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RES Australia Pty Ltd

Cannie Wind Farm

Preliminary Ecological Report

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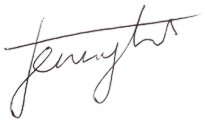

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ACRONYMS AND ABBREVIATIONS

Acronyms	Description
ALA	Atlas of Living Australia
AusWEA	Australian Wind Energy Association
BONN	Convention on Migratory Species
BUS	Bird utilisation survey
CaLP Act	*Catchment and Land Protection Act 1994* (Victoria)
Cannie WF	Cannie Wind Farm
CAMBA	China-Australia Migratory Bird Agreement
CEMP	Construction Environmental Management Plan
DAWE	Department of Agriculture, Water, and the Environment (Commonwealth) [now DCCEEW]
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Commonwealth)
DEECA	Department of Energy, Environment and Climate Action (Victoria)
DELWP	Department of Environment, Land, Water and Planning (Victoria) [Now DEECA]
EE Act	*Environment Effects Act 1978* (Victoria)
EES	Environment Effects Statement
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
ERM	Environmental Resource Management Australia Pty Ltd
EVC	Ecological Vegetation Class
FFG Act	*Flora and Fauna Guarantee Act 1988* (Victoria)
Guidelines	*Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017)
ha	Hectares
JAMBA	Japan-Australia Migratory Bird Agreement
kV	Kilovolt
LoO	Likelihood of occurrence
MNES	Matters of National Environmental Significance
MW	Megawatt
O&M	Operations and Maintenance
PMST	Protection Matters Search Tool
Study Area	The Project footprint and land parcels supporting the development of the Cannie Wind Farm.
PV	Photovoltaic
Ramsar	The Convention on Wetlands
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement

Acronyms	Description
RSA	Rotor Swept Area
TEC	Threatened Ecological Community
VBA	Victorian Biodiversity Atlas
WTG	Wind Turbine Generator

EXECUTIVE SUMMARY

Environmental Resources Management Australia Pty Ltd was engaged by RES Australia Pty Ltd to prepare a Preliminary Ecological Assessment for the Cannie Wind Farm project, located near Kerang in northwestern Victoria. This report presents the results of the Cannie Wind Farm site only and excludes the Transmission Corridor Study Area.

A desktop review and field assessment indicate ecological values of the Cannie Wind Farm site are likely to be encountered to the east and south-east where Avoca River, Back Creek, associated minor tributaries and some parcels of conservation reserves form corridors of high quality of habitat and greater connectivity. Similarly, road reserves were found to consist of relatively high-quality patches of native vegetation due to the absence of grazing.

Desktop and field efforts undertaken so far have identified the potential presence of threatened flora, fauna and communities within the Cannie Wind Farm site. Further field investigations of the site are required to determine the type, extent and potential impacts to identified threatened flora and fauna. Regardless, referral under the Victorian *Environment Effects Act 1978* is recommended due to the potential to exceed 10 ha of impact to native vegetation and adversely affect threatened flora and fauna; referral under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* is recommended due to the potential to significantly impact matters of national environmental significance including threatened flora, fauna and communities.

Mitigation strategies will be undertaken to reduce potential impacts to threatened flora, fauna and communities and include:

- Designing the development footprint to avoid recognised values, and where these values cannot be avoided, further investigations should be undertaken to anticipate any potential impacts and develop appropriate mitigation and management measures.
- Conducting a detailed native vegetation assessment (once the development footprint is progressed), which will confirm the extent of targeted surveys required.
- Assessing the site for potential brolga breeding wetlands (during the brolga breeding season – July-November) to determine whether the Project infrastructure setbacks and buffers are appropriate.
- Completing targeted fauna surveys for the following species in their respective seasonal detection period:
  - Plains Wanderer (*Pedionomus torquatus*).
  - South-eastern Hooded Robin (*Melanodryas cucullata cucullata*).
  - Eastern Bearded Dragon (*Pogona barbata*).

1. INTRODUCTION

Environmental Resources Management Australia Pty Ltd (**ERM**) was engaged by RES Australia Pty Ltd (**RES**) to prepare a preliminary ecological assessment to accompany the Victorian *Environment Effects Act 1978* (**EE Act**) and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (**EPBC Act**) referrals for the Cannie Wind Farm project. This report presents the results of the Cannie Wind Farm site only and excludes the Transmission Corridor Study Area. A separate Desktop Ecological Assessment has been prepared for the Transmission Corridor Study Area (ERM, 2024).

1.1 PROJECT DESCRIPTION

The Cannie Wind Farm project (the **Project**) is located in the north-west region of Victoria approximately 33 kilometres (**km**) west of Kerang and 25 km south of the Murray River. The Project area comprises the Cannie Wind Farm site and the Transmission Corridor Study Area. The total Project Area is 82,606 hectares.

The Cannie Wind Farm (**Cannie WF**) site has an area of 17,870 hectares (178.70 km^2). It will accommodate up to 174 wind turbine generators (**WTGs**) with ~ 1,300 MW generation capacity. The development will also include a Battery Energy Storage System (**BESS**) with up to 200 MW / 800 MWh storage capacity. The Cannie Wind Farm site will connect to the Victoria to NSW Interconnector West project (**VNI West**), being delivered by Government, through the Transmission Corridor Study Area which has an area of 64,736 ha (647.36 km^2).

The Project is targeting construction commencement in 2027 and operations in 2030.

1.2 PURPOSE OF THIS ASSESSMENT

The objective of this Preliminary Ecological Assessment report is to identify and describe key ecological values within the Study Area, provide preliminary recommendations to avoid and mitigate potential impacts, and identify further ecological assessments required for the Project.

For the purpose of this report, biodiversity values include:

- Native species and communities with a particular focus on those listed as migratory, vulnerable, endangered or critically endangered under the EPBC Act and the Victorian *Flora and Fauna Guarantee Act 1988* (**FFG Act**).
- Fauna species susceptible to turbine strikes (e.g. raptors).
- Important habitat components (e.g. hollow-bearing trees) and landscape features.

The scope of this assessment comprises the following:

- Identification and mapping of threatened flora and fauna species records, important habitat components and landscape features, and fauna species susceptible to turbine strikes.
- Preliminary mapping of the extent and type of native Ecological Vegetation Classes (**EVCs**) and Threatened Ecological Communities (**TECs**).
- Preliminary survey design including likely target species and seasonal survey techniques.
- Identification of potential to refer the Project under EBPC Act and the EE Act.
- A description of outcomes and recommendations to support the ongoing Project design and assessment process.

1.3 STUDY AREA AND LOCALITY

The Project is proposed to be located in the Loddon Mallee region of north-west Victoria, approximately 33 km west of Kerang and 25 km south of the Murray River, which runs along the Victoria-New South Wales border. The nearest township is Quambatook, located approximately 9 km southwest.

The Avoca River demarcates the south-eastern boundary of the Wind Farm Area. The landscape within the Project Area is predominantly characterised by large open paddocks and cropping fields, roadside vegetation, and existing infrastructure including road reserves. Much of the remnant vegetation is altered and degraded.

The Project Site includes several state government declared roads, including Kerang-Quambatook Road and Dumosa-Quambatook Road (generally running on an east-west alignment) and Boort-Kerang Road and Quambatook-Swan Hill Road (generally running on a north-south alignment). The south-west section of the Transmission Corridor Study Area traverses the Robinvale Railway Line (freight).

The Cannie Wind Farm (**Cannie WF**) is to be located in the north-west region of Victoria within the Gannawarra Shire. Cannie Wind Farm will connect to a new Kerang 500 kV substation near Tragowel or a new substation) along the Victoria to NSW Interconnector West (**VNI West**) corridor.

The Project footprint encompasses the development footprint, which consists of the following elements:

- Up to 174 WTGs (maximum turbine tip height assumed to be 280.5 m in height).
- Operations and Maintenance (**O&M**) building and associated carparking.
- Up to 3 onsite substations.
- Internal access tracks.
- Site entrance(s) and access points.
- Turbine foundations and hardstands.
- Business identification signage.
- Underground cabling including electrical reticulation from wind turbines and BESS power conversion units up to the Project substation(s).
- Overhead transmission lines from the Wind Farm Area to the new VNI West terminal station proposed to be located in Tragowel.

The conceptual design and layout of the Project are provided in **Figure 1-1** and **Figure 1-2** are subject to detailed design and further technical assessments. The current design and turbine layout adopts a ‘maximum envelope’ approach, with consideration of the maximum number of turbines (i.e. 174) that can be accommodated. The final number and locations of turbines are subject to further investigation and will consider existing environmental values and sensitivities.

The Study Area refers to all land parcels associated with the Project footprint supporting the development of the Cannie WF. This report only focusses on the Study Area and the Transmission Corridor Study Area is not part of the scope of this report. **Figure 1-3** provides the landholders associated with the Cannie WF development.

NYRRABY
VINIFERA
RYANBY
SPEEWA
WOORINEN NORTH
BEVERFORD
CHILLINGOLLAH EAST
TYNTYNDER
NOWIE NORTH PIRA
POLISBET
WOORINEN
TYNTYNDER CENTRAL
TYNTYNDER SOUTH
WOORINEN SOUTH
MURRAYDALE
BULGA
MURRAWEE
MURRAY RIVER
NOWIE
SWAN HILL
WAITCHIE
SWAN HILL WEST
PENTAL ISLAND
SWAN HILL
CASTLE DONNINGTON
GOWANFORD
ULTIMA EAST
FISH POINT
ULTIMA
LAKE BOGA
GOSCHEN
BENJEROOP
WINLATON
CHINANGIN
TRESCO
MURRABIT WEST
TRESCO WEST
GONN CROSSING
LALBERT ROAD
MURRABIT
KUNAT
SPRINGFIELD (SEA LAKE)
MYSTIC PARK
MEATIAN
MYALL (KERANG)
MYALL
MURNUNGIN
CAPELS CROSSING
BEAUCHAMP
LAKE CHARM
WESTBY
RED HILL
LALBERT
REEDY LAKE
BAEL BAEL
FAIRLEY
WANGIE
CULGOA
YEOBURN
KORRAK KORRAK
PYRAMID CREEK
SANDHILL LAKE
KERANG
TITTYBONG
CANNIE
COKUM
GANNAWARRA
WANDELLA
WARNE
KALPIENUNG
BUDGERUM
BUDGERUM EAST
PINE VIEW
NORMANVILLE
DINGWALL
KERANG SOUTH
TOWANINNY
NULLAWIL
QUAMBATOOK
LANGVILLE
TRAGOWEL
LAKE MERAN
APPIN
TOWANINNY SOUTH
MEERING WEST
OAKVALE
DUMOSA
APPIN SOUTH
BULOKE
GREDGWIN
LEAGHUR
NINYEUNOOK
BARRAPORT WEST
CANARY ISLAND
BARRAPORT
LODDON VALE
CANARY ISLAND SOUTH
JERUK
MINMINDIE
BUNGULUKE
GLENLOTH EAST
GLADFIELD
WYCHEPROOF
CATUMNAL
LODDON
YANDO
BOORT
WYCHEPROOF SOUTH
GLENLOTH
NARREWILLOCK
DURHAM OX
BOORT EAST
NAREEWILLOCK
LAKE MARMAL
CHIRRIP
TERRAPPEE

Legend
- Railway
- Highway
- Road
- Local Government Area
- Study Area

Victoria
Melbourne

Coordinate System: GDA2020 MGA Zone 54
Date: 04/03/2024
Created By: CS
Drawing Size: A3
0 2 4 6KM
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F1-1 Project Locality

Cannie Wind Farm
RES Australia Pty Limited

ERM

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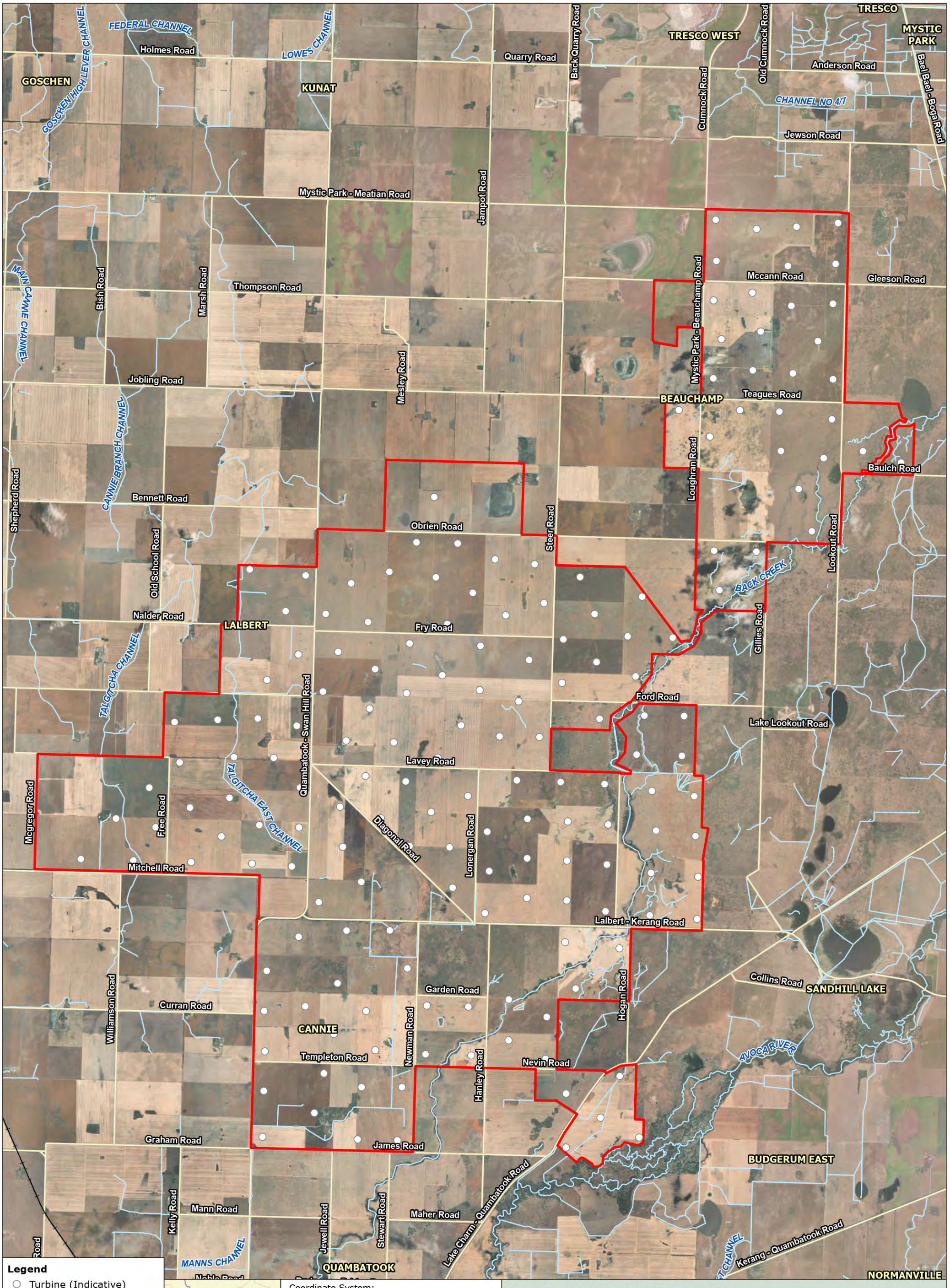

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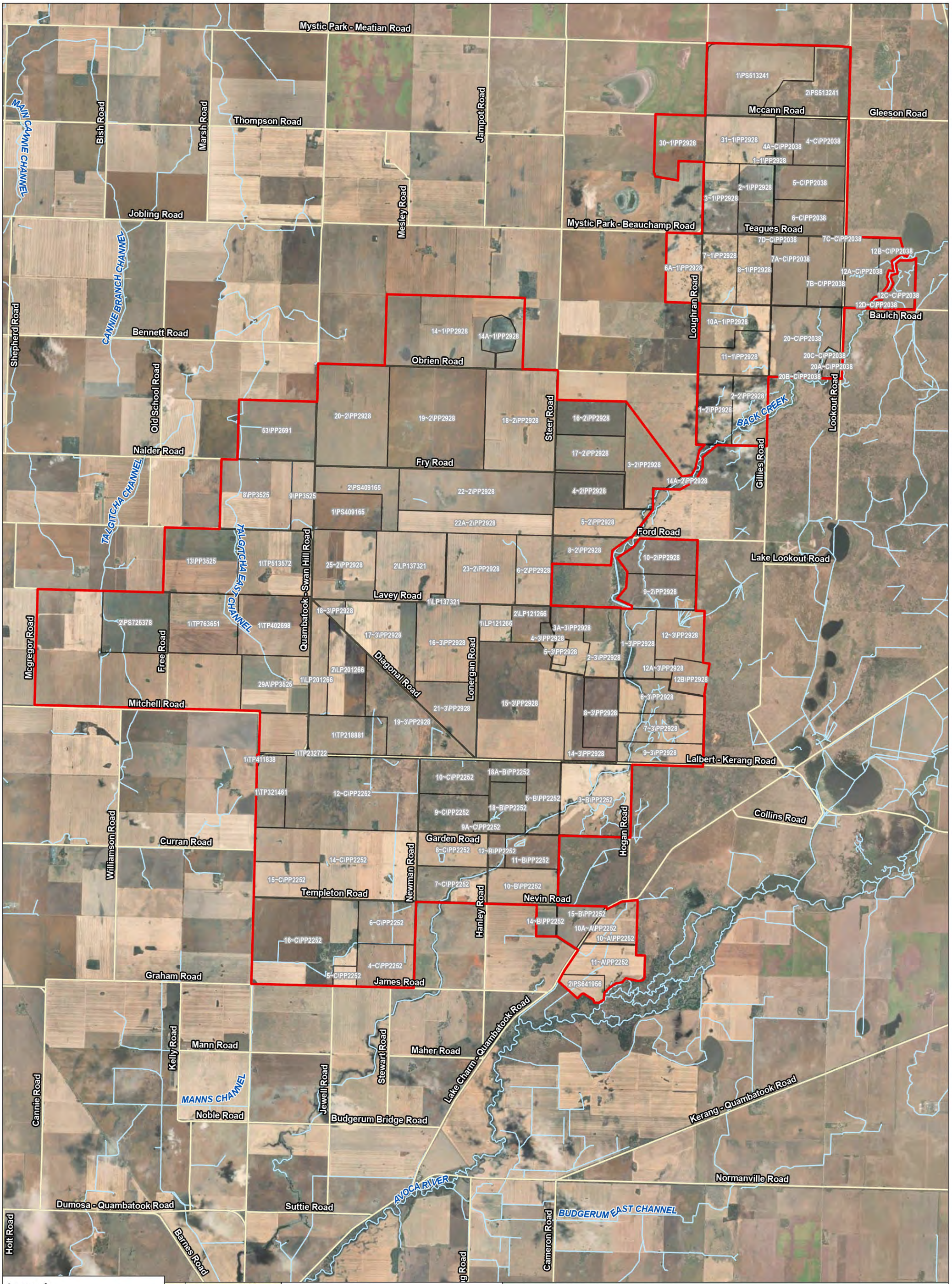

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2. METHODOLOGY

2.1 DESKTOP REVIEW

A desktop assessment of ecological values known or predicted to be present within the Study Area was undertaken using the government databases and spatial datasets outlined below in **Table 2-1**. A Likelihood of Occurrence (**LoO)** assessment was then conducted for all threatened species and communities recorded or with potential to occur within 10 km of the Study Area. Where a species was determined to be assessed as 'Known', 'Likely', or having the 'Potential' to occur, the possibility and implications of impacts from the Project have been considered.

2.1.1 DATABASE SEARCH

Publicly available desktop sources were examined to review and document the listed ecological values potentially present within and surrounding the Project footprint (see **Table 2-1**).

TABLE 2-1 DATABASE DESKTOP SEARCHES

Data source	Data description
EPBC Act Protected Matters Report	The EPBC Act Protected Matters Search Tool (**PMST**) report (DCCEEW 2023) provides predictive results on the occurrence of MNES based on mapping of known and potential species distribution, habitat, threatened ecological communities (**TEC**) and wetlands within a defined area. For assessments of large projects, areas with connectivity or habitat linkages to regions of high biodiversity or potentially poorly studies areas, a standard buffer of 10 km is applied to the Study Area to capture a more comprehensive predictive dataset.
The Victorian Biodiversity Atlas	The Victorian Biodiversity Atlas (**VBA**) database provides a list of flora and fauna species recorded within a 10 km radius around the Study Area. (DEECA 2023a). VBA searches were limited to the restricted 1M grid species and those within the VBA_25 database. VBA_100 database records were disregarded on the basis of locational uncertainty. This database has a locational uncertainty ranging from 500m-10km.
NatureKit	NatureKit provides GIS mapping, maintained by the Department of Energy, Environment and Climate Change (**DEECA**) including modelled mapping of extant and pre-1750 Ecological Vegetation Classes (**EVCs**) and known threatened species records (DEECA 2023b).
NVR Map	The NVR Map NVIM Maps – which provides the Location Map, the Current Wetland Layer, the Strategic Biodiversity Score and the Native Vegetation Condition Score for the Study Area (DEECA 2023c).
Atlas of Living Australia (ALA) spatial portal	Atlas of Living Australia (**ALA**) provides a database of species records from various government, private and not-for-profit surveys and observations. It also records any 'citizen science' records. All records are verified during database searches for location, organisation and species (ALA 2022).
Preliminary Ecology Report – Ecolink 2022	Ecolink provided a high level assessment of biodiversity values of a smaller Project boundary for a previous iteration of Study Area. This included a field verification survey in 2022. Since this assessment in 2022, the Study Area has been expanded to the north-east and west to support an increased number of WTGs.

The *EPBC Act Protected Matters Report* is provided in Appendix B.

2.1.2 LIKELIHOOD OF OCCURRENCE

A preliminary LoO assessment was undertaken for within 10 km of the Study Area, informed by desktop sources (PMST and VBA search results) and the field survey results. Desktop sources identified numerous fauna and flora species listed under the EPBC Act and FFG Act that have been recorded previously or are predicted to occur within 10 km of the Study Area. The LoO approach refines the desktop generated list using site-specific and species-specific habitat information.

The LoO assessment ranks the likelihood of the species occurring through analysis of species distribution information and the presence of specific habitat attributes as identified through the desktop analysis and field survey.

The following listed matters were considered as part of this assessment:

- Flora listed as threatened under the EPBC Act.
- Fauna listed as threatened and/or migratory under the EPBC Act.
- Flora and fauna listed as threatened under the FFG Act.
- Ecological communities listed under the EPBC Act and FFG Act.

The LoO of species within the Study Area are classified as 'Known', 'Likely', 'Potential' and 'Unlikely" based on the criteria of assessment outlined in **Table 2-2**.

The preliminary LoO assessment is provided in Appendix C for flora, Appendix D for fauna, and Appendix E for TECs listed under the EPBC Act.

TABLE 2-2 LIKELIHOOD OF OCCURENCE CRITERIA

Factor	Quality habitat exists	Poor habitat exists[1]	Habitat does not exist[2]
Records within Study Area or recorded during site assessment	Known	Known	Known
Records in the locality[3]	Likely	Potential	Unlikely
No records in the locality, but Study Area is within known distribution	Potential	Unlikely	Unlikely
No records in the locality, and Study Area is outside of known distribution	Unlikely	Unlikely	Unlikely

1. *Habitat may be considered appropriate, but sub-optimal.*
2. *Based on sources reviewed and/or field survey results.*
3. *'Locality' refers to a 10 km buffer of the Project boundary.*

2.2 FIELD ASSESSMENTS

Four ecological site assessments have been conducted as part of the preliminary stages of the Project. The first site assessment was undertaken in March 2022 by Ecolink Consulting Pty Ltd (**Ecolink**) for a previous iteration of the Study Area. Since this assessment in 2022, the Study Area has been expanded to the north-east and west to support an increased number of WTGs. An updated Study Area resulted in a secondary site assessment conducted by ERM in August of 2023.

The second, third and fourth ecological field surveys, primarily associated with commencement of preliminary bird utilisation surveys (**BUS**), were conducted by two ERM ecologists in the Study Area. The field surveys were completed for three seasons (Winter and Spring 2023, Summer 2024), with bat recordings included in two of those assessments. The field surveys were undertaken on foot. Parts of the Study Area were inaccessible due to crop sensitivity; these areas were assessed from the closest roadside vantage point.

2.2.1 VEGETATION COMMUNITIES

Native vegetation in Victoria is mapped in units known as EVCs (DELWP 2019d). EVCs are described according to a combination of floristic, life form and ecological characteristics, and through an inferred fidelity to particular environmental attributes. Each EVC occurs under a common regime of ecological processes within a given biogeographic range and may contain multiple floristic communities.

Other vegetation types that may occur in Victoria include vegetation communities listed as threatened under the EPBC Act and/or the FFG Act. These have separate vegetation classification systems, each of which is separate to the EVC classification system. As such, any single patch of native vegetation occurring within the subject site (or anywhere in Victoria) will be classifiable as a particular EVC and may also be separately classified as a different threatened ecological community under the EPBC Act, and/or as another vegetation community under the FFG Act.

2.2.2 FAUNA SPECIES AND FAUNA COMMUNITIES

Unless otherwise noted, common and scientific names for fauna follow the VBA database.

Fauna conservation significance was determined in accordance with the Victorian FFG Act, and the EPBC Act and includes migratory species listed under the EPBC Act.

The EPBC Act and the FFG Act list a number of threatened fauna communities, at the national and State scale, respectively. Fauna communities known or potentially occurring within the Study Area are only considered if they are listed under one or more of these Acts.

2.3 LIMITATIONS

The field and desktop assessments provide an overview of the biodiversity values that exist within the Study Area. Surveys were undertaken at discrete locations to gain a general understanding of the types of species and habitat features that occur. Not all areas within the Study Area could be visited during the field survey. It is also noted that wet weather conditions during survey events prevented safe access to the site and some locations of potentially important habitat were not accessible due to the heights of crops at the time of survey.

Desktops assessments are reliant on the data obtained from the various databases outlined in this report. These databases are reliant on internal data standards for accurate data. However, accuracy of historical records cannot be guaranteed.

A greater survey effort typically correlates to additional flora and fauna records. Where potential additional records may alter the recommendations of this report, further assessment has been recommended dependant on the potential implications of relevant policies and legislations.

The absence of a species from a database list or observational studies does not confirm its absence within the Study Area. The lack of existing records from databases is more likely to indicate a low historic sampling effort in the region, as opposed to an absence of species. Future targeted biodiversity surveys will be completed to inform detailed assessment.

To overcome these limitations, the LoO is based on the precautionary approach and identifies species that have the potential to occur and is not solely dependent on species sightings alone.

3. RESULTS

3.1 SITE OVERVIEW

The Study Area is bisected by two bioregions: the north-western limit of the Victorian Riverina, and a disjunct portion of the Murray Mallee in the south-east.

The Murray Mallee bioregion experiences a mean annual rainfall of about 400 mm (VicFlora, 2023b) in the southern part of the bioregion where the Study Area is located. This bioregion is characterised by landforms that are extensively undulating with reddish clay to sandy plains, sometimes with ridges. The Avoca River, which runs along the southern boundary of the Cannie WF is a major effluent water channel. This bioregion is dominated by 'mallee' eucalypts, demonstrated by the presence of vegetation assemblages dominated by White Mallee (*Eucalyptus dumosa*) frequenting roadside reserves in the western portion of the Study Area. Other relevant communities that exist within the bioregion potentially present within the Study Area include those associated with Buloke (*Allocasuarina luehmannii*). Additionally, Black Box (*Eucalyptus largiflorens*) woodlands and wetlands occur within both this bioregion and the Riverina, and differ in their understory structure, topographical occurrence, and hydrological reliance (VicFlora, 2023a).

The Riverina bioregion shares climactic similarities to the Murray Mallee bioregion, in that rainfall averages 250-500 mm per annum (VicFlora, 2023b). However, the north-west of the bioregion, where the Study Area is situated, is more inclined to receive higher rainfall than more north-easterly areas. The Riverina consists of several gently undulating alluvial fans and floodplains on which the fans merge. The bioregion features shallow, dry lakes (playas) that are widely distributed throughout and are very common in the Avoca-Loddon Rivers area, close to the Study Area. Several saline basins (salinas) of these playas occur near Kerang and constitute most of the Ramsar Kerang Wetlands. River Red-gum (*Eucalyptus camaldulensis*) dominates vegetation assemblages of open-forest or woodland, particularly in areas that receive regular flooding. Within the Study Area, these often pure-stand communities are more likely to occur in narrow bands along riverbanks and watercourses. Black Box may occur as larger areas of open forest to woodland on the outer margin of River Red-gum forests and woodlands. This bioregion has three major swamp and marsh communities that are anticipated to be present in various compositions within the Study Area: Lignum swamps, halophytic shrublands, and rush and sedgeland swamps (VicFlora, 2023b).

Both bioregions have been extensively modified and cleared for cultivation of cereal crops (mainly wheat, barley and oats, as observed within the Study Area), livestock grazing and other agricultural uses. Additionally, both have been adversely affected by irrigation of the Murray River and other large-scale irrigation schemes, aggravated soil erosion and pasture depletion, salinity, and pest infestation (primarily rabbits).

Two site visits in 2022 and 2023 confirmed that the Study Area is highly modified, with private land consisting of cropping and grazing pastures. As such, much of the remnant vegetation is altered and degraded. Small pockets of higher quality native vegetation remain, either existing as remnant woodland and wetland assemblages, mallee-dominant roadside reserves, native grasslands (typically in connection to more remnant areas or existing as solitary reserves and readily identifiable enclosed land parcels), and riparian corridors associated with Back Creek, Avoca River and minor tributaries.

3.1.1 CROPPING AND SCATTERED PADDOCK TREES

At the time of survey, broad acre-cropped land was dominated by either Canola (*Brassica rapus*), Wheat (*Triticum aestivum*), or Barley (*Hordeum vulgare*) (**Figure 3-1**). Cropping land was observed to provide foraging habitat for a number of avifauna, particularly small to medium raptors. Scattered paddock trees and isolated stands of retained or regrowth vegetation were present variably across the Study Area and were observed to provide important habitat features, such as tree hollows, as well as high utilisation of avifauna. Exotic grass species dominate the regrowth in and around these cropped areas.

FIGURE 3-1 BROAD-ACRE CROPPING OF CANOLA (LEFT) AND GRAIN FIELDS (RIGHT) (ECOLINK, 2022)

Cropping land generally provides a low quality of habitat for a range of small mammals, reptiles and grassland birds. Cropped areas and scattered trees are unlikely to provide habitat to any of the threatened species with the potential, likely or those known to occur within the Study Area outlined in the LoO (Appendix D) except for the Plains Wanderer (*Pedionomus torquatus*) occasionally.

Scattered paddock trees are recorded throughout the Study Area, within cropped and grazed paddocks. These trees were largely comprised of three species, Black Box, White Cypress Pine

(*Callitris glaucophylla*) and Buloke. Hollows were observed in relatively high abundance within the scattered paddock trees and may host arboreal mammals, microbats and a variety of obligate hollow-users such as parrots, cockatoos and potentially owls. Stick nests have been recorded within the Study Area throughout the field surveys conducted, with sizes suitable for medium to large raptors, with two of these nests being old and inactive but for suspected Wedge-tailed Eagles (*Aquila audax*).

Scattered paddock trees may provide habitat for some of the mobile avifauna, particularly those with large ranges such as Black Falcon (*Falco subniger*), Grey Flacon (*Falco hypoleucos*), Little Eagle (*Hieraaetus morphnoides*) and Barking Owl (*Ninox connivens*).

3.1.2 WOODY VEGETATION

Wooded vegetation across the Study Area is largely restricted to roadside vegetation and riparian zones associated with the Avoca River and its tributaries. Some larger patches of retained remnant vegetation are also present across the site but are largely isolated and heavily fragmented.

The Riparian vegetation associated with the Avoca River is dominated by open black box woodland and wetland, with an understory representative of the bioregion characteristic communities (**Figure 3-2**). These understoreys were dominated by Lignum (*Muehlenbeckia florulenta),* a variety of saltbush species (e.g., *Atriplex* spp.), and Nitre Goosefoot (*Chenopodium nitrariaceum*) likely to maintain seasonal flooding regimes. A high abundance of tree hollows was observed with hollows present that will likely provide suitable breeding habitat for avifauna and arboreal mammals, particularly owls. Black box vegetation may also provide important habitat for a high diversity of species relative to other observed habitat types within the Study Area and is likely to be important for local populations of fauna. Use of this habitat by specific fauna will be further investigated throughout the detailed assessment phase.

Open black box woodland was the dominant (although relatively low in occurrence) remnant vegetation type, particularly in the east of the Study Area where it is associated with Back Creek and Avoca River. These areas present relatively higher quality of habitat for threatened flora to occur, notably some of the known and likely threatened flora with records within the Study Area are often associated with Avoca River, or adjacent connected habitat. Similarly, road reserves present relatively high-quality patches of native vegetation due to the absence of grazing. As such, structure of the community is generally retained and provides important corridors for flora and fauna.

FIGURE 3-2 BLACK BOX VEGETATION ASSOCIATED WITH THE AVOCA RIVER (ECOLINK, 2022)

3.1.3 GRASSLAND

Owing to the extent of broad-acre cropping across the Study Area, limited intact grassland was present in parts of the Study Area (**Figure 3-3**). Moderate high quality native grasslands are present in restricted parts of the Study Area with lower quality derived grasslands recorded elsewhere. These grasslands are comprised of a mix of native (*Austrostipa* spp., and *Eragrostis* spp.) and exotic (*Aristida* spp.) grasses. These grasslands are likely to provide habitat to a similar suite of species as to stubble fields, with the exception to various Quail species and a range of reptiles such as the Eastern Bearded Dragon (*Pogona barbata*). In areas where the overstorey is absent, remnant grasslands persist, threatened fauna may find habitat more readily (such as Plains Wanderer where grasslands composition is intact) and threatened flora may more likely be present.

FIGURE 3-3 GRASSLAND ASSOCIATED WITHIN THE STUDY AREA (ERM FIELD SURVEY, AUGUST 2023)

3.1.4 AQUATIC HABITAT

The Study Area contains several natural and artificial waterbodies and wetlands that may have importance for fauna within the landscape.

Artificial dams, as defined by the Department of Energy, Environment and Climate Action (**DEECA**), are present throughout the site and are typically surrounded by broad acre cropping with little to no wetland vegetation. Submerged vegetation was observed in more permanently flooded dams, however, dams were typically observed devoid of emergent and fringing vegetation. Water birds were observed utilising agricultural dams frequently, including White-necked Heron (*Ardea pacifica*), Australasian Grebe (*Tachybaptus novaehollandiae*), Australian Wood Duck (*Chenonetta jubata*), Black-fronted Dotterel (*Elseyornis melanops*), Grey Teal (*Anas gracilis*), Intermediate Egret (*Ardea intermedia*), and Little Pied Cormorant (*Microcarbo melanoleucos)*.

Two irrigation channels are present in the northeast of the Study Area and provide permanent water supplies to the surrounding landscape. No submerged, emergent or fringing vegetation was observed and is unlikely to provide important breeding habitat for water birds and migratory species. Preliminary BUS field effort identified that these irrigation channels were utilised by White-necked Heron (*Ardea pacifica*), Intermediate Egret (*Ardea intermedia*), Australian Wood Duck (*Chenonetta jubata*), and Grey Teal (*Anas gracilis*).

3.2 SURROUNDING LANDSCAPE

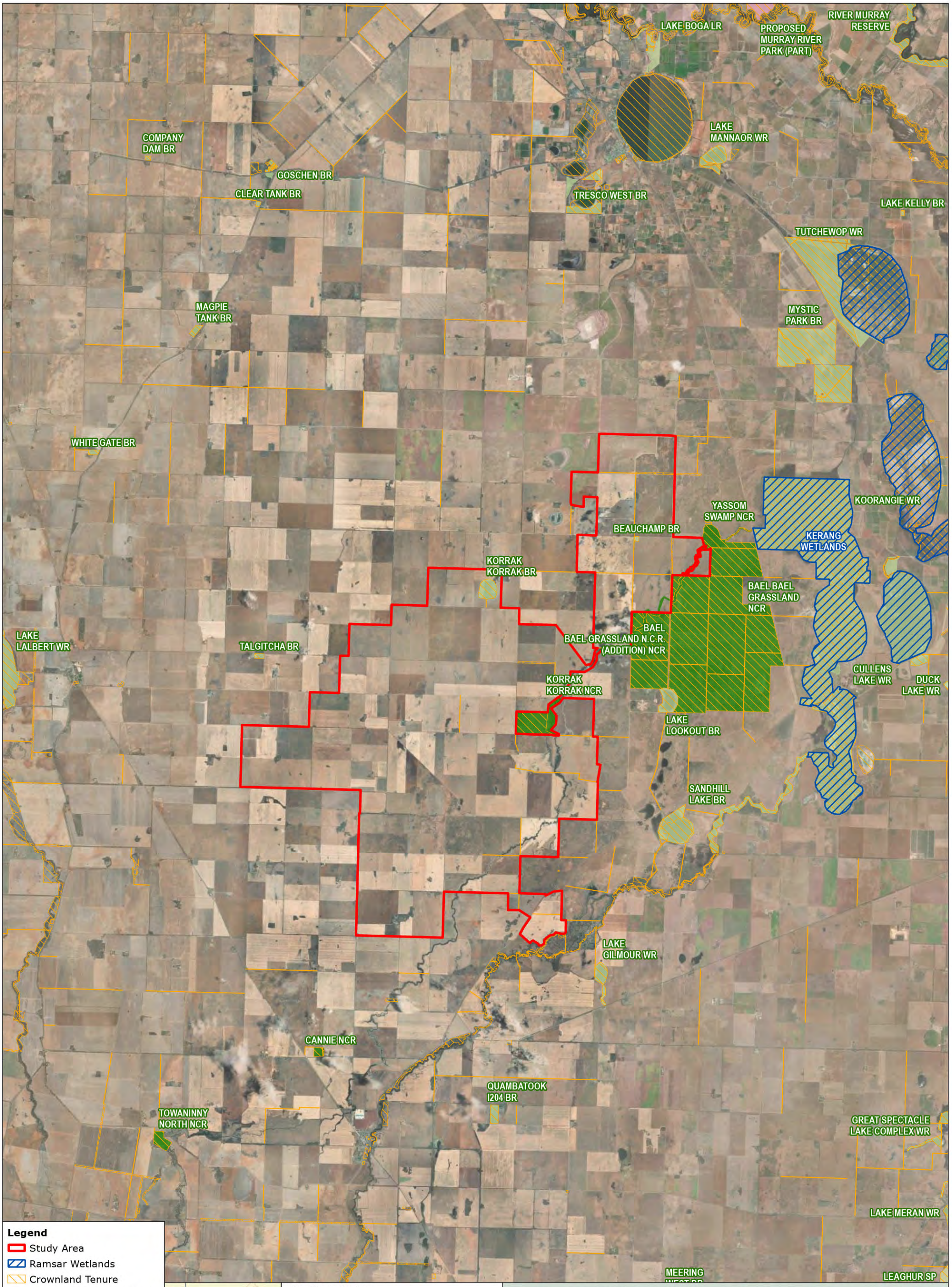
The broader landscape surrounding the Study Area is generally consistent with the landscape within the Study Area. Private properties surrounding the Study Area are utilised for large scale, broadacre cropping and are highly modified. Native vegetation is primarily confined to road reserves and in small patches within private properties. Scattered trees, areas with scattered trees and patches of remnant vegetation do occur throughout the wider landscape.

Grassland habitat, along with riparian and woody vegetation habitat is connected to the Study Area to the east, primarily through Avoca River and Back Creek and the small, vegetated tributaries that branch off. Notable areas which may contain suitable habitat for threatened species or high-quality native vegetation include:

- Yassom Swamp Nature Conservation Area.
- Koorangie Wildlife Reserve.
- Bael Bael Grassland Nature Conservation Reserve.
- Korak Korak Nature Conservation Reserve.
- Sandhill Lake Bushland Reserve.
- Lake Gilmour.
- Kerang Wetlands.

Connectivity to these areas from habitats within the Study Area is somewhat limited due to the fragmented nature and land use of the broader landscape (broadacre cropping); however, fauna mobility and movement through linear corridors between these areas and the Study Area can occur through the Avoca River and Back Creek. Fauna habitat connectivity is also dependant on the requirements of specific fauna for distribution. Avifauna connectivity between areas of suitable habitat is an appropriate example of a group of fauna which has limited constraints in their dispersal across the Study Area and the broader landscape. As such, avifauna that use habitats outside the Study Area but within the broader landscape, particularly in higher quality areas, may have little constraint accessing the same type of habitat within the Study Area that is not connected to the broader landscape.

There are several protected areas within the Study Area, of which important areas of note are outlined above and shown in **Figure 3-4.**



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3.3 FLORA

3.3.1 ECOLOGICAL VEGETATION CLASSES

Investigation of DEECA EVCs mapping and modelling determined that where remnant vegetation remains it is likely to represent a range of woodland, grassland, chenopod shrubland and mallee vegetation communities.

Remnant native vegetation in the Study Area has been mapped by DEECA at a scale of 1:25,000. NatureKit (DELWP 2019b) indicates that the following dominant EVCs were once present in the Study Area:

- EVC 103
  - (Riverine Chenopod Woodland – Victorian Riverina) listed as a Vulnerable EVC.
  - (Riverine Chenopod Woodland – Murray Mallee) listed as a Depleted EVC.
- EVC 826
  - (Plains Grassland and Chenopd Shrublands – Victorian Riverina) listed as an Endangered EVC.
  - (Plains Savannah – Murray Mallee) listed as an Endangered EVC.
- EVC 97 (Semi-arid Woodland – Victorian Riverina) listed as an Endangered EVC
- EVC 829
  - (Chenopod Grassland – Victorian Riverina) listed as an Endangered EVC.
  - (Chenopod Grassland – Murray Mallee) listed as an Endangered EVC.
- EVC 823 (Lignum Swampy Woodland – Victorian Riverina) listed as a Vulnerable EVC
- EVC 824
  - (Woorinen Mallee – Murray Mallee) listed as a Vulnerable EVC.
  - (Woorinen Mallee – Victorian Riverina) listed as a Vulnerable EVC.
- EVC 96
  - (Ridged Plains Mallee – Murray Mallee) listed as an Endangered EVC.
  - (Ridged Plains Mallee – Victorian Riverina) listed as an Endangered EVC.

TABLE 3-1 DOMINANT MODELLED EVCS DESCRIPTIONS WITHIN THE STUDY AREA

EVC	Description
103	Eucalypt woodland to 15 m tall with a diverse shrubby and grassy understorey occurring on most elevated riverine terraces. Confined to heavy clay soils on higher level terraces within or on the margins of riverine floodplains (or former floodplains), naturally subject to only extremely infrequent incidental shallow flooding from major events if at all flooded
826	A structurally diverse vegetation unit which includes ‘grassy openings’ of a few to many hundreds of hectares, with a variable tree density ranging from a very sparse savanna to woodland. The relative absence of eucalypts is particularly characteristic, with *Allocasuarina luehmannii* and perhaps *Callitris gracilis* ssp. *murrayensis* to 10 m tall being the dominant trees. Widespread on the northern plains
97	Non-eucalypt woodland or open forest to 12 m tall, of low rainfall areas. Occurs in a range of somewhat elevated positions not subject to flooding or inundation. The surface soils are typically light textured loamy sands or sandy loams.

EVC	Description
829	Open to sparse shrubland with a more or less continuous tussock grass sward found on heavy somewhat sodic clay plains fringing the active floodplains of major watercourses such as the Loddon and Avoca Rivers.
823	Understorey dominated by Lignum, typically of robust character and relatively dense (at least in patches), in association with a Eucalypt and/or Acacia woodland to 15 m tall. The ground layer includes a component of obligate wetland flora that is able to persist even if dormant over dry periods.
824	Widespread mallee woodland to 12 m tall, associated with the east-west orientated calcareous dunefields of the Woorinen Formation with a low, open chenopod dominated shrub understorey. A diverse array of sub-shrubs, herbs and grasses are also present. Typically occurs on fine textured red-brown sandy loam and clay loam soils.
96	Open, quite grassy mallee woodland to 10 m tall, typical of the gently undulating “plains” of the Wimmera and Southern Mallee. Soils are somewhat variable but are typically duplex with grey or brown sandy clay loam or clay loam top soils of aeolian origin

Further field survey of the Study Area will be required to determine type, extent and potential impacts to identified native vegetation patches.

3.3.2 THREATENED FLORA

A total of 73 flora species threatened under the EPBC Act and FFG Act were assessed under the LoO (Appendix C). Of these, 19 have been assessed as known or likely to occur within the Study Area, and an additional 34 have been assessed as having the potential to occur within the Study Area. These species, with their listing status, are outlined in **Table 3-2**.

TABLE 3-2 FLORA SPECIES ASSESSED AS HAVING POTENTIAL TO OCCUR WITHIN THE STUDY AREA

Scientific name	Common name	EPBC Act	FFG Act
Acacia melvillei	Yaraan		Critically Endangered
Acacia oswaldii	Umbrella Wattle		Critically Endangered
Acacia pendula	Weeping Myall		Critically Endangered
Allocasuarina luehmannii	Buloke		Critically Endangered
Ammannia multiflora	Jerry-jerry		Endangered
Amyema linophylla subsp. *orientalis*	Buloke Mistletoe		Critically Endangered
Aristida obscura	Rough-seed Wire-grass		Endangered
Austrostipa breviglumis	Cane Spear-grass		Endangered
Austrostipa puberula	Fine-hairy Spear-grass		Endangered
Austrostipa tenuifolia	Long-awn Spear-grass		Endangered
Austrostipa trichophylla	Spear-grass		Endangered
Bergia ammannioides	Jerry Water-fire		Endangered
Bergia trimera	Small Water-fire		Endangered

Scientific name	Common name	EPBC Act	FFG Act
Brachyscome readeri	Reader's Daisy		Endangered
Cardamine moirensis	Riverina Bitter-cress		Endangered
Centipeda crateriformis subsp. compacta	Compact Sneezeweed		Endangered
Centipeda crateriformis subsp. crateriformis	Lagoon Sneezeweed		Endangered
Centipeda thespidioides s.s.	Desert Sneezeweed		Endangered
Chenopodium desertorum subsp. *desertorum*	Frosted Goosefoot		Endangered
Chenopodium desertorum subsp. rectum	Frosted Goosefoot		Endangered
Convolvulus clementii	Desert Bindweed		Endangered
Convolvulus graminetinus	Grassland Bindweed		Endangered
Cullen tenax	Tough Scurf-pea		Endangered
Dianella tarda	Late-flower Flax-lily		Critically Endangered
Duma horrida subsp. horrida	Spiny Lignum		Critically Endangered
Elacholoma prostrata	Pale Plover-daisy		Endangered
Eleocharis obicis	a spike rush	Vulnerable	
Eleocharis plana	Flat Spike-sedge		Critically Endangered
Eragrostis australasica	Cane Grass		Critically Endangered
Eragrostis setifolia	Bristly Love-grass		Endangered
Eriochlamys squamata	Scaly Mantle		Endangered
Eryngium paludosum	Long Eryngium		Endangered
Grevillea rosmarinifolia subsp. glabella	Smooth Grevillea		Endangered
Lepidium monoplocoides	Winged Peppercress	Endangered	Endangered
Lepidium phlebopetalum	Veined Peppercress		Endangered
Leptorhynchos waitzia	Button Immortelle		Endangered
Maireana cheelii	Chariot Wheels	Vulnerable	Endangered
Minuria cunninghamii	Bush Minuria		Vulnerable
Minuria integerrima	Smooth Minuria		Vulnerable
Panicum laevinode	Pepper Grass		Vulnerable
Pomaderris paniculosa subsp. paniculosa	Inland Pomaderris		Endangered

Scientific name	Common name	EPBC Act	FFG Act
Ptilotus erubescens	Hairy Tails		Critically Endangered
Sclerolaena patenticuspis	Spear-fruit Copperburr		Vulnerable
Senecio longicollaris	Riverina Fireweed		Endangered
Senecio productus subsp. productus	Riverina Groundsel		Endangered
Sida intricata	Twiggy Sida		Endangered
Sporobolus caroli	Yakka Grass		Endangered
Swainsona murrayana	Slender Darling-pea	Vulnerable	Endangered
Swainsona swainsonioides	Downy Swainson-pea		Endangered
Templetonia egena	Round Templetonia		Endangered
Vittadinia condyloides	Club-hair New Holland Daisy		Endangered
Vittadinia cuneata var. hirsuta	Fuzzy New Holland Daisy		Endangered
Vittadinia pterochaeta	Winged New Holland Daisy		Endangered

3.3.3 NOXIOUS WEEDS

Weeds declared 'noxious weeds; under the *Catchment and Land Protection* (CaLP) *Act 1994* in Victoria and are classified as State Prohibited, Regionally Prohibited, Regionally Controlled or Restricted.

- State Prohibited Weeds
  - State Prohibited Weeds either do not occur in Victoria, or it is reasonably expected that they can be eradicated from the state. DEECA is responsible for the management of these species where ever they occur throughout Victoria, whether it is on public or private land. Reporting these species to DEECA will ensure that treatment and removal are carried out in a safe and timely manner.
- Regionally Prohibited Weeds
  - Regionally Prohibited Weeds are not widely distributed across the North Central CMA region but are capable of spreading further. It is reasonable to expect that these weeds can be eradicated from north central Victoria. Control is the responsibility of both public and private land managers on their land and on Declared Roads under the Victorian *Transport Act 1983*.
- Regionally Controlled Weeds
  - Regionally Controlled Weeds exist in the North Central CMA region and are usually widespread. Continued control measures are required to prevent further spread to clean land. Control is the responsibility of both public and private land managers on their land and on Declared Roads under the Victorian *Transport Act 1983*.

- Restricted Weeds
    - Regionally Controlled Weeds exist in the North Central CMA region and are usually widespread. Continued control measures are required to prevent further spread to clean land. Control is the responsibility of both public and private land managers on their land and on Declared Roads under the Victorian *Transport Act 1983*.

All land managers have a responsibility to manage weeds on their land, regardless of whether that land is public or private land.

Though site visits have observed many introduced species, only one noxious species has been identified. Horehound (*Marrubium vulgare*) is a 'Regionally Controlled' species. Control of the noxious weed will be required for all leased land. A more detailed list of noxious weeds will be prepared when undertaking the detailed vegetation assessment of the final development footprint. Additional noxious species are likely to be encountered.

Protocols to reduce the spread and/or establishment of invasive species will be required as part of the detailed Construction Environment Management Plan, as well as those that require managing during the operations phase under an Operational Environment Management Plan.

3.4 VEGETATION COMMUNITIES

3.4.1 EPBC ACT THREATENED ECOLOGICAL COMMUNITIES

This assessment has detected six TECs listed under the EPBC Act. One is considered likely to occur, and a second is considered to have the potential to occur. The remaining TECs are considered unlikely to occur. Determination of LoO is provided for in Appendix E.

3.4.1.1 PLAINS MALLEE BOX WOODLANDS OF THE MURRAY DARLING DEPRESSION, RIVERINA AND NARACOORTE COASTAL PLAIN BIOREGIONS

The TEC considered likely to occur is the Critically Endangered 'Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions' (hereafter referred to as the' Plains mallee box woodlands'). This TEC primarily occurs on the Woorinen Formation plains, the sand that makes up most of the cropping country in the Murray Mallee, within the Murray Darling Depression Bioregion and Riverina Bioregion (the bioregions that bisect the Study Area). This TEC is characterised by mostly medium (5-10 m) to occasionally tall (to 15 m) canopy that is sparse or open dominated by box-barked eucalypt species (*Eucalyptus porosa, E. behriana*), but can be dominated by other mallee, such as the resident E. dumosa on site can also be dominant and consistent of the TEC. A very sparse large shrub/small tree layer may be present (typically comprising resident *Chenopodium* sp, *Eremophila* sp., *Senna* sp, *Suma* sp and *Acacia oswaldii* and *melvillei*), with a distinctive low to decumbent chenopod sub-shrub layer or a dominant tussock grass ground layer (dominated by *Austrostipa* sp., *Maireana* sp., *Chenopodium* sp., *Einadia* sp., and *Enchylaena* sp.) (DAWE, 2021a).

This TEC has relationships to current modelled EVCs within the Study Area, primarily EVC 96 – Ridge Plains Mallee, but also EVC 824 – Woorinen Malee and EVC 829 – Chenopod Grassland.

Assessment will need to be undertaken to determine extent of these EVCs within the Study Area followed by an assessment against the diagnostic criteria for this TEC to determine if any patches of native vegetation are likely to meet the TEC diagnostic. Current understanding of the Study Area determines that this TEC is most likely to occur within roadside vegetation

where *E. dumosa* has been observed to be present. The TEC may meet diagnostic thresholds where stand of *E. dumosa* contain the relevant understorey species. This TEC for *E. dumosa* is not met by the presence of canopy species alone (DAWE, 2021a). This is also the predicted occurrence of the known extant within the Murray Darling Depression and Riverina where matched vegetation composition is outlined by the TECs conservation advice in **Figure 3-5**.

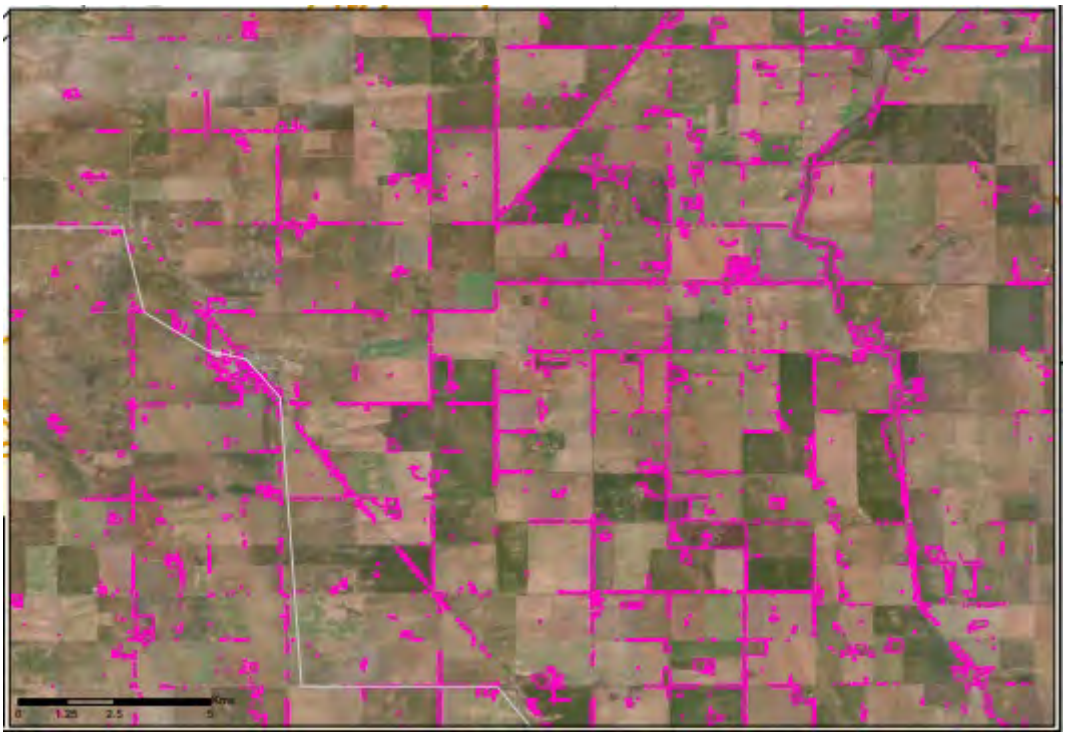

FIGURE 3-5 EXTANT MODELLING OF THE BEST MATCHED VEGETATION UNITS OF THE PLAINS MALLEE BOX WOODLAND DISTRIBUTION (DAWE, 2021A)

3.4.1.2 MALLEE BIRD COMMUNITY OF THE MURRAY DARLING DEPRESSION

An additional TEC considered with potential to occur is the Endangered 'Mallee Bird Community of the Murray Darling Depression' hereafter referred to as the 'Mallee Bird Community'. This TEC is a fauna community represented by 20 avifauna taxa considered dependent on mallee vegetation within a distribution limited to the Murray Malle subregion within Victoria. The avifauna that represent this community can be delineated into mallee specialists or dependants. Mallee specialists are avifauna that are found almost exclusively within the Murray Darling Depression bioregion, while mallee dependants are dependent on mallee where present but have a wider range that extends into non-mallee woodland and shrubland habitats that integrate with mallee vegetation. The 20 avifauna that comprise this TEC are outlined in **Table 3-3**.

For the TEC to meet the diagnostics of this community a 10 ha patch of native vegetation must be present where 5 ha are dominated by mallee vegetation and a minimum of three Mallee Bird Community species (any mix of specialists and dependants) have been recorded within 20 km of the site within the past 10 years. Assessment will need to be undertaken to determine extent of mallee vegetation within the Study Area, and then assessment against the diagnostic criteria for this TEC to determine if any patches of native vegetation are likely to meet the TEC diagnostic (including terrestrial bird surveys around or in the patch). At current, no representative species within the Study Area have been detected.

TABLE 3-3 TAXA REPRESENTING THE MALLEE BIRD COMMUNITY

Scientific name	Species Name	EPBC Status	FFG. Status
Mallee specialists			
Manorina melanotis	Black-eared miner	Endangered	Critically Endangered
Cinclosoma castanotum	Chestnut Quail-thrush		
Stipiturus mallee	Mallee Emu-wren	Endangered	Endangered
Leipoa ocellata	Malleefowl	Vulnerable	Vulnerable
Pachycephala rufogularis	Red-lored Whistler	Vulnerable	Endangered
Neophema splendida	Scarlet-chested Parrot		Endangered
Amytornis striatus	Striated Grasswren		
Psophodes nigrogularis	Malle Western Whipbird	Vulnerable	Critically Endangered
Mallee dependants			
Oreoica gutturalis	Crested Bellbird		Endangered
Ptilotula plumula	Grey-fronted Honeyeater		Endangered
Microeca fascinans	Jacky Winter		
Lichenostomus cratitius	Purple-gaped Honeyeater		Vulnerable
Polytelis anthopeplus	Regent Parrot	Vulnerable	Vulnerable
Calamanthus cautus	Shy Heathwren		
Drymodes brunneopygia	Southern Scrub-robin		
Malurus splendens	Splendid Fairywren		
Pardalotus punctatus	Spotted Pardalote		
Nesoptilotis leucotis	White-eared Honeyeater		
Purnella albifrons	White-fronted Honeyeater		
Ptilotula ornata	Yellow-plumed Honeyeater		

3.4.2 FFG ACT LISTED ECOLOGICAL COMMUNITIES

Five FFG Act ecological communities were identified within the desktop assessment as potentially occurring within the Study Area, these being:

- Semi-arid Shrubby Pine-Buloke Woodland Community
  - The Semi-arid Shrubby Pine-Buloke Woodland is an open woodland or woodland community with a mix of slender cypress-pine and Buloke and a characteristic shrub component. The community is dominated by Slender Cypress-pine (*Callitris gracilis*) and variable numbers of Buloke trees.
- Semi-arid North-West Plains Buloke Grassy Woodland

- The Semi-arid Northwest Plains Buloke Grassy Woodland Community is open woodland in which Buloke is the dominant tree, sometimes in association with Black Box and/or Yellow Gum (*Eucalyptus. leucoxylon*).

- Semi-arid Herbaceous Pine Woodland Community
  - The Semi-arid Herbaceous Pine Woodland Community is a woodland or open woodland mainly dominated by slender cypress-pines, and with few or no shrubs. The dominant tree is Slender Cypress-pine, with occasional Buloke towards the margins. Shrubs are uncommon but typically include Small Cooba (*Acacia ligulatasubsp. angustissima*) has become abundant in many current and former stands
- Semi-arid Herbaceous Pine-Buloke Woodland Community
  - The Semi-arid Herbaceous Pine-Buloke Woodland Community is a woodland or open woodland typically dominated by both slender cypress-pine and Buloke trees, without a shrub layer and with a largely herbaceous ground layer. It occurs where the soil surface is sandy but finer grained from a few centimetres depth down.
- Victorian Mallee Bird Community
  - Represented by similar taxa in the TEC, with the inclusion of Slender-billed Thornbill (*Acanthiza iredalei*), Redthroat (*Pyrrholaemus brunneus*) and Brown-headed Honeyeater (*Melithreptus brevirostris pallidiceps*). Mallee vegetation occurrence.

Similar to TECs, flora composition FFG Act listed communities dominated by Buloke, Slender Cypress-pine, or both, are unlikely to occur due to the degraded nature of the groundcover of these assemblages. The Victorian Mallee Bird Community however, has similar potential for presence as the nationally listed TEC.

3.5 FAUNA

3.5.1 EPBC ACT THREATENED FAUNA AND MIGRATORY SPECIES

3.5.1.1 THREATENED FAUNA

From the desktop database searches, a total of 23 fauna species listed as threatened under the EPBC Act were identified and subsequently assessed under a LoO (Appendix D). Of these species, 11 are listed as Vulnerable, eight are listed as Endangered and four are listed as Critically Endangered. An additional 19 species listed as Migratory under the EPBC Act were recorded in the PMST.

Two species, Plains Wanderer and South-eastern Hooded Robin (*Melanodryas cucullata cucullata)* are considered ‘known’ to occur based on records within the Study Area and potential habitat availability. The Plains Wanderer is listed as Critically Endangered, and the South-eastern Hooded Robin is listed as Endangered under the EPBC Act.

There are a range of relevant records for these species that were assessed as part of the desktop assessment. The most recent record (2012) and closest records for the Plains Wanderer is associated with the eastern boundary of the Study Area, east of Steer Road.

Due to the presence of potential intact grassland habitat (although observed in low quality and unlikely to support populations given inappropriate composition and structure for this species) and high abundance of cereal cropping for which this species is known to occasionally inhabit, this species may utilise the Study Area for foraging and dispersal (Department of the

Environment, 2015). Foraging and dispersal activities may occur within the identified grassland and cereal cropping; however, it is unknown to what degree these areas may support population of the species (potential breeding activity) or just transitional functions (dispersal between more suitable habitat). Further targeted survey effort will be required for this species to determine potential utilisation; however, the proposed development is unlikely to remove the intact grasslands present within the Study Area to a degree which results in a significant impact to the species.

The most recent record for the South-eastern hooded Robin (2018) is associated with the most south-eastern point of the Project boundary for Cannie WF, within native vegetation associated with Avoca River.

This species prefers dry eucalypt and acacia woodland and shrubland habitats with an open understorey and adjacent grassy clearings with a complex ground layer (DCCEEW, 2023). Within the Study Area patches of native vegetation that relatively large (potentially larger than 10 ha in agricultural landscapes) are likely to support this species. These continuous or larger, connected patches, are typically associated with remnant vegetation along Back Creek or Avoca River, consistent with the records within, and adjacent to, the Study Area. It is unlikely that this species would utilise cropping, scattered paddock trees, small patches associated with roadside reserves within the Study Area. Areas of dry eucalypt that are open, particularly where records are observed and contiguous habitat may occur, may comprise habitat critical to the survival of this species.

A further seven species were considered to have the “potential” to occur within the Study Area, on the basis of records in the locality, distribution and potential habitat availability. These species and all avifauna. All species, and their EPBC Act listing, include:

- Southern Whiteface (*Aphelocephala leucopsis*), Vulnerable.
- Curlew Sandpiper (*Calidris ferruginea*); Critically Endangered.
- Brown Treecreeper (south-eastern) (*Climacteris picumnus victoriae*), Vulnerable.
- Grey Falcon (*Falco hypoleucos*), Vulnerable.
- Pink Cockatoo (*Lophochroa leadbeateri leadbeateri*), Endangered.
- Blue-winged Parrot (*Neophema chrysostoma*), Vulnerable.
- Diamond Firetail (*Stagonopleura guttata*), Vulnerable.

Species that have the potential to occur within the Study Area are often those species that are highly mobile, have broad habitat requirements and have records within the locality. It should be noted that the potential species listed above have the potential to occur within the Study Area due to the presence of habitat that may support and ecological function. However, desktop assessment finds that high quality habitat that may support these populations are more likely to be absent and will need to be confirmed following further field efforts. Of the seven potential species, only four have known records associated with the Study Area. These three species include the Curlew Sandpiper, Southern Whiteface and Brown Treecreeper (South-eastern). All of these records are associated with Kerang Wetlands and the numerous records that are observed with the VBA datasets in and around these higher quality habitats. As such, the potential utilisation within the Study Area may be limited to smaller, lower quality patches of habitat.

3.5.1.2 MIGRATORY FAUNA

From the desktop database searches, a total of 19 fauna species listed as migratory under the EPBC Act were identified and subsequently assessed under a LoO (Appendix D). Of these species, two species, the Curlew Sandpiper and the Eastern Curlew (*Numenius madagascariensis*) are both listed as Critically Endangered. Of the 19 fauna species assessed, 10 have been assessed as having the potential to occur within the Study Area, and nine have been considered unlikely to occur.

Of the nine migratory fauna species with potential to occur, all are avifauna and similar to listed threatened species under the EPBC Act, are primarily associated with distribution and occurrence within and adjacent to Kerang Wetlands. The nine migratory avifauna with potential to occur are:

- Curlew Sandpiper.
- Caspian Tern (*Hydroprogne caspia*).
- Common Greenshank (*Tringa nebularia*).
- Marsh Sandpiper (*Tringa stagnatilis*).
- Common Sandpiper (*Actitis hypoleucos*).
- Fork-tailed Swift (*Apus pacificus*).
- Sharp-tailed Sandpiper (*Calidris acuminata*).
- Pectoral Sandpiper (*Calidris melanotos*).
- Red-necked Stint (*Calidris ruficollis*).
- Double-banded Plover (*Charadrius bicinctus*).

With the exception of the Fork-tailed Swift, all other genera of migratory fauna are associated with the order Charadriiformes. A diverse order which includes all shorebirds that typically migrate over long distances, mix in large flocks and inhabit edges of wet, wooded areas (McCain, 2015; Message & Taylor, 2016). As such, potential occupancy would likely be associated with any inundated areas of wetlands within the Study Area. Given the proximity of high-quality habitat in the Kerang Wetlands to the east of the Study Area and the lower quality, infrequently inundated, relatively small wetlands present within the Study Area, occupancy within the Study Area is likely to be infrequent and uncommon with functionality limited to opportunistic foraging and dispersal.

The Fork-tailed Swift is a non-breeding migratory visitor to Australia with widespread but scattered records of observation. This species typically presents in Vicotria through December-January before returning to breeding habitat in the northern hemisphere in April (Commonwealth of Australia, 2015), 2015). The species, like all species within the Apodidae family, are highly aerial, sometimes exclusively, fast-flying and insectivorous (Allaby, 2020; Higgins, 1999). They can occur over a variety of habitats with a tendency to occur over dry or open habitats. Roosting is considered uncommon in occurrence, but where roosting has been recorded it has occurred in emergent trees in woodland and on bare ground (Newell, 1930; Campbell, 1900).

3.5.2 FFG ACT THREATENED FAUNA

Three threatened fauna species under the FFG Act were considered ‘known’ and “likely’ to occur within the Study Area from the LoO assessment (Appendix D). The species considered

'known' to occur within the Study Area, the South-eastern hooded Robin and the Plains Wanderer, are additionally listed under the EPBC Act and are discussed in **Section 3.5.1**. One additional species, the Eastern Bearded Dragon (*Pogona barbata*) is listed as Vulnerable under the FFG Act and is considered 'likely' to occur within the Study Area. The preferred habitat of the Eastern Bearded Dragon are trees in woodlands and dry sclerophyll forests and is considered a common reptile in south-east Australia but anecdotally considered on the decline (Wotherspoon, 2007). This species is likely to use or inhabit most of the habitats within the Study Area as microhabitat including fallen logs or vegetation cover which are often readily available for this species within most observed habitats. However, multiple threats occur within the Study Area that reduce the viability and potential of population viability for this species. Fox and cats are likely abundant within the Study Area, these two invasive species known to predate on juveniles and eggs, and farming equipment and regular crop disturbance, and road infrastructure introduces known threats that remove breeding individuals from populations (Wotherspoon, 2007). The Central Bearded Dragon (*Pogoda vitticeps*), not listed as threatened under the FFG Act, may also occur across this region and are often confused with the Eastern Bearded Dragon, though the Study Area is towards the southern extent of known records. Further surveys may be required to determine presence of the Eastern Bearded Dragon and habitat utilisation and functionality.

A further 18 fauna species were considered to have 'potential' to occur within the Study Area. These species and their FFG Act listing are outlined below:

- Avifauna
  - Brolga (*Antigone rubicunda*), Endangered;
  - Plumed Egret (*Ardea intermedia plumifera*), Critically Endangered;
  - Australian Bustard (*Ardeotis australis*), Critically Endangered;
  - Curlew Sandpiper, Critically Endangered;
  - Grey Falcon, Vulnerable;
  - Black Falcon (*Falco subniger*), Critically Endangered;
  - Australian Gull-billed Tern (*Gelochelidon macrotarsa*), Endangered;
  - White-bellied Sea-Eagle (*Haliaeetus leucogaster*), Endangered;
  - Little Eagle (*Hieraaetus morphnoides*), Vulnerable;
  - Caspian Tern, Vulnerable;
  - Pink Cockatoo, Critically Endangered;
  - Diamond Firetail, Vulnerable;
  - Common Greenshank, Endangered;
  - Marsh Sandpiper, Endangered; and
  - Common Sandpiper, Vulnerable.
- Mammals
  - Fat-tailed Dunnart (*Sminthopsis crassicaudata*), Vulnerable.
- Reptiles
  - Hooded Scaly-foot (*Pygopus schraderi*) Critically Endangered; and
  - Lace Monitor (*Varanus varius*); Vulnerable.

Species considered to have potential to occur either have a record within 10 km of the Study Area or have a modelled distribution that occurs across the Study Area and have elements of potential habitat present that may be used by individuals or populations. Further assessment of the Study Area will further refine the assessment of 'potential' species occurrence within the identified habitat types.

3.6 WETLANDS AND HYDROLOGY

3.6.1 STATE LISTED WETLANDS

Review of the DEECA current wetlands registry confirms there are 19 state-listed wetlands, of which 18 are unnamed. The only named wetland located within the Study Area is the Yassom Swamp, where a small parcel of the allocated boundary of the wetland intersects with the eastern boundary, adjacent to the Yassom Swamp Conservation Area. Wetlands within the Study Area are outlined within **Table 3-4**, and are illustrated, along with important wetlands in the Study Area in **Figure 3-6**.

TABLE 3-4 WETLANDS WITHIN THE STUDY AREA

Wetland ID	Name	Wetland Type	Water regularity
43263		Temporary freshwater swamps	Periodically Inundated - Episodic
43122		Unknown	Periodically Inundated - Episodic
43124		Temporary freshwater swamps	Periodically Inundated - Episodic
43108		Unknown	Periodically Inundated - Seasonal or Episodic
43109		Temporary freshwater swamps	Periodically Inundated - Episodic
43119		Unknown	Periodically Inundated - Episodic
43107		Temporary freshwater marshes and meadows	Periodically Inundated - Seasonal or Episodic
43117		Temporary freshwater marshes and meadows	Periodically Inundated - Episodic
43128	Yassom Swamp	Unknown	Periodically Inundated - Seasonal or Episodic
43255		Temporary freshwater swamps	Periodically Inundated - Seasonal or Episodic
43264		Temporary freshwater swamps	Periodically Inundated - Episodic
43258		Temporary freshwater swamps	Periodically Inundated - Episodic
43262		Temporary freshwater swamps	Periodically Inundated - Episodic
43265		Temporary freshwater swamps	Periodically Inundated - Episodic
43257		Temporary freshwater swamps	Periodically Inundated - Episodic
43256		Temporary freshwater marshes and meadows	Periodically Inundated - Episodic
43261		Temporary freshwater marshes and meadows	Periodically Inundated - Episodic

Wetland ID	Name	Wetland Type	Water regularity
43282		Temporary freshwater swamps	Periodically Inundated - Episodic
43114		Temporary freshwater swamps	Periodically Inundated - Episodic

3.6.2 WETLANDS OF INTERNATIONAL IMPORTANCE

There are no wetlands of international importance within the Study Area. One (1) wetland of international importance is recognised to occur within the Study Area, the Kerang Wetlands. The Kerang Wetlands was designated as a Ramsar Wetland on 15 December 1982, meeting the following criteria:

- 1(a): it regularly supports 10 000 ducks, geese and swans; or 10 000 coots or 20 000 waders.
- 1(b): it regularly supports 1% of the individuals in a population of one species or subspecies of waterfowl.
- 2(b): it is of special value for maintaining the genetic and ecological diversity of a region because of the quality and peculiarities of its flora and fauna
- 3: it is a particularly good example of a specific type of wetland characteristic of its region.

The criteria have been updated since listing in 1982. The site meets current (2005) Criteria 1, 2, 3, 4, 5 and 6 of the nine Ramsar criterion.

The Kerang Wetlands are a mosaic of various wetland types, with the Site comprising 23 named lakes, marshes and swamps varying in depth and salinity. The Site covers an area of 9,419 ha and is located on the lower reaches of the Avoca and Loddon Rivers and the Pyramid Creek near the town of Kerang. The associated group of wetlands extends in a south-easterly chain from Lake Tutchewop in the north to Hird Swamp Wildlife reserve southeast of the town of Kerang. The nearest associated wetland to the Study Area is Third Marsh wetland (ID948) within the Koorangie Wildlife Reserve, located approximately 3 km east of the north-eastern boundary of the Study Area.

The Kerang Wetlands is known to support a high diversity and abundance of avifauna, especially waterbirds. This includes 25 species that are threatened in Victoria and 21 species listed under international bilateral agreements for migratory bird species (Bonn, JAMBA, CAMBA or ROKAMBA). Average annual counts for waterbirds at this site is 31,772 between the years 1979-2003, indicating that the Site regularly supports more than 20,000 waterbirds (a criteria of listing at the time). **Figure 3-6** below presents the wetlands within the Study Area.

The Project is committed to a minimum setback of 65 m from waterways and wetlands, and the WTG and associated project infrastructure will be positioned to ensure that any fauna and flora that depend on the significant waterway would not be significantly impacted.

LAKE BOGA
LONG LAKE
LAKE MANNAOR
ROUND LAKE
GOLF COURSE LAKE
AVOCA FLOODWAY
LAKE TUTCHEWOP
LAKE WILLIAM
KANGAROO LAKE
THIRD MARSH
KERANG WETLANDS
RACECOURSE LAKE
SECOND MARSH
YASSOM SWAMP
THIRD MARSH
FIRST MARSH
CULLENS LAKE
LAKE LOOKOUT
LAKE BAEL
BAEL
SALT LAKE
SAND HILLS LAKE
SANDHILL LAKE
LAKE GILMORE
LITTLE SPECTACLE LAKE
GREAT SPECTACLE LAKE
LAKE MEERING
QUAMBATOOK SEWAGE FARM

Legend
- Study Area
- Cadastre
- Ramsar Wetlands
- DEECA Current Wetlands

Victoria
Melbourne

Coordinate System: GDA2020 MGA Zone 54
Date: 26/03/2024
Created By: CS
Drawing Size: A3
0 1.5 3 4.5KM
1:150,000

F3-6 Wetlands within the Study Area

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4. LEGISLATIVE IMPLICATIONS

4.1 COMMONWEALTH LEGISLATION

4.1.1 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The desktop assessment has identified 20 fauna and two flora species, as well as three TECs, listed under the EPBC Act which are 'known', 'likely' or have the 'potential' to occur within the Study Area as assessed under the LoO.

It is recommended that these species are assessed further throughout the detailed assessment and given the potential for MNES to be adversely affected by the Project, a referral under the EPBC Act may be necessary. Continued assessment of MNES includes targeted surveys to determine potential extent of presence and potential habitat assessment mapping (where verified presence in-field or assessed as 'likely' to occur) to determine potential extent of impacts to any MNES.

All threatened avifauna are likely to have a baseline of adequate survey and detection probability with the current program of bird and bat utilisation surveys undertaken as part of the 24-month seasonal data collection effort to inform and support detailed referral information, avifauna and bat management plans and collision risk modelling. Nocturnal surveys may be undertaken for relevant threatened fauna that require detection outside of diurnal target surveys. This includes Plains Wanderer, a species known to occur within the Study Area and any threatened nocturnal owl such as owl species. Spotlighting for these avifauna would also contribute to the detection of arboreal mammals and reptiles.

Targeted surveys for threatened flora will be conducted in suitable habitats and at optimal seasonal timing for particular species. Determination of the presence and extent of TECs will also be undertaken.

4.1.1.1 IMPACTS TO BIRDS AND BATS

The Project has the potential to impact avifauna and microchiropteran bats and continued assessment of these values is recognised as important throughout the Project's approvals process. The *Onshore Wind Farms – Interim guidance on bird and bat management* (DAWE, 2021) provides technical guidance and areas of focus to ensure that potential impacts to avifauna and microchiropteran species are appropriately captured and assessed. The guidance documents reference undertaking eight seasonal surveys over 24 months to inform risk assessment, management plans and collision risk modelling for any wind farm project with the potential for interaction of EPBC Act listed species.

From this, the Project has already commenced site utilisation surveys commensurate with the objective of the guidance documents and the primary aim of completing assessments for both commonwealth and state referrals. Surveys undertaken by ERM have already commenced investigation in accordance with the guidelines for Level Two diurnal bird surveys prescribed in *Wind Farms and Birds: Interim Standards for Risk Assessment report* (AusWEA, 2005). Level Two investigations provide an indication of site utilisation by species that are at risk of potential turbine collision and associated injury/mortality and will be the likely scope of investigations throughout the remaining seven utilisation surveys unless a high potential for

risk is foreseen (typically for threatened species observed within the RSA, or congregations of at-risk flocking birds).

To date, utilisation surveys have determined that a range of birds occur widely over the landscape, with large, mobile birds (typically birds of prey) likely at more risk than within the RSA than smaller birds. No threatened species have been observed at risk of Project activities to date. Continued survey effort will be conducted throughout the austral spring and summer periods where migratory birds transition into southern Australia. Given the proximity to internationally recognised wetlands and wetlands mapped on site, these surveys will be critical to ascertaining potential risk to a large group of threatened and listed migratory species as well as the deployment of bat detection hardware in this period, to detect relevant microchiropteran species.

4.2 STATE LEGISLATION

4.2.1 ENVIRONMENT EFFECTS ACT 1978

The *Ministerial Guidelines for Assessment of Environmental Effects under the Environment Effects Act 1978* (DSE, 2006) outlines the triggers for referral of a project to the Victorian Minister for Planning who determines if an Environment Effects Statement (**EES**) is required. Criteria relevant to flora and fauna are broadly summarised in **Table 4-1** to include:

TABLE 4-1 ASSESSMENT AGAINST RELEVANT BIODIVERSITY REFERRAL CRITERIA OF THE EE ACT

Referral Criteria	Criteria met	Comments
Potential clearing of 10 hectares or more of native vegetation from an area that: ▪ is of an EVC identified as endangered in the bioregion; or ▪ is, or is likely to be, of very high conservation significance; and ▪ is not authorised under an approved Forest Management Plan or Fire Protection Plan.	Potentially	While the Study Area comprises extensive areas of cropping and modified landscapes, and the understanding that due to this inherent flexibility the Project design is likely to avoid impacts to most native vegetation recorded within the Study Area, the occurrence of native vegetation within roadside reserves representing relatively higher quality patches are less easily avoided. Where road widening and development occurs that cannot avoid roadside reserves, 10 ha may be accumulated in impact quickly.
Potential long-term loss of a significant proportion of known remaining habitat or population of a threatened species within Victoria.	Unlikely	While various threatened species and communities are recorded within the Study Area, micrositing of infrastructure is likely to avoid habitat doe these items.
Potential long-term change to the ecological character of a wetland listed under the Ramsar Convention or in 'A Directory of Important Wetlands in Australia' (Environment Australia 2001).	No	Impacts to waterways, in particular the Avoca River that flows into the Kerang Wetlands Ramsar site, are unlikely to occur with Project controls. This will ensure that long-term change to these wetlands does not occur.
Potential extensive or major effects on the health or biodiversity of aquatic, estuarine	No	Impacts to aquatic, estuarine or marine ecosystems are unlikely to occur with relevant Project controls in place throughout development.

Referral Criteria	Criteria met	Comments
or marine ecosystems, over the long term.		

Given the potential for impacts to native vegetation and the scale of the Project, where 10 ha of vegetation cannot be readily avoidable, a referral under the EES is recommended.

4.2.2 FLORA AND FAUNA GAURANTEE ACT 1988

The FFG Act is the key piece of Victorian legislation for the conservation of threatened species and communities for the management of potentially threatening processes. Under the FFG Act, a permit is required from DEECA to take (kill, injure, disturb or collect) threatened or protected flora species from public land.

This assessment identified 74 flora and 56 fauna species, as well as five FFG Act communities relevant to the Study Area. Many of these species and communities are unlikely to occur based on records outside of the Study Area, an absence of suitable habitat, or inability to meet diagnostic thresholds. However, those outlined matters assessed as 'known', 'likely' or having the 'potential' to occur within the Study Area may occur across a variety of habitats present, but more likely within higher quality remnant patches. It is recommended that vegetation outlined as constrained (as per EcoLink reports) are avoided in detailed design, and subsequently development. Where constraints have not yet been identified, such as areas that are yet to be surveyed due to Project boundary expansions, areas that are clearly delineated as cropping should be referenced for design prior to being able to survey potential areas of native vegetation.

Where avoidance is not able to be provided for native vegetation, targeted surveys may be undertaken for threatened species that potentially inhabit those areas. Where the Project has the potential to impact biodiversity, public authorities (including DELWP and local councils) are able to consider the objective of the Act when making an assessment. Such authorities may require surveys or assessment of particular matters where an assessment of the Project's potential impacts are unclear or of interest.

The FFG Act also provides listings for flora species as 'protected' on public land. Species listed as protected identified in this assessment are outlined in Appendix C. This listing is not considered a 'threatened' listing, though a plant may be listed as both 'threatened' and 'protected' under the Act. A 'protected' listing requires an approved 'protected flora license or permit' from DELWP prior to their removal when located on public land. This is typical within road reserves where surveys are required.

4.2.2.1 BROLGA ASSESSMENT AND MITIGATION STANDARDS

The Brolga is listed as Endangered under the FFG Act and DEECA has recognised that wind energy facilities within the distribution of the species has potential to impact breeding and flocking success, resulting in increased population decline. Proponents of wind energy facilities are obliged to consider the *Draft Brolga Assessment and Mitigation Standards* (DELWP, 2022) in the planning permit applications for such facilities.

The *Draft Brolga Assessment and Mitigation Standards* requires a stepped approach to determining the habitat type and potential likely impact on Brolgas from a wind energy facility. A high-level consideration of the Brolga and the potential for interaction with activities within the Study Area has already been undertaken (available within Appendix A) and conclusions drawn on the assessment pathway and potential for impact are similar. The stepped approach of the *Draft Brolga Assessment and Mitigation Standards* comprises:

- Step 1: Map the assessment area for the proposed wind energy facility.
    - The wind energy facility has included a 5 km buffer surrounding the Study Area (within Appendix A). Updated Project boundaries since the original high-level consideration has resulted in a new assessment area.
- Step 2: Determine whether the assessment area is within the Brolga area of interest.
    - The assessment area is within the brolga area of interest, with the exception of a small portion the northern section of the Study Area. Any wetlands located outside of this area of interest are not liable to assessment under the *Draft Brolga Assessment and Mitigation Standards.*
- Step 3: Determine whether the wind energy facility site is within the Brolga no-go flocking areas.
    - The assessment area is not within a known flocking area. All mapped flocking areas are located south of the Study Area.
- Step 4: Identify suitable breeding wetlands.
    - **Step 4.1 – obtain mapped wetland polygons**
        - **Figure 4-1** identifies all mapped wetlands within the assessment area using the Victorian Wetland Inventory (Current) data layer.
        - Two site visits completed as part of the preliminary ecological analysis have observed all mapped wetlands (current) within the Study Area to be absent of water. One of these studies was outside of the Brolga breeding season (March 2022) where evidence of water absence is not relevant to potential breeding habitat suitability. However, absence of wetlands holding water in the most recent site survey within the breeding season (August 2023) strengthens the current base assumption that that most of the wetlands within the Study Area are unlikely to provide suitable breeding habitat.
        - Further assessment of the wetlands within the Study Area is required to assist where wetlands (and associated infrastructure exclusion buffers) can be excluded.
    - **Step 4.2 – identify any wetlands that are not mapped**
        - No additional wetlands were noted within the Study Area during the current assessment.
    - **Step 4.3 – manage unknown wetland types**
        - Of the 19 wetlands within the Study Area, there are four wetland types that are unknown, as wetland type data was not provided. All other the remaining

wetlands are demonstrated as either temporary freshwater swamp or temporary freshwater marshes and meadows. The four unknown wetlands, if within the Brolga area of interest, onsite inspection to determine water type will be required.

- **Step 4.4 – obtain Brolga breeding records**
  - There are no additional breeding records within 5 km of the Study Area since the original breeding record search as conducted in 2022.
- **Step 4.5 – apply habitat criteria to identify suitable breeding wetlands within the assessment area**
  - Buffers on potential brolga habitat are observed on **Figure 4-1**. All current wetlands are provided buffers as further assessment is required to exclude wetlands that will not hold sufficient water. All current wetlands are currently assessed isolated breeding wetlands or group(s) of breeding wetlands and so are provided with a buffer of 900 m for preliminary infrastructure planning purposes if situated within the brolga are of interest.

- Step 5: Outcome and next steps.
  - Where the steps above identify breeding wetlands then breeding habitat buffers (900 m) will apply. Where further assessment is completed, and wetlands can be excluded from representing suitable breeding habitat, then buffers will not apply. Steps that can be taken to exclude wetlands can include:
    - Wetland observations through the Brolga breeding season to verify water permanence and vegetation structure to discount potential selection by the species.
    - Aerial/satellite imagery analysis of wetlands over the previous 10 years for water occurrence during the Brolga Breeding season.
    - Contour analysis to determine wetland occurrence is valid (i.e. land depression mapped incorrectly).
    - Hydrological analysis of waterflow of any wetland that has constructed water retention facilities (i.e., farm dams) interfering with natural anticipated water flow to the mapped wetland.

Legend

- Study Area
- State Wetlands
- Brolga infrastructure exclusion buffer (900m)
- Brolga Area of Interest

Coordinate System:
GDA2020 MGA Zone 54

Date: 26/03/2024

Created By: CS

Drawing Size: A3

0 0.8 1.6 2.4KM

1:80,000

F4-1 Brolga Assessment Area

Cannie Wind Farm

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ERM

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4.2.3 PLANNING AND ENVIRONMENT ACT 1987

The Project will require a planning permit from the Shire of Gannawarra Council under Clause 52.17 of the planning scheme prior to the removal, destruction or lopping of native vegetation (DELWP, 2017). Vegetation quality assessments will need to be undertaken within the final development footprint where detailed design cannot locate wind and solar farm infrastructure within areas currently cleared or used for cropping. Determination of access route will be key in reducing road potential widening activities and site access points where small amounts of clearing to native vegetation can quickly accumulate.

Some areas of roadside vegetation are overlayed by the vegetation protection overlay, outlined on the planning scheme as VPO1 and VPO2. Vegetation protection overlays are provided for areas within a planning scheme to protect areas of significant vegetation and to ensure that development minimises loss of vegetation and to preserve existing trees and other vegetation. VPO1 is relevant to roadside and corridor protection and a permit is required to remove, destroy or lop native vegetation on land within the road reserve and within 50 metres of the road reserves designated by this overlay. VPO2 is relevant to remnant vegetation and a permit is required to remove, destroy or lop any vegetation, other than vegetation which is not native vegetation. Areas of VPO1 and VPO2 should be avoided and buffered where possible for retention.

Under the *Planning and Environment Act 1987* the Project must also consider Clause 12.01 – Biodiversity, whereby the objective of clause 12.01 is to consider biodiversity with an outcome to protect and enhance Victoria's biodiversity. Similar to the nature of the FFG Act, this provides council the opportunity to raise matters of biodiversity under assessment which can include cumulative impacts, fragmentation, spread of pests and invasive species and impacts to important species and communities. Further, the clause states that the following policy documents must be considered as relevant:

- Any applicable biodiversity strategies, including the relevant Regional Catchment Strategy (prepared under Part 4 of the CaLP Act 1994 (CaLP Act).
- Guidelines for the removal, destruction or lopping of native vegetation (DELWP, 2017).
- Protecting Victoria's Environment – Biodiversity 2037 (DELWP, 2017).
- Victorian Waterway Management Strategy (DEPI, 2013).

4.2.4 *WILDLIFE ACT 1975* AND *WILDLIFE REGULATIONS 2020*

Project activities may potentially result in injury and/or mortality during construction and operations. All native vertebrates are protected under the *Wildlife Act 1975* and the Project must ensure due care when conducting construction activities within the Study Area. A Construction Environment Management Plan should address the potential for interaction with wildlife during construction activities (such as fauna spotted catchers salvaging during clearing, exclusions zones, and traffic rules).

4.2.5 CATCHMENT AND LAND PROTECTION ACT 1994

Primary considerations of the CaLP Act relate to invasive plants and animals in Victoria, as well as matters relating to soil and water. Under the CaLP Act, all landowners are legally required to manage declared noxious weeds and pest animals on their land which means undertaking reasonable steps to:

- Eradicate regionally prohibited weeds.
- Prevent the growth and spread of regionally controlled weeds.
- Prevent the spread of – and as far as possible eradicate – established pest animals on their land.

Only one noxious weed, Horehound, has so far been identified on site in the Study Area, though additional species are likely to be found through the detailed vegetation assessment of the Project footprint.

The spread of noxious weeds will need to be controlled through the implementation of various protocols or management measures throughout construction and operations. Measures for control with be detailed in a Construction Environmental Management Plan (CEMP) and Operation Environmental Management Plan (OEMP). These protocols may include a range of mitigation measure to prevent weed establishment or spread but may also include removal of existing weeds where identified. These methods may include:

- Application of herbicides;
- Cultivation of the soil;
- Physical removal; and
- Mulching.

Further, given the identification of rabbit within the Study Area, the eradication or control of this species may be undertaken which includes ripping and sealing all entrances to any warrens.

5. CONCLUSION AND RECOMMENDATIONS

Ecological values of the Study Area are more likely to be encountered in areas of contiguous habitat and connectivity. This primarily includes areas of the east and south-east of the Study Area where Avoca River, Back Creek, associated minor tributaries and some parcels of conservation reserves form corridors of higher quality, though road reserves may also present as important patches of native vegetation. These areas present potential constraints to the development of the Project, some of which have been known and highlighted for input to the design phase (EcoLink constraint mapping).

The Project will likely require referral under the EPBC Act and the EE Act to determine the process for further assessment as the potential to exceed 10 ha of impact to native vegetation is possible and threatened flora and fauna have the potential to be adversely affected by the Project. Refer to **Table 5-1** which summarises the listed matters that may require referral under the EPBC Act and the EE Act. Prescribing to this assessment process will require additional investigation of the Project footprint to ensure that relevant biodiversity values are identified and adequately protected where required.

TABLE 5-1 SUMMARY OF LISTED MATTERS RELEVANT TO THE STUDY AREA

Listed matter	EPBC Act listing	FFG Act listing	Occurrence in the Study Area
Flora			
Umbrella Wattle		Critically Endangered	**Known.** Recorded in the Study Area (Ecolink, 2022).
Buloke		Critically Endangered	**Known**. Recorded in the Study Arae during field surveys and by Ecolink (2022).
Buloke Mistletoe		Critically Endangered	**Known.** Recorded in the Study Area (Ecolink, 2022).
Rough-seed Wire-grass		Endangered	**Known**. Recorded within the Avoca SF region of the Study Area (solar farm) boundary (VBA). Suitable habitat exists.
Long-awn Spear-grass		Endangered	**Known**. Records within the Study AreaRecorded within wind farm boundary (VBA). Suitable habitat exists.
Frosted Goosefoot		Endangered	**Likely.** Chenopodium desertorum subsp. microphyllum recorded by Ecolink (2022).
Grassland Bindweed		Endangered	**Known.** Records within the Study AreaRecords within Wind Farm boundary (VBA).
Late-flower Flax-lily		Critically Endangered	**Likely**. Recorded in locality. Riverine habitat associated with Back Creek and Avoca River present, and potentially high quality.
Cane Grass		Critically Endangered	**Known.** Records within the Study Area. Records within wind farm boundary.
Bristly Love-grass		Endangered	**Likely**. Records within the locality, higher quality habitat for this species may be present in the Study Area
Scaly Mantle		Endangered	**Known.** Records within the Study Area. Records within wind farm boundary.
Long Eryngium		Endangered	**Known.** Records within the Study Area (wind farm) boundary.
Veined Peppercress		Endangered	**Likely**. Recorded in locality and quality habitat exists in the Study Area.
Chariot Wheels	Vulnerable	Endangered	**Known**. Habitat present. Numerous VBA records throughout the Study Area. Unidentified *Maireana* species recorded by Ecolink (2022) may represent species which requires the presence of fruit for definitive identification.
Bush Minuria		Vulnerable	**Known.** Records within the Study Area (wind farm) boundary.
Smooth Minuria		Vulnerable	**Known.** Records within the Study Area. Records within wind farm boundary.
Yakka Grass		Endangered	**Known.** Records within the Study Area. Records within wind farm boundary.

Listed matter	EPBC Act listing	FFG Act listing	Occurrence in the Study Area
Downy Swainson-pea		Endangered	**Known.** Records within the Study Area. Records within wind farm boundary.
Round Templetonia		Endangered	**Known.** Records within the Study Area. Records within wind farm boundary.
Fauna			
Plains Wanderer	Critically Endangered	Critically Endangered	**Known.** Records within the Study Area. Records within wind farm boundary.
South-eastern Hooded Robin	Endangered	Vulnerable	**Known.** Records within the Study Area. Records within wind farm boundary.
Eastern Bearded Dragon		Vulnerable	**Likely.** Recorded in locality and quality habitat exists in the Study Area.
Threatened Ecological Communities (EPBC Act)			
Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions	Critically Endangered		**Likely.** TEC within known distribution of the Study Area and canopy species has a high potential to form TEC.
Mallee Bird Community of the Murray Darling Depression	Endangered		**Potential.** TEC within potential distribution and reliant on composition of common avifauna known to area.

5.1 RECOMMENDATIONS

There are a variety of steps to consider in order to reduce potential impacts to biodiversity values and to assist with streamlining the assessment process. As such, the following mitigation strategies for the Project include:

- The development footprint will be designed to avoid recognised constraints, and where constraints cannot be avoided, further investigations of these constraint will be made to anticipate any potential impacts and develop appropriate mitigation and management measures.
- Where a development footprint is progressed, detailed vegetation assessment will be undertaken within the footprint to:
    - Determine the extent and quality of native vegetation.
    - Determine the potential for protected community assemblages and flora species to be present.
    - Determine the potential for occurrence of habitat for threatened species.

  - Confirm targeted surveys (as outlined below) to be conducted.
  - Identify potential practicable and reasonable recommendations to mitigate the impacts of the Project on MNES.
  - Identify potential offset requirements through a Native Vegetation Report from DEECA.
  - Preparation and submission of a Planning Permit application for the removal of native vegetation under Clause 52.17 of the Gannawarra Planning Scheme.
- Further site utilisation assessment to be undertaken as planned for avifauna and microchiropteran (i.e. microbats) over the remaining seasonal timeframes prior to approval.
- Assessments throughout Brolga breeding season (July-November) to assess potential brolga breeding wetlands to determine whether infrastructure buffers remain appropriate;
- Targeted fauna surveys for the following species in their respective seasonal detection period:
  - Spotlighting within suitable habitat for Plains Wanderer.
  - Standardised searches for South-eastern Hooded Robin in areas of open woodland that cannot be avoided (such as road reserves).
  - Standardised searches for Eastern bearded Dragon in areas of open woodland that cannot be avoided (such as road reserves).
  - It is anticipated that most avifauna identified as potential to occur can be detected throughout the nominated avifauna utilisation surveys.
  - Detailed surveys will recommend further survey effort where required on additional mammals (Fat-tailed Dunnart) and reptiles (Hooded Scaly-foot and Lace Monitor) where potential habitat is identified on site.
- Targeted flora surveys within areas of suitable habitat will be undertaken at seasonally appropriate times for EPBC-listed species and TECs with the potential to occur.
- Within patches of native vegetation on public land, additional targeted flora surveys for potentially occurring species and communities threatened or protected under the FFG Act will be required where impacts are anticipated. The scopes and timing of targeted flora and ecological community surveys will be determined once detailed vegetation assessment is completed and habitat values are known.
- Prepare and submit two separate referrals, one under the EPBC Act for MNES and another under the EE Act for relevant referral criteria. A Bilateral Agreement should be considered if referral under the EPBC Act is declared a controlled action.

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APPENDIX A PRELIMINARY FLORA AND FAUNA ASSESSMENT, KERANG WIND AND SOLFAR FARM, VICTORIA (ECOLINK, 2022)

ecolink consulting

April 2022

Preliminary Flora and Fauna Assessment, Kerang Wind and Solar Farm, Victoria

DRAFT REPORT

Prepared for:

Umwelt (Australia Pty Ltd)

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Cover Photograph

A photograph of the study area taken during the current assessment.

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Executive Summary

Ecolink Consulting Pty Ltd was engaged by Umwelt, on behalf of RES Australia Pty Ltd, to undertake a Preliminary Flora and Fauna Assessment of a group of properties located to the west of Kerang in parts of Beauchamp, Cannie, Lalbert and Quambatook, Victoria (hereafter the study area). This Preliminary Flora and Fauna Assessment is the initial stage of ecological investigations into the feasibility of a wind and solar farm within the study area. It identifies the ecological constraints to the development of the study area and recommends ways to avoid or mitigate impacts to these biodiversity values.

The study area is located approximately 32 kilometres west of Kerang in northern Victoria. It is approximately 18,097 hectares in size, comprising 16,548 hectares of land initially identified for the wind farm and 1,549 hectares of land identified for the solar farm, located south of the Avoca River. An additional area of approximately 382 hectares of road reserve was also assessed for the current assessment. The study area is set within a rural, agricultural area, on sandy plains and is generally flat, with gentle undulations along dune formations. The majority of the study area is used for broad acre cropping, including Wheat *Triticum aestivum* and Barley *Hordeum* sp..

The study area is located within the Shire of Gannawarra municipality and is largely zoned Farming Zone. An Environmental Significance Overlay – Schedule 4 (ESO4) covers the banks of the Avoca River, and its immediate surrounds, in the east of the study area. This ESO is designed to ensure that the risk of flooding is not increased by any proposed development within these areas. A Vegetation Protection Overlay – Schedule 1 (VPO1) covers three areas of roadside vegetation, while two small areas within the study area are covered by a Vegetation Protection Overlay – Schedule 2 (VPO2). These VPOs protect significant remnant vegetation within the municipality.

A site assessment was undertaken between 14 and 17 March 2022 by Principal Ecologists, Dr Stuart Cooney and Simon Scott. Areas of potential ecological constraint were recorded during the assessment. This included:

- 1,116 hectares of very highly constrained habitat that comprised native vegetation in road reserves and some parts of the private property. These areas are likely to provide habitat to a range of threatened flora and, possibly, threatened fauna species and may represent threatened ecological communities. This represents approximately 6% of the area assessed;
- 527 hectares of highly constrained habitat that comprised the smaller, isolated patches of native vegetation within the private properties, scattered trees and scattered tree areas. These areas provide habitat to a diverse array of flora and fauna species, and may provide habitat to threatened flora and fauna species on occasion. This represents approximately 3% of the area assessed;
- Seven hectares of moderately constrained habitat that comprised areas of non-indigenous vegetation around houses and sheds, as well as in shelter belts along fence-lines. These areas provide habitat to a range of common species that persist in the landscape, particularly birds. This represents less than 0.01% of the area assessed; and,
- 16,829 hectares of areas with low ecological constraint that includes the cropped and grazed land, as well as driveways, roads (excluding the road reserves) and the dry dams that were recorded within the study area. This represents approximately 91% of the area assessed.

The areas of very high and high constraint may provide habitat to up to 30 threatened flora and fauna species that have previously been recorded within the study area, were observed during the current assessment or that have potentially suitable habitat within the study area. This includes:

- Black Falcon *Falco subniger* (*Flora and Fauna Guarantee Act 1988* (Vic) (FFG Act): Critically Endangered);
- Bristly Love-grass *Eragrostis setifolia* (FFG Act: Endangered);
- Buloke *Allocasuarina luehmannii* (FFG Act: Vulnerable);
- Buloke Mistletoe *Amyema linophylla* subsp. *orientalis* (FFG Act: Critically Endangered);
- Bush Minuria *Minuria cunninghamii* (FFG Act: Vulnerable);
- Cane Grass *Eragrostis australasica* (FFG Act: Critically Endangered);
- Chariot Wheels *Maireana cheelii* (FFG Act: Endangered and *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act): Vulnerable);
- Club-hair New Holland Daisy *Vittadinia condyloides* (FFG Act: Endangered);
- Diamond Dove *Geopelia cuneata* (FFG Act: Vulnerable);
- Downy Swainson-pea *Swainsona swainsonioides* (FFG Act: Endangered);
- Fine-hairy Spear-grass *Austrostipa puberula* (FFG Act: Endangered);
- Frosted Goosefoot *Chenopodium desertorum* subsp. *desertorum* (FFG Act: Endangered);
- Grassland Bindweed *Convolvulus graminetinus* (FFG Act: Endangered);
- Hairy Tails *Ptilotus erubescens* (FFG Act: Critically Endangered);
- Hooded Robin *Melanodryas cucullata* (FFG Act: Vulnerable);
- Hooded Scaly-foot *Pygopus schraderi* (FFG Act: Critically Endangered);
- Inland Pomaderris *Pomaderris paniculosa* subsp. *paniculosa* (FFG Act: Endangered);
- Late-flower Flax-lily *Dianella tarda* (FFG Act: Critically Endangered);
- Little Eagle *Hieraaetus morphnoides* (FFG Act: Vulnerable); and,
- Long Eryngium *Eryngium paludosum* (FFG Act: Endangered);
- Pepper Grass *Panicum laevinode* (FFG Act: Vulnerable);
- Plains-wanderer *Pedionomus torquatus* (FFG Act: Critically Endangered and EPBC Act: Critically Endangered).
- Round Templetonia *Templetonia egena* (FFG Act: Endangered);
- Scaly Mantle *Eriochlamys squamata* (FFG Act: Endangered);
- Slender Darling-pea *Swainsona murrayana* (FFG Act: Endangered and EPBC Act: Vulnerable);
- Smooth Minuria *Minuria integerrima* (FFG Act: Vulnerable);
- Umbrella Wattle *Acacia oswaldii* (FFG Act: Critically Endangered);
- Veined Peppercress *Lepidium phlebopetalum* (FFG Act: Endangered);
- Weeping Myall *Acacia pendula* (FFG Act: Critically Endangered);
- Winged New Holland Daisy *Vittadinia pterochaeta* (FFG Act: Endangered);
- Yakka Grass *Sporobolus caroli* (FFG Act: Endangered);
- Yarran *Acacia melvillei* (FFG Act: Critically Endangered);

It is likely that these areas of high quality native vegetation, particularly in the road reserves, may also support the following nationally threatened ecological communities:

- Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions;
- Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions; and,

- Natural Grasslands of the Murray Valley Plains.

It is therefore recommended that the proposed wind and solar farm avoids these areas of high and very high ecological constraint and ensures that there are no impacts to the habitats in these locations. These areas are generally located in the east and south of the study area, with less significant ecological values observed in the west and north of the study area. If the wind and solar farm cannot be designed to avoid the more highly ecologically constrained parts of the study area, targeted surveys for threatened species are recommended to determine their status within the study area, and inform the requirements of the subsequent regulatory process.

The Brolga Assessment and Mitigation Standards also require buffers around wetlands deemed suitable for a breeding Brolga *Antigone rubicunda*. Using the requirements of these standards, additional areas of the study area are constrained from development. If these constraints are limiting for the development of the study area, further work is required to exclude wetlands that are not, in fact, suitable breeding sites for this species.

A detailed flora assessment of the proposed development footprint, including a Habitat Hectare assessment, will be required to address the *Guidelines for the Removal, Destruction or Lopping of Native Vegetation*. In addition, depending on the final construction footprint, and the level of impact to ecologically constrained areas, a range of other ecological assessments are likely to be required to expand on this preliminary assessment and support a planning permit application for the proposed wind and solar farm. These assessments will also address obligations under the FFG Act and EPBC Act. Therefore, based on the relevant legislation and policies, the following recommendations are made:

- Avoid impacts to the very high and highly ecologically constrained parts of the study area identified in the current assessment. If impacts are unavoidable, undertake targeted surveys for threatened species in these areas. The results of these surveys will inform a recommendation in relation to a referral to the Department of Agriculture, Water and the Environment for impacts to Matters of National Environmental Significance under the EPBC Act;
- If road reserves require impacts to enable access to the study area for construction or operation, undertake surveys for Protected flora species under the FFG Act, so that a Permit to Take Protected Flora application can be prepared;
- Undertake a detailed vegetation quality assessment, including a Habitat Hectare assessment and Large Tree assessment within the proposed the development footprint to determine impacts and offset requirements under the *Guidelines for the Removal, Destruction or Lopping of Native Vegetation*;
- Confirm that the project does not warrant a referral to the Minister for Planning based on the proposed impacts against the referral criteria of the *Environment Effects Act 1978* (Vic)*;*
- Undertake Bird Utilisation surveys as per the *Wind Farms and Birds: Interim Standards For Risk Assessment*;
- Undertake Bat surveys to determine their status within the study area;
- Refine the areas identified as suitable breeding wetlands for Brolgas, if the current buffer zones significantly restrict development of the study area;

- Engage suitable contractors to develop a Stormwater Management Plan that ensures that there are no direct or indirect impacts to the Avoca River or the Kerang Wetlands Ramsar which are located down-stream of the study area;
- Prepare a Construction Environmental Management Plan that recommends (as a minimum):
    - Animal welfare protocols;
    - Fencing and designation of no-go areas in locations where vegetation is to be protected;
    - Undertaking weed management prior to, during and post-construction.
    - Maintenance of vehicle hygiene of vehicles entering and leaving the study area to avoid the introduction of weed or weed pathogens into the study area;
    - Implementation of sediment and erosion control prior to and during construction; and,
    - Using locally indigenous species within the plant palette for future landscaping of the site, as appropriate.

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Introduction

Ecolink Consulting Pty Ltd was engaged by Umwelt on behalf of RES Australia Pty Ltd, to undertake a Preliminary Flora and Fauna Assessment of a group of properties located to the west of Kerang in parts of Beauchamp, Cannie, Lalbert and Quambatook, Victoria (as shown on Figure 1 and hereafter referred to as the study area). RES is proposing the construction of a wind and solar farm within the study area.

The Preliminary Flora and Fauna Assessment will be the initial stage of ecological investigations to assess the viability of the wind and solar farm, and will be primarily used to identify any ecological constraints to the development of the study area. The Preliminary Flora and Fauna Assessment identifies the ecological values of the study area and discusses the implications of the project in relation to applicable national and state legislation and policies.

Therefore, the purpose of the Preliminary Flora and Fauna Assessment is to:

- Determine the ecological values of the study area;
- Evaluate any impacts that are likely to occur to any ecological values as a result of the potential loss of vegetation at the study area;
- Make recommendations to minimise or mitigate impacts to these ecological values, based on relevant legislation and policies;
- Identify significant constraints to the development of the study area; and,
- Identify and recommend the next steps required to gain regulatory approval for the development, including the scope, timing and approximate costs associated with further assessments and seeking consents under relevant national and state legislation and policies.

The Study Area

The study area for the assessment is approximately 18,097 hectares in size, comprising 16,548 hectares of land initially identified for the wind farm and 1,549 hectares of land identified for the solar farm, located south of the Avoca River. In addition to the private properties, road reserves surrounding these properties were also assessed so that comment could be made in relation to accessing the wind and solar farm, during and post construction. Approximately 382 hectares of road reserve were therefore included in the study area.

Approximately 2,765 hectares of land, that is identified as a potential location for the wind and solar farm, was not directly accessed during the current assessment (Figure 1). These properties were observed from adjacent public and private land, where access was permitted.

In addition, a high level assessment of the land surrounding the study area, to a distance of five kilometres, was undertaken to determine the ecological values of the landscape and evaluate likely impacts to birds, particularly including Brolgas *Antigone rubicunda,* of the wind farm. This landscape assessment extended to approximately 10 kilometres to include the Kerang Wetlands in the current assessment.

Despite the extensive study area for the current assessment, it is understood that a much smaller area will be required for the wind and solar farm and that the proponent will use, in part, the advice provided by this investigation to identify the best location for the facility.

Methods

Desktop Assessment

In order to determine the ecological values that have previously been recorded within the study area, and its vicinity, the following databases and literature were consulted:

- The Commonwealth Department of Agriculture, Water and the Environment's Protected Matters Search Tool (Department of Agriculture Water and the Environment 2022a) to determine Matters of National Environmental Significance, under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) Act (EPBC Act), that are modelled to occur in the vicinity of the study area;
- The Department of Land, Water and Planning's (DELWP) Victorian Biodiversity Atlas (Department of Environment Land Water and Planning 2022f) for historical records of threatened[1] flora and fauna species in the vicinity of the study area;
- Birdlife Australia's Atlas of Australian Birds for detailed records of bird observations in the vicinity of the study area;
- Planning Schemes Online (Department of Environment Land Water and Planning 2022d) to identify the planning zones and overlays relating to environmental matters e.g. Vegetation Protection Overlays, or Environmental Significance Overlays;
- DELWP's Nature Kit website (Department of Environment Land Water and Planning 2022c) to determine the current and historic vegetation that is mapped within the study area;
- DELWP'S Habitat Importance Maps and Current Wetlands cadastral data for identification of habitat for rare and threatened species and the location of wetlands identified as native vegetation within the study area;
- DELWP's Native Vegetation Information Management website (Department of Environment Land Water and Planning 2022b) to determine the quality and risk location of any native vegetation that is modelled to occur within the study area;
- Policy notes in relation the development of wind farms, including:
    - Department of Environment Land Water and Planning (2020). 'Brolga Assessment and Mitigation Standards. For Wind Energy Facility Permit Applications.' (Department of Environment Land Water and Planning: East Melbourne); and,
    - Brett Lane and Associates Pty Ltd (2005). Wind Farms and Birds: Interim Standards for Risk Assessment. Report prepared for the Australian Wind Energy Association. (Brett Lane and Associates Pty Ltd: Carlton North).

[1] Threatened flora and fauna includes species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, the Victorian *Flora and Fauna Guarantee Act 1988 - Threatened List October 2021*.

- The 'Weeds of National Significance' database (Department of Agriculture Water and the Environment 2022b); and,
- Relevant legislation and policies (as required).

Field Assessment

A site assessment was undertaken between 14 and 17 March 2022 by Principal Ecologists, Dr Stuart Cooney and Simon Scott. Both Stuart and Simon are suitably qualified and experienced to undertake such assessments and Simon holds current Vegetation Quality Assessments (Habitat Hectares) Accreditation with DELWP (Department of Environment Land Water and Planning 2022e).

Dominant flora species observed within the study area were recorded, with the exception of planted vegetation that was not considered a 'weed' (i.e. planted vegetation that was not spreading or reproducing). Where a species was not able to be confidently identified in the field, a sample was collected and later identified. Plants were identified to species level wherever possible, however, some plants that were planted, cultivars, hybrids, or plants that did not contain suitable fertile material used for identification were recorded to genus level.

Vegetation communities such as EVCs and nationally significant vegetation communities were recorded (if observed) and compared with their corresponding benchmarks or thresholds to ensure that they were accurately assigned.

A list of all fauna species observed within, and immediately surrounding, the study area was produced. This list consists of species seen, heard, or identified by other evidence of their presence (e.g. feathers, scats). Leica 12 X 50 binoculars and call mimicry/playback were used to assist in the identification species as required.

The location of all 'patches of native vegetation'[2], 'scattered' indigenous trees[3], scattered tree areas and planted vegetation was recorded using an iPad mini tablet that has an internal Global Positioning System (GPS) and the GIS Pro application (accuracy +/- five metres). The presence of hollows and birds' nests, and other significant ecological features of the landscape were also generally noted.

The presence of fauna habitat was noted, particularly in relation to potential habitats for threatened species. The greatest amount of time was spent surveying the highest quality fauna habitats (e.g. trees, water bodies, crevices or under ground debris) during the assessment.

Limitations and Qualifications

The following limitations and qualifications apply to this report:

[2] A remnant patch of native vegetation is either an area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native, or any area with three or more native canopy trees forming a continuous canopy, or any mapped wetland included in the *Current Wetlands Map*, available from DELWP.

[3] A scattered tree, is a native canopy tree that does not form a patch.

- The results of the desktop assessment are reliant on data obtained from various databases and other reports. These databases all have internal vetting procedures, however the accuracy of these historical data and some of the results provided within these reports cannot be verified. The desktop assessment does, however, rely on the most accurate data available.
- As with all ecological assessments, a greater survey effort is likely to yield additional flora and fauna records. Where these additional flora and fauna records may alter the recommendations made within this report (e.g. where additional threatened species may utilise habitats within the study area, or where threatened species may be impacted by the proposed works), further assessment has been recommended within this report, depending on the implications of relevant policies and legislation.
- Where access to some private properties was not granted, the location of native vegetation, scattered trees and planted vegetation was not recorded. Instead the general land use of these properties was noted, as well as significant ecological differences between these properties and the other part of the study area (i.e. potential ecological red flags for these properties).
- Some flora and fauna species may only be recorded during certain times or seasons (e.g. plants that only contain above-ground biomass and are only visible annually, nocturnal mammals and birds, migratory birds, or fauna identified through seasonal breeding calls such as some frog species).
- A vegetation quality assessment, as required by the *Guidelines for the Removal, Destruction or Lopping of Native Vegetation* (the Guidelines) (Department of Environment Land Water and Planning 2017) under Clause 52.17 of the Planning Scheme has not been undertaken for this preliminary assessment. Where native vegetation is to be impacted a detailed assessment of this vegetation will be required, as stated in the recommendations section of this report.
- The mapping of vegetation within the study area is preliminary in nature. It is expected that it will be refined when a smaller disturbance footprint is proposed. At this time, some areas marked as patches may be downgraded to scattered tree areas and vice versa. In addition the size of patches is likely to change and the detailed assessment plots the drip-line of trees, as per the requirements of the Guidelines.
- Mapping was undertaken using a combination of georeferenced maps, GPS and printed maps showing aerial photography. As a result the location of some fences and property boundaries within the landscape did not align with expectations. Nonetheless, the buffers proposed within this report to protect ecological values will ensure that vegetation not marked near boundaries (because it was assumed to belong to a neighbouring property), will not be impacted by proposed works (unless the final development plan so dictates).

On the basis of the above, the author has made an informed decision about the likely presence of threatened species that may be present, or that may utilise habitats within the study area, based on a detailed desktop assessment, a review of the species' biology, and an understanding of the ecological values of the local area. Therefore, despite the limitations listed above, the results gained by both a desktop and a field-assessment are adequate to address the purposes of this report.

Results

Study Area

The study area is located approximately 32 kilometres west of Kerang in northern Victoria. It is situated within a rural landscape, on sandy plains and is generally flat, with gentle undulations along dune formations.

The study area is generally used for broad acre cropping, including Wheat *Triticum aestivum* and Barley *Hordeum* sp. (Plate 1). Paddocks are large, generally in multiples of approximately 260 hectares, and fenced with wire-strand farming fences. Dwellings and sheds, to support the farming of the land, are scattered throughout the study area. Roads between the paddocks are generally unsealed, and many of them are dry weather roads only (Plate 2). The electricity transmission line, into which the wind and solar farm will connect, is located in the north-east of the study area (Plate 3).

Plate 1. Harvested Wheat crop within the study area

Plate 2. Unsealed road within the study area

Native vegetation is sparse within the study area due to historic and ongoing land uses. Clearance and levelling of the terrain to facilitate the cropping ventures in the landscape has resulted in the widespread removal of vegetation within most of the private properties assessed for this report. Isolated paddock trees (scattered trees) remain within many paddocks, some of which are very large specimens (Plate 4). Despite this, small remnants of native vegetation remain within the study area, often associated with low-lying parts of the study area, including waterways and seasonally or irregularly inundated areas(Plate 5). A mixture of planted and remnant vegetation also persists around a number of the homesteads and shedding areas of the study area (Plate 6).

Plate 3. Powerlines in the north-east of the study area

Plate 4. Isolated Black Box paddock tree in the study area

Plate 5. Area of woodland along Back Creek, adjacent to a Wheat crop within the study area

Plate 6. Planted and native vegetation near farming infrastructure

In contrast, the road reserves within the study area generally retain native vegetation (Plate 7). Often this vegetation is of higher quality than that found on private property because it is not grazed by livestock, nor used as 'camp' areas by livestock to avoid the sun's heat. This means that the vegetation in this location retains it mid- and under-storey strata, which is impacted and generally absent from patches of vegetation within the private property (Plate 8).

Plate 7. High quality, mallee woodland in the road reserve in the north-west of the study area

Plate 8. Native vegetation lacking understorey and midstorey vegetation within the study area

The Avoca River intersects the areas between the proposed wind and solar farm, in the south-east of the study area (Figure 1). It flows north-east through a gap between properties that comprise the study area and is not located within the study area (Plate 9). This area is surrounded by high quality native vegetation.

Back Creek is located in the east of the study area. Back Creek was not holding water at the time of the assessment, and appears to hold water on an irregular basis, probably following heavy, localised rains. Vegetation remains along the Back Creek channel for much of its extent within the study area (Figure 1). Although cadastral data suggests that other creeks and drains occur within the study area, many of these had been removed and levelled. Many dams were observed throughout the study area. Only three of these held any water at the time of the assessment (Figure 1) and none supported native vegetation, aquatic or otherwise (Plates 10 and 11).

Plate 9. The Avoca River passes through the middle of the study area

Plate 10. One of three dams with water observed within the study area

Plate 11. Typical dam within the study area

Plate 12. Korrak Korrak Bushland Reserve

Talgitcha Bushland Reserve and Korrak Korrak Bushland Reserves (Plate 12) are located in the north of the study area (Figure 1). Both of these areas are located within areas of private property but are public parks managed by Parks Victoria and not expected to be impacted by the proposed development. Little publically available information is available for these sites, but native vegetation was recorded in each site during the current assessment.

Surrounding Landscape

The private properties surrounding the study area are generally managed in the same way as the properties within the study area. They are used for large scale, broad acre, cropping and are highly modified from their natural state. Native vegetation is generally confined to the road reserves and around the houses and sheds within the private properties, but scattered trees, scattered tree areas and patches of remnant vegetation also occur within some of the paddocks within the wider landscape.

Despite this, some areas of higher quality native vegetation occur to the east of the study area. This includes the Bael Bael Grassland Nature Conservation Reserve, Sandhill Lake Bushland Reserve, Lake Gilmour Wildlife Reserve, Yassom Swamp Nature Conservation Reserve and the Korrak Korrak Nature Conservation Reserve (Figure 2). The Kerang Wetlands, which is a Wetland of International Significance, listed under the Ramsar Agreement, is located approximately 7.5 kilometres from the north-eastern boundary of the study area.

The Bael Bael Grasslands Nature Conservation Reserve is approximately 1,777 hectares in size and is located to the north-east of the study area (Plate 13; Figure 2). Yassom Swamp Nature Conservation Reserve is 362 hectares in size and is located on the north-western boundary of the Bael Bael Grassland Nature Conservation Reserve (Victorian Environmental Assessment Council 2008). The two reserves protect a large remnant patch of chenopod grasslands (Department of Education and Training 2022). It protects habitat for up to 26 threatened flora species and fauna species, including Plains-wanderer *Pedionomus torquatus* (Victorian Environmental Assessment Council 2008), Grey-crowned Babbler *Pomatostomus temporalis*, Bush Stone-curlew *Burhinus grallarius*, Fat-tailed Dunnart *Sminthopsis crassicaudata*, Striped Legless Lizard *Delma impar* and Hooded Scaly-foot *Pygopus nigriceps* (Department of Education and Training 2022).

Sandhill Lake Bushland Reserve is a small reserve located to the east of the study area (Figure 2). The Reserve protects Sandhill Lake, which is an ephemeral waterbody within the landscape.

Lake Gilmour Wildlife Reserve is a small, ephemeral, saline, lake on the south-eastern boundary of the study area (Plate 14: Figure 1). It is a wildlife hunting reserve that is approximately 52 hectares in size. A number of duck species are sometimes harvested from this site, while hunting for Quail and Deer is prohibited (Game Management Authority 2022).

Plate 13. Bael Bael Grasslands Nature Conservation Reserve

Plate 14. Lake Gilmour Wildlife Reserve

The Korrak Korrak Nature Conservation Reserve is a 273 hectare site that incorporates the existing Korrak Korrak Nature Conservation Reserve and Back Creek Water Frontage Reserve. It is a block of land that is surrounded by the proposed wind farm. The Reserve supports high quality Chenopod Grassland and Riverine Chenopod Woodlands, purchased for conservation (Victorian Environmental Assessment Council 2008). It contains a number of significant flora species, including Chariot Wheels *Maireana cheelii*, Cane Grass *Eragrostis australasica*, Leafless Bluebush *Maireana aphylla* and Smooth Minuria *Minuria integerrima* (Victorian Environmental Assessment Council 2008). The grasslands provide likely habitat for the Plains-wanderer which has been recorded nearby (Victorian Environmental Assessment Council 2008). The Black Box-dominated Back Creek provides an important ecological link between the grasslands in this reserve with the Trust for Nature's Korrak Korrak Grassland Reserve and the grasslands at Yassom Swamp to the north (Victorian Environmental Assessment Council 2008).

The Kerang Wetlands are a group of wetlands that extend in a south-easterly chain from Lake Tutchewop in the north, parallel with the Murray River north and south of Kerang, to Hird Swamp in the south. The nearest wetland in this complex to the study area, Lake Bael Bael, is located within 10 kilometres of the north-eastern boundary of the study area. The Kerang Wetlands are a declared Ramsar Wetland under the Ramsar convention protocol. Ramsar Wetlands are considered Wetlands of International Significance, and, as such are listed Matters of National Environmental Significance under the EPBC Act. The Ramsar site covers an area of 9,419 hectares and consists of 23 named lakes, marshes and swamps which vary in area, depth and salinity (Kellog Brown and Root Pty Ltd 2011).

The Kerang Wetlands support a high abundance and diversity of waterbird species including 25 that are threatened in Victoria and 21 species listed under international bilateral agreements for migratory bird species (Bonn, JAMBA, CAMBA or ROKAMBA). The site regularly supports more than 20,000 waterbirds. Large aggregations of species have occurred at Middle Lake, Hird and Johnson Swamps, Lake Cullen and Lake Tutchewop (Kellog Brown and Root Pty Ltd 2011). These include aggregations of species such as Straw-necked Ibis *Threskiornis spinicollis*, Australian White Ibis *Threskiornis molucca*, Grey Teal *Anas gracilis*, Eurasian Coot *Fulica atra*, Banded Stilt *Cladorhynchus leucocephalus*, Sharp-tailed Sandpiper *Calidris acuminata*, Black Swan *Cygnus atratus*, Australasian Shelduck *Tadorna tadornoides* and Pink-eared Duck *Malacorhynchus membranaceus* (Kellog Brown and Root Pty Ltd 2011).

The original listing of the site as Ramsar Wetland of International Significance was on the basis that it met the following listing criteria:

1(a): it regularly supports 10,000 ducks, geese and swans; or 10,000 coots or 20,000 waders;
1(b): it regularly supports 1% of the individuals in a population of one species or subspecies of waterfowl;
2(b): it is of special value for maintaining the genetic and ecological diversity of a region because of the quality and peculiarities of its flora and fauna; and
3: it is a particularly good example of a specific type of wetland characteristic of its region (Kellog Brown and Root Pty Ltd 2011).

Flora

Flora Species

A total of 97 flora species were recorded during the current assessment. This comprised 69 indigenous species and 28 exotic species (Table A1) and represents the dominant species within the study area, rather than being a comprehensive census of the species within the study area.

Much of the study area was dominated by wheat fields that had been harvested so that only the stubble remained within most of the paddocks. Exotic species dominated the regrowth in these areas and included grass species including Hair Grass *Aira* spp.; Bearded Oat *Avena barbata*; Great Brome *Bromus diandrus*; and Barley-grass *Hordeum murinum*. Other exotic weedy species included understorey species such as Common Peppercress *Lepidium africanum*; Common Heliotrope *Heliotropium europaeum* and Horehound *Marrubium vulgare*, and larger woody species such as African Box-thorn *Lycium ferocissimum*. Some pastures were sown with Lucerne *Medicago sativa* during 'rest' years (when the paddocks are not cropped). One native species was recorded across much of the study area in harvested pastures and was the dominant grass species in some areas: Windmill Grass *Chloris truncata.*

Remnant vegetation within the private property was largely dominated by mature Black Box *Eucalyptus largiflorens* trees, with occasional White Cypress-pine *Callitris glaucophylla* and Buloke *Allocasuarina luehmannii* trees, particularly in the east of the study area. Generally, these trees were growing over an exotic understorey, with a similar mix of exotic species recorded elsewhere within the paddocks. Some patches of vegetation, however, also supported low-growing shrubs, such as Berry Saltbush *Atriplex semibaccata,* Ruby Saltbush *Enchylaena tomentosa* var. *tomentosa* and Short-leaf Bluebush *Maireana brevifolia*, herbs such as Pale Beauty-heads *Calocephalus sonderi* and Grassy Bindweed *Convolvulus remotus*, and native grasses including Rough Spear-grass *Austrostipa scabra*, Common Wallaby-grass *Rytidosperma caespitosum* and Common Blown-grass *Lachnagrostis filiformis.*

In addition to the above-mentioned species, road reserves, waterways and some remnants of native vegetation contained an overstorey of Dumosa Mallee *Eucalyptus dumosa* in the overstorey (more commonly in the west of the study area), as well as midstorey shrubs including Gold-dust Wattle *Acacia acinacea* s.l., Umbrella Wattle *Acacia oswaldii*, and saltbushes such as Nodding Saltbush *Einadia nutans*, Hairy Bluebush *Maireana pentagona* and Hedge Saltbush *Rhagodia spinescens*. River Red-gum *Eucalyptus camaldulensis* and Tangled Lignum *Duma florulenta* were also widespread in the low lying parts of the study area that are subject to seasonal inundation.

Flora Habitat/Vegetation Communities

The vegetation within the study area was required to be assessed and classified against the policy and legislation stipulated by three tiers of government:

- *Local* – Where various overlays and policies may apply pursuant to the Gannawarra Planning Scheme (Department of Environment Land Water and Planning 2022d);
- *State* – Which includes DELWP's EVC mapping of vegetation communities (Department of Environment Land Water and Planning 2022b) and consideration under the *Guidelines for the Removal, Destruction or Lopping of Native Vegetation* (Department of Environment Land Water and Planning 2017); and,

- *Commonwealth* – where vegetation may meet 'thresholds' to be classified as a federally listed community under the EPBC Act.

Local

The study area is located within the Shire of Gannawarra municipality and is largely zoned Farming Zone. Small areas of the study area are zoned Public Conservation and Resource Zone, associated with the Nature Conservation Reserves and the Avoca River.

The study area is covered by three planning overlays relevant to this report:

- Much of the eastern portion of the study area is covered by an Environmental Significance Overlay – Schedule 4 (ESO4). This ordinance identifies areas within the municipality that are subject to poor drainage, with the Avoca River prone to flood over a wide area. Any development within these areas must not impede the movement of water through the landscape and will not result in an increased risk of flood levels or flow velocity. Within the land covered by this ESO, a Land Subject to Inundation Overlay covers the banks of the Avoca River, and its immediate surrounds, in the east of the study area (Department of Environment Land Water and Planning 2022d).
- Three areas of roadside vegetation are protected by a Vegetation Protection Overlay – Schedule 1 (VPO1). This ordinance identifies remnant roadside vegetation that supports important relics of once widespread vegetation within the landscape, provides habitat to threatened flora and fauna species, and provides habitat corridors for native fauna species (Department of Environment Land Water and Planning 2022d). The road reserves protected by this ordinance include:
    - A 550 metre stretch of Mitchell Road, near its eastern terminus, before it heads south;
    - A 730 metre stretch of Lake Charm-Quambatook Road, south-west of Hogan Road, in the east of the study area; and,
    - A 2.2 kilometre stretch of Ford Road, from Steer Road to the east, north of Korrak Korrak Nature Conservation Reserve.
- Two small areas within the study area are covered by a Vegetation Protection Overlay – Schedule 2 (VPO2). The northern area of the VPO2 coincides with the Talgitcha Bushland Reserve. The southern area of the VPO2 falls across two properties. The western parcel has been identified as supporting a native grassland, while the eastern parcel is now cropped and devoid of native vegetation.

  The objectives of the VPO2 is to protect areas of remnant native vegetation and facilitate natural revegetation. The retention of the extent and quality of remnant vegetation, and its enhancement, is a key objective of Victoria's Biodiversity Strategy. The continued viability of native flora and fauna populations within the municipality is dependent upon the maintenance and enhancement of remnant vegetation, as well as on sustainable development and land management practices (Department of Environment Land Water and Planning 2022d).

While the entire study area is within a designated Bushfire Prone Area, a Bushfire Management Overlay is only applicable to the Talgitcha Bushland Reserve in the north of the study area and parts

of the riparian vegetation along the Avoca River in the south-east of the study area (Department of Environment Land Water and Planning 2022d).

State

The study area largely falls within the Murray Mallee bioregion of Victoria. The middle of the study area, centred along the Avoca River, is located in the Victorian Riverina bioregion. The study area is also located within the North Central Catchment Management Authority Area.

Investigation of DELWP's EVC mapping suggests that the historic vegetation within the study area comprised a range of woodland, grassland and mallee vegetation communities (Department of Environment Land Water and Planning 2022a). This vegetation was dominated by EVC 829: Chenopod Grasslands that flanked areas of EVC 823: Lignum Swampy Woodland along the Avoca River. Further away from the River, to the north, the grasslands give way to areas of EVC 103: Riverine Chenopod Woodland, and then a mosaic of EVC 96: Ridged Plains Mallee and EVC 824: Woorinen Mallee. Smaller patches of other vegetation communities, including EVC 66: Low Rises Woodland and EVC 97: Semi-Arid Woodland are also scattered throughout the study area.

Current modelling suggests that while remnants of this vegetation persists along the Avoca River and road reserves within the study area, most of the remaining native vegetation has been removed from the study area. Other areas identified during the current assessment, within private property (many of which only comprised a native overstorey) are also modelled to persist within the landscape.

The description of the dominant EVCs within the study area are as follows:

- EVC 829: Chenopod Grasslands is described as an "*open to sparse shrubland with a more or less continuous tussock grass sward found on heavy somewhat sodic clay plains fringing the active floodplains of major watercourses such as the Loddon and Avoca Rivers*" (Department of Environment Land Water and Planning 2022a). It is classified as Endangered within the Murray Mallee and the Victorian Riverina bioregions.
- EVC 823: Lignum Swampy Woodland is described as having an "u*nderstorey dominated by Lignum, typically of robust character and relatively dense (at least in patches), in association with a Eucalypt and/or Acacia woodland to 15 metres tall. The ground layer includes a component of obligate wetland flora that is able to persist even if dormant over dry periods*" (Department of Environment Land Water and Planning 2022a). It is classified as Vulnerable within the Murray Mallee and the Victorian Riverina bioregions.
- EVC 103: Riverine Chenopod Woodland is described as being a *'Eucalypt woodland to 15 m tall with a diverse shrubby and grassy understorey occurring on most elevated riverine terraces. Confined to heavy clay soils on higher level terraces within or on the margins of riverine floodplains (or former floodplains), naturally subject to only extremely infrequent incidental shallow flooding from major events if at all flooded'* (Department of Environment Land Water and Planning 2022a). This EVC is classified as Depleted within the Murray Mallee bioregion and Vulnerable within the Victorian Riverina bioregion.
- EVC 96: Ridged Plains Mallee is described as being an *'open, quite grassy mallee woodland to 10 metres tall, typical of the gently undulating "plains" of the Wimmera and Southern Mallee. Soils are somewhat variable but are typically duplex with grey or brown sandy clay loam or clay loam topsoils of aeolian origin'* (Department of Environment Land Water and

Planning 2022a). This EVC is classified as Endangered within the Murray Mallee and the Victorian Riverina bioregions.

- EVC 824: Woorinen Mallee is described as being a *'widespread mallee woodland to 12 metres tall, associated with the east-west orientated calcareous dunefields of the Woorinen Formation with a low, open chenopod dominated shrub understorey. A diverse array of sub-shrubs, herbs and grasses are also present.* [It] *typically occurs on fine textured red-brown sandy loam and clay loam soils'* (Department of Environment Land Water and Planning 2022a). This EVC is classified as Vulnerable in the Murray Mallee and the Victorian Riverina bioregions.

Commonwealth

Department of Agriculture, Water and the Environment (2022a) modelling suggests that that up to seven nationally significant vegetation communities may occur within, or near, the study area (Table 1).

Table 1. Listed threatened ecological communities that may occur within the study area of within a five kilometre radius of the study area (Department of Agriculture Water and the Environment 2022a).

Community Name	ed species ▪ ADDIN	Likelihood of presence
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	Community may occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within area
Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions	Critically Endangered	Community likely to occur within area
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered	Community likely to occur within area
Natural Grasslands of the Murray Valley Plains	Critically Endangered	Community likely to occur within area
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area
Mallee Bird Community of the Murray Darling Depression Bioregion	Endangered	Community likely to occur within area

For six of the seven communities listed above, native vegetation within the study area would need to meet species composition, size and condition thresholds. On the basis of the species recorded in the study area it is unlikely that the White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland, the Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains or the Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia threatened ecological communities occur within the study area.

The study area, however, falls within the known geographical range of the other three listed threatened ecological communities, and representative species from each of them were recorded during the current assessment. A detailed assessment of this vegetation will be required, if it is proposed to be impacted to determine if they meet thresholds to be classified as one of these threatened ecological communities. It therefore remains likely that high quality vegetation within

the study area, particularly in the road reserves provides examples of the following threatened ecological communities:

- Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions;
- Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions; and,
- Natural Grasslands of the Murray Valley Plains.

The final threatened ecological community is characterised by a group of Mallee dependent and specialist birds. These birds generally occur to the west of the study area, and there are no Category A (high condition), B, C or D (good to moderate condition) areas identified within the study area or the five kilometre landscape investigation area (Department of Agriculture Water and the Environment 2021). There are no historical records of the Mallee specialist birds that comprise this community recorded within the landscape (BirdLife Australia 2022; Department of Environment Land Water and Planning 2022f). Therefore this community is unlikely to occur within the study area.

The Protected Matters Search Tool also reports that the study area occurs upstream of five Wetlands of International Importance (Ramsar wetlands). The study area is approximately 7.5 kilometres south-east of the Kerang Ramsar Wetlands, as discussed above, and the Avoca River ultimately terminates in Lake Bael Bael, which is part of the Kerang Wetlands Ramsar site. The other wetlands identified by the Protected Matters Search Tool are more than 100 kilometres from the wind and solar farm and are unlikely to be impacted by its proposed development (Department of Environment Land Water and Planning 2022f).

Threatened Flora Species

Fifty-five threatened flora species have previously been recorded within five kilometres of the study area (Figure 2; Table A3). A further five species are predicted to occur within the study area based on the Protected Matters Search Tool (Department of Agriculture Water and the Environment 2022a). A consolidated list of these threatened flora species, as well as their conservation status under the EPBC Act, the *Flora and Fauna Guarantee Act 1988 (Vic) Threatened List: June 2021* (Department of Environment Land Water and Planning 2021a), their preferred habitats and the likelihood of occurrence for each species is provided in Table A3.

Twenty-four threatened flora species have previously been recorded from within the private property that comprises the study area, or in the road reserves immediately adjacent to those properties (Table 2; Figure 2).

Table 2. Conservation status of historical and current observations of threatened flora species recorded within the study area under the *Flora and Fauna Guarantee Act 1988 (Vic)* (Department of Environment Land Water and Planning 2022f).

Common Name	Scientific Name	Current Assessment
Critically Endangered		
Buloke Mistletoe	*Amyema linophylla* subsp. *orientalis*	Yes
Cane Grass	*Eragrostis australasica*	-
Hairy Tails	*Ptilotus erubescens*	-

Common Name	Scientific Name	Current Assessment
Late-flower Flax-lily	*Dianella tarda*	-
Umbrella Wattle	*Acacia oswaldii*	Yes
Yarran	*Acacia melvillei*	-
Weeping Myall	*Acacia pendula*	-
Endangered		
Bristly Love-grass	*Eragrostis setifolia*	-
Chariot Wheels	***Maireana cheelii***	**-**
Club-hair New Holland Daisy	*Vittadinia condyloides*	-
Downy Swainson-pea	*Swainsona swainsonioides*	-
Fine-hairy Spear-grass	*Austrostipa puberula*	-
Frosted Goosefoot	*Chenopodium desertorum* subsp. *desertorum*	-
Grassland Bindweed	*Convolvulus graminetinus*	-
Inland Pomaderris	*Pomaderris paniculosa* subsp. *paniculosa*	-
Long Eryngium	*Eryngium paludosum*	-
Round Templetonia	*Templetonia egena*	-
Scaly Mantle	*Eriochlamys squamata*	-
Slender Darling-pea	***Swainsona murrayana***	**-**
Veined Peppercress	*Lepidium phlebopetalum*	-
Winged New Holland Daisy	*Vittadinia pterochaeta*	-
Yakka Grass	*Sporobolus caroli*	-
Vulnerable		
Buloke	*Allocasuarina luehmannii*	Yes
Bush Minuria	*Minuria cunninghamii*	-
Pepper Grass	*Panicum laevinode*	-
Smooth Minuria	*Minuria integerrima*	-

Table note: Species highlighted in bold italics are also listed as Vulnerable on the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) Act.

Many of the historical observations of threatened flora species within the study area come from studies undertaken by Stacey Gowans in October/November 1995 and January 1996 (Department of Environment Land Water and Planning 2022f). These assessments appear to be comprehensive surveys of higher quality remnant grassland patches to the south of Lalbert-Kerang Road and north of James Road, in the south of the study area (Figure 2). Both of these areas were identified as supporting grasslands during the current assessment. Unfortunately the accuracy of the location of these observations is +/- 2,000 metres, therefore the precise location of these plants is not known. Nonetheless, based on the current assessment and the habitat requirement of these species, it is likely that many or all of these species persist within the general location of the previous observations, as well as other parts of the study area that support higher quality patches of native vegetation, such as the road reserves.

In particular, significant populations of Chariot Wheels are known from the vicinity of the study area (Department of Sustainability and Environment 2009a). Large populations of the species are known from Korrak Korrak Nature Conservation Reserve and private property in Budgerum, with smaller populations known from within the five kilometre landscape assessment area (Department of Sustainability and Environment 2009a). Surveys are recommended for the Lalbert-Kerang Road road

reserve (Mavromihalis 2010), and the species is likely to persist within the higher quality grasslands within the study area.

Of those threatened flora species historically recorded within the study area, three were recorded during the current assessment (Table 2). Buloke was observed to be a relatively common paddock tree within the east and south-east of the study area. It was frequently recorded as a scattered tree and in scattered tree areas in these locations. The critically endangered Buloke Mistletoe *Amyema linophylla* subsp*. orientalis* was recorded on some of these trees. This species is an obligate parasite of Buloke and entirely dependent on the persistence of Buloke to survive. It is a small and unobtrusive species that is easily overlooked and is likely to have been more widespread than noted during the current assessment. The third threatened flora species observed during the current assessment was Umbrella Wattle *Acacia oswaldii.* This species was occasionally recorded in the roadside reserves of Quambatook-Swan Hill Road and Lalbert-Kerang Road, in higher quality patches of native vegetation. This species is also classified as critically endangered in Victoria (Department of Environment Land Water and Planning 2021a).

Many of the other historical records of threatened flora species are of species that are associated with wetlands and regularly inundated areas. There are few of these areas within the study area, and these records are from the wetlands around the periphery of the study area. These species are therefore unlikely to occur within the study area. However, a detailed assessment of areas of remnant vegetation, or areas that have regenerated and are relatively undisturbed, has not been undertaken for the current assessment. Furthermore, although a large number of threatened flora species have been recorded in certain parts of the study area, primarily through the studies of Stacey Gowans, the majority of the study area has not had this level of survey effort. Therefore, it is likely that the species previously recorded within the study area listed in Table 2, as well as some of those recorded near the study area listed in Table A3, and some additional, previously unrecorded threatened species, persist in other parts of the study area that support higher quality patches of native vegetation, particularly the road reserves that criss-cross the landscape.

Fauna

Fauna Species

Fifty-two fauna species were recorded within the study area during the current assessment (Table A2). This included 48 birds (43 native and five introduced), two native reptiles and two mammals (one introduced and one native). Additional fauna species would be recorded with greater time on-site.

All of these species are relatively common to the area. Although there was limited aquatic habitat within the study area, with Back Creek being dry at the time of the assessment and an ephemeral waterway, the Avoca River is likely to provide habitat to a range of native and exotic fish, as well as provide habitat for frogs, which were not recorded during the current assessment. The trees within the study area are also likely to provide habitat to arboreal mammals, including bats, which were not recorded during the current assessment. Further discussion of fauna species and habitats is provided below.

Threatened Fauna Species and Communities

Twenty-two threatened fauna species that have previously been recorded within five kilometres of the study area (Department of Environment Land Water and Planning 2022f) (Figure 2; Table A4). A further 15 threatened fauna species are predicted to occur within the study area, based on the Protected Matters Search Tool (Department of Agriculture Water and the Environment 2022a). A consolidated list of these threatened fauna species, as well as their conservation status under the EPBC Act and the FFG Act, their preferred habitats and the likelihood of occurrence for each species is provided in Table A4.

No threatened species were recorded during the current assessment. Despite this, up to six threatened fauna species that have previously been recorded within the landscape, including three that have previously been recorded within the study area, may occur within the study area:

- Black Falcon *Falco subniger* (FFG Act: Critically Endangered);
- Diamond Dove *Geopelia cuneata* (FFG Act: Vulnerable);
- Hooded Robin *Melanodryas cucullata* (FFG Act: Vulnerable);
- Hooded Scaly-foot *Pygopus schraderi* (FFG Act: Critically Endangered);
- Little Eagle *Hieraaetus morphnoides* (FFG Act: Vulnerable); and,
- Plains-wanderer *Pedionomus torquatus* (FFG Act and EPBC Act: Critically Endangered).

Many arid adapted bird species are able to move widely over the landscape to source food and water in an environment in which these resources are scarce and patchily distributed. This means that species such as Diamond Dove, Little Eagle, and Black Falcon, the latter of which has been recorded on Lalbert-Kerang Road in the west of the study area in 2000 (Figure 2: Department of Environment Land Water and Planning 2022f), are likely to move across the landscape, including the study area, on occasion. Diamond Doves move within the landscape to eat the seeds of predominantly native grass species, arriving in areas as grasses start seeding and leaving areas where the seed resource is exhausted (Higgins and Davies 1996). Little Eagles and Black Falcons occupy large home ranges, over which they hunt for small mammals, reptiles and invertebrates (Marchant and Higgins 1993). These species are likely to be regular visitors to the study area, which is likely to be the home range of one or more pairs of these species. The scattered trees and larger trees in patches may provide the substrate for nests of these species, both of which build stick nests that are relatively large and conspicuous (Marchant and Higgins 1993). Neither of the two large stick nests observed during the current assessment supported these species.

Hooded Robins have been recorded from Yassom Swamp and Bael Bael Grassland Reserve to the north-east of the study area (Department of Environment Land Water and Planning 2022f). An additional observation comes from near the Avoca River on the south-eastern edge of the study area (Figure 2; Department of Environment Land Water and Planning 2022f). Hooded Robins are sedentary species, with relatively fixed home ranges (Higgins and Peter 2002). The key threats to Hooded Robins are the loss of habitat, often at a local level, and modification of habitat through grazing or other agricultural practices (NSW Office of Environment and Heritage 2017). They are susceptible to exclusion by Noisy Miners *Manorina melanocephala*, when the midstorey and understorey is cleared (NSW Office of Environment and Heritage 2017), which may explain why none were recorded during the current assessment.

Hooded Scaly-foot have been regularly recorded in the grasslands to the north-east of the study area, in grasslands on the Trust for Nature property that is contiguous with the Korrak Korrak Grassland Nature Conservation Reserve (Department of Environment Land Water and Planning 2022f; Figure 2). Similar quality grasslands occur to the east and west of Hanley Road near the Lalbert-Kerang Road, and north and south of James Road in the southern portion of the study area. There is a moderate likelihood that Hooded Scaly-foot are also present in these areas, and that the lack of historic records is an artefact of a lack of survey effort, rather than their absence.

Plains-wanderers are small quail-like birds of open plains and grasslands. Habitat for the species includes 'treeless, species-rich, lowland native grasslands with approximately 50% bare ground, 40% herbs and grasses and 10% fallen litter, with grass tussocks spaced around 10-20 centimetres apart and most vegetation less than five centimetres in height' (Commonwealth of Australia 2016, p. 13). At the time of the current assessment there was very little of this habitat present within the project area, with native grasslands supporting much higher biomass of small shrubs and grasses and little inter-tussock space. Plains-wanderers area also occasionally found in cereal crops and cereal stubble (Commonwealth of Australia 2016), which the project area, at certain times of the year (such as the time of the current assessment), provides in abundance. However it is not known if these habitats can support a population of Plains-wanderers, if birds recorded in these paddocks are moving through this habitat to more suitable habitat, or if they are forced into these conditions because of the loss and lack of habitat within the landscape (Commonwealth of Australia 2016).

The Plains-wanderer was formerly more common and widespread than it is now (Commonwealth of Australia 2016). The primary 'stronghold' of the species is the Riverina region of south-western New South Wales, with the north-central region of Victoria providing a secondary stronghold (Commonwealth of Australia 2016). Within Victoria, Plains-wanderers have been concentrated in the Patho Plains, an area encompassing the town of Gunbower and Terrick Terrick National Park, and the Avoca Plains, which includes much of the eastern portion of the study area, as well as protected areas in Bael Bael Grasslands Nature Conservation Reserve, from Budgerum in the south to Tresco West in the north (Appendix 3; Baker-Gabb *et al.* 2016).

There has been a 84% decline in the population size of the Plains-wanderer to 2014, with fewer than 1,000 birds left in the wild (Commonwealth of Australia 2016). In Victoria, this decline is even more stark with the populations within the Patho and Avoca Plains estimated to have declined by 90 and 95% respectively between 2010 and 2012 (Baker-Gabb *et al.* 2016). This is due to the modification and loss of habitat, with secondary threats from the size of the population and predation by cats and foxes (Commonwealth of Australia 2016). However, there are ten historical records of this species from within five kilometres of the study area, all of which are located in the eastern portion of the study area (Table 3; Figure 2). Three of these may have been recorded within the study area, although the accuracy of the location of the observations is +/- 1,000 metres (Table 3).

Table 3. Historic observations of Plains-wandered within five kilometres of the study area (Department of Environment Land Water and Planning 2022f).

Survey Date	Location	Latitude GDA94	Longitude GDA94	Accuracy (m +/-)	Extra Info
01/06/1900	Bael Bael Grassland Nature Conservation Reserve	-35.65833	143.675	1,000	
06/03/1969	Yassom Swamp Nature Conservation Reserve	-35.60833	143.675	1,000	
01/02/1976	Bael Bael Grassland Nature Conservation Reserve	-35.64167	143.675	1,000	
25/02/1992	***Hanley Road***	***-35.74167***	***143.575***	***1,000***	
21/01/2010	Bael Bael Grassland Nature Conservation Reserve	-35.675	143.675	1,000	Breeding
12/01/2011	East of Lake Charm-Quambatook Road	-35.749	143.6167	1,500	
19/03/2012	***East of Steer Road***	***-35.69167***	***143.625***	***1,000***	
19/03/2012	Bael Bael Grassland Nature Conservation Reserve	-35.65833	143.65833	1,000	
23/03/2012	Bael Bael Grassland Nature Conservation Reserve	-35.65833	143.65833	1,000	
23/03/2012	***East of Steer Road***	***-35.69167***	***143.625***	***1,000***	

Table Note: Observations marked in bold italics may be from within the study area.

On the basis of the historic records of the species within and around the study area, the habitat observed to the east and west of Hanley Road near the Lalbert-Kerang Road, and the variable habitat provided by Wheat stubble at various times of the year, there is a moderate likelihood that Plains-wanderer persist within parts of the project area, particularly in the eastern and north-eastern portions of the proposed development. Although observations are now more than 10 years old, the species is cryptic and hard to detect if not actively and intensively surveyed. This means that they could be overlooked and are unlikely to be reported incidentally. That stated, the habitat for Plains Wanderer within the study area is generally of low quality as it includes cereal crops subject to regular disturbance through cropping. This habitat is relatively abundant within the landscape. In this context, the proposed impacts posed by the development is unlikely to significantly impact a substantial amount of high quality habitat and the removal of habitat is unlikely to be higher than currently occurs through normal agricultural enterprise in any given year.

A group of four Grey-crowned Babbler *Pomatostomus temporalis* (FFG Act: Vulnerable) was recorded at the Yassom Swamp Nature Conservation Reserve in 1993 (Department of Environment Land Water and Planning 2022f; Figure 2). Grey-crowned Babblers occur in woodlands, open forests and farmlands (Pizzey and Knight 2012). They require a sparse ground cover, with logs and leaf litter (Higgins and Peter 2002). The species is a co-operative breeder that retains territories throughout the year, with few movements recorded (Higgins and Peter 2002). A breeding group typically consist of a breeding pair and three to four non-breeding helpers (Higgins and Peter 2002). Grey-crowned Babblers make distinctive roosting nests within a set territory and are noisy and conspicuous in their behaviour (Higgins and Peter 2002). While potential habitat for this species occurs within the study area in the patches of native vegetation, there was no direct (observations by sight or sound) or indirect (nests) evidence that this species persists within the study area.

The Victorian Temperate Woodland Bird Community, which is listed under the Victorian *Flora and Fauna Guarantee Act 1988* is likely to be present within the study area. Although only one species

that is recorded in this threatened ecological community was recorded during the current assessment (Brown Treecreeper *Climacteris picumnus*), the Black Box and Buloke and Cypress-pine woodlands within the study area are likely to support other characteristic species.

Of the remaining 15 threatened fauna species that have been recorded within the landscape, 13 are wetland dependent species. These species may visit the Korrak Korrak Bushland Reserve in the north of the study area, Lake Gilmore immediately adjacent to the south-eastern boundary of the study area, and the modelled wetland on the un-accessed private property north of Lalbert-Kerang Road when these waterbodies hold water. However, none of these waterbodies were holding water at the time of the assessment, and given that these wetlands appear to be ephemeral, they are unlikely to provide significant habitat to the ducks that favour deep water, or the shorebirds that are only present in Australia during times when the lakes are likely to be dry in most years.

Fauna Habitats

The current assessment identified four potential habitats for flora and fauna species:

- Crops;
- Patches of native vegetation;
- Scattered paddock trees; and,
- Dams.

Crops

The cropped and grazed paddocks within the study area comprise approximately 16,829 hectares (approximately 91% of the study area) (Figure 1). Crops were largely Wheat and had been harvested within the previous recent months (Plates 15 and 16).

The crops generally provide very low quality habitat for a range of species including small mammals, reptiles and grassland birds. At the time of the assessment, the harvested crops were likely to provide foraging and dispersal habitat for species such as snakes, lizards, native mice. In these locations birds such as Brown Songlarks *Cincloramphus mathewsi*, Rufous Songlarks *Cincloramphus mathewsi* and Australasian Pipit *Anthus australis* were observed within these paddocks. Seed eating birds, such as Red-rumped Parrots *Psephotus haematonotus* and Zebra Finch *Taeniopygia guttata* were also recorded in these locations. A range of raptors, such as Nankeen Kestrels *Falco* cenchroides, Brown Falcons *Falco berigora* and Spotted Harriers *Circus assimilis* hunt over grasslands, including crops, for ground dwelling birds, such as quail (Marchant and Higgins 1993). The cropped paddocks are likely to provide abundant habitat for these species as they hunt within their territories, and Nankeen Kestrels were amongst the most common species observed during the recent assessment.

Plate 15. Harvested crop with relatively low residual biomass within the study area

Plate 16. Harvested crop with relatively higher residual biomass within the study area

The cropped areas of the study area are unlikely to provide habitat to any of the threatened species listed in Tables A3 and A4 on a regular basis, with the exception of Plains-wanderer. Plains-wanderer may occur within the study area after the harvest of the cereal crops. Most of the paddocks contained stubble at the time of the assessment and were not burnt. It is not known if the farmers intended to burn the stubble later in the year, as is common practice in some areas. Where the stubble is not burnt, the low vegetation that remains, along with a relatively wide inter-tussock space, makes these stubble paddocks potentially suitable for Plains-wanderer, albeit that habitat quality would be considered low, temporary and subject to ongoing disturbance. This species is discussed in greater detail above.

Patches of Native Vegetation

Patches of native vegetation were largely restricted to the Back Creek riparian area and road reserves within the study area (Figure 1). Despite this, patches of native vegetation, supporting remnant overstorey trees (mostly Black Box) were also located in other parts of the study area, including Talgitcha Bushland Reserve. In addition, two paddocks near the middle of the study area and half a paddock in the south of the study area were dominated by native grasses. These entire areas were classified as patches of native vegetation. Approximately 9.8% of the study area (1,617 hectares) is covered by native vegetation, however 382 hectares of this vegetation (2.1%) is located within the road reserves, with the remaining vegetation located on private land (7.7%).

Two broad types of native vegetation were observed: remnant woodlands and grasslands (including derived grasslands).

Remnant Woodlands

Most of remnant woodlands were unfenced, allowing access by stock when they were present and encroachment by farm machinery. This reduced the recruitment of young plants and effectively removed the midstorey, which is sparse the in the vegetation communities present within the study area anyway (Plate 8). This was particularly apparent when contrasted with the dense understorey and midstorey vegetation present within the Bael Bael Grasslands Nature Conservation Reserve, where introduced grazers have been removed since 2009 (Department of Education and Training 2022). The lack of complex vegetation strata reduces the value of the patches for a range of species as it allows larger, more dominant birds, such as Noisy Miners *Manorina melanocephala* to drive

smaller birds away. Despite this, other patches seemed to be less impacted by grazing and supported a denser midstorey (Plate 17). In these areas, birds such as Brown Treecreepers *Climacteris picumnus*, Weebills *Smicrornis brevirostris,* Striated Pardalote *Pardalotus striatus* and Eastern Rosellas *Platycercus eximius* were recorded. These woodlands also provided a relatively large number of hollows (Plate 18) for species such as Australian Owlet-nightjar *Aegotheles cristatus*, which was recorded during the current assessment, as well as a range of other hollow nesting diurnal and nocturnal birds. Eastern Grey Kangaroos *Macropus giganteus* were also observed loafing in the shade provided the trees in these locations.

Plate 17. High quality woodlands, showing native grasses and annuals under a native Black Box overstorey

Plate 18. Hollow in a tree within the Talgitcha Bushland Reserve

Despite these limitations, the woodland patches of native vegetation have a moderate likelihood of providing habitat for threatened species such as Diamond Dove and Hooded Robin, and a low likelihood of providing habitat for Grey-crowned Babbler, and Barking Owl *Ninox connivens*.

Grasslands and Derived Grasslands

Moderately high quality native grasslands were recorded in three locations within the study area, with lower quality derived grasslands recorded elsewhere within the study area (Plate 19). These grasslands are likely to provide habitat to a similar suite of species that was recorded in the stubble fields, but may also include Quail and Button-quail, as well as a range of snakes and lizards, such as the Eastern Brown Snake *Psuedonaja textilis* and Eastern Bearded Dragon *Pogona barbata* that were recorded during the current assessment.

In these areas, where the overstorey is absent but remnant grasslands persist, threatened birds such as Plains-wanderer, Australian Bustard *Ardeotis australis,* and Inland Dotterel *Peltohyas australis*, as well as Hooded Scaly-foot*,* may find habitat. A range of threatened flora species may also occur in the higher quality grasslands, including the 24 species listed above.

Scattered Paddock Trees

Scattered paddock trees were recorded throughout the study area, within both cropped and grazed paddocks (Figure 1). These trees largely comprised four species, dominated by Black Box, White Cypress Pine, and Buloke. All of these trees were mature specimens, with little sign of recruitment observed anywhere in the study area. Some of these trees were dead and dying, and many

supported hollows (Plate 18). Despite this, hollows are generally a limited resource within the landscape (Gibbons and Lindenmayer 2002; Gibbons *et al.* 2002; Lindenmayer *et al.* 1994), which makes trees that do support hollows of greater ecological value than trees that do not support hollows. Species likely to use these tree hollows include Common Ringtail Possums *Pseudocheirus peregrinus*, Common Brushtail Possums *Trichosurus vulpecula* and microbats, as well as a wide variety of birds, particularly parrots and cockatoos, as well as, potentially, owls.

The trees are isolated within the landscape and the lack of other vegetation strata reduces the quality of the habitat for woodland dependent species (Plate 20). Nonetheless, the scattered paddock trees are likely to provide habitat to a range of common bird and arboreal mammal species. This is likely to include gregarious bird species such as Noisy Miners¸ Galahs *Eolophus roseicapilla*, Red-rumped Parrots and Eastern Rosellas. Smaller birds are likely to be restricted to the canopy, such as Striated Pardalotes and Weebills. Other species had built nests within the branches of these trees including corvids, Australian Magpies. Two Wedge-tailed Eagle *Aquila audax* nests were observed during the current assessment. Both of these nests were old and appeared to be inactive and not recently used (Figure 1; Plate 21). Mammals such as Common Brushtail Possums and Common Ringtail Possums are also likely to forage in the canopy of these trees, whilst micro-bats are likely to use the fissures and flaking bark as diurnal roosting locations (Plate 22), although these species were not observed during the current diurnal assessments.

Plate 19. Native grasslands within the study area

Plate 20. An example of an isolated, scattered, paddock tree in the study area

Plate 21. Wedge-tailed Eagle nest located within the study area

Plate 22. Fissure in a tree within the Talgitcha Bushland Reserve that is likely to provide roosting habitat for microbats

The scattered paddock trees may provide habitat to some of the large, more mobile threatened species such as Little Eagle, Black Falcon and Barking Owl, as they pass through the study area, when moving between higher quality habitat. Both of the raptor species build stick nests that are relatively large and conspicuous (Marchant and Higgins 1993). Neither of the two raptor nests observed supported these species during the current assessment, and it is therefore considered unlikely that these species currently nest within the study area. Owls nest in hollows and potentially suitable hollows for owls, including Barking Owls, were observed during the current assessment. In the absence of nocturnal surveys, it remains possible that this species occurs within the study area.

Dams

Dams were located throughout the study area. These dams lacked fringing vegetation or aquatic emergent or submerged vegetation and only four held water at the time of the assessment. They therefore provided extremely low habitat value for most species (Plates 10 and 11). Nonetheless, Maned Duck *Chenonetta jubata*, was recorded at one of these dams. Other species, such as Crested Pigeons *Ocyphaps lophotes* were also frequently recorded near the dams and Welcome Swallows *Hirundo neoxena* were observed hawking for insects over the waterbodies. The fauna species associating with the dry dams was not noticeably different to those using the surrounding, generally cropped, landscape.

None of the threatened species listed in Appendix A4 are likely to use these dams due to the degraded nature of these dams and lack of native vegetation that surrounds them.

Areas of Ecological Constraint

Areas of ecological constraint are shown on Figure 1. They include:

- The very highly constrained vegetation within the study area comprised the road reserves that surround the private property within the study area and the native grasslands to the east and west of Hanley Road near the Lalbert-Kerang Road, the southern parts of the patch of native vegetation north of James Road and the eastern portion of the property north of Maher Road. Vegetation along the Avoca River is also considered very highly constrained, although it is not expected that this area will be impacted by the proposed development (and has not been included in the area calculations). All of these areas support high quality native vegetation, as well as likely habitat for a range of threatened flora species and fauna species. They provide connective habitat to flora and fauna within the wider landscape, as well as potentially limiting resources for a range of common and threatened species. The very highly constrained areas of the study area comprise approximately 1,116 hectares, or 6% of the study area.
- Highly constrained parts of the study area include the smaller, isolated patches of native vegetation within the private properties, scattered trees and scattered tree areas shown on Figure 1. These areas are considered less significant than the very highly constrained areas, but still support significant ecological values that are limited within the landscape, given the level of extensive modification of the landscape. These areas provide habitat to a diverse array of flora and fauna species, and may provide habitat to threatened flora and fauna species on occasion, or in sup-optimal conditions. The highly constrained areas of the study area comprise approximately 527 hectares, or 3% of the study area.

- Moderately constrained areas include non-indigenous planted vegetation. These areas were particularly noted around houses and sheds, as well as in shelter belts along fence-lines. While lacking the structural complexity and species richness of patches of native vegetation, given the large-scale removal of vegetation from the landscape, these areas provide habitat to a range of common species that persist in the landscape, particularly birds, which are mobile and able freely move around the landscape. The moderately constrained areas of the study area comprise approximately seven hectares, or less than 0.01% of the study area.
- The remaining areas within the study area are considered to have low ecological values. This includes the cropped and grazed land, as well as driveways, roads (but not road reserves) and the dry dams that were recorded within the study area. These areas are not marked on Figure 1, but include all areas not otherwise marked as constrained, and comprise approximately 16,829 hectares, or 91% of the study area.

Discussion

A detailed summary of the legislation that was considered when preparing this report is provided in Appendix 2. The discussion presented in this section of the report does not reiterate information provided in Appendix 2, but summarises the results and recommendations arising from the interpretation of this legislation.

Environment Protection and Biodiversity Conservation Act 1999 (Cth)

The desktop assessment identified eight flora and 16 fauna species, as well as seven threatened ecological communities, listed under the EPBC Act, which may occur within the study area.

Most of the threatened flora and fauna species listed on the EPBC Act that are predicted to occur within the vicinity study area are, in fact, unlikely to occur due to the absence of suitable habitats or the degraded nature of habitats within the study area. Despite this, up to two species of threatened flora (Chariot Wheels and Slender Darling-pea) and one species of threatened fauna (Plains-wanderer) have been recorded within the study area. There is a moderate to high chance that these species persist within the study area, in the road reserves or patches of higher quality grassland recorded within the study area and shown on Figure 1. The National Recovery Plan for Chariot Wheels identifies the Lalbert-Kerang Road as a location where further survey work is required (Mavromihalis 2010).

It is also likely that up to three threatened ecological communities persist within these same parts of the study area (Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions; Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions; and, Natural Grasslands of the Murray Valley Plains).

It is recommended that the parts of the study area that may support these ecological values are avoided and buffered by at least 15 metres (i.e. the very highly and highly constrained areas shown on Figure 1). If these areas cannot be avoided through the development planning process, targeted surveys for these species are recommended. Surveys will need to be undertaken at a suitable time of year and demonstrate an appropriate survey intensity to support a potential referral to the Department of Agriculture, Water and the Environment under the EPBC Act. Survey guidelines for the three EPBC Act threatened species are provided in Table 4.

Table 4. *Environment Protection and Biodiversity Conservation Act 1999* (Cth) Act threatened species survey guidelines.

Species	Method	Survey Effort	Timing
Plains-wanderer	• Nocturnal transect surveys in suitable habitat from vehicle with spotlights and vehicle lights • Still, clear nights	• At least 12 hours/50 hectares over 3 days, preferably separated by a week	All year
Chariot Wheels	• Transect surveys, on foot, in suitable habitat	• Transects no greater than 5 metres apart	Late winter/Early spring (during flowering season)
Slender Darling-pea	• Transect surveys, on foot, in suitable habitat	• Transects no greater than 5 metres apart	Late winter/Early spring (during flowering season)

Survey Method References:

Plains-wanderer: Department of Environment Water Heritage and the Arts (2010). 'Survey Guidelines for Australia's Threatened Birds.' Department of Environment, Water, Heritage and the Arts, Canberra.

Chariot Wheel: Mavromihalis J (2010). 'National Recovery Plan for the Chariot Wheels Maireana cheelii.' Department of Sustainability and Environment, East Melbourne.

Environmental Effects Act 1978 (Vic)

The *Environment Effects Act 1978* (Vic) establishes a process to assess the environmental impacts of a project. If applicable, the Act requires that an Environment Effects Statement (EES) be prepared by the proponent. The EES is submitted to the Minister for Planning and enables the Minister to assess the potential environmental effects of the proposed development. An assessment of the likely project impacts against the referral criteria of the *Environment Effects Act 1978* (Vic) is provided in Table 5.

Table 5. Assessment of the project against the individual potential environmental effects referral criteria of the *Environment Effects Act 1978* (Vic).

Referral Criteria	Referral Criteria Met	Comments
• Potential clearing of 10 hectares or more of native vegetation from an area that: ○ is of an Ecological Vegetation Class identified in the bioregion; or ○ is, or is likely to be, of very high conservation significance; and ○ is not authorised under an approved Forest Management Plan or Fire Protection Plan.	Unlikely	Given the extensive areas that lack native vegetation, is it likely that the development design can avoid impacts to most native vegetation recorded within the study area.
Potential long-term loss of a significant proportion of known remaining habitat or population of a threatened species within Victoria.	No	Although several threatened flora and fauna species have been recorded within the study area, or were recorded during the current assessment, careful micrositing of the development will avoid habitats for these species and will therefore minimise impacts that arise from the development.
Potential long-term change to the ecological character of a wetland listed under the Ramsar Convention or in 'A Directory of Important Wetlands in Australia' (Environment Australia 2001).	No	The implementation of controls to ensure indirect impacts to waterways, in particular the Avoca River that flows into the Kerang Wetlands Ramsar site, will ensure that long-term change to these wetlands does not occur.
Potential extensive or major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems, over the long term.	No	As above
Potential extensive or major effects on the health, safety or well-being of a human community, due to emissions to air or water or chemical hazards or displacement of residences.	Beyond the scope of the current assessment	
Potential greenhouse gas emissions exceeding 200,000 tonnes of carbon dioxide equivalent per annum, directly attributable to the operation of the facility.	Beyond the scope of the current assessment	

If the recommendations of this report can be achieved, it is unlikely that an EES will be required. If these recommendations cannot be achieved, depending on the extent of the impact, this advice would need to be reassessed.

Flora and Fauna Guarantee Act 1988 (Vic)

The desktop assessment identified 60 flora species and 37 fauna species listed under the FFG Act that may occur within the study area (Tables A3 and A4). In addition to the three threatened species listed above, which are listed under both the EPBC Act and the FFG Act, up to 22 threatened flora species and five other threatened fauna species, listed only on the FFG Act, may occur in the higher quality habitats within the study area. As per the recommendations for the EPBC Act species, it is recommended that the vegetation in the very highly and highly constrained areas shown on Figure 1 are avoided in the future development of the study area, and if that is not possible, that targeted surveys for the threatened species that may reside within those areas are undertaken.

Until the recent change to the FFG Act in 2021, impacts to species listed as threatened under the Act were assessed through The Guidelines (Department of Environment Land Water and Planning 2017). An assessment of the extent of vegetation removal, proposed in areas modelled to support FFG Act listed threatened species, is part of the calculation to determine offsets required for the removal of that native vegetation. The 2021 change requires that public authorities (including DELWP and Councils) consider the objectives of the Act, where projects may impact upon biodiversity. On this basis, although currently not common practice, such responsible authorities may request surveys of particular species so that a thorough assessment of the likely impact of a proposal on that species can be made.

The FFG Act also lists species as 'protected flora' on public land. Protected flora includes whole families or genera, (as well as species), such as daisies, heaths, orchids, and most Acacias. These species and genera are not necessarily regarded as threatened, but require an approved 'protected flora licence or permit' from DELWP prior to their removal when located on public land. For works undertaken on private land, a Permit to Take Protected Flora is not required. If road upgrades are required, flora surveys of road reserves are required to address this requirement.

Planning and Environment Act 1987 (Vic)

The proposed development will require a planning permit from the Shire of Gannawarra Council under Clause 52.17 prior to the removal, destruction or lopping of native vegetation (Department of Environment Land Water and Planning 2017). This will require that a vegetation quality assessment is undertaken within the final development footprint. It is likely, however, that the development can avoid the removal of native vegetation by locating the wind and solar farm in parts of the study area that are cleared and currently used for cropping. Careful siting of access points to the proposed development that make use of existing crossings through native vegetation within the road reserves will also minimise impacts to native vegetation, which is consistent with Clause 52.17 and The Guidelines. It is recommended that the areas of roadside vegetation covered by the VPO1 are avoided and buffered where possible, to ensure their protection. In addition the two areas covered by the VPO2 should also be avoided and buffered in the future development of the site. This approach will be consistent with the ecological overlays that apply to those parts of the study area.

Catchment and Land Protection Act 1994 (Vic)

Primary considerations of the *Catchment and Land Protection Act 1994* (Vic) relate to soil and water conservation, as well as the management of pest plants and animals. The current assessment identified one weed species that is listed as 'noxious' within the North Central Catchment Management Area (Table A1). Horehound *Marrubium vulgare* is a 'Regionally Controlled' species. The proponent is required to 'control the spread' of all 'Regionally Controlled' species from their property. A more detailed list of noxious weeds will be prepared when undertaking the detailed vegetation assessment of the final development footprint.

Nonetheless, the proposed development should aim to remove these plants when construction commences, and ensure they are removed during the future the landscaping and maintenance of the study area. It is expected that weed management would form part of Construction Environment Management Plan (or equivalent).

The Construction Environment Management Plan should manage the potential spread of noxious weeds during the development and remove any weeds that establish post-construction. As a minimum, this should include:

- Maintain vehicle hygiene and vehicle wash-down areas;
- Using clean fill (if required);
- Manage noxious that may establish post-construction through spraying with herbicide or hand-removal;
- Avoiding the use of noxious species during any landscaping of the property.
- Erosion and sediment control to EPA Standards in order to avoid impacts downslope.

Wildlife Act 1975 (Vic)

It is possible that some locally common species of fauna will be displaced by the proposed development. Furthermore, there remains a low likelihood that animals may be accidentally injured when disturbing soil and removing vegetation. All native vertebrate wildlife is protected under the *Wildlife Act 1975* (Vic), and therefore contractors must use due care when removing vegetation from the study area. It is recommended that a zoologist or wildlife handler salvage any wildlife from trees prior to their removal.

Guidelines for the Removal, Destruction or Lopping of Native Vegetation

The Three-step Approach

Applicants who wish to remove native vegetation must generally demonstrate how the application meets the three-step approach to:

1. Avoid the removal, destruction or lopping of native vegetation.
2. Minimise impacts from the removal, destruction or lopping of native vegetation that cannot be avoided; and
3. Provide an offset to compensate for the biodiversity impact from the removal, destruction or lopping of native vegetation (Department of Environment Land Water and Planning 2017).

The application of the three-step approach is generally demonstrated through appropriate design. It is recommended that the design of infrastructure for the wind and solar farm, inclusive of services, is located in areas identified as being of low ecological constraint in the current assessment. By doing this it is expected that impacts to native vegetation will be minimised and offsets will be small. Residual impacts to native vegetation will be assessed once the development plan is known and an offset for the impact can be calculated (if required).

Bird and Bat Impact Risk

The *Wind Farms and Birds: Interim Standards For Risk Assessment* (Brett Lane and Associates Pty Ltd 2005) recommend investigations of the likely impact of a wind farm development on birds at three levels:

- *Level One investigations provide an initial assessment of the risk of significant bird impacts from the operation of the proposed wind farm; if the level of risk is estimated to be low, or can be reduced to that level through mitigation measures, design reviews or siting alterations, no further investigations are recommended; otherwise, Level Two investigations are recommended;*
- *Level Two investigations refine the risk assessment from the Level One investigation, using more intensive methods; if the level of risk is estimated to be low, or can be reduced to that level through mitigation measures, design reviews or siting alterations, no further investigations are recommended; otherwise, Level Three investigations are recommended;*
- *Level Three investigations are initiated if the results of the Level Two investigation indicate a greater than low level of residual risk of significant bird impacts from the operation of the proposed wind farm* (Brett Lane and Associates Pty Ltd 2005; p. 8).

The current assessment addresses the first component of Level One investigations, which provide an estimate of the risk of significant bird impact (Brett Lane and Associates Pty Ltd 2005). This comprises two approaches: a review of existing data and a site assessment (Brett Lane and Associates Pty Ltd 2005).

The assessment to date identifies the areas to the east and south-east as providing higher quality habitat to a wider range of bird species than the north and the west. This is largely due to the greater abundance of water in the east of the study area, including the Avoca River and a number of ephemeral and permanent water-bodies, with the internationally significant Kerang Ramsar wetland located approximately 7.5 kilometres to the north-east of the study area. A range of birds, including large, mobile species, have been recorded in significant numbers in that wetland, and these birds are likely to range widely over the landscape. This includes species including threatened and common species of duck and other large waterfowl and wetland dependent species (such as Ibis, herons and cormorants). Despite this, only one duck species was observed during the current assessment. Maned Ducks were recorded at one of the dams that held water within the study area, and they are an abundant species in the landscape. The lack of ducks and other waterfowl observed during the current assessment is not surprising given the generally lack of standing water within the study area and five kilometre landscape assessment area at the time of the assessment. It is likely that more species would be recorded during a wet year, or during winter, when more dams may hold water and ephemeral creeks and drains may be flowing or supporting pockets of standing water.

It should also be noted that the study area does not occur between areas of significant waterbird habitat. Based on the desktop assessment there are few resources to the west of the study area that would normally prompt the movement of birds across the study area in an east/west trajectory, which is likely to mitigate the risk of impacts to significant population of birds by the wind farm.

Two old nests of Wedge-tailed Eagles were observed during the current assessment (Plate 21) and individual Wedge-tailed Eagles were observed on four occasions during the four day site assessment. Large soaring birds are susceptible to collision with wind turbines (Brett Lane and Associates Pty Ltd 2005). Other raptors observed during the current assessment include Brown Falcons, Black Kite *Milvus migrans*, and Whistling Kite *Haliastur sphenurus* each of which are potentially susceptible to collision with wind turbines. Other raptors, such as Black-shouldered Kite *Elanus axillaris* and Nankeen Kestrel are less likely to be struck by turbines as these species hover-hunt, rather than soar, and therefore spend more time at lower elevations. The desktop assessment and habitat assessment also predict the presence of two threatened raptor species within the landscape: Black Falcon and Little Eagle, each of which, if present, could be impacted by the proposed wind farm.

The final component of the Level One investigations is a quantitative approach to determining bird utilisation within the study area and surrounding landscape, including the relative abundance of the abovementioned species within the landscape, the patterns of use of the study area by those birds, and the movement patterns of those birds around and across the study area (Brett Lane and Associates Pty Ltd 2005). These Bird Utilisation Surveys are expected to be done once the footprint for the proposed wind farm has been refined. They will be required at different times of the year to account for seasonal variation in the use of the study area by birds in the landscape and may be required for up to years prior to the completion of construction works. A detailed protocol for the assessments including survey effort, timing of surveys, target species and habitats, and location of count points will be developed prior to undertaking these surveys.

There are no records of bats within the study area (Department of Environment Land Water and Planning 2022f), although the Protected Matters Search Tool models habitat for Vulnerable South-eastern Long-eared Bat *Nyctophilus corbeni* within the study area. The lack of historical records is likely to be a result of a lack of surveys for microbats, as these mammals are likely to occur within the landscape. Bats are known to have negative interactions with wind turbines (Clean Energy Council 2018). Therefore a targeted survey to determine the species of bat that use the study area (including any threatened species), their abundance and patterns of movement within the study area and five kilometre landscape assessment area are recommended. These assessments would be undertaken by deploying recording devices at a number of locations within the study area to record the echolocation calls of bats, which are diagnostic characteristics used to identify them to species level.

Brolga Assessment and Mitigation Standards

The Brolga is listed as Endangered on the FFG Act Threatened Species List (Department of Environment Land Water and Planning 2021a). Unmitigated expansion of wind energy facilities within the distribution of the Brolga habitat has the potential to exacerbate the species' decline by impacting breeding and flocking success (Department of Environment Land Water and Planning 2020).

There are no records of Brolga from within five kilometres of the study area (BirdLife Australia 2022; Department of Environment Land Water and Planning 2022f) and no breeding habitat was recorded within the study area during the current assessment. Despite this, under the Victoria Planning Provisions and all planning schemes in Victoria, wind energy facilities are obliged to consider the Brolga Assessment and Mitigation Standards in the planning permit applications for those facilities (Department of Environment Land Water and Planning 2022f)[4].

The stated objective of the Brolga Assessment and Mitigation Standards is to ensure that:

The Victorian Brolga population does not become more threatened, at the state-wide level, from the impacts of wind energy facilities. This objective is achieved through these standards by requirements that protect Brolga breeding and flocking habitat.

These standards specify:

- *Brolga no-go flocking areas… …where a permit application for a wind energy facility is prohibited.*
- *The process applicants must use to identify suitable breeding wetlands and apply breeding habitat buffers to these wetlands* (Department of Environment Land Water and Planning 2020; p. 5).

The Brolga Assessment and Mitigation Standards require a step-wise approach to determining the likely impact of a proposed action on Brolgas. The current assessment addresses the preliminary steps in the following paragraphs.

Step 1 – Map the assessment area for the proposed wind energy facility

The assessment area is the proposed wind energy facility site, including any associated infrastructure, with a five kilometres buffer applied (Department of Environment Land Water and Planning 2020). This area is shown on Figure 3. The current assessment area does not include an allowance for any buildings, quarries, anemometers, powerlines, fences and other structures used in connection to the proposed wind and solar farm that are located outside the footprint comprising the study area, as described above and provided by the client.

Step 2 – Determine whether the assessment area is within the Brolga area of interest

Almost the entire study area is located within the 'Brolga area of interest' (Department of Environment Land Water and Planning 2020). The northern boundary of the Brolga area of interest passes through the study area, in a north-east/south-west direction, and crosses the study area near the intersection of Nalder Road and Quambatook-Swan Hill Road. The location of the Brolga area of interest is shown on Figure 3, however the spatial data for this area has not been released by DELWP at the time of writing and so the location is approximate. Although two paddocks are located to the west of the Brolga area of interest, because they are part of the study area for the current

[4] The Brolga Assessment and Mitigation Standards (Department of Environment Land Water and Planning 2020) are currently in draft form and have not been incorporated into the planning scheme at the time of writing. However, it is expected that by the time a planning permit for the proposed wind and solar farm is presented to council for assessment, the Brolga Assessment and Mitigation Standards will be an incorporated document.

assessment, the entire study area must comply with the Brolga Assessment and Mitigation Standards (Department of Environment Land Water and Planning 2020).

Step 3 – Determine whether the wind energy facility site is within the Brolga no-go flocking areas

The study area is not located within a known flocking Brolga area. All of the known flocking areas are located to the south of the study area, with nearest known flocking area at Lake Cooper and Green Lake approximately 135 kilometres south-east of the study area (Department of Environment Land Water and Planning 2020).

Step 4 – Identify if there are suitable breeding wetlands

Step 4.1 – Obtain mapped wetland polygons

Figure 3 shows the location of all mapped wetlands using the Victorian Wetland Inventory (Current) data layer within five kilometres of the study area. For the purposes of this preliminary assessment, and to assist with the development design, it is assumed that all wetlands identified on Figure 3 are suitable breeding wetlands for Brolgas[5]. A 900 metre buffer is required around all isolated breeding wetlands (Department of Environment Land Water and Planning 2020), as shown on Figure 3. Turbines, buildings, quarries, anemometers, power lines, quarries, fences, access tracks/roads and other structures used in connection to the wind energy facility are prohibited within all breeding habitat buffers (Department of Environment Land Water and Planning 2020).

It is unlikely that all, or any, of the wetlands identified by this preliminary desktop assessment would, in fact, provide suitable breeding habitat, based on the current site assessment. However, additional assessments of these waterbodies will be required to exclude them from being considered suitable Brolga breeding wetlands (under the Brolga Assessment and Mitigation Standards), if the buffer areas shown on Figure 3 cannot be excluded from the development plan and development requires their encroachment. This is particularly true of Back Creek, which is mapped as a wetland but is unlikely to "hold water continuously for at least four months through the Brolga breeding season (July to November)" (Department of Environment Land Water and Planning 2020; p. 14), along most of its length within the study area. Many of the other areas identified as wetlands by the Victorian Wetland Inventory (Current), while supporting native vegetation, were not identified as wetlands capable of holding water for extended periods of time, and supported vegetation that was not typically wetland vegetation.

If Figure 3 presents significant constraints to the development of the study area, a process to exclude wetlands from being considered a suitable Brolga nesting site is provided in the Brolga Assessment and Mitigation Standards (Department of Environment Land Water and Planning 2020). This process involves a site assessment and collection and presentation of evidence to exclude

[5] The Brolga Assessment and Mitigation Standards states that the Victorian Wetland Inventory (Current) has a field entitled WETLAND_TY (Department of Environment Land Water and Planning 2020; p. 13). The supplied dataset (downloaded 9 April 2022) does not have a field so titled. It has a field titled WETLANDTY, however this field is blank for every wetland in the entire state. This means that wetlands cannot be excluded on the basis of their classification and a site assessment to determine their suitability is required.

wetlands from being classified as suitable Brolga breeding wetlands. This would be undertaken in conjunction with future assessments of the study area.

Step 4.2 – Identify if there are wetlands that are not mapped

No additional wetlands were noted within the study area during the current assessment.

Step 4.3 – Manage unknown wetland types

All wetland types are currently classified as unknown, as wetland type data was not provided. It is proposed that all wetlands marked on Figure 3 are inspected to determine if the wetland is a permanent or temporary waterbody. Following the recommended onsite inspection, Figure 3 will include a label according to whether it was determined to be a permanent or temporary waterbody.

Step 4.4 – Obtain Brolga breeding records

There are no Brolga breeding records within the study area, based on the Victorian Biodiversity Atlas (Department of Environment Land Water and Planning 2022f) and Birdata database (BirdLife Australia 2022).

Step 4.5 – Apply habitat criteria to identify suitable breeding wetlands within the assessment area

Using the data gained from the desktop assessment and the evidence collected during the site assessments of the wetlands, a final map of suitable Brolga breeding habitat will be made that identifies buffer areas within the study area.

Step 5 – Outcome and next steps

Where the steps above identify breeding wetlands with the assessment area, then breeding habitat buffers apply as shown on Figure 3. Where the steps above identify that there are no breeding wetlands within the assessment area, then no mitigation is required.

Recommendations

The Preliminary Flora and Fauna Assessment identified areas of increasing ecological significance generally in the east and south-east of the study area, with other, even higher, areas of ecological significance located within the five kilometre landscape assessment, located in these directions (Figure 1). These areas present potential constraints to the development of the wind and solar farm that should be avoided where possible. Table 4 describes these areas and provides recommendations for their management, including the requirements for further assessments if these areas are to be impacted.

In addition to the recommendations of Table 4, the following recommendations area also made, based on relevant ecological and environmental legislation and policy:

- If the buffers shown on Figure 3 present a constraint to development, undertake site assessments of potential Brolga breeding wetlands to refine the number and location of nest site buffers. This is expected to release more land to development for the wind and solar farm.
- Undertake Bird Utilisation Surveys to determine the composition of the bird fauna within the study area, the relative abundance of various species and the movement and use of the study area the landscape within five kilometres of the study area.
- Undertake surveys of microbats to determine the relative abundance of various species and their movements within the study area.
- Prepare a Stormwater Management Plan that ensures that there are no direct or indirect impacts to the Avoca River, or other significant wetlands located near the study area. In particular, this plan should consider potential impacts to the Kerang Wetlands Ramsar site and ensure that there are no impacts to these or other wetlands which are located down-stream of the study area.
- Prepare a Construction Environmental Management Plan that recommends (as a minimum):
    - Animal welfare protocols, particularly for the removal of trees within the study area (if required);
    - Fencing and designation of no-go areas in locations where retained vegetation is to be protected;
    - Undertaking weed management prior to, during and post-construction. Target noxious weeds such as Horehound, and monitor the construction footprint for emerging and establishing noxious weeds.
    - Maintenance of vehicle hygiene of vehicles entering and leaving the study area to avoid the introduction of weed or weed pathogens into the study area;
    - Implementation of sediment and erosion control prior to and during construction; and,
    - Using locally indigenous species within the plant palette for future landscaping of the site, as appropriate.

Table 4. Constraint classification of ecological values identified within the study area.

Constraint Level	Ecological Features	Ecological Values	Notes and Recommendations	Further Assessment Requirements	Permit Requirements (relevant to this report)
Very High	• Road reserve vegetation • High quality grasslands • Confirmed Brolga suitable breeding wetlands	• High quality flora habitat for common and potentially threatened species • High quality fauna habitat for common and potentially threatened species • Breeding habitat for common and potentially threatened fauna species • Likely presence of EPBC Act threatened ecological communities • High vegetation quality assessment scores (Habitat Hectare) • Provide habitat connectivity within the landscape	• Substantial impacts unlikely to be approved by regulators • Vegetation offsets will be required and, depending on extent and location, may be high and/or difficult to achieve (specific species offsets may be applicable) • Avoid wherever possible • Buffer by at least 15 metres (maximum tree protection zone area) • Protect retained areas during construction in Conservation Management Plan • Confirmed Brolga suitable breeding wetlands to be buffered by 900 metres, in which no development can occur	• Vegetation quality assessment of impacted areas under Clause 52.17 of the planning scheme, including reference to the *Guidelines for the Removal, Destruction or Lopping of Native Vegetation* three step approach • Targeted threatened flora surveys • Targeted threatened fauna surveys • Detailed surveys for Protected flora species under the FFG Act • Confirm if mapped wetlands provide suitable breeding wetlands for Brolgas	• Planning permit approval to remove native vegetation and satisfy offset requirements • EPBC Act referral for impacts to one or more Matter of National Environmental Significance (if present) • FFG Act Permit to take Protected Flora (public land)
High	• Patches of native vegetation on private property • Scattered tree areas • Scattered trees	• Low to moderate quality flora habitat for common and potentially threatened species • Low to moderate quality fauna habitat for common and potentially threatened species	• Substantial impacts likely to resisted by regulators • Vegetation offsets will be required • Avoid wherever possible • Buffer by at least 15 metres (maximum tree	• Vegetation quality assessment of impacted areas under Clause 52.17 of the planning scheme, including reference to the *Guidelines for the Removal, Destruction or Lopping of Native*	• Planning permit approval to remove native vegetation and satisfy offset requirements • EPBC Act referral for impacts to one or more Matter of National Environmental Significance

Constraint Level	Ecological Features	Ecological Values	Notes and Recommendations	Further Assessment Requirements	Permit Requirements (relevant to this report)
		• Breeding habitat for common and potentially threatened fauna species • Low vegetation quality assessment scores (Habitat Hectare) • Relatively isolated patches used as "stepping stones" for fauna movement within the landscape	protection zone area) • Protect retained areas during construction in Conservation Management Plan	*Vegetation* three step approach • Targeted threatened flora surveys • Targeted threatened fauna surveys	(if present)
Moderate	• Planted native, non-indigenous or exotic trees	• Low quality flora habitat for common species • Low quality fauna habitat for common species • Breeding habitat for common fauna species	• Retain trees where possible	• Offsets are generally not required for impacts to planted vegetation, but may be required for native vegetation planted with public money (i.e. Landcare funding) • Vegetation quality assessment of impacted areas under Clause 52.17 of the planning scheme, including reference to the *Guidelines for the Removal, Destruction or Lopping of Native Vegetation* three step approach, to confirm provenance	• Planning permit approval to remove native vegetation planted with public money and satisfy offset requirements
Low	• Cropped areas not included above	• Few ecological values given the homogeneity of the	• Prioritise for development	• Vegetation quality assessment of impacted	• None

Constraint Level	Ecological Features	Ecological Values	Notes and Recommendations	Further Assessment Requirements	Permit Requirements (relevant to this report)
	• Grazed areas not included above	vegetation in these landscapes and ongoing disturbance for agricultural purposes		areas under Clause 52.17 of the planning scheme, including reference to the *Guidelines for the Removal, Destruction or Lopping of Native Vegetation* three step approach, to confirm the lack of native vegetation within proposed footprint	

Further Assessments

A number of additional assessments are required to support the planning permit application for the wind and solar farm (Table 4). The timing and indicative costs for these assessments are provided in Table 5. Table 5 also provides indicative costs for the preparation of management plans recommended for the development. The list of items in Table 5 may not be complete, as the ultimate requirements can only be determined once the proposed footprint is known and impacts to the ecological values caused by the development is finalised.

Table 5. Indicative costs and timing for additional assessments required to support a planning permit application for the proposed wind and solar farm.

Task	Description	Timing	Indicative Cost[1]
Habitat Hectare Assessment	Vegetation quality assessment to determine offset requirements to be undertaken across entire development footprint	Any time of year, preferably spring	$20,000 plus $5,000/10 hectares of land classified as possessing Very High, High or Moderate Ecological Constraint
Targeted threatened flora surveys	Transect surveys of suitable habitat to detect the presence of threatened flora species. Multiple species will be surveyed concurrently, depending on the season.	Species dependent, but predominantly late winter/spring	$7,500/hectare of impacted suitable habitat
Targeted Plains-wanderer surveys	Nocturnal transect surveys of potentially suitable habitat	Any time of year	$15,000/hectare of impacted suitable habitat
Targeted FFG Act threatened species surveys	Variable and dependent on species	Variable	TBC
Brolga breeding wetland confirmation	Confirm which of the mapped wetlands within the study area and five kilometre landscape assessment provide suitable Brolga breeding habitat	Any time of year	$15,000
Bird Utilisation Surveys	Complete Level One investigations of the *Wind Farms and Birds: Interim Standards For Risk Assessment*	Various times of the year	$50,000-$75,000
Bat surveys	Determine the use of the study area by microbats	Various times of the year	$40,000-$60,000
FFG Act Protected flora species surveys	*Confirm impacts to flora species listed as*	*Any time of year, preferably spring*	*$10,000 plus $5,000/10 hectares of*

Task	Description	Timing	Indicative Cost[1]
	protected under the FFG Act in public land proposed to be impacted by the development		*impacted public land*
EPBC Act referral	For confirmed impacts to one or more EPBC Act Matters of National Environmental Significance (based on targeted surveys described above)	Any time of year	$10,000
Offsets under Clause 52.17 of the Victorian Planning Scheme	*Offsets for impacts to native vegetation within the study area*	*Any time of year*	*TBC. The cost depends on the location and extent of the impact*
Offsets for impacts to Matters of National Environmental Significance	If impacts to threatened species or communities, under the EPBC Act are proposed, offsets may be required in addition to above	Any time of year	TBC. The cost depends on the extent of the impact and, if required, will be a condition of approval of an EPBC Act referral

Table notes:

Rows in italics can be undertaken as a condition of planning permit approval

[1.] All prices include reporting and mapping and exclude GST

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Figures

Figure 1: Results of the current assessment

Kerang Wind and Solar Farm

Legend

- Submaps

Study Area

- Wind Farm
- Solar Farm
- No Access

Ecological Constraint (Vegetation Type)

- Very High (Patch)
- High (Patch)
- High (Scattered Tree Area)
- Moderate (Planted)

Scattered Trees

- Living
- Dead

Points of Interest

- Dam Holding Water
- Scar Trees
- Wedge-tailed Eagle's Nest
- Vegetation Protection Buffer
- Public Land

0 1,000 2,000 3,000 4,000 Meters

ecolink consulting

Figure 1a: Results of the current assessment

Kerang Wind and Solar Farm

Legend

- Submaps

Study Area

- Wind Farm
- Solar Farm
- No Access

Ecological Constraint (Vegetation Type)

- Very High (Patch)
- High (Patch)
- High (Scattered Tree Area)
- Moderate (Planted)

Scattered Trees

- Living
- Dead

Points of Interest

- Dam Holding Water
- Scar Trees
- Wedge-tailed Eagle's Nest
- Vegetation Protection Buffer
- Public Land

0 500 1,000 1,500 2,000 Meters

ecolink consulting

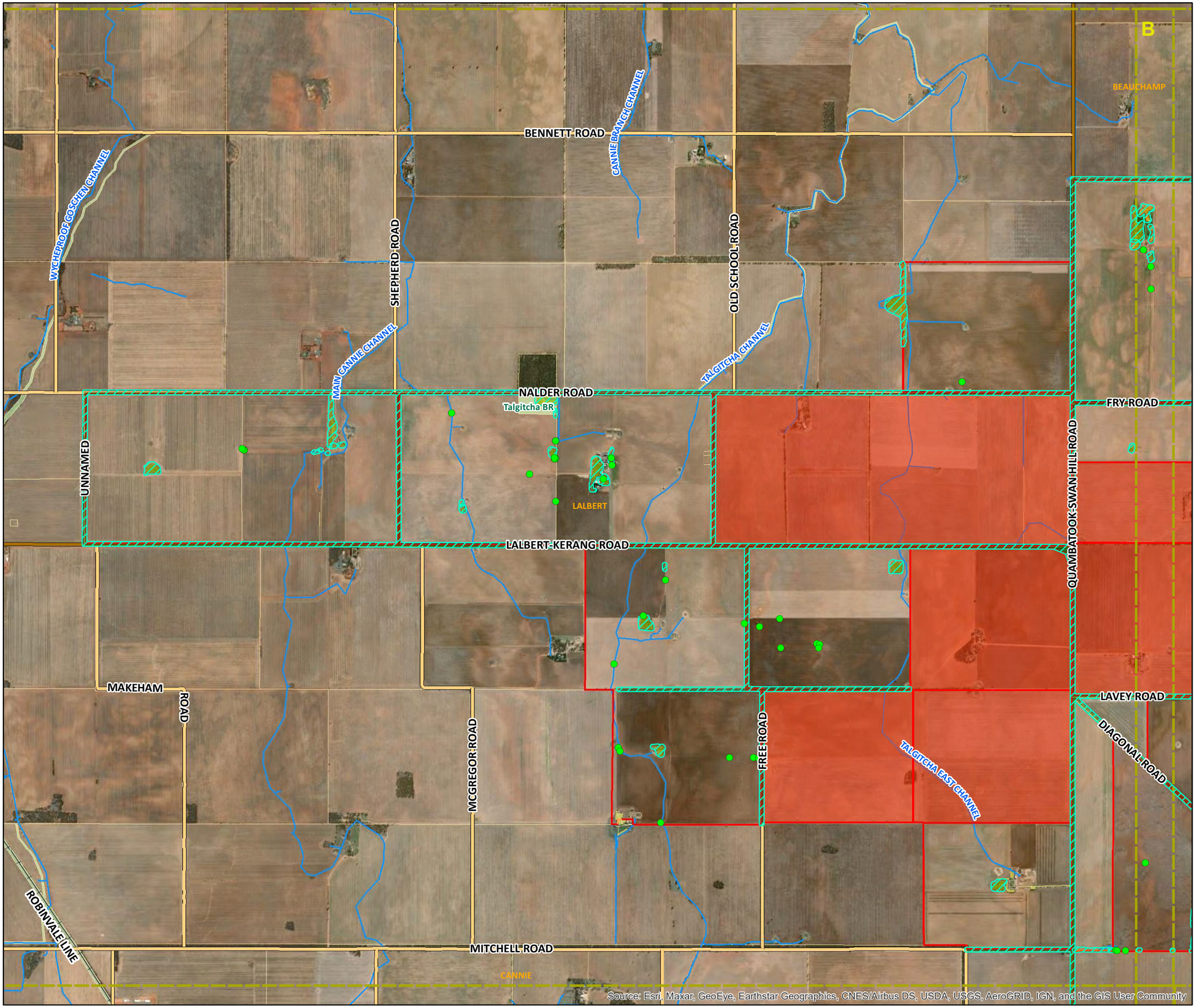

Figure 1b: Results of the current assessment

Kerang Wind and Solar Farm

Legend

- Submaps

Study Area

- Wind Farm
- Solar Farm
- No Access

Ecological Constraint (Vegetation Type)

- Very High (Patch)
- High (Patch)
- High (Scattered Tree Area)
- Moderate (Planted)

Scattered Trees

- Living
- Dead

Points of Interest

- Dam Holding Water
- Scar Trees
- Wedge-tailed Eagle's Nest
- Vegetation Protection Buffer
- Public Land

0 500 1,000 1,500 2,000 Meters

ecolink consulting

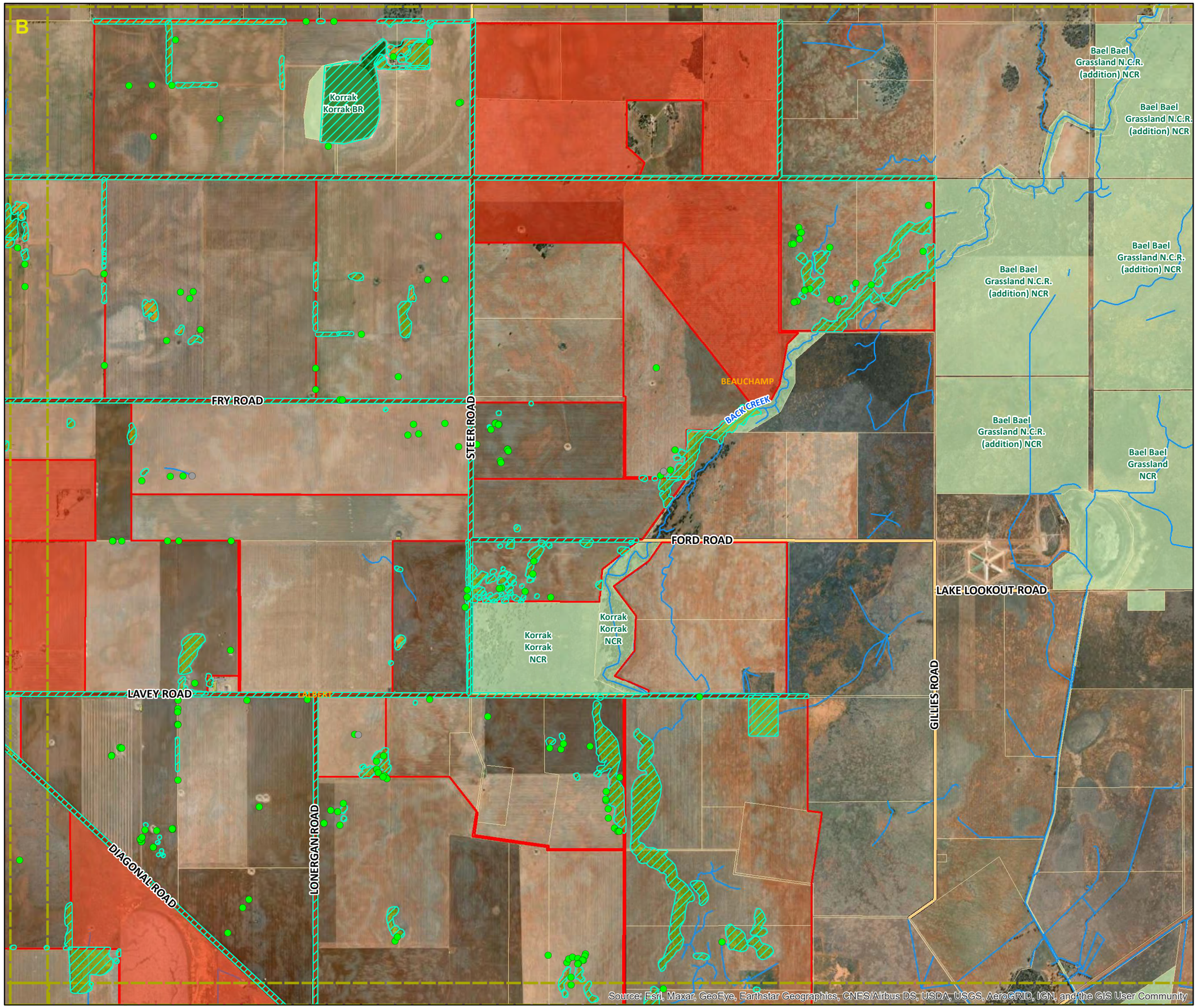

Figure 1c: Results of the current assessment

Kerang Wind and Solar Farm

Legend

- Submaps

Study Area

- Wind Farm
- Solar Farm
- No Access

Ecological Constraint (Vegetation Type)

- Very High (Patch)
- High (Patch)
- High (Scattered Tree Area)
- Moderate (Planted)

Scattered Trees

- Living
- Dead

Points of Interest

- Dam Holding Water
- Scar Trees
- Wedge-tailed Eagle's Nest
- Vegetation Protection Buffer
- Public Land

0 500 1,000 1,500 2,000 Meters

ecolink consulting

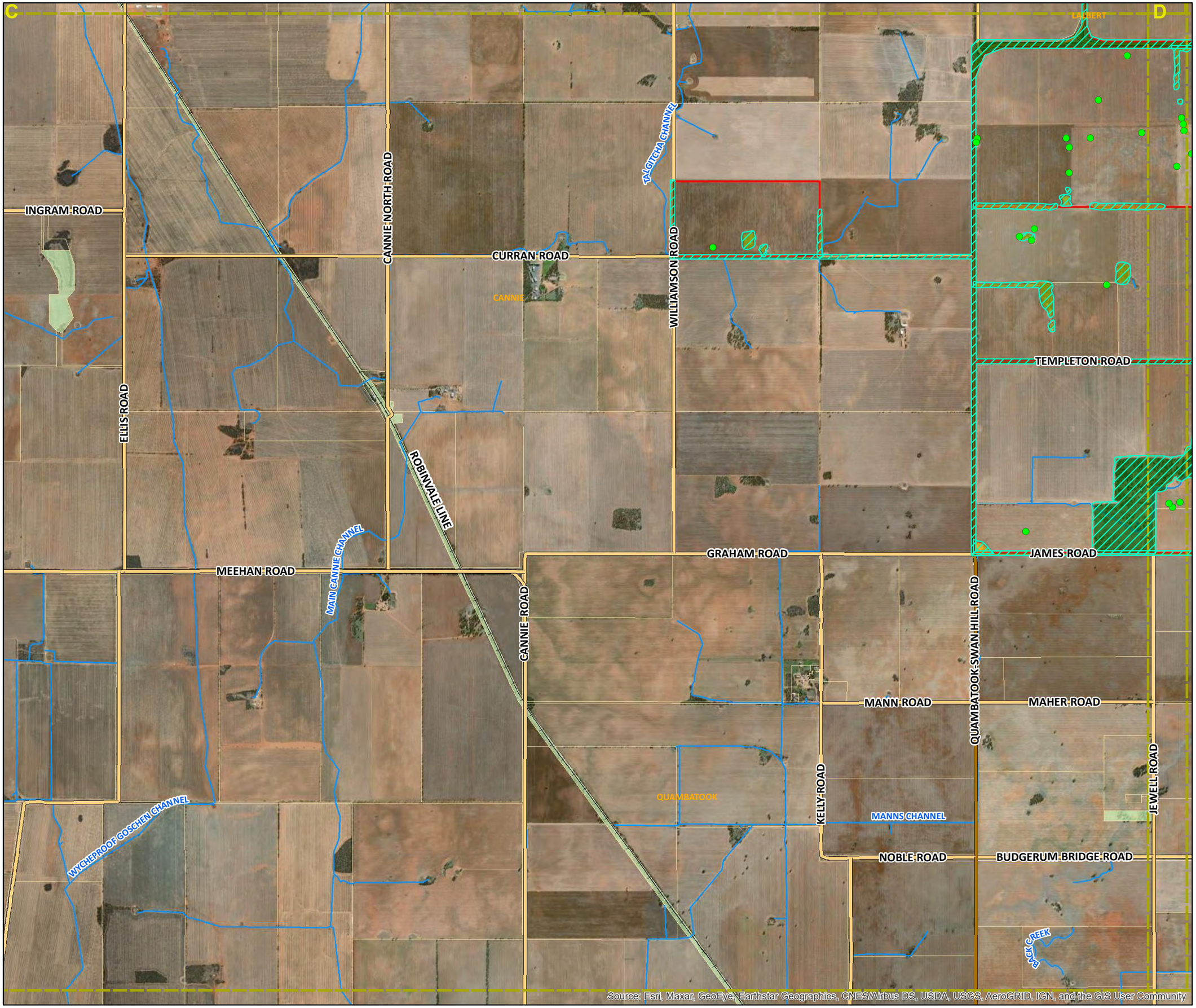

Figure 1d: Results of the current assessment

Kerang Wind and Solar Farm

Legend

- Submaps

Study Area

- Wind Farm
- Solar Farm
- No Access

Ecological Constraint (Vegetation Type)

- Very High (Patch)
- High (Patch)
- High (Scattered Tree Area)
- Moderate (Planted)

Scattered Trees

- Living
- Dead

Points of Interest

- Dam Holding Water
- Scar Trees
- Wedge-tailed Eagle's Nest
- Vegetation Protection Buffer
- Public Land

0 500 1,000 1,500 2,000 Meters

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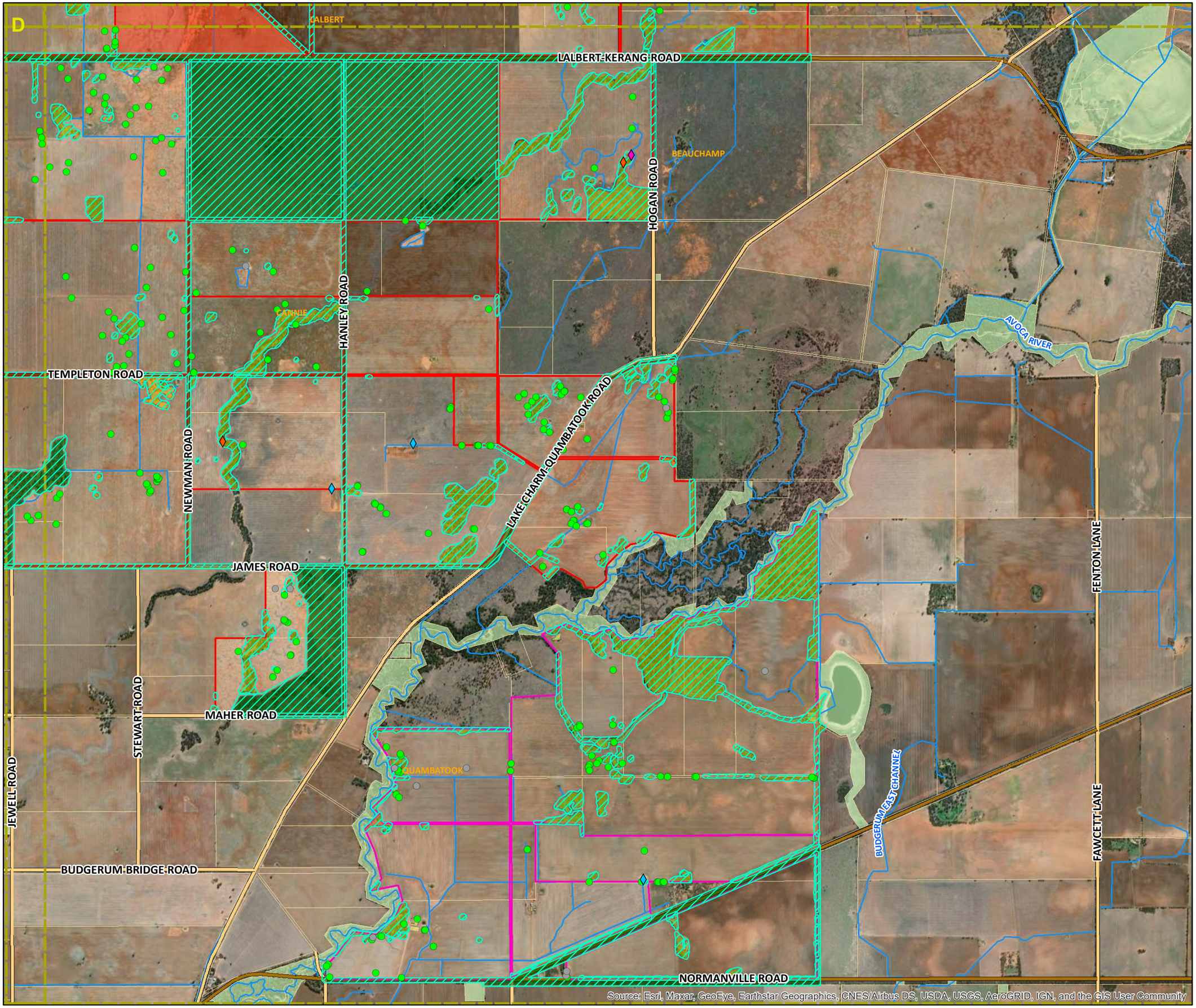

Figure 2: Threatened flora and fauna within 5 kilometres of the study area, within the last 30 years.

Kerang Wind and Solar Farm

Legend

Study Area
- Wind Farm
- Solar Farm
- 5km Study Area Buffer

Common Name
- Australasian Shoveler
- Australian Gull-billed Tern
- Black Falcon
- Blue-billed Duck
- Caspian Tern
- Common Greenshank
- Diamond Dove
- Eastern Great Egret
- Grey-crowned Babbler
- Hardhead
- Hooded Robin
- Musk Duck
- Plains-wanderer
- Plumed Egret
- White-bellied Sea-Eagle
- Carpet Python
- Hooded Scaly-foot
- Bristly Love-grass
- Buloke
- Buloke Mistletoe
- Bush Minuria
- Button Immortelle
- Cane Grass
- Chariot Wheels
- Club-hair New Holland Daisy
- Desert Sneezeweed
- Downy Swainson-pea
- Dwarf Myall
- Fine-hairy Spear-grass
- Floodplain Fireweed
- Frosted Goosefoot
- Fuzzy New Holland Daisy
- Golden Cowslips
- Grassland Bindweed
- Hairy Tails
- Inland Pomaderris
- Jerry-jerry
- Late-flower Flax-lily
- Long Eryngium
- Long-awn Spear-grass
- Pepper Grass
- Reader's Daisy
- Riverina Bitter-cress
- Riverine Flax-lily
- Rough-seed Wire-grass
- Round Templetonia
- Salt Copperburr
- Scaly Mantle
- Slender Darling-pea
- Slit-wing Bluebush
- Small Water-fire
- Small-flower Mud-mat
- Smooth Grevillea
- Smooth Minuria
- Stiff Goodenia
- Tough Scurf-pea
- Umbrella Wattle
- Veined Peppercress
- Weeping Myall
- Western Nightshade
- Winged New Holland Daisy
- Winged Peppercress
- Winged Water-starwort
- Woolly Copperburr
- Woolly Yellow-heads
- Yakka Grass
- Yarran

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Note: Some points have been shifted for illustrative purposes

0 1,500 3,000 4,500 6,000 Meters

Figure 3: Brolga Assessment and Mitigation Standards Wetland Assessment.

Kerang Wind Farm

Legend

- Wind Farm
- Solar Farm
- 5 Kilometre Wind Farm Buffer
- Potnetially Suitable Brolga Breeding Wetlands
- 900 Metre Brolga Buffer
- Brolga Area of Interest (north-western boundary)
- Public Land

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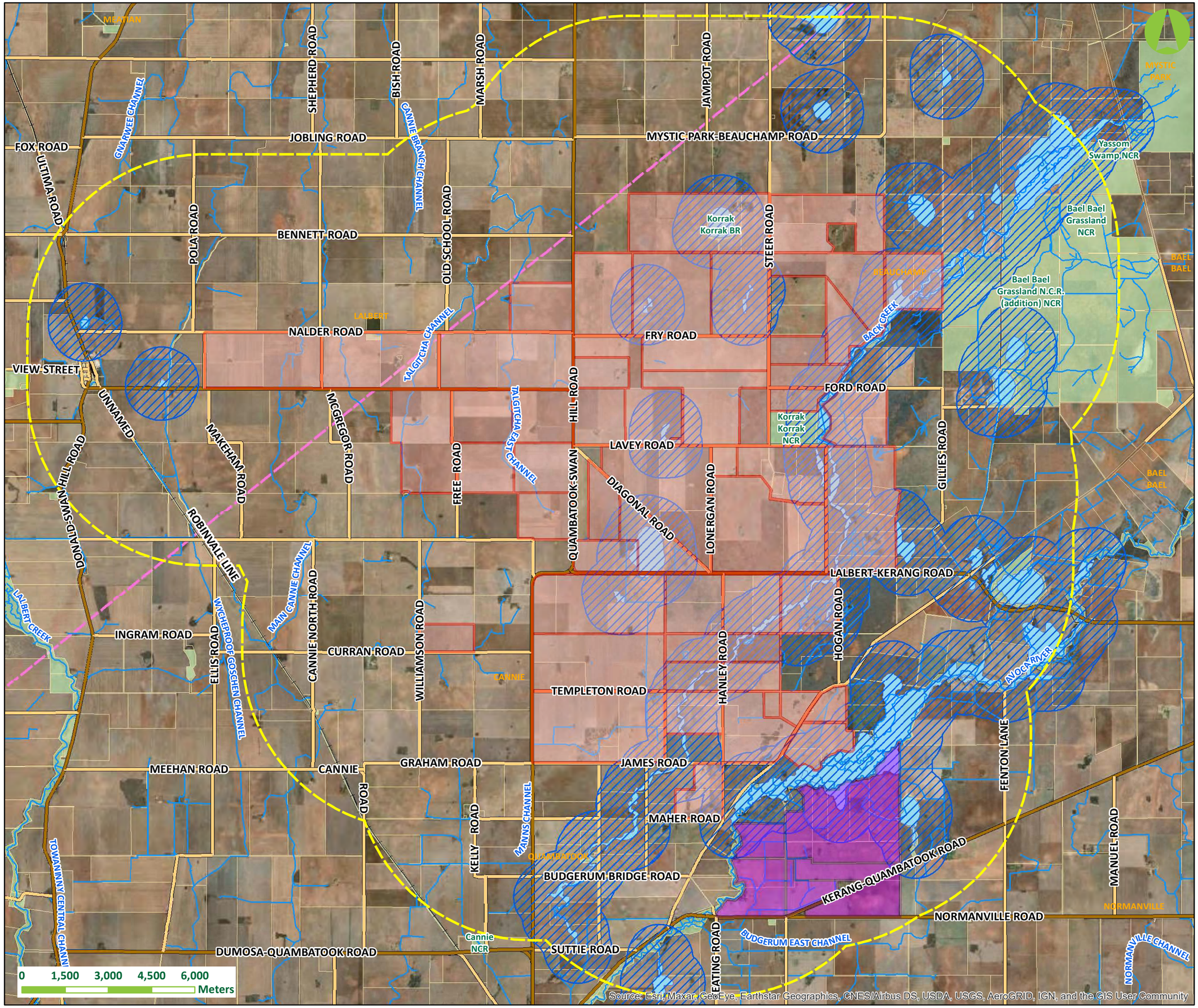


Appendices

Appendix 1. Flora and Fauna Tables.

Table A1. Flora Species Recorded Within the Study Area

Origin	Common Name	Scientific Name	Weeds of National Significance	Noxious Weeds Classification
*	African Box-thorn	*Lycium ferocissimum*	-	-
	Annual Cudweed	*Euchiton sphaericus*	-	-
*	Barley Grass	*Hordeum spp.*	-	-
*	Barley-grass	*Hordeum murinum* s.l.	-	-
*	Bearded Oat	*Avena barbata*	-	-
	Beauty Buttons	*Leptorhynchos tetrachaetus*	-	-
	Berrigan	*Eremophila longifolia*	-	-
	Berry Saltbush	*Atriplex semibaccata*	-	-
	Black Box	*Eucalyptus largiflorens*	-	-
	Black Roly-poly	*Sclerolaena muricata*	-	-
	Blue Heron's-bill	*Erodium crinitum*	-	-
	Bluebush	*Maireana spp.*	-	-
	Bluish Raspwort	*Haloragis glauca f. glauca*	-	-
	Bottle Bluebush	*Maireana excavata*	-	-
	Bristly Wallaby-grass	*Rytidosperma setaceum*	-	-
	Brown-back Wallaby-grass	*Rytidosperma duttonianum*	-	-
	Bull Mallee	*Eucalyptus behriana*	-	-
	Buloke	***Allocasuarina luehmannii***	**-**	**-**
	Buloke Mistletoe	***Amyema linophylla* subsp. *orientalis***	**-**	**-**
*	Cluster Clover	*Trifolium glomeratum*	-	-
	Common Blown-grass	*Lachnagrostis filiformis* s.l.	-	-
*	Common Heliotrope	*Heliotropium europaeum*	-	-
*	Common Heron's-bill	*Erodium cicutarium*	-	-
*	Common Peppercress	*Lepidium africanum*	-	-
	Common Sneezeweed	*Centipeda cunninghamii*	-	-
*	Common Sow-thistle	*Sonchus oleraceus*	-	-
	Common Wallaby-grass	*Rytidosperma caespitosum*	-	-
	Cottony Saltbush	*Chenopodium curvispicatum*	-	-
*	Curled Dock	*Rumex crispus*	-	-
	Desert Spear-grass	*Austrostipa eremophila*	-	-
	Dumosa Mallee	*Eucalyptus dumosa*	-	-
	Eumong	*Acacia stenophylla*	-	-
	Feather Spear-grass	*Austrostipa elegantissima*	-	-
*	Flat Spurge	*Euphorbia drummondii* s.l.	-	-
*	Flaxleaf Fleabane	*Erigeron bonariensis*	-	-

Origin	Common Name	Scientific Name	Weeds of National Significance	Noxious Weeds Classification
	Fuzzy New Holland Daisy	*Vittadinia cuneata*	-	-
	Gold-dust Wattle	*Acacia acinacea* s.l.	-	-
	Golden Billy-buttons	*Pycnosorus chrysanthus*	-	-
	Grassland Wood-sorrel	*Oxalis perennans*	-	-
	Grassy Bindweed	*Convolvulus remotus* s.l.	-	-
*	Great Brome	*Bromus diandrus*	-	-
	Grey Copperburr	*Sclerolaena diacantha*	-	-
*	Hair Grass	*Aira* spp.	-	-
	Hairy Bluebush	*Maireana pentagona*	-	-
	Hakea Wattle	*Acacia hakeoides*	-	-
	Hedge Saltbush	*Rhagodia spinescens*	-	-
*	Horehound	*Marrubium vulgare*	-	Regionally Controlled
	Jersey Cudweed	*Laphangium luteoalbum*	-	-
	Leafless Bluebush	*Maireana aphylla*	-	-
	Lesser Joyweed	*Alternanthera denticulata* s.l.	-	-
*	Lucerne	*Medicago sativa*	-	-
*	Mallow of Nice	*Malva nicaeensis*	-	-
*	Medic	*Medicago* spp.	-	-
*	Mustard	*Sisymbrium* spp.	-	-
	Native Flax	*Linum marginale*	-	-
	Nitre Goosefoot	*Chenopodium nitrariaceum*	-	-
	Nitre-bush	*Nitraria billardierei*	-	-
	Nodding Saltbush	*Einadia nutans*	-	-
	Old-man Saltbush	*Atriplex nummularia*	-	-
*	Ox-tongue	*Helminthotheca echioides*	-	-
	Pale Beauty-heads	*Calocephalus sonderi*	-	-
*	Paspalum	*Paspalum dilatatum*	-	-
*	Perennial Rye-grass	*Lolium perenne*	-	-
	Pimelea Daisy-bush	*Olearia pimeleoides*	-	-
	Plump Spear-grass	*Austrostipa aristiglumis*	-	-
*	Prickly Lettuce	*Lactuca serriola*	-	-
*	Prostrate Knotweed	*Polygonum aviculare* s.l.	-	-
	Quena	*Solanum esuriale*	-	-
	Red Mallee	*Eucalyptus calycogona*	-	-
*	Ribwort	*Plantago lanceolata*	-	-
	Rigid Panic	*Walwhalleya proluta*	-	-
	Rohrlach's Bluebush	*Maireana rohrlachii*	-	-
	Rough Halgania	*Halgania cyanea*	-	-
	Rough Spear-grass	*Austrostipa scabra*	-	-
	Ruby Saltbush	*Enchylaena tomentosa* var. *tomentosa*	-	-

Origin	Common Name	Scientific Name	Weeds of National Significance	Noxious Weeds Classification
	Short-leaf Bluebush	*Maireana brevifolia*	-	-
	Short-wing Saltbush	*Sclerochlamys brachyptera*	-	-
	Slender Cypress-pine	*Callitris gracilis*	-	-
	Slender-fruit Saltbush	*Atriplex leptocarpa*	-	-
	Small-leaf Goosefoot	*Chenopodium desertorum* subsp. *microphyllum*	-	-
	Spear Grass	*Austrostipa* spp.	-	-
	Spider Grass	*Enteropogon acicularis*	-	-
	Streaked Copperburr	*Sclerolaena tricuspis*	-	-
	Sugarwood	*Myoporum platycarpum*	-	-
	Sweet Quandong	*Santalum acuminatum*	-	-
	Tangled Lignum	*Duma florulenta*	-	-
	Thorny Lawrencia	*Lawrencia squamata*	-	-
	Umbrella Wattle	***Acacia oswaldii***	**-**	**-**
*	Wheat	*Triticum aestivum*	-	-
	White Cypress-pine	*Callitris glaucophylla*	-	-
*	Wild Oat	*Avena fatua*	-	-
	Willow Wattle	*Acacia salicina*	-	-
*	Wimmera Rye-grass	*Lolium rigidum*	-	-
	Windmill Grass	*Chloris truncata*	-	-
	Wingless Bluebush	*Maireana enchylaenoides*	-	-
	Woolly Buttons	*Leiocarpa panaetioides*	-	-
	Woolly New Holland Daisy	*Vittadinia gracilis*	-	-

Table Notes:
* – Exotic
Species in bold are threatened species.

This table does not include ornamental plants, trees or shrubs that were not spreading or reproducing beyond where they were planted.

Table A2. Fauna Species Recorded Within the Study Area

Origin	Common Name	Scientific Name
Birds		
	Maned Duck	*Chenonetta jubata*
	Masked Lapwing	*Vanellus miles*
	Black-shouldered Kite	*Elanus axillaris*
	Black Kite	*Milvus migrans*
	Whistling Kite	*Haliastur sphenurus*
	Wedge-tailed Eagle	*Aquila audax*
	Brown Falcon	*Falco berigora*
	Nankeen Kestrel	*Falco cenchroides*
*	Feral Pigeon	*Columba livia*
	Common Bronzewing	*Phaps chalcoptera*
	Crested Pigeon	*Ocyphaps lophotes*
	Galah	*Eolophus roseicapilla*
	Cockatiel	*Nymphicus hollandicus*
	Eastern Rosella	*Platycercus eximius*
	Mulga Parrot	*Psephotellus varius*
	Eastern Bluebonnet	*Northiella haematogaster*
	Australian Owlet-nightjar	*Aegotheles cristatus*
	Rainbow Bee-eater	*Merops ornatus*
	Brown Treecreeper	*Climacteris picumnus*
	Variegated Fairywren	*Malurus lamberti*
	White-winged Fairywren	*Malurus leucopterus*
	Striated Pardalote	*Pardalotus striatus*
	Weebill	*Smicrornis brevirostris*
	Yellow-rumped Thornbill	*Acanthiza chrysorrhoa*
	Blue-faced Honeyeater	*Entomyzon cyanotis*
	Noisy Miner	*Manorina melanocephala*
	Yellow-throated Miner	*Manorina flavigula*
	Singing Honeyeater	*Gavicalis virescens*
	Grey Shrikethrush	*Colluricincla harmonica*
	Willie Wagtail	*Rhipidura leucophrys*
	Black-faced Cuckooshrike	*Coracina novaehollandiae*
	Masked Woodswallow	*Artamus personatus*
	Black-faced Woodswallow	*Artamus cinereus*
	Pied Butcherbird	*Cracticus nigrogularis*
	Australian Magpie	*Gymnorhina tibicen*
	Australian Raven	*Corvus coronoides*
	White-winged Chough	*Corcorax melanorhamphos*
	Welcome Swallow	*Hirundo neoxena*
	Tree Martin	*Petrochelidon nigricans*
	Australian Pipit	*Anthus australis*
	Horsfield's Bush Lark	*Mirafra javanica*

Origin	Common Name	Scientific Name
*	Eurasian Skylark	*Alauda arvensis*
	Rufous Songlark	*Megalurus mathewsi*
	Brown Songlark	*Megalurus cruralis*
*	House Sparrow	*Passer domesticus*
	Zebra Finch	*Taeniopygia guttata*
*	Common Starling	*Sturnus vulgaris*
*	Common Myna	*Acridotheres tristis*
Mammals		
	Eastern Grey Kangaroo	*Macropus giganteus*
*	European Rabbit	*Oryctolagus cuniculus*
Reptiles		
	Eastern Bearded Dragon	*Pogona barbata*
	Eastern Brown Snake	*Psuedonaja textilis*

Definitions

* - Introduced species

Table A3. Threatened flora species that have previously been recorded within, or within 3 kilometres of the study area (Department of Environment Land Water and Planning 2022f), or that has habitat that may occur within the vicinity of the study area (Department of Agriculture Water and the Environment 2022a).

Common Name	Species Name	National Status	Victorian Status	Habitat Preferences	Most Recent Record	Habitat Present on Site	Likelihood of Presence*
Branching Groundsel	*Senecio cunninghamii* var. *cunninghamii*	-	Endangered	Plains grasslands	1991 (1)	No	Unlikely
Bristly Love-grass	*Eragrostis setifolia*	-	Endangered	Occurs on clayey soils of seasonally flooded areas, confined to the far north-west	2010 (4)	Yes	High
Buloke	*Allocasuarina luehmannii*	-	Critically Endangered	Woodlands on non-calcerous soils, usually associated with Grey Box	2018 (20)	Yes	Present
Buloke Mistletoe	*Amyema linophylla* subsp. *orientalis*	-	Critically Endangered	Box woodland on Allocasuarina luehmannii	1996 (6)	Yes	Present
Bush Minuria	*Minuria cunninghamii*	-	Vulnerable	Usually occurring on slightly to strongly saline ground in sand, clay or gypseous soils	2018 (10)	Yes	High
Button Immortelle	*Leptorhynchos waitzia*	-	Endangered	Occurs in open grassy plains, grassy woodlands and sandy flats in mallee areas, with isolated occurrence at Lake Corangamite where growing on fine-grained soil	2014 (1)	Yes	Low
Candy Spider-orchid	*Caladenia versicolor*	Vulnerable	Endangered	Open woodland and open forests	NPR	No	Unlikely
Cane Grass	*Eragrostis australasica*	-	Critically Endangered	Largely confined to clay-pans and shallow lakes in the north-west	2014 (7)	Yes	High
Cane Spear-grass	*Austrostipa breviglumis*	-	Endangered	Rocky gullies and ridge-tops, often in wet areas	1991 (1)	No	Unlikely
Chariot Wheels	*Maireana cheelii*	Vulnerable	Endangered	Occurs on seasonally wet, heavy red loam or clay soils	2020 (125)	Yes	High

Common Name	Species Name	National Status	Victorian Status	Habitat Preferences	Most Recent Record	Habitat Present on Site	Likelihood of Presence*
Club-hair New Holland Daisy	*Vittadinia condyloides*	-	Endangered	Usually occurring in grassland and grassy woodlands on better mallee soils and loams of the Riverina	1995 (2)	Yes	High
Downy Swainson-pea	*Swainsona swainsonioides*	-	Endangered	Grows on heavier clay soils in woodland and now very rare due to habitat destruction	2015 (7)	Yes	High
Dwarf Myall	*Acacia ancistrophylla var. lissophylla*	-	Endangered	Grows mostly on flats in sandy loam and loam over limestone usually in mallee communities	2018 (1)	Yes	Low
Fine-hairy Spear-grass	*Austrostipa puberula*	-	Endangered	Sandy soils in the far north-west of the State, with isolated occurrences near Ararat, Horsham, Lake Bolac and Dartmoor	1995 (1)	Yes	High
Floodplain Fireweed	*Senecio campylocarpus*	-	Endangered	Dry and valley sclerophyll forest	2012 (1)	No	Unlikely
Frosted Goosefoot	*Chenopodium desertorum subsp. desertorum*	-	Endangered	Occurring mainly on sand-ridges	2011 (1)	Yes	High
Frosted Goosefoot	*Chenopodium desertorum* subsp. *rectum*	-	Endangered	Occurring in mallee scrub on sand or slightly heavier soils where it can be locally common	2018 (2)	Yes	Low
Fuzzy New Holland Daisy	*Vittadinia cuneata* var. *hirsuta*	-	Endangered	Known in Victoria from open woodland	1996 (1)	No	Unlikely
Golden Cowslips	*Diuris behrii*	-	Endangered	Grassland and open woodland around Derrinallum, Stawell and the Grampians.	2017 (2)	No	Unlikely
Grassland Bindweed	*Convolvulus graminetinus*	-	Endangered	Apparently rare in Victoria where known from grassland or woodland communities on relatively fertile soils sometimes prone to inundation	2012 (15)	Yes	High
Hairy Tails	*Ptilotus*	-	Critically	Fertile soils supporting grassland and	2011 (8)	Yes	High

Common Name	Species Name	National Status	Victorian Status	Habitat Preferences	Most Recent Record	Habitat Present on Site	Likelihood of Presence*
	erubescens		Endangered	woodland communities in northern and western Victoria, excluding mallee areas			
Inland Pomaderris	*Pomaderris paniculosa* subsp. *paniculosa*	-	Endangered	Mostly on shallow soils overlying sandstone or limestone in the nearer north-west, associated with mallee and taller woodlands	2017 (3)	Yes	High
Jerry-jerry	*Ammannia multiflora*	-	Endangered	Mostly confined in Victoria to the Murray River floodplain in the north-west on heavy soils, occasionally submerged.	2011 (1)	No	Unlikely
Late-flower Flax-lily	*Dianella tarda*	-	Critically Endangered	Floodplains, often in River Red-gum riverine forest or woodland	2017 (5)	Yes	High
Long Eryngium	*Eryngium paludosum*	-	Endangered	Confined to heavy soils of lake margins and river floodplains in the north and north-west (e.g. Robinvale, Warracknabeal, Kerang, Numurkah districts).	2014 (8)	Yes	High
Long-awn Spear-grass	*Austrostipa tenuifolia*	-	Endangered	Known from only 2 collections in the north-central part of the state (Quambatook, Terrick Terrick) where growing in Callitris-dominated woodland.	1995 (2)	No	Unlikely
Mallee Cucumber	*Austrobryonia micrantha*	-	Endangered	Occurs on drying or dried clay soils (e.g. lake-beds, ephemeral watercourses and lagoons) on the floodplain of the Murray River in the far north-west	1974 (1)	No	Unlikely
Pepper Grass	*Panicum laevinode*	-	Vulnerable	Uncommon, recorded from native grassland, grassy Red Gum forests, and sometimes, pasture in north-central Victoria, mostly occurring on land prone to inundation and very responsive to summer rain	2005 (1)	Yes	High

Common Name	Species Name	National Status	Victorian Status	Habitat Preferences	Most Recent Record	Habitat Present on Site	Likelihood of Presence*
Reader's Daisy	*Brachyscome readeri*	-	Endangered	Usually growing in areas subject to inundation	2014 (1)	No	Unlikely
Rigid Spider-orchid	*Caladenia tensa*	Endangered	-	A range of dry habitats including Cypress-pine (family Cupressaceae)/Yellow Gum Woodland, Pine/Box woodland, mallee-heath sites, heathy woodland and mallee woodland, generally with rock outcrops.	NPR	No	Unlikely
Riverina Bitter-cress	*Cardamine moirensis*	-	Endangered	Seasonally wet areas	2014 (3)	No	Unlikely
Riverine Flax-lily	*Dianella porracea*	-	Critically Endangered	Inhabiting sandy soils and silty alluvium	2014 (1)	No	Unlikely
Rough-seed Wire-grass	*Aristida obscura*	-	Endangered	Known in Victoria by a few collections in grassland or open woodland	2005 (2)	No	Unlikely
Round Templetonia	*Templetonia egena*	-	Endangered	Favours deep sandy soils in mallee and woodland communities	2014 (2)	Yes	High
Salt Copperburr	*Sclerolaena ventricosa*	-	Endangered	Known in Victoria from a few small populations on treeless, saline, alluvial flats at Neds Corner in the far north-west and in black box-chenopod woodland near Kerang	2018 (1)	Yes	Low
Scaly Mantle	*Eriochlamys squamata*	-	Endangered	Usually in woodland on heavier clay soils	2014 (16)	Yes	High
Slender Darling-pea	*Swainsona murrayana*	Vulnerable	Endangered	Usually found in seasonally inundated flats and around lakes.	2020 (4)	Yes	High
Slit-wing Bluebush	*Maireana georgei*	-	Critically Endangered	Heavier, loamy soils of interdune swales in the Sunset Country and near Kulwin (east of Hattah)	2012 (1)	No	Unlikely
Small Water-fire	*Bergia trimera*	-	Endangered	Confined to floodplains of the Murray River in the far northwest (Red Cliffs, Lake Wallawalla), and areas prone to inundation	2011 (1)	No	Unlikely

Common Name	Species Name	National Status	Victorian Status	Habitat Preferences	Most Recent Record	Habitat Present on Site	Likelihood of Presence*
				near Kerang			
Small-flower Mud-mat	*Glossostigma cleistanthum*	-	Endangered	Collected from temporary pools on granite outcrops, clayey soils of the Murray River floodplain, and margins of subalpine bogs.	2014 (1)	No	Unlikely
Small-flower Tobacco	*Nicotiana goodspeedii*	-	Endangered	Confined to the north-west where rare and found mostly in alkaline soils, often in sand overlying limestone.	1974 (1)	No	Unlikely
Smooth Grevillea	*Grevillea rosmarinifolia* subsp. *glabella*	-	Endangered	Grows in mallee, open woodland and shrub associations, usually on sandy soils.	2014 (1)	Yes	Low
Smooth Minuria	*Minuria integerrima*	-	Vulnerable	In Victoria confined to heavy clay and alluvial silt on floodplains of the Murray River, from Barmah district to the South Australian border	2014 (5)	Yes	High
Soft Sunray	*Leucochrysum molle*	-	Endangered	Apparently confined to Mildura and Swan Hill (both pre-1900 collections), and Serpentine near Inglewood (1959), but possibly more widespread on the northern plains	1985 (1)	No	Unlikely
Spiny Peppercress	*Lepidium aschersonii*	Vulnerable	Endangered	Heavy clay soil near salt lakes on volcanic plain, but with outlying records from near Lake Omeo and the Grampians	NPR	No	Unlikely
Stiff Goodenia	*Goodenia lunata*	-	Critically Endangered	In Victoria, known with certainty only by a few old collections from the Dimboola area, and recent collections from near Kerang	2017 (4)	No	Unlikely
Striate Spike-sedge	*Eleocharis obicis*	Vulnerable	-	Occurring in grasslands, associated with ephemeral wetlands and gilgai hollows	NPR	No	Unlikely
Tough Scurf-pea	*Cullen tenax*	-	Endangered	Forests and open woodlands	2011 (1)	No	Unlikely
Umbrella Wattle	*Acacia oswaldii*	-	Critically	Through north-western Victoria, mainly in	2018 (16)	Yes	Present

Common Name	Species Name	National Status	Victorian Status	Habitat Preferences	Most Recent Record	Habitat Present on Site	Likelihood of Presence*
			Endangered	calcareous sands or loam.			
Veined Peppercress	*Lepidium phlebopetalum*	-	Endangered	Very rare in Victoria, recorded in recent times only from open herbfields in the Quambatook area, often in relatively bare sites with crusting red clay loam soils	2017 (8)	Yes	High
Weeping Myall	*Acacia pendula*	-	Critically Endangered	Throughout its range it grows mainly on floodplains in fertile alluvial clay and red earth soils.	2018 (2)	Yes	High
Western Nightshade	*Solanum coactiliferum*	-	Critically Endangered	In Victoria, known only from near Annuello in the far north-west	2018 (1)	No	Unlikely
Winged New Holland Daisy	*Vittadinia pterochaeta*	-	Endangered	Apparently confined to relatively fertile clay-loam soils.	2017 (10)	Yes	High
Winged Peppercress	*Lepidium monoplocoides*	Endangered	Endangered	Uncommon in north-western quarter of State, mostly on heavy soils near lakes and watercourses	2012 (1)	No	Unlikely
Winged Water-starwort	*Callitriche umbonata*	-	Endangered	Scattered throughout damp depressions and swamps throughout Victoria.	2014 (1)	No	Unlikely
Woolly Copperburr	*Sclerolaena lanicuspis*	-	Endangered	Very rare in Victoria, known from a few alluvial flats or lakeside lunettes supporting chenopod shrublands, with or without Black Box (Eucalyptus largiflorens) overstorey	2014 (1)	No	Unlikely
Woolly Yellow-heads	*Trichanthodium skirrophorum*	-	Vulnerable	In Victoria confined to the far north-west, frequently in chenopod shrubland in saline and gypseous soils	2018 (1)	No	Unlikely
Yakka Grass	*Sporobolus caroli*	-	Endangered	Apparently confined in Victoria to seasonally inundated areas along the Murray River floodplain downstream of about Echuca	2017 (6)	Yes	High
Yarran	*Acacia melvillei*	-	Critically	Scattered through north-western Victoria,	2018 (6)	Yes	High

Common Name	Species Name	National Status	Victorian Status	Habitat Preferences	Most Recent Record	Habitat Present on Site	Likelihood of Presence*
			Endangered	mostly along Murray River and its flood-plain, often in woodland			
Yellow Swainson-pea	*Swainsona pyrophila*	Vulnerable	-	Grows in mallee scrub on sandy or loamy soil and usually found only after fire	NPR	No	Unlikely

Table Notes:

NPR – Not previously recorded

*** Likelihood of Presence Definitions**:

Unlikely – Site does not contain habitat and/or it is outside the species' known, current distribution.

Low –Site contains some marginal habitat, but the species was not observed and has not been recently recorded in previous surveys in the area.

Moderate – Site contains preferred habitat that may support a population of the species. However, other factors, such as fragmentation, disturbance or predators may be impacting any local population.

High - Site contains the preferred habitat which is likely to support the species.

Present – Preferred habitat is present on the site, and the species was observed on the site, or recently recorded at the site.

NPR – No previous record, modelled presence only under the EPBC Protected Matters Search results (Department of Agriculture Water and the Environment 2022a).

Threatened status based on the Advisory List of Rare or Threatened Plants in Victoria (Department of Environment and Primary Industries 2014).

Table A4. Threatened fauna species that have previously been recorded within, or within 3 kilometres of the study site (Department of Environment Land Water and Planning 2022f), or that has habitat that may occur within the vicinity of the site (Department of Agriculture Water and the Environment 2022a).

Common Name	Species Name	National Status	Victorian Status	Habitat Preferences	Most Recent Record	Habitat Present on Site	Likelihood of Presence*
Birds							
Malleefowl	*Leipoa ocellata*	Vulnerable	Vulnerable	Mallee, acacia, paperbark and other scrubs as well as open eucalypt woodlands or coastal heaths on sandy or gravelly soils.	NPR	No	Unlikely
Australasian Shoveler	*Spatula rhynchotis*	-	Vulnerable	Heavily vegetated swamps and floodwaters.	2017 (35)	No	Unlikely
Hardhead	*Aythya australis*	-	Vulnerable	Deep, vegetated swamps, open water.	2017 (661)	No	Unlikely
Blue-billed Duck	*Oxyura australis*	-	Vulnerable	Well-vegetated freshwater swamps, large dams, lakes. More open waters in winter.	1993 (2)	No	Unlikely
Musk Duck	*Biziura lobata*	-	Vulnerable	Permanent swamps with dense vegetation, more open waters in non-breeding season.	1993 (9)	No	Unlikely
Australian Bustard	*Ardeotis australis*	-	Critically Endangered	Migratory occurring near waterways, waterbodies and open plains throughout northern Australia	1937 (1)	Yes	Low
Diamond Dove	*Geopelia cuneata*	-	Vulnerable	Drier grassy woodlands, scrub near water and wooded watercourses	2017 (2)	Yes	Moderate
Inland Dotterel	*Peltohyas australis*	-	Vulnerable	Sparsely vegetated inland plains, including gibber, gravel flats and claypans, sometimes ploughed fields and wheat stubble	1977 (1)	Yes	Low
Australian Painted-snipe	*Rostratula australis*	Endangered	Critically Endangered	Uncommon summer migrant to Victoria. Lowlands on shallow freshwater swamps with emergent vegetation, and flooded salt marshes.	NPR	No	Unlikely

Common Name	Species Name	National Status	Victorian Status	Habitat Preferences	Most Recent Record	Habitat Present on Site	Likelihood of Presence*
Plains-wanderer	*Pedionomus torquatus*	Critically Endangered	Critically Endangered	Sparse, treeless, lightly grazed native grasslands/herbfields with bare ground, old cereal crops, low shrubland.	2012 (10)	Yes	Moderate
Eastern Curlew	*Numenius madagascariensis*	Critically Endangered	Critically Endangered	Estuaries, tidal mudflats, mangroves, shallow river margins, coastal or inland	NPR	No	Unlikely
Curlew Sandpiper	*Calidris ferruginea*	Critically Endangered	Critically Endangered	Estuaries, tidal mudflats, mangroves, shallow river margins, coastal or inland	1978 (2)	No	Unlikely
Common Greenshank	*Tringa nebularia*	-	Endangered	Estuaries, tidal mudflats, mangroves, shallow river margins, coastal or inland	2001 (5)	No	Unlikely
Australian Gull-billed Tern	*Gelochelidon macrotarsa*	-	Endangered	Beaches, mudflats, wetlands and inland	1999 (8)	No	Unlikely
Caspian Tern	*Hydroprogne caspia*	-	Vulnerable	Coastal, offshore waters, beaches estuaries, some inland birds	2001 (7)	No	Unlikely
Australasian Bittern	*Botaurus poiciloptilus*	Endangered	Critically Endangered	Reed beds, dense vegetation of freshwater swamps and creeks.	NPR	No	Unlikely
Eastern Great Egret	*Ardea alba modesta*	-	Vulnerable	Floodwaters, rivers and shallows of wetlands, intertidal mud flats.	2017 (4)	No	Unlikely
Plumed Egret	*Ardea intermedia plumifera*	-	Critically Endangered	Freshwater wetlands, pastures and croplands, tidal mudflats and floodplains.	1999 (1)	No	Unlikely
Little Eagle	*Hieraaetus morphnoides*	-	Vulnerable	Woodlands, Forests	1980 (2)	Yes	Moderate
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	-	Endangered	Oceanic / coastal and larger inland waterways.	1998 (2)	No	Unlikely
Barking Owl	*Ninox connivens*	-	Critically Endangered	Forest and woodland.	1953 (1)	Yes	Low
Black Falcon	*Falco subniger*	-	Critically Endangered	Woodland, scrub, shrubland and grassland types in arid and semi-arid zones.	2018 (11)	Yes	Moderate
Grey Falcon	*Falco hypoleucos*	-	Vulnerable	Shrubland, grassland and wooded watercourses of arid and semi-arid	NPR	No	Unlikely

Common Name	Species Name	National Status	Victorian Status	Habitat Preferences	Most Recent Record	Habitat Present on Site	Likelihood of Presence*
				regions, although it is occasionally found in open woodlands near the coast			
Regent Parrot	*Polytelis anthopeplus*	Vulnerable	Vulnerable	River Red-gum forests and adjacent farmlands	NPR	No	Unlikely
Superb Parrot	*Polytelis swainsonii*	Vulnerable	Endangered	Woodlands near rivers, also gardens and pastures in core range of NSW Riverina.	NPR	No	Unlikely
Swift Parrot	*Lathamus discolor*	Critically Endangered	Critically Endangered	Winter migrant from Tasmania. Generally prefers Box-Ironbark forests and woodlands inland of the Great Dividing Range during winter.	NPR	No	Unlikely
Night Parrot	*Pezoporus occidentalis*	Endangered	-	Long unburnt spinifex plains away from disturbance	NPR	No	Unlikely
Painted Honeyeater	*Grantiella picta*	Vulnerable	Vulnerable	Open box-ironbark forests and woodlands, particularly where trees are infested with mistletoe.	NPR	No	Unlikely
Grey-crowned Babbler	*Pomatostomus temporalis*	-	Vulnerable	Open forest, woodlands, scrublands.	1993 (4)	Yes	Low
Hooded Robin	*Melanodryas cucullata*	-	Vulnerable	Lightly timbered woodland, mainly dominated by acacia and/or eucalypts.	2018 (12)	Yes	Moderate
Mammals							
South-eastern Long-eared Bat	*Nyctophilus corbeni*	Vulnerable	Endangered	Found in a wide range of inland woodland vegetation types including box / ironbark / cypress pine woodlands, Buloke woodlands, Brigalow woodland, Belah woodland, smooth-barked apple woodland, river red gum forest, black box woodland, and various types of tree mallee.	NPR	No	Unlikely
Frogs							

Common Name	Species Name	National Status	Victorian Status	Habitat Preferences	Most Recent Record	Habitat Present on Site	Likelihood of Presence*
Growling Grass Frog	*Litoria raniformis*	Vulnerable	Vulnerable	Permanent lakes, swamps, dams and lagoons.	NPR	No	Unlikely
Reptiles							
Hooded Scaly-foot	*Pygopus schraderi*	-	Critically Endangered	Dry to arid zones in a variety of habitats, but typically on stony and heavy soils	2018 (19)	Yes	Moderate
Carpet Python	*Morelia spilota metcalfei*	-	Endangered	Woodlands of the Murray–Darling Basin	1993 (1)	No	Unlikely
Fish							
Flat-headed Galaxias	*Galaxias rostratus*	Critically Endangered	Vulnerable	Still or slow moving water bodies such as wetlands and lowland streams. They have been associated with a range of habitats including rock and sandy bottoms and aquatic vegetation.	NPR	No	Unlikely
Murray Cod	*Maccullochella peelii*	Vulnerable	Endangered	Small clear, rocky, upland streams with riffle and pool structure on the upper western slopes of the Great Dividing Range to large, meandering, slow-flowing, often silty rivers in the alluvial lowland reaches of the Murray-Darling Basin.	NPR	No	Unlikely
Murray Hardyhead	*Craterocephalus fluviatilis*	Endangered	Critically Endangered	Remnant populations of Murray Hardyhead occupy still and slow-flowing waters including billabongs, lakes and margins and backwaters of lowland rivers. Individuals are frequently observed schooling in open-water and amongst aquatic vegetation such as fringing emergent rushes.	NPR	No	Unlikely

Table Notes:

This table excludes species listed exclusively as 'migratory' or 'marine' under the EPBC Protected Matters Search results (Department of Agriculture Water and the Environment 2022a).

NPR – Not previously recorded

*** Likelihood of Presence Definitions:**

Unlikely – Site does not contain habitat and/or it is outside the species' known, current distribution. Birds and bats may fly over.

Low –Site contains some marginal habitat, but the species was not observed and has not been recorded in previous recent surveys in the area. Birds and bats may fly over.

Moderate – Site contains preferred habitat that may support a population of the species. Birds and bats may opportunistically or seasonally forage at the site.

High – Site contains preferred habitat which is likely to support the species. Birds and bats are likely to regularly (at least seasonally) forage or roost at the site.

Present – Preferred habitat is present on the site, and the species was observed on the site, or recently recorded on the site.

NPR– No previous record, modelled presence only under the EPBC Protected Matters Search results (Department of Agriculture Water and the Environment 2022a).

Threatened status based on the Advisory List of Threatened Vertebrate Fauna in Victoria (Department of Sustainability and Environment 2013) and the Advisory List of Threatened Invertebrate Fauna in Victoria (Department of Sustainability and Environment 2009b).

Appendix 2. Legislation

Commonwealth Legislation

***Environment Protection and Biodiversity Conservation Act 1999* (Cth)**

The *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) is to provide for the conservation of 'Matters of National Environmental Significance'. The Act defines eight Matters of National Environmental Significance:

- World Heritage properties;
- National Heritage Places;
- Ramsar wetlands of international significance;
- Nationally listed threatened species and ecological communities;
- Listed migratory species;
- Commonwealth marine areas;
- The Great Barrier Reef Marine Park; and,
- Nuclear actions.

Under the Act, actions that are likely to have a significant impact upon Matters of National Environmental Significance require approval from the Federal Environment Minister. This approval is sought through a referral process for a particular action. An action includes any project, development, undertaking, activity or series of activities. Consideration of the requirement for an 'EPBC Referral' to the Minister has been made within this report.

State Legislation

Environmental Effects Act

The *Environment Effects Act 1978* (Vic) provides for assessment of proposed projects (works) that are capable of having a significant effect on the environment. The Act does this by enabling the Minister administering the Environment Effects Act to decide that an Environment Effects Statement (EES) should be prepared.

The Minister might typically require a proponent to prepare an EES when:

- There is a likelihood of regionally or State significant adverse effects on the environment;
- There is a need for integrated assessment of potential environmental effects (including economic and social effects) of a project and relevant alternatives; and
- Normal statutory processes would not provide a sufficiently comprehensive, integrated and transparent assessment (Department of Sustainability and Environment 2007).

<u>Referral criteria: individual potential environmental effects.</u>

Individual types of potential effects on the environment that might be of regional or State significance, and therefore warrant referral of a project, are:

- Potential clearing of 10 ha or more of native vegetation from an area that:
    - is of an Ecological Vegetation Class identified endangered by the Department of Sustainability and Environment (in accordance with Appendix 2 of Victoria's Native Vegetation Management Framework); or

    - is, or is likely to be, of very high conservation significance (as defined in accordance with Appendix 3 of Victoria's Native Vegetation Management Framework); and
    - is not authorised under an approved Forest Management Plan or Fire Protection Plan.
- Potential long-term loss of a significant proportion (e.g. 1 to 5 percent depending on the conservation status of the species) of known remaining habitat or population of a threatened species within Victoria;
- Potential long-term change to the ecological character of a wetland listed under the Ramsar Convention or in 'A Directory of Important Wetlands in Australia';
- Potential extensive or major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems, over the long term;
- Potential extensive or major effects on the health, safety or well-being of a human community, due to emissions to air or water or chemical hazards or displacement of residences; and/or,
- Potential greenhouse gas emissions exceeding 200,000 tonnes of carbon dioxide equivalent per annum, directly attributable to the operation of the facility (Department of Sustainability and Environment 2007).

***Flora and Fauna Guarantee Act 1988* (Vic)**

The *Flora and Fauna Guarantee Act 1998* (Vic) (FFG Act) provides a legal framework for enabling and promoting the conservation of all Victoria's native flora and fauna, and to enable management of potentially threatening processes on public land. The Act lists native species, communities, and processes that threaten native flora and fauna, under Schedules of the Act. This enables the assessor and regulators to establish management measures to mitigate impacts on listed values within Victoria.

The FFG Act was amended in 2021 and now contains an obligation or duty on public authorities and ministers to consider potential biodiversity impacts when exercising their functions. The FFG Act requires ministers and public authorities (including Councils) reasonably consider the objectives of the Act where projects may impact upon biodiversity, so far as is consistent with the proper exercising of their functions.

The types of potential impacts on biodiversity that should be considered include:

- Long and short term impacts;
- Detrimental and beneficial impacts;
- Direct and indirect impacts;
- Cumulative impacts; and,
- Potentially threatening processes (Department of Environment Land Water and Planning 2021b).

It is therefore anticipated that regulators will give due consideration to the FFG Act when considering the approval for the project.

In additional, a 'Permit to Take Protected Flora' is required to 'take' listed flora species that are members of listed communities or protected flora from public land. 'Taking' flora is defined as any

action which results in the removal or death of a native plant. A permit is not required under the FFG Act for private land, unless listed species are present and the land is declared 'critical habitat' for the species. On public land the permit is issued by DELWP.

An evaluation of the likelihood of the presence of significant flora and fauna species on the subject site, including those listed under the FFG Act that have previously been recorded in the vicinity of the site, has been undertaken.

***Planning and Environment Act 1987* (Vic)**

The *Planning and Environment Act 1987* (Vic) (P&E Act), later amended by the *Planning and Environment (Planning Schemes) Act 1996* (Vic) provides the foundation of planning schemes in Victoria. Planning schemes set out policies and provisions for the development and protection of land within each municipality in Victoria.

The *Planning and Environment (Planning Schemes) Act 1996* provides for the Minister for Planning to prepare a set of standard provisions for planning schemes called the Victoria Planning Provisions (VPP). The VPP is a state-wide reference document or template from which planning schemes are sourced and constructed. Incorporation of references such as the *Permitted Clearance of Native Vegetation – Biodiversity Assessment Guidelines* into Section 12 of the VPP ensures that all municipalities must consider this policy. Local zones and overlays, such as Environmental Significance Overlays, may be incorporated into Section 30 and 40 of the planning provisions by each Council, but only remain relevant within that municipality.

The objectives of the P&E Act are to integrate local land use, development planning and development policy with environmental, social, economic, conservation and resource management policies at State, regional and municipal levels through a set of planning schemes. The Act also establishes a clear procedure for public participation in decision making in amending planning schemes.

Some important sections of the planning scheme, in relation to the ecological values of a site, include:

- Section 12 of the State Planning Policy Framework, which identifies, and aims to protect, key biodiversity assets from inappropriate development. It directly refers to Victoria's No Net Loss policy and other legislation which must be considered when preparing a planning permit application;
- Provision 52.17 which identifies where native vegetation removal is exempt from requiring a planning permit;
- Provision 66.02 which identifies all of the mandatory referral authorities. In particular the Victorian Department of Environment and Primary Industries (DEPI) is identified as the recommending referral authority if a proponent proposes:
    - *To remove, destroy or lop native vegetation if the area to be cleared is 0.5 hectare or more.*
    - *To remove, destroy or lop native vegetation for the following class of application based on the risk-based pathway as defined in the Permitted clearing of native vegetation – Biodiversity assessment guidelines*

- *High risk-based pathway.*
- *To remove, destroy or lop native vegetation if a property vegetation plan applies to the site.*
- *To remove, destroy or lop native vegetation on Crown land which is occupied or managed by the responsible authority (Department of Environment Land Water and Planning 2022d).*

***Catchment and Land Protection Act 1994* (Vic)**

The *Catchment and Land Protection Act 1994* (Vic) (CALP Act) is the principle legislation relating to the management of pest plants and animals in Victoria. Under this Act, landowners have a responsibility to avoid causing or contributing to land degradation. Where possible, landowners are required to conserve soil, protect water resources, eradicate 'regionally prohibited' weeds, prevent the growth and spread of 'regionally controlled' weeds and control pest animals. The CALP Act lists the species that are considered weeds and pest animals.

***Wildlife Act 1975* (Vic)**

Victoria's *Wildlife Act 1975* (Vic) and the *Wildlife Regulations 2002* (Vic) protect all indigenous vertebrate fauna, some non-indigenous vertebrate fauna, and some invertebrate fauna listed as 'threatened' under the FFG Act. The *Wildlife Act 1975* (Vic) prevents intentional injury to wildlife and stipulates that a licence should be granted where there is a possibility that wildlife are injured, or where wildlife is to be kept, relocated or traded.

In most cases, where the proponent is planning to develop a site, a planning permit approval provides this licencing approval, however, this report advises if an additional permit is required. Circumstances where this legislation may not be relevant is where fish are involved, on public land where additional regulatory approval is required, or where other permits are required (such as where fauna are required to undergo invasive procedures or installation of telemetry systems).

***Fisheries Act 1995 (*Vic)**

The *Fisheries Act 1995* (Vic) provides the legislative framework for the regulation, management conservation of Victorian fish species and their habitats. As with the Victorian *Wildlife Act 1975* described above, the key method to ensure compliance is through licencing. Where fish, or their habitats, are likely to be impacted, this report will identify additional requirements.

Other Relevant Policy

***Guidelines for the Removal, Destruction or Lopping of Native Vegetation* (Department of Environment Land Water and Planning 2017c)**

The *Guidelines for the Removal, Destruction or Lopping of Native Vegetation* (Department of Environment Land Water and Planning 2017) were released by DELWP in December 2017. These guidelines supersede the Biodiversity Assessment Guidelines (Department of Environment and Primary Industries 2013).

A permit to remove native vegetation under clause 52.16 and 52.17 of the Victoria Planning Provisions is required unless:

- The table of exemptions to this clause specifically states that a permit is not required;
- It is native vegetation or an area specified in the schedule to the clause;
- A Native Vegetation Precinct Plan corresponding to the land is incorporated into the relevant planning scheme; or
- Bushfire exemptions apply in bushfire prone areas (Department of Environment Land Water and Planning 2017).

The Guidelines describe the permitting process for applications to remove native vegetation on private and public property within Victoria. A key strategy of the State Planning Policy Framework, relating to biodiversity, is to ensure that there is no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation. This is achieved through iteratively applying the three-step approach:

1. Avoiding the removal, destruction or lopping of native vegetation.
2. Minimising impacts from the removal, destruction or lopping of native vegetation that cannot be avoided.
3. Providing an offset to compensate for the biodiversity impact from the removal, destruction or lopping of native vegetation (Department of Environment Land Water and Planning 2017; p. 4).

Native vegetation is defined in the Victoria Planning Provisions as 'plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses' (Department of Environment Land Water and Planning 2017).

Native vegetation is further classified into two categories (Department of Environment Land Water and Planning 2017):

- A remnant patch of native vegetation (measured in hectares) is either:

  - An area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native, or
  - Any area with three or more native canopy trees where the drip line of each tree touches the drip line of at least one other tree, forming a continuous canopy, or
  - Any mapped wetland included in the *Current Wetlands Map*, available in DELWP systems and tools.

OR

- A scattered tree (measured in number of trees), is a native canopy tree that does not form a patch (Department of Environment Land Water and Planning 2017).

In addition, a canopy tree with a Diameter at Breast Height (DBH) greater than or equal to the large tree benchmark for the relevant bioregional EVC is defined as a large tree. Large trees can be either a large scattered tree or a large tree within a patch.

The contribution that is made by native vegetation to the biodiversity values of Victoria is determined through an assessment of both site-based information and landscape scale information.

At a site-based level, the contribution is determined through an assessment of:

- The extent of native vegetation;
- The number of large trees (either within a patch or scattered trees), relative to the appropriate EVC benchmark;
- The native vegetation condition, which is determined through a Habitat Hectare assessment
- The conservation status of the Ecological Vegetation Class (EVC) to which the vegetation can be classified; and,
- The presence of sensitive wetlands and coastal areas.

At a landscape scale, the value of the vegetation is determined with reference to its strategic context in the Victorian landscape (Department of Environment and Primary Industries 2013). This is determined by the vegetation's 'Strategic Biodiversity Score' (SBS) and its 'Habitat Importance Score' (HIS) for its value to rare and threatened species (Department of Environment Land Water and Planning 2017).

All native vegetation within Victoria has a SBS that has been determined through spatial modelling, based on its rarity, level of depletion, species habitats, and condition and connectivity (Department of Environment Land Water and Planning 2017). SBS scores are between 0 and 1 and are used to determine the offset required for the loss of that vegetation. Native vegetation only has a HIS score if it is habitat for a particular rare or threatened species (Department of Environment Land Water and Planning 2017). There are two types of rare or threatened species habitats that may be provided by native vegetation:

- **Highly localised habitats for rare or threatened species** – where impact to this particular patch of native vegetation could result in a significant biodiversity impact, such as a breeding colony or species with a limited geographic extent.

- **Dispersed rare or threatened species habitats** – where habitat for the threatened species has become depleted or fragmented over time (Department of Environment Land Water and Planning 2017).

The HIS is used to apply the decision guidelines in relation to the removal of a patch of native vegetation and to determine offset requirements (Department of Environment Land Water and Planning 2017).

Applications to remove native vegetation are categorised against one of three assessment pathways. These pathways are categorised as:

- Basic – limited impacts on biodiversity.
- Intermediate – could impact on large trees, endangered EVCs, and sensitive wetlands and coastal areas.
- Detailed – could impact on large trees, endangered EVCs, sensitive wetlands and coastal areas, and could significantly impact on habitat for rare or threatened species (Department of Environment Land Water and Planning 2017).

This is initially determined in two ways, based on the 'location map' and the extent risk of the vegetation proposed to be removed. The location risk is determined with reference to the *Native*

Vegetation Location Risk map available on DELWP's website (Department of Environment Land Water and Planning 2022b). This map shows whether native vegetation is classified as Location 1, 2 or 3.

The extent risk is determined based on the amount of native vegetation that is proposed for removal and includes the area (in hectares) of impact to native vegetation, the number of scattered trees, and the number of large trees (Table A5).

Table A5. Assessment pathways for removal of remnant patches of native vegetation (Department of Environment Land Water and Planning 2017).

Extent	Location		
	Location 1	Location 2	Location 3
Less than 0.5 hectares and not including any large trees	Basic	Intermediate	Detailed
Less than 0.5 hectares and including one or more large trees	Intermediate	Intermediate	Detailed
0.5 hectares or more	Detailed	Detailed	Detailed

All applications to remove native vegetation must include the following information:

1. Information about the native vegetation to be removed, including:
    a. The assessment pathway and reason for the assessment pathway;
    b. A description of the native vegetation to be removed;
    c. Maps showing the native vegetation and property in context;
    d. The offset requirement, determined in accordance with section 5 of the Guidelines that will apply if the native vegetation is approved to be removed.
2. Topographic and land information relating to the native vegetation to be removed;
3. Recent, dated photographs of the native vegetation to be removed;
4. Details of any other native vegetation approved to be removed, or that was removed without the required approvals, on the same property or on contiguous land in the same ownership as the applicant, in the five year period before the application for a permit is lodged;
5. An 'Avoid and Minimise' statement;
6. A copy of any Property Vegetation Plan contained within an agreement made pursuant to section 69 of the *Conservation, Forests and Lands Act 1987* (Vic) that applies to the native vegetation to be removed;
7. Where the removal of native vegetation is to create defendable space, a written statement explaining why the removal of native vegetation is necessary;
8. If the application is under Clause 52.16, a statement that explains how the proposal responds to the Native Vegetation Precinct Plan considerations at decision guideline 8, and
9. An offset statement providing evidence that an offset that meets the offset requirements for the native vegetation to be removed has been identified, and can be secured in accordance with the Guidelines (Department of Environment Land Water and Planning 2017; p. 20-21).

If the application will be assessed under the Detailed Assessment Methodology, the following additional requirements apply:

10. A site assessment report of the native vegetation to be removed, including:
    a. A habitat hectare assessment of any patches of native vegetation, including the condition, extent (in hectares), Ecological Vegetation Class and bioregional conservation status.
    b. The location, number, circumference (in centimetres measured at 1.3 metres above ground level) and species of any large trees within patches.
    c. The location, number, circumference (in centimetres measured at 1.3 metres above ground level) and species of any scattered trees, and whether each tree is small or large.
11. Information about impacts on rare or threatened species habitat, including:
    a. The relevant section of the Habitat importance map for each rare or threatened species requiring a species offset.
    b. For each rare or threatened species that the native vegetation to be removed is habitat for, according to the Habitat importance maps: - the species' conservation status - the proportional impact of the removal of native vegetation on the total habitat for that species - whether their habitats are highly localised habitats, dispersed habitats, or important areas of habitat within a dispersed species habitat (Department of Environment Land Water and Planning 2017; p. 22).

Ten decisions guidelines are identified within the Guidelines that the responsible or referral authority must consider when deciding on an application to remove native vegetation. These are summarised as follows:

1. The degree to which the application avoids and minimises impacts to native vegetation, and where vegetation is proposed to be removed, the highest quality vegetation is avoided;
2. The role that the vegetation to be removed has in relation to landscape services such as erosion control, ground-water quality, waterway quality;
3. The role of the vegetation in the preservation of landscape features;
4. Whether any part of the native vegetation to be removed, destroyed or lopped is protected under the *Aboriginal Heritage Act 2006* (Vic);
5. The need to remove, destroy or lop native vegetation to create defendable space to reduce the risk of bushfire to life and property, having regard to other available bushfire risk mitigation measures;
6. Whether the native vegetation to be removed is in accordance with any Property Vegetation Plan that applies to the site;
7. Whether an offset that meets the offset requirements for the native vegetation to be removed has been identified and can be secured in accordance with the Guidelines;
8. Whether the application is consistent with a Native Vegetation Precinct Plan (where relevant);
9. For applications in both the Intermediate and Detailed Assessment Pathway only, the impacts on biodiversity values that would occur as a result of vegetation removal; and,
10. For applications in the Detailed Assessment Pathway only, the impacts on habitat for rare or threatened species (Department of Environment Land Water and Planning 2017).

Offset requirements

In all cases where native vegetation is approved for removal, the proponent is liable for the security of an offset site that meets the requirements under the Guidelines. An offset can be either a:

- First party offset – on the same property as the proposed removal of native vegetation, or on another property owned or managed (in the case of Crown land) by the party requiring the offset, or
- Third party offset – on another party's property. Third party offsets are traded as native vegetation credits.

In most cases a third party offset is the simplest and most cost effective means of securing the required offset.

There are three components to offset requirements:

1. Offset type (general or species).
2. Offset amount (measured in general or species habitat units).
3. Offset attributes.

Two types of offset are identified: General Offsets and Specifies Offsets. Specific Offsets may only be required if the native vegetation to be removed is habitat for rare or threatened species that are identified in an Intermediate or Detailed Assessment Pathway application (Department of Environment Land Water and Planning 2017). To determine this, a 'Specific Biodiversity Equivalence Score' is calculated by multiplying the habitat hectares with the HIS for each species that may be impacted. For each of the species, this figure is divided by the sum of all the Specific Biodiversity Value Scores calculated for the remaining vegetation under investigation to give a specific offset threshold for each species. If the amount of vegetation removed exceeds this threshold, then a Specific Offset is required. If it does not exceed the threshold, then only a General Habitat Offset is required (Table A6)(Department of Environment Land Water and Planning 2017).

Table A6 summarises the offset requirements for each of the Assessment Pathways and offset types.

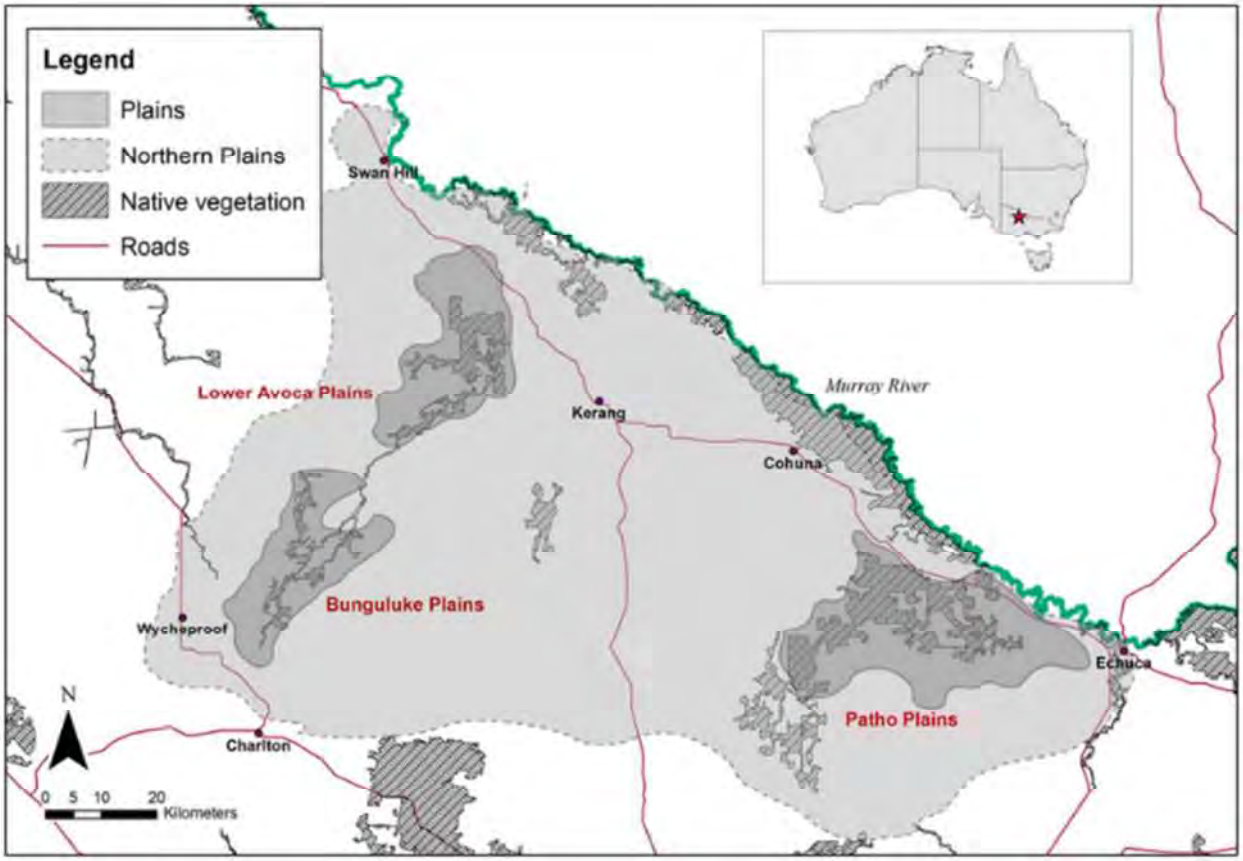
Table A6. Offset requirements for the removal of native vegetation

Assessment Pathway	Offset Type	Offset amount		Offset attributes	
		Risk Adjusted Biodiversity Equivalence	Species Habitat Requirement	Vicinity	Strategic Biodiversity Score
Basic Assessment Pathway	General offset	1.5 times the general biodiversity equivalence score[1] of the native vegetation to be removed.	No restrictions.	In the same Catchment Management Authority boundary as the native vegetation to be removed.	At least 80 per cent of the SBS of the native vegetation to be removed.
Intermediate or Detailed Assessment Pathway	General offset	1.5 times the general biodiversity equivalence score of the native vegetation to be removed.	No restrictions.	In the same Catchment Management Authority boundary as the native vegetation to be removed.	At least 80 per cent of the SBS of the native vegetation to be removed.
	Specific offset	For each species impacted, 2 times the specific biodiversity equivalence score of the native vegetation to be removed.	Likely habitat for each rare or threatened species that a specific offset is required for, according to the specific-general offset test.	No restrictions.	No restrictions.

[1] The general biodiversity equivalence score is determined by multiplying the vegetation's habitat hectare score by its SBS.

Appendix 3. Location of Important Plains-wanderer Habitat Within Victoria.

Sourced from: Baker-Gabb D, Antos M and Brown G (2016). Recent decline of the critically endangered Plains-wanderer (Pedionomus torquatus), and the application of a simple method for assessing its cause: Major changes in grassland structure. *Ecological Management and Restoration* **17**.



APPENDIX B PROTECTED MATTERS SEARCH TOOL RESULTS

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. Please see the caveat for interpretation of information provided here.

Report created: 14-Mar-2024

Summary

Matters of National Environment 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 (Ramsar	5
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	7
Listed Threatened Species:	40
Listed Migratory Species:	17

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 https://www.dcceew.gov.au/parks-heritage/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 Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	28
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	19
Regional Forest Agreements:	None
Nationally Important Wetlands:	8
EPBC Act Referrals:	14
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity	Buffer Status
Banrock station wetland complex	300 - 400km upstream from Ramsar site	In feature area
Hattah-kulkyne lakes	100 - 150km upstream from Ramsar site	In feature area
Kerang wetlands	Within Ramsar site	In feature area
Riverland	200 - 300km upstream from Ramsar site	In feature area
The coorong, and lakes alexandrina and albert wetland	300 - 400km upstream from Ramsar site	In feature area

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.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	Community may occur within area	In feature area
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community likely to occur within area	In feature area
Mallee Bird Community of the Murray Darling Depression Bioregion	Endangered	Community likely to occur within area	In feature area
Natural Grasslands of the Murray Valley Plains	Critically Endangered	Community likely to occur within area	In feature area
Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions	Critically Endangered	Community likely to occur within area	In feature area

Community Name	Threatened Category	Presence Text	Buffer Status
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered	Community likely to occur within area	In feature area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Amytornis striatus howei			
Murray Mallee Striated Grasswren, Striated Grasswren (sandplain) [91648]	Endangered	Species or species habitat may occur within area	In buffer area only
Aphelocephala leucopsis			
Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area	In feature area
Botaurus poiciloptilus			
Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]	Vulnerable	Roosting known to occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Climacteris picumnus victoriae			
Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat known to occur within area	In feature area
Falco hypoleucos			
Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Gallinago hardwickii			
Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area	In feature area
Grantiella picta			
Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Lathamus discolor](#) Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area	In feature area
[Leipoa ocellata](#) Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Limosa limosa](#) Black-tailed Godwit [845]	Endangered	Roosting known to occur within area	In buffer area only
[Lophochroa leadbeateri leadbeateri](#) Major Mitchell's Cockatoo (eastern), Eastern Major Mitchell's Cockatoo, Pink Cockatoo (eastern) [82926]	Endangered	Species or species habitat likely to occur within area	In feature area
[Melanodryas cucullata cucullata](#) South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat known to occur within area	In feature area
[Neophema chrysostoma](#) Blue-winged Parrot [726]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Pedionomus torquatus](#) Plains-wanderer [906]	Critically Endangered	Species or species habitat known to occur within area	In feature area
[Polytelis anthopeplus monarchoides](#) Regent Parrot (eastern) [59612]	Vulnerable	Breeding likely to occur within area	In feature area
[Polytelis swainsonii](#) Superb Parrot [738]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Rostratula australis](#) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
[Stagonopleura guttata](#) Diamond Firetail [59398]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
FISH			
[Craterocephalus fluviatilis](#) Murray Hardyhead [56791]	Endangered	Species or species habitat known to occur within area	In feature area
[Galaxias rostratus](#) Flathead Galaxias, Beaked Minnow, Flat-headed Galaxias, Flat-headed Jollytail, Flat-headed Minnow [84745]	Critically Endangered	Species or species habitat known to occur within area	In feature area
[Maccullochella peelii](#) Murray Cod [66633]	Vulnerable	Species or species habitat likely to occur within area	In feature area
FROG			
[Crinia sloanei](#) Sloane's Froglet [59151]	Endangered	Species or species habitat may occur within area	In feature area
[Litoria raniformis](#) Southern Bell Frog,, Growling Grass Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat likely to occur within area	In feature area
MAMMAL			
[Nyctophilus corbeni](#) Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area	In feature area
PLANT			
[Amphibromus fluitans](#) River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Caladenia tensa](#) Greencomb Spider-orchid, Rigid Spider-orchid [24390]	Endangered	Species or species habitat may occur within area	In feature area
[Caladenia versicolor](#) Candy Spider-orchid [24392]	Vulnerable	Species or species habitat may occur within area	In feature area
[Eleocharis obicis](#) a spike rush [15320]	Vulnerable	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Lepidium aschersonii Spiny Peppercress [10976]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Lepidium hyssopifolium Basalt Pepper-cress, Peppercress, Rubble Pepper-cress, Pepperweed [16542]	Endangered	Species or species habitat known to occur within area	In buffer area only
Lepidium monoplocoides Winged Pepper-cress [9190]	Endangered	Species or species habitat known to occur within area	In feature area
Maireana cheelii Chariot Wheels [8008]	Vulnerable	Species or species habitat known to occur within area	In feature area
Myriophyllum porcatum Ridged Water-milfoil [19919]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Senecio behrianus Stiff Groundsel, Behr's Groundsel [14030]	Endangered	Species or species habitat known to occur within area	In feature area
Swainsona murrayana Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat known to occur within area	In feature area
Swainsona pyrophila Yellow Swainson-pea [56344]	Vulnerable	Species or species habitat may occur within area	In feature area
REPTILE			
Hemiaspis damelii Grey Snake [1179]	Endangered	Species or species habitat may occur within area	In feature area

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Motacilla flava](#) Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
[Myiagra cyanoleuca](#) Satin Flycatcher [612]		Species or species habitat known to occur within area	In feature area
Migratory Wetlands Species			
[Actitis hypoleucos](#) Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]	Vulnerable	Roosting known to occur within area	In feature area
[Calidris ferruginea](#) Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area	In feature area
[Calidris melanotos](#) Pectoral Sandpiper [858]		Species or species habitat known to occur within area	In feature area
[Calidris ruficollis](#) Red-necked Stint [860]		Roosting known to occur within area	In buffer area only
[Charadrius bicinctus](#) Double-banded Plover [895]		Roosting known to occur within area	In buffer area only
[Gallinago hardwickii](#) Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Gallinago megala](#) Swinhoe's Snipe [864]		Roosting likely to occur within area	In buffer area only
[Gallinago stenura](#) Pin-tailed Snipe [841]		Roosting likely to occur within area	In buffer area only
[Limosa limosa](#) Black-tailed Godwit [845]	Endangered	Roosting known to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting known to occur within area	In buffer area only
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area	In buffer area only
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area	In feature area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Roosting known to occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area overfly marine area	In feature area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area overfly marine area	In buffer area only
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area	In feature area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area overfly marine area	In buffer area only
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area overfly marine area	In buffer area only
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area overfly marine area	In buffer area only
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area overfly marine area	In buffer area only
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Breeding known to occur within area	In feature area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area overfly marine area	In buffer area only
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Limosa limosa Black-tailed Godwit [845]	Endangered	Roosting known to occur within area overfly marine area	In buffer area only
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting known to occur within area overfly marine area	In buffer area only
Philomachus pugnax Ruff (Reeve) [850]		Roosting known to occur within area overfly marine area	In buffer area only
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area overfly marine area	In buffer area only
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Stiltia isabella Australian Pratincole [818]		Roosting known to occur within area overfly marine area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area overfly marine area	In buffer area only

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Bael Bael Grassland N.C.R.	Natural Features Reserve	VIC	In feature area
Bael Bael Grassland N.C.R. (addition)	Natural Features Reserve	VIC	In feature area
Beauchamp B.R.	Natural Features Reserve	VIC	In feature area
Cannie N.C.R.	Natural Features Reserve	VIC	In buffer area only
Cullens Lake W.R.	Natural Features Reserve	VIC	In buffer area only
Koorangie W.R.	Natural Features Reserve	VIC	In buffer area only
Korrak Korrak B.R	Natural Features Reserve	VIC	In feature area
Korrak Korrak N.C.R.	Natural Features Reserve	VIC	In feature area
Lake Gilmour W.R	Natural Features Reserve	VIC	In buffer area only
Lake Lookout B.R.	Natural Features Reserve	VIC	In buffer area only
Lake Mannaor W.R	Natural Features Reserve	VIC	In buffer area only
Mystic Park B.R.	Natural Features Reserve	VIC	In buffer area only
Quambatook I204 B.R	Natural Features Reserve	VIC	In buffer area only
Sandhill Lake B.R.	Natural Features Reserve	VIC	In buffer area only

Protected Area Name	Reserve Type	State	Buffer Status
Talgitcha B.R	Natural Features Reserve	VIC	In buffer area only
Tresco West B.R.	Natural Features Reserve	VIC	In buffer area only
Tutchewop W.R.	Natural Features Reserve	VIC	In buffer area only
Unnamed P0325	Private Nature Reserve	VIC	In feature area
Yassom Swamp N.C.R.	Nature Conservation Reserve	VIC	In feature area

Nationally Important Wetlands

[Resource Information]

Wetland Name	State	Buffer Status
Avoca Floodway (Tutchewop Plains)	VIC	In buffer area only
Bunguluke Wetlands, Tyrrell Creek & Lalbert Creek Floodplain	VIC	In buffer area only
First Marsh (The Marsh)	VIC	In buffer area only
Lake Bael Bael	VIC	In buffer area only
Lake Cullen	VIC	In buffer area only
Little Lake Charm, Kangaroo Lake & Racecourse Lake	VIC	In buffer area only
Second Marsh (Middle Marsh)	VIC	In buffer area only
Third Marsh (Top Marsh)	VIC	In buffer area only

EPBC Act Referrals

[Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Goschen Mineral Sands and Rare Earths Project, Vic	2018/8291	Controlled Action	Assessment Approach	In feature area
Lake Tutchewop Serial Flushing Pipeline and Associated Works	2004/1588	Controlled Action	Completed	In buffer area only
Nava-1 Cable System	2001/510	Controlled Action	Completed	In buffer area only
The Modified Operation of the Goulburn Murray Irrigation District	2009/5123	Controlled Action	Post-Approval	In feature area
Not controlled action				
Barr Creek Weir Construction Project	2002/682	Not Controlled Action	Completed	In buffer area only
Cannie Ridge Pipeline Project	2004/1341	Not Controlled Action	Completed	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Construction of wastewater treatment lagoons at Lake Boga, Victoria	2002/693	Not Controlled Action	Completed	In buffer area only
Conversion of the North Western Victoria rail system from broad gauge to standar	2002/657	Not Controlled Action	Completed	In buffer area only
enhancement work at Middle Lake and Ibis Rookery	2004/1476	Not Controlled Action	Completed	In feature area
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Lake Mokoan Decommissioning and Mid Murray Storage Project	2007/3342	Not Controlled Action	Completed	In feature area
Wimmera Mallee Pipeline Project	2004/1692	Not Controlled Action	Completed	In feature area
Not controlled action (particular manner)				
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and 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

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

Where little information is available for a 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 detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

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

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

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

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

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.

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APPENDIX C LIKELIHOOD OF OCCURRENCE: FLORA

Scientific name	**Common name**	**EPBC Act**	**FFG Act – Threatened**	**FFG Act – Protected**	**Source**	**Number of records**	**Last recorded**	**Habitat and other information***	**Likelihood of occurrence**
Acacia melvillei	Yarran		Critically Endangered	P	Sighting	8	17/10/2018	Grows in loam, clay and sand, often in mixed open woodland and woodland	**Potential**. Recorded in the locality. Potential suitable habitat exists.
Acacia oswaldii	Umbrella Wattle		Critically Endangered	P	Sighting	28	17/10/2018	Mainly grows in calcareous sands or loam. Widespread and scattered in arid, semi-arid and subtropical areas in all mainland States.	**Known.** Recorded in the Study Area (Ecolink, 2022).
Acacia pendula	Weeping Myall		Critically Endangered	P	Sighting	1	1/01/1994	Grows mainly in floodplains in the fertile alluvial clat (and red earth soils in the south), sometimes dominant and woodland and open woodland.	**Potential**. Recorded in the locality. Potential suitable habitat exists.
Allocasuarina luehmannii	Buloke		Critically Endangered	P	Sighting	23	17/10/2018	Scattered in woodland on noncalcareous soils.	**Known**. Recorded during field surveys and by Ecolink (2022).
Ammannia multiflora	Jerry-jerry		Endangered		Sighting	1	12/03/2011	Occurs most frequently on river flood plains. Grows in shallow water or	**Potential**. Recorded in the locality, potential suitable habitat

Scientific name	**Common name**	**EPBC Act**	**FFG Act – Threatened**	**FFG Act – Protected**	**Source**	**Number of records**	**Last recorded**	**Habitat and other information***	**Likelihood of occurrence**
								damp situations on heavy soils.	exists, associated with ephemeral waterways.
Amphibromus fluitans	River Swamp Wallaby-grass	Vulnerable			PMST	0	N/A	Grows mostly in permanent swamps. Requires wetlands which are moderately fertile and have some bare ground with seasonally fluctuating water levels	**Unlikely**. No records, though suitable habitat may exist.
Amyema linophylla subsp. orientalis	Buloke Mistletoe		Critically Endangered		Sighting	6	16/01/1996	Parasitic species principally to two species of leafless tree Buloke and Belah (*Casuarina pauper*)	**Known.** Recorded in the Study Area (Ecolink, 2022).
Aristida obscura	Rough-seed Wire-grass		Endangered	P	Sighting	2	6/01/2005	Usually grows in open woodland on loamy soils	**Known**. Recorded within solar farm boundary (VBA). Suitable habitat exists.
Austrostipa breviglumis	Cane Spear-grass		Endangered		Sighting	2	1/01/1991	Occurs in southern and central Victoria.	**Potential**. Recorded within locality (solar farm). Suitable habitat exists.

Scientific name	**Common name**	**EPBC Act**	**FFG Act – Threatened**	**FFG Act – Protected**	**Source**	**Number of records**	**Last recorded**	**Habitat and other information***	**Likelihood of occurrence**
Austrostipa puberula	Fine-hairy Spear-grass		Endangered		Sighting	1	17/10/1995	Grows in temperate Mallee areas.	**Potential**. Recorded within locality (solar farm). Suitable habitat exists.
Austrostipa tenuifolia	Long-awn Spear-grass		Endangered		Sighting	3	23/12/1995	Grows primarily in the desert or dry shrubland biomes.	**Known**. Recorded within wind farm boundary (VBA). Suitable habitat exists.
Austrostipa trichophylla	Spear-grass		Endangered		Sighting	1	18/11/2003	Scattered in drier areas, often on hillsides. Associated with sandy soils and Malee, open woodland and shrubland	**Potential.** Recorded within the wind farm locality. Suitable habitat exists
Bergia ammannioides	Jerry Water-fire		Endangered		Sighting	1	11/07/2011	Grows on clay pans and stand lines of inland lakes, seasonally wet areas.	**Potential.** Recorded within the locality. Suitable habitat exists
Bergia trimera	Small Water-fire		Endangered		Sighting	2	11/07/2011	Grows in seasonally wet areas.	**Potential.** Recorded within the locality. Suitable habitat exists
Brachyscome readeri	Reader's Daisy		Endangered		Sighting	3	11/09/2013	Grows in open black box communities in	**Potential.** Recorded within the

Scientific name	**Common name**	**EPBC Act**	**FFG Act – Threatened**	**FFG Act – Protected**	**Source**	**Number of records**	**Last recorded**	**Habitat and other information***	**Likelihood of occurrence**
								seasonally wet brown clays.	locality. Suitable habitat exists
Caladenia tensa	Greencomb Spider-orchid	Endangered		P	PMST	0	N/A	Occurs on red-brown sandy loams on rises in open woodland dominated by Yellow-gum (Eucalyptus leucoxylon). Species also recorded from Black Box woodlands.	**Unlikely**. No records present, suitable habitat present (black box) however extensive threats (weeds, grazing, habitat fragmentation) present.
Caladenia versicolor	Candy Spider-orchid	Vulnerable	Endangered	P	PMST	0	N/A	Found on plains, sedgy woodland and shallow sands woodland on silty clay loams. Associated with woodlands dominated by Yellow Gum.	**Unlikely.** No records within locality. Habitat absent.
Cardamine moirensis	Riverina Bitter-cress		Endangered		Sighting	2	31/03/2011	Grows in low-lying areas, adjacent to streams and swamps.	**Potential**. Recorded within locality. Suitable habitat present.
Centipeda crateriformis subsp. compacta	Compact Sneezeweed		Endangered	P	Sighting	1	11/07/2011	Occurs chiefly on shores and drying beds of lakes, claypans, stream-	**Potential**. Recorded in locality. Suitable habitat exists. Common

Scientific name	**Common name**	**EPBC Act**	**FFG Act – Threatened**	**FFG Act – Protected**	**Source**	**Number of records**	**Last recorded**	**Habitat and other information***	**Likelihood of occurrence**
								beds, dams and seasonally inundated swamps and depressions.	Sneezeweed (*Centipeda cunninghamii*) recorded by Ecolink (2022).
Centipeda crateriformis subsp. crateriformis	Lagoon Sneezeweed		Endangered	P	Sighting	1	15/12/2011	Occurs chiefly on shores and drying beds of lakes, claypans, stream-beds, dams and seasonally inundated swamps and depressions.	**Potential**. Recorded in locality. Suitable habitat exists.
Centipeda thespidioides s.s.	Desert Sneezeweed		Endangered	P	Sighting	2	29/04/2012	Occurs chiefly on shores and drying beds of lakes, claypans, stream-beds, dams and seasonally inundated swamps and depressions.	**Potential**. Recorded in locality. Suitable habitat exists.
Chenopodium desertorum subsp. desertorum	Frosted Goosefoot		Endangered		Sighting	1	13/10/2011	Heavy soils.	**Known.** Chenopodium desertorum subsp. microphyllum recorded by Ecolink (2022).

Scientific name	**Common name**	**EPBC Act**	**FFG Act – Threatened**	**FFG Act – Protected**	**Source**	**Number of records**	**Last recorded**	**Habitat and other information***	**Likelihood of occurrence**
Chenopodium desertorum subsp. rectum	Frosted Goosefoot		Endangered		Sighting	2	18/12/1995	Heavy soils.	**Potential**. Recorded within locality. Suitable habitat exists.
Convolvulus clementii	Desert Bindweed		Endangered		Sighting	1	31/10/2017	growing in a variety of habitats from seasonally wet depressions to sandy rises.	**Potential**. Recorded within locality. Suitable habitat exists.
Convolvulus graminetinus	Grassland Bindweed		Endangered		Sighting	15	6/06/2012	Apparently rare in Victoria where known from grassland or woodland communities on relatively fertile soils sometimes prone to inundation	**Known.** Records within Wind Farm boundary (VBA)
Cullen tenax	Tough Scurf-pea		Endangered	P	Sighting	1	29/03/2011	Generally grows in drier parts of the state in grassland and grassy woodland on heavy soils	**Potential**. Recorded in locality. Suitable habitat exists.
Dianella porracea	Riverine Flax-lily		Critically Endangered		Sighting	1	11/12/2014	Largely confined to the north-west, mostly near the Murray River and rather rare,	**Unlikely**. Recorded in locality, though no suitable habitat exists.

Scientific name	**Common name**	**EPBC Act**	**FFG Act – Threatened**	**FFG Act – Protected**	**Source**	**Number of records**	**Last recorded**	**Habitat and other information***	**Likelihood of occurrence**
								inhabiting sandy soils and silty alluvium	
Dianella tarda	Late-flower Flax-lily		Critically Endangered		Sighting	5	8/12/2017	Floodplain, often in River Red-gum riverine forest or woodland	**Likely**. Recorded in locality. Riverine habitat associated with Back Creek and Avoca River present, and potentially high quality.
Diuris behrii	Golden Cowslips		Endangered	P	Sighting	2	8/12/2017	Locally common in grassland and open woodland mostly in western Victoria	**Unlikely**. Recorded in locality, but suitable habitat further south of the locality.
Duma horrida subsp. horrida	Spiny Lignum		Critically Endangered		Sighting	7	18/09/2018	Infrequent on silty soils and clays fringing shallow swamps and lakes in the northwest, and near the Murray River downstream from about Swan Hill.	**Potential**. Recorded in locality. Suitable habitat exists.
Eleocharis obicis	a spike rush	Vulnerable			PMST	0	N/A	The species grows in ephemerally wet locations, such as roadside mitre	**Potential**. Recorded in locality. Suitable habitat exists.

Scientific name	**Common name**	**EPBC Act**	**FFG Act – Threatened**	**FFG Act – Protected**	**Source**	**Number of records**	**Last recorded**	**Habitat and other information***	**Likelihood of occurrence**
								drains and depressions, usually in low-lying grasslands	
Eleocharis plana	Flat Spike-sedge		Critically Endangered		Sighting	2	7/10/1998	Known from seasonal wetlands in the Terrick Terrick and Kerang areas,	**Potential**. Recorded in locality. Suitable habitat exists.
Eragrostis australasica	Cane Grass		Critically Endangered		Sighting	11	19/09/2018	Largely confined to clay-pans and shallow lakes in the north-west	**Known.** Records within wind farm boundary.
Eragrostis setifolia	Bristly Love-grass		Endangered		Sighting	5	10/09/2013	Occurs on clayey soils of seasonally flooded areas, confined to the far north-west.	**Likely**. Records within the locality, higher quality habitat may exist for this species.
Eriochlamys squamata	Scaly Mantle		Endangered		Sighting	20	25/05/2014	Scattered across northern and north-western Victoria, usually in woodland on heavier clay soils.	**Known.** Records within wind farm boundary.
Eryngium paludosum	Long Eryngium		Endangered		Sighting	9	25/05/2014	Confined to heavy soils of lake margins and river floodplains	**Known.** Records within wind farm boundary.

Scientific name	**Common name**	**EPBC Act**	**FFG Act – Threatened**	**FFG Act – Protected**	**Source**	**Number of records**	**Last recorded**	**Habitat and other information***	**Likelihood of occurrence**
								in the north and north-west	
Goodenia lunata	Stiff Goodenia		Critically Endangered		Sighting	4	16/02/2017	known with certainty only by a few old collections from the Dimboola area, and recent collections from near Kerang.	**Unlikely**. Records in locality, however scarcity and degraded habitat indicates unlikely presence.
Grevillea rosmarinifolia subsp. glabella	Smooth Grevillea		Endangered		Sighting	1	11/12/2014	Grows in mallee, open woodland and shrub associations, usually on sandy soils.	**Potential**. Recorded in locality. Suitable habitat exists.
Elacholoma prostrata	Pale Plover-daisy		Endangered	P	Sighting	1	26/11/2014	Mostly on heavy soils prone to seasonal inundation (gilgais, floodplains etc.).	**Potential**. Recorded in locality. Suitable habitat exists.
Lepidium aschersonii	Spiny Peppercress	Vulnerable	Endangered	P	PMST	0	N/A	The Spiny Peppercress occurs in periodically wet sites such as gilgai depressions and the margins of freshwater and saline marshes and shallow lakes, usually on heavy	**Unlikely**. No records, outside of distributions and, unlikely habitat (seasonally inundated wetlands are only periodically inundated) presence.

Scientific name	Common name	EPBC Act	FFG Act – Threatened	FFG Act – Protected	Source	Number of records	Last recorded	Habitat and other information*	Likelihood of occurrence
								clay soil. Almost all sites receive some degree of soil waterlogging or seasonal flooding.	
Lepidium hyssopifolium	Basalt Peppercress	Endangered	Endangered	P	PMST	0	N/A	Almost all remaining populations of Basalt Peppercress occur in heavily modified, non-natural environments, usually amongst exotic pasture grasses and weed species, sometimes with an overstorey of introduced tree species.	**Unlikely**. No records, outside of distributions and though modified habitat may still indicate presence – it would be unlikely.
Lepidium monoplocoides	Winged Peppercress	Endangered	Endangered		Both	4	5/06/2012	Winged Pepper-cress occurs predominantly in mallee scrub in semi-arid areas. Sites are seasonally moist to water-logged with heavy, fertile soils and a mean annual rainfall of around 300 to	**Potential**. Recorded in locality. Suitable habitat exists.

Scientific name	Common name	EPBC Act	FFG Act – Threatened	FFG Act – Protected	Source	Number of records	Last recorded	Habitat and other information*	Likelihood of occurrence
								500 mm. The predominant vegetation is usually an open-woodland dominated by Allocasuarina leuhmannii and/or eucalypts, particularly Eucalyptus largiflorens (Black Box)	
Lepidium phlebopetalum	Veined Peppercress		Endangered		Sighting	8	7/11/2017	Recorded in recent times only from open herbfields in the Quambatook area, often in relatively bare sites with crusting red clay loam soils.	**Likely**. Recorded in locality However quality habitat exists.
Leptorhynchos waitzia	Button Immortelle		Endangered	P	Sighting	1	1/09/2014	Occurs in open grassy plains, grassy woodlands and sandy flats in mallee areas.	**Potential**. Recorded in locality. Suitable habitat exists.
Maireana cheelii	Chariot Wheels	Vulnerable	Endangered	P	Both	46	7/04/2020	Very rare in Victoria where known only from the Kamarooka area (but not collected there since	**Known**. Habitat present. Numerous VBA records throughout the Study Area.

Scientific name	Common name	EPBC Act	FFG Act – Threatened	FFG Act – Protected	Source	Number of records	Last recorded	Habitat and other information*	Likelihood of occurrence
								1947), Lake Buloke near Donald, and near Kerang. Occurs on seasonally wet, heavy red loam or clay soils. Fruits mostly Sep.–Nov.	Unidentified Maireana species recorded by Ecolink (2022) may represent this species which requires the presence of fruit for definitive identification.
Maireana georgei	Slit-wing Bluebush		Critically Endangered		Sighting	1	6/06/2012	Rare, recorded in Victoria only from heavier, loamy soils of interdune swales in the Sunset Country and near Kulwin	**Unlikely**. Records in locality, however scarcity and degraded habitat indicates unlikely presence.
Malva preissiana s.s. (white-flowered coastal form)	Coast Hollyhock		Endangered		Sighting	1	29/04/2012	Uncommon, growing on sand, mainly along the coast from Corner Inlet to Portland. Inland variant.	**Unlikely**. Records in locality, however scarcity and degraded habitat indicates unlikely presence.
Minuria cunninghamii	Bush Minuria		Vulnerable	P	Sighting	10	7/11/2017	Usually occurring on slightly to strongly saline ground in sand, clay or gypseous soils.	**Known.** Records within wind farm boundary.

Scientific name	**Common name**	**EPBC Act**	**FFG Act – Threatened**	**FFG Act – Protected**	**Source**	**Number of records**	**Last recorded**	**Habitat and other information***	**Likelihood of occurrence**
Minuria integerrima	Smooth Minuria		Vulnerable	P	Sighting	5	25/05/2014	Confined to heavy clay and alluvial silt on floodplains of the Murray River,	**Known.** Records within wind farm boundary.
Myriophyllum porcatum	Ridged Water-milfoil	Vulnerable	Critically Endangered	P	PMST	0	N/A	aquatic species that occurs in shallow, ephemeral wetlands (including lakes, swamps, rock pools in granite outcrops, waterholes in claypans) and highly modified habitats (including farm dams and drainage lines on private land).	**Unlikely.** No records, habitat may be present.
Panicum laevinode	Pepper Grass		Vulnerable		Sighting	1	6/01/2005	Uncommon, recorded from native grassland, grassy Red Gum forests, and sometimes, pasture in north-central Victoria	**Potential**. Recorded in locality. Suitable habitat exists.
Pomaderris paniculosa subsp. paniculosa	Inland Pomaderris		Endangered		Sighting	3	8/12/2017	Mostly on shallow soils overlying sandstone or limestone in the nearer north-west,	**Potential**. Recorded in locality. Suitable habitat exists.

Scientific name	**Common name**	**EPBC Act**	**FFG Act – Threatened**	**FFG Act – Protected**	**Source**	**Number of records**	**Last recorded**	**Habitat and other information***	**Likelihood of occurrence**
								associated with mallee and taller woodlands	
Ptilotus erubescens	Hairy Tails		Critically Endangered	P	Sighting	4	13/10/2011	Occasional on relatively fertile soils supporting grassland and woodland communities in northern and western Victoria, but not in mallee areas.	**Potential**. Recorded in locality. Suitable habitat exists.
Rhagodia parabolica	Fragrant Saltbush		Vulnerable		Sighting	1	29/05/2012	In Victoria occurs on a few steep rocky slopes and broad ridges between Sunbury and Geelong but locally rather common, and in mallee at a few scattered locations in the northwest.	**Unlikely**. Records in locality, however suitability of habitat within Study Area is uncertain given distribution of records.
Sclerolaena lanicuspis	Woolly Copperburr		Endangered		Sighting	1	17/06/2014	Very rare in Victoria, known from a few alluvial flats or lakeside lunettes supporting chenopod shrublands, with or without Black Box overstorey.	**Unlikely**. Records in locality, however suitability of habitat within Study Area is unlikely to support this species.

Scientific name	**Common name**	**EPBC Act**	**FFG Act – Threatened**	**FFG Act – Protected**	**Source**	**Number of records**	**Last recorded**	**Habitat and other information***	**Likelihood of occurrence**
Sclerolaena patenticuspis	Spear-fruit Copperburr		Vulnerable		Sighting	1	1/12/1995	In Victoria mainly confined to the far north-west, near the Murray River downstream from Robinvale, and a few disjunct occurrences in the Kerang-Quambatook area. Occurs in mallee and on alluvial plain shrublands.	**Potential**. Recorded in locality. Suitable habitat exists.
Senecio behrianus	Stiff Groundsel	Endangered	Critically Endangered	P	PMST	0	N/A	Exceedingly rare in Victoria, and thought to be extinct until 1991 when rediscovered between Rochester and Stanhope, and Miners Rest near Ballarat in 2004. Apparently confined to heavy, winter-wet, clayey soils	**Unlikely.** No records, habitat unlikely to be present.
Senecio campylocarpus	Floodplain Fireweed		Endangered	P	Sighting	1	6/02/2012	in loam to clay soils in forest and woodland, usually in seasonally inundated areas.	**Unlikely. Re**cords within locality however habitat unlikely to be present.

Scientific name	**Common name**	**EPBC Act**	**FFG Act – Threatened**	**FFG Act – Protected**	**Source**	**Number of records**	**Last recorded**	**Habitat and other information***	**Likelihood of occurrence**
Senecio cunninghamii var. cunninghamii	Branching Groundsel		Endangered	P	Sighting	1	1/01/1991	Grows in heavy sometimes winter-wet soils as well as dry rocky soils, commonly on embankments or escarpments	**Unlikely. Re**cords within locality however habitat unlikely to be present.
Senecio longicollaris	Riverina Fireweed		Endangered	P	Sighting	1	15/12/2011	Grows on floodplains and by water in forest, woodland and shrubland mainly in the north of the state with scattered occurrences in the south at Portland, Beaumaris and Sandringham.	**Potential**. Recorded in locality. Suitable habitat exists.
Senecio productus subsp. productus	Riverina Groundsel		Endangered	P	Sighting	1	11/07/2011	Rare along the edges of watercourses in clay soils and in chenopod shrubland.	**Potential**. Recorded in locality. Suitable habitat exists.
Sida intricata	Twiggy Sida		Endangered		Sighting	3	18/09/2018	Moderately common in open areas of the far north and north-west, usually on heavier loam and clay loam soils not	**Potential**. Recorded in locality. Suitable habitat exists.

Scientific name	**Common name**	**EPBC Act**	**FFG Act – Threatened**	**FFG Act – Protected**	**Source**	**Number of records**	**Last recorded**	**Habitat and other information***	**Likelihood of occurrence**
								far from the Murray River.	
Sporobolus caroli	Yakka Grass		Endangered		Sighting	11	7/11/2017	Apparently confined in Victoria to seasonally inundated areas along the Murray River floodplain	**Known.** Records within wind farm boundary
Swainsona murrayana	Slender Darling-pea	Vulnerable	Endangered	P	Both	7	10/09/2020	Extremely rare in northern and western Victoria. Usually found in seasonally inundated flats and around lakes. Flowers Aug.–Nov.	**Potential.** Numerous nearby records in locality and habitat in Study Area.
Swainsona pyrophila	Yellow Swainson-pea	Vulnerable	Endangered		PMST	0	N/A	In Victoria, known only from the far north-west where rare. Grows in mallee scrub on sandy or loamy soil and usually found only after fire. Flowers mainly Sep.–Dec.	**Unlikely to occur.** No nearby records, and Study Area outside known distribution.
Swainsona swainsonioides	Downy Swainson-pea		Endangered	P	Sighting	15	20/09/2019	In Victoria, mainly confined to the Wimmera and	**Known.** Records within wind farm boundary

Scientific name	Common name	EPBC Act	FFG Act – Threatened	FFG Act – Protected	Source	Number of records	Last recorded	Habitat and other information*	Likelihood of occurrence
								nearby districts (e.g. Donald, Birchip, Nhill areas), east to near Kerang. Grows on heavier clay soils in woodland and now very rare due to habitat destruction. Flowers mainly Aug.–Nov.	
Tecticornia pergranulata subsp. divaricata	Blackseed Glasswort		Endangered		Sighting	6	31/05/2012	Usually occupying the outer zone of saltmarsh communities.	**Unlikely**. Nearby records but no habitat in the Study Area**.**
Tecticornia syncarpa	Fused Glasswort		Endangered		Sighting	1	10/09/2013	Occasional in the outer vegetated zone around salt lakes between Jeparit and Natimuk.	**Unlikely**. Nearby records but no habitat in the Study Area**.**
Templetonia egena	Round Templetonia		Endangered		Sighting	2	11/12/2014	In Victoria confined to the north-west. Favours deep sandy soils in mallee and woodland communities. Flowers Aug.–Sep.	**Known.** Records within wind farm boundary
Trigonella suavissima	Sweet Fenugreek		Endangered		Sighting	3	29/04/2012	Apparently confined to the drier north-	**Unlikely.** Nearby records but no

Scientific name	**Common name**	**EPBC Act**	**FFG Act – Threatened**	**FFG Act – Protected**	**Source**	**Number of records**	**Last recorded**	**Habitat and other information***	**Likelihood of occurrence**
								west of the state where it grows along seasonal watercourses, floodplains and depressions. Flowers mainly Sep.–Nov.	habitat in the Study Area.
Vittadinia condyloides	Club-hair New Holland Daisy		Endangered	P	Sighting	3	24/10/1995	Uncommon in Victoria, confined to the north-west, usually occurring in grassland and grassy woodlands on better mallee soils and loams of the Riverina. Flowers Oct.–Dec.	**Potential**. Recorded in locality. Suitable habitat exists.
Vittadinia cuneata var. hirsuta	Fuzzy New Holland Daisy		Endangered	P	Sighting	1	13/01/1996	Known in Victoria from open woodland within a band extending from the Little Desert to Nathalia area. Flowers Oct.–Nov.	**Potential.**The parent species, Vittadinia cuneata, was recorded by Ecolink (2022). Paucity of nearby records of subsp. hirsuta, but many at the species level. Habitat present and Study Area within known distribution.

Scientific name	Common name	EPBC Act	FFG Act – Threatened	FFG Act – Protected	Source	Number of records	Last recorded	Habitat and other information*	Likelihood of occurrence
Vittadinia pterochaeta	Winged New Holland Daisy		Endangered	P	Sighting	13	16/02/2017	Very rare in Victoria, known by only a few collections in the Quambatook-Leaghur region, near Warracknabeal and Wallpolla Island west of Mildura. Apparently confined to relatively fertile clay-loam soils. Flowers Oct.–Jan. (but probably dependent on summer rain).	**Potential.** Numerous nearby records and habitat present. Study area within small region of known occurrence.

*Notes: EPBC Act = threatened status under the EBC Act; FFG Act – threatened = threatened status under the FFG Act; FFG Act – protected = Protected (P) under the FFG Act; Source = consideration for likelihood analysis based on VBA records (i.e., Sighting), PMST modelling or both; * = Treatment taken from VicFlora (RBGM 2023).*

APPENDIX D LIKELIHOOD OF OCCURRENCE: FAUNA

Class	*Scientific Name*	Common Name	FFG Act	EPBC Act	Records in Locality	Habitat Summary
Bird	*Amytornis striatus howei*	Striated GrassWren		Endangered	NPR	The habitat of Murray Mallee striated grasswren is sandplains dominated by mature spinifex (Triodia spp.), typically with an overstorey of mallee eucalypts
Bird	*Antigone rubicunda*	Brolga	Endangered		10Km Buffer	Brolga inhabits large open wetlands, grassy plains, coastal mudflats and irrigated croplands and, less frequently, mangrove-studded creeks and estuaries. It is less common in arid and semi-arid regions, but will occur close to water
Bird	*Aphelocephala leucopsis*	Southern Whiteface		Vulnerable	10Km Buffer	Southern whitefaces live in a wide range of open woodlands and shrublands where there is an understorey of grasses or shrubs, or both. These areas are usually in habitats dominated by acacias or eucalypts on ranges, foothills and lowlands, and plains
Bird	*Ardea intermedia plumifera*	Plumed Egret	Critically Endangered		10Km Buffer	Freshwater wetland inhabitant, where shallow waters and vegetation and present. May also occupy pastures and croplands.

Class	*Scientific Name*	Common Name	FFG Act	EPBC Act	Records in Locality	Habitat Summary
Bird	*Ardeotis australis*	Australian Bustard	Critically Endangered		10Km Buffer	Species inhabits open grasslands, perhaps with some trees, spinifex plains and low shrublands. Species may enter denser areas of vegetation after fire, and is observed on artificial cleared areas such as golf courses and farmland
Bird	*Arenaria interpres*	Ruddy Turnstone	Endangered	Migratory	10Km Buffer	mainly found on coastal regions with exposed rock coast lines or coral reefs. It also lives near platforms and shelves, often with shallow tidal pools and rocky, shingle or gravel beaches. It can, however, be found on sand, coral or shell beaches, shoals, cays and dry ridges of sand or coral. It has occasionally been sighted in estuaries, harbours, bays and coastal lagoons, among low saltmarsh or on exposed beds of seagrass, around sewage ponds and on mudflats
Bird	*Aythya australis*	Hardhead	Vulnerable		10Km Buffer	species is usually found in deeper, permanent freshwater swamps and lagoons of the Murray-Darling Basin and south-east South Australia, and occasionally in sheltered estuaries.

Class	*Scientific Name*	Common Name	FFG Act	EPBC Act	Records in Locality	Habitat Summary
Bird	*Biziura lobata*	Musk Duck	Vulnerable		10Km Buffer	Musk Ducks tend to be found in deep freshwater lagoons, with dense reed beds
Bird	*Botaurus poiciloptilus*	Australasian Bittern	Critically Endangered	Endangered	NPR	The Australasian Bittern occurs mainly in freshwater wetlands and, rarely, in estuaries or tidal wetlands. It favours wetlands with tall dense vegetation, where it forages in still, shallow water up to 0.3 m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water. It favours permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and reeds (e.g. Phragmites, Cyperus, Eleocharis, Juncus, Typha, Baumea, Bolboschoenus) or cutting grass (Gahnia) growing over a muddy or peaty substrate
Bird	*Calidris ferruginea*	Curlew Sandpiper	Critically Endangered	Critically Endangered, Migratory	10 Km buffer	Mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also

Class	*Scientific Name*	Common Name	FFG Act	EPBC Act	Records in Locality	Habitat Summary
						recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand.
Bird	*Climacteris picumnus victoriae*	Brown Treecreeper (south-eastern)		Vulnerable	10Km Buffer	Brown treecreepers (south-eastern) occupy dry open eucalypt forests and woodlands. The subspecies mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species. They also occur in mallee, forests and woodlands subject to periodic inundation, e.g., river red gum (Eucalyptus camaldulensis) woodlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses in the upper Murray River
Frog	*Crinia sloanei*	Sloane's Froglet	Endangered	Endangered	NPR	temporary and permanent waterbodies including oxbows off creeks and rivers, farm dams, large and small natural wetlands, constructed frog ponds and temporary puddles.

Class	*Scientific Name*	Common Name	FFG Act	EPBC Act	Records in Locality	Habitat Summary
						It prefers wetlands that contain riparian and aquatic vegetation. Most often it has been found in waterbodies that contain grasses and reeds that are of medium height and have small stem diameters
Bird	*Falco hypoleucos*	Grey Falcon	Vulnerable	Vulnerable	NPR	Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey
Bird	*Falco subniger*	Black Falcon	Critically Endangered		10Km Buffer	The Black Falcon is found along tree-lined watercourses and in isolated woodlands, mainly in arid and semi-arid areas
Bird	*Gelochelidon macrotarsa*	Australian Gull-billed Tern	Endangered		10Km Buffer	freshwater swamps, brackish and salt lakes, beaches and estuarine mudflats, floodwaters, sewage farms, irrigated croplands and grasslands
Bird	*Grantiella picta*	Painted Honeyeater	Vulnerable	Vulnerable	NPR	The species inhabits mistletoes in eucalypt forests/woodlands, riparian woodlands of black box and river red gum, box-ironbark-yellow gum

Class	*Scientific Name*	Common Name	FFG Act	EPBC Act	Records in Locality	Habitat Summary
						woodlands, acacia-dominated woodlands, paperbarks, casuarinas, callitris, and trees on farmland or gardens. The species prefers woodlands which contain a higher number of mature trees, as these host more mistletoes.
Bird	*Haliaeetus leucogaster*	White-bellied Sea-Eagle	Endangered		10Km Buffer	found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterised by the presence of large areas of open water (larger rivers, swamps, lakes, the sea).
Reptile	*Hemiaspis damelli*	Grey Snake		Endangered	NPR	The core area for the grey snake in the Brigalow Belt is south of the Great Dividing Range between Dalby and Glenmorgan. favours woodlands (typically brigalow Acacia harpophylla and belah Casuarina cristata), usually on heavier, cracking clay soils, particularly in association with water bodies or in areas with gilgais.

Class	*Scientific Name*	Common Name	FFG Act	EPBC Act	Records in Locality	Habitat Summary
Bird	*Hieraaetus morphnoides*	Little Eagle	Vulnerable		10Km Buffer	Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter.
Bird	*Hydroprogne caspia*	Caspian Tern	Vulnerable	Migratory	10Km Buffer	The Caspian Tern is mostly found in sheltered coastal embayments (harbours, lagoons, inlets, bays, estuaries and river deltas) and those with sandy or muddy margins are preferred. They also occur on near-coastal or inland terrestrial wetlands that are either fresh or saline, especially lakes (including ephemeral lakes), waterholes, reservoirs, rivers and creeks. They also use artificial wetlands, including reservoirs, sewage ponds and saltworks.
Bird	*Lathamus discolor*	Swift Parrot	Critically Endangered	Critically Endangered	NPR	On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany

Class	*Scientific Name*	Common Name	FFG Act	EPBC Act	Records in Locality	Habitat Summary
						Eucalyptus robusta, Spotted Gum Corymbia maculata, Red Bloodwood C. gummifera, Forest Red Gum E. tereticornis, Mugga Ironbark E. sideroxylon, and White Box E. albens.
Bird	*Leipoa ocellata*	Malleefowl	Vulnerable	Vulnerable	NPR	Malleefowl is 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
Bird	*Litoria raniformis*	Growling Grass Frog	Vulnerable	Vulnerable	NPR	Permanent lakes, swamps, dams and lagoons.
Bird	*Lophochroa leadbeateri leadbeateri*	Pink Cockatoo, Major Mitchell's Cockatoo (eastern)	Critically Endangered	Endangered	NPR	Pink Cockatoos live mostly in semi-arid and arid areas, in dry woodlands, particularly Mallee. They are also found in stands of River Red Gum, Eucalyptus camaldulensis, or Black Box, E. largiflorens, and on sand plains and dunes. Sometimes they are found in other areas such as Acacia shrubland with a spinifex ground cover, or Banksia heathlands.

Class	*Scientific Name*	Common Name	FFG Act	EPBC Act	Records in Locality	Habitat Summary
Bird	*Melanodryas cucullata*	Hooded Robin	Vulnerable	Endangered	In-situ	Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.
Reptile	*Morethia adeladensis*	Samphire Skink	Endangered		10Km Buffer	Found in samphire shrublands, often near salty areas
Bird	*Neophema chrysostoma*	Blue-winged Parrot		Vulnerable	NPR	inhabit a range of habitats from coastal, sub-coastal and inland areas, through to semi-arid zones. They tend to favourgrasslands and grassy woodlands and are often found near wetlands both near the coast and in semi-arid zones
Bird	*Numenius madagascariensis*	Eastern Curlew, Far Eastern Curlew	Critically Endangered	Critically Endangered, Migratory	NPR	most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass

Class	*Scientific Name*	Common Name	FFG Act	EPBC Act	Records in Locality	Habitat Summary
Mammal	*Nyctophilus corbeni*	Corben's Long-eared Bat	Endangered	Vulnerable	NPR	Corben's Long-eared Bat has a scattered distribution mostly within the Murray-Darling Basin, but with some records outside of this area. It is more common in box, ironbark and cypress pine woodland on the western slopes and plains. Its stronghold seems to be the Pilliga Scrub. It roosts in tree hollows, crevices and under loose bark.
Bird	*Oxyura australis*	Blue-billed Duck	Vulnerable		10m Buffer	The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation.
Bird	*Pedionomus torquatus*	Plains-wanderer	Critically Endangered	Critically Endangered	In-situ	Plains-wanderers inhabit sparse grasslands with c.50% bare ground, with most vegetation less than 5 cm in height and some widely spaced plants up to 30 cm high. The species may occasionally use lower-quality habitat including cereal stubble, but cannot persist in an agricultural landscape. Plains-wanderers are sedentary for as long as the habitat remains suitable. The nest is a hollow or 'scrape' that is scratched into the ground and lined with grass . In some

Class	*Scientific Name*	Common Name	FFG Act	EPBC Act	Records in Locality	Habitat Summary
						instances nearby grasses may be pulled over the nest to form a concealing cone or tent. The nests are placed amongst native grasses and herbs, or sometimes amongst crops.
Bird	*Pezoporus occidentalis*	Night Parrot		Endangered	NPR	*Triodia* (Spinifex) grasslands and/or chenopod shrublands in the arid and semi-arid zones. *Astrebla spp*., shrubby samphire and chenopod associations with scattered trees and shrubs (such as *Acacia anuera*).
Bird	*Pluvialis fulva*	Pacific Golden Plover	Vulnerable	Migratory	10Km Buffer	this species usually inhabits coastal habitats, though it occasionally occurs around inland wetlands. Beaches, mudflats and sandflats (sometimes in vegetation such as mangroves, low saltmarsh such as Sarcocornia, or beds of seagrass) in sheltered areas including harbours, estuaries and lagoons, and also in evaporation ponds in saltworks. The species is also sometimes recorded on islands, sand and coral cays and exposed reefs and rocks. They are less often recorded in terrestrial habitats,

Class	*Scientific Name*	Common Name	FFG Act	EPBC Act	Records in Locality	Habitat Summary
						usually wetlands such as fresh, brackish or saline lakes, billabongs, pools, swamps and wet claypans, especially those with muddy margins and often with submerged vegetation or short emergent grass.
Reptile	*Pogona barbata*	Bearded Dragon	Vulnerable		10Km Buffer	The preferred habitat of Bearded Dragons are trees in woodlands and dry sclerophyll (Eucalyptus) forests
Bird	*Polytelis anthopeplus monarchoides*	Regent Parrot (eastern)	Vulnerable	Vulnerable	NPR	The species nests within River Red Gum forests along the Murray, Wakool and lower Murrumbidgee Rivers, and possibly the Darling River downstream of Pooncarie. Typical nest trees are large, mature healthy trees with many spouts (though dead trees are used) and are usually located close to a watercourse.
Bird	*Polytelis swainsonii*	Superb Parrot	Endangered	Vulnerable	NPR	Species utilises a wide variety of eucalypts, typically near a watercourse, with many hollow branches for nesting. Species has a particular reliance on Blakely's red gum (*E. blakelyi*). Foraging habitat may present as a variety of woodland types,

Class	*Scientific Name*	Common Name	FFG Act	EPBC Act	Records in Locality	Habitat Summary
						including artificial habtiats such as crops and recreation reserves.
Reptile	*Pygopus schraderi*	Hooded Scaly-foot	Critically Endangered		10Km Buffer	Within Victoria the species occurs in the north of the state and generally inhabits areas of clay and clay-loam soils, with Black Box *Eucalyptus largiflorens*, chenopod, grassland and Buloke *Casuarina luehmannii* vegetation
Bird	*Rostratula australis*	Australian Painted Snipe	Critically Endangered	Endangered	NPR	Occurs in shallow freshwater (occasionally brackish) wetlands, both ephemeral and permanent, such as lakes, swamps, claypans, inundated or waterlogged grassland/saltmarsh, dams, rice crops, sewage farms and bore drains, generally with a good cover of grasses, rushes and reeds, low scrub, Muehlenbeckia spp. (lignum), open timber or samphire. Uncommon summer migrant to Victoria
Mammal	*Sminthopsis crassicaudata*	Fat-tailed Dunnart	Vulnerable		10Km Buffer	occupy a variety of open habitats, including open woodland, low shrublands and

Class	*Scientific Name*	Common Name	FFG Act	EPBC Act	Records in Locality	Habitat Summary
						arid shrublands. Populations can also be found living in areas of agricultural land such as unimproved pasture, they have been found in old hay sheds, amongst rock piles and old logs.
Bird	*Spatula rhynchotis*	Australasian Shoveler	Vulnerable		10Km Buffer	Heavily vegetation swamps and floodwaters
Bird	*Stagonopleura guttata*	Diamond Firetail	Vulnerable	Vulnerable	NPR	Diamond firetails occur in eucalypt, acacia or casuarina woodlands, open forests and other lightly timbered habitats, including farmland and grassland with scattered trees
Bird	*Tringa nebularia*	Common Greenshank	Endangered	Migratory	10Km Buffer	found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. Uses both permanent and ephemeral terrestrial wetlands, including swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans and saltflats. It will also use artificial wetlands
Bird	*Tringa stagnatilis*	Marsh Sandpiper	Endangered	Migratory	10Km Buffer	inhabits warm inland wetlands from open steppe to boreal forest, including shallow freshwater and brackish

Class	*Scientific Name*	Common Name	FFG Act	EPBC Act	Records in Locality	Habitat Summary
						marshlands, grassy or marshy lake-edges, river valleys, flooded meadows and occasionally salt-lakes.
Reptile	*Varanus varius*	Lace Monitor	Endangered		10Km Buffer	Lace Monitors need large, well-connected areas of bushland with lots of woody debris and large hollows to shelter in when the weather is cold. As an apex predator, monitors need healthy woodland habitats filled with abundant insects, reptiles, young birds and eggs.
Bird	*Actitis hypoleucos*	Common Sandpiper	Vulnerable	Migratory	NPR	Generally the species forages in shallow water and on bare soft mud at the edges of wetlands; often where obstacles project from substrate, e.g. rocks or mangrove roots. Birds sometimes venture into grassy areas adjoining wetlands
Bird	*Apus pacificus*	Fork-tailed Swift		Migratory	NPR	Widespread but scattered records within Victoria. Almost exclusively aerial, occurs over most dry or open habitats including riparian woodland, tea-tree swamps, low scrub, heathland and saltmarsh

Class	*Scientific Name*	Common Name	FFG Act	EPBC Act	Records in Locality	Habitat Summary
Bird	*Calidris acuminata*	Sharp-tailed Sandpiper		Migratory	10Km Buffer	They forage at the edge of the water of wetlands or intertidal mudflats, either on bare wet mud or sand, or in shallow water. They also forage among inundated vegetation of saltmarsh, grass or sedges. They forage in sewage ponds, and often in hypersaline environments. After rain, they may forage in paddocks of short grass, well away from water.
Bird	*Calidris melanotos*	Pectoral Sandpiper		Migratory	10Km Buffer	It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. The species has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands
Bird	*Calidris ruficollis*	Red-necked Stint		Migratory	10Km Buffer	The Red-necked Stint mostly forages on bare wet mud on intertidal mudflats or sandflats, or in very shallow water; mostly in areas with a film of surface water and mostly close to edge of water. During high tides they sometimes forage in non-tidal wetlands. Red-necked Stints may also forage in

Class	*Scientific Name*	Common Name	FFG Act	EPBC Act	Records in Locality	Habitat Summary
						samphire, generally avoid beds of seagrass, but may feed along edges.
Bird	*Charadrius bicinctus*	Double-banded Plover		Migratory	10Km Buffer	Found on littoral, estuarine and fresh or saline terrestrial wetlands and also saltmarsh, grasslands and pasture.
Bird	*Gallinago hardwickii*	Latham's Snipe, Japanese Snipe		Migratory	NPR	Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. Inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies)
Bird	*Limosa limosa*	Black-tailed Godwit	Critically Endangered	Migratory	NPR	In Australia the Black-tailed Godwit has a primarily coastal habitat environment. There are a few inland records, around shallow, freshwater and saline lakes, swamps, dams and bore-overflows
Bird	*Motacilla flava*	Yellow Wagtail		Migratory	NPR	The species is considered a vagrant to Victoria. Habitat requirements for the Yellow Wagtail are highly variable, but typically include open grassy flats near water. Habitats

Class	*Scientific Name*	Common Name	FFG Act	EPBC Act	Records in Locality	Habitat Summary
						include open areas with low vegetation such as grasslands, airstrips, pastures, sports fields; damp open areas such as muddy or grassy edges of wetlands, rivers, irrigated farmland, dams, waterholes; sewage farms, sometimes utilise tidal mudflats and edges of mangroves
Bird	*Myiagra cyanoleuca*	Satin Flycatcher		Migratory	NPR	Satin Flycatchers are eucalypt forest and woodland inhabitants. They are particularly common in tall wet sclerophyll forest, often in gullies or along water courses. In woodlands they prefer open, grassy woodland.
Bird	*Numenius minutus*	Little Curlew, Little Whimbrel		Migratory	NPR	The Little Curlew is most often found feeding in short, dry grassland and sedgeland, including dry floodplains and blacksoil plains, which have scattered, shallow freshwater pools or areas seasonally inundated.
Bird	*Philomachus pugnax*	Ruff (Reeve)		Migratory	NPR	found on generally fresh, brackish of saline wetlands with exposed mudflats at the edges. It is found in terrestrial wetlands including lakes,

Class	*Scientific Name*	Common Name	FFG Act	EPBC Act	Records in Locality	Habitat Summary
						swamps, pools, lagoons, tidal rivers, swampy fields and floodlands. They are occasionally seen on sheltered coasts, in harbours, estuaries, seashores and are known to visit sewage farms and saltworks

APPENDIX E LIKELIHOOD OF OCCURRENCE: THREATENED ECOLOGICAL COMMUNITIES

Threatened Ecological Community	EPBC ACT	Likelihood of occurrence
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	Although areas dominated by Buloke occur in the Study Area, these are devoid of native understorey species and therefore not representative of the community. **Unlikely to occur.**
*Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia*	Endangered	Neither Grey Box nor native grassland recorded in the Study Area. **Unlikely to occur.**
Mallee Bird Community of the Murray Darling Depression Bioregion	Endangered	Mallee vegetation characteristic of the bioregion present, though much reduced in area and patches may not meet the minimum five-hectare extent required to qualify as key habitat. **Potential to occur.**
Natural Grasslands of the Murray Valley Plains	Critically Endangered	Native grassland recorded in the Study Area. Potential **to occur.**
Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions	Critically Endangered	Dominant canopy species and floral assemblages associated with the

Threatened Ecological Community	EPBC ACT	Likelihood of occurrence
		community present in the Study Area. **Likely to occur.**
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered	All areas that may have supported seasonally herbaceous wetlands converted to cropping land. **Unlikely to occur.**
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Requisite canopy species nor native grassland recorded in the Study Area. **Unlikely to occur.**

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