STATEMENT OF ENVIRONMENTAL EFFECTS

Lots 41 & 46 DP 752581, 6 Euromedah Road, Narromine, NSW

Wahroonga Solar Farm

Zenith TOWN PLANNING

sustainable thinking

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1. INTRODUCTION

1.1 Overview

The purpose of this Statement of Environmental Effects is to support an application to Narromine Shire Council to develop a solar farm at Lots 41-46 DP 752581, No 6 Euromedah Road, Narromine, referred to as the Wahroonga Solar Farm. 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 Narromine Shire Council during discussions held during January 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 & 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

The proponent for the proposed Wahroonga Solar Farm is IT Power (Australia) Pty Ltd. IT Power (Australia) 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 Wahroonga Solar Farm aims to fill the gap in the mid-sized plants. It will generate 5MW 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 Wahroonga 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 Wahroonga Solar Farm is described as Lots 41 and 46 DP 752581, No 6 Euromedah Road, Narromine, NSW. It is located approximately 5.5 kilometres east-north-east of the town centre of Narromine and is an irregular shape with an area of approximately 32.3 hectares.

The northern, western and southern boundaries adjoin occupied farmland. The eastern boundary of the two lots is the Macquarie River. The site is approximately 2 kilometres from the Mitchell Highway to the south which is separated from the development site by private property, the Macquarie River and Webb Reserve. An unformed road separates the northern boundary of the site from Lot 52 DP 661453 which is zoned for rural residential development. A 22kV power line runs roughly east to west across the site.

Existing access to the site is by way of an unsealed track off Euromedah Road that runs through Lot A DP 376726 and Lot 52 DP 661453 which are in the same ownership.

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

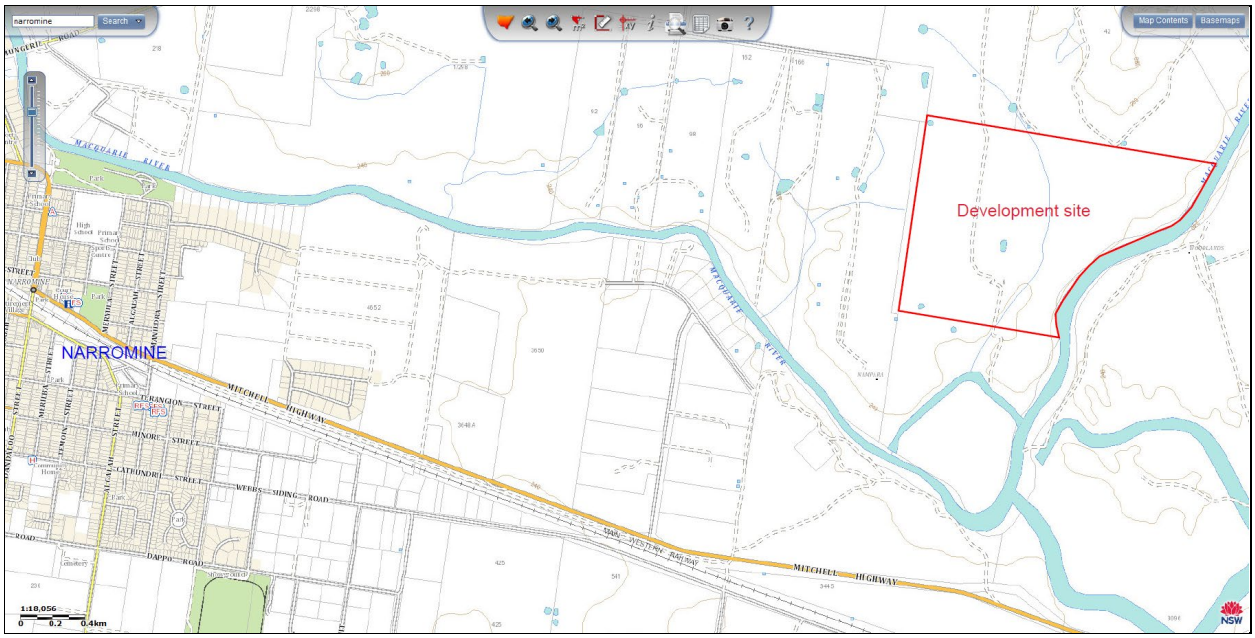


Figure 1: Locality map. Source: SIX Maps, 2019

The site has been cleared in the past for agricultural use other than a row of eucalypt trees straddling the northern boundary of Lot 46 and the unformed road reserve and scattered trees across the paddocks. A

larger stand of native trees has been retained in the vicinity of a wet area at the south-eastern corner of Lot 41. The topography is generally flat and there are no structures on the site.

2.2 Context

The site and surrounding countryside is generally flat with gentle undulations. The site is mapped as being bushfire prone land.

The inland rail project, managed by the Australian Rail Track Corporation, will link Brisbane to Melbourne. The section between Narromine and Narrabri (N2N) currently includes a 5 kilometre wide study area around the eastern side of Narromine. Lots 41 and 46 are located within this corridor. ARTC have advised Narromine Shire Council that the corridor will be narrowed to a width of 150 metres and eventually to a 30 metre wide corridor. Environmental assessment of the inland rail corridor is currently underway and it is expected that, although the final 30 metre wide corridor may traverse Lots 41 and 46, it will be outside the area of the proposed solar farm.

Land surrounding the development site is predominantly farmland with an extractive industry taking place on land to the north-east of the development site. Rural farm dwellings are located to the west and south-west of the site at distances of 760 metres, 830 metres and 885 metres to the closest point and more than one kilometre to the north-east and east.

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

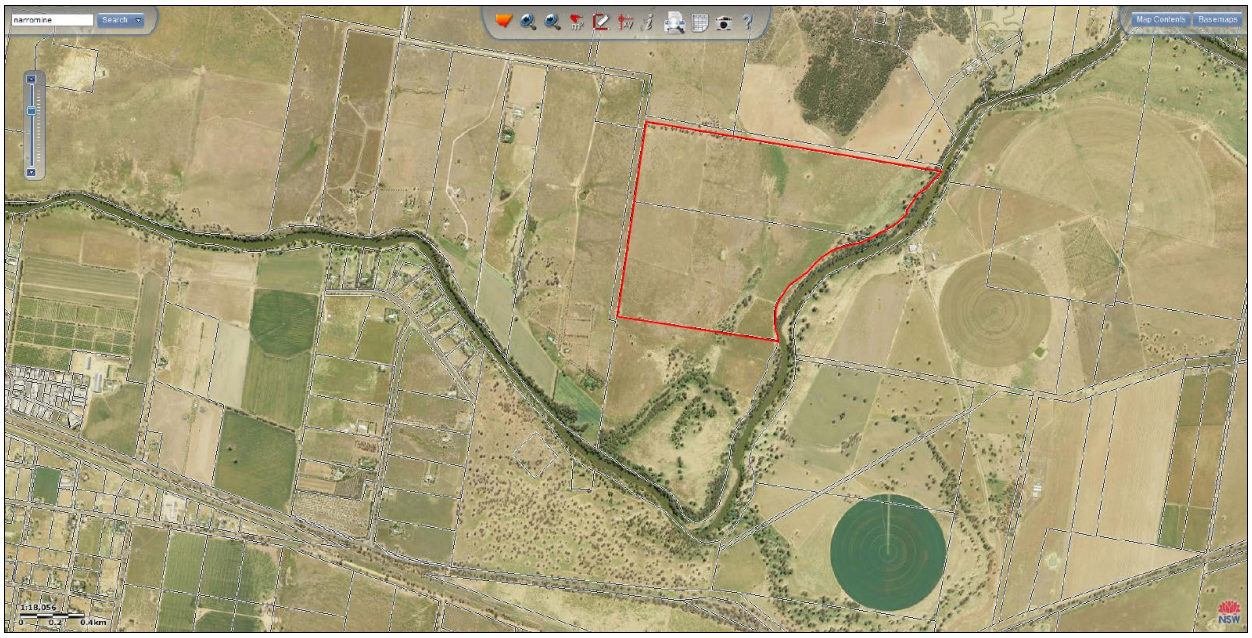


Figure 2: Aerial image dated October 2015. Source: SIX Maps, 2019

Below is an extract from the topographic map for land in the vicinity of Narromine. This map shows the location of the settlement, services including transport infrastructure, dams, cadastre and waterways. The development site is 6.3 kilometres east of Narromine airport.

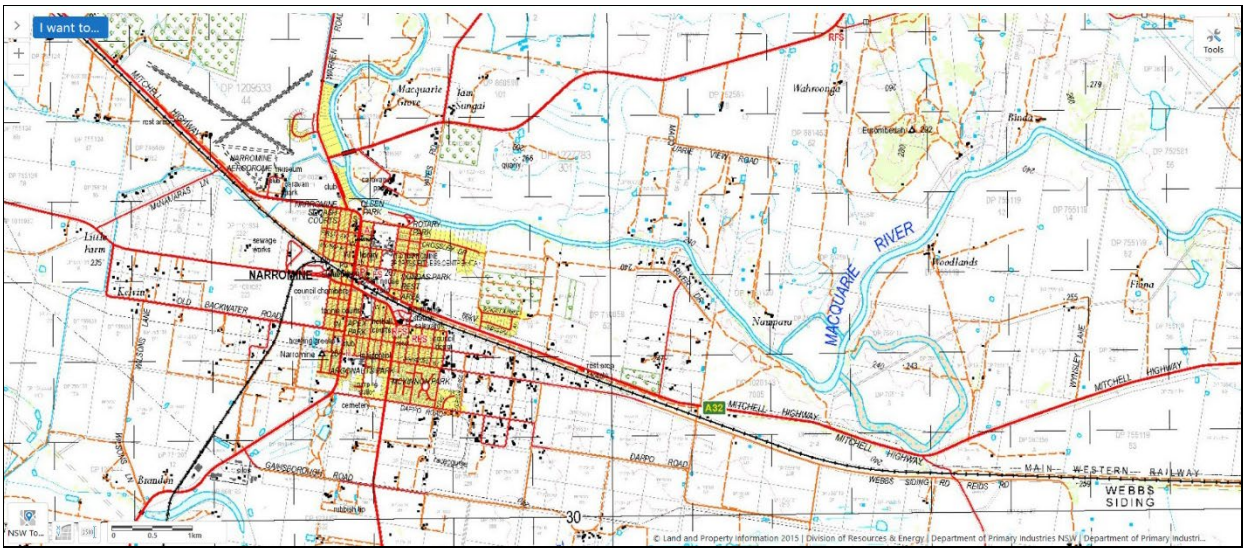


Figure 3: Extract from the topographic map. Source: Land & Property Information 2015

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/m^2 (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 May 2018 to 30 April 2019. Narromine LGA has received an average of between 18 and 20 MJ/m^2 each day, placing it within the second highest area receiving solar radiation in Australia.

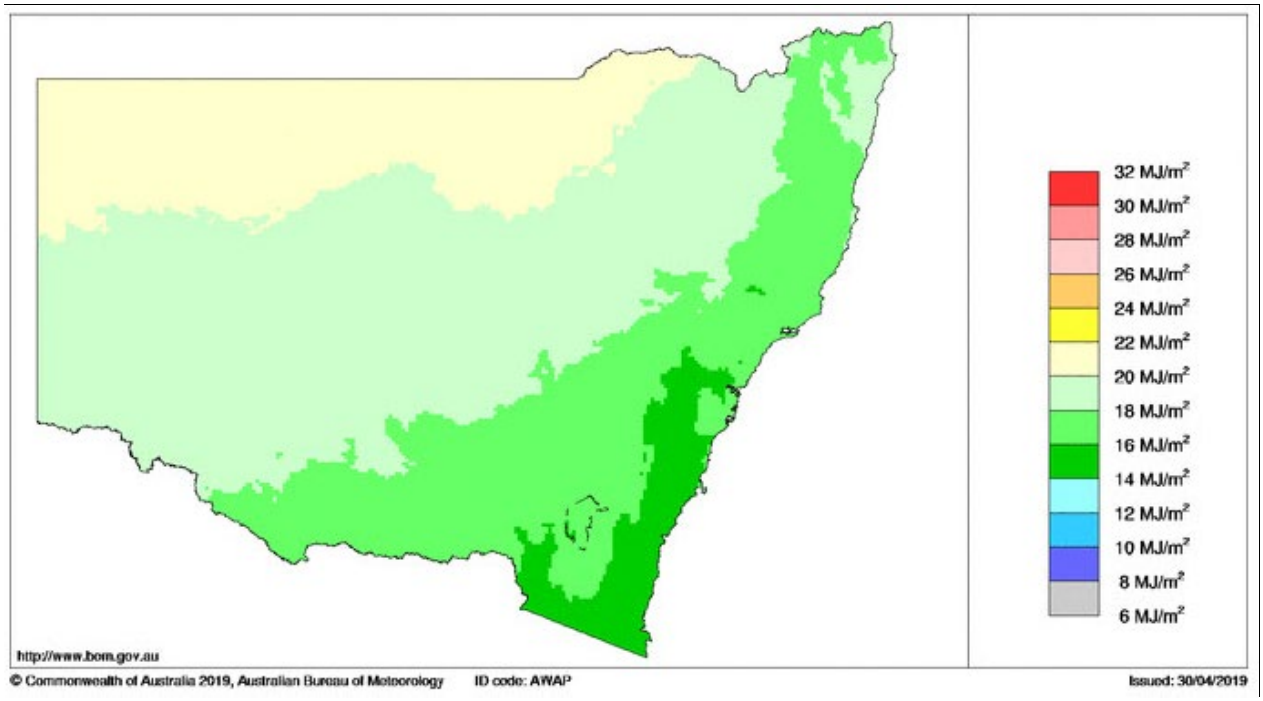


Figure 4: Average daily solar exposure. Source: Australian Bureau of Meteorology

The mean monthly global solar exposure measured at Narromine Airport, the closest measuring station to the Wahroonga Solar Farm site, is given in Table 1 below. The annual average for 2018 was 19.1MJ/m^2.

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly mean	26.9	23.2	20.6	16.2	12.3	10.7	12.0	14.7	19.0	21.8	24.1	27.8

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

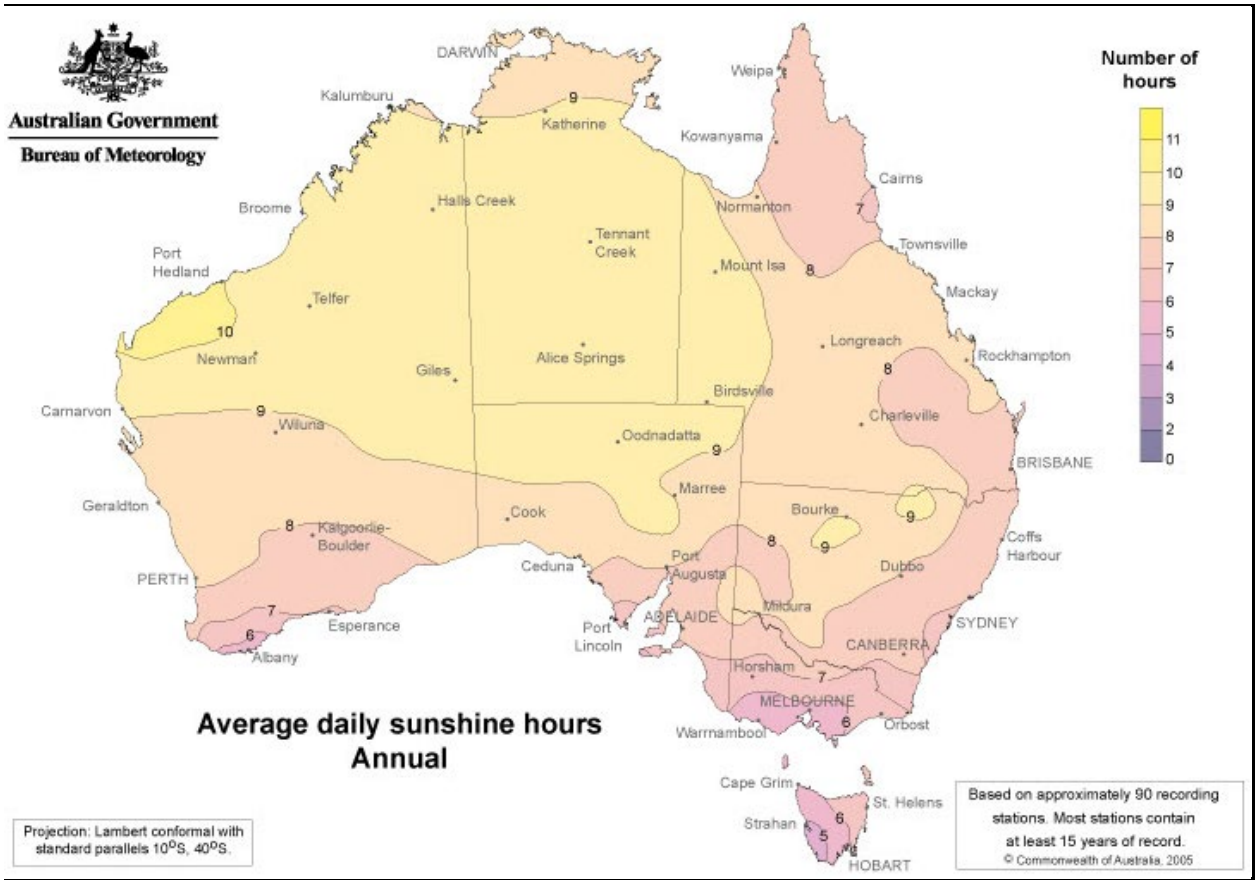


Figure 5: Average daily sunshine hours. Source: Australian Bureau of Meteorology

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 22kV power lines transecting the development site.

3. DETAILS OF THE PROPOSED DEVELOPMENT

3.1 Overview

The proposed Wahroonga Solar Farm is to be located at 6 Euromedah Road, east-north-east of the town of Narromine. The total site area is approximately 32.3 hectares that is currently used for agriculture. A lease agreement is being negotiated with the land owner with the intention of constructing a solar farm with a DC array capacity of 6.05MW and an AC output of 5.0MW on approximately 15.6 hectares of the total site. It would be capable of generating 12.98GWh annually. The array is proposed to be placed within a section along the western edge of Lots 41 and 46.

3.2 Photovoltaic panels

There are proposed to be 15,708 solar modules installed in 88 rows, each row being either 60 metres or 88 metres long and 2 metres wide. 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 1.5 metres with the peak of the modules reaching an approximate height of 2.9 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 NRM4A-G-210).

3.3 Inverters and battery storage

Two 2.5 MW AC inverter stations will be installed at the solar farm. These inverters are to be located within the array and are each mounted on a 6 metre long skid. Each of these inverter stations incorporate high and medium voltage switchgear and transformers. Each will connect by way of underground cables to connect to the a 22kV feeder that transects the development site to inject power to the electricity grid at Narromine Substation. 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.

Existing access to the site is by way of an unsealed track off Euromedah Road that runs through Lot A DP 376726 and Lot 52 DP 661453 which are in the same ownership. An easement is required to be formalized though a section 88B instrument under the Conveyancing Act until such time as subdivision of Lot 52 is enacted and direct access dedicated to the development site.

During the construction stage there would be approximately 160 semi-articulated trucks, 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.

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 0.8 spaces per worker. A temporary car parking area is to be sited at the northern end of the array of panels.

Materials laydown areas are located at the northern and south-eastern corners of the development site. Internal access will be by a 10 metre wide access road running through the centre of the area with entry points at the north-eastern and south-eastern corners off the existing track that runs along the eastern edge of the development area.

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 comfirmed 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 three 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

Due to the isolated nature of the site and negligible visual impacts, it is considered that landscaping of the site after installation of the panel arrays is not necessary. Potential adjoining properties to the north which may be created by subdivision of land zoned R5 Large Lot Residential would benefit from a visual screen provided by a low hill and an existing row of trees.

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.

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.

3.7 Security

The Wahroonga Solar Farm is to be enclosed within a 1.8 metre high security fence set 3 metres within the western boundary and surrounding the array. Solar arrays are to be setback 20 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.

Security lighting is not proposed to be installed.

Plate 1: Example of security fencing

3.8 Decommisioning

The Wahroonga Solar Farm is intended to remain in operation indefinitely in order to contribute to the sustainable electricity power supply to 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.

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 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. The use of farm chemicals such as pesticides and fertilisers is not considered to contaminate soils to the extent that mediation is required. It is considered that a preliminary investigation is not required for the development of a solar farm.

4.2.2 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*.

4.2.3 State Environmental Planning Policy (Rural Lands) 2008

SEPP (Rural Lands) 2008 applies to all rural LGAs including Narromine Shire Council area. This policy sets out *Rural Planning Principles* and *Rural Subdivision Principles* to implement measures that are intended to reduce land use conflicts and to identify State significant agricultural land.

The development site is not listed in a schedule to the policy as being state significant agricultural land.

4.2.4 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 over $5 million and is regionally significant. The application will be determined by the Western Regional Planning Panel.

4.3 Local Environmental Plan

4.3.1 Narromine Local Environmental Plan 2011

The property is zoned RU1 primary Production under *Narromine LEP 2011*. 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.*

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 *Narromine LEP 2011* to the extent of an inconsistency meaning that the use is permitted with consent in zone RU1 by way of *SEPP (Infrastructure).*

The site is mapped as being environmentally sensitive in the *Terrestrial Biodiversity Map* that accompanies *Narromine LEP 2011* along the eastern boundary adjoining the Macquarie River. It is mapped as being groundwater vulnerable on the *Groundwater Vulnerability Map* and as being subject to flooding on the *Flood Planning Map.* The Macquarie River which adjoins the eastern boundary of the site is mapped as a watercourse on the *Watercourse Map.*

It is not a listed heritage item and is not in the vicinity of a heritage item or heritage conservation area listed in *Schedule 5 Environmental heritage* of *Narromine LEP 2011.*

The following clauses of *Narromine LEP 2011* apply to the proposed development:

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 if decommissioned, relics, the natural environment or adjoining developments.

Clause 6.2 Flood planning

Clause 6.5 sets considerations for the suitability of development, potential impacts on flood behaviour and measures to protect life and property. The objectives of clause 6.5 are:

(a) to minimise the flood risk to life and property associated with the use of land,
(b) to allow development on land that is compatible with the land's flood hazard, taking into account projected changes as a result of climate change,
(c) to avoid significant adverse impacts on flood behaviour and the environment.

Part of the development site is shown as being a *flood planning area* on the Flood Planning Map of *Narromine LEP 2011*. The water resources assessment summarised in section *5.3 Water Resources* examined flooding and groundwater issues relating to the proposed solar farm. It is noted that the site is on the boundary of floodplain modelling and any impacts due to a proposed levee that is proposed to be constructed on the southern side of the Macquarie River are as yet unknown. It is recommended that Council include the development site in its review of the floodplain risk management plan to determine whether it is subject to the 1% AEP flood event.

The water assessment found that regional flooding events may disrupt site activities and particularly access to the site during construction. It is recommended that the development incorporate monitoring of relevant gauging sites (rainfall and streamflow) with mitigation and/or management measures in project plans.

Clause 6.4 Terrestrial biodiversity

The objective of clause 6.4 is to maintain terrestrial biodiversity by protecting native fauna and flora, and the ecological processes necessary for their continued existence, and conserving and restoring native fauna and flora and their habitats. The consent authority is required to consider the following matters in determining a DA on land affected by biodiversity:

(a) potential impacts on the condition, ecological value and significance of the fauna and flora on the land, and
(b) potential impacts on the importance of the vegetation on the land to the habitat and survival of native fauna, and
(c) the potential to fragment, disturb or diminish the biodiversity structure, function and composition of the land, and
(d) potential impacts on the habitat elements providing connectivity on the land.

Potential impacts on biodiversity on neighbouring sensitive areas has been assessed in section *5.1 Biodiversity* of this Statement. It has been found that there have been no recorded threatened species on the site and that any impacts on vegetation communities on adjoining land can be managed to avoid adverse impacts.

Clause 6.5 Riparian land and watercourses

The objectives of clause 6.5 are to protect and maintain water quality, the stability of beds and banks, aquatic riparian habitats and ecological processes. The consent authority must consider whether the proposed development:

(a) is likely to have any adverse impact on the following:
(i) the water quality and flows within the watercourse,
(ii) aquatic and riparian species, habitats and ecosystems of the watercourse,
(iii) the stability of the bed and banks of the watercourse,
(iv) the free passage of fish and other aquatic organisms within or along the watercourse,
(v) any future rehabilitation of the watercourse and its riparian areas, and
(b) is likely to increase water extraction from the watercourse.

The proposed Wahroonga Solar Farm is not expected to impact on riparian land or any watercourses. Stormwater runoff will be managed as described in section *5.3 Water Resources*. The development does

not require water to be extracted from the Macquarie River and the development area is located approximately 675 metres from the river at the closest point.

Clause 6.6 Groundwater vulnerability

The objectives of this clause are to maintain the hydrological functions of key groundwater systems, and to protect vulnerable groundwater resources from depletion and contamination as a result of development. Council is required to consider the potential for groundwater contamination due to the proposed development, adverse impacts on groundwater dependent ecosystems, cumulative impacts and proposed measures to avoid, mitigate or minimize impacts.

The development site is mapped as being groundwater vulnerable. This issue is addressed in the groundwater assessment and findings are summarized in section *5.3 Water Resources*. The proposed development has the potential to alter existing water quality conditions within the site, although, the impervious area of solar facilities is typically only marginally increased with associated hardstand and building areas. Further, panels may impact the nature of vegetation 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. There is the potential that site runoff may contain sediments and increase turbidity or other water quality parameters in downstream water ways. These issues are considered manageable due to the topographic relief of the site and subject to the implementation of recommended mitigation measures.

Clause 6.8 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 an existing entrance to the site off Euromedah Road. It is proposed to formalize this access by way of a right of way effected through a section 88B instrument.

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

Narromine Shire Council DCP 2011 applies to all land in Narromine LGA. Council recognises the importance of rural and agricultural activities, including their impact on the local economy and seeks to enhance these uses through the following objectives:

- *To encourage sustainable agricultural and primary production activities;*
- *To ensure that rural or agricultural activities are not affected by land use conflict, unnecessary fragmentation or alienation of land uses*
- *To protect and conserve the quality of the natural environment.*

There are no specific development controls for solar farms.

4.5 Land use strategies

4.5.1 Narromine Residential and Large Lot Residential Land Use Strategy

The Narromine Shire Council Residential and Large Lot Residential (Land Use) Strategy gives direction and certainty regarding where R5 Large Lot Residential zoned land should be located and the area of rural residential land required based on development trends, supply and demand analysis, and expected population growth.

Land to the north of the proposed development site which is in the same ownership was identified as suitable and has since been rezoned as R5 but has not yet been subdivided. This land is 39.8 hectares in area, is less than 5 kilometres from town and comprises a single lot. Constraints analysis identified the following factors:

- there is no vegetation on the site and it is not affected by any environmentally sensitive lands
- The lot is not affected by constraints such as extractive industries, sewerage treatments plants or contamination
- It is relatively flat land
- Contains land capability class 2 consistent with most of the land around Narromine

- Does not contain any heritage items, ground water vulnerability, biodiversity, flood prone land, bush fire prone land or wetlands
- It is not affected by dry land salinity

The potential development of the land zoned R5 to the north of the development area has been considered in the visual impact assessment provided in section 5.10 of this Statement.

4.5.1 Narromine Agricultural Land Use Strategy – Intensive Plant Agriculture

The *Narromine Agricultural Land Use Strategy – Intensive Agriculture Strategy* applies to the cultivation of irrigated crops for commercial purposes (other than irrigated pasture or fodder crops), horticulture, turf farming and viticulture. The objectives of the strategy are:

- To identify and protect existing land utilised for intensive plant agriculture; and
- To identify any additional land appropriate for intensive plant agriculture.

A number of factors are assessed in the strategy to determine which lands are appropriate for future intensive plant agriculture, including soils, water allocations and availability, farm sizes, climate and capability balanced with environmental sensitivities such as contamination and biodiversity. In order to facilitate agricultural diversity, *Narromine LEP 2011* has since been amended to permit intensive plant agriculture in certain areas within the RU1 Primary Production zone.

4.5.3 Central West and Orana Regional Plan

The *Central West and Orana Regional Plan 2036* was released in June 2017. It establishes a framework for growth over the next 20 years for the Central West and Orana Region. Narromine LGA is located within the Orana district being the upper part of the region. Economic opportunities identified in the plan include renewable energy generation to promote local jobs in small communities and development opportunities for associated industries. It is stated on page 15 of the plan that *the large open plains of Orana provide the best access for solar energy generation*.

A series of goals, directions and actions are to guide land use planning priorities and decision-making. The plan aims to develop the region as *the most diverse regional economy in NSW*.

Direction 9 is to increase renewable energy generation. Action 9.1 is to iden*tify locations with renewable energy generation potential and access to the electricity network*. In the case of the proposed Wahroonga Solar Farm, IT Power have identified the development site as being suitable in terms of existing power infrastructure to enable connection and proximity to the township of Narromine in order to directly generate power for use by the local community. Action 9.2 is to *facilitate small-scale renewable energy projects using … solar … through local environmental plans*.

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 January 2019 and knowledge provided by the land owner.

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 dated October 2013,
- Mapping accompanying *Narromine LEP 2011*,
- BioNet Atlas of Living Australia,
- 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*.

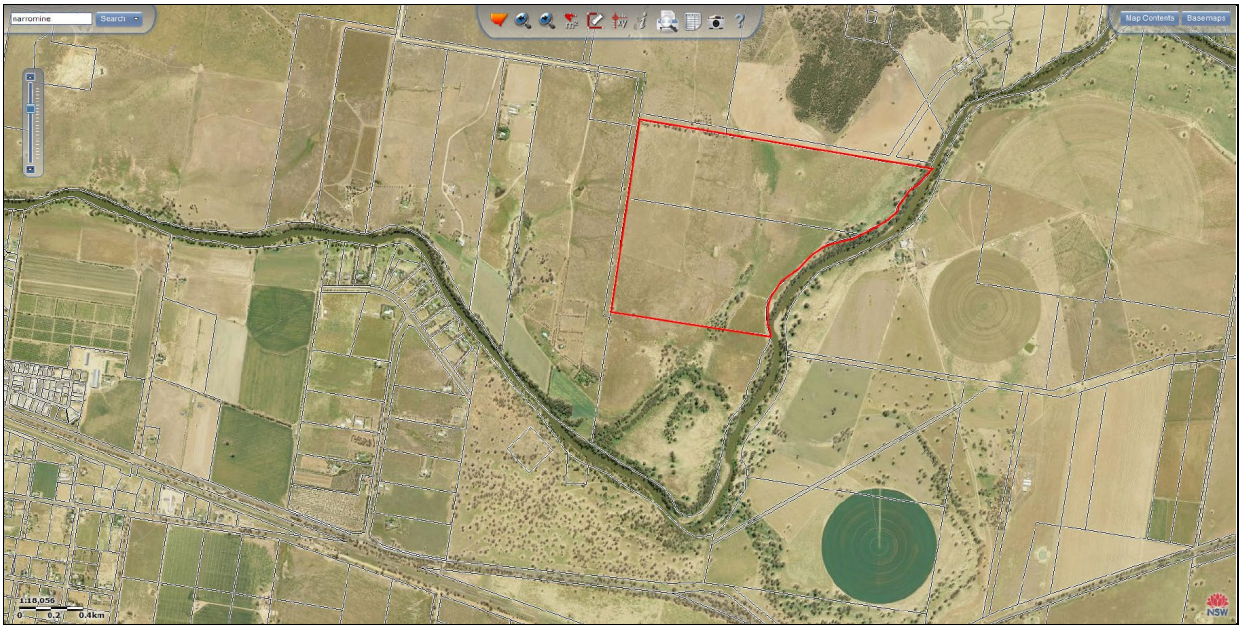


Figure 6: Aerial image of the development site. Source: SIX Maps

5.1.2 Narromine LEP 2011

The development site is shown as being affected to a minor degree by biodiversity on the Terrestrial Biodiversity Map of *Narromine LEP 2011* as shown in Figure 7 below. This is assumed to be riparian vegetation adjoining the Macquarie River.

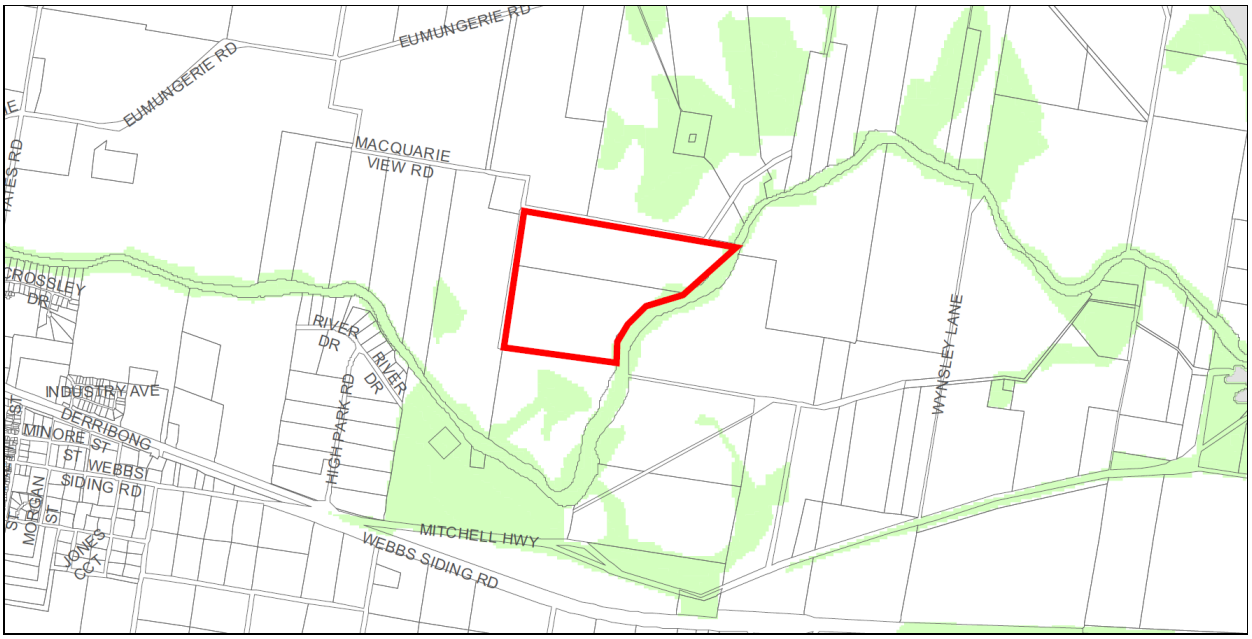


Figure 7: Extract from Narromine LEP 2011 Terrestrial Biodiversity Map Sheet BIO_005

A setback of the solar farm in excess of approximately 750 metres to the banks of the Macquarie River to the east is proposed at the closest point and approximately 650 metres to the mapped sensitive land on the adjoining property located south of the development site. The Mitchell Highway separates other sensitive land to the south.

5.1.3 Significant flora

Native vegetation/ecological communities

Development footprint

The development footprint comprises cleared and developed land. A sparse cover of hardy native groundcover species persists, however, exotic pasture grasses and agricultural weeds clearly dominate. The site is heavily grazed, with the ground surface further exacerbated by dry conditions. There are no signs of recent cultivation, however, it is likely that cropping or pasture improvement is undertaken periodically based on surrounding land use.

Off site

Cleared land on adjoining properties is of similar cover, condition and land use to that within the development footprint. Very recent cultivation has occurred on adjoining land to the west. Remnant native vegetation in the vicinity of the proposal comprises an isolated stand of remnant/regrowth native trees within the paper road reserve at the northern end of the subject land, about 120 metres from the development as shown in Figure 8 below. With regard to the OEH Plant Community Types (PCTs) classification, this vegetation best matches to PCT 82 Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregion. PCT 82 forms part of the threatened ecological community (TEC) Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions. The conservation status of this community in NSW under the *Biodiversity Conservation Act 2016* is Endangered Ecological Community. It is listed as endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

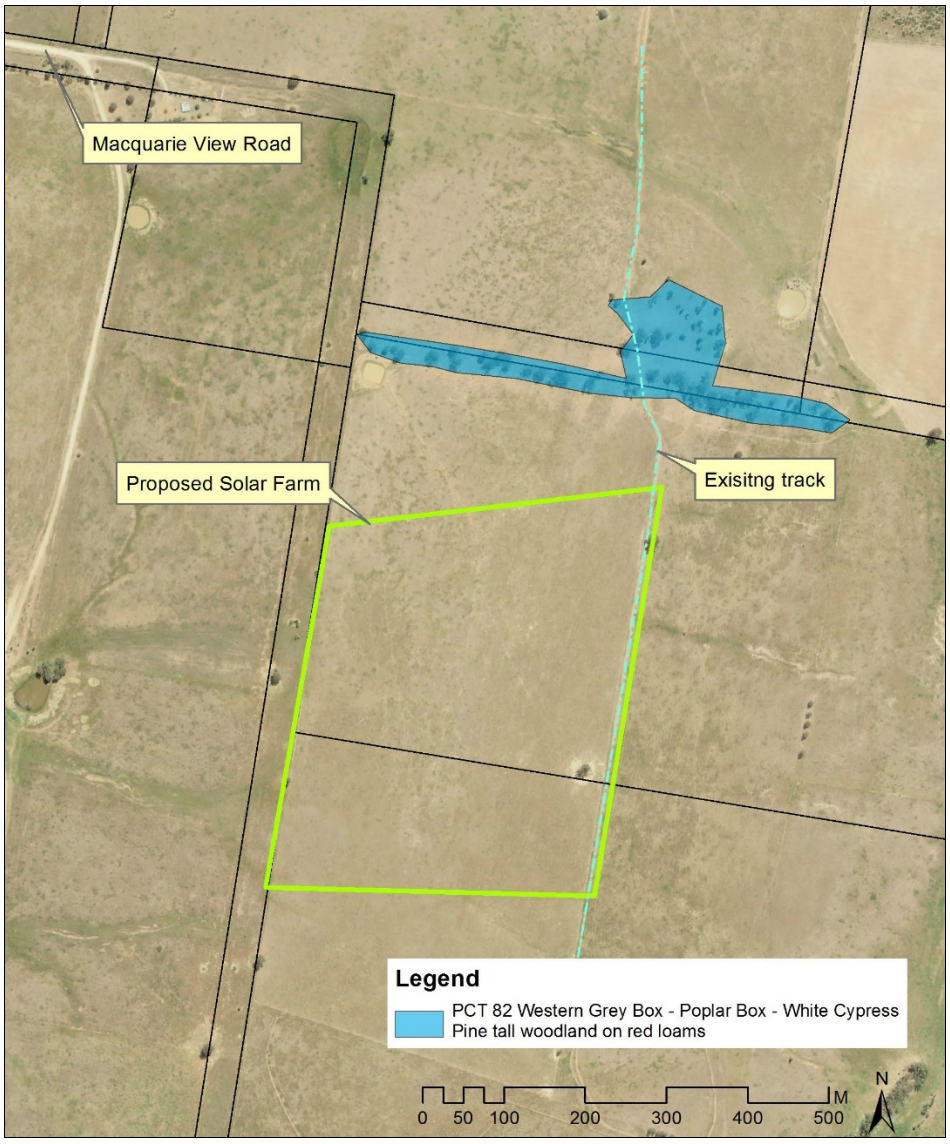


Figure 8: Location of PCT 82 vegetation community. Source: OEH 2019

5.1.4 Significant fauna

Figure 9 below shows the search results from the Bionet Atlas maintained by OEH. Records of species are provided within a 100 square kilometre area surrounding the development site. The map indicates that no species have been recorded on the site.

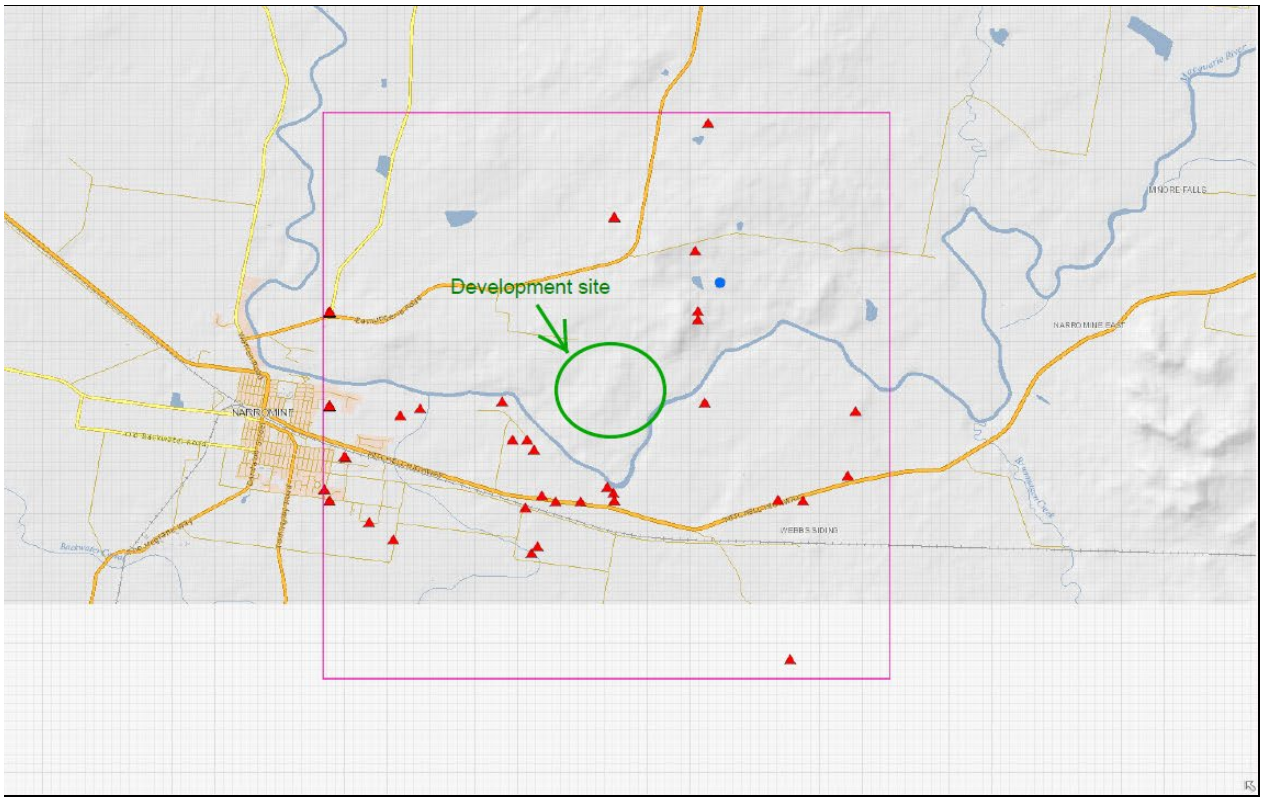


Figure 9: Bionet Atlas map. Source: OEH, 2019

One species listed as endangered and five listed as vulnerable have been recorded in the 100 square kilometre area surrounding the site. This is likely due to the extensive clearing and cultivation of crops that has fragmented the landscape. These species are listed in Table 2 below.

Table 1: Endangered and vulnerable species recorded near the site

Common name	Status
Australian bustard	Endangered
Superb Parrot	Vulnerable
Brown treecreeper	Vulnerable
Koala	Vulnerable
Yellow-bellied Sheathtail Bat	Vulnerable
Little Pied Bat	Vulnerable

Given that the part of the site to be developed as a solar farm has been fully 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 no native vegetation/habitat clearing.

Potential indirect impacts

Access to the site will run either adjacent to the western end of the PCT 82 remnant or through it via the existing farm road shown in Figure 8 above.

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.

5.1.6 Biodiversity Values Map

The Biodiversity Values Map is given in Figure 10 below. This map identifies land with high biodiversity value as defined by clause7.3(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 400 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 not proposed to clear the land of any native vegetation, therefore, it is not necessary to engage an accredited assessor to determine the offsets required to enable the project to proceed.

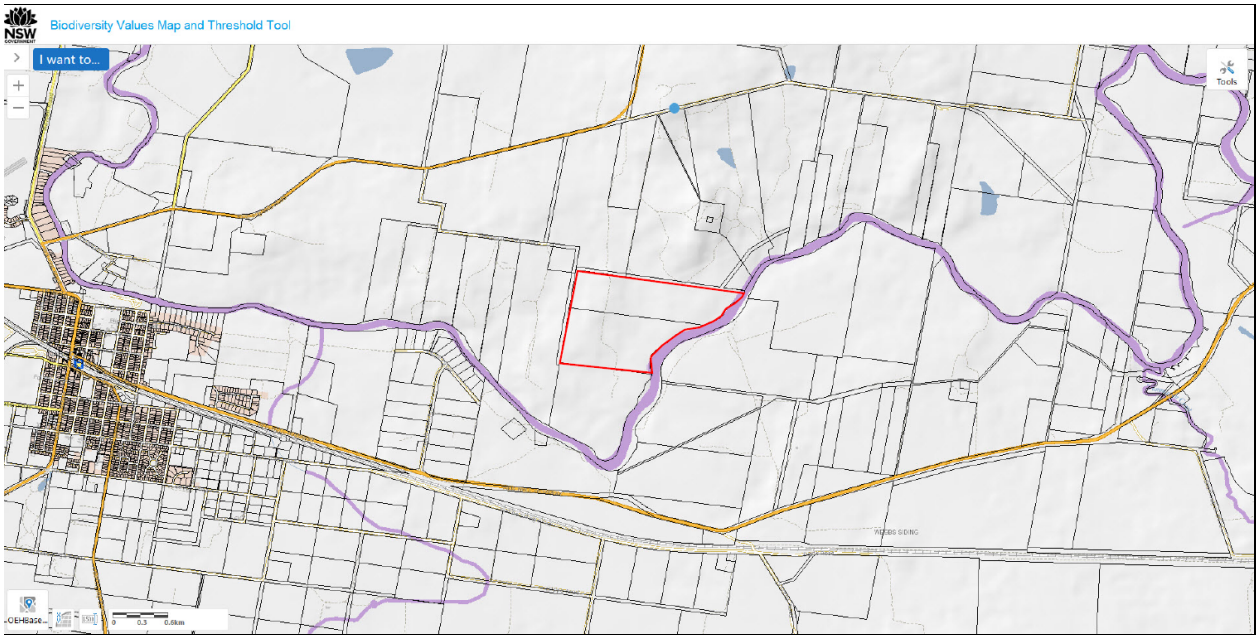


Figure 10: Biodiversity Values Map. Source: OEH, 2019

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 significant affect threatened species, ecological communities, and their habitats. As potential threats to biodiversity are already in existence due to continuing agricultural land use, it is considered that a significance assessment is not required.

5.1.8 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 Lots 460-464 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) other than what are assumed to be mapping irregularities of riparian land adjoining the Macquarie River or the riparian vegetation iteslf.

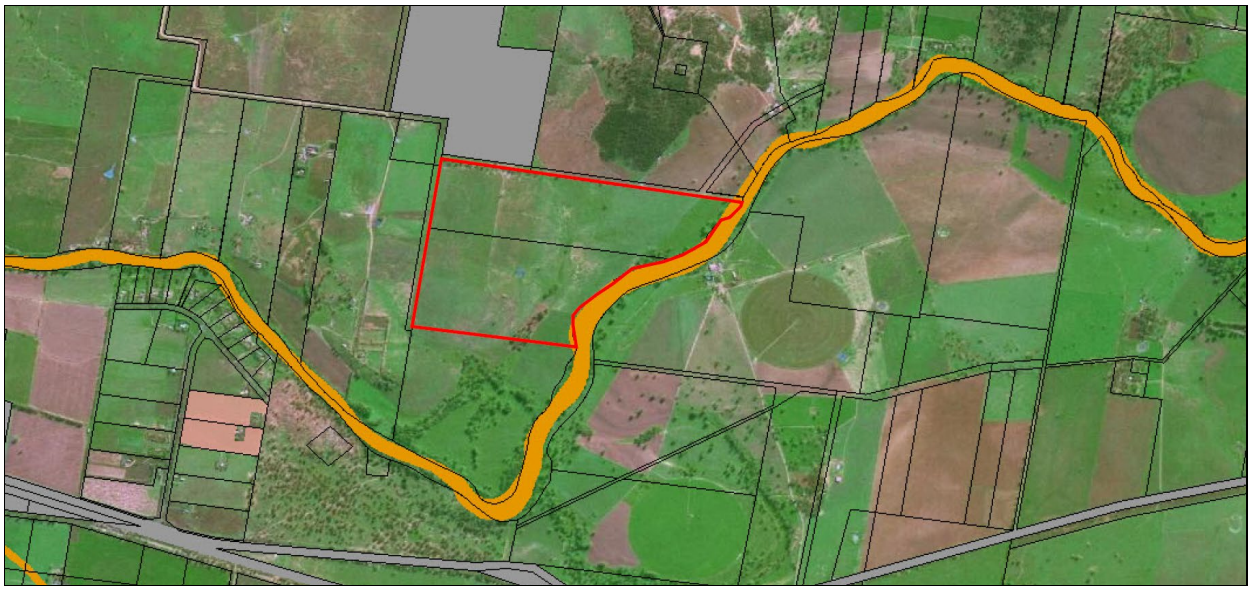


Figure 11: Native Vegetation Regulatory Map. Source: OEH, 2019

5.1.9 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 international importance, 5 listed threatened ecological communities, 23 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 provisions of the *Environment Protection and Biodiversity Conservation Act 1999* may apply to the development of a solar farm, however, the search of the Bionet Atlas 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 B.

The area to be developed as solar farm is fully cleared and has been used for farming. There are no wetlands, threatened ecological communities or threatened species listed under the EPBC Act likely to

occur on the site. There is no development proposed within 750 metres of the bank of the Macquarie River at the closest point and the development is not likely to have a significant impact on a matter of national environmental significance. Referral to the Commonwealth Government is not considered necessary.

5.1.8 Mitigation measures

To avoid interference with the vegetation community located to the north of the development area it is recommended that any vegetation planted to screen the development and any grasses planted to bind the soil following construction of the solar farm be native species endemic to the area. 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 partially mapped as being flood prone in *Narromine LEP 2011*. 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 mapped as being bushfire pone 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*.

However, a bushfire assessment is required by Council to be prepared and submitted with the development application making recommendations to provide protection for the occupants of any building, to provide for defendable space around buildings and separation between the hazard and buildings, for ongoing hazard management, and to provide access and utility services for fire-fighters.

The solar farm is classified as a class 10b structure. It is noted in the assessment that all land within 140 metres of the proposed development is managed grazing land which is equivalent to grassland vegetation and of low risk. The slope of the site is 0 to 5 degrees.

The development will be subject to a bushfire attack level of 12.5. An asset protection zone, or defendable space, of 20 metres managed as an inner protection area is recommended on all sides of the solar arrays to be incorporated within the boundaries of the development site. Certain recommendations are also made regarding siting and design, construction standards and access requirements.

5.2.3 Mitigation measures

There are no mitigation measures recommended in relation to flooding.

The following mitigation measures are recommended in relation to bushfire and to ensure that the development complies with *Planning for Bushfire Protection 2006* and provisions of the *Environmental Planning and Assessment Act 1979*:

Asset protection zones

- Performance criteria
- A defendable space should be provided onsite.
- An asset protection zone should be provided and maintained for the life of the development
- Recommendations

1. The APZ should be a 20m wide inner protection area surrounding the entire development.
2. The inner protection area should comprise of the following:

a) minimal fine fuel at ground level;

b) vegetation that does not provide a continuous path to building/s for the transfer of fire;

c) shrubs and trees that do not form a continuous canopy and vegetation is planted/cleared into clumps rather than continuous rows;

d) species that retain dead material or deposit excessive quantities of ground fuel are avoided;

e) shrubs and trees are pruned or removed so they do not touch or overhang the building/s;

f) vegetation is located far enough away from the building/s so that plants will not ignite the building/s by direct flame contact or radiant heat emission.

Siting and design

- Performance criteria
- Buildings should be sited and designed to minimise the risk of bush fire attack.
- Recommendations
- The development should be sited so that a defendable space (APZ) of 20m can be provided within the confines of the allotment boundaries on all sides of the solar arrays.

Construction standards

- Performance criteria
- It should be demonstrated that the proposed building can withstand bush fire attack in the form of wind, smoke, embers, radiant heat and flame contact.
- Recommendations
- Nil recommendations

Access requirements

- Performance criteria

- Safe, operational access should be provided (and maintained) for emergency services personnel in suppressing a bush fire while residents are seeking to relocate, in advance of a bush fire

- Recommendations

  Property access roads should comply with the following requirements of section 4.1.3 (2) of *Planning for Bush Fire Protection* 2006.

  - A minimum carriageway width of 4 metres should be provided.
  - A minimum vertical clearance of 4 metres to any overhanging obstruction, including tree branches should be provided.
  - Curves should have a minimum inner radius of 6 metres to allow for rapid access and egress.
  - The minimum distance between the inner and outer curves should be 6 metres.
  - Crossfall should not exceed 10 degrees.
  - Maximum grades for sealed roads should not exceed 15 degrees and should not be more than 10 degrees for unsealed roads

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. The assessment examines:

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

The development site is located east of Narromine and north of the Macquarie River and is outside of the Narromine Irrigation District. The Narromine township is prone to flooding by the Macquarie River and Council has resolved to develop a levee along the southern side of the river. The development site is shown on flood maps that have been prepared for Council as being on higher ground and outside the inundation zone of a 1% annual exceedance probability flood. However, the site is on the boundary of the modelling and any impacts due to the levee are unknown. Council is aiming to review its current floodplain risk management plan in 2019 and it is recommended that Council include the development site to determine whether it is subject to the 1% AEP flood event. Part of the development site is shown as being a *flood planning area* on the Flood Planning Map of *Narromine LEP 2011*.

The site is located within the Macquarie-Bogan catchment area where groundwater sources include:

- minor alluvial systems in the highlands

- fractured rock aquifers of the Lachlan Fold Belt
- porous rock aquifers associated with the Gunnedah Basin
- broad alluvial plains north and west of Narromine underlain by Sedimentary Great Artesian Basin aquifers

The fractured rock, known as the Lachlan Fold Belt, covers the width of the Murray Darling Basin (MDB) in NSW and therefore extends beyond the Macquarie-Bogan catchment. This formation underlies the Bell Alluvium, Cudgegong Alluvium, portions of the Upper Macquarie Alluvium, the Coolaburragundy–Talbragar Alluvium and the Lower Macquarie Alluvium. In this area, it is considered to exhibit low to moderate connection with surface water. Much of the upper Macquarie catchment is underlain by fractured rock which has a low yield.

The Bell, Upper Macquarie and Lower Macquarie alluvial deposits form a continuous sequence of unconsolidated sediments which generally allows for uninterrupted down valley flow as there is hydraulic connection across contiguous boundaries. A basement high exists between the Upper Macquarie Alluvium and the Lower Macquarie Alluvium which restricts down valley flows.

The area to east of Narromine is generally underlain by the alluvial groundwater unit with a small pocket underlain by a fractured rock unit. The development site is most likely crossing the boundary of these formations or is with a transition zone.

The site lies within the Lachlan Fold Belt which is one of nine sustainable diversion limit units of the Murray Darling Basin fractured rock and basalt group of groundwater sources. The Lachlan Fold Belt is an extensive aquifer system with salinity generally increasing towards the west along with an increasingly arid climate.

Alluvial aquifers in the Lower Macquarie extend to depths of up to 160 metres with the highest yielding aquifers being located north-west of Narromine. Good quality groundwater is found locally and is the main town water supply and irrigation water in the Macquarie River catchment.

The development site is shown as being groundwater vulnerable under clause 6.6 of *Narromine LEP 2011*. However, the proposed solar farm does not require extraction of groundwater and, as the site is elevated, groundwater levels should be well below the surface.

The proposed development is therefore not expected to materially contribute to any salinity or regional groundwater issues particularly those associated with nearby irrigation districts. Potential adverse surface water-related impacts to the site are impediments to site accessibility and managing downstream sedimentation.

Regional flooding events may disrupt site activities and particularly access to the site during construction. It would be prudent to incorporate monitoring of relevant gauging sites (rainfall and streamflow) with mitigation and/or management measures in project plans.

The proposed 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 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. There is the potential that site runoff may contain sediments and increase turbidity or other water quality parameters in downstream water ways. These issues are considered manageable due to the topographic relief of the site.

5.3.2 Mitigation measures

The following mitigation measures given in Table 2 are recommended to manage downstream sedimentation.

Table 2: Proposed mitigation measures to manage downstream sedimentation

Stage	Measure	Activities/approach
Design	Site drainage and water quality controls	Design Basis • Undertake hydrological assessment of the site's 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 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

Stage	Measure	Activities/approach
Construction and/or demolition	Site drainage and water quality controls	General site works: • 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	In the event of concrete works: • 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. In the event that dewatering practices are required: • 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

Stage	Measure	Activities/approach
		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 and, if not, 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

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 Dubbo. 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 are also a source of air pollution in the hot, dry climate of Narromine and can cause poor air quality.

Particles are measured as PM_{10} and $PM_{2.5}$. PM_{10} 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 12 at Dubbo at 1.00pm on Sunday 19 May 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 of 12 at Dubbo at 1.00pm on Sunday 19 May 2019. Total suspended particles have an average hourly reading of 12 on 19 May 2019. This is a comparatively moderate to high reading indicative of the autumn climate of Dubbo and the Central West region and is likely to be partly due to hazard reduction burns carried out by the NSW Rural Fire Service and other agencies that manage native bushland.

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 previous use of the land for farming may have 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. The construction of the solar farm will not involve extensive earthworks and only excavation for footings for the array framework and 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 pasture 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. 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.

A number of potential noise sensitive receptors were identified as listed in Table 3 and shown in Figure 12 below. These receptors comprise residential and commercial properties.

Table 3: Noise sensitive receptors

ID	Description/address
R1	226 Macquarie View Road (Clay Target Shooting Club)
R2	166 Macquarie View Road
R3A	Lot 511 Macquarie View Road
R3B	Lot 511 Macquarie View Road
R4A	162 Macquarie View Road
R4B	162 Macquarie View Road
R5	4 Euromedah Road (Project Related)
R6	116 Euromedah Road
R7	3096 Mitchell Highway

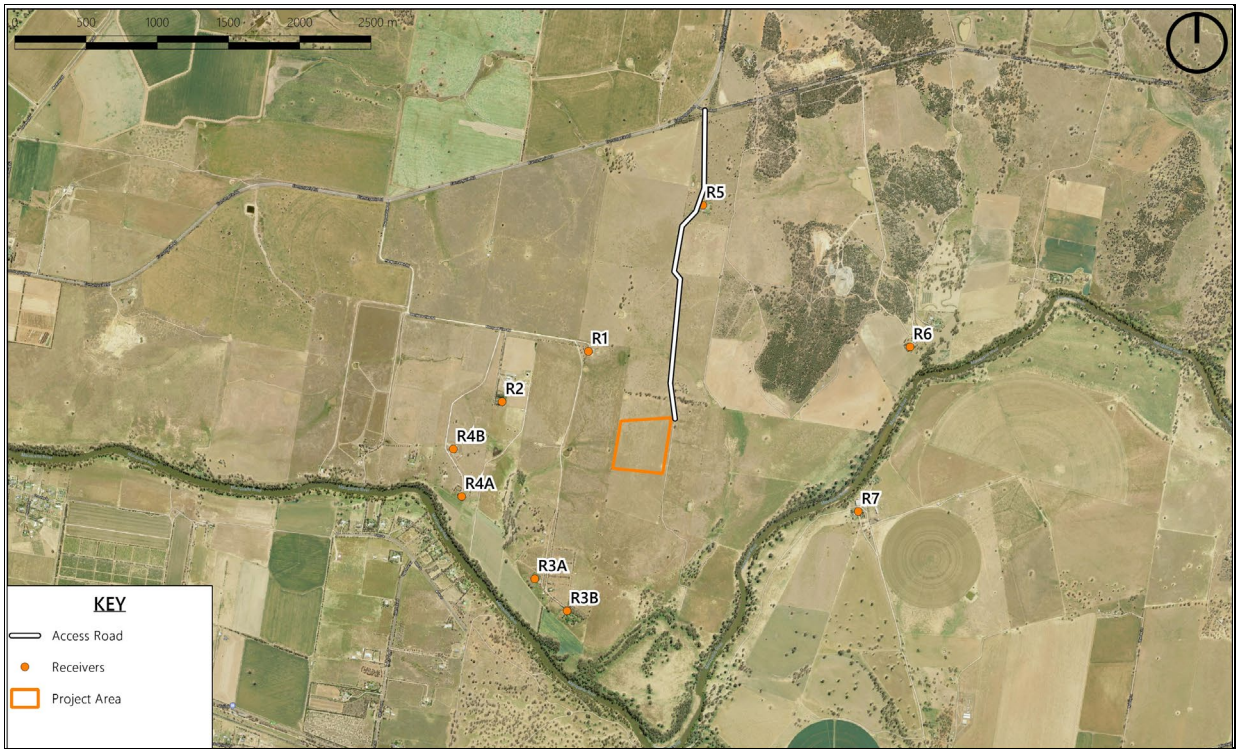


Figure 12: Location of noise sensitive receptors

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.

An agreement is in place with the owners of Receiver R5. Notwithstanding, R5 has been included in this assessment for completeness. Receiver R1 is a small shelter which is used for shelter by the Narromine Clay Target Shooting Club. They are permitted to have shoots there 1 day per month. Noise levels have been assessed for completeness and impacts at this location would only occur when the site is in use. Hence, this receiver is classified as an active recreation area.

The results of the noise assessment demonstrate that construction noise levels are expected to satisfy the relevant construction noise management levels at all receiver locations. Recommendations have been provided to minimise the potential noise impacts for the short periods when construction is in close proximity to receivers.

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

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 (μT), 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, substations, transformers or other electrical sources, regardless of proximity.

5.6.2 Mitigation measures

The location of the proposed Wahroonga 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. The assessment includes a description of the existing road network and considers expected traffic generation during construction and operation, site access and intersection capacity.

The development site gains access via a private access road that joins Euromedah Road which is a collector road. This in turn connects to Eumungerie Road which is a sub-arterial road connecting Narromine and Eumungerie. Eumungerie Road is a bitumen sealed, two lane, two way road and has an auxiliary lane at the intersection with Euromedah Road. The private access road comes off Euromedah Road about 30 metres from the intersection with Eumungerie Road. The private road runs for about 2.2 kilometres to the development site, is unsealed and is 3 to 4 metres wide.

Data provided by Narromine Shire Council indicates that an average of 861 vehicles use Eumungerie Road per day and 129 vehicles per hour during peak periods. Of these 32% are heavy vehicles. Euromedah Road has daily traffic volumes of between 70 and 150 vehicles, or 23 per hour based on the higher rate, 20% of which are likely to be heavy vehicles. Vehicle trips for the private access road which services a dwelling are approximately 9 vehicles per day or 1 per hour. The assessment is based on estimated traffic volumes during the three month construction period of 40 light vehicles for up to 50 staff accessing the site and 45 heavy vehicles delivering machinery and materials outside of morning and afternoon peak periods. It is noted that a bus service may potentially be used to transport staff to and from the site. It is also noted that the area within the development site along the northern boundary is adequate to accommodate staff parking and materials laydown.

Traffic volume

Traffic volumes are estimated to increase by 23% during peak hours on Eumungerie Road and 174% on Euromedah Road. These estimates come off a low base and the assessment concludes that the impacts would be minor and not alter the functional classification of the road network during construction or once the solar farm is operational. The expected traffic generated by the development can be accommodated on existing roads.

Site access

The assessment found that the existing arrangements at the intersection of Eumungerie Road and Euromedah Road are adequate to accommodate the increased traffic volumes including heavy vehicles due to the auxiliary lane which enable vehicles travelling north to pass a 19 metre semi-articulated vehicle

turning right into Euromedah Road. However, the intersection between Euromedah Road and the private access road and the road itself require upgrading as described in section *5.7.2 Mitigation measures* below.

Intersection operations analysis

The findings of SIDRA modelling of the intersections of Eumungerie Road and Euromedah Road, and Euromedah Road and the site access indicate that there would be no decrease in the operational level of each intersection.

5.7.2 Mitigation measures

The following mitigation measures are recommended:

- Widening of the northern shoulder of Euromedah Road opposite the intersection with the private access road to allow for vehicles to pass a vehicle turning right on to the private access road;
- Widening of the existing private access at its intersection with Euromedah Road to provide two lanes on the private access road and to accommodate the swept path of a 19m semi-articulated truck entering/leaving the road;
- Bitumen sealing of the intersection of Euromedah Road and the private access road; and
- Upgrading of the private access road along its length to accommodate the predicted traffic volumes and loads. This would include the provision of regularly spaced passing lanes to allow for two-way traffic.

5.8 The community and economy

5.8.1 Change of use of agricultural land

According to the *Narromine Shire Council Agricultural Land Use Strategy – Intensive Plant Agriculture*, approximately 96% of land in Narromine LGA is used for agriculture at the time the study was prepared. This comprises 34% for cropping which includes vegetables, fruits, nuts, broadacre crops, grapes and nurseries, 55% used for grazing and about 7% of land laying fallow.

The development site has land capability classes of 3 and 4. The development area is class 4. This indicates moderate capability land – that is, the land has moderate to high limitations for high-impact land uses that restrict land management options for uses such as cropping, high-intensity grazing and horticulture. These limitations can only be managed by specialised management practices with a high level of knowledge, expertise, inputs, investment and technology. (*The land and soil capability assessment scheme – A general rural land evaluation scheme for NSW, 2nd Approximation*, OEH).

Figure 13 below shows land capability mapping for the development site and land surrounding Narromine. Land shaded blue is class 3 land capability and land shaded green is class 4 land capability.

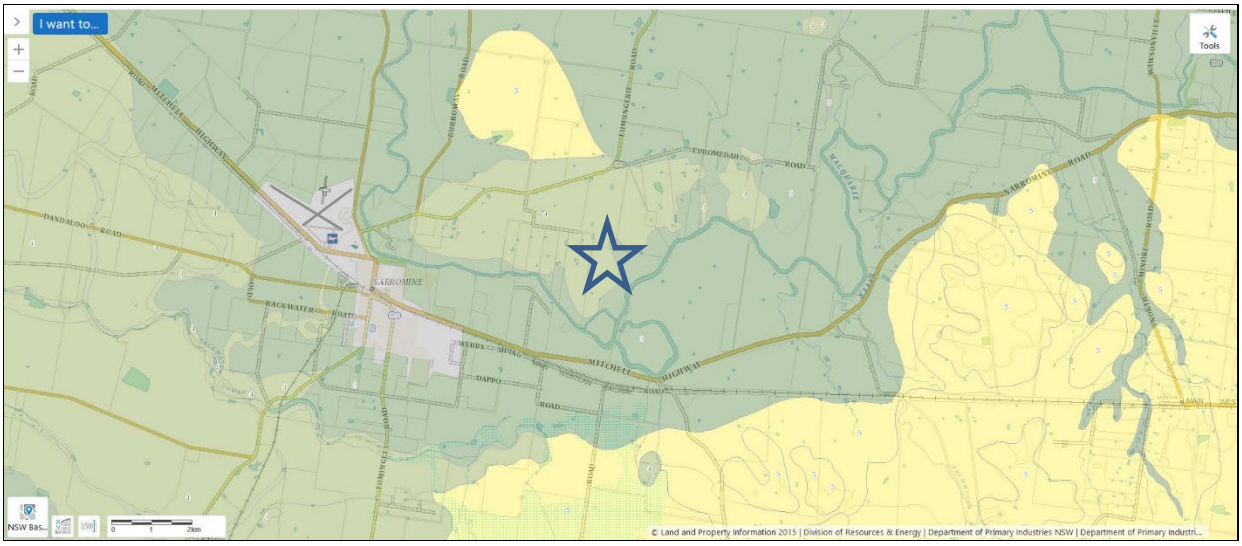


Figure 13: Land capability mapping. Source: OEH 2019

The loss of agricultural land 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. 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. 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.

5.8.2 Employment

The Wahroonga Solar Farm is designed to generate in excess of 12.9GWh of energy annually with the system offsetting almost 8.5 thousand tonnes of CO^2 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 2,150 NSW homes.

The benefit to the community of the Wahroonga Solar Farm will be through an understanding of sustainable development and by gaining a commitment to greater reliance on renewable energy. Similarly, the clustering of solar power generation would bring regional economic development benefits as the Central West area gains a reputation as a suitable location for renewable energy and linked industries.

During the initial planning phase IT Power commissioned local professionals to carry out the land survey and traffic engineering. An indigenous cultural survey of the development site has also been carried out by local persons engaged through Narromine Local Aboriginal Lands Council. This initial expenditure generates flow on effects throughout the local economy through income and employment.

It is anticipated that there will be 50 personnel directly involved in construction on site which is expected to take approximately three 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 Wahroonga 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.

5.8.3 Summary and mitigation measures

In summary:

- The development of a 5MW 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 Narromine LGA wherever possible. Where labour needs to be brought into the Narromine area, it is considered that there would be sufficient accommodation options for employees in either Narromine or Dubbo for the estimated 50 workers engaged during the three month construction phase. 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 Narromine and surrounding districts to participate in the construction and ongoing maintenance activities.

5.9 Heritage

The Aboriginal people of the Narromine area belong to the Wiradjuri Nation. The name Narromine came from an Aboriginal word for '*place of honey'* or '*place of many lizards'*. The explorer John Oxley passed through the district in 1818 during his exploration of the Macquarie River. Squatters followed and in 1835 Narramine station was taken up by the explorer William Charles Wentworth.

The western railway line was extended to connect Dubbo and Nevertire which included the Narromine area. The township was proclaimed as Narramine in July 1883 after the official opening of the railway and post office in October 1882 and the construction of a railway station in 1883. Numerous buildings followed including the police station and the Royal Hotel both built in 1890, with the town centred around the railway. A bridge over the Macquarie River was built in 1897. In 1898 the town was declared a municipality and a courthouse and lock-up were built adjoining the police station. The town was then renamed Narromine in 1900.

Agriculture expanded in the district with the first citrus orchard established in 1913. Burrendong Dam, built between 1946 and 1967, facilitated irrigation schemes which have assisted the growth of local agriculture.

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 substation. 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 C.

A search of Lots 41 and 46 DP 752581 was performed on 12 June 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. However, land close to the banks of the Macquarie River is likely to contain Aboriginal objects such as fishing tools. The arrays are proposed to be 750 metres distant from the banks of the river at the closest point.

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 survey has been carried out by Narromine Local Aboriginal Lands Council on 5 July 2019. The results are appended as Attachment D. Two possible artefacts were found – a potential axehead and a hammer stone. There was no evidence that more artefacts are present on the development area.

5. Further investigations and impact assessment

Narromine Local Aboriginal Lands Council has been advised of the plans to develop the solar farm and a cultural site survey was undertaken on Friday 5th July 2019. A report of the survey is appended. It is recommended in the report that Narromine LALC be advised of any future works due to the potential to find more artefacts, however, there is no reason in terms of indigenous heritage that the development should not proceed. Council may recommend a condition of consent to require contact be made with Narromine LALC with a view to a representative of the LALC being on site during works that require ground disturbance.

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.

An archaeological site located at 1956 Burroway Road, Narromine which contains carved trees is listed in *Schedule 5 Environmental heritage* of *Narromine 2011.* This item is assessed to be of local heritage significance. It is located 20 kilometres north of the township and the development site.

5.9.2 Non-indigenous heritage

There are 20 non-indigenous heritage properties in Narromine that are listed in *Schedule 5 Environmental heritage* of *Narromine 2011.* All of these properties have been assessed to be of local heritage significance.

Lots 41 and 46 DP 752581 are not listed as items of environmental heritage in *Schedule 5 Environmental heritage* of *Narromine LEP 2011* and are not within a heritage conservation area. There are no listed heritage items in the vicinity of the site. The closest items to the site are Narromine Railway Station (item 11) located south-west in the centre of the township and Eurombedah Homestead (item 12) located to the north-east of the development site. Both are located more than 5 kilometres from the development site.

Clause 5.10 Heritage conservation of *Narromine LEP 2011* applies to development relating to a listed heritage item 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 of a listed item, or development in the vicinity of a heritage item, that assesses the extent

of effects on heritage significance. Development in the vicinity of a heritage item is taken to mean development that is proposed on a site that is located adjoining or adjacent a site which is occupied by a heritage item. In this case, there are no listed items in the vicinity of the development site, therefore a heritage management is not required.

5.10.3 Mitigation measures

In relation to indigenous heritage, depending upon the results of the site survey further consultation may need to be carried out with the Narromine Local Aboriginal Lands Council prior to commencing site works and construction to determine whether it is necessary for members of the local indigenous community to be present on site during ground-disturbing works.

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

5.10 Visual and scenic amenity

5.10.1 Methodology

Impacts on the visual and scenic amenity of the proposed Wahroonga Solar Farm have been assessed 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 January 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, architecture of neighbouring buildings and any heritage values of any significant sites in the vicinity of the proposed solar farm were noted and the capacity of the area to absorb physical change is 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.

5.10.2 Description of the landscape

The character of the landscape near Narromine is predominantly an open modified agricultural landscape that has been shaped by farming. It is generally flat land with gentle undulations and little remnant vegetation other than in public reserves and along the banks of the Macquarie River.

The site itself is rural and located east-north-east of the township of Narromine. Structures within the vicinity of the site comprise scattered rural farm dwellings set within primary production land uses. Photographs provided below illustrate the site and surrounding area. The landscape is assessed to have low sensitivity to change.

5.10.3 Assessment of impacts on landscape character

The proposed Wahroonga Solar Farm will comprise approximately 16,000 solar modules installed in 187 rows. These are to be placed within a confined area of about 15 hectares to the west of the 32.3 hectare property.

The solar arrays are to be setback 23 metres from the western boundary, approximately 150 metres from the northern boundary, and variable from the eastern and southern boundaries with a minimum of about 700 metres and 450 metres respectively.

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

5.10.4 The visual catchment

The visual catchment of the site of the proposed Wahroonga Solar Farm is defined by an area within 500 metres of the development site from which the works may be clearly visible as shown inside orange edging on the visual envelope map below. This area is less than has been considered in the glare and glint analysis as 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 screening measures to reduce visibility of the site. Some potential viewpoints were therefore discounted because of significant existing features such as built structures and vegetation. The site itself is cleared and there are no existing structures or vegetation in the development area that would screen the site. However, a row of trees and the slope of the land to the north provides screening to potential future dwellings on land zoned for rural residential development.

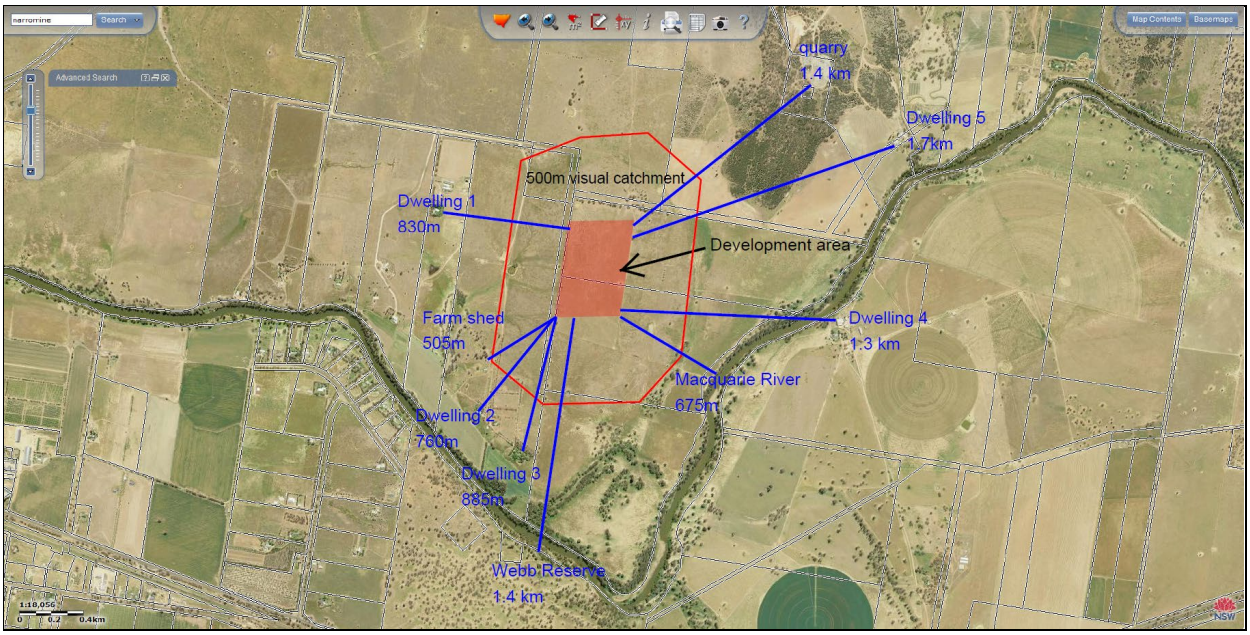


Figure 14: 500 metre visual catchment. Source: SIX Maps

There are no dwellings within 500 metres of the development site. There are five dwellings ranging from the nearest at approximately 760 metres to the south-west from the nearest point of the development are to 1.7 kilometres to the north-east. The separation distances from each dwelling to the nearest point of the

development area are shown in Figure 14. It would not be visible from public roads such as the Mitchell Highway which is over 2 kilometres to the south, Eumungerie Road or Euromedah Road, or from public places such as the Macquarie River and Webb Reserve due to distance separation and vegetation on intervening land. Visibility to unoccupied farm sheds and commercial entities such as the quarry is not a consideration.

The sensitivity of the neighbouring dwellings to landscape change is low to negligible given the existing modified landscape and distance separation of the development area. The sensitivity would decrease with distance so that visibility of the solar farm to dwellings and other structures beyond 500 metres outside the visual catchment would be negligible. The sensitivity of public places to landscape change would be high in close proximity to a new development, however, the distance separation mitigates that sensitivity and in this case it is assessed to be low to negligible.

There are no structures that would screen the development from future neighbouring rural residential properties to the north, however, the row of trees immediately north of the development area and the slope of the land would effectively screen any future dwellings on the R5 zoned land meaning that sensitivity is low.

Below are photographs of the development site and neighbouring land. All photographs were taken by IT Power (Australia) Pty Ltd.

Plate 2: Looking north from eastern boundary of development area to the ridge and line of trees separating adjoining land zoned R5

Plate 3: Looking east -south-east from within the development areas towards the Macquarie River

Plate 4: Looking south-west across adjoining farmland

Plate 5: Looking west along from the development area towards the western boundary and buildings on adjoining land

Plate 6: Looking towards the north-west corner of the development sitarea

Plate 7: Looking west from within the development area

5.10.5 Assessment of visual impacts

Table 4 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	Magnitude	Sensitivity	Rating
Mitchell Highway	Negligible	Negligible	Negligible
Eumungerie Road	Negligible	Negligible	Negligible
Euromedah Road	Low	Low	Low
Macquarie River	Low	Low	Low
Webb Reserve	Low	Low	Low
Dwelling 1	Low	Low	Low
Dwelling 2	Low	Low	Low
Dwelling 3	Low	Low	Low
Dwelling 4	Negligible	Negligible	Negligible
Dwelling 5	Negligible	Negligible	Negligible
R5 zoned land	Low	Low	Low

5.10.6 Summary of impacts

The landscape to the east of Narromine is one that has been modified by human activity associated with the agricultural industry. It is characterised by a mix of farming and rural uses including an extractive industry and utilities including the 22kV power lines.

The impact of the proposed Wahroonga Solar Farm on landscape character has been assessed to be low to negligible based on magnitude of works and the sensitivity to change of surrounding properties. The works would not be visible to motorists travelling along the Mitchell Highway, Eumungerie Road or Euromedah Road and, given the presence of trees along the riparian corridor of the Macquarie River and within Webb Reserve, will not be visible to any other public place.

The visual impact of the proposed works are assessed to be low to negligible for the viewpoints identified in this assessment – being five dwellings, roads and public places. 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. The solar farm would be visible from the property identified as Dwelling 1 in Figure 13 The 500 metre Visual Catchment Map as that property is elevated above the level of the solar farm site and would be looking over the development. However, vegetation surrounding the dwelling would screen the solar farm from within the building and its immediate curtilage. Similarly, vegetation surrounding dwellings 2 and 3 to the south, the separation distance and the generally flat topography extending in that direction would provide sufficient screening to the development. Dwellings 4 and 5 are located more than a kilometre from the development area and also benefit from the presence of vegetation on intervening land.

5.10.7 Mitigation measures

There are no recommended mitigation measures.

5.11 Glare and glint

5.11.1 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 Wahroonga 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. The results of the glare analysis are appended as Attachment E. 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 measure 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 sensitive receptors, called observation points, are shown in Figure 15 below. 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.

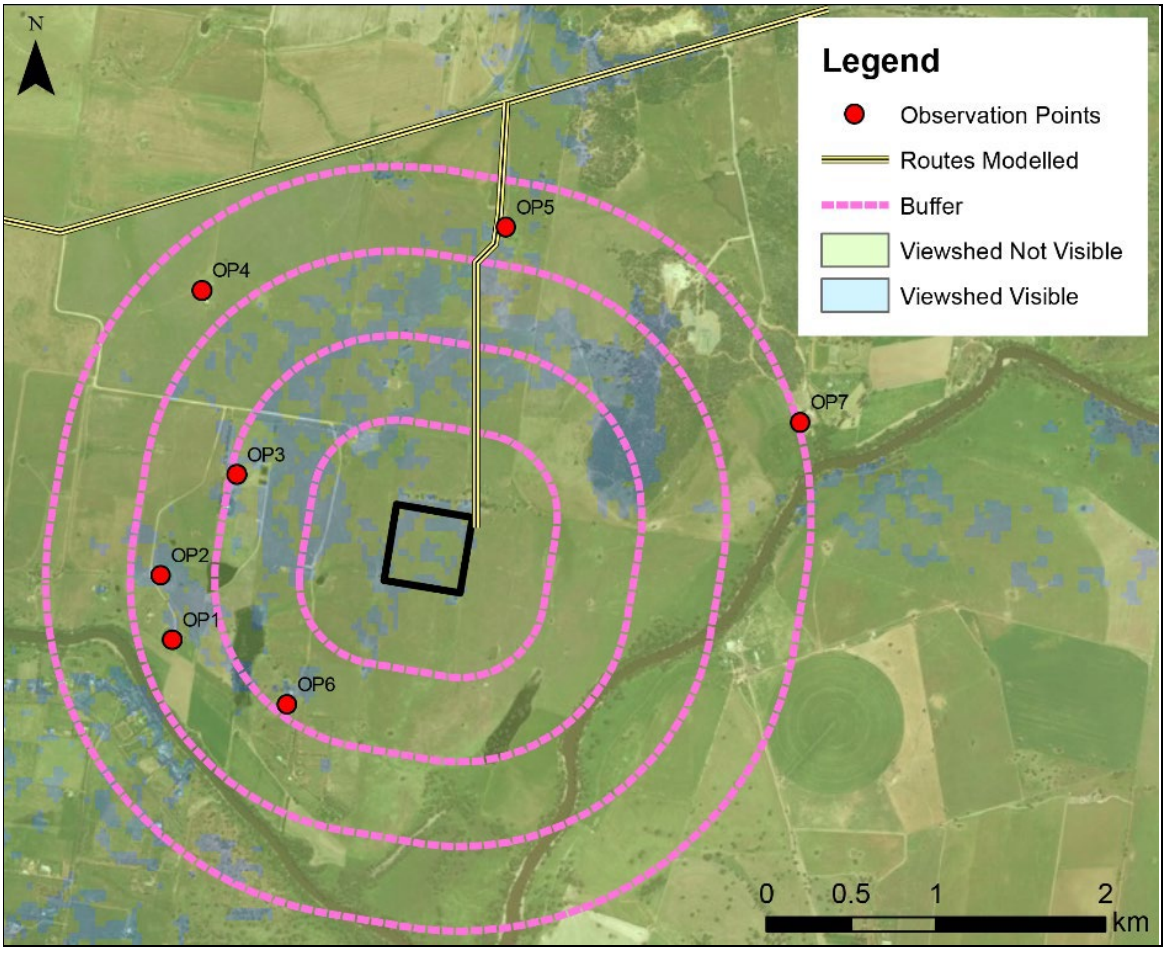


Figure 15: Viewshed and observation points

Two road observation routes and six residential observation points were identified as potential visual receptors. These were identified as follows:

- Considering the elevation of the site relative to surrounding land to determine land potentially affected. The blue shaded area in Figure 15 indicates areas of possible visual impact,
- Including residential and commercial properties and public roads within a 2 km radius of the site. Properties located at greater distances are unlikely to be affected, and
- Excluding any properties where existing structures would act as visual barriers.

Narromine Airport, which is located approximately 7 kilometres west of the site, is not considered a potential visual receptor of the site due to relative elevation and distance. Trees to the north of the site will act as a visual barrier to one receptor (OP5). It is noted that the site is fully cleared and there are no structures or vegetation within the proposed solar farm area. Of the seven observation points modelled, only three (OP2, 3, and 4) are not currently screened by trees although gardens exist within the dwelling curtilages surrounding dwellings on these properties.

The results of the Solar Glare Hazard Analysis Tool for the Hay Solar Farm are detailed in Table 6.

Table 6: Solar Glare Hazard Analysis Tool specification inputs

Observation point (property)	Type or property	Green glare	Yellow glare	Results
Route 1	Dirt access track	0	0	No glare
Route 2	Eumungerie Road	0	0	No glare
OP1	Residence	0	0	No glare
OP2	Residence	0	0	No glare
OP3	Residence	0	0	No glare
OP4	Residence	0	0	No glare
OP5	Residence	0	0	No glare
OP6	Residence	0	0	No glare

The results of the analysis indicate that persons occupying the selected properties are unlikely to be affected by either green or yellow glare as a result of the proposed solar farm. Existing vegetation is expected to provide a physical obstruction between the solar farm and road users, further minimising the visual impact of the solar farm. Additional vegetation screening could be considered on the western side of the solar farm to further mitigate any impacts to visual amenity.

5.11.2 Mitigation measures

No mitigation measures are considered necessary.

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 Wahroonga Solar Farm has been carried out to determine the appropriate means of waste disposal and recycling. The assessment takes into account the requirements of relevant legislation and policy including the Protection of the Environment Operations (POEO) Act 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 Gainsborough Rd in Narromine, approximately 20 minutes' drive south-west of the site. It is open 9.00am to 4.00pm all days except Tuesday and Thursday when it is closed. There is another facility in Trangie, located 45 kilometres north-west of the site, and a waste transfer station in Tomingley, 50 kilometres to the south.

None of the waste facilities accept liquid waste (e.g. paint, chemicals, grease tank waste) or hazardous waste (e.g. contaminated soil). In addition to these, the Tomingley 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 Dubbo, approximately 45 minutes' drive east of the development site.

Estimates of waste materials and proposed management arrangements for each phase of the development project are provided in Table 7 below.

Table 7: Estimated waste materials and waste management arrangements

Phase	Waste material	Proposed management
Construction	• Packaging waste such as cardboard, wood pallets, plastic wrap, scrap metal, general waste including approximately 830 wooden pallets and carboard 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	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: Recycling: • Steel and scrap metal (recycled) • Timber/cardboard (recycled) • Recyclable plastics Landfill: • General wastes and plastic (other than where recyclable) All recycling and general waste would be collected and taken to off-site waste management facilities for disposal Fluids would be recycled where possible or taken to off-site waste management facilities for disposal

Phase	Waste material	Proposed management
Operational	• Minimal volumes of domestic wastes such as office consumables, paper, plastics and glass • Waste resulting from maintenance or replacement of equipment	All waste materials would be taken to off-site waste management facilities for recycling or disposal
Decommissioning	• PV modules (15,708 modules) and supporting poles and mounts • Glass for panels (260 tonnes) • Silicon for wafers (40 tonnes) • Inverters / transformers / batteries • PV boxes, skids, scrap metal (830 tonnes) • Electrical cables • Fencing • Storage containers (two 40-foot containers)	The solar farm infrastructure would be dismantled into separate waste products such as metals, glass, plastics and concrete. 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. It is expected that the waste recycling industry will expand and develop new technologies and 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 occur.

6. CONCLUSION

The site is considered suitable for the proposed development of the Wahroonga Solar Farm. A 22kV power line runs through the development site enabling connection to the Essential Energy Narromine Sub-station to transfer power generated by the solar PV panels to the grid.

The site is 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, substations, 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 8 includes a recommendation as to whether the mitigation measure should be included in the management plan.

Table 8: Summary of mitigation measures

Consideration	Mitigation measures	Environmental Management Plan
Biodiversity	To avoid interference with the vegetation community located on the vegetation community to the north of the development area it is recommended that any vegetation planted to screen the development and any grasses planted to bind the soil following construction of the solar farm be native species endemic to the area. 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	*Asset protection zones* • Performance criteria - A defendable space should be provided onsite. - An asset protection zone should be provided and maintained for the life of the development • Recommendations	n/a

	1. The APZ should be a 20m wide inner protection area surrounding the entire development. 2. The inner protection area should comprise of the following: a) minimal fine fuel at ground level; b) vegetation that does not provide a continuous path to building/s for the transfer of fire; c) shrubs and trees that do not form a continuous canopy and vegetation is planted/cleared into clumps rather than continuous rows; d) species that retain dead material or deposit excessive quantities of ground fuel are avoided; e) shrubs and trees are pruned or removed so they do not touch or overhang the building/s; f) vegetation is located far enough away from the building/s so that plants will not ignite the building/s by direct flame contact or radiant heat emission. *Siting and design* • Performance criteria - Buildings should be sited and designed to minimise the risk of bush fire attack. • Recommendations - The development should be sited so that a defendable space (APZ) of 20m can be provided within the confines of the allotment boundaries on all sides of the solar arrays. *Construction standards* • Performance criteria - It should be demonstrated that the proposed building can withstand bush fire attack in the form of wind, smoke, embers, radiant heat and flame contact. • Recommendations - Nil recommendations *Access requirements* • Performance criteria - Safe, operational access should be provided (and maintained) for emergency services personnel in suppressing a bush fire while residents are seeking to relocate, in advance of a bush fire • Recommendations Property access roads should comply with the following requirements of section 4.1.3 (2) of *Planning for Bush Fire Protection* 2006. - A minimum carriageway width of 4 metres should be provided. - A minimum vertical clearance of 4 metres to any overhanging obstruction, including tree branches should be provided. - Curves should have a minimum inner radius of 6 metres to allow for rapid access and egress. - The minimum distance between the inner and outer curves should be 6 metres. - Crossfall should not exceed 10 degrees. - Maximum grades for sealed roads should not exceed 15 degrees and should not be more than 10 degrees for unsealed roads	

Water resources	Design – site drainage and water quality controls: • 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 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	Yes, for construction and operational phases. Include an erosion & sediment control plan or soil and water management plan
	Construction and/or demolition – site drainage and water quality controls: • 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: In the event of concrete works: • 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. In the event that dewatering practices are required: • 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	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 groundcover immediately construction works are completed • Ensure all plant and equipment operates in accordance with specifications	Yes, for construction and operational phases
Noise	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.	Yes, for construction and operational phases

	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.	
Electromagnetic radiation	No mitigation measures are proposed.	n/a
Traffic	• Widening of the northern shoulder of Euromedah Road opposite the intersection with the private access road to allow for vehicles to pass a vehicle turning right on to the private access road; • Widening of the existing private access at its intersection with Euromedah Road to provide two lanes on the private access road and to accommodate the swept path of a 19m semi-articulated truck entering/leaving the road; • Bitumen sealing of the intersection of Euromedah Road and the private access road; and • Upgrading of the private access road along its length to accommodate the predicted traffic volumes and loads. This would include the provision of regularly spaced passing lanes to allow for two-way traffic.	Yes, with reference to site access during the establishment and construction phases
The community & local economy	• labour to construct and maintain the solar farm be sourced from within Narromine LGA wherever possible • advertising be placed in local media and local businesses contacted to determine whether there is the capacity and expertise available in Narromine and surrounding districts to participate in the construction and ongoing maintenance activities.	n/a
Heritage	Consult with Narromine Local Aboriginal Lands Council prior to commencing site works and construction to determine whether it is necessary for members of the local indigenous community to be present on site during ground-disturbing works.	Yes, for construction phase
Visual & scenic amenity	No mitigation measures are proposed.	n/a
Glare and glint	No mitigation measures are proposed.	n/a
Waste management	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 occur.	Yes, for construction phase

The proposed development of the Wahroonga 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.

The system is designed to generate in excess of 12.9GWh of energy annually with the system offsetting almost 8.5 thousand tonnes of CO^2 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 2,150 NSW homes.

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.

ATTACHMENT A

Data from the BioNet BioNet Atlas website, which holds records from a number of custodians. The c
comprehensive inventory, and may contain errors and omissions. Species listed under the Sensitive
rounded to 0.1Â°; ^^ rounded to 0.01Â°). Copyright the State of NSW through the Office of Environ
Records of Entities in selected area [North: -32.18 West: 148.25 East: 148.35 South: -32.28] returne
Report generated on 8/07/2019 9:57 AM

Kingdom	Class	Family	Species Code	Scientific Name	Exotic
Animalia	Amphibia	Hylidae	3025	*Cyclorana platycephala*	
Animalia	Reptilia	Gekkonidae	2138	*Underwoodisaurus milii*	
Animalia	Reptilia	Pygopodidae	2911	*Pygopus schraderi*	
Animalia	Reptilia	Scincidae	2375	*Ctenotus robustus*	
Animalia	Reptilia	Agamidae	2252	*Intellagama lesueurii*	
Animalia	Reptilia	Varanidae	2283	*Varanus varius*	
Animalia	Reptilia	Typhlopidae	2588	*Anilios bituberculatus*	
Animalia	Reptilia	Elapidae	2726	*Parasuta dwyeri*	
Animalia	Aves	Anatidae	0208	*Anas superciliosa*	
Animalia	Aves	Anatidae	0202	*Chenonetta jubata*	
Animalia	Aves	Columbidae	9931	*Geopelia striata*	
Animalia	Aves	Columbidae	0043	*Ocyphaps lophotes*	
Animalia	Aves	Phalacrocoracidae	0100	*Microcarbo melanoleucos*	
Animalia	Aves	Phalacrocoracidae	0097	*Phalacrocorax sulcirostris*	
Animalia	Aves	Pelecanidae	0106	*Pelecanus conspicillatus*	
Animalia	Aves	Ardeidae	8712	*Ardea modesta*	
Animalia	Aves	Ardeidae	0188	*Egretta novaehollandiae*	
Animalia	Aves	Threskiornithidae	0182	*Platalea flavipes*	
Animalia	Aves	Threskiornithidae	0179	*Threskiornis molucca*	
Animalia	Aves	Accipitridae	0228	*Haliastur sphenurus*	
Animalia	Aves	Falconidae	0239	*Falco berigora*	
Animalia	Aves	Otididae	0176	*Ardeotis australis*	
Animalia	Aves	Charadriidae	0144	*Elseyornis melanops*	
Animalia	Aves	Cacatuidae	0269	*Cacatua galerita*	
Animalia	Aves	Cacatuidae	0273	*Eolophus roseicapillus*	
Animalia	Aves	Cacatuidae	0274	*Nymphicus hollandicus*	
Animalia	Aves	Psittacidae	0277	*^^Polytelis swainsonii*	

Animalia	Aves	Psittacidae	0295	*Psephotus haematonotus*
Animalia	Aves	Alcedinidae	0322	*Dacelo novaeguineae*
Animalia	Aves	Climacteridae	8127	*Climacteris picumnus victoriae*
Animalia	Aves	Meliphagidae	0625	*Ptilotula penicillatus*
Animalia	Aves	Pomatostomidae	8388	*Pomatostomus temporalis temporalis*
Animalia	Aves	Campephagidae	0424	*Coracina novaehollandiae*
Animalia	Aves	Pachycephalidae	0408	*Colluricincla harmonica*
Animalia	Aves	Artamidae	0700	*Cracticus nigrogularis*
Animalia	Aves	Rhipiduridae	0364	*Rhipidura leucophrys*
Animalia	Aves	Corvidae	0930	*Corvus coronoides*
Animalia	Aves	Monarchidae	0415	*Grallina cyanoleuca*
Animalia	Aves	Megaluridae	0508	*Cincloramphus cruralis*
Animalia	Aves	Hirundinidae	0357	*Hirundo neoxena*
Animalia	Aves	Hirundinidae	0359	*Petrochelidon nigricans*
Animalia	Mammalia	Tachyglossidae	1003	*Tachyglossus aculeatus*
Animalia	Mammalia	Dasyuridae	1072	*Sminthopsis crassicaudata*
Animalia	Mammalia	Phascolarctidae	1162	*Phascolarctos cinereus*
Animalia	Mammalia	Pseudocheiridae	1129	*Pseudocheirus peregrinus*
Animalia	Mammalia	Phalangeridae	T082	*Trichosurus sp.*
Animalia	Mammalia	Phalangeridae	1113	*Trichosurus vulpecula*
Animalia	Mammalia	Macropodidae	1265	*Macropus giganteus*
Animalia	Mammalia	Emballonuridae	1321	*Saccolaimus flaviventris*
Animalia	Mammalia	Molossidae	1324	*Austronomus australis*
Animalia	Mammalia	Molossidae	T091	*Mormopterus sp.*
Animalia	Mammalia	Vespertilionidae	1353	*Chalinolobus dwyeri*
Animalia	Mammalia	Vespertilionidae	1349	*Chalinolobus gouldii*
Animalia	Mammalia	Vespertilionidae	1352	*Chalinolobus picatus*

Animalia	Mammalia	Vespertilionidae	T092	*Nyctophilus sp.*	
Animalia	Mammalia	Vespertilionidae	1364	*Scotorepens balstoni*	
Animalia	Mammalia	Vespertilionidae	1362	*Scotorepens greyii*	
Animalia	Mammalia	Vespertilionidae	1022	*Vespadelus darlingtoni*	
Animalia	Mammalia	Vespertilionidae	1379	*Vespadelus vulturnus*	
Animalia	Mammalia	Muridae	1415	*Hydromys chrysogaster*	
Animalia	Mammalia	Canidae	1532	*Vulpes vulpes*	*
Animalia	Mammalia	Cervidae	9112	*Cervus sp.*	*
Plantae	Flora	Adoxaceae	1954	*Sambucus gaudichaudiana*	
Plantae	Flora	Aizoaceae	7094	*Zaleya galericulata subsp. australis*	
Plantae	Flora	Aizoaceae	8525	*Zaleya galericulata subsp. galericulata*	
Plantae	Flora	Amaranthaceae	1064	*Amaranthus viridis*	*
Plantae	Flora	Amaranthaceae	8523	*Ptilotus semilanatus*	
Plantae	Flora	Apiaceae	1128	*Hydrocotyle laxiflora*	
Plantae	Flora	Asteraceae	1260	*Ambrosia confertiflora*	*
Plantae	Flora	Asteraceae	1261	*Ambrosia psilostachya*	*
Plantae	Flora	Asteraceae	1273	*Arctotheca calendula*	*
Plantae	Flora	Asteraceae	1280	*Aster subulatus*	*
Plantae	Flora	Asteraceae	1283	*Bidens pilosa*	*
Plantae	Flora	Asteraceae	6714	*Brachyscome ciliaris var. lanuginosa*	
Plantae	Flora	Asteraceae	1335	*Calotis anthemoides*	
Plantae	Flora	Asteraceae	1342	*Calotis hispidula*	
Plantae	Flora	Asteraceae	1344	*Calotis lappulacea*	
Plantae	Flora	Asteraceae	1354	*Carduus pycnocephalus*	*
Plantae	Flora	Asteraceae	1358	*Carthamus lanatus*	*
Plantae	Flora	Asteraceae	1378	*Centaurea calcitrapa*	*
Plantae	Flora	Asteraceae	1400	*Cirsium vulgare*	*
Plantae	Flora	Asteraceae	8634	*Craspedia variabilis*	
Plantae	Flora	Asteraceae	9413	*Hyalosperma praecox*	
Plantae	Flora	Asteraceae	1540	*Hypochaeris glabra*	*
Plantae	Flora	Asteraceae	1574	*Minuria leptophylla*	
Plantae	Flora	Asteraceae	10166	*Schkuhria pinnata var. abrotanoides*	*

Plantae	Flora	Asteraceae	12811	*Senecio pinnatifolius var. pinnatifolius*	
Plantae	Flora	Asteraceae	1675	*Senecio quadridentatus*	
Plantae	Flora	Asteraceae	7851	*Soliva sessilis*	*
Plantae	Flora	Asteraceae	1688	*Soliva stolonifera*	*
Plantae	Flora	Asteraceae	8925	*Triptilodiscus pygmaeus*	
Plantae	Flora	Asteraceae	6737	*Vittadinia cuneata var. cuneata*	
Plantae	Flora	Asteraceae	VITT	*Vittadinia spp.*	
Plantae	Flora	Asteraceae	11380	*Xerochrysum viscosum*	
Plantae	Flora	Azollaceae	9260	*Azolla filiculoides*	
Plantae	Flora	Boraginaceae	1751	*Echium plantagineum*	*
Plantae	Flora	Boraginaceae	1761	*Heliotropium europaeum*	*
Plantae	Flora	Brassicaceae	1794	*Capsella bursa-pastoris*	*
Plantae	Flora	Brassicaceae	1811	*Harmsiodoxa blennodioides*	
Plantae	Flora	Brassicaceae	1820	*Lepidium fasciculatum*	
Plantae	Flora	Brassicaceae	1839	*Raphanus raphanistrum*	*
Plantae	Flora	Brassicaceae	1850	*Sinapis arvensis*	*
Plantae	Flora	Brassicaceae	1855	*Sisymbrium orientale*	*
Plantae	Flora	Campanulaceae	1934	*Wahlenbergia gracilis*	
Plantae	Flora	Campanulaceae	7314	*Wahlenbergia luteola*	
Plantae	Flora	Capparaceae	1942	*Apophyllum anomalum*	
Plantae	Flora	Casuarinaceae	2019	*Casuarina cristata*	
Plantae	Flora	Chenopodiaceae	2071	*Atriplex spinibractea*	
Plantae	Flora	Chenopodiaceae	2096	*Chenopodium multifidum*	*
Plantae	Flora	Chenopodiaceae	2111	*Einadia nutans*	
Plantae	Flora	Chenopodiaceae	2127	*Maireana decalvans*	
Plantae	Flora	Chenopodiaceae	7923	*Salsola kali var. kali*	
Plantae	Flora	Chenopodiaceae	7321	*Sclerolaena bicornis var. horrida*	

Plantae	Flora	Chenopodiaceae	2170	*Sclerolaena birchii*	
Plantae	Flora	Convolvulaceae	12255	*Convolvulus angustissimus*	
Plantae	Flora	Cucurbitaceae	2258	*Momordica balsamina*	
Plantae	Flora	Cupressaceae	2279	*Callitris endlicheri*	
Plantae	Flora	Cyperaceae	2307	*Bolboschoenus medianus*	
Plantae	Flora	Cyperaceae	2327	*Carex inversa*	
Plantae	Flora	Cyperaceae	2357	*Cyperus concinnus*	
Plantae	Flora	Cyperaceae	2418	*Eleocharis pallens*	
Plantae	Flora	Cyperaceae	2421	*Eleocharis plana*	
Plantae	Flora	Euphorbiaceae	10564	*Adriana tomentosa var. tomentosa*	
Plantae	Flora	Euphorbiaceae	2715	*Euphorbia helioscopia*	*
Plantae	Flora	Euphorbiaceae	13981	*Euphorbia lathyris*	*
Plantae	Flora	Euphorbiaceae	2722	*Euphorbia planiticola*	
Plantae	Flora	Euphorbiaceae	EUPR	*Euphorbia spp.*	
Plantae	Flora	Euphorbiaceae	2761	*Ricinus communis*	*
Plantae	Flora	Fabaceae (Caesalpinioideae)	6644	*Senna barclayana*	
Plantae	Flora	Fabaceae (Faboideae)	2774	*Astragalus hamosus*	*
Plantae	Flora	Fabaceae (Faboideae)	6967	*Crotalaria mitchellii subsp. laevis*	
Plantae	Flora	Fabaceae (Faboideae)	2860	*Glycine clandestina*	
Plantae	Flora	Fabaceae (Faboideae)	2861	*Glycine tabacina*	
Plantae	Flora	Fabaceae (Faboideae)	2862	*Glycyrrhiza acanthocarpa*	
Plantae	Flora	Fabaceae (Faboideae)	2908	*Lotus cruentus*	
Plantae	Flora	Fabaceae (Faboideae)	2922	*Medicago polymorpha*	*
Plantae	Flora	Fabaceae (Faboideae)	2926	*Medicago truncatula*	*
Plantae	Flora	Fabaceae (Faboideae)	10070	*Swainsona cadellii*	

Plantae	Flora	Fabaceae (Faboideae)	3041	*Swainsona galegifolia*	
Plantae	Flora	Fabaceae (Faboideae)	3051	*Swainsona oroboides*	
Plantae	Flora	Fabaceae (Faboideae)	3059	*Swainsona swainsonioides*	
Plantae	Flora	Fabaceae (Faboideae)	3073	*Trifolium arvense*	*
Plantae	Flora	Fabaceae (Faboideae)	3079	*Trifolium glomeratum*	*
Plantae	Flora	Fabaceae (Mimosoideae)	3722	*Acacia brachystachya*	
Plantae	Flora	Fabaceae (Mimosoideae)	3759	*Acacia deanei*	
Plantae	Flora	Fabaceae (Mimosoideae)	8269	*Acacia deanei subsp. deanei*	
Plantae	Flora	Fabaceae (Mimosoideae)	3761	*Acacia decora*	
Plantae	Flora	Fabaceae (Mimosoideae)	3792	*Acacia implexa*	
Plantae	Flora	Fabaceae (Mimosoideae)	3813	*Acacia lineata*	
Plantae	Flora	Fabaceae (Mimosoideae)	3825	*Acacia melvillei*	
Plantae	Flora	Fabaceae (Mimosoideae)	3843	*Acacia oswaldii*	
Plantae	Flora	Fabaceae (Mimosoideae)	3845	*Acacia paradoxa*	
Plantae	Flora	Fabaceae (Mimosoideae)	3878	*Acacia spectabilis*	
Plantae	Flora	Fumariaceae	3126	*Fumaria densiflora*	*
Plantae	Flora	Geraniaceae	3142	*Erodium crinitum*	
Plantae	Flora	Goodeniaceae	3177	*Goodenia cycloptera*	
Plantae	Flora	Goodeniaceae	3182	*Goodenia glabra*	

Plantae	Flora	Goodeniaceae	3193	*Goodenia pinnatifida*	
Plantae	Flora	Haloragaceae	3249	*Haloragis aspera*	
Plantae	Flora	Haloragaceae	6546	*Myriophyllum verrucosum*	
Plantae	Flora	Juncaceae	8940	*Juncus subglaucus*	
Plantae	Flora	Lamiaceae	3381	*Marrubium vulgare*	*
Plantae	Flora	Lamiaceae	3446	*Salvia verbenaca*	*
Plantae	Flora	Lamiaceae	3453	*Teucrium racemosum*	
Plantae	Flora	Lamiaceae	9229	*Teucrium sp. A*	
Plantae	Flora	Linaceae	3583	*Linum marginale*	
Plantae	Flora	Lomandraceae	8802	*Lomandra multiflora subsp. multiflora*	
Plantae	Flora	Loranthaceae	7497	*Amyema linophyllum subsp. orientale*	
Plantae	Flora	Lythraceae	3623	*Lythrum hyssopifolia*	
Plantae	Flora	Malvaceae	3648	*Hibiscus trionum*	
Plantae	Flora	Malvaceae	3664	*Sida corrugata*	
Plantae	Flora	Malvaceae	3673	*Sida rhombifolia*	*
Plantae	Flora	Martyniaceae	13212	*Proboscidea jussieui*	*
Plantae	Flora	Myoporaceae	3942	*Eremophila longifolia*	
Plantae	Flora	Myoporaceae	10213	*Myoporum platycarpum subsp. perbellum*	
Plantae	Flora	Myrtaceae	6360	*Eucalyptus camaldulensis*	
Plantae	Flora	Myrtaceae	6798	*Eucalyptus chloroclada*	
Plantae	Flora	Myrtaceae	4085	*Eucalyptus dwyeri*	
Plantae	Flora	Myrtaceae	4124	*Eucalyptus melanophloia*	
Plantae	Flora	Myrtaceae	4125	*Eucalyptus melliodora*	
Plantae	Flora	Myrtaceae	10023	*Eucalyptus populnea subsp. bimbil*	
Plantae	Flora	Najadaceae	6985	*Najas tenuifolia*	
Plantae	Flora	Onagraceae	7375	*Ludwigia peploides subsp. montevidensis*	
Plantae	Flora	Onagraceae	8808	*Oenothera stricta subsp. stricta*	*
Plantae	Flora	Ophioglossaceae	10482	*Ophioglossum lusitanicum*	
Plantae	Flora	Oxalidaceae	4615	*Oxalis exilis*	
Plantae	Flora	Oxalidaceae	4621	*Oxalis perennans*	
Plantae	Flora	Papaveraceae	4635	*Papaver aculeatum*	*
Plantae	Flora	Phormiaceae	7783	*Dianella longifolia*	
Plantae	Flora	Pittosporaceae	11202	*Pittosporum angustifolium*	

Plantae	Flora	Plantaginaceae	4705	*Plantago varia*	
Plantae	Flora	Poaceae	14896	*Anthosachne scabra*	
Plantae	Flora	Poaceae	4754	*Aristida behriana*	
Plantae	Flora	Poaceae	9334	*Aristida calycina var. calycina*	
Plantae	Flora	Poaceae	9335	*Aristida calycina var. praealta*	
Plantae	Flora	Poaceae	7611	*Aristida contorta*	
Plantae	Flora	Poaceae	4758	*Aristida echinata*	
Plantae	Flora	Poaceae	4760	*Aristida jerichoensis*	
Plantae	Flora	Poaceae	6933	*Aristida jerichoensis var. subspinulifera*	
Plantae	Flora	Poaceae	4767	*Aristida personata*	
Plantae	Flora	Poaceae	4770	*Aristida ramosa*	
Plantae	Flora	Poaceae	10384	*Austrostipa aristiglumis*	
Plantae	Flora	Poaceae	10375	*Austrostipa nitida*	
Plantae	Flora	Poaceae	10376	*Austrostipa nodosa*	
Plantae	Flora	Poaceae	10377	*Austrostipa scabra*	
Plantae	Flora	Poaceae	AUSO	*Austrostipa spp.*	
Plantae	Flora	Poaceae	10371	*Austrostipa verticillata*	
Plantae	Flora	Poaceae	4780	*Avena fatua*	*
Plantae	Flora	Poaceae	4790	*Bothriochloa macra*	
Plantae	Flora	Poaceae	4804	*Bromus arenarius*	
Plantae	Flora	Poaceae	4806	*Bromus diandrus*	*
Plantae	Flora	Poaceae	4833	*Chloris truncata*	
Plantae	Flora	Poaceae	4841	*Cymbopogon refractus*	
Plantae	Flora	Poaceae	6540	*Cynodon dactylon*	
Plantae	Flora	Poaceae	7178	*Dactyloctenium radulans*	
Plantae	Flora	Poaceae	7485	*Dichanthium sericeum*	
Plantae	Flora	Poaceae	4895	*Dichanthium setosum*	
Plantae	Flora	Poaceae	4898	*Dichelachne micrantha*	
Plantae	Flora	Poaceae	6857	*Digitaria brownii*	
Plantae	Flora	Poaceae	4903	*Digitaria coenicola*	
Plantae	Flora	Poaceae	4907	*Digitaria divaricatissima*	
Plantae	Flora	Poaceae	4915	*Digitaria ramularis*	
Plantae	Flora	Poaceae	4920	*Diplachne fusca*	
Plantae	Flora	Poaceae	13430	*Elymus rectisetus*	
Plantae	Flora	Poaceae	6721	*Enteropogon acicularis*	
Plantae	Flora	Poaceae	6722	*Enteropogon ramosus*	

Plantae	Flora	Poaceae	11647	*Eragrostis alveiformis*	
Plantae	Flora	Poaceae	4967	*Eragrostis parviflora*	
Plantae	Flora	Poaceae	6378	*Eragrostis setifolia*	
Plantae	Flora	Poaceae	7335	*Eriochloa pseudoacrotricha*	
Plantae	Flora	Poaceae	7602	*Eulalia aurea*	
Plantae	Flora	Poaceae	11388	*Lachnagrostis filiformis*	
Plantae	Flora	Poaceae	5030	*Lolium loliaceum*	*
Plantae	Flora	Poaceae	5033	*Lolium rigidum*	*
Plantae	Flora	Poaceae	6395	*Panicum decompositum*	
Plantae	Flora	Poaceae	5055	*Panicum effusum*	
Plantae	Flora	Poaceae	5073	*Paspalidium aversum*	
Plantae	Flora	Poaceae	5077	*Paspalidium constrictum*	
Plantae	Flora	Poaceae	5082	*Paspalidium jubiflorum*	
Plantae	Flora	Poaceae	5086	*Paspalum dilatatum*	*
Plantae	Flora	Poaceae	5087	*Paspalum distichum*	
Plantae	Flora	Poaceae	PASP	*Paspalum spp.*	
Plantae	Flora	Poaceae	5113	*Phragmites australis*	
Plantae	Flora	Poaceae	8744	*Poa sieberiana var. hirtella*	
Plantae	Flora	Poaceae	7878	*Rostraria cristata*	*
Plantae	Flora	Poaceae	14305	*Rytidosperma caespitosum*	
Plantae	Flora	Poaceae	14322	*Rytidosperma setaceum*	
Plantae	Flora	Poaceae	RYTI	*Rytidosperma spp.*	
Plantae	Flora	Poaceae	5167	*Setaria sphacelata*	*
Plantae	Flora	Poaceae	5179	*Sporobolus creber*	
Plantae	Flora	Poaceae	5220	*Themeda avenacea*	
Plantae	Flora	Poaceae	7770	*Themeda triandra*	
Plantae	Flora	Poaceae	5229	*Tripogon loliiformis*	
Plantae	Flora	Poaceae	7774	*Urochloa subquadripara*	
Plantae	Flora	Poaceae	5242	*Vulpia myuros*	*
Plantae	Flora	Polygonaceae	14542	*Duma florulenta*	
Plantae	Flora	Potamogetonaceae	5330	*Potamogeton crispus*	
Plantae	Flora	Potamogetonaceae	13489	*Potamogeton sulcatus*	
Plantae	Flora	Resedaceae	5529	*Reseda lutea*	*
Plantae	Flora	Rubiaceae	5654	*Asperula cunninghamii*	

Plantae	Flora	Rutaceae	5742	*Boronia glabra*	
Plantae	Flora	Rutaceae	10760	*Citrus glauca*	
Plantae	Flora	Solanaceae	6034	*Datura wrightii*	*
Plantae	Flora	Solanaceae	6040	*Lycium ferocissimum*	*
Plantae	Flora	Solanaceae	6045	*Nicotiana glauca*	*
Plantae	Flora	Solanaceae	7052	*Nicotiana megalosiphon subsp. megalosiphon*	
Plantae	Flora	Solanaceae	6065	*Solanum aviculare*	
Plantae	Flora	Solanaceae	6072	*Solanum cinereum*	
Plantae	Flora	Solanaceae	6995	*Solanum eremophilum*	
Plantae	Flora	Solanaceae	6081	*Solanum esuriale*	
Plantae	Flora	Solanaceae	6114	*Solanum triflorum*	*
Plantae	Flora	Thymelaeaceae	6191	*Pimelea stricta*	
Plantae	Flora	Verbenaceae	10718	*Verbena incompta*	*

data are only indicative and cannot be considered a
Species Data Policy may have their locations denatured (^
ment and Heritage. Search criteria : Public Report of all Valid
d a total of 440 records of 273 species.

Common Name	NSW status	Comm. status	Records	Info
Water-holding Frog	P		1	
Thick-tailed Gecko	P		1	
Eastern Hooded Scaly-foot	P		1	
Robust Ctenotus	P		1	
Eastern Water Dragon	P		1	
Lace Monitor	P		2	
Prong-snouted Blind Snake	P		1	
Dwyer's Snake	P		2	
Pacific Black Duck	P		1	
Australian Wood Duck	P		2	
Peaceful Dove	P		1	
Crested Pigeon	P		1	
Little Pied Cormorant	P		1	
Little Black Cormorant	P		1	
Australian Pelican	P		1	
Eastern Great Egret	P		1	
White-faced Heron	P		1	
Yellow-billed Spoonbill	P		1	
Australian White Ibis	P		1	
Whistling Kite	P		1	
Brown Falcon	P		1	
Australian Bustard	E1,P		2	
Black-fronted Dotterel	P		1	
Sulphur-crested Cockatoo	P		2	
Galah	P		3	
Cockatiel	P		2	
Superb Parrot	V,P,3	V	1	

Red-rumped Parrot	P		1	
Laughing Kookaburra	P		1	
Brown Treecreeper (eastern subspecies)	V,P		1	
White-plumed Honeyeater	P		1	
Grey-crowned Babbler (eastern subspecies)	V,P		1	
Black-faced Cuckoo-shrike	P		1	
Grey Shrike-thrush	P		1	
Pied Butcherbird	P		1	
Willie Wagtail	P		1	
Australian Raven	P		1	
Magpie-lark	P		1	
Brown Songlark	P		1	
Welcome Swallow	P		1	
Tree Martin	P		1	
Short-beaked Echidna	P		2	
Fat-tailed Dunnart	P		1	
Koala	V,P	V	1	
Common Ringtail Possum	P		1	
brushtail possum	P		1	
Common Brushtail Possum	P		2	
Eastern Grey Kangaroo	P		1	
Yellow-bellied Sheathtail-bat	V,P		3	
White-striped Freetail-bat	P		2	
mastiff-bat	P		5	
Large-eared Pied Bat	V,P	V	2	
Gould's Wattled Bat	P		5	
Little Pied Bat	V,P		2	

long-eared bat	P	6
Inland Broad-nosed Bat	P	2
Little Broad-nosed Bat	P	4
Large Forest Bat	P	4
Little Forest Bat	P	7
Water-rat	P	1
Fox		3
Unidentified Deer		1
White Elderberry		1
		1
		1
Green Amaranth		1
Lambs tails		1
Stinking Pennywort		1
Burr Ragweed		1
Perennial Ragweed		2
Capeweed		2
Wild Aster		1
Cobbler's Pegs		1
Variable Daisy		1
Cut-leaved Burr-daisy		1
Bogan Flea		1
Yellow Burr-daisy		2
Slender Thistle		1
Saffron Thistle		1
Star Thistle		1
Spear Thistle		1
Common Billy-buttons	P	1
		1
Smooth Catsear		1
		1
Dwarf Marigold		1

	1
Cotton Fireweed	1
Bindyi	1
Jo-jo	1
Common Sunray	2
A Fuzzweed	2
Fuzzweed	1
Sticky Everlasting	1
Pacific Azolla	1
Patterson's Curse	1
Potato Weed	1
Shepherd's Purse	1
	1
Bundled Peppercress	1
Wild Radish	1
Charlock	1
Indian Hedge Mustard	1
Sprawling Bluebell	1
Bluebell	1
Warrior Bush	1
Belah	1
Spiny-fruit Saltbush	3
Scented Goosefoot	2
Climbing Saltbush	1
Black Cotton Bush	1
Buckbush	5
Goathead Burr	1

Galvinized Burr	2
	1
Balsam Apple	1
Black Cypress Pine	1
	1
Knob Sedge	1
Trim Flat-sedge	1
Pale Spike Sedge	1
Flat Spike-sedge	1
	2
Sun Spurge	1
Caper Spurge	1
Plains Spurge	1
	2
Castor Oil Plant	1
Smooth Senna	2
Yellow Milk-vetch	2
	2
Twining glycine	1
Variable Glycine	1
Native Liquorice	1
Red-flowered Lotus	1
Burr Medic	2
Barrel Medic	1
	2

Smooth Darling Pea	1
	1
Downy Swainson-pea	1
Haresfoot Clover	1
Clustered Clover	2
Umbrella Mulga	1
Green Wattle	1
Deane's Wattle	1
Western Silver Wattle	1
Hickory Wattle	1
Streaked Wattle	1
Yarran	1
Miljee	1
Kangaroo Thorn	1
Mudgee Wattle	2
Narrow-leaved Fumitory	2
Blue Crowfoot	1
Cut-leaf Goodenia	2
Smooth Goodenia	1

Scrambles Eggs	3
Rough Raspwort	3
Red Water-milfoil	1
Rush	1
White Horehound	5
Vervain	1
Grey Germander	1
	2
Native Flax	1
Many-flowered Mat-rush	1
	1
Hyssop Loosestrife	1
Flower-of-an-hour	1
Corrugated Sida	1
Paddy's Lucerne	1
	2
Emubush	4
	1
River Red Gum	2
Dirty Gum	1
Dwyer's Red Gum	1
Silver-leaved Ironbark	2
Yellow Box	2
Bimble Box	4
Waternymph	1
Water Primrose	1
	1
Adder's Tongue	1
	1
	2
Native Poppy	1
Blueberry Lily	1
Butterbush	1

			1	
Wheatgrass, Common Wheatgrass			1	
Bunch Wiregrass			6	
			2	
			1	
Bunched Kerosene Grass			1	
			3	
Jericho Wiregrass			1	
Jericho Wiregrass			4	
			7	
Purple Wiregrass			2	
Plains Grass			2	
			1	
A Speargrass			2	
Speargrass			2	
A Speargrass			2	
Slender Bamboo Grass			3	
Wild Oats			1	
Red Grass			4	
Sand Brome			1	
Great Brome			1	
Windmill Grass			2	
Barbed Wire Grass			2	
Common Couch			1	
Button Grass			2	
Queensland Bluegrass			1	
Bluegrass	V	V	1	
Shorthair Plumegrass			1	
Cotton Panic Grass			3	
Finger Panic Grass			3	
Umbrella Grass			4	
Finger Panic Grass			1	
Brown Beetle Grass			3	
			1	
Curly Windmill Grass			5	
Curly Windmill Grass			1	

	1
Weeping Lovegrass	3
Neverfail	1
Early Spring Grass	2
Silky Browntop	4
	1
Stiff Ryegrass	1
Wimmera Ryegrass	2
Native Millet	1
Hairy Panic	4
Bent Summer Grass	2
Knottybutt Grass	3
Warrego Grass	6
Paspalum	1
Water Couch	1
	1
Common Reed	1
	1
Annual Cat's Tail	1
Ringed Wallaby Grass	5
Small-flowered Wallaby-grass	1
	3
South African Pigeon Grass	1
Slender Rat's Tail Grass	2
Native Oatgrass	1
	1
Fiveminute Grass	1
Green Summer Grass	2
Rat's Tail Fescue	1
Lignum	2
Curly Pondweed	1
	1
Cut-leaved Mignonette	3
Twining Woodruff	2

Sandstone Boronia	P	1
Desert Lime		2
Hairy Thornapple		1
African Boxthorn		2
Tree Tobacco		2
Long-flowered Tobacco-bush		3
Kangaroo Apple		1
Narrawa Burr		2
		1
Quena		2
Three-flowered Nightshade		1
Gaunt Rice-flower		1
		1

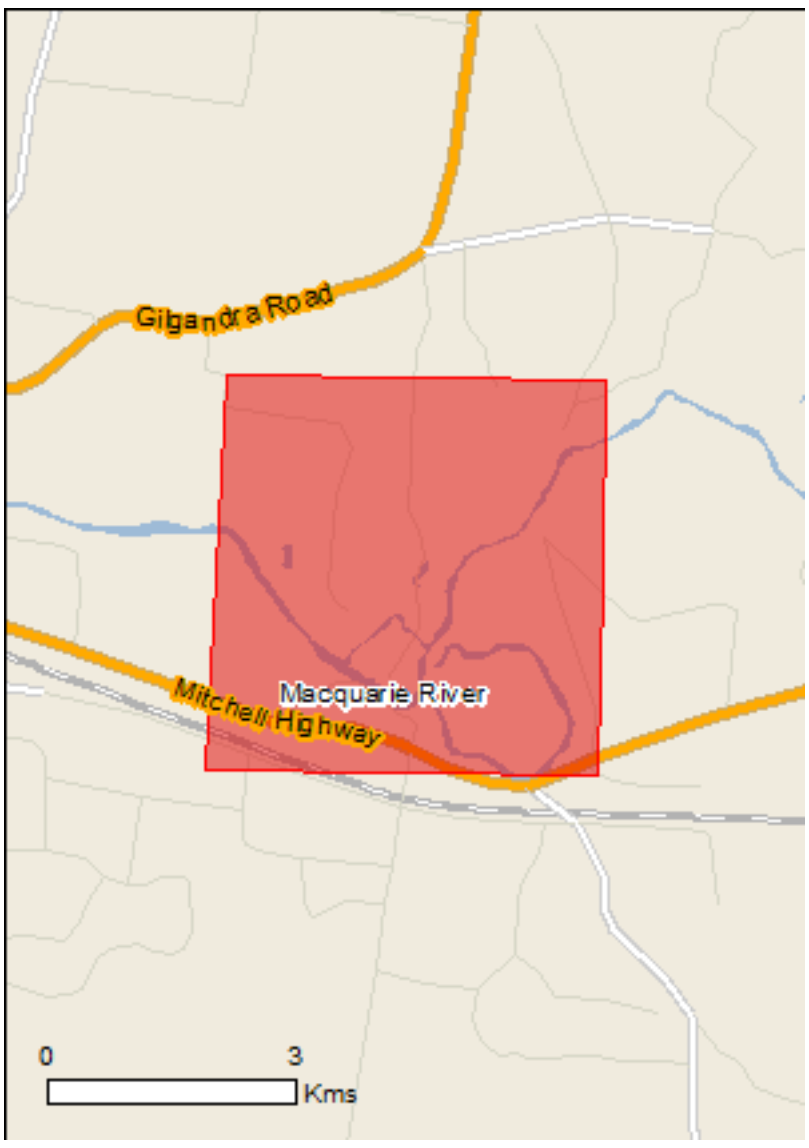
EPBC Act Protected Matters Report

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.

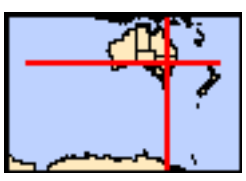
Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 13/06/19 11:13:02



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:	5
Listed Threatened Species:	23
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:	16
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:	18
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	700 - 800km upstream
Riverland	700 - 800km upstream
The coorong, and lakes alexandrina and albert wetland	800 - 900km upstream
The macquarie marshes	100 - 150km upstream

Listed Threatened Ecological Communities [Resource Information]

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
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Community may occur within area
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Critically Endangered	Community may occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area
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
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
[Rostratula australis](#) Australian Painted-snipe, Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Fish		
[Maccullochella macquariensis](#) Trout Cod [26171]	Endangered	Species or species habitat may occur within area
[Maccullochella peelii](#) Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area
[Macquaria australasica](#) Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area
Mammals		
[Chalinolobus dwyeri](#) Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area
[Dasyurus maculatus maculatus (SE mainland population)](#) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area
[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 known to occur within area
[Pteropus poliocephalus](#) Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Plants		
[Androcalva procumbens](#) [87153]	Vulnerable	Species or species habitat likely to occur within area
[Philotheca ericifolia](#) [64942]	Vulnerable	Species or species habitat may occur within area
[Prasophyllum sp. Wybong (C.Phelps ORG 5269)](#) a leek-orchid [81964]	Critically Endangered	Species or species habitat may occur within area
[Swainsona murrayana](#) Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area
[Swainsona recta](#) Small Purple-pea, Mountain Swainson-pea, Small Purple Pea [7580]	Endangered	Species or species habitat may occur within area
[Tylophora linearis](#) [55231]	Endangered	Species or species habitat may occur within area
Reptiles		
[Aprasia parapulchella](#) Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat may 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		
Hirundapus caudacutus		
White-throated Needletail [682]		Species or species habitat may occur within area
Motacilla flava		
Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca		
Satin Flycatcher [612]		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

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

Name	Threatened	Type of Presence
		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 likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat may occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area
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
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat may occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may 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		
Carduelis carduelis European Goldfinch [403]		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
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur

Name	Status	Type of Presence
		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		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		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
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		
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		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

-32.21551 148.283187,-32.215873 148.324128,-32.252029 148.323269,-32.251521 148.280869,-32.21551 148.283101,-32.21551 148.283187

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.

Department of the Environment
GPO Box 787
Canberra ACT 2601 Australia
+61 2 6274 1111

ATTACHMENT C

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : 0219B

Client Service ID : 427308

Zenith Town Planning

P O Box 591
Moruya New South Wales 2537

Attention: Allen Grimwood

Email: zenithplan@bigpond.com

Date: 12 June 2019

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 41, DP:DP752581 with a Buffer of 0 meters, conducted by Allen Grimwood on 12 June 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) 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 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.

3 Marist Place, Parramatta NSW 2150
Locked Bag 5020 Parramatta NSW 2220
Tel: (02) 9585 6380 Fax: (02) 9873 8599

ABN 30 841 387 271
Email: ahims@environment.nsw.gov.au
Web: www.environment.nsw.gov.au

AHIMS Web Services (AWS)
Search Result

Purchase Order/Reference : 0219A

Client Service ID : 427287

Zenith Town Planning

Date: 12 June 2019

P O Box 591
Moruya New South Wales 2537

Attention: Allen Grimwood

Email: zenithplan@bigpond.com

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lot : 46, DP:DP752581 with a Buffer of 0 meters, conducted by Allen Grimwood on 12 June 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.
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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) website. Gazettal notices published prior to 2001 can be obtained from Office of Environment and Heritage's Aboriginal Heritage Information Unit upon request

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- 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.
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NARROMINE LOCAL ABORIGINAL LAND COUNCIL

Attachment D

ABORIGINAL SITE SURVEY REPORT 2019

Completed by

Diran Ngurmbang Consulting

For

Allen Grimwood RPIA
Director
Zenith Town Planning
zenithplan@bigpond.com

on behalf of

Mishka Talent
IT Power (Australia) Pty Ltd
Level 1, 19 Moore Street
Turner Act 2616

For

Mr Murray Fedderson
6 Euromedah Road
Narromine NSW 2821
murray.fedd@gmail.com

INTRODUCTION

Culture Site Survey for proposed Solar Farm requested by Allen Grimwood RPIA from Zenith Town Planning on behalf of IT Power (Australia) Pty Ltd.

Initial contact was made with Narromine Local Aboriginal Land Council from Allen Grimwood on Wednesday 12th June 2019.

After consultation with the Narromine Local Aboriginal Land Council Board and Elders group a recommendation that a Culture Site Survey be proposed.

The engagement documentation was received on 24th June 2019 requesting the Culture Site Survey be conducted on Friday the 5th July 2019.

The property 6 Euromedah Road Narromine NSW 2821 Lot 6 DP 752581is owned by Mr Murray Fedderson. The survey area was Approximately 35 Acres.

Narromine Local Aboriginal Land Council Site Survey team Diran Ngurumbang Consulting completed Aboriginal Culture Site Survey on Friday 5th July 2019.

CONSULTATION

Narromine Local Aboriginal Land Council had consultation with the LALC Board Members Elders and knowledge holders from Community.

CULTURE SITE SURVEY OFFICERS

Michael Clarke (George) was born in Narromine over the river on the reserve land now known as Rosebank.
Michael has lived on Rosebank that follows the river for 56 years. His Family has lived on this land for six generations. He is familiar with the river area Quarry, Birthing Tree and Cob & Co trail that are significant sites to this area. Michael Clarke is a Narromine LALC Member.

Mark Smith was born on Country. His family is one of the original Aboriginal Families in the Narromine area. Marks Nan, Aunty Col is an Elder of this community.
Mark has lived in Narromine for 40 years, he has a connection to country and shares his knowledge with young ones teaching them about traditional plants, medicines, dance and significant areas on country.

Paul Brydon (Midnight) is a Narromine LALC member. Midnight has been completing Culture Surveys for more than 23 years. He has knowledge of the area and the significance of Country.
Midnight has been involved in the National museum of Australia visits and the cataloguing of artefacts found on this Country. He has worked for CMA and sits on many consultation committees with the Railway and mines.

LEGISLATIVE AND POLICY FRMAEWORK

Aboriginal Heritage is primarily protected under the

National Parks and Wildlife Act 1974 as amended in 2010 with the introduction of the *National parks and Wildlife Amendmen*t (Aboriginal objects and Places) Regulation 2010.

The aim of the NPW Act includes:

- The conservation of objects, places or features (including biological diversity) of cultural value within the landscape, including but not limited to: places, objects and features of significance to Aboriginal people.

An Aboriginal object is defined as:

- Any deposit, object or material evidence (not being a handicraft made for sale) relating to the Aboriginal habitation of the area that comprises New South Wales, being habitation before or concurrent with the occupation of the area by persons on non- Aboriginal extraction and includes Aboriginal remains.

Part 6 of the NPW ACT concerns Aboriginal objects and places and various sections describe the offences, defences and requirements to harm an Aboriginal object or place. The main offences under section 86 of NPW Act are:

- A person must not harm or desecrate an object that the person knows is an Aboriginal object
- A person must not harm an Aboriginal object
- For the purpose of this section, "circumstances of aggravation" are:
  That the offence was committed in the course of carrying out a commercial activity, or that the offence was the second or subsequent occasion on which the offender was convicted of an offence under this section.

- A person must not harm or desecrate an Aboriginal place.

Under section 87 of the NPW Act, there are specified defences to prosecution including authorisation through an Aboriginal Heritage Impact Permit 9AHIP) or through exercising due diligence or compliance through the regulation.

Section 89A of the Act also requires that a person who is aware of an Aboriginal object, must notify the Director-General in a prescribed manner. In effect this section requires the completion of OEH AHIMS site cards for all sites located during heritage surveys.

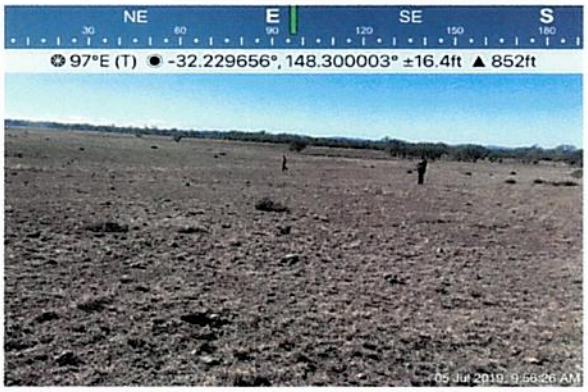
Section 90 of the NPW Act deal with the issuing of an AHIP, including that the permit may be subject to certain conditions.

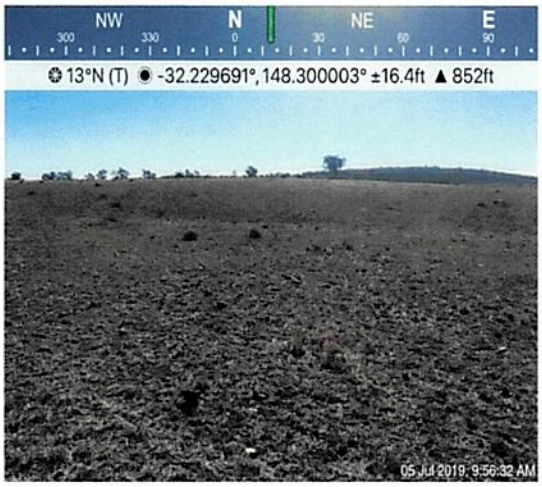
The EP&A A Act is legislation for the management of development in NSW. It sets up a planning structure that requires developers (individuals or companies) to consider the environmental impacts of new projects. Under this act, cultural heritage is considered to be a part of the environment. This Act requires that Aboriginal cultural heritage and the possible impacts to Aboriginal heritage that development may have are formally considered in land-use planning and development approval processes.

ENVIROMENT

6 Euromedah Road Narromine – Lot 46 DP 752581 as shown in accompany map of area is a sparse grass paddock. The area has minimal vegetation and undulating ground.
Approximately 35 acres was surveyed.
The area which was surveyed was shown to the Culture Survey Field officers by the owner of the property Mr Murray Fedderson. The area surveyed was from the powerline south to the fence line.

The area may have been ploughed up at one stage.

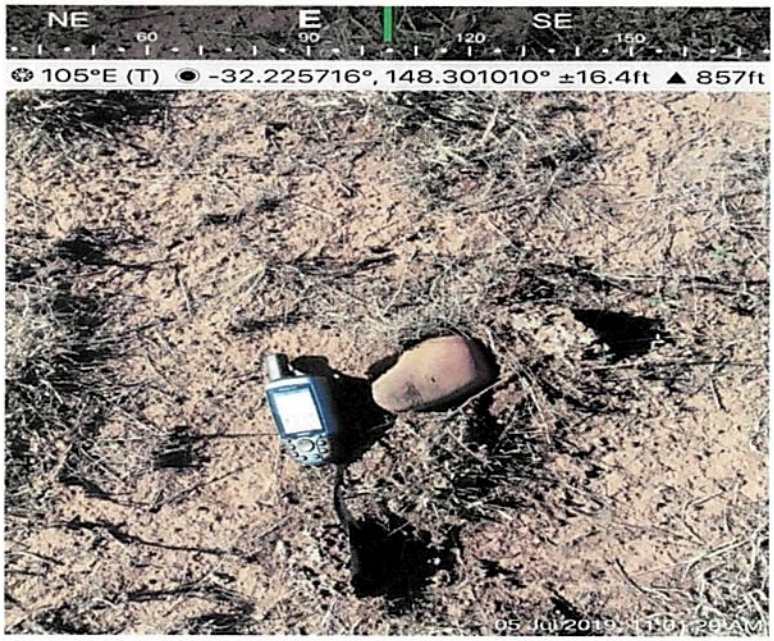




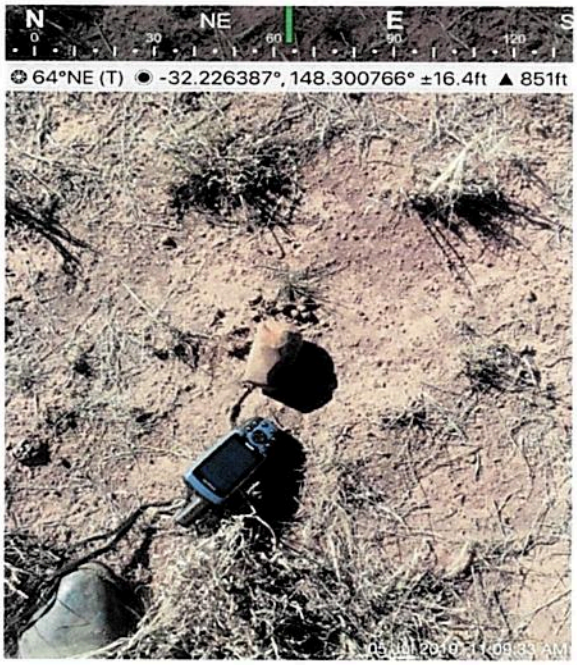
SURVEY RESULTS

Two possible artefacts where found on 6 Euromedah Road Narromine – Lot 46 DP 752581.

1. The first possible artefact may have been the making of an axe head. It is approximately 10cm at its smallest point and approximately 15cm at the largest point.



2. The second possible artefact found may have been a hammer stone. The stone has pieces broken off and was found on top of the ground. The possible hammer stone is aproximately 10cm in length.



South of this area is significant due to numerous artefacts found in a recent ARTC Culture survey. The site was a possible camping site south to the river including a walking trail.

Surrounding areas are signifiacnt to the NGARRU people.
The NGARRU MAYIN (meaning place of honey) people are apart of the Wiradjuri Nation.
The area was used for residence, a safe river crossing and tool making.

The country South of this site was to be the original site for the Township of Narromine.
Known to the Ngarru Mayin people as a significant meeting place.
The Four creeks/rivers that were followed by our people – Colbaggie Creek, Gin Gin and Ulma.

The quarry was the source for making tools to hunt and gather food.

RECOMMENDATION

The Narromine Local Aboriginal Land Council requests they be notified if any future works are to take place due to proposed ground disturbance may uncover further artefacts.

We ask that you contact the Narromine LALC so we may preserve any found atrefacts and protect our Aboriginal Culture Heritage for the Ngarru Mayin people.

The two possible artefacts found during the Culture Site Survey that took place on the 5th July 2019 had pieces broken off and nothing else was found on top of the ground.

There is no evidence to support that any other atrefacts where present.

The Culture Site Survey officers can see no reason why the proposed project of Solar Farm at site surveyed 6 Euromedah Narromine could not proceed.

CONCLUSION

The Culture survey was recommended due to the siginficance of the area south of the property 6 Euromedah Raod Narromine. The Ngarru Mayin people used this area as a meeting place, river crossing and walking trail. The quarry was used for tool making.
A recent Culture site survey for surrounding areas completed by archeologist found many scared trees and artefacts along the river area.

The two possible artefacts found during the Culture Site Survey that took place on the 5th July 2019 had pieces broken off and nothing else was found on top of the ground, this could have been because the artefacts where moved by ground disturbance such as the ground being ploughed or moved.

There is no evidence to support that any other atrefacts where present.

The site has not been registered.

ATTACHMENT E

FORGESOLAR GLARE ANALYSIS

Project: **Narromine 4A**
Proposed 5MW solar facility

Site configuration: **Narromine 4A**
Analysis conducted at 03:54 on 06 Jan, 2019.

U.S. FAA 2013 Policy Adherence

The following table summarizes the policy adherence of the glare analysis based on the 2013 U.S. Federal Aviation Administration Interim Policy 78 FR 63276. This policy requires the following criteria be met for solar energy systems on airport property:

- No "yellow" glare (potential for after-image) for any flight path from threshold to 2 miles
- No glare of any kind for Air Traffic Control Tower(s) ("ATCT") at cab height.
- Default analysis and observer characteristics (see list below)

ForgeSolar does not represent or speak officially for the FAA and cannot approve or deny projects. Results are informational only.

COMPONENT	STATUS	DESCRIPTION
Analysis parameters	PASS	Analysis time interval and eye characteristics used are acceptable
Flight path(s)	N/A	No flight paths analyzed
ATCT(s)	N/A	No ATCT receptors designated

Default glare analysis parameters and observer eye characteristics (for reference only):

- Analysis time interval: 1 minute
- Ocular transmission coefficient: 0.5
- Pupil diameter: 0.002 meters
- Eye focal length: 0.017 meters
- Sun subtended angle: 9.3 milliradians

FAA Policy 78 FR 63276 can be read at https://www.federalregister.gov/d/2013-24729

SITE CONFIGURATION

Analysis Parameters

DNI: peaks at 1,000.0 W/m^2
Time interval: 1 min
Ocular transmission coefficient: 0.5
Pupil diameter: 0.002 m
Eye focal length: 0.017 m
Sun subtended angle: 9.3 mrad
Site Config ID: 24294.4215

PV Array(s)

Name: Main PV Array
Axis tracking: Single-axis rotation
Tracking axis orientation: 180.0°
Tracking axis tilt: 0.0°
Tracking axis panel offset: 0.0°
Max tracking angle: 60.0°
Resting angle: 60.0°
Rated power: 0.36 kW
Panel material: Light textured glass with AR coating
Reflectivity: Vary with sun
Slope error: correlate with material

Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-32.223924	148.298368	253.33	2.90	256.23
2	-32.224359	148.302338	257.74	2.90	260.64
3	-32.227627	148.301845	258.19	2.90	261.09
4	-32.227246	148.297832	253.00	2.90	255.90

Discrete Observation Receptors

Name	ID	Latitude (°)	Longitude (°)	Elevation (m)	Height (m)
OP 1	1	-32.229804	148.286481	241.58	1.50
OP 2	2	-32.226900	148.285880	251.18	1.50
OP 3	3	-32.222362	148.289914	257.00	1.50
OP 4	4	-32.214084	148.288069	253.15	1.50
OP 5	5	-32.211252	148.304205	261.03	1.50
OP 6	6	-32.232700	148.292575	248.37	1.50
OP 7	7	-32.220022	148.319848	244.91	1.50

Route Receptor(s)

Name: Dirt Access Track
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-32.205658	148.304248	261.44	1.65	263.09
2	-32.211541	148.303733	261.42	1.65	263.07
3	-32.212920	148.302618	259.88	1.65	261.53
4	-32.223958	148.302274	257.54	1.65	259.19

Name: Eumungerie Road
Path type: Two-way
Observer view angle: 50.0°

Vertex	Latitude (°)	Longitude (°)	Ground elevation (m)	Height above ground (m)	Total elevation (m)
1	-32.216551	148.258243	252.17	1.65	253.82
2	-32.216769	148.260990	254.09	1.65	255.74
3	-32.210379	148.270517	239.96	1.65	241.61
4	-32.210306	148.271890	242.18	1.65	243.83
5	-32.211250	148.280645	246.00	1.65	247.65
6	-32.203915	148.310772	279.64	1.65	281.29

GLARE ANALYSIS RESULTS

Summary of Glare

PV Array Name	Tilt (°)	Orient (°)	"Green" Glare min	"Yellow" Glare min	Energy kWh
Main PV Array	SA tracking	SA tracking	0	0	1,148.0

Total annual glare received by each receptor

Receptor	Annual Green Glare (min)	Annual Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
Dirt Access Track	0	0
Eumungerie Road	0	0

Results for: Main PV Array

Receptor	Green Glare (min)	Yellow Glare (min)
OP 1	0	0
OP 2	0	0
OP 3	0	0
OP 4	0	0
OP 5	0	0
OP 6	0	0
OP 7	0	0
Dirt Access Track	0	0
Eumungerie Road	0	0

Point Receptor: OP 1

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 2

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 3

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 4

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 5

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 6

0 minutes of yellow glare
0 minutes of green glare

Point Receptor: OP 7

0 minutes of yellow glare
0 minutes of green glare

Route: Dirt Access Track

0 minutes of yellow glare
0 minutes of green glare

Route: Eumungerie Road

0 minutes of yellow glare
0 minutes of green glare

Assumptions

"Green" glare is glare with low potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
"Yellow" glare is glare with potential to cause an after-image (flash blindness) when observed prior to a typical blink response time.
Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual results and glare occurrence may differ.
Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid based on aggregated research data. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.