



Premise

ENERPARC AUSTRALIA

Dunedoo Solar Farm

BIODIVERSITY ASSESSMENT

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Prepared By		Reviewed By		Authorised By	
Isobel Colson		Sally Kirby		Mark Raikhman	

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EXECUTIVE SUMMARY

Premise Australia Pty Ltd (Premise) has prepared this biodiversity assessment report for the construction of a solar farm by Enerparc Australia on land at 126 Lawson Park Road, Dunedoo, NSW. The project involves the installation of solar panels and infrastructure within a footprint of approximately 35 hectares over a total site of 183 hectares.

This report has been prepared to support a Development Application (DA) for the development being prepared by Premise. As the project will not result in the loss of native vegetation, does not overlap with an area mapped on the Biodiversity Values Map and is not a State Significant Development, the Biodiversity Offset Scheme and Biodiversity Assessment Method (BAM) established under the BC Act (2016) does not apply. The impact of the project on biodiversity has been assessed via Five Part Test of significance in this biodiversity assessment report.

The biodiversity assessment comprises:

- Searches of relevant State and Commonwealth databases and a literature review to determine which threatened biodiversity has potential to occur on the study area.
- Biodiversity survey conducted in April 2022 using a rapid sampling method for flora.

Key findings of the survey

- A list of the plant species identified in the study areas is provided in **Appendix A**. A total of 19 flora species were recorded on the study area, of which 5 are native, 6 are planted native and 8 are introduced species.
- Vegetation on the study area was classified into three categories: Exotic Pasture Grassland, Exotic Wheat Crop, and Native Planting (planted native trees).
- One species listed as a High Threat Environmental Weed by NSW DPE was found on the study area: *Paspalum dilatatum*. No other priority weeds were identified on the study area.
- Five broad fauna habitat types were identified on the study area: Exotic cropped paddock, exotic pasture grassland, non hollow-bearing stags, planted native tree lanes and dam and small ephemeral depression.
- No fauna species were observed on the study area during the survey, possibly due to inclement weather.

Threatened Biodiversity

- No threatened flora species were identified as having potential to breed on the study area based on literature and database searches.
- Four threatened bird species: Black Falcon, Spotted Harrier, Gang-Gang Cockatoo and Glossy Black Cockatoo were identified by literature and database searches as having potential to utilise the study area for foraging.
- No endangered populations listed under the BC Act or threatened ecological communities listed under the EPBC or BC Acts occur in the investigation area or remain if they once occurred.
- No Areas of Outstanding Biodiversity Value have been declared on or near the investigation area under the BC Act or areas of Critical Habitat under the EPBC Act.

Impact Avoidance and Mitigation

Measures to avoid or minimise impacts of the project on threatened species include:

- As far as possible, the solar farm will be designed to avoid impact to native vegetation. In particular, the footprint is offset from the eastern tree lane to prevent shading and avoid the need for tree removal.
- The proposed solar farm footprint is to be placed on a cleared, cropped paddock where soil disturbance is a part of existing land management.
- Feral animal and weed control will continue as part of existing land management.
- Rocks from the centre of the paddock will be relocated to the tree lanes adjoining the site to avoid loss of rocky habitat.
- Stags removed from the solar farm footprint will be relocated to the tree lane to provide additional habitat as fallen timber.
- Reflective metal tags are to be installed along with boundary fencing to reduce the risk of entanglement of fauna in barbed wire.
- The remaining dam on the site will be left in place and any fringing vegetation which becomes established will be retained.
- Vehicles will be cleaned prior to working on the site to prevent the introduction of weed seeds and pathogens.

Residual impacts

Impacts of the proposed development once impact avoidance and minimisation has taken place include:

- Permanent clearing of approximately 15 metre wide section of roadside vegetation along Lawson Park Road as an access point for the solar farm (0.009 ha).
- Installation of solar panels over 31.15 ha of exotic wheat crop.
- Relocation of two non hollow-bearing stags and rocks to adjacent area.
- A small amount of noise and dust generated during the construction phase of the project.

No native vegetation will be cleared as a result of the proposed development.

Five-Part Tests

The proposed solar farm is not considered likely to have an adverse impact on the life cycle or habitat of any of the threatened species identified as having potential to occur on the study area. Nor will the proposed activity remove, modify or fragment the habitat of any subject species. Neither Species Impact Statements nor application of the Biodiversity Offsets Scheme (BOS) is required under the BC Act.

Commonwealth Environment Protection and Biodiversity Conservation Act (EPBC Act)

None of the threatened fauna species with potential habitat on the study area are listed as threatened under the EPBC Act. Referral to the Commonwealth Department of Environment and Energy is not required.

State Environmental Planning Policy (Biodiversity and Conservation) (2021)

The proposed solar farm will not result in the loss of any native vegetation or koala habitat and therefore will not impact koala core habitat. The proposed solar farm will not impede movement of koalas between habitat and a koala assessment report is not required and the Biodiversity and Conservation (2021) SEPP does not apply.

1. INTRODUCTION

Premise Australia Pty Ltd (Premise) was commissioned by Enerparc Australia to conduct an ecological assessment for the construction of a solar farm on land at 126 Lawson Park Road, Dunedoo, NSW. The project involves the installation of solar panels and infrastructure within a footprint of approximately 35 hectares over a total site of 183 hectares.

The project is expected to have an electrical production capacity of approximately 5 MW which is below the 30 MW trigger for designated development according to Clause 24, Part 1, Schedule 3 of the *Environmental Planning and Assessment Regulation 2021*.

The project is for electricity generating works with a capital investment value (CIV) less than \$5,000,000 which is below the trigger for regionally significant development according to Part 5 of Schedule 7 of the *State Environmental Planning Policy (Planning Systems) 2021*. Therefore the project is considered local development for which Warrumbungle Shire Council is the consent authority.

This report has been prepared to support a Development Application (DA) for the project being prepared by Premise. As the proposed solar farm will not result in the loss of native vegetation, does not overlap with an area mapped on the Biodiversity Values Map and is not a State Significant Development, the Biodiversity Offset Scheme and Biodiversity Assessment Method (BAM) established under the BC Act does not apply. The impact of the proposed solar farm on biodiversity has been assessed via Five Part Test of Significance in this biodiversity assessment report.

1.1 PROJECT DESCRIPTION

The project involves the installation of a solar farm and associated infrastructure on approximately 35 ha of agricultural land on Lot Lot 78 DP754309 in the Warrumbungle Shire Local Government Area.

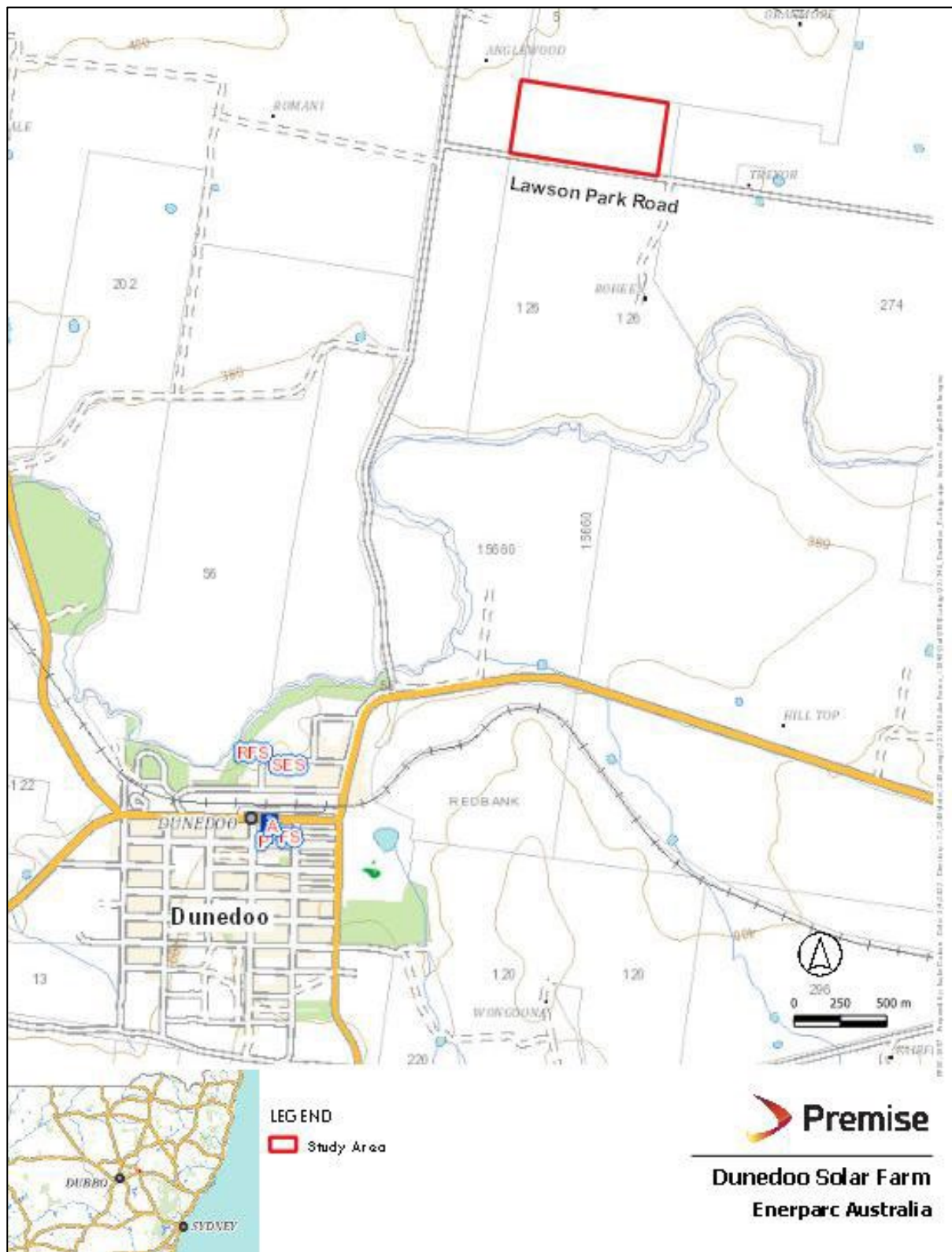
1.2 OBJECTIVES

The objectives of the biodiversity assessment report are to:

- develop a list of threatened flora and fauna species, populations, communities or critical habitat, listed in the schedules of the BC Act and EPBC Act that could potentially occur on the study area, based on searches of the BioNet Atlas of NSW Wildlife and querying of the Commonwealth Department of the Environment Protected Matters Search Tool;
- assess the likelihood of occurrence of the identified potential threatened entities by comparing the habitats on the study area with their known habitat requirements as identified in threatened species profiles on the NSW Department of Planning and Environment and Commonwealth Department of the Environment websites;
- sample the vegetation on the study area using standard flora survey techniques;
- identify and map any vegetation communities (Plant Community Types [PCT]) present on or around the study area with regard to the NSW Vegetation Map Viewer and DPE Spatial Data Catalogue;
- identify flora or fauna species on the study area and immediate surrounds, including Priority and Nationally Significant weeds;
- conduct targeted searches for potentially occurring migratory fauna species and threatened flora and fauna species, populations, communities and critical habitat, and map any occurrences;
- map the distribution of hollow-bearing trees;

- undertake an analysis of the potential impacts of the proposed project on threatened flora, fauna and their habitats, including migratory species;
- develop avoidance and mitigation measures to minimise impacts on threatened flora, fauna and migratory species; and
- assess potential project impacts using Five Part Tests of Significance.

Figure 1 – Location of Survey Area



1.3 THE STUDY AREA

The study area for this biodiversity assessment is shown in **Figure 1** and includes the proposed solar farm and associated infrastructure, including the access from Lawson Park Road and construction laydown areas. The Subject Area is rectangular in shape and was planted with a wheat crop (*Triticum aestivum*) at the time of survey in June 2021. The study area is bounded by Lawson Park Road to the south, planted native trees to the east and west and agricultural land dominated by exotic grasses to the north.

The study area is located approximately 2.8km north-west of Dunedoo, New South Wales, north of the Talbragar River on its outer floodplain within the Macquarie River catchment. The Talbragar River rises just west of the Great Dividing Range, north of Cassilis and flows southwest toward Dubbo where it meets the Macquarie River.

The study area is flat and sits at an altitude of 380 m Australian Height Datum (AHD), with a minor depression along the northern boundary at the site of a decommissioned dam.

1.3.1 LAND USE

The study area is part of the ancestral country of the Wiradjuri people for which the Talbragar River and its floodplain have been a vital resource for food supply, due to its seasonably reliable water source and rich soils. European land use dates to around the 1840s by which time pastoralists occupied most of the Macquarie and Talbragar River frontages. Much of the open woodland on the floodplain has since been converted to broad-acre cropping. Land Use mapping released by the Department of Planning, Industry and Environment (2017) indicates that land bordering the study area is classified as 3.3.0 Cropping land use.

1.3.2 GEOLOGY AND SOILS

The study area is located within the Talbragar Soil Landscape (Murphy and Lawrie, 1998) which describes 157 km² of alluvial plains and terraces of the upper Talbragar River. Soils on the main floodplain consist of a topsoil of self-mulching black clays known as Black Earths, with a subsoil of black cracking clay. Soils become brownish-black structured clay loams and sand and loam with greater proximity to the Talbragar River, and transition to Red Earths further away from the river. Soils on the study area consist of the transitional Red Earth soils. Parent materials are colluvium and alluvium from the surrounding areas. Soils are well drained, have moderate fertility and moderate waterholding capacity, with low risk of flooding. Erodibility is moderate but erosion risk is low, as is salinity (reference Murphy and Lawrie, 1989?).

1.3.3 CLIMATE

The nearest Bureau of Meteorology weather station at a similar altitude to the study area with a long run of data up to the present is at the Dunedoo Post Office (1912 to 2022) (BOM, 2022). Data from this station indicates the climate of the study area is generally mild in winter with moderate to high temperatures in summer. The mean daily maximum temperatures vary from 15.5 degrees C in July to 32.2 degrees C in January. The corresponding mean daily minimum temperatures vary from 2.1 degrees C in July to 17.2 degrees C in January and February. Average annual rainfall is 615.4 mm and peaks between December and February.

1.3.4 BIOGEOGRAPHICAL AND BOTANICAL REGIONS

The study area lies within the Inland Slopes Subregion in the north of the South Western Slopes Bioregion (SWS) as defined in the Interim Biogeographic Regionalisation of Australia (IBRA) (Thackway and Cresswell, 1995). The study area also lies within the NSW Central West Slopes Botanical Division (Anderson, 1961) and the Central West Local Land Services region.

1.4 THREATENED BIODIVERSITY

Database searches were undertaken in May 2022 to compile lists of threatened biodiversity that have been recorded in the surrounding region and may therefore have potential to occur on the study area. This involved searching for historical records of threatened flora and fauna species, populations, ecological communities and critical habitat. The databases consulted, and the search areas within them included:

- BioNet website – Searches the NSW National Parks and Wildlife Service, NSW State Forests, Australian Museum and Royal Botanic Gardens Sydney databases (BioNet, 2022a). The search area comprised a 10 × 10 km square centred on the study area.
- Commonwealth Department of the Environment and Energy (DoAWE) website – Protected Matters Search Tool (PMST) (DoAWE, 2022a). The search area comprised the same 10 × 10 km square as for the BioNet search. The PMST uses actual records and habitat modelling to return a list of 'protected matters' that are known or predicted to occur in the search area, including threatened species, migratory species, ecological communities, wetlands of international significance, and national and world heritage properties.

1.4.1 THREATENED FLORA AND FAUNA SPECIES

The database searches returned 11 threatened flora species and 27 threatened fauna species that have potential to occur in the broader region around the study area (**Table 2** and **Table 3**). The life cycle requirements and habitat of these species were reviewed and compared with the habitats available on the study area and surrounds. Threatened species whose foraging or nesting habitat were not likely to occur on or around the study area were not considered further in this biodiversity assessment.

Of the threatened species assessed in **Table 2** and **Table 3**, four bird species are considered to potentially utilise the study area for foraging

1.4.2 ENDANGERED POPULATIONS

29 terrestrial fauna populations and 20 flora populations are listed as endangered under NSW BC Act, as at June 2022 (Scientific Committee, 2022). None are applicable to the study area.

1.4.3 THREATENED ECOLOGICAL COMMUNITIES

The database searches indicated that six threatened ecological communities listed in the schedules of the NSW BC Act and/or the Commonwealth EPBC Act may potentially occur on the study area (**Table 1**). None of the threatened ecological communities remain on the study area.

1.4.4 AREAS OF OUTSTANDING BIODIVERSITY VALUE

No Areas of Outstanding Biodiversity Value listed under the BC Act (DPE, 2022a) or areas of Critical Habitat under the EPBC Act occur on or near the study area (DoAWE, 2022b).

Table 1 - Threatened Terrestrial Ecological Communities Known to Occur within the Wider Region

Scientific Name	Common Name	Database		Conservation Status		Likelihood to be on Study Area	Assessment of Likelihood
		BioNet1	PMST2	BC Act	EPBC Act		
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Grey Box Woodlands	-	✓	-	E	Nil	Inland Grey Box Woodland includes woodlands in which the most characteristic tree species, <i>Eucalyptus microcarpa</i> (Inland Grey Box), is often found in association with Bimbil Box (<i>E. populnea</i> subsp. <i>bimbil</i>), White Cypress Pine (<i>Callitris glaucophylla</i>), Kurrajong (<i>Brachychiton populneus</i>), Bulloak (<i>Allocasuarina luehmannii</i>) or Yellow Box (<i>E. melliodora</i>) and sometimes with White Box (<i>E. albens</i>). There is a correlation between the distribution of Grey Box communities and soils of Tertiary and Quaternary alluvial origin, largely corresponding with the Red Brown Earths (Threatened Species Scientific Committee, 2010). Soils are suitable on the study area to support this community, however it is no longer present if it once occurred, due to clearing for agriculture.
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Box Gum Woodland	-	✓	CE	CE	Nil	This ecological community, commonly known as Box-Gum Woodland, is widespread on the NSW western slopes and tablelands (DPE, 2022b). It was formerly one of the dominant communities in the region south and east of Dubbo such as at Dunedoo. It occurs on relatively deep high fertility soils, and on active alluvial plains. Soils on the study area are suitable for Box-Gum Woodland, and the community may once have occurred. However, no overstorey or groundcover species characteristic of the community remain on the study area.
Weeping Myall Woodlands		-	✓	-	E	Nil	This community ranges from an open woodland in higher rainfall areas to fringing vegetation on well-watered areas within dry landscapes (Threatened Species Scientific Committee, 2009b). Weeping Myall (<i>Acacia pendula</i>) may occur as a monospecific stand or in association

¹ NSW Atlas of Wildlife (DPE, 2022d)

² Protected Matters Search Tool (DoAWE, 2022a)

E Endangered

CE Critically Endangered

V Vulnerable

Scientific Name	Common Name	Database		Conservation Status		Likelihood to be on Study Area	Assessment of Likelihood
		BioNet1	PMST2	BC Act	EPBC Act		
							with species such as Western Rosewood (<i>Alectryon oleifolius</i>), Poplar Box (<i>Eucalyptus populnea</i> subsp. <i>bimbi</i>) or Black Box (<i>E. largiflorens</i>). Occurs on flat areas and shallow depressions on relictual alluvial plains and is rarely associated with regularly flooded areas. The study area could potentially have supported this community prior to clearing, however it is no longer present.
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland		-	✓	-	CE	Nil	This community is strongly reliant on soil type as it is associated with fine textured, often cracking clays derived from either basalt or quaternary alluvium. The ecological community generally occurs on flat to low slopes, of no more than 5% (or less than 1 degree) inclination (Threatened Species Scientific Committee, 2009a). The study area contains the appropriate slope but is on a marginal soil type. This community would be more likely to occur closer to the Talbragar River on black cracking soils. A minimum of three indicator species for this community must also be present. A single species, <i>Eriochloa crebra</i> , is present in the drainage line along the roadside but is present in very low densities and no other indicator species are present.
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions		-	✓	E	-	Nil	A woodland community of flora and fauna found on the grey, self-mulching clays of periodically waterlogged floodplains, swamp margins, ephemeral wetlands, and stream levees. The structure of the community may vary from tall riparian woodlands to very open 'savanna like' grassy woodlands with a sparse midstorey of shrubs and saplings (DPE, 2022b). Typically, these woodlands form mosaics with grasslands and wetlands, and are characterised by Coolibah (<i>Eucalyptus coolabah</i>) and, in some areas, Black Box (<i>E. largiflorens</i>). Self-mulching grey soils are not present on the study area and therefore the community is unlikely to have been present.
Poplar Box Grassy Woodland on Alluvial Plains		-	✓	-	E	Nil	The Poplar Box Grassy Woodland on Alluvial Plains ecological community is typically a grassy woodland with a canopy dominated by <i>Eucalyptus populnea</i> and understorey mostly of grasses and other herbs (DPE, 2022b). The ecological community mostly occurs in gently

Scientific Name	Common Name	Database		Conservation Status		Likelihood to be on Study Area	Assessment of Likelihood
		BioNet1	PMST2	BC Act	EPBC Act		
							undulating to flat landscapes and occasionally on gentle slopes on a wide range of soil types of alluvial and depositional origin. This community may once have occurred in the locality, however Poplar Box is not present anywhere on the study area. Therefore this community is absent.

Table 2 - Threatened Flora Species Identified by Database and Literature Searches of the Surrounding Region

Scientific Name	Common Name	Database		Conservation Status		Likelihood to be on Study Area	Assessment of Likelihood
		BioNet3	PMST4	BC Act	EPBC Act		
<i>Commersonia procumbens</i>		-	✓		V	Nil	<i>Commersonia procumbens</i> is a species of sandstone environments and is mainly known from Pilliga Sandstone areas (DPE, 2022b). Suitable sandy soils are absent from the study area.
<i>Dichanthium setosum</i>	Bluegrass	-	✓	-	V	Nil	Upright grass less than 1m tall, flowering in summer. Associated with basaltic heavy black soils and red brown loams with clay subsoil. Often found in cleared woodlands, grassy roadside remnants and highly disturbed pasture (DPE, 2022b). Soils on the study area are not basaltic but may be suitable. No records of the species occur near Dunedoo (DPE, 2022d), and the footprint is too modified by years of cultivation to support the species. The roadside supports some native grasses but is waterlogged and heavily dominated by <i>Paspalum dilatatum</i> , therefore it is not considered suitable to support the species.
<i>Euphrasia arguta</i>		-	✓	-	CE	Nil	Erect annual herb to 35cm tall. Semi parasitic on the roots of other plants, dies off over winter months. Prefers open forest habitats in sub humid places (DPE, 2022b). Populations are known to decline at sites that have been disturbed twice in three years. Suitable forest habitat is not present on the study area.
<i>Homoranthus darwinioides</i>	Fairy Bells	-	✓		V	Nil	Associated with gravelly sandy soils, in various shrubby woodland habitats from Putty to Dubbo in NSW (DPE, 2022b). The soils on the site are not gravelly or sandy, and the type of shrubby woodland habitat which supports the species is absent from the study area and surrounds.

³ NSW Atlas of Wildlife (DPE, 2022d)

⁴ Protected Matters Search Tool (DoAWE, 2022a)

E Endangered

CE Critically Endangered

V Vulnerable

Scientific Name	Common Name	Database		Conservation Status		Likelihood to be on Study Area	Assessment of Likelihood
		BioNet3	PMST4	BC Act	EPBC Act		
<i>Lepidium aschersonii</i>	Spiny Peppercross	-	✓	V	V	Nil	Erect perennial herb which grows on the edges of grey clay gilgais in the north-western plains and central western slopes (DPE, 2022b). Associated with Grey Box (<i>Eucalyptus microcarpa</i>), Belah (<i>Casuarina cristata</i>), Buloke (<i>Allocasuarina luehmannii</i>) and Brigalow (<i>Acacia harpophylla</i>) in areas which receive periodic flooding. Although the study area is located on a floodplain, the soils are not grey clays, it is outside the known distribution of the species and is too highly disturbed to support the species.
<i>Lepidium monolocoides</i>	Winged Peppercross	-	✓	E	E	Nil	Occurs on seasonally moist to waterlogged sites, on heavy fertile soils, with a mean annual rainfall of around 300-500 mm (DPE, 2022b). Associated vegetation is open woodland with Bullock and/or eucalypts, particularly Black Box or Poplar Box. Occurs in periodically flooded and waterlogged habitats and does not tolerate grazing disturbance. The study area is located in an area with higher rainfall than the typical habitat of the species, and the cultivation history means that it is too disturbed to support the species, if it ever occurred.
<i>Prasophyllum petilum</i>	Tarengo Leek Orchid	-	✓		E	Nil	Grows in open sites in natural temperate grassland, grassy woodland and in grassy Box-Gum Woodland. Highly susceptible to cultivation and grazing, being retained only at little-grazed travelling stock reserves and in cemeteries (DPE, 2022b). The study area is too disturbed to support this species.
<i>Prasophyllum sp. Wybong</i> (C. Phelps ORG 5269)		-	✓		CE	Nil	This taxon is considered synonymous with <i>Prasophyllum petilum</i> in NSW (PlantNet, 2022). Known to occur in open eucalypt woodland and grassland habitat, the study area is considered too disturbed to support this species.
<i>Swainsona recta</i>	Small Purple-pea	-	✓	E	E	Nil	Small Purple-pea occurs mainly in the grassy understorey of Box-Gum Woodlands and open-forests in association with understorey dominants that include Kangaroo Grass (<i>Themeda australis</i>), poa tussocks (<i>Poa</i> spp.) and spear-grasses (<i>Austrostipa</i> spp.) (DPE, 2022b). Suitable grassy habitat is absent from the study area, which has been highly disturbed and cleared for agriculture.

Scientific Name	Common Name	Database		Conservation Status		Likelihood to be on Study Area	Assessment of Likelihood
		BioNet3	PMST4	BC Act	EPBC Act		
<i>Thesium australe</i>	Austral Toadflax	-	✓	V	V	Nil	Austral Toadflax was formerly widespread in grasslands and grassy woodlands in eastern Australia from the Bunya Mountains in Queensland to Tasmania. It is mainly hemiparasitic on Kangaroo Grass (<i>Themeda australis</i>) and possibly <i>Poa</i> species on a wide range of substrates (DPE, 2022b). Dense stands of <i>Themeda</i> and <i>Poa</i> are absent from the study area and it is unlikely to occur.
<i>Tylophora linearis</i>			✓	V	E	Nil	<i>Tylophora linearis</i> occurs in relatively dry woodlands and forests, principally on the NSW western slopes. The ironbark and <i>Allocasuarina</i> species with which it is usually found do not occur on the study area (DPE, 2022b).

¹ NSW Atlas of Wildlife (DPE, 2022d)

² Protected Matters Search Tool (DAWE, 2022a)

E Endangered

CE Critically Endangered

V Vulnerable

Table 3 – Threatened Fauna Species Identified by Database and Literature Searches of the Surrounding Region

Scientific Name	Common Name	Database		Conservation Status		Likelihood to be on Study Area	Assessment of Likelihood
		BioNet1	PMST2	BC Act	EPBC Act		
<i>**Galaxias rostratus</i>	Flathead Galaxias	-	✓	-	CE	Nil	These fish species occur in large permanent rivers with deep waterholes (DAWE, 2022c). No waterbodies occur on the study area and therefore these species have no potential to occur. *Species listed as Endangered on the Fisheries Management Act (1994) **Species listed as Critically Endangered on the Fisheries Management Act (1994)
<i>Maccullochella peelii</i> ⁴	Murray Cod	-	✓	-	V	Nil	
<i>*Macquaria australasica</i>	Macquarie Perch	-	✓	-	E	Nil	
<i>*Maccullochella macquariensis</i>	Trout Cod	-	✓		E	Nil	
<i>Aprasia parapulchella</i>	Pink-tailed Worm Lizard, Pink-tailed legless Lizard	✓	✓	V	V	Nil	Worm like lizard up to 14cm long, lives in rocky outcrops or under scattered partly buried rocks in grassland and woodland where it inhabits ant nests (DPE, 2022b). Some small rocks have been placed around the bare base of the stag during cultivation of the paddock, however these rocks are not naturally occurring and no ant nests are present. There is no suitable habitat for this species on the study area.
<i>Delma impar</i>	Striped Legless Lizard	-	✓	V	V	Nil	Found mainly on the Southern Tablelands and South West Slopes in Natural Temperate Grassland but may also occur in grasslands with a high exotic component. Also recorded recently in the upper Hunter Valley (DPE, 2022d). Occasionally found in open Box-Gum Woodland. Shelters in soil cracks, beneath logs and/or rocks in winter (DPE, 2022b). The study area has been cultivated, lacks suitable tussock grasses for shelter and is therefore unlikely to support this species.

Scientific Name	Common Name	Database		Conservation Status		Likelihood to be on Study Area	Assessment of Likelihood
		BioNet1	PMST2	BC Act	EPBC Act		
<i>Leipoa ocellata</i>	Mallee Fowl	-	✓	E-	V	Nil	Mallee Fowl are found in semi-arid to arid shrublands and low woodlands, especially those dominated by mallee and/or acacias. A sandy substrate and abundance of leaf litter are required for breeding (Benshemesh, 2007). Suitable habitat is absent from the study area and surrounding region.
<i>Circus assimilis</i>	Spotted Harrier	✓	-	V	-	Possible	Spotted harriers are widespread in NSW in a range of habitats, including grassy open woodland, <i>Acacia</i> and mallee remnants, inland riparian woodland, grassland, farmland and shrub steppe. Lays eggs in spring, stick nest built in a tree (DPE, 2022b). One record from 2004 within 10km of the study area, hovering over a wheat crop (DPE, 2022d). May seasonally forage over the site when crops are established and prey species such as mice are present.
<i>Falco hypoleucos</i>	Grey Falcon	-	✓		V	Nil	Mostly found in inland NSW, in areas with less than 500mm mean annual rainfall (DPE, 2022b). Inhabits grassland, shrubland and wooded watercourses of arid and semi-arid regions and nests in tall trees usually in the abandoned nests of other species. Very unlikely in the study area since the rainfall is greater than 500mm per year and the study area is located within a highly modified landscape with broadacre cropping as the dominant land use and vegetation cover.
<i>Falco subniger</i>	Black Falcon	✓	-	V	-	Possible	Mostly found in inland NSW. Found along tree-lined creeks and rivers, mainly inland in arid and semi-arid areas. One record from within 10km of the study area, close to the Talbragar River (DPE, 2022d). The species may forage in the study area when crops are more established, or prey on birds using the tree lanes.
<i>Lathamus discolor</i>	Swift Parrot	-	✓	E	CE	Nil	The Swift Parrot is a migratory species that breeds in Tasmania and winters on the mainland, where it feeds on flowering eucalypts (DPE,

Scientific Name	Common Name	Database		Conservation Status		Likelihood to be on Study Area	Assessment of Likelihood
		BioNet1	PMST2	BC Act	EPBC Act		
							2022b). The study area is not mapped on the Important Areas Map for the Swift Parrot, and its use of the study area is very unlikely.
<i>Polytelis swainsonii</i>	Superb Parrot	-	✓	V	V	Nil	The Superb Parrot occurs in tall grassy Box-Gum Woodlands and forests west of the Tablelands (Blakers et al., 1984). No suitable breeding habitat occurs in the study area and the wheat crop is unlikely to be suitable foraging habitat.
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	-	✓	V	-	Possible	Migrates between tall mountain forest in spring and summer to lower altitudes in drier open Eucalyptus woodlands in autumn and winter. Prefers old growth forest for nesting and roosting. Known to forage in She-oak along rivers (DPE, 2022b). The study area does not contain any suitable breeding habitat for the species. Casuarina has been planted in the tree lanes adjacent to the study area, and the Gang-gang may utilise these trees for foraging during winter when it moves to lower elevations.
<i>Calyptorhynchus lathami</i>	Glossy Black Cockatoo	✓	-	V	-	Possible	Inhabits open forest and woodlands in a large range from the coast to the central western plains of NSW (DPE, 2022b). Feeds exclusively on Allocasuarina and Casuarina seeds and requires large hollow-bearing eucalypts for nest sites. The species has been recorded around Dunedoo in 2020 and although no nesting habitat is present on the study area the tree lanes have been planted with <i>Casuarina cunninghamiana</i> which may be used as forage by the species during their seasonal movements.
<i>Rostratula australis</i>	Australian Painted Snipe	-	✓	E	E	Nil	Australian Painted Snipe inhabits freshwater swamps, dams and marshes with cover of grasses, lignum, low scrub or open timber (Blakers et al., 1984). Forages nocturnally in shallow water on worms, molluscs, insects and some plants. Nests on the ground amongst tall vegetation in September to December. There is no suitable habitat on the study area for this species.

Scientific Name	Common Name	Database		Conservation Status		Likelihood to be on Study Area	Assessment of Likelihood
		BioNet1	PMST2	BC Act	EPBC Act		
<i>Calidris ferruginea</i>	Curlew Sandpiper	-	✓	E	CE	Nil	Forages mainly on coastal estuarine mudflats, but also in inland lakes and lagoons with extensive shallows (DPE, 2022b). No suitable habitat on the study area for this species.
<i>Calidris melanotos</i>	Pectoral Sandpiper	-	✓		Migratory	Nil	Migratory species which is found throughout Australia during its non-breeding period. Mainly coastal but also found inland. Prefers open mudflats with fringing vegetation. No suitable habitat on the study area for this species.
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		✓		Migratory	Nil	Migratory species which visits Australia during its non-breeding period. Inhabits shallow freshwater wetlands and mudflats with sedges and emergent vegetation. No suitable habitat on the study area for this species.
<i>Actitis hypoleucos</i>	Common Sandpiper		✓		Migratory	Nil	Migratory species which is found throughout Australia during its non-breeding period. Mainly coastal but also uses inland habitat. Uses bare soft mud at the edges of wetlands. No suitable habitat on the study area for this species.
<i>Numenius madagascariensis</i>	Eastern Curlew	-	✓	-	CE	Nil	The Eastern Curlew has a primarily coastal distribution on mudflats in estuaries. The species is found in all states, particularly the north, east, and south-east regions including Tasmania (DoAWE, 2022c). Eastern curlews are rarely recorded in inland wetlands. There is no suitable habitat on the study area for this species.
<i>Botaurus poiciloptilus</i>	Australasian Bittern	-	✓	E	E	Nil	Lives in reed beds and other vegetation in wetlands such as cumbungi, lignum and sedges (DPE, 2022b). No habitat is present on the study area.
<i>Anthochaera phrygia</i>	Regent Honeyeater	✓	✓	CE	CE	Nil	A nomadic/migratory nectar-dependent species found in flowering eucalypts, which has been recorded rarely in the region around the study

Scientific Name	Common Name	Database		Conservation Status		Likelihood to be on Study Area	Assessment of Likelihood
		BioNet1	PMST2	BC Act	EPBC Act		
							area (DPE, 2022d). Suitable Box woodland habitat is absent from the study area.
<i>Grantiella picta</i>	Painted Honeyeater	-	✓	V	V	Nil	Seasonal bird moving north-south across south-eastern Australia following the fruiting of Mistletoe. Specialised diet consisting of mistletoe fruits, nectar of mistletoe, eucalypts and possibly banksias, and arthropods (DPE, 2022b). No mistletoe is present in the planted tree lanes, and the species is unlikely to visit the site.
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	✓	-	V	-	Nil	Inhabits grassy woodlands with rough-barked trees at close to natural densities, sparse shrub cover and fallen timber on the ground (DPE, 2022b). Prefers forests with open understorey with litter and fallen timber for foraging, mainly on ants. Requires hollows in trees and logs for nesting. No suitable habitat on the study area for this species.
<i>Motacilla flava</i>	Yellow Wagtail	-	✓		Migratory	Nil	Breeds in Europe and Asia. Inhabits open country near water, such as wet meadows and marshland. There are no records of this species in the vicinity of the study area as records of the species in NSW occur east of the Dividing Range. While the study area becomes seasonally damp, it cannot be considered wet meadow or marshland, and is unlikely to be suitable habitat for the species.
<i>Rhipidura rufifrons</i>	Rufous Fantail	-	✓		Migratory	Nil	Prefers moist eucalypt forest and rainforest, particularly in densely vegetated gullies and areas of deep shade. No suitable habitat on the study area.
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	-	✓		Migratory	Nil	Inhabits heavily vegetated gullies in tall eucalypt-dominated forest and wet sclerophyll forest. No suitable habitat on the study area for this species.
<i>Apus pacificus</i>	Fork-tailed Swift	-	✓		Migratory	Nil	Fork-tailed Swifts are almost exclusively aerial and spend most of their lives flying and breed in cliffs in Central Asia. They occasionally forage

Scientific Name	Common Name	Database		Conservation Status		Likelihood to be on Study Area	Assessment of Likelihood
		BioNet1	PMST2	BC Act	EPBC Act		
							over open forest and waterways. No suitable habitat on the study area for this species.
<i>Hirundapus caudactutus</i>	White-throated Needletail	-	✓	-	V	Nil	Migratory bird occurring in large gregarious flocks when in Australia. Breeds in Asia and moves through Australia, mostly in coastal regions of NSW and Queensland, extending inland to the western slopes of the Great Divide and occasionally on the adjacent inland plains (Birdlife Australia, 2020). The habitat is almost exclusively aerial, from 1-1000m above the ground. Unlikely to utilise the study area.
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	✓	✓	V	E	Nil	Generally confined to areas of native forest and woodland where it nests in rock caves or hollow logs (Edgar, 1983). Hollow logs and caves are absent from the study area.
<i>Phascolarctos cinereus</i>	Koala	✓	✓	V	E	Nil	The Koala has been recorded within 10km of the study area, within farmland close to a large remnant forest patch (DPE, 2022d). Trees planted along the tree lane include River Red Gum, which is a preferred food tree species of the Koala (DPE, 2018b). However, the tree lane is fenced which would provide a barrier to its use by the species, and there is no other connectivity between the tree lane and other woodland habitat. Therefore its presence and use of the study area is highly unlikely.
<i>Petaurus norfolcensis</i>	Squirrel Glider	✓	-	V	-	Nil	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas (DPE, 2022b). Prefers mixed species stands with a shrub or <i>Acacia</i> midstorey. Requires abundant tree hollows for refuge and nest sites. The study area does not contain suitable tree hollows and the tree lane is isolated from other woodland. The species is unlikely to occur on the study area.

Scientific Name	Common Name	Database		Conservation Status		Likelihood to be on Study Area	Assessment of Likelihood
		BioNet1	PMST2	BC Act	EPBC Act		
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	✓	✓	V	V	Nil	The Grey-headed Flying-fox mostly occurs on the eastern side of the Great Dividing Range but may establish temporary roosts west of the divide when food supplies are abundant (DPE, 2022b). The species has not been recorded within the area and there is no suitable habitat on the study area.
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat		✓	V	V	Nil	Inhabits woodland and forest communities, in particular box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. Roosts in tree hollows, crevices, and under loose bark. No suitable roosting habitat is present on the study area.
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	-	✓	V	V	Nil	The Large-eared Pied Bat roosts in caves, mine tunnels and the abandoned nests of Fairy Martins and forages over areas of continuous forest habitat (Richards, 2000). Roosting habitat and continuous forest are absent from the study area.

2. METHODS

2.1 SURVEY TIMING

A vegetation survey was conducted on the 27th April, 2022. The survey encompassed all vegetated parts of the study area in order to identify and map all vegetation types present. All habitat types that may support threatened species were examined to maximise the chances of finding populations or other evidence of any threatened species that may be present.

2.2 VEGETATION SAMPLING

The study area was assessed by a qualified and experienced ecologist during a site walkover in June 2022. Photographs were used to document the vegetation on the development footprint and rapid assessment spot sampling was undertaken on the study area and in adjacent areas to characterise vegetation in the surrounding area. Details of the vegetation on the study area are provided in **Figure 2** and a full species list is provided in **Appendix A**.

2.2.1 RAPID ASSESSMENT SPOT SAMPLING

Three rapid assessment spot samples were undertaken on X June 2021, on the development footprint, in the roadside area, and in the native planting areas to the east and west of the study area. All flora species were recorded within a 20 × 20 m area and the location was recorded using a GPS. Each species was given an abundance rating according to the following approximate scale;

- a. Abundant (> 50)
- b. Common (11 to 50)
- c. Occasional (6 to 10)
- d. Uncommon (3 to 5)
- e. Rare (1 or 2)

2.2.2 THREATENED SPECIES

No targeted searches were considered necessary for the biodiversity assessment due to the lack of native vegetation on the study area.

2.2.3 VEGETATION AND PLANT COMMUNITY TYPES

Vegetation types were described and categorised according to the dominant species, level of disturbance, presence or absence of exotic or native vegetation, natural or planted. Vegetation types have been mapped to describe the study area in **Figure 2**.

There was no native vegetation recorded on the study area. Native vegetation in the roadside area adjacent to the study area was identified and classified into a Plant Community Type (PCT) using the DPE BioNet Vegetation Classification System (DPE, 2022e). Threatened Ecological Communities (TECs) associated with PCTs are identified in BioNet and conformance of the vegetation was verified by reference to the relevant Final Determination of the NSW Scientific Committee (2022).

2.3 FAUNA

2.3.1 FAUNA OBSERVATIONS

No fauna were observed on the study area during the site visit in June 2022, due to a lack of habitat and potentially poor weather conditions.

2.3.2 HABITAT ASSESSMENT

Assessment of the suitability of the study area for threatened fauna included observation of key habitat features while moving around the site. The lone stag in the centre of the study area and stag on the boundary of the study area was measured and assessed for the presence of hollows, and the tree lanes were assessed for nectar sources, presence or absence of mistletoe, hollows and seed sources. The study area was assessed for rocky habitat and the adjacent roadside was assessed for the presence of logs, litter and grass seed.

3. RESULTS AND DISCUSSION

3.1 FLORA

3.1.1 VEGETATION TYPES

The study area was classified into three types of vegetation: exotic wheat crop, exotic pasture grassland and native planting (**Table 4** and **Figure 2**).

The stag in the paddock and the native grasses remaining along the roadside are evidence that the area once supported PCT 281 *Rough-Barked Apple - red gum - Yellow Box woodland on alluvial clay to loam soils on valley flats in the northern NSW South Western Slopes Bioregion and Brigalow Belt South Bioregion*.

The native planting along the eastern and western boundaries contain a mix of midstorey species, however the overstorey can be most closely aligned with PCT 78 *River Red Gum riparian tall woodland / open forest wetland in the Nandewar Bioregion and Brigalow Belt South Bioregion* due to the species mix of River Red Gum (*Eucalyptus camaldulensis*), River Oak (*Casuarina cunninghamiana*), and Kurrajong (*Brachychiton populneus*).

The vegetation types are described as mapping units summarised in **Table 4** below.

Table 4 – Vegetation Types Identified on the Study Area

Mapping Unit	Vegetation Type		Comments
	PCT	Name	
1	-	Exotic Wheat Crop	Cultivated crop with a monoculture of <i>Triticum aestivum</i> (Common Wheat)
2	PCT 281	Exotic Pasture Grassland	Exotic grasses and forbs on the roadside along the southern boundary of the solar farm footprint.
3	PCT 78	Native planting	Tree lane with native and exotic trees and native shrubs.



Premise



LEGEND

-  Study Area
-  Solar Farm footprint
-  Exotic Pasture
Grassland
-  Exotic Wheat Crop
-  Native Planting
-  Dam
-  Stag



3.1.2 VEGETATION COMMUNITY DESCRIPTIONS

3.1.2.1 Mapping Unit 1 – Exotic Wheat Crop

The majority of the study area is cultivated land which contained wheat (*Triticum aestivum*) at the time of assessment. No other species were present (**Figure 3**).

Figure 3 – Mapping Unit 1 - Exotic Wheat Crop



3.1.2.2 Mapping Unit 2 –Exotic Pasture Grassland

Vegetation along the roadside south of the study area contained a mix of introduced and native grasses, remnant of the original vegetation present with the addition of exotic pasture species and agricultural forbs which would have been introduced when the land was used for livestock grazing. The dominant species on the roadside were *Paspalum dilatatum* and Windmill Grass (*Chloris truncata*), with a small amount of Cupgrass (*Eriochloa crebra*), *Verbena bonariensis*, Pale Pigeon Grass (*Setaria pumila*) and Rose Clover (*Trifolium hirtum*). *Juncus* sp. was present in the wet drainage areas (**Figure 4**).

Figure 4 – Mapping Unit 2 – PCT 281 Exotic Pasture Grassland



3.1.2.3 Mapping Unit 3 – Native Planting

Native trees and shrubs have been planted along the eastern and western boundaries of the study area. The trees are estimated to be approximately 10 years old. The tree lanes are outside of the proposed solar farm footprint and will be retained. Overstorey species include River Red Gum (*Eucalyptus camaldulensis*) and Mugga Ironbark (*E. sideroxylon*), with smaller numbers of River Oak (*Casuarina cunninghamiana*) and Kurrajong (*Brachychiton populneus*). Shrub species include non-local natives such as *Acacia* spp. and Narrow-leaved Bottlebrush (*Callistemon linearis*). Groundcovers include native Red Grass (*Bothriochloa macra*), Wallaby grass (*Rytidosperma* spp.) and *Chloris truncate* (**Figure 5**).

Figure 5 – Mapping Unit 3 – Native Planting



3.1.3 PRIORITY, NATIONALLY SIGNIFICANT AND HIGH THREAT WEEDS

One species listed as a High Threat Environmental weed (HTW) is located in the study area: *Paspalum dilatatum* (DPE, 2018a). No other priority weeds were identified on the study area.

3.2 FAUNA

3.2.1 FAUNA HABITAT TYPES

The study area has been highly modified from its original form via 200 years of European occupation. Habitat features such as cliffs, caves, rocky outcrops and termite mounds do not occur. Logs and leaf litter have been removed from the study area due to the agricultural land use (cropping). Two non hollow-bearing stags occur on the solar farm footprint, and a small amount of rock has been piled around the central stag, presumably removed from the cultivated land for cropping.

One farm dam remains on the study area, and there is a decommissioned dam which is now a small depression which temporarily fills with water following large rain events. Neither dams have fringing vegetation and are of limited ecological value due to their proximity to cropping activity which includes the use of chemical spray and fertiliser.

Broad habitat types on the study area are described below:

- Exotic cropped paddock
- Exotic pasture grassland
- Non-hollow bearing stags
- Planted native tree lanes
- Dam and small ephemeral depression

3.2.1.1 Exotic cropped paddock

Exotic cropped paddock dominates the study area and contains very little habitat value for threatened flora or fauna species. The exotic crop is a monoculture of wheat with bare ground between the individual plants. At the time of assessment the wheat plants were less than 20cm tall and unlikely to provide shelter for small mammals or lizards. Some transitory foraging by species such as mice may occur when the crop becomes more established and could provide refuge for prey for birds of prey as part of a broader hunting ground. Fallen timber, hollow logs and surface rocks are absent.

3.2.1.2 Exotic pasture grassland

Exotic pasture grassland occurs in a narrow strip which is regularly mown and sprayed as part of regular roadside maintenance. This area provides very limited habitat for flora and fauna due to regular disturbance and would only be used occasionally by generalist species such as Australian Magpies (*Cracticus tibicen*) and some birds of prey foraging on road kill. Fallen timber, hollow logs and surface rocks are absent.

3.2.1.3 Non hollow-bearing stags

Two stags occur on the study area likely to be Blakely's Red Gum (*Eucalyptus blakelyi*) based on the presence of this species in the surrounding landscape. Neither stag contains hollows, however the stag in the centre of the cropping paddock is cracked and partially hollow. Rocks have been placed around this stag, presumably relocated from the cropped area. Habitat value of these rocks is very limited due to the lack of vegetation which would expose them to extremes of temperatures, and the isolation from adjacent habitats.

3.2.1.4 Planted native tree lanes

Planted native vegetation in the tree lanes either side of the study area provide some habitat value to the site. It should be noted that these tree lanes are outside of the development footprint. They are

approximately 12 metres wide and 400 metres long and contain two rows of established trees and shrubs and some native grasses in the understorey. Trees are up to 18 metres tall but none contain hollows. Shrubs provide habitat for small and medium-sized native birds, and the tree species provide nectar and Casuarina nuts for parrots. Birds of prey may be drawn to tree lanes seeking prey.

3.2.1.5 Dam and small ephemeral depression

A small dam in the south-western corner of the study area provides essential water resources for mobile fauna species, however The dam is not likely to provide habitat value to frogs or waterbirds as it is devoid of fringing vegetation and is subject to overspray from the adjacent crop. There was also a small depression on the north-eastern boundary of the study area which contained some *Juncus* spp. at the time of assessment. As with the farm dam, this depression would provide water for wildlife, but very little habitat value due to surrounding landscape use and lack of fringing vegetation.

3.3 THREATENED BIODIVERSITY

3.3.1 THREATENED ECOLOGICAL COMMUNITIES

No Threatened Ecological Communities were identified on the study area and none were considered likely to occur based on database searches or literature review (**Table 1**).

3.3.2 THREATENED FLORA

No threatened flora species, populations or critical habitat listed under the BC Act or the EPBC Act were identified during the survey and none were considered likely to occur based on database searches and literature review (**Table 2**).

3.3.3 THREATENED FAUNA

Four threatened birds were identified as potentially utilizing the study area for foraging based on database searches and literature review (**Table 3**).

4. BIODIVERSITY IMPACT ASSESSMENT

4.1 IMPACT AVOIDANCE AND MINIMISATION MEASURES

The Project has been designed to avoid and minimise impacts on biodiversity, using the following strategies:

- As far as possible, the solar farm will be designed to avoid impact to native vegetation. In particular, the footprint is offset from the eastern tree lane to prevent shading and avoid the need for tree removal.
- The proposed solar farm footprint is to be placed on a cleared, cropped paddock where soil disturbance is a part of existing land management.
- Feral animal and weed control will continue as part of existing land management.
- Rocks from the centre of the paddock will be relocated to the tree lanes adjoining the site to avoid the loss of rocky habitat.
- Stags removed from the solar farm footprint will be relocated to the tree lane to provide additional habitat as fallen timber.
- Reflective metal tags are to be installed along with boundary fencing to reduce the risk of entanglement of fauna in barbed wire.

- The remaining dam on the site will be left in place and any fringing vegetation which becomes established will be retained.
- Vehicles will be cleaned prior to working on site to prevent the introduction of weed seeds and pathogens.

4.2 RESIDUAL PROJECT IMPACTS

4.2.1 DIRECT IMPACTS

Direct impacts of the proposal on biodiversity, once impact and avoidance measures have been carried out include:

- Permanent clearing of approximately 15 metre wide section of roadside exotic dominated vegetation along Lawson Park Road as an access point for the solar farm (0.009 ha).
- Installation of solar panels over 31.15 ha of exotic wheat crop.
- Removal of two non hollow-bearing stags.

The proposed solar farm will not result in the loss of any native vegetation.

4.2.2 INDIRECT AND LONG TERM IMPACTS

The indirect impacts of the proposal on biodiversity include:

- Dust generated during construction (if conditions are dry)
- Some noise generated during construction.

Dust generated during construction of the road access and installation of panels is not likely to be significant however is a possibility if conditions become dry. Dust can have adverse effects on both flora and fauna. It is expected that dust will be managed in accordance with the SEE.

Given the context of the site in an agricultural landscape, it is not expected that noise generated will be significantly greater than those generated by routine agricultural activity in the area, however care should be taken to minimise noise where possible.

The clearing of mostly exotic vegetation will not have any indirect or long-term impacts on resources available to terrestrial fauna in the region.

4.2.3 CUMULATIVE IMPACTS

Panel installation and associated infrastructure will impact a cultivated paddock from which all native vegetation has previously been cleared, apart from two non hollow-bearing stags which are of minimal habitat value. A very small area of vegetation will be permanently removed as part of the project, however this is low-quality exotic-dominated pasture grassland. The area to be removed for road access is 0.009 ha which is likely to have a minimal to negligible cumulative impact.

4.3 BIODIVERSITY FOR IMPACT ASSESSMENT

Table 1, Table 2 and Table 3 of this report list the threatened biodiversity predicted to occur in the region surrounding the study area. Matching the known habitat requirements of the threatened entities to the resources available on the study area, it was possible to determine the likelihood of species being present on the study area (**Table 5**). This section assesses the potential impact of the Project on each of the species that are considered to have potential to occur.

Table 5 – Analysis of Habitat Suitability of the Project Footprint for 8 Potential Threatened Fauna Species

(X = factor missing or unsuitable, ✓ = factor present, blank = not applicable)

Species	Factor											Special Requirements	Comments	Habitat suitable?
	Nectar	Native seed	Rushes and	Shrub cover	Litter	Shallow water	Open areas	Tree Canopy	Tree hollows	Logs	Caves			
Spotted Harrier							✓	✓				Preys on terrestrial mammals eg rodents, birds and reptiles, likes acacia and mallee remnants, native grasslands, but also occurs in cleared ag land	Cleared agricultural land, could target birds in tree lanes	Yes (possible foraging in open areas when crop established and along tree lanes)
Black Falcon							✓	✓				Preys on birds, small mammals, insects, reptiles, carrion. Steal from other birds, nest along tree lined creeks, high in trees.	Needs large old trees for nesting and hunting	Yes (possible foraging in open areas and along tree lanes)
Gang Gang Cockatoo		✓		✓			✓	✓	X			Tall trees with nest hollows with dense shrub, forage on seeds, berries, fruits, nuts and insects	Forage available in tree lanes	Winter visitor (no suitable trees for breeding)
Glossy Black Cockatoo		✓							X			Allocasuarina and Casuarina species are its food source. Large hollows in eucalypt trees required for nesting.	Forage available in tree lanes.	Occasional visitor for foraging (no suitable trees for breeding or nesting)

4.4 ASSESSMENTS OF SIGNIFICANCE

4.4.1 THREATENED ECOLOGICAL COMMUNITIES

No threatened ecological communities are present on the study area.

4.4.2 THREATENED FLORA

No threatened flora species are likely to occur on the study area.

4.4.3 THREATENED FAUNA

Four threatened bird species have been identified as potentially utilising the habitat on the study area. The Spotted Harrier (*Circus assimilis*), Black Falcon (*Falco subniger*), Gang Gang Cockatoo (*Callocephalon fimbriatum*) and Glossy Black Cockatoo (*Calyptorhynchus lathami*) (**Table 3**). The breeding requirements of these species are not present on the study area, however it is possible that they could forage or be transient visitors to the study area at certain times of the year. A summary of threatened fauna species for consideration using the five Part Test of Significance is provided in **Table 6**.

Table 6 – Summary of Threatened Fauna Species for Impact Assessment

Scientific Name	Common Name	Likely Status
<i>Falco subniger</i>	Black Falcon	Foraging visitor
<i>Circus assimilis</i>	Spotted Harrier	Foraging visitor
<i>Callocephalon fimbriatum</i>	Gang Gang Cockatoo	Foraging visitor
<i>Calyptorhynchus lathami</i>	Glossy Black Cockatoo	Foraging visitor

4.5 IMPACT ASSESSMENT – FIVE PART TESTS

4.5.1 FLORA SPECIES

No threatened flora species are likely to occur on the study area, therefore no impacts to threatened flora are anticipated as a result of the proposed Solar Farm.

4.5.2 FAUNA SPECIES

The likelihood of the Project significantly affecting 4 threatened fauna species or their habitats is assessed below in accordance with the five factors of assessment (Five Part Test of Significance) set out in section 7.3 of the BC Act.

(1) the following is to be taken into account for the purposes of determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats:

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

The proposed solar farm will result in the installation of panels covering an area of 31.15 ha which is currently a Wheat Crop, and will permanently remove 0.009 ha of exotic pasture for the access point from Lawson Park Road. Two non hollow-bearing stags and some scattered rocks will be relocated to adjacent vegetated areas.

Four threatened fauna species were assessed as having some potential to visit the site for foraging: the Black Falcon, Spotted Harrier, Glossy Black Cockatoo and the Gang Gang Cockatoo.

None of these species were observed during the site visit in June 2022, however conditions were not favourable for bird surveys. BioNet records indicate that The Black Falcon, Spotted Harrier and Glossy Black Cockatoo have been recorded within a 20km radius of the study area. The Spotted Harrier was observed in flight over the floodplain of the Talbragar River 9 km west of the site in 2004, the Black Falcon was observed along a creek at the edge of Dunedoo township in 2007, and the Glossy Black Cockatoo was recorded in the locality in 2020 (DPE, 2022d).

Table 5 outlines the specific breeding and foraging habitat requirements of the fauna species being considered in this assessment. The Black Falcon, Spotted Harrier, Gang Gang Cockatoo and Glossy Black Cockatoo are considered to have potential to utilise part of the study area for foraging only as their breeding requirements are not present on the study area.

The Black Falcon and Spotted Harrier are open country predators which forage over very large ranges. The removal of exotic wheat crop and a very small patch of roadside pasture grass will fractionally reduce the area over which these birds can hunt for prey, however the scale of the clearing in the scheme of the broader landscape of similar vegetation makes the impact minimal. The two stags proposed for removal are unlikely to be useful as perches for birds of prey due to the presence of taller trees within the tree lanes, which provide a better vantage point. No living trees will be removed and the placement of solar panels will not impact the foraging potential of the surrounding environment for these birds.

The Gang Gang Cockatoo and Glossy Black Cockatoo require woodlands and leaf litter for foraging, and both require hollow-bearing trees for nesting and breeding. The Gang Gang Cockatoo is also known to occasionally forage along roadsides. The removal of a very small area (0.009 ha) of roadside vegetation is not considered to be significant in the context of similar habitat occurring widely in the locality.

It is very unlikely that the study area supports a viable local population of any of the four birds. The lack of nesting habitat and marginal foraging habitat renders it very unlikely that the proposal solar farm will place any of these birds at risk of extinction.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or*
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,*

Not applicable.

(c) in relation to the habitat of a threatened species or ecological community:

- (i) The extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and*

- (ii) (whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and*
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,*

The Spotted Harrier may forage over grasslands periodically, however the loss of this area is not significant in the context of their large range. Black Falcons, Glossy Black and Gang Gang Cockatoos are more likely to forage in the wooded areas along the Talbragar River. Casuarina species planted along the tree lanes which may provide forage for Glossy Black-Cockatoos will not be affected by the proposed solar farm. No suitable breeding habitat is present on the study area for any threatened fauna.

Agricultural production in the Dunedoo area is extensive and woodland habitat has mostly been cleared for cropping. Remnant vegetation occurs as isolated paddock trees or narrow corridors of vegetation such as along the Talbragar River. The study area is predominantly exotic vegetation with native planted vegetation to the east and west. The native planted vegetation will be retained on the study area, so there will be no change to the connectivity as a result of the proposed solar farm.

- (d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),*

There are currently only four listed areas of outstanding biodiversity value, as defined by the BC Act in NSW and none occur on or near the study area (DPE, 2022a).

- (e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.*

Key threatening processes are listed under the BC Act and EPBC Act, and fall into three broad categories, habitat loss or change, pest animals and weeds, and disease.

The proposed development is located in an agricultural landscape with established weeds and low densities of pest animals associated with open cropping land. The proposed solar farm will not introduce additional weed species since vehicles will be washed down before coming to site and no fill material will be used. Pest animals will continue to be managed as part of routine agricultural activities on the rest of the property and will not increase in number as a result of the development.

The habitat value of the exotic grassland to be lost is limited for the four bird species. The presence of similar habitat in the surrounding landscape and the large foraging ranges of the four bird species renders the impact of the loss of 31.15 ha of cropped land to be insignificant. No vectors for disease are likely to be introduced as part of the development.

4.5.2.1 CONCLUSION

The proposed solar farm at 126 Lawson Park Road, Dunedoo is not likely to have an adverse impact on the life cycle or habitat of any of the four threatened species assessed in this Five Part Test. Nor will the proposed activity remove, modify or fragment the habitat of the subject species. A Species Impact Statement or triggering of the Biodiversity Offsets Scheme is not required for any flora or fauna species.

4.6 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

None of the threatened fauna species with potential to occur on the study area are listed on the EPBC Act and therefore impacts on Matters of National Environmental Significance are not assessed as part of this report. Referral of the project to the Commonwealth is not required.

4.7 STATE ENVIRONMENTAL PLANNING POLICY (BIODIVERSITY CONSERVATION) 2021

The Consolidated State Environmental Planning Policy (Biodiversity Conservation) 2021 contains the Koala Habitat Protection SEPP 2020 and 2021. The Koala SEPP aims to protect habitat utilised by the Koala, *Phascolarctos cinereus*, which is known to occur in agricultural landscapes on the Northwest Slopes (Western Slopes and Plains Koala Management Area). Being rural zoned land in the Warrumbungle LGA, the Biodiversity Conservation SEPP applies to the study area.

The proposed development footprint does not contain a resident population of Koalas and there are no recent sightings of the species (DPE, 2022d). The study area is therefore not 'core koala habitat' as defined by the SEPP. No suitable feed tree species are present within the development footprint and although suitable feed trees have been planted in the tree lanes adjacent to the proposed solar farm, barbed wire fencing is a barrier to movement of Koalas into these plantings.

The development does not include clearing of native vegetation, , nor is it likely to impede movement of Koalas between habitats. The proposed development will therefore have low or no direct impact on Koalas or Koala habitat and does not require a Koala plan of management under the SEPP.

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APPENDIX A

PLANT SPECIES LIST

Status ¹	Family	Species	Common name	Roadside (S1)	Tree Lane	Wheat Crop
E	Amaranthaceae	<i>Gomphrena celosioides</i>	Gomphrena Weed	O		
E	Asteraceae	<i>Conyza bonariensis</i>	Fleabane	O	C	
Planted	Casuarinaceae	<i>Casuarina cunninghamiana</i>	River She-oak		A	
Planted	Fabaceae	<i>Acacia cultriformis</i>	Knife-leaf Wattle		O	
Planted	Fabaceae	<i>Acacia</i> sp. 2	Wattle		R	
E	Fabaceae	<i>Trifolium hirtum</i>	Rose Clover	C		
E	Fagaceae	<i>Quercus robur</i>	English Oak		O	
N	Juncaceae	<i>Juncus</i> sp		U		
Planted	Malvaceae	<i>Brachychiton populneus</i>	Kurrajong		C	
Planted	Myrtaceae	<i>Callistemon linearis</i>	Narrow-leaved Bottlebrush		O	
Planted	Myrtaceae	<i>Eucalyptus sideroxylon</i>	Mugga Ironbark		A	
N	Poaceae	<i>Bothriochloa macra</i>	Red Grass		A	
N	Poaceae	<i>Chloris truncata</i>		C	C	
N	Poaceae	<i>Eriochloa crebra</i>	Cupgrass	O		
E	Poaceae	<i>Paspalum dilatatum</i>		A		
N	Poaceae	<i>Rytidosperma</i> sp.	Wallaby Grass		C	
E	Poaceae	<i>Setaria pumila</i>	Pale Pigeon-grass	C		
E	Poaceae	<i>Triticum aestivum</i>	Wheat			A
E	Verbenaceae	<i>Verbena bonariensis</i>		O		

¹ E = Exotic ; N = Native; Planted = Planted native



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