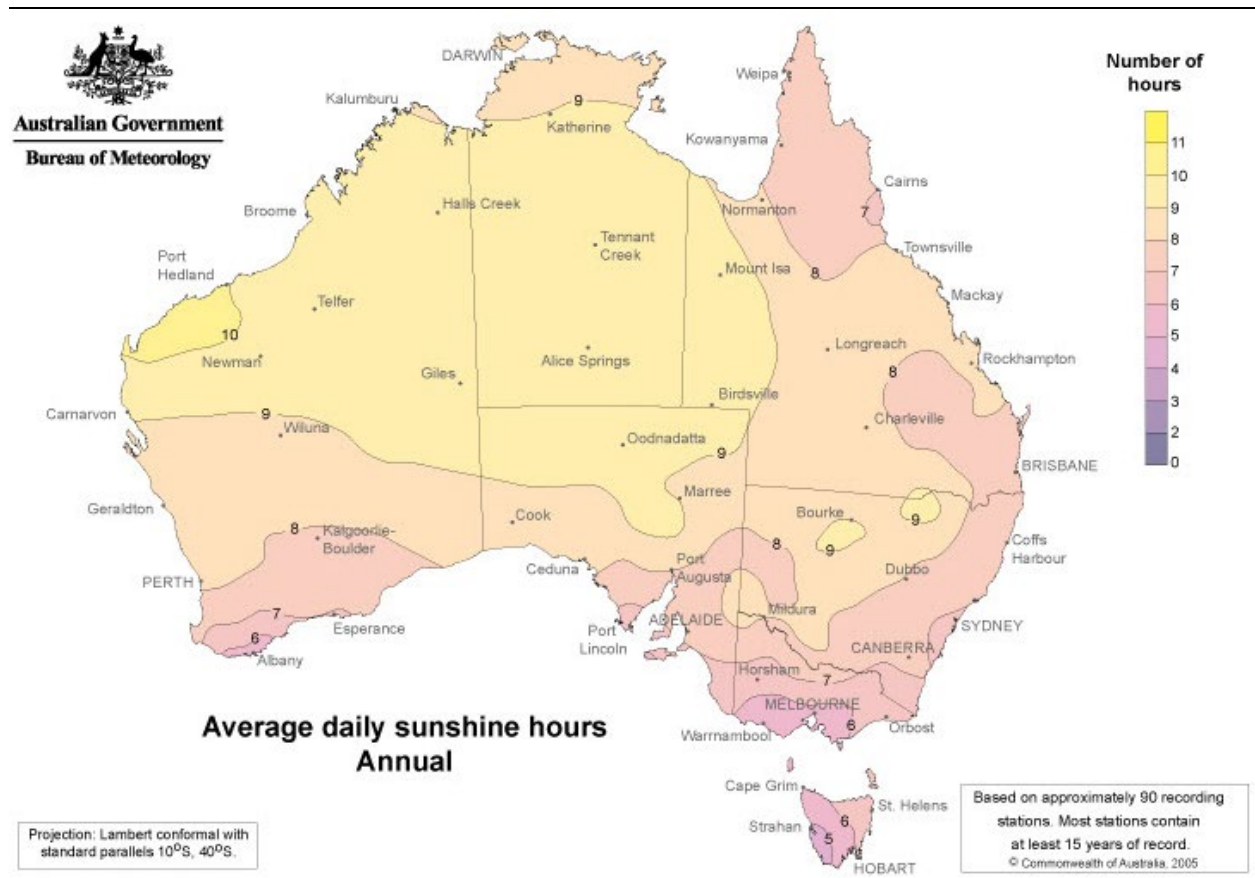


Figure 5: Average daily sunshine hours. Source: Australian Bureau of Meteorology

3. DETAILS OF THE PROPOSED DEVELOPMENT

3.1 Daisy Hill Solar Farm and subdivision

The proposed development comprises a solar farm and ancillary facilities with a DC capacity of 12.2MW and an AC output of 10.0MW on approximately 23 hectares of the total site. It would be capable of generating 24.8GWh annually. The array is proposed to be placed within two sections of 5MW each covering the south-western quarter of Lot 103. It is proposed to excise part of the development area from the parent lot to create proposed Lot 1 of 12.73 hectares that is occupied by Stage 1 being half of the array (16,000 panels) generating 5MW. Proposed Lot 2 is the residue of 55.14 hectares which will be occupied by Stage 2 being the northern section of the array (16,000 panels) that also generates 5MW. A Plan of Proposed Subdivision has been prepared by Price Merrett Consulting dated 6 December 2019.

3.2 Photovoltaic panels

There are proposed to be 32,000 solar modules installed in about 400 mounting structures running north to south. There is approximately 6 metres spacing between each row.

Each row of PV modules will rotate to track the sun across the sky from east to west each day. The hub height of each tracker is 1.7 metres with the peak of the modules reaching an approximate height of 2.6 metres when the array is fully tilted to 60 degrees from horizontal, i.e. in the early morning and late evening.

The layout of the solar farm is shown on General Arrangement Plan (Drawing No HIL1A-G-210).

3.3 Inverters and battery storage

Two 5 MW AC inverter stations housing two 2.5 MW inverters in each and a transformer will be installed at each stage of the solar farm. These inverters are to be located within the array and are each mounted on 12 metre long skids. Each of these inverter stations incorporates high and medium voltage switchgear. Each will connect by way of underground cables to the existing 33kV power line that runs south of Racecourse Road and then north within a 30 metre easement to the south-western corner of the property. This line feeds into the Hillston Zone Sub-station on the western side of Kidman Way. Dial-before-you-dig investigations would be carried out prior to commencing all subsurface work.

3.4 Services

Reticulated water and sewer services are not required to be provided to the solar farm as there are no permanent offices or amenities proposed on site. Portaloos for wastewater disposal (see <https://www.kennards.com.au/site-equipment/showers-toilets.html>) and water supply by way of a portable tank or cart (see <https://www.kennards.com.au/site-equipment/water-tank.html>) are proposed to be

installed during the construction phase. Maintenance workers would not be required to remain on site. Cleaning of the PV panels would be carried out on an annual basis to maximise the performance of the system. This is done using water brought into the site and a sponge mop.

There are two access entries to the site. The primary access is located at the south-eastern corner of Lot 103 and is used by the land owner to access the farm and carry out agricultural activities. The secondary access is located opposite the Essential Energy sub-station off Kidman Way. It is proposed to use only the primary access point during construction and operation of the solar farm.

During the initial site establishment phase it is estimated that there will be 6 to 8 light vehicle trips per day and an average 10 to 15 truck and trailer movements. During the six month construction stage there would be the equivalent of 90 semi-trailer (19 metre articulated vehicles) loads of materials and equipment, with an expected daily maximum of 4 vehicles, accessing the site to deliver PV panels, mounting frame equipment and inverters plus construction machinery to grade the accessways and erect the mounting system. Approximately 10 specialist contractors would commission the facility using light or heavy rigid vehicles of 12 metres length. The trucks delivering the solar system will likely come from Melbourne which would take a route through Shepparton, Tocumwal, Finley, Jerilderie and up the B87 to Hillston.

An internal unsealed road of 8 metres width is to be constructed running east-west above the 'environmental area'. In addition, it is expected that car parking for up to 40 small vehicles will be needed to cater to the 50 construction workers at the rate of 1.2 spaces per vehicle. A temporary car parking and materials laydown area is to be sited at the eastern side of each section of panels. A pedestrian emergency exit gate is to be located at the south-eastern corner of the arrays.

3.5 Construction

The mounting system for the PV panels is constructed on piles that are driven into the ground using a vibrating pile driver. The piles will be driven approximately 1.2 to 2.5 metres into the ground, as to be confirmed by a geotechnical and structural engineer.

During construction there is expected to be 50 personnel on site working from 7.00am – 4.00pm Monday to Friday. The construction is expected to take approximately six months. Should it be necessary to carry out work outside these hours then activities would be limited to those generating low noise emissions. Once operational the site will be unmanned. Maintenance is expected to be carried out quarterly by a crew of 2 to 3 people.

3.6 Landscaping

Land that is disturbed during construction of the solar farm and not to be used for access or other maintenance purposes will be sown with grasses following completion of construction. Planting will also

assist to minimise site disturbance and contribute to the rural landscape and character of the immediate area.

Plantings will be maintained and watered by maintenance crew on a regular basis. Regular inspections of the site will be carried out to ensure that grassland is managed to reduce the risk of bushfire to surrounding land and to control weeds. Mowing or slashing between rows of PV panels and in the area immediately surrounding the arrays would be carried out as required. Livestock grazing is being trialled elsewhere and may be carried out around and beneath panels in the future.

Landscaping of the site after installation of the panel arrays to provide vegetative screening to Kidman Way and/or dwellings located on Norwood Lane is not proposed as existing vegetation along the Kidman Way road reserve and within the development site, and distance separation from residential dwellings will ensure effective visual screening.

3.7 Security

The Daisy Hill Solar Farm is to be enclosed within a 1.8 metre high security fence surrounding the array. The fence has a variable setback from the western boundary at a minimum of 13.4 metres, and setbacks of 16.5 metres to the southern boundary, over 400 metres to the eastern boundary and over 300 metres to the northern boundary. Solar arrays are to be setback 6 metres from the security fence. The proposed fence is to be chain mesh steel topped with three rows of barbed wire giving a total height of 2.1 metres similar to that shown in Plate 1 below. Temporary security fencing is to be placed around the materials laydown and car parking areas. Security lighting is not proposed to be installed.

3.8 Decommissioning

The Daisy Hill Solar Farm is intended to remain in operation indefinitely in order to contribute to the sustainable electricity power supply of the state of NSW. If, however, circumstances change and it is necessary to decommission the farm in around 20 to 25 years then all infrastructure, panels, mounting frames including footings, inverters, cabling and other sub-surface materials would be disassembled and removed from the site to enable the site to be re-cultivated for cropping or grazing purposes. All gravel surfacing of accessways would be removed unless required for a future use. If necessary, a condition of consent may be imposed that requires a decommissioning plan to be prepared and approved prior to the event.



Plate 1: Example of security fencing

4. STATUTORY FRAMEWORK

4.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment (EPA) Act 1979* is the principal piece of legislation governing the use and development of land in NSW. The objects of the Act are:

- (a) *to promote the social and economic welfare of the community and a better environment by the proper management, development and conservation of the State's natural and other resources,*
- (b) *to facilitate ecologically sustainable development by integrating relevant economic, environmental and social considerations in decision-making about environmental planning and assessment,*
- (c) *to promote the orderly and economic use and development of land,*
- (d) *to promote the delivery and maintenance of affordable housing,*
- (e) *to protect the environment, including the conservation of threatened and other species of native animals and plants, ecological communities and their habitats,*
- (f) *to promote the sustainable management of built and cultural heritage (including Aboriginal cultural heritage),*
- (g) *to promote good design and amenity of the built environment,*
- (h) *to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants,*
- (i) *to promote the sharing of the responsibility for environmental planning and assessment between the different levels of government in the State,*
- (j) *to provide increased opportunity for community participation in environmental planning and assessment.*

The objects of the EPA Act are intended to guide land planning and management. Section 4.15 of the Act lists matters for consideration when assessing and determining an application for development.

4.2 State Environmental Planning Policies

4.2.1 State Environmental Planning Policy No 44 – Koala Habitat Protection

SEPP No 44 – Koala Habitat Protection aims to conserve and manage areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline. Carrathool LGA is not listed in Schedule 1 to *SEPP 44* as land to which the policy applies. An assessment of the significance of the development site does not need to be carried out as the land is not expected to contain any of the tree species listed in Schedule 2 of *SEPP 44*, any areas of land with a resident population of koalas evidenced by the presence of breeding females, recent sightings or historical records, or land that constitutes potential koala habitat or core koala habitat as defined in the policy.

4.2.2 State Environmental Planning Policy No 55 – Remediation of Land

SEPP 55 requires Council to consider whether land is contaminated and to determine whether the proposed use is suitable with or without contamination. Council can require an applicant for development to conduct a preliminary investigation and a subsequent more detailed investigation if warranted. Where contamination exists and remediation is necessary, Council must be satisfied that the remediation will take place before the land is used for the proposed purpose. It is noted that should the preliminary investigation identify contamination on the site then the *NSW Contaminated Land Planning Guidelines* apply to subsequent investigations.

The property has been cleared and farmed for many years and is not known to be listed on a Council register of potentially contaminated land. There has been no known historical usage that would cause the land to be contaminated. NSW Health advise that the use of farm chemicals such as pesticides and fertilisers is not considered to contaminate soils to the extent that remediation is required. It is considered that a preliminary investigation is not required for the development of a solar farm.

4.2.3 State Environmental Planning Policy (Infrastructure) 2007

The aims of *SEPP (Infrastructure) 2007* are to ensure a consistent and flexible planning system to facilitate the delivery of services. The policy identifies environmental assessment categories for types of infrastructure, matters to consider when assessing development adjacent to infrastructure and provides for consultation with relevant public authorities. The policy applies to the whole of NSW. *SEPP (Infrastructure)* contains provisions relating to approval processes and assessment requirements for infrastructure proposals according to the type or sector of infrastructure. It outlines land use zones where types of infrastructure are permissible with or without consent and identifies certain works as exempt and complying development.

Part 3 Division 4 of the policy relates to electricity generating works or solar energy systems. Section 34 enables Development for the purpose of electricity generating works to be carried out by any person with consent on any land in a prescribed rural, industrial or special use zone. Zone RU1 Primary Production is a prescribed rural zone. Similarly, development for the purpose of a solar energy system may be carried out by any person with consent on any land, although this is limited to no more than 100kW in a prescribed residential zone. The proposed development is located in zone RU1 Primary Production and is therefore permitted with consent by *SEPP (Infrastructure) 2007*.

4.2.4 State Environmental Planning Policy (Primary Production and Rural Development) 2019

This policy replaces four other SEPPs that apply to rural land including *SEPP (Rural Lands) 2008*. The aims of *SEPP (Primary Production and Rural Development) 2019* are:

- (a) *to facilitate the orderly economic use and development of lands for primary production,*

- (b) *to reduce land use conflict and sterilisation of rural land by balancing primary production, residential development and the protection of native vegetation, biodiversity and water resources,*
- (c) *to identify State significant agricultural land for the purpose of ensuring the ongoing viability of agriculture on that land, having regard to social, economic and environmental considerations,*
- (d) *to simplify the regulatory process for smaller-scale low risk artificial waterbodies, and routine maintenance of artificial water supply or drainage, in irrigation areas and districts, and for routine and emergency work in irrigation areas and districts,*
- (e) *to encourage sustainable agriculture, including sustainable aquaculture,*
- (f) *to require consideration of the effects of all proposed development in the State on oyster aquaculture,*
- (g) *to identify aquaculture that is to be treated as designated development using a well-defined and concise development assessment regime based on environment risks associated with site and operational factors.*

The policy applies to *State significant agricultural land*, farm dams and other artificial waterbodies, livestock industries and aquaculture. There is no *State significant agricultural land* listed in the schedule to the policy. It is noted that, separately, the Department of Primary Industries are in the process of preparing mapping of *Important Agricultural Land* in NSW to assist decision-making.

4.2.5 State Environmental Planning Policy (State and Regional Development) 2011

Development that is state and regionally significant is identified in *SEPP (State and Regional Development) 2011*. Electricity generating works including solar farms which have a capital investment value of more than \$30 million, or a capital investment value of more than \$10 million and are located in an environmentally sensitive area of State significance, are declared state significant development. Private infrastructure, including electricity generating stations, that have a capital investment value of over \$5 million are declared regionally significant. In this case the proposed development has a CIV of \$13.2 million and is regionally significant. The application will be determined by the Western Regional Planning Panel.

4.3 Local Environmental Plan

4.3.1 Carrathool Local Environmental Plan 2012

The property is zoned RU1 Primary Production under *Carrathool LEP 2012*. The objectives of zone RU1 are:

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*
- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*
- *To minimise the fragmentation and alienation of resource lands.*

- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*
- *To facilitate farm adjustments.*
- *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.*
- *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 defined as **electricity generating works** which means a building or place used for the purpose of making or generating electricity. This use is prohibited in zone RU1. However, *SEPP (Infrastructure) 2007* prevails over *Carrathool LEP 2012* to the extent of an inconsistency meaning that the use is permitted with consent in zone RU1 by way of *SEPP (Infrastructure)*.

The development site is mapped as being affected by wetlands. The development site is not mapped as being affected by heritage, terrestrial biodiversity, groundwater vulnerability, or riparian land and watercourses on maps accompanying *Carrathool LEP 2012*.

The following clauses of *Carrathool 2012* apply to the proposed development:

Clause 4.1 Minimum subdivision lot size

The site is affected by a development standard restricting subdivision for a dwelling to a minimum lot size of 40 hectares. Subdivision of Lot 103 into two lots less than 40 hectares under clause 4.2 of *Carrathool LEP 2012* is proposed as discussed below.

Clause 4.2 Rural subdivision

The objective of clause 4.2 is to provide flexibility in the application of standards for subdivision in rural zones to allow land owners a greater chance to achieve the objectives for development in the relevant zone. A minimum subdivision lot size of 40 hectares applies to the development site. Under clause 4.2(3) land in zone RU1 Primary Production may be subdivided for the purpose of primary production to create a lot of a size that is less than the minimum size so long as a dwelling would not exist on the newly-created lot.

It is proposed to subdivide the existing allotment which is 67.87 hectares into two allotments comprising proposed Lot 1 of 12.73 hectares and proposed Lot 2 of 55.14 hectares. Subdivision to a lot size less than 40 hectares can be justified on the following basis:

1. The proposed subdivision which will accommodate two solar farms on separate lots is not expected to impact on the quantum of agricultural output in the area and will not create conflicts with land uses on adjoining land which are occupied by the Essential Energy sub-station, a vegetated road reserve and rail line reserve along Kidman Way. Rural properties and an unformed road reserve,
2. Essential energy only allows connection to a sub-station from a single property occupied by a solar photovoltaic facility up to a maximum of 5mw. To connect a 10mw system requires that two systems each of 5MW be located on separate lots. In this case, proposed Lot 1 will be occupied by the Stage 1 of the solar farm and Lot 2 by Stage 2,
3. It is contended that energy production by way of solar photovoltaic panels is a type of primary production. Primary industries are those that harvest or extract raw material from nature. Various jurisdictions include oil and gas extraction and mining as well as agriculture as primary production. By extension this would include harnessing solar radiation for conversion to electricity. It cannot be classified as a secondary industry as there is no manufacturing or processing involved. The *Australian Energy Update 2018*, prepared by the Australian Government Department of Environment and Energy, makes reference to forms of renewable energy that produce electricity directly without a thermal component, such as wind, hydro and solar PV, primary energy production, and
4. Should there be any doubt that primary production includes electricity generation through the capture of solar radiation and refers only to agriculture, then livestock grazing with sheep is proposed to take place beneath and around the arrays to continue farming of the property.

In this case it is contended that, despite the fact that the use of the land for electricity generating works is prohibited in zone RU1 but permitted by SEPP (Infrastructure) 2007, power generation using solar photovoltaic panels is essentially a primary production use that meets the objectives of zone RU1 and that requires a rural location. The solar panels simply harvest sunlight (solar radiation) and convert that resource to electricity in the same way that farming harvests sunlight and water to grow crops. There is no secondary industry or manufacturing involved in the generation of power by sunlight. It is considered that the minimum lot size may be disregarded in this instance and subdivision to less than 40 hectares permitted.

Clause 6.1 Earthworks

The objective of this clause is to ensure that earthworks for which development consent is required will not have a detrimental impact on environmental functions and processes, neighbouring uses, cultural or heritage items or features of the surrounding land.

Development consent is required for earthworks unless the earthworks are ancillary to development for which development consent has been given. In deciding whether to grant development consent for development involving ancillary earthworks, the consent authority must consider:

- (a) the likely disruption of, or any detrimental effect on, drainage patterns and soil stability in the locality of the development,*
- (b) the effect of the development on the likely future use or redevelopment of the land,*
- (c) the quality of the fill or the soil to be excavated, or both,*
- (d) the effect of the development on the existing and likely amenity of adjoining properties,*
- (e) the source of any fill material and the destination of any excavated material,*
- (f) the likelihood of disturbing relics,*
- (g) the proximity to, and potential for adverse impacts on, any waterway, drinking water catchment or environmentally sensitive area,*
- (h) any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.*

Earthworks associated with the development comprise minor excavation to 150mm to install road base for accessways, 750mm footings for the inverters and security fence strainer posts, 1,000mm footings for the access gate and 1,500mm footings for the panel mounting frames. Cable trenching of 600mm for low voltage cables and 1,200mm deep trenching is also to be carried out. All of these earthworks are ancillary to the development of a solar farm and are not expected to impact adversely on drainage, future use of the land if the facility is decommissioned, relics, the natural environment or adjoining developments.

Clause 6.6 Wetlands

The objective of clause 6.6 is to ensure that wetlands are preserved and protected from the impacts of development. The consent authority is to consider potential impacts on flora and fauna, habitat, and surface and groundwaters as well as measures to avoid, minimise or mitigate impacts.

There is no evidence of a wetland or wet area on the property. The area mapped as wetland is under cultivation and planted with wheat. It is considered that the development of a solar farm would not impact on the mapped wetland or the flow of waters during flood events. The positioning of the development is intended to optimise access to the Essential Energy sub-station on the western side of Kidman Way and to minimise visual impacts on residences along Norwood Lane. The location is seen in the context of balancing these considerations against the mapped wetland. It is not considered necessary to provide a buffer to the mapped wetland.

Clause 6.7 Essential services

This clause requires a consent authority to be satisfied that any of the following services that are essential for the development are available or that adequate arrangements have been made to make them available when required:

- (a) the supply of water,*

- (b) *the supply of electricity,*
- (c) *the disposal and management of sewage,*
- (d) *stormwater drainage or on-site conservation,*
- (e) *suitable vehicular access.*

The supply of reticulated water and sewerage services is not required for the proposed development. However, portaloos for wastewater disposal (see <https://www.kennards.com.au/site-equipment/showers-toilets.html>) and water supply by way of a portable tank or cart (see <https://www.kennards.com.au/site-equipment/water-tank.html>) are proposed to be installed during the construction phase. Electrical services are available to the site. Stormwater management is proposed to be addressed by controls recommended in this Statement with full details to be provided with the application for a construction certificate. Adequate vehicular access is proposed by way of existing entrances to the site off Norwood Lane.

There are no draft environmental planning instruments that are on exhibition or have been exhibited but not yet published that apply to the site, or that relate to the proposed development of electricity generating works.

4.4 Development Control Plan

There are no development control plans in force that apply to land in Carrathool Shire.

4.5 Land use strategies

4.5.1 Riverina Murray Regional Plan

The *Riverina Murray Regional Plan 2036* was released in March 2017. It establishes a framework for growth over the next 20 years for the Riverina Murray Region which includes Carrathool LGA. Hillston is located at the north-west corner of the region.

The plan supports the protection of high-value environmental assets and aims to develop a strong and diverse economy with supportive communities. The plan contains the following four goals:

1. A growing and diverse economy
2. A healthy environment with pristine waterways
3. Efficient transport and infrastructure networks
4. Strong, connected and healthy communities

A series of directions and actions are to guide land use planning priorities and decisions. Direction 11 is to *promote the diversification of energy supplies through renewable energy generation*. It is noted that Carrathool is suitable for large-scale solar power generation. Actions associated with this direction are:

- 11.1 Encourage renewable energy projects by identifying locations with renewable energy potential and ready access to connect with the electricity network.*
- 11.2 Promote best practice community engagement and maximise community benefits from all utility-scale renewable energy projects.*
- 11.3 Promote appropriate smaller-scale renewable energy projects using bioenergy, solar, wind, small-scale hydro, geothermal or other innovative storage technologies.*

Direction 21 is to *align and protect utility infrastructure investment*. It is noted that there are opportunities to provide cost-effective extended and upgraded services for stand-alone alternative energy generation and the use of renewable options such as solar generation.

5. ENVIRONMENTAL EFFECTS

5.1 Biodiversity

5.1.1 Methodology

A desktop biodiversity assessment has been carried out to determine the potential impact on threatened species and endangered ecological communities. This is supported by a site inspection carried out in August 2019. The following sources of information and data have been used to determine whether any threatened species or endangered ecological communities are likely to occur on or near the site:

- SIX Maps aerial imagery,
- Maps accompanying Carrathool LEP 2012,
- NSW BioNet Species Sightings records,
- Mapping by the NSW Office of Environment and Heritage (Central West Lachlan vegetation mapping, Native Vegetation Regulatory Map, Biodiversity Values Map)
- Schedules to the *Biodiversity Conservation Act 2016*, and
- Protected Matters Report of the *Environment Protection and Biodiversity Act 1999*.



Figure 6: Aerial image of the development site. Source: SIX Maps

5.1.2 Carrathool LEP 2012

The lower part of the development site is shown as being affected by wetlands on the Wetlands Map of *Carrathool LEP 2012*. It appears to be on the fringe of a large system of wetlands that surrounds the property on all sides.

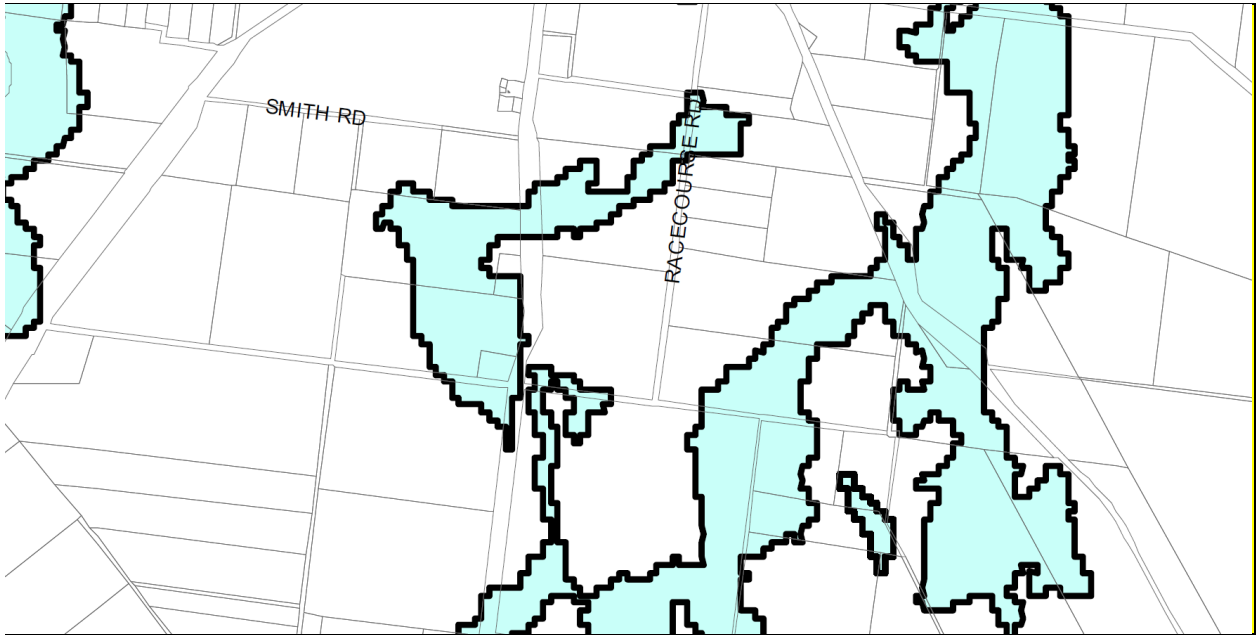


Figure 7: Extract from the Wetlands Map Sheet WET_009

A site inspection carried out in August 2019 revealed that the area mapped as wetland is under cultivation and is planted with wheat. There is no evidence of a wetland or wet area on the property. It is considered that the development of a solar farm would not impact on the mapped wetland or the flow of waters during flood events. The positioning of the development is intended to optimise access to the Essential Energy sub-station on the western side of Kidman Way and to minimise visual impacts on residences along Norwood Lane. The location is seen in the context of balancing these considerations against the mapped wetland. It is not considered necessary to provide a buffer to the mapped wetland.

5.1.3 Significant flora

Native vegetation/ecological communities

Hillston is located in the Riverina Bioregion. The development site is located towards the outer perimeter of the Lachlan River floodplains near Hillston. Black box woodlands dominate with an understorey of salt-tolerant grasses, saltbushes and daisies. Yellow box communities with cypress pine and grey box occur on the higher terraces. The river channels support river red gum and acacia communities. Further from the rivers, many plains are treeless and carry saltbush shrubland, cotton bush and native grasslands.

The Riverina grassland communities are nationally significant because they are significantly threatened and poorly conserved. These communities support a number of threatened plant species such as the endemic red Swainson pea. Twenty-eight threatened species from the Riverina Bioregion are listed in the schedules of the *Biodiversity Conservation Act 2016*. Twelve of these are listed as endangered, 15 are listed as vulnerable and one species is considered extinct in the bioregion.

Development footprint

The development footprint comprises land that has been cleared and used for the cultivation of crops. Other than scattered paddock trees and vegetation along the eastern boundary that separates the rail line and Kidman Way from the property, the site has been cleared for the cultivation of wheat. The photographs below indicate the condition of the ground surface at the development area. A tree is to be removed at the south-eastern corner of the Stage 1 array and a second tree will be removed at the north-western corner of the Stage 2 array to facilitate construction of the solar farm.



Plate 2: Looking north across the development area



Plate 3: Looking east across the development area

Off site

Cleared land on the remainder of the development site and on adjoining properties that are used for agricultural purposes is of similar cover, condition and land use to that within the development footprint. Remnant native vegetation in the vicinity of the proposal comprises regrowth shrubby vegetation along the western boundary, remnant native vegetation in the unformed road reserve parallel to the southern boundary, vegetation restoration in the environmental area at the south-eastern corner of the property and scattered paddock trees.

Central West Lachlan vegetation mapping indicates that the community along the western and southern boundaries is PCT 15 - Blackbox open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (Mainly Riverina Bioregion and Murray Darling Depression Bioregion). The vegetation formation is described as semi-arid woodlands (Grassy sub-formation) and the vegetation class is Inland Floodplain Woodlands.

The community in the environmental area is PCT 45 - Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion. The vegetation formation is described as Grasslands and the vegetation class is Riverine Plain Grasslands.



Plate 4: Looking towards the unformed road reserve parallel to the southern boundary



Plate 5: Looking north along the rail line and the western boundary

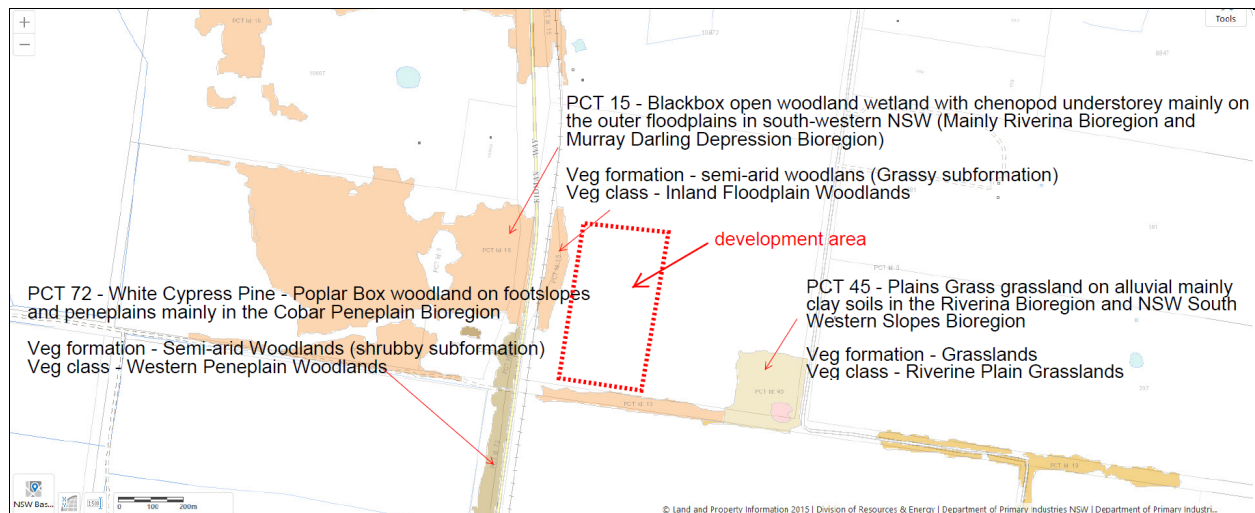


Figure 8: Vegetation communities. Source: OEH, 2019

5.1.4 Significant fauna

Significant fauna known to occur in the riverine forests of the Riverina Bioregion include the superb parrot, sugar glider, feathertail glider, squirrel glider, brush-tailed phascogale, koala, carpet python, freckled duck and peregrine falcon. Black box woodlands provide significant habitat to a diversity of bird species including the superb parrot, which will only nest where box woodland occurs within 10 km of selected nest trees (usually river red gum). Species including the plains-wanderer, bush thicknee, striped legless-lizard and fat-tailed dunnart are found in the shrublands and grasslands of the Riverina Bioregion.

The effect of clearing and grazing, coupled with competition from introduced herbivores such as sheep and rabbits and the impact of carnivores such as foxes and cats, has resulted in a general decrease in the number and species of fauna in the bioregion.

Figure 9 below shows the search results from the NSW Bionet Species Sightings map maintained by the Department of Planning, Industry and Environment. Species records of koalas, superb parrots and other general sightings were used. The map indicates that no vulnerable species have been recorded on the site. This is likely due to the extensive clearing and cultivation of crops that has fragmented the landscape.

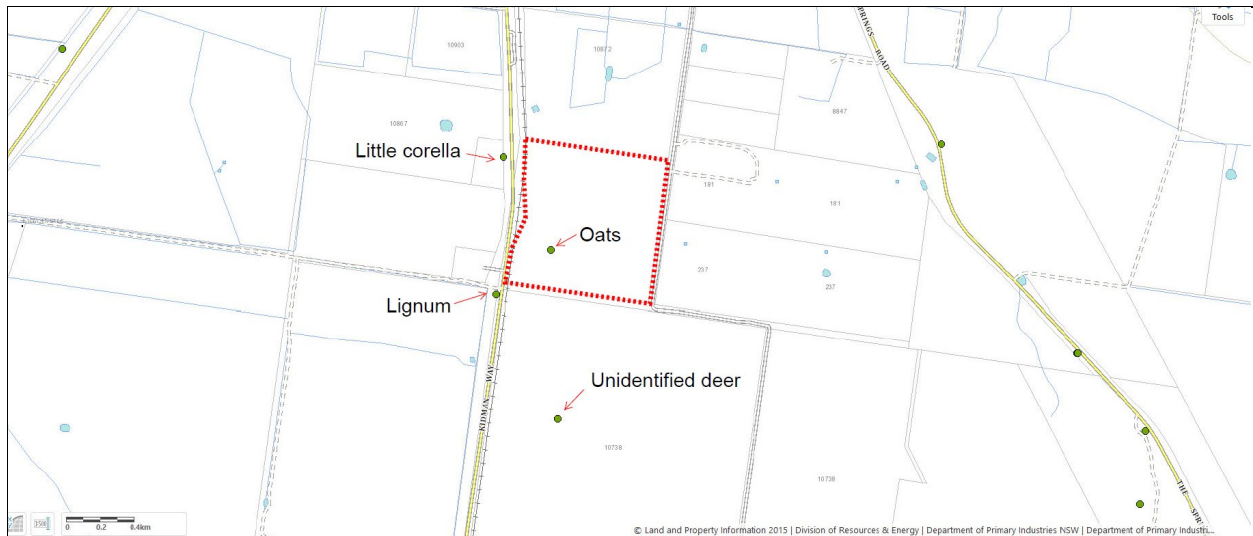


Figure 9: Species sightings. Source: OEH, 2019

A search of the BioNet Atlas of Living Australia has also been carried to determine the potential for endangered and vulnerable species to be present within a 100 square kilometre area surrounding the site. Three species listed as endangered and 11 listed as vulnerable have been recorded in the surrounding area. Some of the rare and endangered fauna species found in the Riverina Bioregion are not listed as potentially occurring within the search area around the development site. These species are listed in Table 2 below.

Table 2: Endangered and vulnerable species recorded near the site

Common name	Status
Spotted harrier	Vulnerable
Little eagle	Vulnerable
White-bellied sea-eagle	Vulnerable
Black falcon	Vulnerable
Turquoise parrot	Vulnerable
Major Mitchell's cockatoo	Vulnerable
Superb parrot	Vulnerable
Barking owl	Vulnerable
Brown treecreeper	Vulnerable
Grey-crowned babbler	Vulnerable
Diamond firetail	Vulnerable

Given that the part of the site to be developed as a solar farm has been cleared and used for the cultivation of crops for many years it is not likely that any endangered, vulnerable or threatened species occur on the site. As shown in Figure 9 the map of the Bionet Atlas search indicates that no endangered, vulnerable or threatened species have been recorded on the site.

5.1.5 Likelihood of occurrence assessment

Potential direct impacts

The proposal, including access, requires the removal of two trees located at the south-eastern corner of the Stage 1 array and the north-western corner of the Stage 2 array. These trees are not hollow-bearing and there would be no interference with habitat.

Potential indirect impacts

Access to the site will be from Norwood Lane then an internal track running east-west to the panel arrays.

Typical potential indirect impacts include noise and light disturbance, introduction of weeds and soil compaction. These factors are already in existence due to ongoing agricultural land use.

5.1.5 Biodiversity Values Map

The Biodiversity Values Map is given in Figure 10 below. This map identifies land with high biodiversity value as defined by clause 7.3(3) of the *Biodiversity Conservation Regulation 2017*. The Biodiversity Offsets Scheme applies to all clearing of native vegetation and other biodiversity impacts prescribed by the regulation on land identified on the map.

The Biodiversity Offsets Scheme is used to determine whether the Biodiversity Assessment Method is to be used to assess the impacts of a development proposal and applies to local development. The scheme is triggered based on threshold levels of clearing comprising the land area to be cleared and whether the area is mapped on the Biodiversity Values Map. In this case the development site is not mapped as being of high biodiversity value.

A minimum lot size of 40 hectares applies to the development site. The threshold for clearing of native vegetation above which the Biodiversity Assessment Method applies is 1 hectare or more. It is proposed to remove only two native trees over both stages of the development, therefore, it is not necessary to engage an accredited assessor to determine the offsets required to enable the project to proceed.

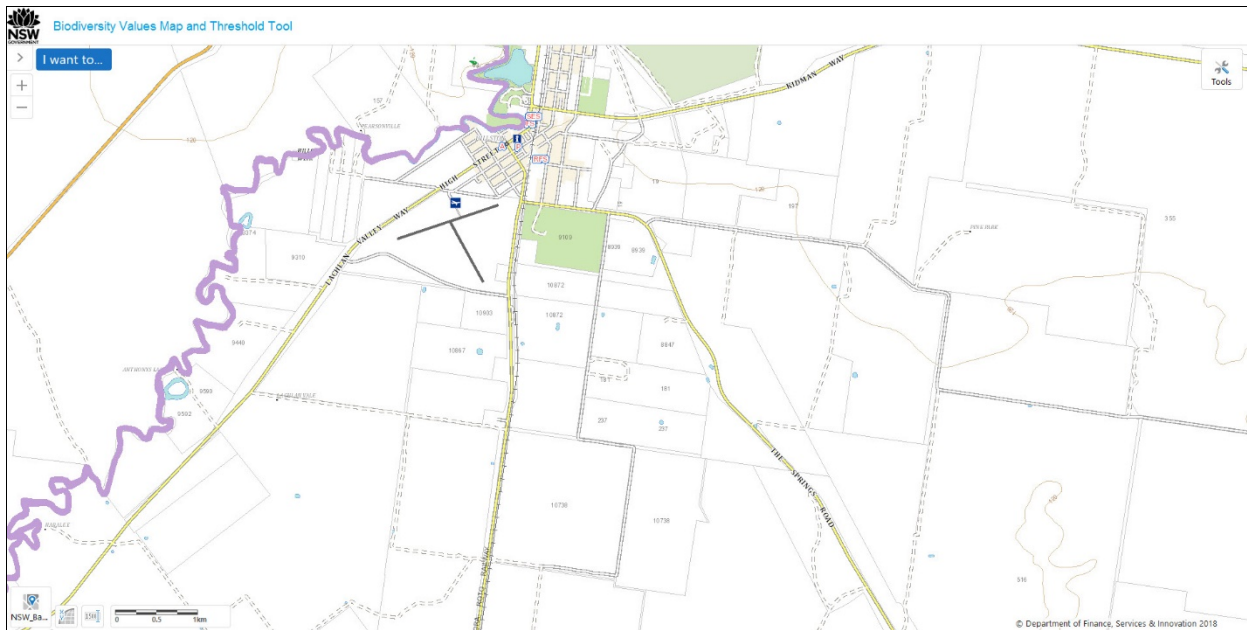


Figure 10: Biodiversity Values Map. Source: OEH, 2019

A test of significance under section 7.3 of the *Biodiversity Conservation Act 2016* may be carried out for local development proposals that do not exceed the Biodiversity Offsets Scheme threshold. This test determines whether the potential impacts of development are likely to significantly affect threatened species, ecological communities, and their habitats. As potential threats to biodiversity are already in existence due to continuing agricultural land use and no threatened species or EECs have been recorded on the site, it is considered that a significance assessment is not required.

5.1.6 Native Vegetation Regulatory Map

The Native Vegetation Regulatory Map covers rural land in NSW and categorises land where management of native vegetation can occur without approval or where management of native vegetation may be carried out in accordance with Part 5A Land Management (native vegetation) of the *Local Land Services Act 2013*.

The categories are Category 1 (unrestricted management where clearing is exempt from the *LLS Act*), Category 2 is regulated land where the *LLS Act* applies to clearing as either code based, vulnerable or sensitive, and Excluded Land which is not regulated by the *LLS Act*.

The Native Vegetation Regulatory Map for the development site is given as Figure 11 below. This land is not mapped as *sensitive regulated land* (shown in pink) or *vulnerable regulated land* (shown in yellow).

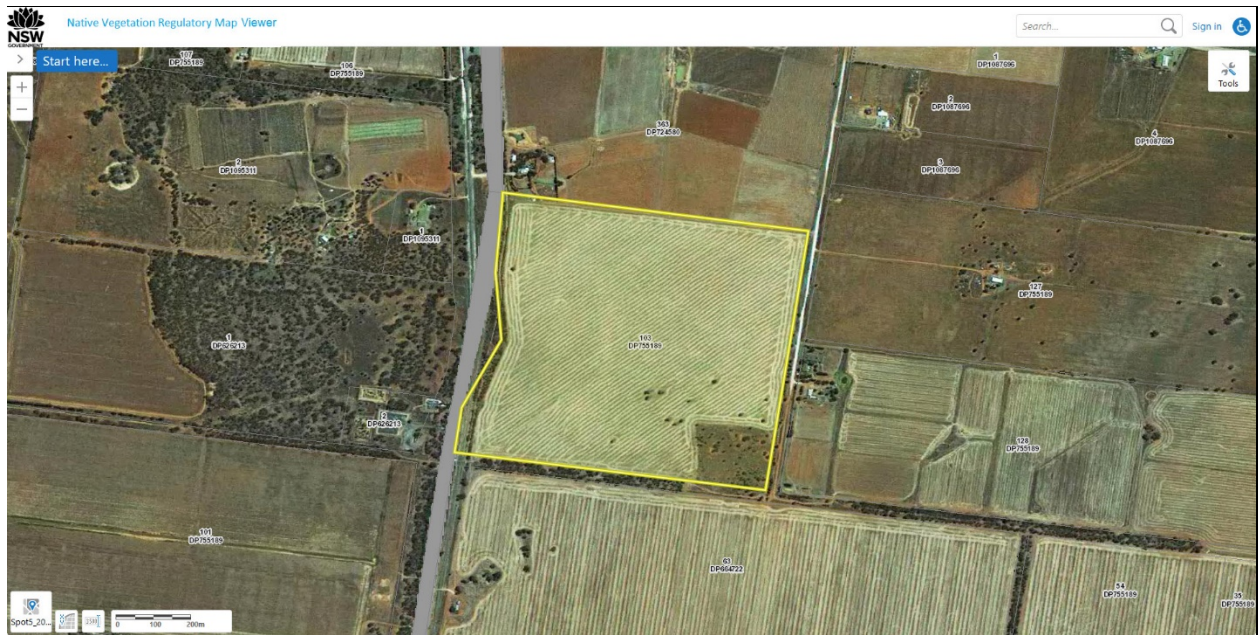


Figure 11: Native Vegetation Regulatory Map. Source: OEH, 2019

5.1.7 Environment Protection & Biodiversity Conservation Act

The *Environment Protection and Biodiversity Conservation Act 1999* affords protection for seven matters of national environmental significance. These matters are world heritage properties, national heritage places, wetlands of national importance, listed threatened species and ecological communities, migratory species, commonwealth marine areas and nuclear actions including uranium mines. Actions that have, or are likely to have, a significant impact on a matter of national environmental significance require the approval of the Australian Government Minister for the Environment and Energy.

Actions include but are not limited to construction, expansion, alteration or demolition of buildings, structures, infrastructure or facilities; storage or transport of hazardous materials; waste disposal; earthworks; impoundment, extraction and diversion of water; research activities; vegetation clearance; military exercises and use of military equipment; and sale or lease of land. It is the responsibility of the Minister to decide whether assessment and approval is required under the *EPBC Act*.

There are potentially 4 wetlands of national importance, 3 listed threatened ecological communities, 15 listed threatened species of flora and fauna, and 9 listed migratory species of flora and fauna protected under the *EPBC Act* within the surrounding locality. The area to be developed as solar farm is cleared and has been intensively used for cultivation. The provisions of the *Environment Protection and Biodiversity Conservation Act 1999* may apply to the development of a solar farm, however, the search of the NSW Bionet Species Sightings map indicates that there are no recorded threatened or migratory species, or threatened ecological communities on the development site. The *EPBC Protect Matters Report* is appended as Attachment A.

The *Wetland Map of Carrathool LEP 2012* indicates that the site is affected by a wetland located at the south-western corner of the property. As discussed above, this area is under cultivation and there is no evidence of the wetland on the ground. This mapped wetland is not part of the RAMSAR wetlands of international importance. It is considered that the development is not likely to have a significant impact on a matter of national environmental significance and that referral to the Commonwealth Government is not necessary.

5.1.8 Mitigation measures

In summary, the development site is not mapped on the Biodiversity Values Map, the clearing of native vegetation is not above the threshold based on minimum lot size, and a test of significance is not necessary due to the condition of the land. A biodiversity development assessment report is not required and the biodiversity offsets scheme does not apply.

Access to the site is to be limited to that point shown on development plans and within the development area. Storage of materials is to be carried out wholly within the development area.

5.2 Natural hazards

5.2.1 Flooding

The site is not mapped as being flood prone in *Carrathool LEP 2012*. Flood mitigation measures and stormwater management have been considered in section 4.3 *Water resources* of this Statement.

5.2.2 Bushfire

The development site is not mapped as being bushfire prone land. Infrastructure comprising electricity generating works is not a habitable building and is not listed as a *special fire protection purpose* under section 100B of the *Rural Fires Act 1997*.

5.2.3 Mitigation measures

There are no mitigation measures recommended in relation to flooding or bushfire protection.

5.3 Water resources

5.3.1 Assessment of impacts

A desktop assessment of potential impacts on groundwater and surface water flows has been carried out by ITP Renewables. The assessment examines:

- Local hydrology and catchment and water quality data,
- Surface and groundwater quality data,
- Flood-risk potential of the site,
- Hydraulic modelling,
- Impacts of the development against NSW policies and industry standards, and
- Management procedures and mitigation measures for construction and operation.

According to spatial data from the Australian Hydrological Geospatial Fabric (Geofabric), the proposed facility is located within a sub-catchment that flows into the Lachlan River. Hillston is located in the western part of the Lachlan Water Resource Plan Area.

The site is located in an area characterized by relatively flat topography between the 116 metre and 120 metre contours. The centre of the site has an elevation of 119 metres AHD, with the nearest part of the Lachlan River having an elevation of 117 metres AHD.

The land is mostly cleared of native vegetation and is currently used for farming. Maps provided in the *Hillston Floodplain Risk Study 2005* show the 1% AEP Flood Extent and the Flood Planning Level and indicate that the southern part of the development site is within a flood fringe area. This corresponds with the mapped wetland in *Carrathool LEP 2012*.

Groundwater

Hillston is located within the catchment of the Lachlan River. The majority of groundwater extraction in the catchment takes place in alluvial aquifers spread across the western part of the catchment from Lake Cargelligo to beyond Hillston. Under the *Water Management Act 2000*, there is a current water sharing plan for the Lachlan Alluvial Groundwater Sources.

The water sharing plan recognizes benefits for users, economic considerations, unregulated streams, and sets rules for alluvial aquifers in the area. The aquifers of the region consist of unconsolidated alluvial sediments that form a broad alluvial fan at the point where the Lachlan River emerges into the riverine plain near Hillston. Ground water monitoring by the Murray Darling Basin Authority indicates that groundwater elevation has decreased by approximately 5 metres between 1970 and 2010, with most of the decline happening after 2000.

Surface water

A water sharing plan is in place for the *Lachlan Unregulated and Alluvial Water Sources*. The Lachlan River system is regulated from the upper limit of Wyangala Dam to the junction with the Murrumbidgee River and, historically, floodplain connectivity, wetland health and the riparian zone have been adversely affected by river regulation and agricultural production in the Lachlan catchment. Water quality in the Lachlan

catchment varies from poor to excellent with problems mostly caused by a combination of alteration to natural flow regimes and land use change. The proportion of native woody riparian vegetation cover near Hillston is high (60%-80%) and the geomorphic recovery potential of streams near Hillston is also high. Conservation areas in the area north of Hillston are noted for being a large, continuous area of vegetation of ecological importance within the broader Lachlan catchment.

5.3.2 Summary of impacts

Flood planning maps indicate that the southern part of the project site is within a flood fringe area but is not within a floodway. As such, a major flood event may cause disruption during construction activities or for material suppliers. Localized drainage patterns means there is potential for overland flow during rainfall. The water will flow in a westerly direction towards the Lachlan River.

The development has the potential to alter existing water quality conditions within the site. The impervious area of solar facilities is typically only marginally increased owing to associated hardstand and building areas. However, the panels may impact the nature of vegetation/grass coverage on the site, which has the potential to increase surface runoff and peak discharge. Increased flow concentration off the panels also has the potential to erode soil at the base of solar panels.

Furthermore, as the site has been historically used for farming there is very little natural ground cover vegetation. There is the potential that site runoff will contain sediments and increase turbidity or other water quality parameters in downstream water ways.

5.3.3 Mitigation measures

The potential for site accessibility and the potential for inundation issues during flood events should be reviewed and procedures developed to halt construction during heavy rainfall to reduce potential impacts to the development and to increases in downstream sedimentation.

Impacts associated with erosion and sedimentation resulting from construction activities can be minimised by undertaking works in accordance with provisions of the NSW government's best practice sediment and erosion control series, Managing Urban Stormwater: Soils and Construction (DECC, 2008). The following mitigation measures given in Table 3 are recommended to manage downstream sedimentation.

Table 3: Proposed mitigation measures to manage downstream sedimentation

Stage	Measure	Activities/approach
Design	Site drainage and water quality controls	Design Basis <ul style="list-style-type: none"> Undertake hydrological assessment of the site's catchment in accordance with relevant methods outlined in Australian Rainfall and Runoff

Stage	Measure	Activities/approach
		<ul style="list-style-type: none"> Determine sediment management targets and drainage control standards in accordance with Managing Urban Stormwater: Soils and Construction Vol 1 (Blue Book) (DECC, 2008). Develop a site erosion and sediment control plan in accordance with the Blue Book. Develop site drainage design incorporating detention basins and sedimentation management structures where relevant. Permanent site drainage should coincide with temporary arrangements where possible
Construction and/or demolition	Site drainage and water quality controls	<p>General site works:</p> <ul style="list-style-type: none"> Catch drains to be located downslope of any proposed road works. Install location appropriate sediment fences or other applicable control measures depending on whether the feature is upstream or downstream of a disturbed part of the site or will need to be trafficable. All stormwater collection points need to have appropriate sedimentation and erosion controls. Undertake ongoing inspections of stormwater facilities and water control measures to assess their effectiveness. Vibration grids or wash bays at all construction exits. Level spreaders at locations where concentrated flow is discharged offsite to ensure sheet flow like conditions are maintained. Flat land erosion control options include erosion control blankets, gravelling, mulching, soil binder, turfing and revegetation
Construction and/or Demolition	Stormwater point source control	<p>In the event of concrete works:</p> <ul style="list-style-type: none"> Do not undertake works if chance of heavy rain. Store rinsate water, if applicable, separately to other water on site and dispose of offsite as appropriate. Block on site drains in the area of the works and remove any contaminated runoff. <p>In the event that dewatering practices are required:</p> <ul style="list-style-type: none"> Elevate pump hose intakes for withdrawing water from excavations to minimise sediment pumping and direct hose to a containment area for settling prior to discharge of water. Limit direct discharge off site (consistent with the design requirements for sediment pond discharge). Stormwater collected on site should be reused where possible. Controls should be inspected and maintained on a regular basis. All water released from sediment basins should be clear or disposed of off site by vehicle. Material and waste storage areas should be designed and operated to minimise interaction with surface waters. Vehicle washdown areas should be located away from water courses

5.4 Air quality

5.4.1 Assessment of impacts

The Office of Environment and Heritage maintain air quality monitoring stations across rural NSW. The nearest monitoring station to the development site is located at Hillston. The instruments used at most rural network sites are low cost indicative particulate monitors that respond to all aerosols including smoke and fog.

Total Suspended Particles (TSP) are measured at this station. Data is collected in 15 minute intervals and reported hourly on the OEH website. Total suspended particulates are solid particles and liquid droplets 100 micrometres or less in diameter. They come from natural and human-made sources, such as pollen, bushfires and motor vehicle emissions. Dust emissions from farming practices are also a source of air pollution in the climate of Hillston and can cause poor air quality.

Particles are measured as PM₁₀ and PM_{2.5}. PM₁₀ are particles less than 10 micrometres in diameter. Sources include crushing or grinding operations and dust stirred up by vehicles on roads. Particles less than 10 micrometres in diameter are measured as an hourly average reading of 32 at Hillston on Tuesday 26 November 2019.

PM_{2.5} are fine particles less than 2.5 micrometres in diameter. Sources include all types of combustion, including motor vehicles, power plants, residential wood burning, forest fires, agricultural burning, and some industrial processes. Particles less than 2.5 micrometres in diameter are also measured as an hourly average reading at Hillston and measured 1 on 26 November 2019.

Total suspended particles have an average hourly reading of 36 on 26 November 2019. These are comparatively good to very good readings indicative of the spring climate of Hillston and the Riverina region.

Activities that disturb the earth's surface and that is carried out with the use of machinery have the potential to generate dust emissions. This may be exacerbated by wind exposure to an exposed ground surface.

The use of the land for farming has involved regular tilling, sowing and harvesting that may create dust and impact on air quality. The land has been modified for agriculture with the consequent loss of most native vegetation leading to exposed soil surfaces. Recent poor air quality is due in part to the effects of the drought causing loss of pasture coverage.

The construction of the solar farm will not involve extensive earthworks and only pile driving for footings for the array framework and excavation for ancillary structures will be carried out. Along with the delivery of materials using heavy vehicles, these construction works may generate dust, however, once operational the change of use of the land from agricultural to solar photovoltaic electricity generation is expected to reduce particulate emissions and lead to an improvement in local air quality. Vehicle movements would be restricted to internal access roads and the majority of the site would be revegetated with native grasses.

5.4.2 Mitigation measures

To minimize dust generation during the construction and operational phases the following mitigation measures are proposed:

During construction:

- Limit vehicle movements to areas necessary to deliver panels, ancillary structures and equipment
- Suppress dust emissions using watering and cease works during dry and windy conditions
- Ensure ground disturbance is limited to areas necessary to place footings or to be used for access
- Ensure minimal handling of excavated materials
- Ensure stockpiles of excavated material is bunded and protected from wind and vehicle movements

During operation:

- Grade and add road base to internal accessways
- Revegetate the site with suitable endemic native groundcover immediately construction works are completed
- Ensure all plant and equipment operates in accordance with specifications

5.5 Noise

5.5.1 Assessment of impacts

An assessment of the impacts of noise emissions has been carried out by Muller Acoustic Consulting. The purpose of the noise assessment is to quantify potential environmental noise emissions associated with the construction and operation of the project. Where impacts are identified, recommendations are made to mitigate and manage noise.

The assessment includes the following key tasks:

- review construction and operating activities to identify key noise generating plant, equipment, machinery or activities proposed to be undertaken as part of the project;
- identify the closest and/or potentially most affected receptors situated within the area of influence to the project;
- establish existing noise levels to determine project-specific construction Noise Management Levels (NMLs), and operational noise criteria;
- undertake 3D noise modelling to predict levels that may occur as a result of the construction and operation of the project at the closest and/or potentially most affected receptors;

- provide a comparison of predicted noise levels against relevant construction NMLs and operational criteria;
- assess the potential noise impacts associated with construction and operational aspects of the project; and
- provide feasible and reasonable noise mitigation and management measures, and monitoring options, where NMLs or operational criteria may be exceeded.

The assessment has been conducted in accordance with the following key policy and guidelines where relevant:

- NSW Department of Environment and Climate Change, NSW Interim Construction Noise Guideline (ICNG), 2009,
- Environment Protection Authority's (EPA's), Noise Policy for Industry (NPI), 2017,
- NSW Department of Environment, Climate Change and Water (DECCW), NSW Road Noise Policy (RNP), 2011.
- Australian Standard AS 2436–2010 (R2016) (AS 2436) – Guide to Noise and Vibration Control on Construction, Demolition and Maintenance sites,
- Australian Standard AS 1055:2018 – Description and Measurement of Environmental Noise,
- Australian Standard AS IEC 61672.1–2004 (AS 61672) – Electro Acoustics - Sound Level Meters Specifications Monitoring, and
- Australian Standard AS IEC 60942-2004 (AS 60942) – Electroacoustics – Sound Calibrators.

Several potential noise sensitive receptors were identified as shown in Figure 12 below. These receptors comprise residential properties and an industrial property. Construction and operational noise levels were predicted to each assessed receptor assuming receiver heights of 1.5m above ground level for typical construction activities and allowing for road traffic noise.

The results of the noise assessment demonstrate that construction noise levels have the potential to exceed the relevant construction noise management levels at six receiver locations. Recommendations have been provided to minimise the potential noise impacts upon receivers for the six month construction period.

Operational noise levels satisfy the management levels for all assessed receivers. However, recommendations to ensure noise levels are verified have been provided in the noise report. Additionally, the noise assessment demonstrates that road noise criteria will be satisfied at all receivers on the proposed transport route.



Figure 12: Location of noise sensitive receptors

5.5.2 Mitigation measures

The following mitigation measures are recommended to address noise emissions during the construction phase:

- a construction noise management protocol to minimise noise emissions, manage out of hours (minor) works to be inaudible, and to respond to potential concerns from the community,
- where possible use localised mobile screens or construction hoarding around plant to act as barriers between construction works and receivers, particularly where equipment is near the site boundary and/or a residential receiver including areas in constant or regular use (e.g. unloading and laydown areas),
- operating plant in a conservative manner (no over-revving), shutdown when not in use, and be parked/started at farthest point from relevant assessment locations,
- selection of the quietest suitable machinery available for each activity,
- avoidance of noisy plant/machinery working simultaneously where practicable,
- minimise impact noise wherever possible,
- utilise a broadband reverse alarm in lieu of the traditional high frequency type reverse alarm,
- provide toolbox meetings, training and education to drivers and contractors visiting the site during construction so they are aware of the location of noise sensitive receivers and to be cognisant of any noise generating activities,

- signage is to be placed at the front entrance advising truck drivers of their requirement to minimise noise both on and off-site, and
- utilise project related community consultation forums to notify residences within close proximity of the site with project progress, proposed/upcoming potentially noise generating works, its duration and nature and complaint procedure.

It is recommended that noise emissions from the solar farm be minimised when operational. To assist in noise management, it is recommended that a one-off noise validation monitoring assessment be completed to quantify emissions from the site and to confirm that relevant criteria are satisfied.

5.6 Electromagnetic radiation

5.6.1 Potential radiation sources

The information presented in this section has been sourced from the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). It includes a description of the type of electromagnetic radiation that may be produced by the generation and distribution of electricity.

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

ELF EMF is produced by both natural and artificial sources. Naturally occurring ELF EMF is associated with atmospheric processes such as ionospheric currents, thunderstorms and lightning. Artificial sources are the dominant sources of ELF EMF and are usually associated with the generation, distribution and use of electricity at the frequency of 50 or 60 Hz. The widespread use of electricity means that people are exposed to ELF electric and magnetic fields in the home, in the environment and in the workplace.

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

5.6.2 Mitigation measures

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

5.7 Traffic and access

5.7.1 Existing access arrangements and proposed movements

An assessment of the impacts on traffic and the adequacy of access arrangements has been carried out by Price Merrett Consulting. The assessment includes a description of the existing road network and considers expected traffic generation during construction and operation and site access.

Site access

The site is currently accessed from Norwood Lane which starts at The Springs Road and runs south to access the eastern boundary of the property. Norwood Lane is a gravel track which turns to dirt just south of the neighbouring house. The existing access from Norwood Lane is within the 100 km/hr zone and therefore would have a safe intersection sight distance of 285 metres.

Kidman Way (B87) is a state highway that services rural communities of the Murrumbidgee Irrigation Area and links the Newell Highway with the Sturt, Mid-Western, Barrier, Mitchell and Kamilaroi highways. Average daily two way volumes are 500 vehicles with 26% of those being heavy vehicles. The western access to the development site off Kidman Way which crosses the rail will not be used due to safety issues.

Norwood Lane intersects with The Springs Road which connects to Kidman Way. SISD is greater than the required 285 metres at the intersection with Norwood Lane.

It is recommended that a new access point be created off Norwood Lane into the development site. The proposed access point has adequate sight lines and will be suitable for heavy vehicle access and there are no major geometry issues. The new access should be designed to accommodate a 19m heavy vehicle. AN easement will be required over proposed Lot 2 to enable ongoing access to proposed Lot 1.

Traffic impacts

Up to 90 semi-articulated trucks will access the site during the construction period with an expected daily maximum of 4 trucks. The trucks will access the site throughout the day generally between 10am and 2 pm and would therefore not contribute to morning or afternoon peak hour of existing commuters in the area.

Construction workers are likely to be in the order of 10-20 vehicles entering the site in the morning between 6:30 to 8:00am and leaving at the afternoon peak around 4:00 to 5:00pm. These will be light vehicles and or shuttle bus service. These movements are expected to be 90% between Hillston township and the site.

These additional traffic numbers from staff and heavy vehicles will not impact on the operation of the intersection of Kidman and The Springs Road. The turning movements onto Norwood Lane are very low and impacts from short term construction works will be minimal. It is recommended that during the construction period, signage be installed on either side of the Norwood Lane intersection with The Springs Road to advise motorists.

5.7.2 Mitigation measures

It is recommended that:

- A new access point to Lot 103 DP 755189 should be constructed immediately north of the existing access off Norwood Lane,
- An easement be created over proposed Lot 2 to enable ongoing access to proposed Lot 1,
- Turning movements for heavy vehicles from Norwood Lane into the site be limited to right turn in and left turn out
- New access to be designed to accommodate 19m semi-trailers and constructed to a standard to accommodate the initial construction phase, and
- Trucks on Road signs (W5-22A) should be installed 250m either side of the Norwood Lane intersection on The Springs Road during the construction period.

5.8 The community and economy

5.8.1 The population

The population of Hillston state suburb in 2016, as defined by the Australian Bureau of Statistics and which includes the development site and rural land surrounding the settlement of Hillston, was 1,465 persons of which over 75% were born in Australia. The total population of Carrathool local government area in 2016 was 2,719 persons.

Occupied private dwellings accounted for 83.2% of dwellings in Hillston state suburb and 16.8% were unoccupied. Over 90% of dwellings were separate houses and 5% were medium density dwellings.

Unemployment at the time of the 2016 Census of Population and Housing was 4.4% of the labour force comprising persons aged 15 years and over in Hillston state suburb. Just under a quarter of employed people were managers with significant proportions employed as labourers, machinery operators and drivers, and technicians and trade workers. The top industries of employment were grain growing, vegetable growing, and fruit and nut tree growing.. Employment in these sectors accounted for 17.8% of the labour force in Hillston state suburb.

5.8.2 Change of use of agricultural land

Hillston is located in the Riverina region. The region includes the major regional centres of Wagga Wagga and Griffith and the local government areas of Coolamon, Griffith, Gundagai, Junee, Leeton, Lockhart, Narrandera, Snowy Valleys, Temora, and Wagga Wagga, as well as parts of Bland, Carrathool, Greater Hume Shire, Federation, Murrumbidgee, and Yass Valley local government areas.

According to the Commonwealth Department of Agriculture the gross value of agricultural production in the region in 2017-2018 was \$2.5 billion, which was 19 per cent of the total gross value of agricultural production in New South Wales of \$13 billion. Agricultural land in the region occupies 44,600 square kilometres, or 78 per cent of the region. The most common land use by area is grazing modified pastures, which occupies 22,100 square kilometres or 39 per cent of the region.

The Riverina region has a diverse agricultural sector. The most important commodities in the region based on the gross value of agricultural production were wheat (\$375 million), followed by cotton (\$347 million) and cattle and calves (\$247 million). These commodities together contributed 38 per cent of the total value of agricultural production in the region. ABS data indicates that in 2016–2017 there were 3,518 farms in the Riverina region. Other grain growing farms which includes wheat farms (717 farms) were the most common, accounting for 20.4 per cent of all farms in the region, and 22.4 per cent of all other grain growing farms in New South Wales.

Figure 13 below shows land capability mapping for the development site and land to the south of Hillston. Land that is shaded green is class 3 and 4 land capability whilst land shaded yellow is class 5. The development site has a land capability class of 5. This indicates that the land is moderate–low capability. The land has high limitations for high-impact land uses and use is largely restricted to grazing, some horticulture (orchards), forestry and nature conservation. The limitations need to be carefully managed to prevent long-term degradation. (*The land and soil capability assessment scheme – A general rural land evaluation scheme for NSW, 2nd Approximation*, OEH).

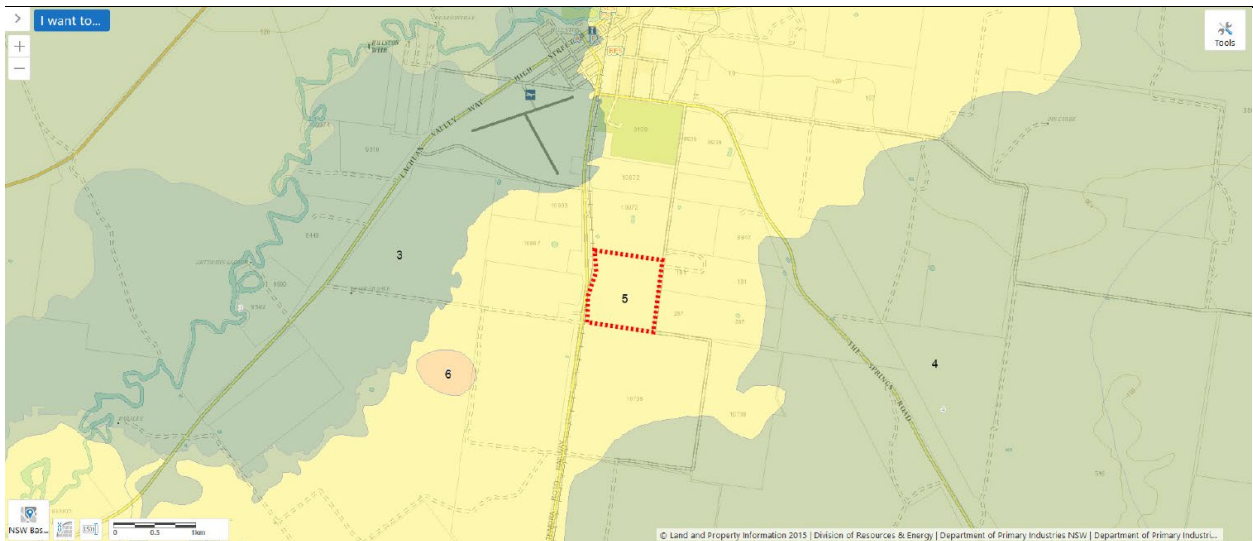


Figure 13: Land capability mapping. Source: OEHL 2019

The development site is used to cultivate wheat and was sown when the site was inspected in August 2019. The loss of agricultural land due to the development of the Daisy Hill Solar Farm would be minimal and temporary. It would be offset by the contribution that the solar farm will make to the local economy through direct and indirect employment and expenditure over the short term and through the benefits that renewable energy power supply will bring to the region. The land area to be occupied by the solar farm represents a fraction of the total agricultural land used for grain growing.

If necessary and practical in terms of security, the land surrounding panel arrays can continue to be used for farming purposes such as the cultivation of vegetables or flowers, or potentially livestock grazing during the operation of the solar farm. The arrays of panels can be removed once the facility is decommissioned and the land can be returned to agricultural use. It is considered that the impact in terms of loss of productive agricultural land should be seen in the context of the impacts on farmland of other forms of power generation, for example, fracking for coal seam gas, and mining for coal and uranium as well as the infrastructure to support the processing of coal and gas.

5.8.3 Employment

The Daisy Hill Solar Farm is designed to generate in excess of 24.8GWh of energy annually with the system offsetting almost 17 thousand tonnes of CO₂ equivalent emissions (Sources: *National Greenhouse and Energy Reporting (Measurement) Determination 2008 (Schedule 1)* and Department of the Environment and Energy) and providing enough energy to power about 4,300 NSW homes.

A benefit to the community of the solar farm will be through an understanding of sustainable development and by gaining a commitment to greater reliance on renewable energy. Solar power generation would bring regional economic development benefits to the Riverina region as the area gains a reputation as a suitable location for renewable energy and linked industries.

It is anticipated that there will be 50 personnel directly involved in construction on site which is expected to take approximately six months. Varying levels of expertise will be required ranging from labourers to qualified electricians and project managers. In addition, personnel would be involved in transport and delivery of materials to the site. Some of this employment is to be sourced locally. This will bring direct economic benefits to the local economy through wages and salaries and indirect benefits through the need for accommodation and sustenance in the area for non-local employees.

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

The skills required to be involved in the construction and ongoing maintenance of the Daisy Hill Solar Farm may require some personnel to undergo further training and education, leading to an upskilling of the local workforce and enhanced employment opportunities generally.

A search of visitor accommodation in Hillston using www.visitnsw.com and www.tripadvisor.com.au indicates that visitor accommodation in Hillston comprises two caravan parks, backpackers accommodation, two hotels and three motels. There is also a motel in Goolgowi which is 60 kilometres to the south.

In addition to these establishments there are short term rentals, unoccupied private dwellings and unregulated accommodation places. There were 105 unoccupied private dwellings in Hillston and a total of 208 across Carrathool LGA at the time of the 2016 census. It is considered that there is adequate accommodation available to cater to the expected number of construction workers even if all are sourced from outside the Hillston area and require temporary local accommodation.

5.8.4 Summary and mitigation measures

In summary:

- The development of a 10MW solar farm will contribute to the electricity grid in a sustainable manner that reduces greenhouse gas emissions and will assist the transition of our economy from reliance on fossil fuels to renewable sources to decarbonise electricity production
- The solar farm will assist Commonwealth and NSW Governments to achieve targets and objectives relating to emissions and addressing climate change
- The solar farm will generate community economic benefits through local employment opportunities during the planning and construction phases as well as limited maintenance and inspection jobs once operational. The development of a solar farm will create a new market for local contractors and expand diversity of income for the land holder
- The loss of productive agricultural land is minimal and temporary. The arrays of panels can be removed once the facility is decommissioned and the land can be returned to agricultural use

- If necessary and practical in terms of security, the land surrounding panel arrays can continue to be used for farming purposes such as the cultivation of vegetables or flowers, or the grazing of sheep during the operation of the solar farm
- Any impacts on the natural environment including the scenic quality of the rural landscape are minimal and can be mitigated. Alternatively, the natural environment may benefit such as through the restoration of native grasses in and around panel arrays

It is recommended that labour to construct the solar farm and for ongoing maintenance be sourced from within Carrathool LGA wherever possible. Where labour needs to be brought into the Hillston area, it is considered that there would be sufficient accommodation options for employees in the LGA for the estimated 50 workers engaged during the six month construction phase. The level of visitor accommodation available in the local government area suggests that there is adequate accommodation to cater to the volume of workers during the construction period.

There is likely to be negligible effects on the availability of affordable rental over the short construction period as it is not expected that landlords would evict long-term tenants in preference of short term workers. Workers coming to the area would be likely to take up tourist accommodation similar to mine workers across country NSW, however, construction may be limited to the off-peak tourist season if necessary.

It is recommended that advertising be placed in local media and to approach local businesses to determine whether there is the capacity and expertise available in Hillston and surrounding districts to participate in the construction and ongoing maintenance activities.

5.9 Heritage

5.9.1 Indigenous heritage

The generic due diligence process outlined in the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* was implemented to ensure that an adequate due diligence process that addresses Aboriginal cultural heritage issues has been carried out. This process follows the following five steps:

1. *Will the activity disturb the ground surface?*

Earthworks will involve trenching which is required for cabling of each PV array/module to inverters and a sub-station. Other earthworks would be pile-driving to support module frames, and to enable the placement of concrete slabs and gravel accessways. Most of the infrastructure would be pre-fabricated off-site, delivered and assembled on-site.

2a. Search the AHIMS database

In accordance with the code, an on-line search was carried out of the *Aboriginal Heritage Information Management Service (AHIMS)* that is maintained by the Office of Environment and Heritage. The search is part of the due diligence process and remains valid for 12 months. The search results are appended as Attachment B.

A search of Lot 103 DP 755189 was performed on 22 November 2019. The search results are:

- There are no Aboriginal sites recorded in or near the selected location, and
- There are no Aboriginal places that have been declared in or near the selected location.

It is noted that surveys for Aboriginal objects have not been carried out in all parts of NSW and Aboriginal objects may exist on a parcel of land even though they have not been recorded in *AHIMS*. Further, not all known Aboriginal sites are registered on the *AHIMS* database and not all sites consist of physical evidence or remains, e.g. dreaming and ceremonial sites.

2b. Activities in areas where landscape features indicate the presence of Aboriginal objects

The development area does not possess landscape features that indicate the presence of Aboriginal objects.

3. Can you avoid harm to the object or disturbance of the landscape features

Not applicable as the development area has been disturbed and farmed, does not possess significant landscape features and no known Aboriginal objects are listed in *AHIMS*.

4. Desktop assessment and visual inspection

The desktop assessment found that no known Aboriginal objects are listed in *AHIMS*. A site inspection was made on 14 August 2019 and there was no evidence of any artefacts on the surface of the land.

5. Further investigations and impact assessment

Griffith Local Aboriginal Lands Council was advised of the plans to develop the solar farm during November 2019. Details of any knowledge of Indigenous heritage sites, places, relics or the like were requested, however, to date no reply has been received. Council may impose a condition of consent that requires a site survey be carried out prior to the commencement of construction. Council may also recommend a condition of consent to comply with provisions of the *National Parks and Wildlife Act 1974* should any

evidence of Aboriginal occupation be found during site works. An *Aboriginal Heritage Impact Permit* may be required to be obtained if indigenous heritage objects are found.

5.9.2 Non-indigenous heritage

There are 20 properties in and around the town of Hillston listed as heritage items in *Schedule 5 Environmental heritage of Carrathool LEP 2012*. All of these properties are of local significance.

Clause 5.10 Heritage conservation of *Carrathool LEP 2012* applies to these items, buildings and structures and to development within the vicinity of a heritage item. The relevant objective of clause 5.10 is *to conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings and views*. Clause 5.10 (5) enables a consent authority to require that a heritage management document be prepared for development in the vicinity of a heritage item or heritage conservation area, that assesses the extent of effects on heritage significance.

Heritage item I131 Hillston cemetery is located adjacent Hillston Airport and approximately 970 metres from the development site at the closest point. There is no visual or physical connection between the development site and the cemetery and there are a number of intervening properties including the Kidman Way road reserve. It is considered that a heritage management document is not required in this instance as the development will not impact on the heritage significance of the cemetery or its setting.

5.10.3 Mitigation measures

No mitigation measures are necessary in relation to indigenous or non-indigenous heritage.

5.10 Glare and glint

5.10.1 Potential glare and glint

Glare is defined as a continuous source of excessive brightness relative to ambient lighting. Glint is defined as a momentary flash of bright light. Solar photovoltaic (PV) panels are constructed of dark, light-absorbing material and covered with anti-reflective coating. In order to maximise the efficiency, the panels are designed to limit reflection and to absorb around 98% of the light received. The glare generated from solar panels is significantly lower than many other surfaces, including water, however, the glass panels and metal frames have the potential to generate glare and glint. An assessment of the potential glare and glint generated by the proposed solar farm is necessary to ensure visual receptors such as road users, air traffic control towers and pilots are not impacted by the development of solar farms.

In a fixed PV solar array, the angle of incidence varies as the sun moves across the sky, that is, the angle of incidence is at its lowest around noon where the sun is directly overhead and increases in the early mornings and late evenings as the incidence angles increase. The variation of the angle is reduced where

the PV array is mounted on a single axis tracking system whereby the panels rotate to remain perpendicular to the sun as proposed in the Daisy Hill Solar Farm. Therefore, an array mounted on a tracking system has less potential to cause glare whilst it tracks the sun.

A desktop assessment has been carried out using the Solar Glare Hazard Analysis Tool by ITP Renewables. The assessment is based on identifying the potential sensitive receptors and then assessing the potential glare and glint hazard and impacts on those receptors using the tool. Glare resulting from PV solar farms is analysed at different viewpoints based on the location, orientation and specifications of the solar panels. Mitigation measures are recommended to reduce potential impacts to an acceptable level. This tool is used by the United States Federal Aviation Administration for glare hazard analysis near airports and is also recognised by the Australian Government Civil Aviation Safety Authority (CASA).

The analysis estimates green glare and yellow glare received at each identified potential receptor. Green glare is glare with low potential to cause an after-image when observed prior to typical blink response time, and yellow glare has a higher potential to cause an after-image when observed prior to a typical blink response time. The analysis is on a minute-by-minute basis because sun reflections from solar panels are likely to last at least one minute. Glint is a short-term flash which lasts for less than a minute is therefore unlikely to occur from the sun, due to the pace at which the sun and panels move. Glint is not considered to be a factor affecting motorists or pilots and is not considered further in this assessment.

Potential visual receptors within 2 kilometres of the development site were identified and are shown in Figure 14 below. A 2 kilometre radius from the site was considered appropriate based on it being highly unlikely for glint and glare impacts at distances greater than this. The heights of the observation points were assumed to be 1.5 m for a motorist and 1.65 m for a standing person. Existing vegetation or structures can affect visual connectivity with solar panels. Similarly, atmospheric conditions such as cloud cover can influence light reflection and the resulting impact on visual receptors. Varying atmospheric conditions have not been accounted for in the analysis.

Observation points were identified as follows:

- Considering the elevation of the site relative to surrounding land to determine land potentially affected,
- Including residential properties and public roads within a 2 km radius of the site. Properties located at greater distances are unlikely to be affected, and
- Including any properties where large stands of trees or existing structures would act as visual barriers noting that obstructions are likely to prevent glare from being received at these receptors.

As a result seven residential observation routes and five road observation points were identified as potential visual receptors. Hillston Airport flight paths were also assessed noting that there are no air traffic control towers at the airport.

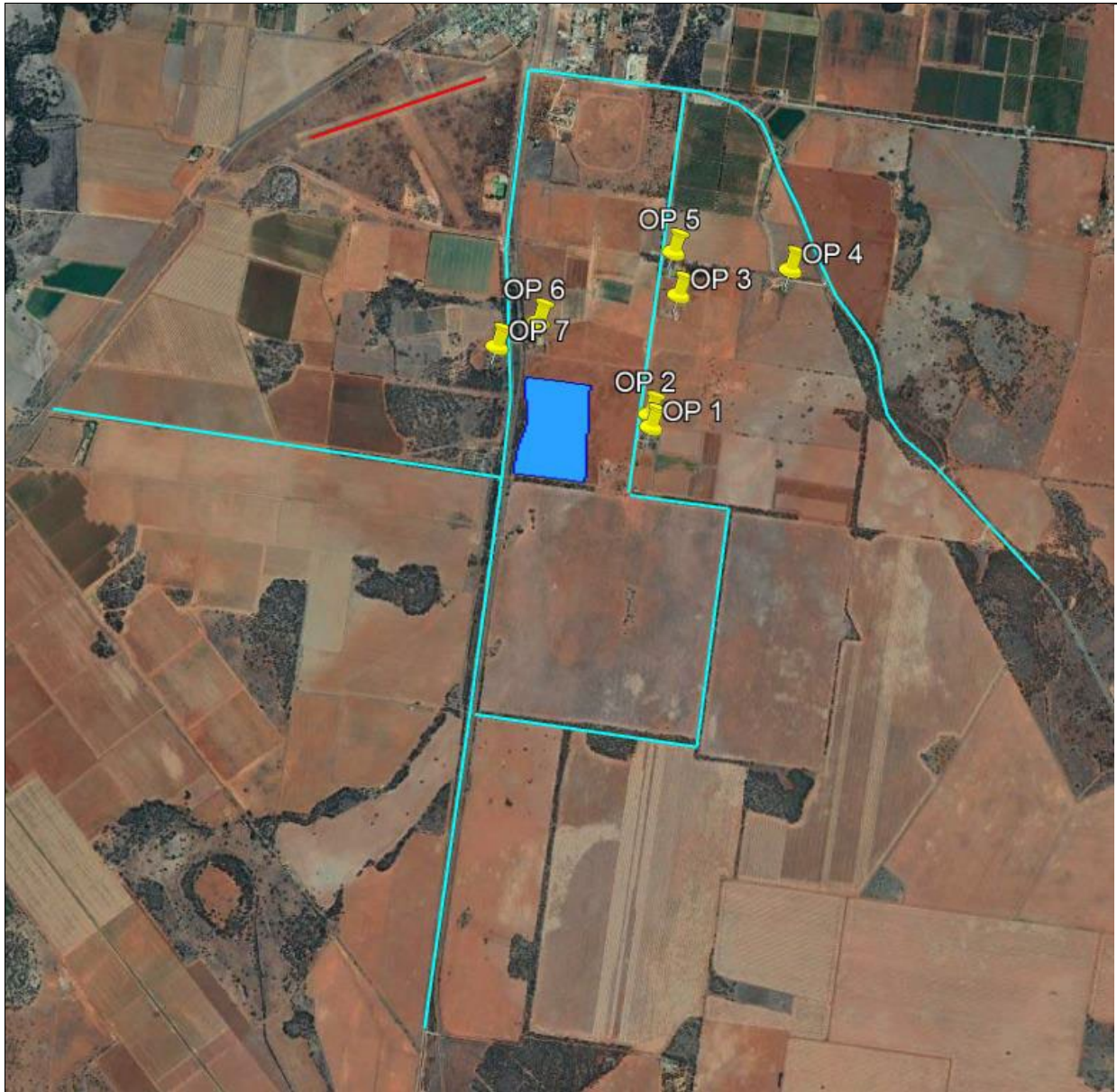


Figure 14: Potential visual receptors

The results of the analysis indicate that none of the properties are expected to be affected by either green or yellow glare as a result of the proposed solar farm. Many residences will also not have direct view of the solar farm due to visual obstruction from trees and other structures. Motorists approaching the solar farm along road routes in the vicinity of the development site (Kidman Way, Norwood Lane, Racecourse Road, The Springs Road and an unnamed road to the west of the development site) are also not expected to experience any glare. Aircraft using runways 06 or 24 at Hillston airport are also not likely to experience any glare.

5.10.2 Mitigation measures

No mitigation measures are considered necessary.

5.11 Visual and scenic amenity

5.11.1 Methodology

Impacts on the visual and scenic amenity of the proposed Daisy Hill Solar Farm have been assessed by Zenith Town Planning Pty Ltd using the RMS guideline *Environmental Impact Assessment Practice Note – Guideline for Landscape Character and Visual Impact Assessment* (EIA-N04 Version 2-0 released on 28 March 2013). Details of methodology are given below.

A site inspection of the location of the proposed works and the surrounding area took place in August 2019. The visual catchment, the context of the site of the proposed works and viewpoints were identified at this time. Land uses and characteristics of the environment such as topography, vegetation, neighbouring buildings and any heritage values of any significant sites in the vicinity of the proposed solar farm were noted to enable the capacity of the area to absorb physical change to be assessed.

Development plans for the solar farm have been reviewed and the likely impacts on landscape character identified. This is determined by the sensitivity of the landscape to physical change and the magnitude, or relative size and scale, of the works.

The visual significance of the site to viewpoints and receivers within the visual catchment is described in terms of proximity to the site, landscape character, the composition of views and the sensitivity to change that will affect scenic values. The visual impacts that will be experienced by each receiver are identified and evaluated in terms of the sensitivity of each receiver to change and the magnitude of that change in terms of the proposed works.

The impacts are calculated and ranked according to negligible, low, moderate or high impact based on the following matrix (sourced from the RMS *Guideline for Landscape Character and Visual Impact Assessment*).

Table 4: Landscape character and visual impact grading matrix. Source: RMS Guideline for Landscape Character and Visual Impact Assessment, 2013

Landscape character and visual impact grading matrix					
	Magnitude				
Sensitivity		High	Moderate	Low	Negligible
	High	High impact	High-moderate	Moderate	Negligible
	Moderate	High-moderate	Moderate	Moderate-low	Negligible
	Low	Moderate	Moderate-low	Low	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

The findings of the landscape character and visual impact assessments are summarised in the conclusion. Recommendations as to refinements of the development plans to avoid or mitigate significant landscape and visual impacts are made if necessary.

5.11.2 Description of the landscape

The character of the landscape near the site of the Daisy Hill Solar Farm is predominantly an open modified agricultural landscape that has been sculpted by farming. It is generally flat with some remnant vegetation along road reserves and on public land. Drainage lines that traverse the landscape flow into the Lachlan River to the west of the development site.

The site itself is rural and located south of the township of Hillston. Structures within the vicinity of the site comprise scattered rural farm dwellings set within primary production land uses, farm sheds and the Essential Energy sub-station. Photographs provided below illustrate the site and surrounding area. The landscape is assessed to have low to medium sensitivity to change.

5.11.3 Assessment of impacts on landscape character

The proposed Daisy Hill Solar Farm will comprise approximately 32,000 solar modules. These are to be placed within a confined area of about 23 hectares at the south-western corner of the property. Remnant native vegetation is located along the western boundary of the development site and within the unformed road reserve to the south. The solar farm is to be enclosed within a chain mesh steel security fence topped with three rows of barbed wire to a height of 2.1 metres. The fence surrounding the array is to be setback 16.5 metres from the southern boundary and a minimum of 13.4 metres from the western boundary. The vegetation along the western boundary will be on the outer side of the security fence, between the fence and the property boundary. Solar arrays are to be setback 6 metres from the security fence.

The sensitivity of private property and public roads to landscape change would be low to moderate given the predominantly agricultural landscape. The magnitude of the project and impact on landscape character is also considered to be low to moderate for private property and low to negligible for public roads.

5.11.4 The visual catchment

The visual catchment of the site of the proposed Daisy Hill Solar Farm is defined by an area within 2 kilometres of the development site from which the works may be visible as shown on the visual catchment map below. This area is the same as that considered in the glare and glint analysis. The greater the distance from the development site the less clear is the view of the solar farm. The ability to distinguish the type of land use and the actual composition of materials diminishes with distance.

The visual impact of solar farms depends on the scale and type of infrastructure, the prominence and topography of the site relative to the surrounding environment; vegetation, and any proposed or existing screening measures to reduce visibility of the site. Some potential viewpoints may not have a clear line of sight towards the solar farm because of significant existing features such as built structures and vegetation. The site itself is cleared and there are no existing structures in the development area that would screen the site. However, vegetation along the western boundary to Kidman Way provides screening from that direction.

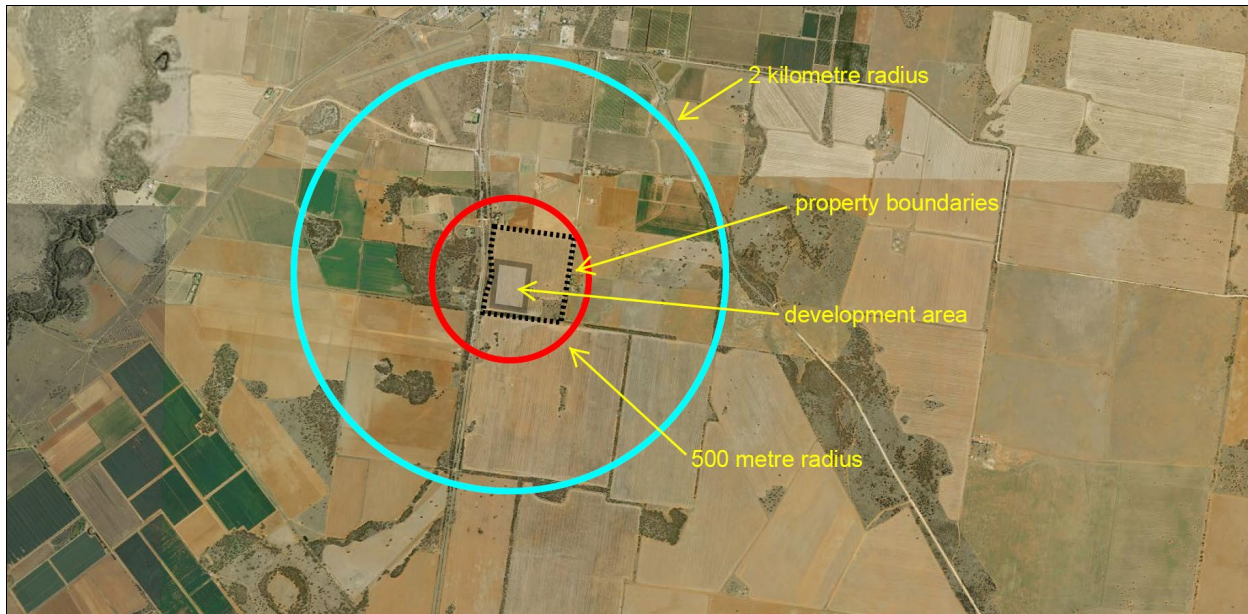


Figure 15: The visual catchment. Source: SIX Maps

There are seven dwellings and five public roads within the 2 kilometre radius of the development area. There are no receptors within a 500 metre radius of the development area. The separation distances from each dwelling to the nearest point of the development area are given in Table 5. The solar panels would be partially visible from public roads such as Kidman Way, Norwood Lane, Racecourse Road, The Springs Road and the unformed road along the southern boundary. Visual impacts on commercial properties are generally considered negligible.

The sensitivity of the neighbouring dwellings to landscape change is low to moderate given the existing modified landscape, distance separation of the development area and topography. The sensitivity would decrease with distance so that visibility of the solar farm to dwellings and other structures beyond 2 kilometres outside the visual catchment would be negligible. The sensitivity of public places to landscape change would be moderate where the place is clearly visible with unobstructed views of the development area such as along Norwood Lane. Distance separation, vegetation on intervening land and topography mitigates that sensitivity for other road routes which are assessed to be low to negligible.

Below are photographs of the development site and neighbouring land. All photographs were taken by Zenith Town Planning Pty Ltd at the time of the site inspection.



Plate 6: Vegetation along the western boundary



Plate 7: Looking east from the development area towards dwellings on Norwood Lane



Plate 8: Looking west towards the development area from Norwood Lane



Plate 9: Looking south from the development area across the unformed road reserve



Plate 10: Looking east towards the development area from Kidman Way



Plate 11: Looking south towards the development area from adjoining property to the north-west



Plate 12: Looking towards the development area from Kidman Way at the north-east corner of the property

5.11.5 Assessment of visual impacts

Table 5 below indicates the magnitude of the proposed solar farm in terms of the visual change in the landscape and proximity to the viewpoint, and the degree of sensitivity based on the quality of the view, whether the site is clearly visible or obscured by landform or vegetation, the direction and composition of the view, and how sensitive the view is to changes in the landscape that will result from the proposed development. A rating is then given based on magnitude and sensitivity using the landscape character and visual impact grading matrix.

Table 5: Viewpoint impacts

Viewpoint	Location relative to solar farm	Comment	Magnitude	Sensitivity	Rating
OP1 Residential	650m east	Directly east of the development area and partially screened by trees	Moderate	Moderate	Moderate
OP2 Residential	650m east	Directly east of the development area and partially screened by trees	Moderate	Moderate	Moderate
OP3 Residential	1.3km north-east	Partially screened by roadside vegetation and vegetation on private property. Significant distance separation	Low	Low	Low

Viewpoint	Location relative to solar farm	Comment	Magnitude	Sensitivity	Rating
OP4 Residential	2km north-east	Adequate distance separation	Low	Low	Low
OP5 Residential	1.5km north-east	Partially screened by roadside vegetation and vegetation on private property. Significant distance separation	Low	Low	Low
OP6 Residence	800m north	Distance separation and crops on intervening land	Moderate	Low	Low-moderate
OP7 Residence	750m north-west	Distance separation and crops on intervening land	Low	Low	Low
OP8 Kidman Way	South-west through to north-west	Vegetation along western boundary provides partial screening	Low	Moderate	Low-moderate
OP9 Norwood Lane	North-east through to east	Distance separation at north-eastern. Visible from southern section to the east of the development area	Low	Moderate	Low-moderate
OP10 Racecourse Road	East through to south-east	Over 1.5 kilometres to the south of the development area at the closest point	Negligible	Negligible	Negligible
OP11 The Springs Road	North through to south-east	Over 2 kilometres to the north of the development area at the closest point	Negligible	Negligible	Negligible
OP12 Unnamed road	South	Unformed and vegetated in the vicinity of the development area	Negligible	Low	Negligible

5.11.6 Summary of impacts

The landscape surrounding Hillston is one that has been modified by human activity associated with the agricultural industry. Land in the immediate area near the development site is characterised by a mix of farming (mainly cropping), rural uses, an electrical sub-station, some remnant native vegetation and public roads.

The impact of the proposed Daisy Hill Solar Farm on landscape character has been assessed to be negligible to moderate based on magnitude of works and the sensitivity to change of surrounding properties. There would be glimpses of the development to motorists travelling along Kidman Way but existing vegetation on the property and within the road reserve would provide effective screening.

There would be views across the development from Norwood Lane to the east and distant views from the north-east but roadside vegetation and landscaping on private properties would provide partial screening.

The development would not be visible from The Springs Road or Racecourse Road and the unnamed road to the south is unformed and vegetated.

The visual impact of the proposed works is assessed to range from negligible to moderate for the residential residential viewpoints identified in this assessment. The solar farm would be visible to dwellings in close proximity along Norwood Road to the east of the development area although farm structures and crops on intervening land would distract vision and lessen the visual impact.

There would be distant views of the development from other dwellings to the north-east along Norwood Lane although vegetation on private property and within the road reserve would provide some screening. Distance separation and roadside vegetation would assist to mitigate the impact on dwellings to the north and north-west.

These impacts are considered acceptable given the nature of the proposed development and that it will contribute to renewable energy generation. It is expected that acceptance of and adaptation to change will occur within a relatively short space of time following completion of works.

5.11.7 Mitigation measures

No mitigation measures are recommended.

5.12 Waste management

5.12.1 Waste materials and management

Life Cycle Analysis considers the total energy input and annual energy output of the project. This is termed the energy payback time and varies depending upon the project's design and geographic location. For solar projects the general timeframe for energy payback is achieved in less than four years for projects with a 25-30 year operating period (Bhandari et al., 2015; Department of Industry, Resources and Energy NSW, 2016). Alsema et al (2006) found that PV modules have an energy payback of 1.5-2 years in southern Europe and 2.7–3.5 years for central Europe. Due to the greater solar resource in Australia the energy payback for this project is expected to be at the lower end of these ranges.

The Fraunhofer Institute for Solar Energy Systems (2015) considered the ratio of energy produced by a solar photovoltaic module compared to the energy used to create the module. It was estimated that the PV modules would provide more than 10 times the amount of energy used to make the system.

A desktop assessment of the waste generated during construction and operation of the proposed Daisy Hill Solar Farm has been carried out by ITP Renewables to determine the appropriate means of waste disposal and recycling. The assessment takes into account the requirements of relevant legislation and policy including the Protection of the Environment Operations (POEO) Act 1997, POEO (Waste) Regulation 2014 and the Waste Avoidance and Resource Recovery Act 2001.

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

It is expected that the solar farm will be operational for at least 20 to 25 years. Upon decommissioning all infrastructure, including cabling and panels and mounting frames including footings and inverters would be disassembled and removed from the site. There are currently limited opportunities to recycle the components of solar panels, however, it is anticipated that the waste recycling industry will expand and develop new technologies and uses for those components by the time decommissioning occurs.

The closest waste management facility to the development site is on Molesworth Street in Hillston which is operated by Carrathool Shire Council and is located approximately 3 kilometres north of the development site. Another waste facility is located at Carrathool approximately 2 hours drive from the site and a waste transfer station at Goolgowi which is about 40 minutes south.

These waste facilities do not accept liquid waste (e.g. paint, chemicals, grease tank waste) or hazardous waste (e.g. contaminated soil). In addition to these, the Goolgowi waste transfer station does not accept tyres or asbestos. The waste facilities offer recycling for paper, cardboard, glass, plastic, steel, aluminium, used motor oil, car batteries, farm chemical drums that are properly cleaned, scrap metal and clean fill (by prior arrangement). The nearest scrap metal merchants are in Griffith, approximately 1 hour and 15 minutes' drive south-west of the site.

Estimates of waste materials and proposed management arrangements for each phase of the development project are provided in Table 6 below.

Table 6: Estimated waste materials and waste management arrangements

Phase	Waste material	Proposed management
Construction	<ul style="list-style-type: none"> • Packaging waste such as cardboard, wood pallets, plastic wrap, scrap metal, general waste including approximately 1,640 wooden pallets and cardboard packing boxes • Concrete waste during setting of footings and mounts • Electric cable waste and cable reels • Plastic pipe offcuts/scrap • Empty drums and containers (minimal quantities) • Minimal used lubricating oil and filters • Unused or spent chemicals 	<p>Waste products will be sorted and stored separately in skip bins located in the materials laydown area in accordance with EPA Waste Classification Guidelines. This will facilitate disposal through appropriate waste streams as follows:</p> <p>Recycling:</p> <ul style="list-style-type: none"> • Steel and scrap metal (recycled) • Timber/cardboard (recycled) • Recyclable plastics <p>Landfill:</p> <ul style="list-style-type: none"> • General wastes and plastic (other than where recyclable) <p>All recycling and general waste would be collected and taken to off-site waste management facilities for disposal</p> <p>Fluids would be recycled where possible or taken to off-site waste management facilities for disposal</p>
Operational	<ul style="list-style-type: none"> • Minimal volumes of domestic wastes such as office consumables, paper, plastics and glass • Waste resulting from maintenance or replacement of equipment 	<p>All waste materials would be taken to off-site waste management facilities for recycling or disposal</p>
Decommissioning	<ul style="list-style-type: none"> • PV modules (32,000 panels) and supporting poles and mounts • Glass for panels (500 tonnes) • Silicon for wafers (80 tonnes) • Inverters / transformers / batteries • PV boxes, skids, scrap metal (1,640 tonnes) • Electrical cables • Fencing • Storage containers (two 40-foot containers) 	<p>The solar farm infrastructure would be dismantled into separate waste products such as metals, glass, plastics and concrete.</p> <p>All products would be sorted on site into recyclable and general waste streams in accordance with the EPA Waste Classification Guidelines and taken to Council's Waste Management Facility for recycling or disposal.</p> <p>It is expected that the waste recycling industry will expand and develop new technologies and</p>

Phase	Waste material	Proposed management
		uses for those components by the time decommissioning occurs. At the present time only a single company in South Australia has the capacity to recycle specific materials

It is recommended that a waste management plan be prepared following approval and prior to construction to specify precise volumes of each waste material, classify that waste material and identify appropriate management procedures including means of transport and the destination. Waste management should be predicated on the international hierarchy of waste management to avoid/reduce, reuse, recycle, recover, treat and dispose of waste products to avoid or reduce waste materials where possible, and to re-use, recycle and recover the majority of waste materials generated during each of the construction, operational and decommissioning phases.

5.12.2 Mitigation measures

It is recommended that a waste management plan be developed to provide detailed procedures to manage the waste stream. The plan should contain:

- Strategies to reduce waste during all project phases,
- Recycling, re-use and recovery strategies and opportunities,
- Classification of all waste streams,
- Tracking register and details,
- On site recycling management,
- Allocation of responsibilities for recycling, re-use and disposal,
- Reporting and notification procedures if a waste incident occurs and there is a threat to the environment.

6. CONCLUSION

The site is considered suitable for the proposed development of the Daisy Hill Solar Farm and subdivision of the property so that Stage 1 and Stage 2 of the facility are accommodated on separate lots. The Essential Energy Hillston Zone sub-station is located adjacent the development site enabling connection to the grid to transfer power generated by the solar PV panels.

The development area is relatively flat, is free of constraints and is accessible to large delivery vehicles during the construction phase and utility vehicles for ongoing maintenance.

The likely impacts of the development have been considered in this Statement and supporting documents. Considerations include impacts on biodiversity, natural hazards, visual and scenic amenity, glare and glint, traffic, noise, air quality, waste management, water resources, indigenous and non-indigenous heritage, the community and the local economy. Any impacts on these interests have been found to be acceptable and mitigation measures have been recommended where necessary.

According to the Australian Radiation Protection and Nuclear Safety Agency, which maintains continual oversight of emerging research into the potential health effects of the EMF exposure, there is no established evidence of health effects from exposure to electric and magnetic fields from powerlines, sub-stations, transformers or other electrical sources, regardless of the proximity, causes any health effects. The location of the solar farm and the distance separation between nearby dwellings and the site mean that any impacts on health are mitigated.

Below is a summary of mitigation measures. It is recommended that an environmental management plan be prepared to cover the construction and operational phases. Where necessary Table 7 includes a recommendation as to whether the mitigation measure should be included in the management plan.

Table 7: Summary of mitigation measures

Consideration	Mitigation measures	Environmental Management Plan
Biodiversity	It is recommended that access to the site is to be limited to that point shown on development plans and within the development area. Storage of materials is to be carried out wholly within the development area	Yes, with reference to ongoing site access during both construction and operational phases, and to the storage of materials within the site
Natural hazards	No mitigation measures are proposed	n/a
Water resources	Design – site drainage and water quality controls: <ul style="list-style-type: none"> Undertake hydrological assessment of the sites catchment in accordance with relevant methods outlined in Australian Rainfall and Runoff. Determine sediment management targets and drainage control standards in accordance with Managing Urban 	Yes, for construction and operational phases. Include an erosion & sediment control plan or soil and water management plan

	<p>Stormwater: Soils and Construction Vol 1 (Blue Book) (DECC, 2008).</p> <ul style="list-style-type: none"> • Develop a site erosion and sediment control plan in accordance with the Blue Book. • Develop site drainage design incorporating detention basins and sedimentation management structures where relevant. • Permanent site drainage should coincide with temporary arrangements where possible 	
	<p>Construction and/or demolition – site drainage and water quality controls:</p> <ul style="list-style-type: none"> • Catch drains to be located downslope of any proposed road works. • Install location appropriate sediment fences or other applicable control measures depending on whether the feature is upstream or downstream of a disturbed part of the site or will need to be trafficable. • All stormwater collection points need to have appropriate sedimentation and erosion controls. • Undertake ongoing inspections of stormwater facilities and water control measures to assess their effectiveness. • Vibration grids or wash bays at all construction exits. • Level spreaders at locations where concentrated flow is discharged offsite to ensure sheet flow like conditions are maintained. • Flat land erosion control options include erosion control blankets, gravelling, mulching, soil binder, turfing and revegetation 	
	<p>Construction and/or demolition – stormwater point source control:</p> <p>In the event of concrete works:</p> <ul style="list-style-type: none"> • Do not undertake works if chance of heavy rain. • Store rinsate5 water, if applicable, separately to other water on site and dispose of offsite as appropriate. • Block on site drains in the area of the works and remove any contaminated runoff. <p>In the event that dewatering practices are required:</p> <ul style="list-style-type: none"> • Pump hose intakes for withdrawing water from excavations will be elevated to minimise sediment pumping and directed to a containment area for settling prior to discharge. • Limit direct discharge off site (consistent with the design requirements for sediment pond discharge). • Stormwater collected on site should be reused where possible. Controls should be inspected and maintained on a regular basis. All water released from sediment basins should be clear or disposed off site by vehicle. • Material and waste storage areas should be designed and operated to minimise interaction with surface waters. • Vehicle washdown areas should be located away from water courses 	
Air quality	<p>During construction:</p> <ul style="list-style-type: none"> • Limit vehicle movements to areas necessary to deliver panels, ancillary structures and equipment 	Yes, for construction and operational phases

	<ul style="list-style-type: none"> • Suppress dust emissions using watering and cease works during dry and windy conditions • Ensure ground disturbance is limited to areas necessary to place footings or to be used for access • Ensure minimal handling of excavated materials • Ensure stockpiles of excavated material is banded and protected from wind and vehicle movements <p>During operation:</p> <ul style="list-style-type: none"> • Grade and add road base to internal accessways • Revegetate the site with suitable groundcover immediately construction works are completed • Ensure all plant and equipment operates in accordance with specifications 	
Noise	<p>The following mitigation measures are recommended to address noise emissions during the construction phase:</p> <ul style="list-style-type: none"> • a construction noise management protocol to minimise noise emissions, manage out of hours (minor) works to be inaudible, and to respond to potential concerns from the community, • where possible use localised mobile screens or construction hoarding around plant to act as barriers between construction works and receivers, particularly where equipment is near the site boundary and/or a residential receiver including areas in constant or regular use (e.g. unloading and laydown areas), • operating plant in a conservative manner (no over-revving), shutdown when not in use, and be parked/started at farthest point from relevant assessment locations, • selection of the quietest suitable machinery available for each activity, • avoidance of noisy plant/machinery working simultaneously where practicable, • minimise impact noise wherever possible, • utilise a broadband reverse alarm in lieu of the traditional high frequency type reverse alarm, • provide toolbox meetings, training and education to drivers and contractors visiting the site during construction so they are aware of the location of noise sensitive receivers and to be cognisant of any noise generating activities, • signage is to be placed at the front entrance advising truck drivers of their requirement to minimise noise both on and off-site, and • utilise project related community consultation forums to notify residences within close proximity of the site with project progress, proposed/upcoming potentially noise generating works, its duration and nature and complaint procedure. <p>It is recommended that the noise emissions from the solar farm be minimised when operational. To assist in noise management, it is recommended that a one-off noise validation monitoring assessment be completed to quantify emissions from site and to confirm emissions relevant criteria are satisfied.</p>	Yes, for construction and operational phases

Electromagnetic radiation	No mitigation measures are proposed.	n/a
Traffic	<ul style="list-style-type: none"> A new access point to Lot 103 DP 755189 should be constructed immediately north of the existing access off Norwood Lane, Turning movements for heavy vehicles from Norwood Lane into the site be limited to right turn in and left turn out New access to be designed to accommodate 19m semi-trailers and constructed to a standard to accommodate the initial construction phase, and Trucks on Road signs (W5-22A) should be installed 250m either side of the Norwood Lane intersection on The Springs Road during the construction period. 	Yes, with reference to site access during the establishment and construction phases
The community & local economy	<ul style="list-style-type: none"> labour to construct and maintain the solar farm be sourced from within Carrathool LGA wherever possible advertising be placed in local media and local businesses contacted to determine whether there is the capacity and expertise available in Hillston and surrounding districts to participate in the construction and ongoing maintenance activities 	n/a
Heritage	No mitigation measures are proposed.	n/a
Visual & scenic amenity	No mitigation measures are proposed.	n/a
Glare and glint	No mitigation measures are proposed.	n/a
Waste management	<p>It is recommended that a waste management plan be developed to provide detailed procedures to manage the waste stream. The plan should contain:</p> <ul style="list-style-type: none"> Strategies to reduce waste during all project phases, Recycling, re-use and recovery strategies and opportunities, Classification of all waste streams, Tracking register and details, On site recycling management, Allocation of responsibilities for recycling, re-use and disposal, Reporting and notification procedures if a waste incident occur. 	Yes, for construction phase

The proposed development of the Daisy Hill Solar Farm is permissible under provisions of *SEPP (Infrastructure) 2007* and would assist to generate electricity and at the same time contribute to reducing greenhouse gas emissions and achieving the national targets.

Subdivision of Lot 103 into two separate allotments each accommodating a 5MW solar farm is considered feasible and permissible under Clause 4.2 of *Carrathool LEP 2012* for the following reasons:

- Subdivision will not affect agricultural output or result in land use conflict with development and activities taking place on adjoining land,

- The purpose of the subdivision is to facilitate primary production and to meet Essential Energy requirements that separate solar facilities be located on separate allotments to connect to the Hillston zone sub-station,
- Solar photovoltaic energy production is a primary industry. The harnessing of solar radiation for the purposes of generating electricity is considered primary production in the same way as oil and gas extraction and mining are classified as primary production, and
- Sheep grazing is proposed to continue on the land beneath and around the solar arrays.

Given the regional benefits of renewable energy generation and based on implementation of the recommended mitigation measures to minimize disruption to the existing natural and built environment, the development is considered to be in the public interest.



EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 22/11/19 15:17:30

[Summary](#)

[Details](#)

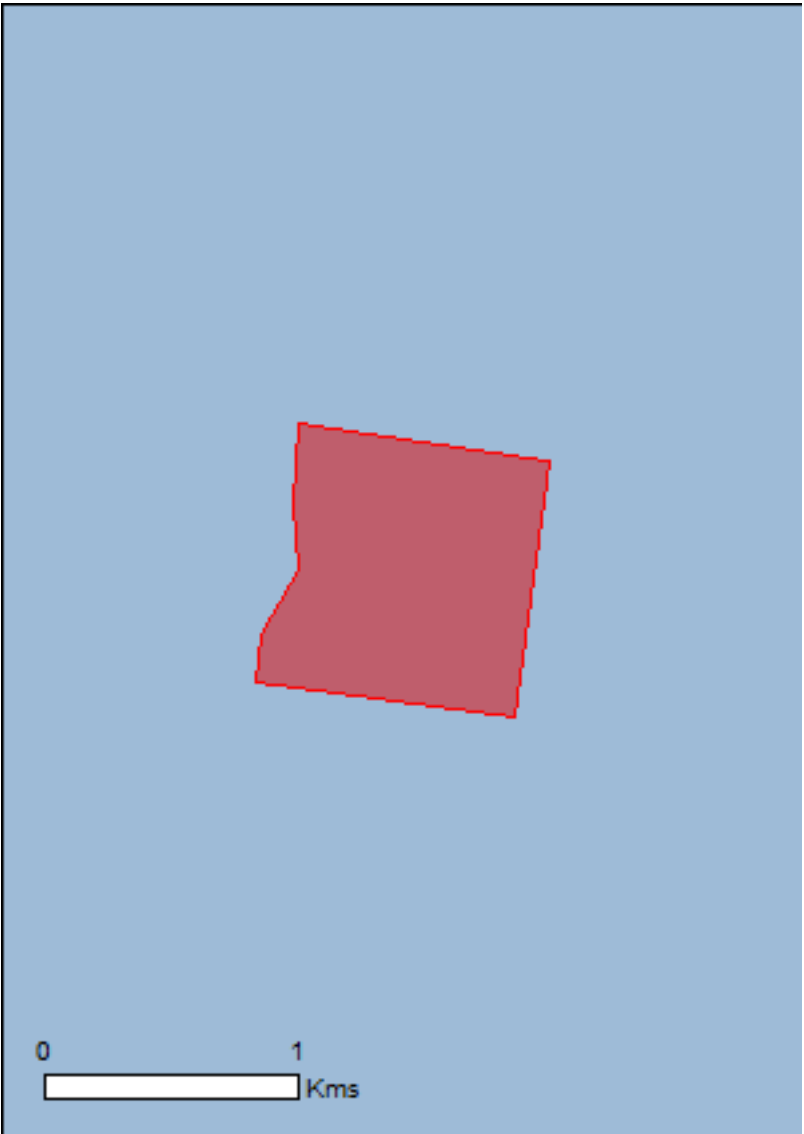
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

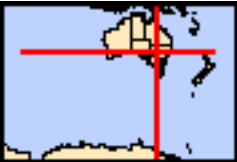
[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

Buffer: 1.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the [Administrative Guidelines on Significance](#).

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	3
Listed Threatened Species:	15
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage>

A [permit](#) may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	15
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	12
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)		[Resource Information]
Name	Proximity	
Banrock station wetland complex	400 - 500km upstream	
Hattah-kulkyne lakes	300 - 400km upstream	
Riverland	400 - 500km upstream	
The coorong, and lakes alexandrina and albert wetland	500 - 600km upstream	

Listed Threatened Ecological Communities	[Resource Information]
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For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Name	Status	Type of Presence
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	Community may occur within area
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community may occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area

Listed Threatened Species	[Resource Information]
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Name	Status	Type of Presence
Birds		
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat may occur within area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
Fish		
Galaxias rostratus Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745]	Critically Endangered	Species or species habitat may occur within area
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Frogs		
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat likely to occur within area
Mammals		
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat may occur within area
Plants		
Lepidium monoplacoides Winged Pepper-cress [9190]	Endangered	Species or species habitat likely to occur within area
Swainsona murrayana Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area
Listed Migratory Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area

Name	Threatened	Type of Presence
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species	[Resource Information]	
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

Extra Information

Invasive Species

[Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

-33.510285 145.541891,-33.51787 145.540689,-33.516868 145.531505,-33.515401 145.53172,-33.513541 145.533007,-33.511573 145.532836,-33.509211 145.533007,-33.51032 145.541762,-33.510285 145.541891

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

- [Office of Environment and Heritage, New South Wales](#)
- [Department of Environment and Primary Industries, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment, Water and Natural Resources, South Australia](#)
- [Department of Land and Resource Management, Northern Territory](#)
- [Department of Environmental and Heritage Protection, Queensland](#)
- [Department of Parks and Wildlife, Western Australia](#)
- [Environment and Planning Directorate, ACT](#)
- [Birdlife Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Museum Victoria](#)
- [Australian Museum](#)
- [South Australian Museum](#)
- [Queensland Museum](#)
- [Online Zoological Collections of Australian Museums](#)
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Canberra](#)
- [University of New England](#)
- [Ocean Biogeographic Information System](#)
- [Australian Government, Department of Defence](#)
- [Forestry Corporation, NSW](#)
- [Geoscience Australia](#)
- [CSIRO](#)
- [Australian Tropical Herbarium, Cairns](#)
- [eBird Australia](#)
- [Australian Government – Australian Antarctic Data Centre](#)
- [Museum and Art Gallery of the Northern Territory](#)
- [Australian Government National Environmental Science Program](#)
- [Australian Institute of Marine Science](#)
- [Reef Life Survey Australia](#)
- [American Museum of Natural History](#)
- [Queen Victoria Museum and Art Gallery, Inveresk, Tasmania](#)
- [Tasmanian Museum and Art Gallery, Hobart, Tasmania](#)
- Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the [Contact Us](#) page.

Zenith Town Planning
P O Box 591
Moruya New South Wales 2537
Attention: Allen Grimwood
Email: zenithplan@bigpond.com

Date: 22 November 2019

Dear Sir or Madam:

**AHIMS Web Service search for the following area at Lot : 103, DP:DP755189 with a Buffer of 0 meters,
conducted by Allen Grimwood on 22 November 2019.**

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



A search of the Office of the Environment and Heritage AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

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

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

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

Important information about your AHIMS search

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