NEOEN

Tchelery Wind Farm

Preliminary Biodiversity Assessment

June 2023

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Tchelery Wind Farm
Preliminary Biodiversity Assessment

NEOEN

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A	27/05/2022	Draft
B	28/04/2023	Updated to include preliminary field survey data
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	Name	Date	Signature
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Reviewed by:	Mark Stables	27/06/2023	
Approved by:	Toby Lambert	27/06/2023	

WSP acknowledges that every project we work on takes place on First Peoples lands.
We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

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Glossary

Avoid	Measures taken by a proponent such as careful site selection or actions taken through the design, planning, construction and operational phases of the development to completely avoid impacts on biodiversity values, or certain areas of biodiversity. Refer to the BAM for operational guidance.
Biodiversity study area	Indicative preliminary design including a 50-metre buffer to all tracks and a design buffer of 200-metres to each wind turbine area to encompass the entire rotor span.
BioNet Atlas	The DPE database of flora and fauna records (formerly known as the NSW Wildlife Atlas). The Atlas contains records of plants, mammals, birds, reptiles, amphibians, some fungi, some invertebrates (such as insects and snails listed under the TSC Act) and some fish.
BioNet Vegetation Classification	The master vegetation community-level classification for use in vegetation mapping programs and regulatory biodiversity impact assessment frameworks in NSW. The BioNet Vegetation Classification is published by DPE and available at www.environment.nsw.gov.au/research/Visclassification.htm.
Broad condition state	Areas of the same PCT that are in relatively homogenous condition. Broad condition is used for stratifying areas of the same PCT into a vegetation zone for the purpose of determining the vegetation integrity score.
BAM Credit Calculator	The computer program that provides decision support to assessors and proponents by applying the BAM, in particular by using the data required to be entered and the equations in Appendix 6 and Appendix 9 to calculate the number and class of biodiversity credits required to offset the impacts of a development or created at a biodiversity stewardship site.
Development site	An area of land that is subject to a proposed development application, application for approval.
Ecosystem credits	A measurement of the value of threatened ecological communities, threatened species habitat for species that can be reliably predicted to occur with a PCT, and PCTs generally. Ecosystem credits measure the loss in biodiversity values at a development site.
Gilgai	A hollow where rainwater collects; a waterhole
Habitat	An area or areas occupied, or periodically or occasionally occupied, by a species or ecological community, including any biotic or abiotic component.
High threat weed	Plant cover composed of vascular plants not native to Australia that if not controlled will invade and outcompete native plant species.
Hollow bearing tree	A living or dead tree that has at least one hollow. A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. you cannot see solid wood beyond the entrance); (d) the hollow is at least 1 m above the ground. Trees must be examined from all angles.

IBRA region	A bioregion identified under the Interim Biogeographic Regionalisation for Australia (IBRA) system, which divides Australia into bioregions on the basis of their dominant landscape-scale attributes.
IBRA subregion	A subregion of a bioregion identified under the IBRA system.
Landscape attributes	In relation to a development site or a biodiversity stewardship site, native vegetation cover, vegetation connectivity, patch size and the strategic location of a biodiversity stewardship site.
Local population	The population that occurs in the study area. In cases where multiple populations occur in the study area or a population occupies part of the study area, impacts on each subpopulation must be assessed separately.
Locality	A 20 km radius surrounding the project site in which threatened species database searches were conducted.
Minimise	A process applied throughout the development planning and design life cycle which seeks to reduce the residual impacts of development on biodiversity values.
Mitchell landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000.
Patch size	An area of intact native vegetation that: **a** occurs on the development site or biodiversity stewardship site, and **b** includes native vegetation that has a gap of less than 100 m from the next area of moderate to good condition native vegetation (or ≤30 m for non-woody ecosystems). Patch size may extend onto adjoining land that is not part of the development site or biodiversity stewardship site.
Plant community type (PCT)	A NSW plant community type identified using the PCT classification system.
Project	Tchelery Wind Farm
Project site	Location of the proposed Tchelery Wind Farm property,
Species credits	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates.
Threatened ecological community	Means a critically endangered ecological community, an endangered ecological community or a vulnerable ecological community listed in Schedule 2 of the BC Act.
Threatened species	Critically endangered, endangered or vulnerable threatened species as defined by Schedule 1 of the BC Act, or any additional threatened species listed under Part 13 of the EPBC Act as critically endangered, endangered or vulnerable.
Vegetation class	A level of classification of vegetation communities defined in Keith (2004). There are 99 vegetation classes in NSW.
Vegetation formation	A broad level of vegetation classification as defined in Keith (2004). There are 16 vegetation formations and sub-formations in NSW.

Abbreviations

BAM	Biodiversity Assessment Methodology, as required for assessment under the *Biodiversity Conservation Act 2016* (BC Act) which commenced on 25 August 2017
BC Act	*Biodiversity Conservation Act 2016* (NSW) regulated by the NSW Government Environment, Energy and Science (ESS) (previously Office of Environment and Heritage)
BCD	Biodiversity and Conservation Division of DPE (previously known as OEH)
BDAR	Biodiversity Development Assessment Report
DPE	NSW Department of Planning and Environment
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
EEC	Endangered ecological community
EES	NSW Department of Planning, Industry and Environment, Office of Environment, Energy and Science (previously OEH). The department develops and implements state policy, programs and legislation to protect and conserve NSW's natural environment and cultural heritage and administers the BC Act.
EIA	Environmental impact assessment
EIS	Environmental impact statement
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
FM Act	*Fisheries Management Act 1994* (NSW)
LEP	Local Environmental Plan
LGA	Local Government Area
LLS	*Local Land Services Act 2013*
MNES	Matter/s of National Environmental Significance (MNES) protected by a provision of Part 3 of the EPBC Act.
NSW	New South Wales
OEH	Office of Environment and Heritage
PCT	A NSW plant community type (PCT) identified using the BioNet Vegetation Classification system.
SAII	Serious and Irreversible Impacts
SVM	State Vegetation Mapping
TEC	Threatened ecological community

Executive summary

This Preliminary Biodiversity Assessment (this report) has been prepared by WSP Australia Pty Ltd on behalf of NEOEN. The purpose of this report is to present preliminary biodiversity findings within the project site based on desktop, pre-existing, preliminary and ongoing field validation to inform the Scoping Report, and initial communications with determining authorities.

This report also identifies potential data gaps and seasonal survey requirements that pose potential issues that would likely need to be addressed as part of a Biodiversity Development Assessment Report (BDAR) that would be prepared in accordance with the Biodiversity Assessment Method 2020 (BAM). It is likely that a BDAR would need to be prepared to support an Environmental Impact Statement (EIS) for the project in accordance with the *Biodiversity Conservation Act 2016* (BC Act).

This report also considers 'Matters of National Environmental Significance' (MNES) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The overall purpose of this report to is to present all biodiversity constraints requiring assessment and/or consideration under the relevant NSW and Commonwealth legislation. More detailed studies and assessment reporting for the refined design would be completed in the future in accordance with the requirements of the relevant determining authorities.

The project site has been identified, based on desktop, pre-existing and preliminary field survey data, to form part of several vegetation formations including Arid Shrublands, Freshwater Wetlands, Grasslands, Saline Wetlands and Semi-arid Woodlands. Preliminary field verification of these vegetation formations have identified to form 16 plant community types (PCTs) which potentially form four threatened ecological communities (TECs) listed under the BC Act. These are:

- *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregions – Endangered
- *Allocasuarina luehmannii* Woodland in the Riverina and Murray-Darling Depression Bioregions – Endangered and Serious and Irreversible Impact (SAII)
- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions – Endangered
- Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions – Endangered.

In addition, several PCTs identified are considered to potentially form two TECs listed under the EPBC Act. These are:

- Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions – Endangered
- Weeping Myall Woodlands – Critically Endangered.

Pre-existing and preliminary field surveys undertaken by WSP have identified seven threatened flora species listed under the BC Act and EPBC Act to occur within the project site. These are:

- *Brachyscome papillosa* (Mossgiel Daisy) – listed as vulnerable under the BC Act and EPBC Act
- *Calotis moorei* (A Burr-daisy) – listed as endangered and as a SAII entity under the BC Act, and as endangered under the EPBC Act
- *Eleocharis obicis* (A Spike-rush) – listed as vulnerable under the BC Act and EPBC Act
- *Lepidium monoplocoides* (Winged Peppercress) – listed as endangered under the BC Act and EPBC Act
- *Maireana cheelii* (Chariot Wheels) – listed as vulnerable under the BC Act and EPBC Act
- *Pilularia novae-hollandiae* (Austral Pillwort) – listed as endangered and SAII entity under the BC Act.
- *Swainsona murrayana* (Slender Darling Pea) – listed as vulnerable under the BC Act and EPBC Act.

Database searches have identified additional 12 threatened flora species as potential candidate of which two have been identified as having a moderate or higher likelihood of occurrence.

Database searches have identified 15 threatened fauna species listed under the BC Act and three threatened fauna species listed under the EPBC Act are predicted to have a moderate of higher likelihood of occurrence within the proposal project site. Pre-existing and preliminary surveys undertaken by WSP have recorded five threatened fauna species listed under the BC Act within the project site, being:

- *Circus assimilis* (Spotted Harrier) – listed as vulnerable under the BC Act
- *Epthianura albifrons* (White-fronted Chat) – listed as vulnerable under the BC Act
- *Falco subniger* (Black Falcon) – listed as vulnerable under the BC Act
- *Lophochroa leadbeateri* (Major Mitchell's Cockatoo) – listed as vulnerable under the BC Act
- *Petroica phoenicea* (Flame Robin) – listed as vulnerable under the BC Act.

The following eight species of migratory avifauna were recorded:

- *Apus pacificus* (Fork-tailed Swift)
- *Calidris ferruginea* (Curlew Sandpiper)
- *Calidris ruficollis* (Red-necked Stint)
- *Calidris acuminata* (Sharp-tailed Sandpiper)
- *Pelecanus conspicillatus* (Australian Pelican)
- *Merops ornatus* (Rainbow Bee-eater)
- *Microcarbo melanoleucos* (Little Pied Cormorant)
- *Threskiornis spinicollis* (Straw-necked Ibis).

A BDAR would need to be prepared as part of the EIS, which would further identify and clarify the potential significance of biodiversity impacts associated with the project. The BDAR would be prepared in accordance with BC Act and BAM. Further targeted detailed threatened species seasonal survey would be required to ensure compliance with the BAM along with vegetation integrity plot based native vegetation surveys.

Potential measures would be identified to avoid and minimise any adverse biodiversity effects and further detailed design would reduce the overall amount of vegetation required to be removed.

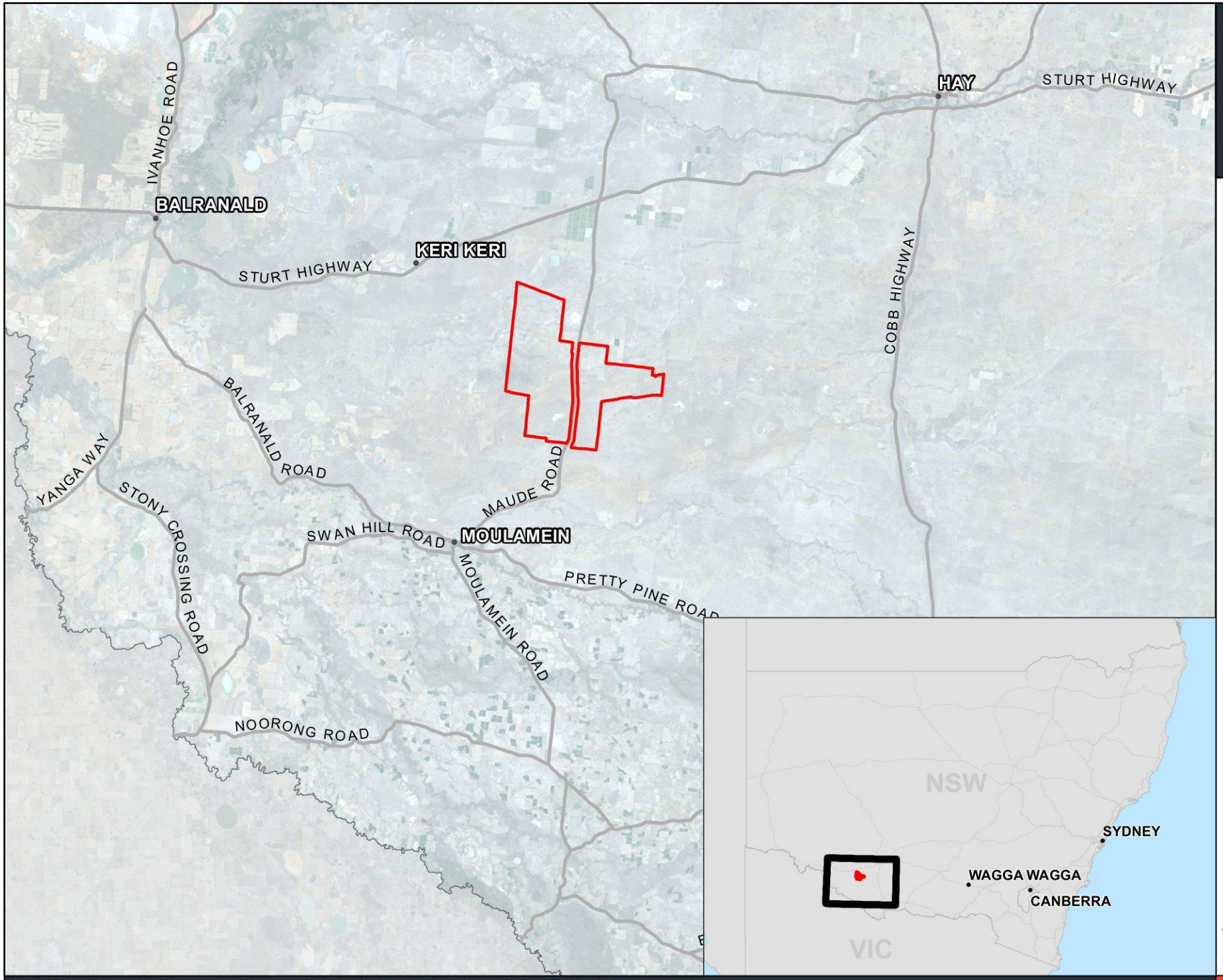
A Referral under the EPBC Act to the Commonwealth would be required.

1 Introduction

1.1 Background

Neoen Australia Pty Ltd (NEOEN) propose to construct and operate the Tchelery Wind Farm (the project), a renewable energy development near Keri Keri in the Riverina Murray region of New South Wales (NSW) (refer to Figure 1.1 for the regional context of the project). Fully constructed, the project would include up to 120 wind turbines providing a total capacity of up to approximately 800 megawatts (MW), that would be connected into EnergyConnect (NSW – Eastern Section) or existing 220 kV powerline. NEOEN is seeking State Significant Development (SSD) consent under Part 4, Division 4.7 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the project.

The Energy Corporation of NSW (EnergyCo) (a NSW State Owned Corporation) is in the early stages of planning the South West Renewable Energy Zone (REZ). The proposed location of the South West REZ (shown in Figure 1.2) has been identified as a NSW priority energy zone and the project would be within the current proposed REZ boundaries. The proposed location of the project and the South West REZ would benefit from connection into EnergyConnect (NSW – Eastern Section) that traverses the proposed REZ and comprises relative land use compatibility and a strong pipeline for renewable energy, including the project. The project would contribute to renewable energy generation to reach the NSW and Commonwealth net-zero emission targets.



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Tchelery Wind Farm

Figure 1.1
Regional Context

Legend

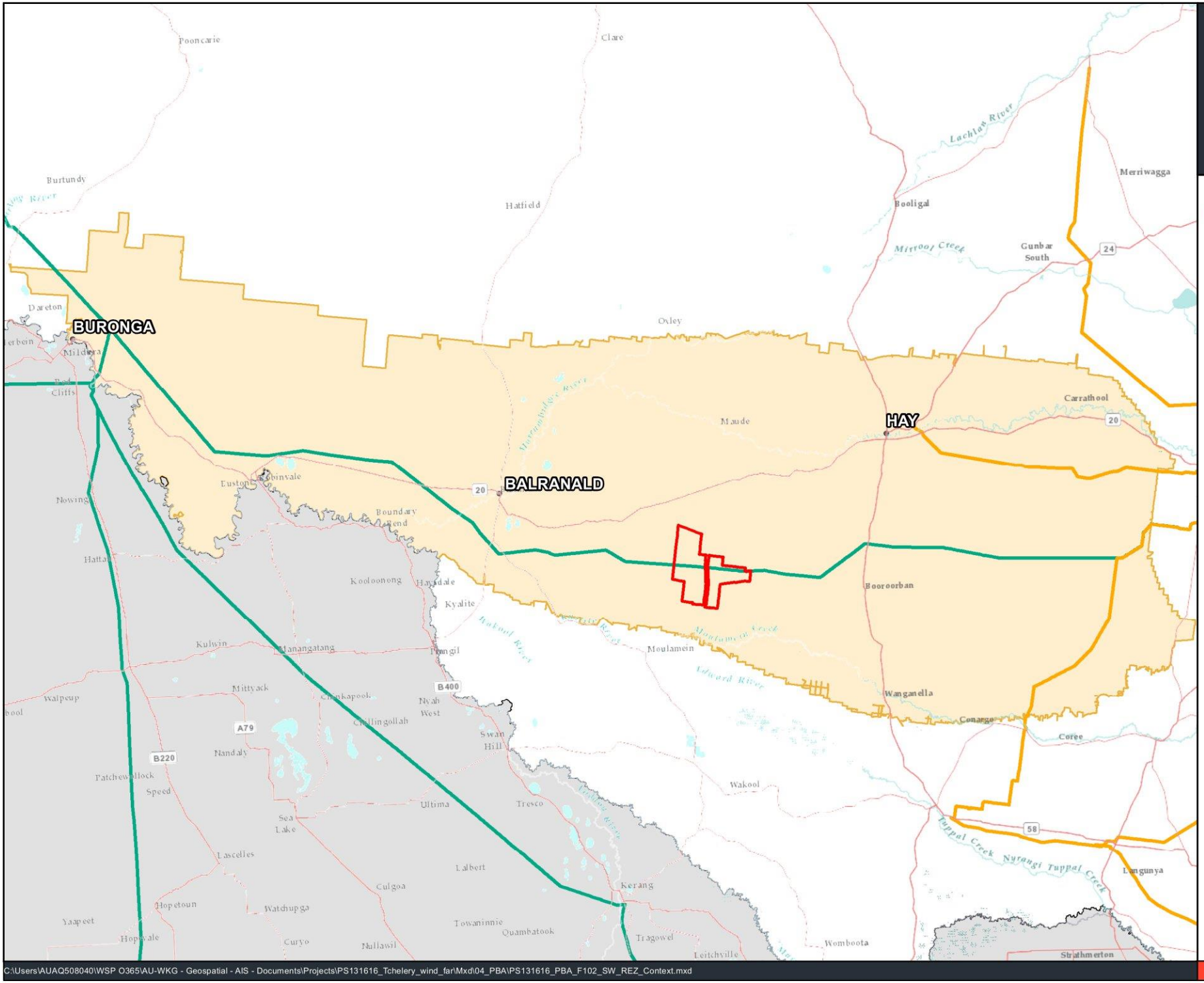
- Houses within Project Boundary
- Nearby Houses
- Road
- Project Site

0 10 20
Kilometers

Coordinate system: GDA 1994 MGA Zone 55

Scale ratio correct when printed at A4

1:752,175 Date: 21/04/2023



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Tchelery Wind Farm

Figure 1.2
Indicative Location of the South-West REZ

Legend

- Project Site
- South West Renewable Energy Zone

Transmissions Lines

- 132 kV
- 220 kV
- 330 kV

Coordinate system: GDA 1994 MGA Zone 55

Scale ratio correct when printed at A4

1:1,500,000 Date: 21/04/2023

1.2 Overview of the project

NEOEN (the Proponent) propose to construct and operate the Tchelery Wind Farm (the project), a utility scale renewable energy development near Keri Keri in the Riverina Murray region of NSW. The project would be approximately 790 kilometres (by road) west of Sydney, 35 kilometres (by road) east of Keri Keri, and 79 kilometres (by road) east of Balranald. The project is within the Edward River Local Government Area (LGA), south of the Sturt Highway. The project site is traversed by Maude Road (north-south) and Boorooban-Tchelery Road (east-west). Existing land uses of the project site and surrounds are predominately sheep grazing and cropping.

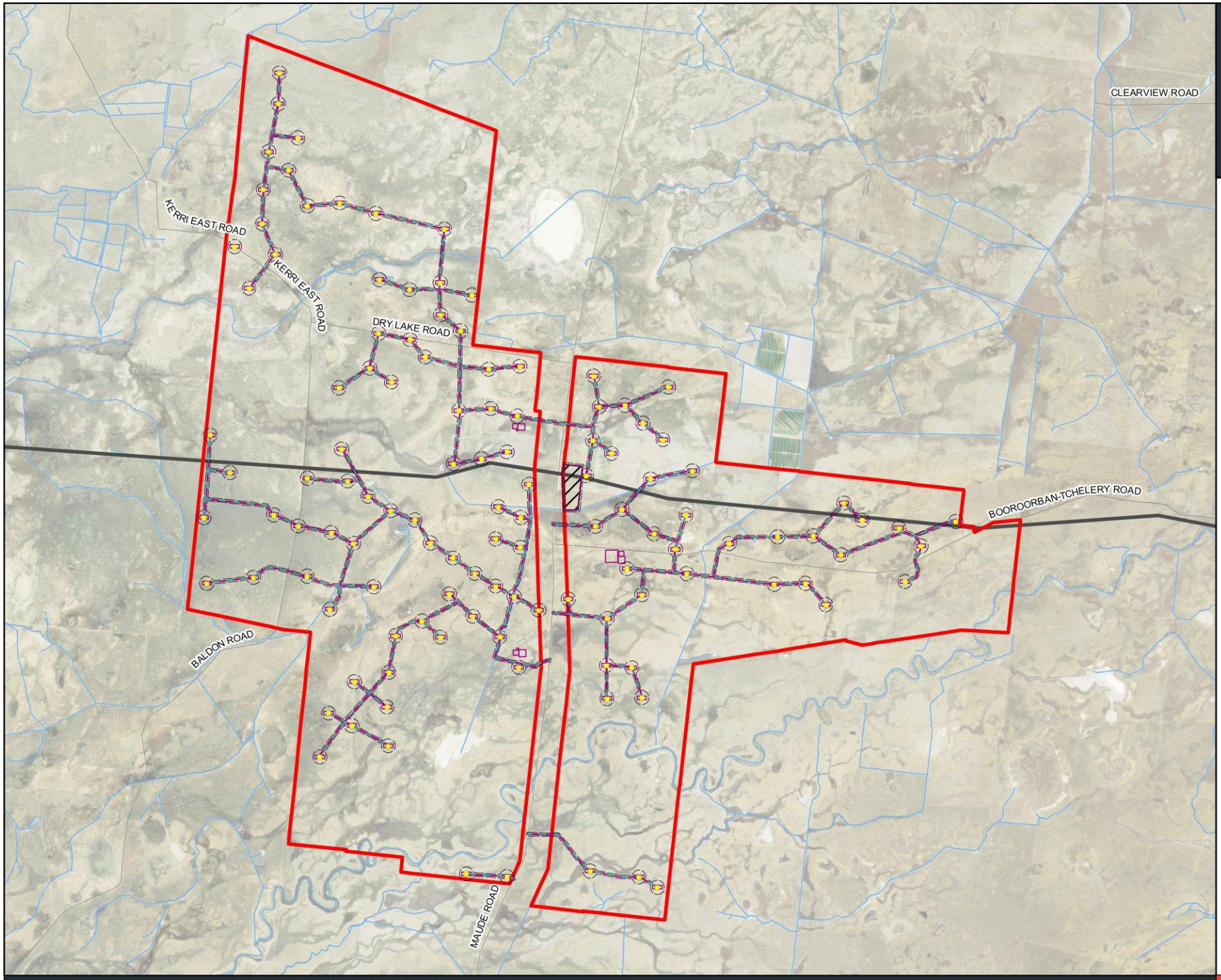
Fully constructed, the project would include around 120 wind turbines providing a total capacity of up to approximately 800 MW. The project seeking approval for a hub height of up to 185 metres and tip height of 285 metres.

The project would also comprise of the following infrastructure and associated works:

- construction vehicle and workforce vehicle parking
- concrete batching plant, crushing facilities and gravel pits
- construction laydown and stockpiles
- a wind monitoring mast
- parking for operational staff
- workforce accommodation camps
- temporary site offices.

It is expected that construction of the project would commence in late-2026 and take about two – two and a half years to complete. It is anticipated that the project would be operational in late 2028 or early 2029.

An overview of the project is shown in Figure 1.3.

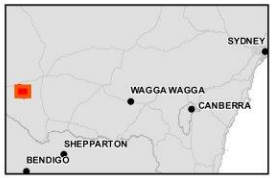


Tchelery Wind Farm

Figure 1.3
Overview of the project site

Legend

- Wind Turbine
- Watercourse
- Roads
- Transmission Line
- Internal roads and access tracks
- Biodiversity Study Area
- Substation and Site Compound
- Disturbance Area
- Project Site



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1.3 Key terms

The following terms are used throughout this Scoping Report:

- Renewable Energy Zone (REZ): A geographic area with high-quality variable renewable energy resources (such as wind and solar), suitable topography and land use designations for development, and demonstrated interest from project developers.
- South West REZ: The South West REZ is a geographic area of between Balranald to the west and Coleambally to the east and to Deniliquin in the south and Carrathool in the north, that would combine renewable energy generation, storage and high voltage transmission infrastructure to deliver energy to electricity consumers.
- The project: the proposed Tchelery Wind Farm and associated infrastructure that would allow energy generation and storage and connection into EnergyConnect (NSW – Eastern Section) and/or the existing 220 kV transmission line between Balranald and Darling point substation.
- Project site: The project site boundary is within the Keri Keri region in NSW and comprises an area of approximately 274 km^2.
- Biodiversity study area: Includes indicative preliminary design including a 50-metre buffer to all tracks and a design buffer of 200-metre to each wind turbine area to encompass the entire rotor span.

1.4 Purpose of the report

This Preliminary Biodiversity Assessment (this report) has been prepared by WSP Australia Pty Ltd (WSP) on behalf of NEOEN. The purpose of this report is to present preliminary biodiversity findings within the project site based on desktop, pre-existing and ongoing field validation to inform the Scoping Report, and initial communications with determining authorities.

This report also identifies potential data gaps and seasonal survey requirements that pose potential issues that would likely need to be addressed as part of a Biodiversity Development Assessment Report (BDAR), that would be prepared in accordance with the Biodiversity Assessment Method 2020 (BAM). It is likely that a BDAR would need to be prepared to support an Environmental Impact Statement (EIS) for the project in accordance with the *Biodiversity Conservation Act 2016* (BC Act).

This report also considers 'Matters of National Environmental Significance' (MNES) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The overall purpose of this report to is to present all likely biodiversity constraints requiring assessment (at a desktop level) and/or consideration under the relevant NSW and Commonwealth legislation. More detailed studies and assessment reporting for the refined design would be completed in the future in accordance with the requirements of the relevant determining authorities.

2 Methods

The following chapter outlines the methods used to assess known or predicted biodiversity values within the project site. All work for this report was carried out under the appropriate licenses, including a scientific license as required under Part 2 of the BC Act (License Number: SL100630) and an Animal Research Authority (TRIM 18/195) issued by the Department of Primary Industries (Agriculture).

2.1 Personnel

The contributors to the preparation of this report, their qualification and roles are provided below in Table 2.1.

Table 2.1 Contributors and their roles

Name	Qualifications	Role
Alex Cockerill	BSc (Hons), accredited BAM assessor BAAS17020	National Executive – technical review
Toby Lambert	BEnvSc, accredited BAM assessor BAAS17046	Technical Executive – technical review
Mark Stables	BSc (Hons), accredited BAM assessor BAAS18097	Principal Ecologist – report preparation
Nicholas Everitt	BEnvSc, accredited BAM assessor BAAS17049	Principal Ecologist – report preparation
Devon Raiff	BSc (Hons), Cert III Conservation and Land Management	Professional Ecologist – report preparation

2.2 Nomenclature

Names of vegetation communities used in this report are based on the Plant Community Type (PCT) used in the NSW BioNet Vegetation Classification (Department of Planning and Environment 2022a).

These names are cross-referenced with those used for threatened ecological communities listed under the BC Act and/or the EPBC Act. They are also cross-referenced with previous vegetation mapping (Porteners 1993) using dominant species and structure of the community.

Names of plants used in this document follow PlantNet (Royal Botanic Gardens 2022). Scientific names are used in this report for species of plant. The names of introduced species are denoted with an asterisk (*).

For threatened species of plants, the names used in the BioNet Atlas (Department of Planning and Environment 2022b) are also provided where these differ from the names used in the PlantNet database.

Names of vertebrate fauna follow the Australian Faunal Directory maintained by the Department of Climate Change, Energy, the Environment and Water (2023). Common names are used in the report for species of animal. Both common and scientific names are provided in appendices.

For threatened species of animals, the names used in the BioNet Atlas of NSW Wildlife and NSW Department Primary Industries (Department of Planning and Environment 2022b) are provided.

2.3 Database and literature review

2.3.1 Database searches

The aim of the database searches was to identify threatened flora and fauna species, populations and ecological communities, Commonwealth listed Migratory species or critical habitat recorded previously or predicted to occur near the project site.

Records of threatened species, populations and ecological communities known or predicted to occur in the locality of the project site were obtained from a range of databases as detailed in Table 2.2.

Table 2.2 Database searches undertaken

Database	Search date	Area searched	Reference
BioNet Atlas	22/04/2022	20 km search around the project site	Department of Planning and Environment 2022b
Protected Matters Search Tool	22/04/2022	20 km search around the project site	Department of Climate Changes, Energy, the Environment and Water, 2022a
PlantNet	22/04/2022	Edward River LGA Hay LGA	Royal Botanic Gardens 2022
Atlas of Living Australia	22/04/2022	Locality search around the project site	Atlas of living Australia 2022
Areas of Outstanding Biodiversity Value register	22/04/2022	Search of the register	Department of Planning and Environment 2022c
NSW Department of Primary Industries Critical Habitat register	22/04/2022	Search of the register	Department of Primary Industries 2022b

2.3.2 Literature and spatial data review

The background research included analysis of the following information sources:

- aerial photographic imagery (Land and Property Information, 2022)
- Atlas of Living Australia – interactive map search (Atlas of living Australia 2022).
- BioNet Atlas (Department of Planning and Environment 2022b)
- BioNet Vegetation Classification database (Department of Planning and Environment 2022a)
- Directory of Important Wetlands of Australia (DCCEEW, 2023)
- Interim Biogeographic Regionalisation of Australia (IBRA version 7.0) (DCCEEW, 2023)
- NSW Mitchell Landscapes – version 3.1 (Department of Planning and Environment 2022e)
- Register of Declared Areas of Outstanding Biodiversity Value – Critical habitat declarations in NSW (Department of Planning and Environment 2022c)
- State Vegetation Type Map: Riverina Region Version v1.2 – VIS_ID 4469 (Department of Planning and Environment 2022d)
- the natural vegetation of the Hay Plain: Booligal-Hay and Deniliquin-Bendigo 1:250 000 maps (Porteners 1993).

2.4 Likelihood of occurrence assessment

An assessment was completed to assess the likelihood of occurrence of each threatened species, population and community (threatened biodiversity) identified with the potential to occur in the project site. All threatened biodiversity identified during background research were considered (see Section 2.3). Preliminary field surveys and habitat assessments were also utilised to inform the likelihood of occurrence assessment. Assessments were also based on the habitat profile for the species and other habitat information in BioNet Atlas (2022a) and the Species Profile and Threats Database (DCCEEW 2022d). The assessment also included consideration of the dates and locations of nearby records and information about species populations in the locality. The assessment results are summarised in Section 3 and are provided in full in Appendix A and Appendix B.

For this study, the likelihood of occurrence of threatened and migratory species and populations was determined based on the criteria shown in Table 2.3 below.

Table 2.3 Likelihood of occurrence criteria for threatened species and populations

Classification	Definition
Recorded	Where a threatened species has been recorded within the project site.
High	It is highly likely that a species inhabits the biodiversity study area and is dependent on identified suitable habitat (i.e. for breeding or important life cycle periods such as winter flowing resources), has been recorded recently within the locality and is known or likely to maintain resident populations in the biodiversity study area. Also, includes known or likely to visit the study area during regular seasonal movements or migration.
Moderate	Potential habitat is present within the project site. Species unlikely to maintain sedentary populations, however may seasonally use resources within the biodiversity study area opportunistically or during migration. The species is unlikely to be dependant (i.e. for breeding or important life cycle periods such as winter flowing resources) on habitat within the study area, or habitat is in a modified or degraded state. Includes cryptic flowering flora species that were not seasonally targeted by surveys and that have not been recorded.
Low	It is unlikely that the species inhabitants the project site and has not been recorded recently in the locality. It may be an occasional visitor, but habitat similar to the biodiversity study area is widely distributed in the local areas, meaning that the species is not dependant (i.e. for breeding or important life cycle periods such as winter flowing resources) on available habitat. Specific habitat is not present in the biodiversity study area or the species are a non-cryptic perennial flora species that were specially targeted by surveys and not recorded.
None	Suitable habitat is absent from project site.

2.5 Excluded impacts – native vegetation regulatory assessment of Category 1 'Exempt Lands'

This section summarises the method for native vegetation regulatory mapping of proposed Category 1 – exempt land within the project site.

In accordance with section 6.8 (3) of the BC Act, the BAM excludes the assessment of impacts on Category 1 – exempt land within the meaning of Part 5A of the *Local Land Services Act 2013* (LLS Act), other than any impacts prescribed by the regulations under section 6.3.

The LLS Act defines 'Category 1 – exempt land' as areas of the State to which Part 5A of the LLS Act applies, which are designated as Category 1 – exempt land on the 'native vegetation regulatory map', prepared and published under the LLS Act. A native vegetation regulatory map is being developed by the Department of Planning and Environment; however, this is currently incomplete and no Category 1 land has been mapped within NSW.

Section 60F of the LLS Act provides transitional requirements which identify how the relevant categorisation of land is to be determined pursuant to section 60H of the LLS Act in the absence of a native vegetation regulatory map. Accredited assessors may determine the categorisation of land during this transitional period in accordance with Section 60F. The method applied to determine the categorisation is provided below.

2.5.1 Background to Category 1 – Exempt land

Under the NSW Land Management Framework, the categorisation of land determines the native vegetation management options available to landholders. Rural land in NSW is categorised into three main categories:

- Category 1 – exempt land is land where native vegetation can be cleared without approval from Local Land Services.
- Category 2 – land is divided into:
  - Category 2 – regulated land is Category 2 land that is not Vulnerable or Sensitive regulated land. You may need authorisation from Local Land Services to clear native vegetation from rural zoned land in this category.
  - Category 2 – vulnerable regulated land is land where clearing of native vegetation may not be permitted under the Land Management (Native Vegetation) Code 2018, and a limited range of allowable activities are permitted.
  - Category 2 – sensitive regulated land is land where clearing is not permitted under the Land Management Code (Native Vegetation) Code 2018, and a limited range of allowable activities is permitted.

Excluded land – is land where the Land Management (Native Vegetation) Code 2018 and allowable activities do not apply.

2.5.2 Land category criteria

Each land category is determined by various criteria as outlined in the LLS Act. Category 1 – exempt land is defined in 60H of the LLS Act as the below:

1 *Land is to be designated as Category 1 – exempt land if the Environment Agency Head reasonably believes that:*

a) the land was cleared of native vegetation as at 1 January 1990, or

b) the land was lawfully cleared of native vegetation between 1 January 1990 and the commencement of this Part.

2 *Land is to be designated as Category 1 – exempt land if the Environment Agency Head reasonably believes that:*

a) the land contains low conservation value grasslands, or

b) the land contains native vegetation that was identified as regrowth in a property vegetation plan referred to in section 9 (2) (b) of the Native Vegetation Act 2003, or

c) the land is of a kind prescribed by the regulations as Category 1 – exempt land.

3 *Land is to be designated as Category 1 – exempt land if the land is biodiversity certified under Part 8 of the Biodiversity Conservation Act 2016 or under any Act repealed by that Act.*

4 *However:*

a) land described in subsection (1) or (2) is not to be designated as Category 1 – exempt land if section 60I (2) requires the land to be designated as category 2-regulated land, and

b) land described in subsection (1) (a) is not to be designated as Category 1 – exempt land if the land was unlawfully cleared of native vegetation after 1 January 1990, and

c) land described in subsection (2) (a) is not to be designated as Category 1 – exempt land if the land was unlawfully cleared of native vegetation after 1 January 1990.

5 *The regulations may make provision for the purposes of determining whether grasslands are low conservation value grasslands for the purposes of this Division.*

2.5.3 Determination of mapped category of land

The matters relating to determination of mapped category of land are outlined in 60J of the LLS Act. Section 60J of the LLS Act is reproduced below:

1 *This section makes provision relating to the mapping of land under this Division as Category 1-exempt land or Category 2 – regulated land.*

2 *Native vegetation that comprises grasslands or other non-woody vegetation is taken to have been cleared if the native vegetation was significantly disturbed or modified. The regulations may make provision for the purposes of determining whether native vegetation has been significantly disturbed or modified for the purposes of this Division.*

3 *Determinations may be made by the Environment Agency Head that land was unlawfully cleared of native vegetation only if compliance or enforcement action of a kind prescribed by regulations was taken in relation to the clearing.*

4 *Determinations may be made by the Environment Agency Head that land was cleared of native vegetation as at 1 January 1990 or between that date and the commencement of this Part only on the basis of the best available aerial photographs or satellite imagery before and after the relevant date, and any evidence provided by the landholder under section 60K (8).*

5 *Determinations made (or taken on appeal to have been made) by the Environment Agency Head as to whether land was or was not unlawfully cleared of native vegetation does not affect any decision made with respect to compliance or enforcement action taken under this or any other Act in relation to the clearing.*

2.5.4 Assessment of Category 1 exempt land

The LLS Act publishes maps (the native vegetation regulatory map) that show areas of the State to which Part 5A of the LLS Act applies, which are designated as Category 1 – exempt land. However, the native vegetation regulatory map is currently incomplete, and Category 1 – exempt land has not yet been mapped within NSW.

Section 60F of the LLS Act provides transitional requirements which identify how the relevant categorisation of land is to be determined pursuant to section 60H of the LLS Act in the absence of a native vegetation regulatory map.

WSP has developed a desktop land characterisation methodology that builds on previous land categorisation assessments and with reference to the Native vegetation regulatory map (NVR): method statement (DPE, 2017).

In defining the area Category 1 – exempt land, an initial analysis of the following spatial datasets has been undertaken:

- Land use: NSW Land Use 2017 v1.2, published June 2020
- Woody vegetation: NSW Woody Vegetation Extent 2011, published 2015
- NVR: Transitional Native Vegetation Regulatory Map, version 3.0, published 26 March 2021
- Zoning: EPI LEP LZN Land Zoning, current at 23 April 2021
- Travelling Stock Routes, LPI, supplied by ARTC 30 October 2020
- State Vegetation Type Map
- aerial photos (to determine areas that were/are obviously under cultivation or improved pasture or otherwise disturbed).

Each of these datasets was used to determine whether native vegetation has been significantly disturbed or modified (and therefore cleared) in accordance with 60J of the LLS Act.

The steps in identifying Category 1 – exempt land included the following:

1. An initial inclusion of all land use classifications 3, 4 and most of 5 as mapped by the Land use: NSW Land Use 2017 v1.2, published June 2020 (consistent with figure 7 of the NVR method statement) (DPE, 2017).
2. The land use classification was subsequently overlayed with the Transitional Native Vegetation Regulatory Map, version 3.0, published 26 March 2021 and any areas of the subject site mapped as Category 2 lands were excluded.
3. This was followed by the exclusion of areas of extant remnant vegetation as published within the Woody vegetation: NSW Woody Vegetation Extent 2011, (OEH, 2015) which were also included within the Category 2 lands.
4. Finally, State Vegetation mapping and field verification surveys were used to further classify any areas of mapped native vegetation, including derived native grasslands and were included within the Category 2 lands.

A summary of this process is provided in Figure 2.1.

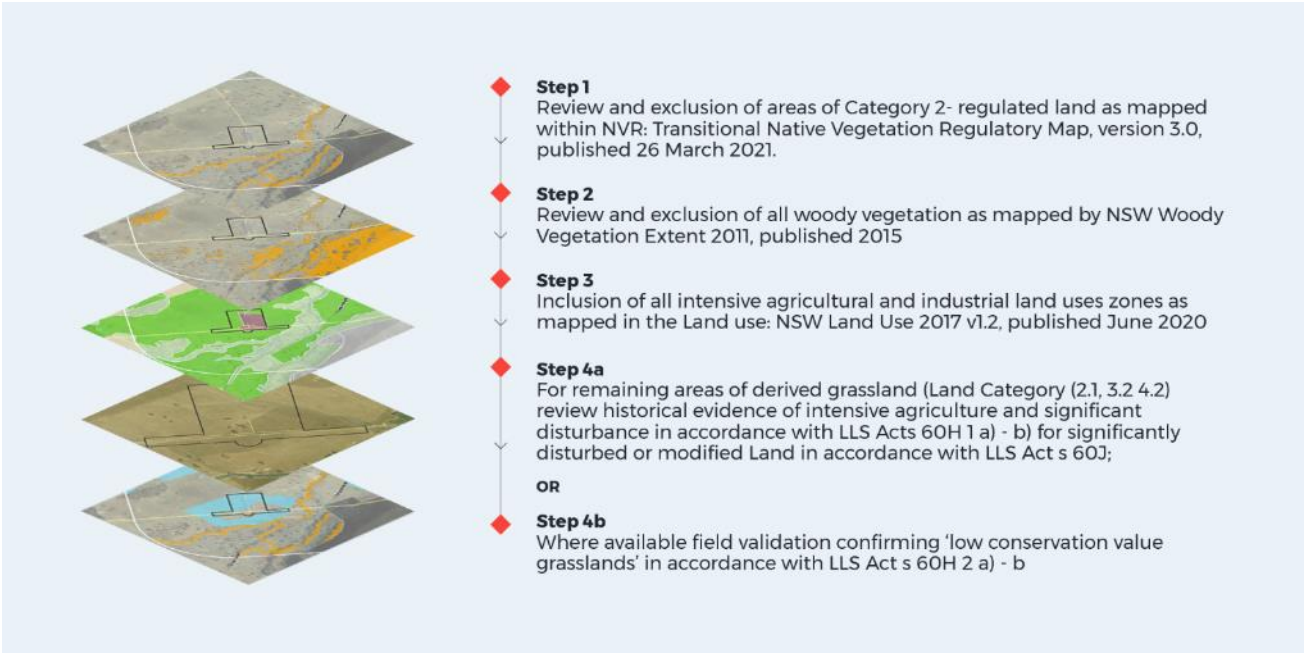


Figure 2.1 Approach to identifying Category 1 – exempt land

2.6 Mapping native vegetation extent

Mapping of native vegetation extent within the project site was undertaken in accordance with section 4.1 of the Biodiversity Assessment Method (BAM) 2020 and detailed requirements outlined in section 3.2 of the BAM 2020 Operation Manual.

In determining native vegetation extent within the project site, the following method was employed:

- Preliminary mapping of vegetation community boundaries was undertaken through analysis of existing vegetation mapping and aerial photograph interpretation.
- Vegetation within the project site and locality has been mapped at the regional scale in:
  - State Vegetation Type Map: Riverina Region Version v1.2 – VIS_ID 4469 (Department of Planning 2016).
- Data on geology, dominant canopy species, native species richness, vegetation structure and condition were collected from areas able to be accessed during preliminary field surveys to validate and refine this existing vegetation mapping to determine their associated Plant Community Type (PCT) in accordance with the BioNet Vegetation Classification System (DPIE 2022).

The vegetation within the project site was firstly assessed to a PCT level and then aligned to a vegetation zone which is defined in the BAM as 'an area of native vegetation on the proposal site that is the same PCT and has the same broad condition state'.

A broad condition state infers that the vegetation has a similar tree cover, shrub cover, ground cover, weediness or combinations of these attributes which determine vegetation condition.

Broad condition state is used for stratifying areas of the same PCT into a vegetation zone for determining the vegetation integrity score. Broad condition states used for this report are outlined in Table 2.4.

Table 2.4 Native vegetation broad condition states

Broad condition state	Description
Moderate – good	Native vegetation is relatively intact with all structural layers present. Exotic weed cover is generally less than 30%.
Moderate	Native vegetation where one or more structural understorey components of the vegetation is entirely removed or reduced. Vegetation integrity scores are generally less than 60% and exotic cover is generally greater than 30%.
Poor	Vegetation has retained a native canopy, or the canopy cover is showing signs of regeneration. The understorey and groundcover layers are generally dominated or co-dominated by exotic species. Native species diversity is generally relatively low, and the mid and low stratums have been structurally modified due to weed incursions, clearing or agricultural practices such as cropping or direct seeding.
Derived	Vegetation is generally lacking a native over-storey and mid stratum. This includes PCTs that have changed to an alternative stable state because of land management practices since European settlement. Over-storey structural components of derived communities have either entirely been removed or are severely reduced (i.e., derived native grasslands with or without scattered paddock trees). Derived grassland was assigned to patches of vegetation where native perennial cover was greater than 50%.

2.7 Plot-based vegetation surveys

A total of 27 vegetation integrity plots were completed as part of preliminary field surveys in accordance with BAM 2020. A schematic diagram illustrating the layout of each vegetation integrity plot is provided in Figure 2.2.

Figure 2.2 Vegetation integrity plot layout

The following site attributes were recorded at each vegetation integrity plot location:

- **Location:** (easting – northing grid type MGA 94, Zone 54 & 55).
- **Vegetation structure and dominant species and vegetation condition:** Vegetation structure was recorded through estimates of percentage foliage cover, average height and height range for each vegetation layer.
- **Native and exotic species richness** (within a 400-metre squared quadrat): This consisted of recording all species by systematically walking through each 20 metre x 20 metre plot. The cover and abundance (percentage of area of quadrat covered) of each species was estimated. The growth form, stratum/layer and whether each species was native/exotic/high threat weed was also recorded.
- **Number of trees with hollows** (1000 metre squared quadrat): This was the frequency of hollows within living and dead trees within each 50 metre x 20 metre plot. A hollow was only recorded if (a) the entrance could be seen: (b) the estimated entrance width was at least five centimetres across: (c) the hollow appeared to have depth: (d) the hollow was at least one metre above the ground and the (e) the centre of the tree was located within the sampled quadrat.
- **Number of large trees and stem size diversity** (1000 metre squared quadrat): tree stem size diversity was calculated by measuring the diameter at breast height (DBH) (i.e. 1.3 metre from the ground) of all living trees (greater than five centimetre DBH) within each 50 metre x 20 metre plot. For multi-stemmed living trees, only the largest stem was included in the count. Number of large trees was determined by comparing living tree stem DBH against the PCTs benchmarks.
- **Total length of fallen logs** (1000 metre squared quadrat): This was the cumulative total of logs within each 50 metre x 20 metre plot with a diameter of at least 10 centimetres and a length of at least 0.5 metre.
- **Litter cover:** This comprised estimating the average percentage groundcover of litter (i.e. leaves, seeds, twigs, branchlets and branches with a diameter less than 10 centimetre which is detached from a living plant) from within five 1 metre x 1 metre sub-plots spaced evenly either side of the 50-metre central transect.
- **Evaluation of regeneration:** This was estimated as the presence/absence of overstorey species present at the site that was regenerating (i.e. saplings with a diameter at breast height less than or equal to five centimetres).

Prior to establishing plot survey locations, vegetation stratification was undertaken to provide a representative vegetation zone for sampling. Stratification involved marking waypoints and bearings randomly to provide a representative assessment of the vegetation integrity of the vegetation zone in the study area and establishing the required number of plots at some of these waypoints.

A summary of the preliminary BAM plot-based vegetation survey effort is detailed in Table 2.5.

Table 2.5 Summary of BAM plot-based vegetation survey effort

PCT ID	PCT name	Condition	BAM vegetation integrity plot	Extent mapped within project site (ha)
PCT 15	Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	SVTM[1]	–	0.08
PCT 16	Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Moderate-good	–	1.82
PCT 17	Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Moderate-good	TS_08 TS_14	2.75
PCT 22	Semi-arid shrubby Buloke – Slender Cypress Pine woodland, far south-western NSW	Moderate-good	–	0.16
PCT 23	Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones	Moderate-good	TS_01	3.75
		Moderate	TS_17 TS_25	19.38
		Derived	TS_03 TS_18 TS_19	24.02
PCT 24	Canegrass swamp tall grassland wetland of drainage depressions, lakes and pans of the inland plains	Moderate-good	TS_15	2.32
PCT 26	Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Poor	TS_12	1.52
PCT 28	White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone	Moderate-good	TS_09	1.07
		Moderate	–	0.76
		Derived	–	7.20
		SVTM[1]	–	5.34
PCT 44	Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion	SVTM[1]	–	0.77

PCT ID	PCT name	Condition	BAM vegetation integrity plot	Extent mapped within project site (ha)
PCT 58	Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	Moderate-good	–	2.86
		Moderate	TS_24	0.81
PCT 153	Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones	Moderate-good	TS_16	36.14
PCT 157	Bladder Saltbush shrubland on alluvial plains in the semi-arid (warm) zone including Riverina Bioregion	Moderate-good	TS_10 TS_11 TS_21 TS_26	154.22
		SVTM[1]	–	0.01
PCT 159	Old Man Saltbush shrubland mainly of the semi-arid (warm) climate zone (south western NSW)	Derived	TS_23	2.87
PCT 160	Nitre Goosefoot shrubland wetland on clays of the inland floodplains	Moderate-good	TS_04 TS_22	7.16
PCT 163	Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones	Moderate-good	TS_05 TS_07 TS_20	166.78
PCT 164	Cotton Bush open shrubland of the semi-arid (warm) zone	Moderate-good	TS_02 TS_13 TS_27	162.75
		SVTM[1]	–	19.55
PCT 166	Disturbed annual saltbush forbland on clay plains and inundation zones mainly of south-western NSW	Moderate-good	–	0.20
		SVTM[1]	–	5.56
PCT 236	Derived Giant Redburr low shrubland on alluvial plains of the semi-arid (warm) climate zone	Moderate-good	TS_06	13.11
Total				**642.96**

(1) State Vegetation Type Mapping (SVTM) for areas not subject to field verification

2.8 Threatened flora surveys

Preliminary threatened flora surveys were undertaken in Spring 2022 utilising a modified two-phase grid-based systematic survey method as outlined in *Surveying threatened plants and their habitats; NSW guide for the BAM* (Department of Planning Industry and Environment 2020). Due to the large-scale nature of the proposal and large number of threatened flora species recorded, targeted flora surveys were restricted to a parallel transverse along proposed tracks

and a singular stage-one search of the two-phase grid-based survey method at the centre of each proposed tower location. Phase-two of the two-phase grid-based survey method was completed in areas where more unique threatened flora was recorded (i.e. *Calotis moorei*).

2.9 Threatened fauna surveys

2.9.1 Opportunistic and anecdotal recording of fauna species and evidence of fauna activity

Opportunistic sightings of animals were recorded during all preliminary field surveys. Evidence of animal activity, such as scats, diggings, scratch marks, nests/dreys, burrows, mounds etc., was also noted. This provided indirect information on animal presence and activity. During these field surveys, a hand-held GPS was used to record the locations of:

- hollow-bearing trees
- aquatic habitat (including gilgai's)
- nest sites
- any other important habitat features of note.

Anecdotal records from landholders were also recorded if provided.

2.9.2 Diurnal bird surveys

Formal 20-minute diurnal bird searches were completed by two ecologists. Bird surveys were completed by actively walking through the nominated site (transect) over a period of 20 minutes. All birds were identified to the species level, either through direct observation or identification of calls. Flight height ranges and directions were recorded to inform potential wind turbine impacts.

Bird surveys were completed during different times of the day, but generally occurred during morning hours or evening. Birds were also recorded opportunistically during all other surveys.

Wherever threatened bird species were absent from the site, habitat assessments were conducted to determine the likelihood that the disturbance area might support those species that are known to occur in the region.

2.9.3 Call playback

Call playback was used to survey for threatened owls (Powerful, Masked, Barking and Sooty Owl), Bush Stone-curlew and arboreal mammals (predominantly Koala and Gliders) using the methods of Kavanagh (Kavanagh and Peake 1993) and Debus (Debus 1995). Call playback was conducted after dusk each night, within suitable habitat in the project site. An initial listening period of 10 minutes was undertaken, followed by a spotlight search for 10 minutes to detect any animals in the immediate vicinity. The calls of the target species were then played intermittently for five minutes followed by a 10-minute listening period. After the calls were played, another 10 minutes of spotlighting was carried out in the vicinity to check for animals attracted by the calls without vocalising. Calls were broadcast using a portable call playing device and amplified through a megaphone or Bluetooth speaker. Wherever threatened bird species were absent from the site, habitat assessments were conducted to determine the likelihood that the disturbance area might support those species that are known to occur in the region.

2.9.4 Anabat detection

Passive Ultrasonic Anabat Bat detection (Anabat SD1/SD2 or Anabat Express unit – Titley Scientific, Brendale QLD) was used to record and identify the echolocation calls of microchiropteran bats foraging at each survey site. Passive monitoring of survey sites was achieved by setting Anabat bat detectors to record throughout the night. Anabat Bat detectors recorded bat vocalisations throughout the full night, with the recording starting before dusk. Bat activity throughout the night does vary (Taylor and Oneill 1988, Department of Environment and Conservation 2004), but the peak in activity is usually within a few hours of dusk. For this proposal study the sampled population was defined as those active up to two hours after last light. Bat activity is used as a substitute for abundance and is based on the number

of microchiropteran bat calls recorded during the survey period, including those calls assigned to a species complex (i.e., not positively attributable to an individual species). Calls will be analysed as part of the BDAR for the EIS using Analook (Version 4.7) software with reference to 'Bat Calls of NSW: Region Based Guide to the Echolocation Calls of Microchiropteran Bats' (Pennay, Law et al. 2004).

2.9.5 Spotlighting

Spotlighting surveys were completed on foot or vehicle by two ecologists, targeting arboreal, flying and large ground-dwelling mammals, as well as nocturnal birds, reptiles and amphibians. At least one person hour of survey effort was completed per site. The spotlighting methodology also included the use of a thermal imaging monocular to assist in nocturnal species identification, including target Western Pygmy Possum. The FLIR Thermal Imaging Monocular Scout II was used for this purpose.

2.10 Weather conditions

Weather conditions were mostly fine and sunny with mild to warm daytime temperatures ranging from 13.8˚ to 18.5˚ during spring and winter, with overnight lows ranging from -1.7˚ to 2˚. During the 2023 summer hot daytime temperatures were experienced, with a high of 42.5˚. Winds were mostly light and variable. Details on weather condition for each survey date are presented in Table 2.6. Rainfall in the preceding months prior to the commencement of the biodiversity surveys was above average for all autumn months. A comparison of recorded rainfall and monthly median averages are presented in Table 2.7.

Table 2.6 Weather conditions during conducted surveys. Source: Hay Airport AWS station 07501

Date	Temperature		Rain (mm)	Wind direction/Speed (kph)	
	Minimum	Maximum		9 am	3 pm
29/06/2022	-1.7	14.7	0	E 7	N 13
30/06/2022	2.0	16.1	0	E 4	SE 6
01/07/2022	0.5	15.5	0	S 13	SE 9
02/07/2022	0.5	13.8	0.2	S 15	SSW 24
03/07/2022	0.4	15.6	0	SSE 17	SSE 19
04/07/2022	-0.1	15.1	0.2	SSE 13	S 19
05/07/2022	-0.4	16.0	0	SSE 11	SSE 13
06/07/2022	-1.4	18.5	0	ESE 9	SE 9
29/09/2022	6.9	21.9	0.2	SW 20	SSW 15
30/09/2022	7.1	22.7	0	NE 22	E 17
01/10/2022	7.1	22.6	0	ENE 19	E 13
02/10/2022	3.4	22.8	0	ENE 7	SE 17
03/10/2022	6.0	23.5	0	ESE 13	'Calm'
4/10/2022	8.0	24.3	0	E 15	ENE 13
01/02/2023	11.8	30.7	0	SSE 11	SW 26
16/02/2023	22.0	39.6	0	NNE 22	WNW 11

Date	Temperature		Rain (mm)	Wind direction/Speed (kph)	
	Minimum	Maximum		9 am	3 pm
17/02/2023	24.1	42.5	0	N 28	NW 19
18/02/2023	19.2	36.2	0	SSW 17	WSW 30
19/02/2023	13.1	34.7	0	SSE 19	SSW 19
20/02/2023	13.1	38.4	0	E 9	S 17
21/02/2023	17.3	37.7	0	S 24	SSE 26
22/02/2023	17.9	34.9	0	ENE 31	E 22
23/02/2023	17.7	32.4	0	ENE 28	E 20

Table 2.7 Summary of recorded rainfall in the months prior to the commencement of the biodiversity surveys and the monthly median averages since 1886. Source: BOM Moulamein (Tchelery) station 075062

Year	March (mm)	April (mm)	May (mm)
Recorded 2022	29.0	43.0	44.9
Recorded median (1886 – 2022)	14.0	17.4	26.5

3 Existing environment

An overview of the existing environment has been undertaken based on a combination of broad scale State vegetation mapping, threatened species database searches, literature review and surveys.

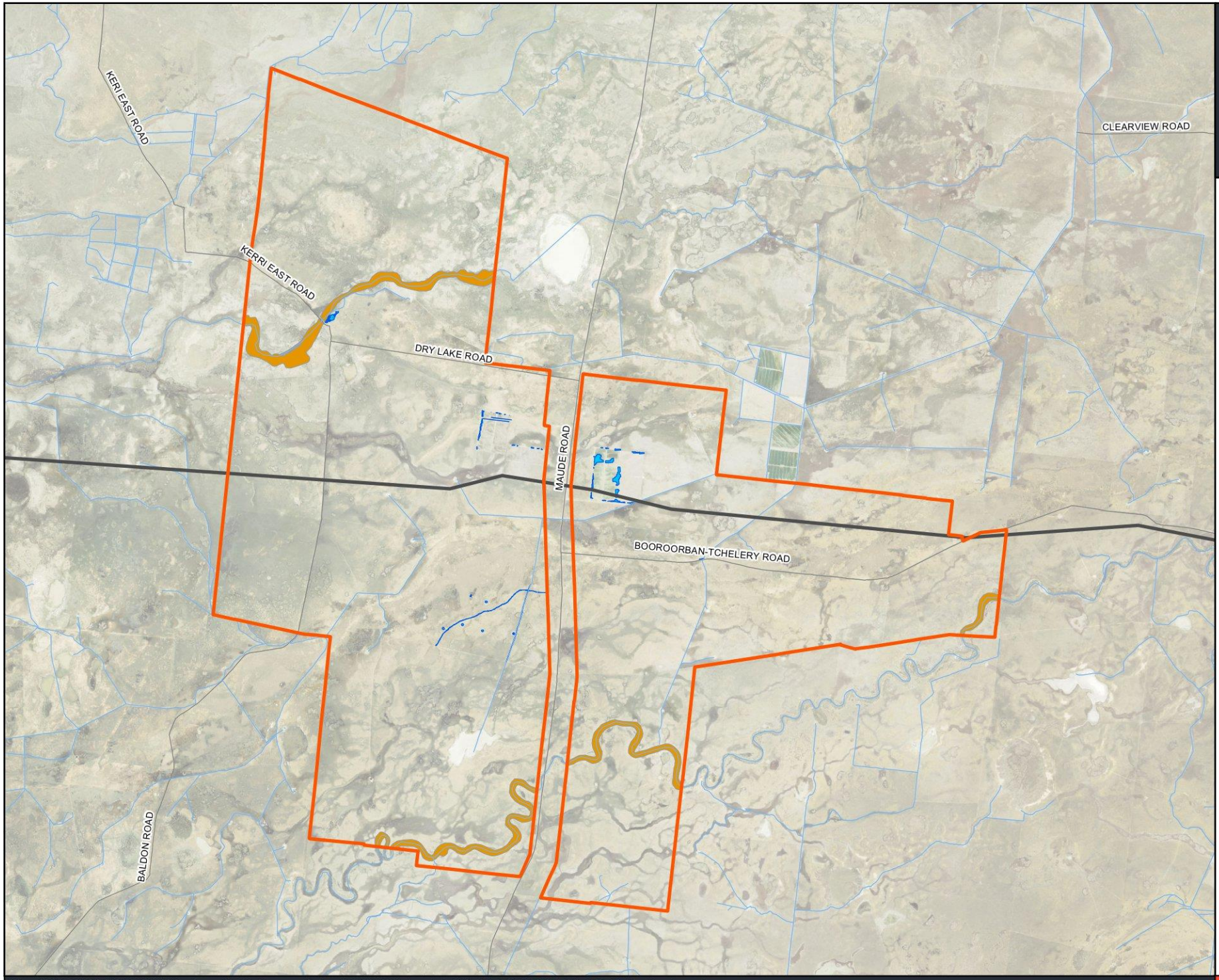
3.1 Native vegetation and threatened ecological communities

3.1.1 Determination of excluded impacts (Category 1 – exempt land)

Vegetation assigned to Category 1 – exempt lands has been assessed using methodology provided in Section 2.5. In accordance with section 6.8 (3) of the BC Act, the BAM excludes the assessment of impacts on Category 1-exempt land within the meaning of Part 5A of the LLS Act, other than any impacts prescribed by the regulations under section 6.3. An overview of Category 1 – exempt lands And Category 2 which are not excluded) is provided in Table 3.1 with a visual description in Figure 3.1.

Table 3.1 Overview of Category 1 -exempt lands within the project site

Land classification	Area within the project site (ha)
Category 1 – exempt lands	32
Category 2 – Vulnerable Regulated Land	563
Native vegetation	26,725
Total	**27,320**



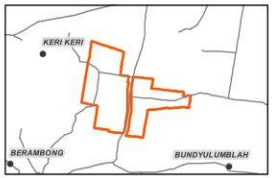
wsp

Tchelery Wind Farm

Figure 6.1
Overview of Category 1 and Category 2 lands within project site

Legend

- Watercourse
- Roads
- Transmission Line
- Project Site
- Category 1 - Exempt Land
- Category 2 - Vulnerable Regulated Land



Coordinate system: GDA 1994 MGA Zone 55

Scale ratio correct when printed at A4

1:150,000 Date: 21/04/2023

Data sources: Atlas Bionet, Geoscience Australia

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3.1.2 Native vegetation

The project site has been identified to traverse a range of native vegetation types including six broad NSW vegetation formations, being:

- Arid Shrublands (Chenopod sub-formation)
- Freshwater Wetlands
- Grasslands
- Saline Wetlands
- Semi-arid Woodlands (Grassy sub-formation)
- Semi-arid Woodlands (Shrubby sub-formation).

Based on desktop assessment and preliminary field surveys undertaken by WSP, these six vegetation formations are identified to contain a total of 23 native PCTs. An overview of each PCT, its associated vegetation formation, class, threat status and estimated historical percentage cleared and extent within the project site is presented in Table 3.2. The percentage cleared is a reference to the estimated percentage of clearing of PCTs across NSW and is recorded on NSW BioNet Vegetation Classification system. This clearing extent is used by the BAM to determine like-for-like credits within the NSW Biodiversity Offset Scheme.

3.1.2.1 Plant community types

Based on field verified vegetation mapping 16 native PCTs were identified to potentially occur within the project site:

- PCT 16 – Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion).
- PCT 17 – Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion).
- PCT 22 – Semi-arid shrubby Buloke – Slender Cypress Pine woodland, far south-western NSW.
- PCT 23 – Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones.
- PCT 24 – Canegrass swamp tall grassland wetland of drainage depressions, lakes and pans of the inland plains.
- PCT 26 – Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion.
- PCT 28 – White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zones.
- PCT 58 – Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion.
- PCT 153 – Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones.
- PCT 157 – Bladder Saltbush shrubland on alluvial plains in the semi-arid (warm) zone including Riverina Bioregion.
- PCT 159 – Old Man Saltbush shrubland mainly of the semi-arid (warm) climate zone (south western NSW).
- PCT 160 – Nitre Goosefoot shrubland wetland on clays of the inland floodplains.
- PCT 163 – Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones.
- PCT 164 – Cotton Bush open shrubland of the semi-arid (warm) zone.
- PCT 166 – Disturbed annual saltbush forbland on clay plains and inundation zones mainly of south-western NSW.
- PCT 236 – Derived Giant Redburr low shrubland on alluvial plains of the semi-arid (warm) climate zone.

Additional seven native PCTs were identified to occur by the State Vegetation Type Mapping (SVTM) in areas not subject to field verification, being:

- PCT 13 – Black Box – Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion).
- PCT 15 – Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion).
- PCT 19 – Cypress Pine woodland of source-bordering dunes mainly on the Murray and Murrumbidgee River floodplainsPCT 44 – Forb-rich Speargrass – Windmill Grass – White Top grassland of the Riverina Bioregion.
- PCT 46 – Curly Windmill Grass – Speargrass – wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion.
- PCT 57 – Belah/Black Oak – Western Rosewood – Wilga woodland of central NSW including the Cobar Peneplain Bioregion.
- PCT 181 – Common Reed – Bushy Groundsel aquatic tall reedland grassland wetland of inland river systems.

The occurrence for each PCT is provided in Table 3.2. A visual representation of each PCT within the proposed disturbance area is provided in Figure 3.2.

Table 3.2 Overview of native plant community types within the biodiversity study area

Vegetation class	PCT ID and name	Condition	BC Act	EPBC Act	SAII	% cleared	Extent mapped within proposed disturbance area (ha)	Extent mapped within the project site (ha)
Arid Shrublands (Chenopod sub-formation)								
Aeolian Chenopod Shrublands	PCT 153 – Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones	Moderate-good	Not listed	Not listed	No	40%	36.14	36.14
		SVTM					0	80.17
Riverine Chenopod Shrublands	PCT 157 – Bladder Saltbush shrubland on alluvial plains in the semi-arid (warm) zone including Riverina Bioregion	Moderate-good	Not listed	Not listed	No	60%	154.22	154.22
		SVTM	Not listed	Not listed	No	60%	0.01	6441.20
	PCT 159 – Old Man Saltbush shrubland mainly of the semi-arid (warm) climate zone (south western NSW)	Derived	Not listed	Not listed	No	92%	2.87	2.87
	PCT 163 – Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones	Moderate-good	Not listed	Not listed	No	26%	166.78	166.78
		SVTM					0	21.75
	PCT 164 – Cotton Bush open shrubland of the semi-arid (warm) zone	Moderate-good	Not listed	Not listed	No	8%	162.75	0
		SVTM					0	8490.24
	PCT 236 – Derived Giant Redburr low shrubland on alluvial plains of the semi-arid (warm) climate zone	Moderate-good	Not listed	Not listed	No	0%	13.11	13.11
		SVTM					0	74.04
Freshwater Wetlands								
Inland Floodplain Shrublands	PCT 17 – Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Moderate-good	Not listed	Not listed	No	63%	2.75	2.75
		SVTM					0	124.17
	PCT 24 – Canegrass swamp tall grassland wetland of drainage depressions, lakes and pans of the inland plains	Moderate-good	Not listed	Not listed	No	20%	2.32	2.32
		SVTM					0	88.60
	PCT 160 – Nitre Goosefoot shrubland wetland on clays of the inland floodplains	Moderate-good	Not listed	Not listed	No	28%	7.16	7.16
		SVTM					0	36.72

Vegetation class	PCT ID and name	Condition	BC Act	EPBC Act	SAII	% cleared	Extent mapped within proposed disturbance area (ha)	Extent mapped within the project site (ha)
Inland Floodplain Wetlands	PCT 181 – Common Reed – Bushy Groundsel aquatic tall reedland grassland wetland of inland river systems	SVTM	Not listed	Not listed	No	33%	0	0.28
Grasslands								
Riverine Plain Grasslands	PCT 44 - Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion	SVTM	Not listed	Critically endangered[7]	No	73%	0.77	158.97
	PCT 46 – Curly Windmill Grass – speargrass – wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion	SVTM	Not listed	Critically endangered[7]	No	20%	0	3208.98
Saline Wetlands								
Inland Saline Lakes	PCT 166 – Disturbed annual saltbush forbland on clay plains and inundation zones mainly of south-western NSW	Moderate-good	Not listed	Not listed	No	34%	0.20	0.20
		SVTM	Not listed	Not listed	No	34%	5.56	2610.87
Semi-arid Woodlands (Grassy sub-formation)								
Inland Floodplain Woodlands	PCT 13 – Black Box - Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	SVTM	Not listed	Not listed	No	57%	0	21.47
	PCT 15 – Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	SVTM	Not listed	Not listed	No	50%	0	927.43
	PCT 16 – Black Box grassy open woodland wetland of rarely flooded depressions in South Western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	SVTM	Not listed	Not listed	No	50%	0.08	1.82
		Moderate-good	Not listed	Not listed	No	50%	1.82	0.46
Riverine Plain Woodlands	PCT 26 – Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Poor	Endangered[1]	Not listed	No	90%	1.52	1.52

Vegetation class	PCT ID and name	Condition	BC Act	EPBC Act	SAII	% cleared	Extent mapped within proposed disturbance area (ha)	Extent mapped within the project site (ha)
Semi-arid Woodlands (Shrubby sub-formation)								
Riverine Sandhill Woodlands	PCT 19 – Cypress Pine woodland of source-bordering dunes mainly on the Murray and Murrumbidgee River floodplains	SVTM	Endangered[6]	Not listed	No	70%	0	698.03
	PCT 22 – Semi-arid shrubby Buloke - Slender Cypress Pine woodland, far south-western NSW	Moderate-good	Endangered[3]	Endangered[4]	Yes	70%	0.16	0.16
	PCT 23 – Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones	Moderate-good	Endangered[5]	Not listed	No	71%	3.75	3.75
		Moderate	Endangered[5]	Not listed	No	71%	19.38	19.38
		Derived	Not listed	Not listed	No	71%	24.02	24.02
	PCT 28 – White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone	Moderate-good	Endangered[5]	Not listed	No	73%	1.07	1.07
		Moderate	Endangered[5]	Not listed	No	73%	0.76	0.76
		Derived	Endangered[5]	Not listed	No	73%	7.20	7.20
		SVTM	Endangered[5]	Not listed	No	73%	5.34	1457.74
Semi-arid Sand Plain Woodlands	PCT 57 – Belah/Black Oak – Western Rosewood – Wilga woodland of central NSW including the Cobar Peneplain Bioregion	SVTM	Endangered[8]	Not listed	No	43%	0	6.60
	PCT 58 – Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion	Moderate-good	Not listed	Not listed	No	50%	2.86	2.86
		Moderate	Not listed	Not listed	No	50%	0.81	0.81
Total							**642.96**	**24896.62**

(1) Myall woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray – Darling Depression, Riverina and NSW South Western Slopes bioregions – listed as Endangered under the BC Act

(2) Weeping Myall Woodlands – listed as Endangered under the EPBC Act

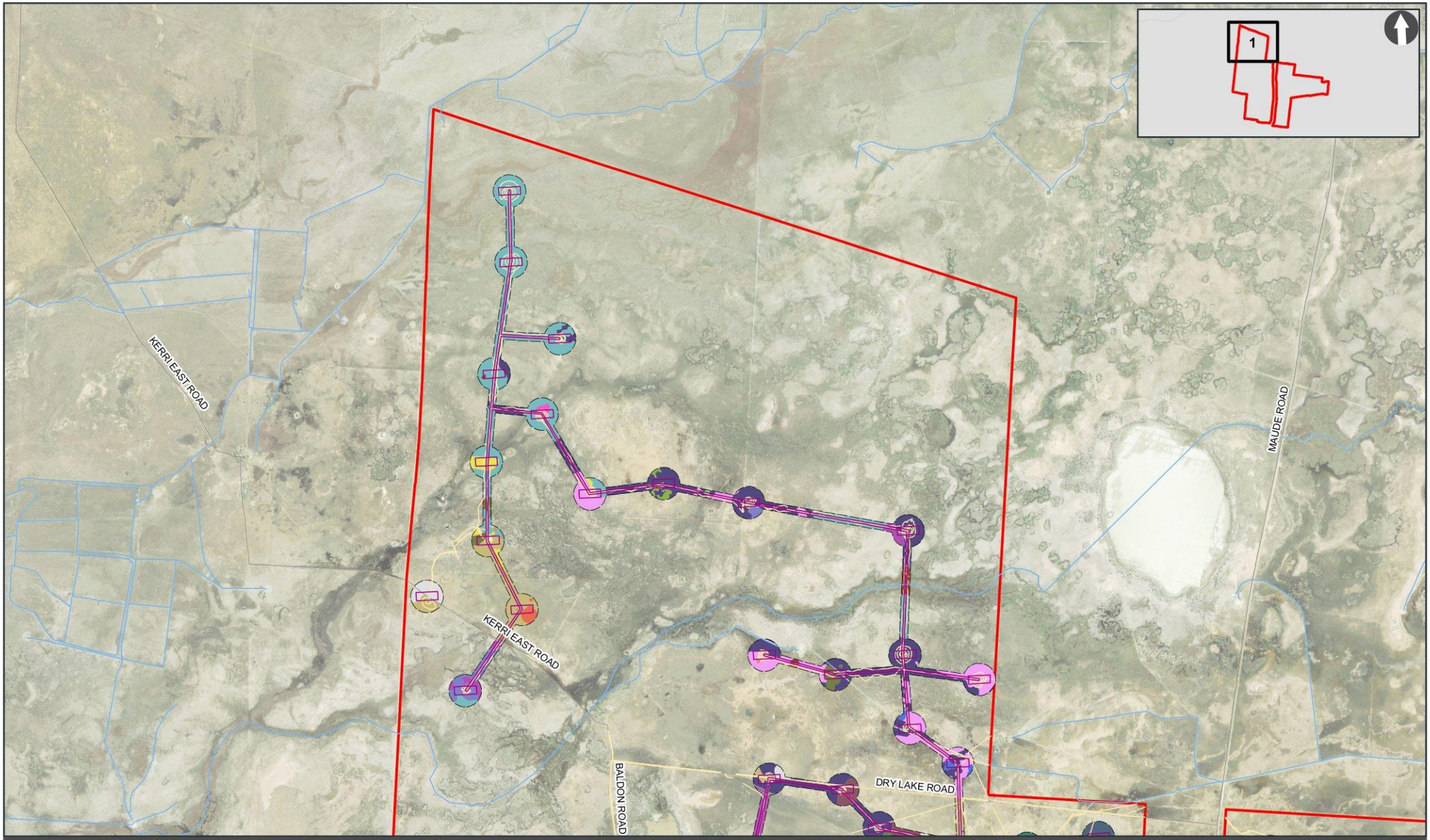
(3) *Allocasuarina luehmannii* Woodland in the Riverina and Murray-Darling Depression Bioregions – listed as Endangered under the BC Act

(4) Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions – listed as Endangered under the EPBC Act

(5) *Acacia melvillei* shrubland in the Riverina and Murray Darling Depression bioregions – Endangered under the BC Act

(6) Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions – Endangered under the BC Act

(7) Natural Grasslands of the Murray Valley Plains – listed as Critically endangered under the EPBC Act.



Plant Community Types / Condition

- Survey Tracks
- Watercourse
- Roads
- Biodiversity Study Area
- Disturbance Area
- Project site

- Miscellaneous/exotic
- PCT153 - Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones, Mod-good
- PCT157 - Bladder Saltbush shrubland on alluvial plains in the semi-arid (warm) zone including Riverina Bioregion, Mod-good
- PCT159 - Old Man Saltbush shrubland mainly of the semi-arid (warm) climate zone (south western NSW), Derived
- PCT16 - Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion), Mod-good
- PCT160 - Nitre Goosefoot shrubland wetland on clays of the inland floodplains, Mod-good
- PCT163 - Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones, Mod-good
- PCT164 - Cotton Bush open shrubland of the semi-arid (warm) zone, Mod-good
- PCT166 - Disturbed annual saltbush forbland on clay plains and inundation zones mainly of south-western NSW, Mod-good
- PCT17 - Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion), Mod-good
- PCT22 - Semi-arid shrubby Buloke - Slender Cypress Pine woodland, far south-western NSW, Mod-good
- PCT23 - Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones, Derived
- PCT23 - Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones, Mod-good
- PCT23 - Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones, Moderate
- PCT24 - Canegrass swamp tall grassland wetland of drainage depressions, lakes and pans of the inland plains, Mod-good
- PCT26 - Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion, Moderate
- PCT26 - Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion, Poor
- PCT28 - White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone, Derived
- PCT28 - White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone, Mod-good
- PCT58 - Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion, Mod-good
- PCT58 - Black Oak - Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion, Moderate

Native Vegetation Mapping of Plant Community Types and Zones

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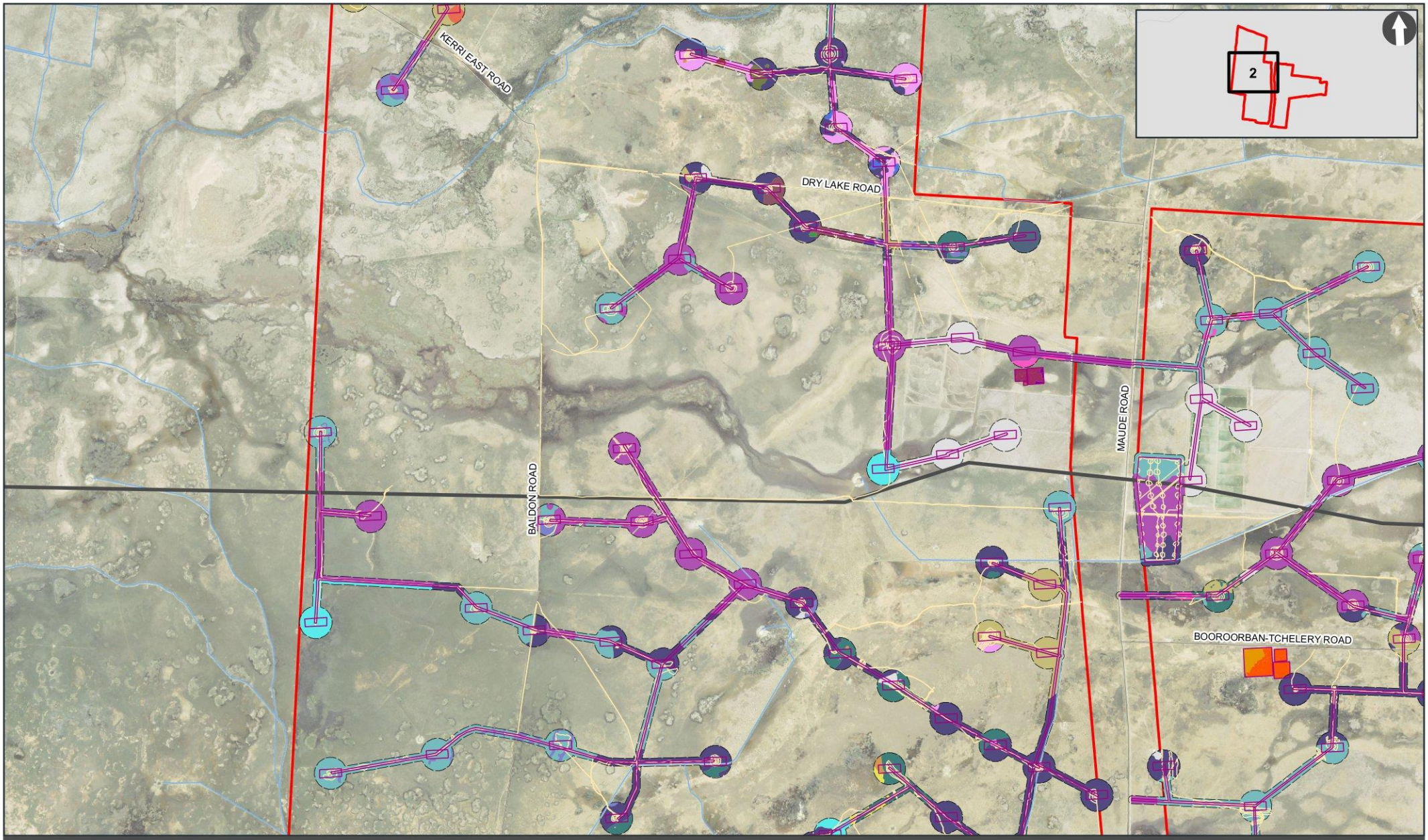
Source: NSWSS, ESRI, Transgrid, WSP



Native Vegetation Mapping of Plant Community Types and Zones

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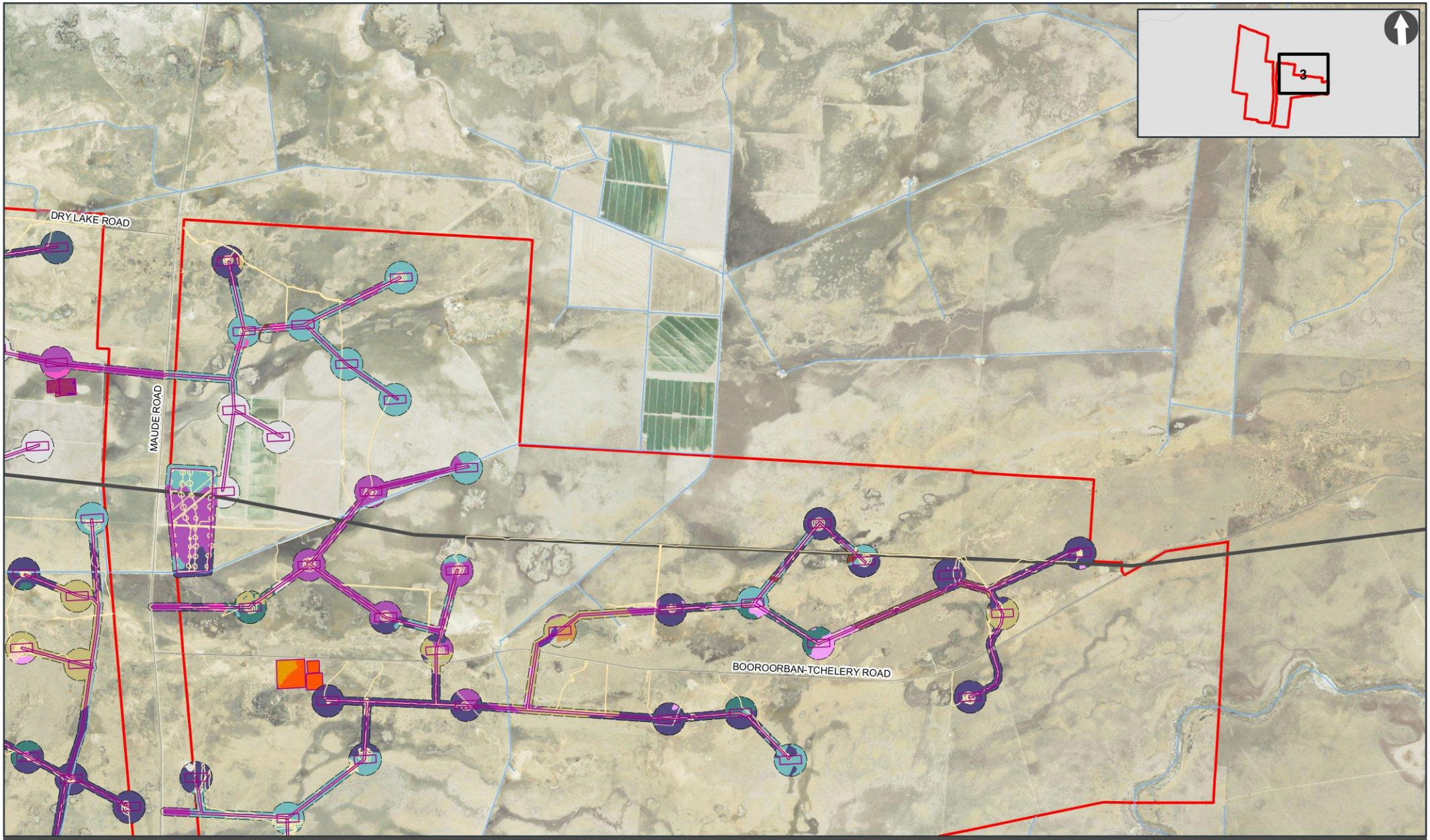

Transmission Line
Survey Tracks
Watercourse
Roads
Biodiversity Study Area
Disturbance Area
Project site

Plant Community Types / Condition

Miscellaneous/exotic
PCT153 - Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones, Mod-good
PCT157 - Bladder Saltbush shrubland on alluvial plains in the semi-arid (warm) zone including Riverina Bioregion, Mod-good
PCT159 - Old Man Saltbush shrubland mainly of the semi-arid (warm) climate zone (south western NSW), Derived
PCT16 - Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion), Mod-good
PCT163 - Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones, Mod-good
PCT164 - Cotton Bush open shrubland of the semi-arid (warm) zone, Mod-good
PCT17 - Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion), Mod-good
PCT23 - Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones, Derived
PCT23 - Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones, Moderate
PCT24 - Canegrass swamp tall grassland wetland of drainage depressions, lakes and pans of the inland plains, Mod-good
PCT26 - Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion, Poor
PCT28 - White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone, Derived
PCT28 - White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone, Moderate

State Vegetation Mapping

Miscellaneous/exotic, SVTM
PCT15 - Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion), SVTM
PCT164 - Cotton Bush open shrubland of the semi-arid (warm) zone, SVTM
PCT166 - Disturbed annual saltbush forbland on clay plains and inundation zones mainly of south-western NSW, SVTM
PCT28 - White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone, SVTM
PCT44 - Forb-rich Speargrass - Windmill Grass - White Top grassland of the Riverina Bioregion, SVTM

Native Vegetation Mapping of Plant Community Types and Zones

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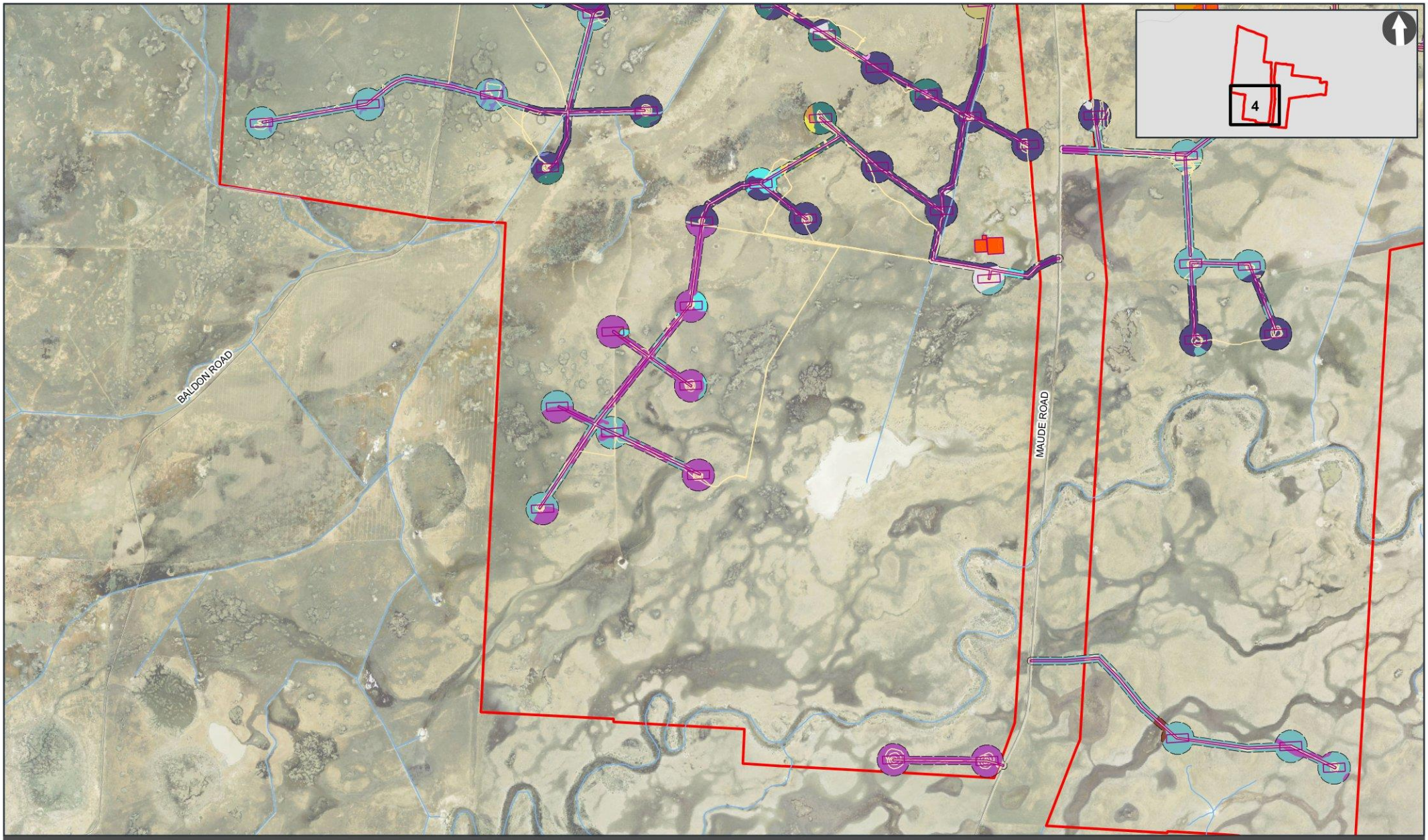
Source: NSWSS, ESRI, Transgrid, WSP



Survey Tracks
Watercourse
Roads
Biodiversity Study Area
Disturbance Area
Project site

Plant Community Types / Condition

Miscellaneous/exotic
PCT153 - Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones, Mod-good
PCT157 - Bladder Saltbush shrubland on alluvial plains in the semi-arid (warm) zone including Riverina Bioregion, Mod-good
PCT16 - Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion), Mod-good
PCT160 - Nitre Goosefoot shrubland wetland on clays of the inland floodplains, Mod-good
PCT163 - Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones, Mod-good
PCT164 - Cotton Bush open shrubland of the semi-arid (warm) zone, Mod-good
PCT17 - Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion), Mod-good
PCT23 - Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones, Derived
PCT23 - Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones, Moderate
PCT236 - Derived Giant Redburr low shrubland on alluvial plains of the semi-arid (warm) climate zone, Mod-good

State Vegetation Mapping

PCT15 - Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion), SVTM
PCT157 - Bladder Saltbush shrubland on alluvial plains in the semi-arid (warm) zone including Riverina Bioregion, SVTM
PCT164 - Cotton Bush open shrubland of the semi-arid (warm) zone, SVTM
PCT28 - White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone, SVTM

Native Vegetation Mapping of Plant Community Types and Zones

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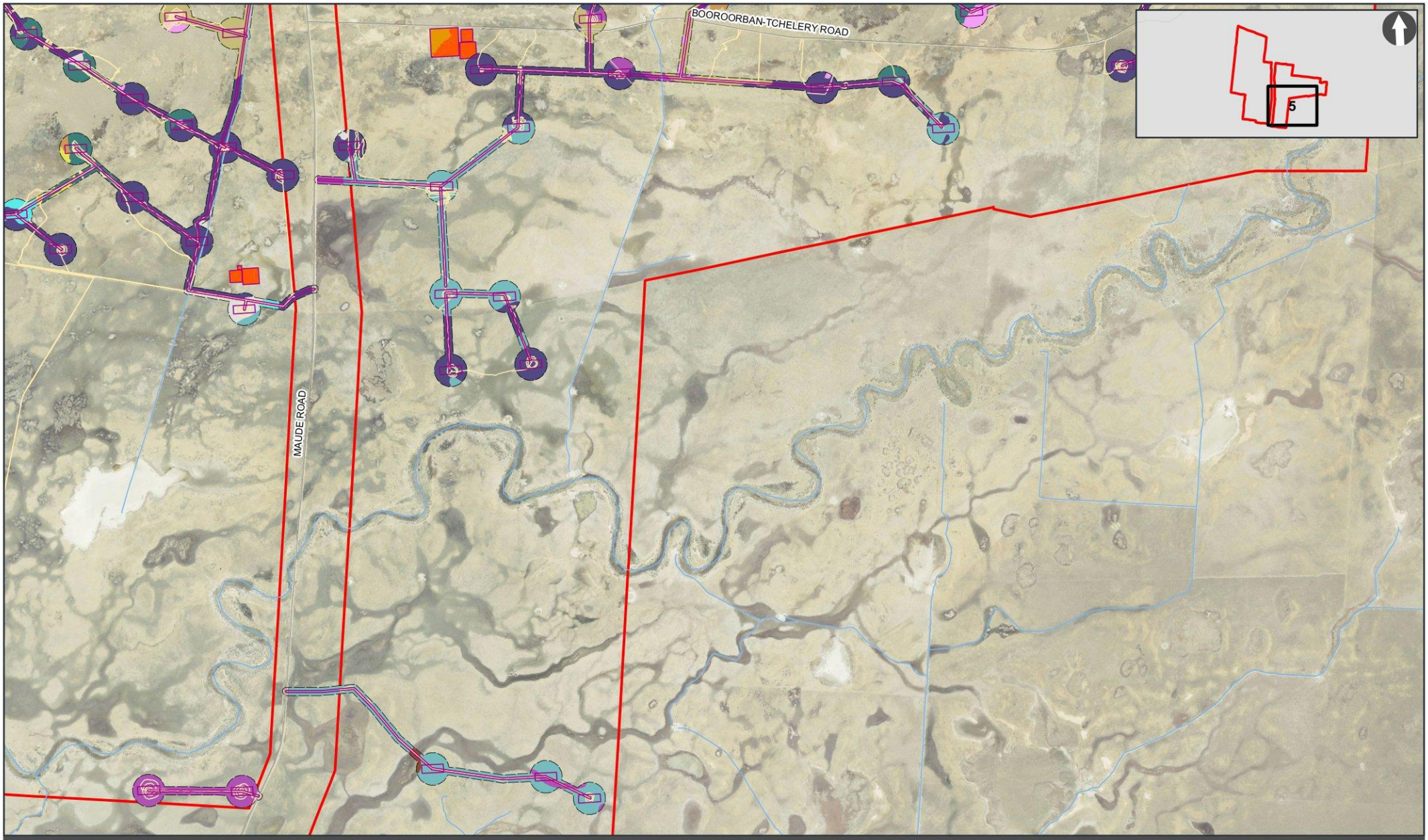
Source: NSWSS, ESRI, Transgrid, WSP



Survey Tracks
Watercourse
Roads
Biodiversity Study Area
Disturbance Area
Project site

Plant Community Types / Condition

Miscellaneous/exotic
PCT153 - Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones, Mod-good
PCT157 - Bladder Saltbush shrubland on alluvial plains in the semi-arid (warm) zone including Riverina Bioregion, Mod-good
PCT16 - Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion), Mod-good
PCT160 - Nitre Goosefoot shrubland wetland on clays of the inland floodplains, Mod-good
PCT163 - Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones, Mod-good
PCT164 - Cotton Bush open shrubland of the semi-arid (warm) zone, Mod-good
PCT17 - Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion), Mod-good
PCT23 - Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones, Derived
PCT23 - Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones, Moderate
PCT236 - Derived Giant Redburr low shrubland on alluvial plains of the semi-arid (warm) climate zone, Mod-good
PCT26 - Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion, Poor

State Vegetation Mapping

PCT15 - Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion), SVTM
PCT157 - Bladder Saltbush shrubland on alluvial plains in the semi-arid (warm) zone including Riverina Bioregion, SVTM
PCT164 - Cotton Bush open shrubland of the semi-arid (warm) zone, SVTM
PCT28 - White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone, SVTM

Native Vegetation Mapping of Plant Community Types and Zones

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Source: NSWSS, ESRI, Transgrid, WSP

3.1.2.2 Threatened ecological communities – BC Act

A total of four Threatened Ecological Communities (TEC's) listed under the BC Act have been identified to occur within the project site based on their alliance to native vegetation recorded either through broad scale mapping or field verification, geographic distribution and determinants provided in the final determinations or listing advice for each TEC. These four communities are considered candidate TEC's and include:

- *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregions – Endangered
- *Allocasuarina luehmannii* Woodland in the Riverina and Murray-Darling Depression Bioregions – Endangered (SAII)
- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South-Western Slopes bioregions – Endangered
- Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South-Western Slopes bioregions – Endangered.

An overview of each TEC, its threat status and associated PCTs is presented below. Further detailed field surveys would be required to analyse, understand, confirm and assess the full extent of all potential and recorded TEC's within the project site.

Table 3.3 Summary of recorded threatened ecological communities within the proposed disturbance area

TEC name	Associated vegetation zones	BC Act[1]	EPBC Act[2]	SAII	Extent within study area (ha)
Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions	PCT 23 – Moderate-good PCT 23 – Moderate	E	Not listed	No	23.13
Allocasuarina luehmannii Woodland in the Riverina and Murray-Darling Depression Bioregions	PCT 22 – Moderate-good	E	E	Yes	0.16
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South-Western Slopes bioregions	PCT 26 – Poor	E	E	No	1.52
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South-Western Slopes bioregions	PCT 28 – Moderate-good PCT 28 – Moderate PCT 28 – Derived PCT 28 – SVTM	E	Not listed	No	14.37

(1) *Biodiversity Conservation Act 2016* (BC Act) – (E) Endangered

(2) *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) – (E) – Endangered

3.2 Habitat suitability for threatened species – BC Act

3.2.1 Identification of threatened species for assessment

In the BAM, threatened species are assessed as either ecosystem credit species, species credit species or a combination of the two (referred to as 'dual credit species'). The BAM defines these threatened species categories as follows:

- **ecosystem credit species** (predicted): are those threatened species where the likelihood of occurrence and/or elements of its habitat can be confidently predicted by vegetation surrogates and landscape features
- **species credit species** (candidate): are those threatened species that cannot be reliably predicted by habitat surrogates
- **dual credit species** are those threatened species where part of the habitat is assessed as an ecosystem credit (e.g. foraging habitat) and part as a species credit (e.g. breeding habitat). In this report, dual credit species would be included in both ecosystem and species credit assessment.

3.2.1.1 Ecosystem credit species

Database searches have identified 36 threatened ecosystem credit fauna species that are predicted or known to occur within the locality of the project. The results of likelihood of occurrence assessments identified that 15 threatened ecosystem credit fauna species (including those that occur as dual credit species) have a moderate or higher likelihood of occurrence within the project site (see Appendix B for further detail). A summary of ecosystem fauna species likely to occur within the project site is provided in Table 3.4.

Table 3.4 List of BAM-C generated ecosystem credit species with a moderate or higher likelihood of occurrence

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII	Associated native vegetation and PCTs
Birds					
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	–	No	PCTs 16, 17, 24, 28, 58, 153, 157, 160, 163, 164, 166 & 236
Circus assimilis	Spotted Harrier	V	–	–	PCTs 16, 17, 24, 28, 58, 153, 157, 160, 163, 164, 166 & 236
Epthianura albifrons	White-fronted Chat	V	–	–	PCTs 17, 24, 153, 157, 160, 163, 164, 166 & 236
Falco hypoleucos	Grey Falcon	E	–	–	PCTs 16, 17, 24, 28, 58, 153, 157, 160, 163, 164, 166 & 236
Falco subniger	Black Falcon	V	–	No	PCTs 16, 17, 24, 28, 58, 153, 157, 160, 163, 164, 166 & 236
Grus rubicunda	Brolga	V	–	No	PCTs 16, 17, 24, 160, 163 & 166
Haliaeetus leucogaster	White-bellied Sea Eagle	V	–	No	PCTs 16, 17, 24, 28, 58, 153, 157, 160, 163, 164, 166 & 236
Hieraaetus morphnoides	Little Eagle	V	–	No	PCTs 16, 17, 24, 28, 58, 153, 157, 160, 163, 164, 166 & 236
Hirundapus caudacutus	White-throated Needletail	–	V, M	No	PCTs 16, 17, 24, 157 & 160

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII	Associated native vegetation and PCTs
Lophochroa leadbeateri	Major Mitchell's Cockatoo	V	–	–	PCTs 16, 28, 58, 153, 163 & 166
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V	–	No	PCTs 16, 28 & 58
Pedionomus torquatus	Plains-wanderer	E	CE	Yes	No associated PCTs recorded in the project site however the species is known to occur to the west in Yanga National Park.
Pomatostomus temporalis temporalis	Grey-crowned Babbler (Eastern subspecies)	V	–	–	PCT 16, 28 & 58
Polytelis swainsonii	Superb Parrot	V	V	No	PCT 28
Mammals					
Saccolaimus flaviventris	Yellow-bellied Sheathtail Bat	V	–	No	PCTs 16, 17, 24, 28, 58 & 160

(1) Listed under the *Biodiversity and Conservation Act 2016*: E = Endangered, V = Vulnerable

(2) Listed under the *Environmental Protection and Biodiversity Conservation Act 1999*: CE = Critically Endangered, E = Endangered, V = Vulnerable, M = Migratory

(3) SAII= Serious and Irreversible Impact

3.2.1.2 Species credit species

Candidate threatened flora species credit species generated from BAM-C and database searches

Database searches have identified 19 threatened flora species credit species that are predicted or known to occur within the locality of the project. The results of likelihood of occurrence assessments identified that seven threatened flora species have a moderate of higher likelihood of occurrence within the project site (see Appendix A for further detail). A summary of threatened flora species recorded or likely to occur within the project site is provided in Table 3.5 and records are visually represented in Figure 3.3.

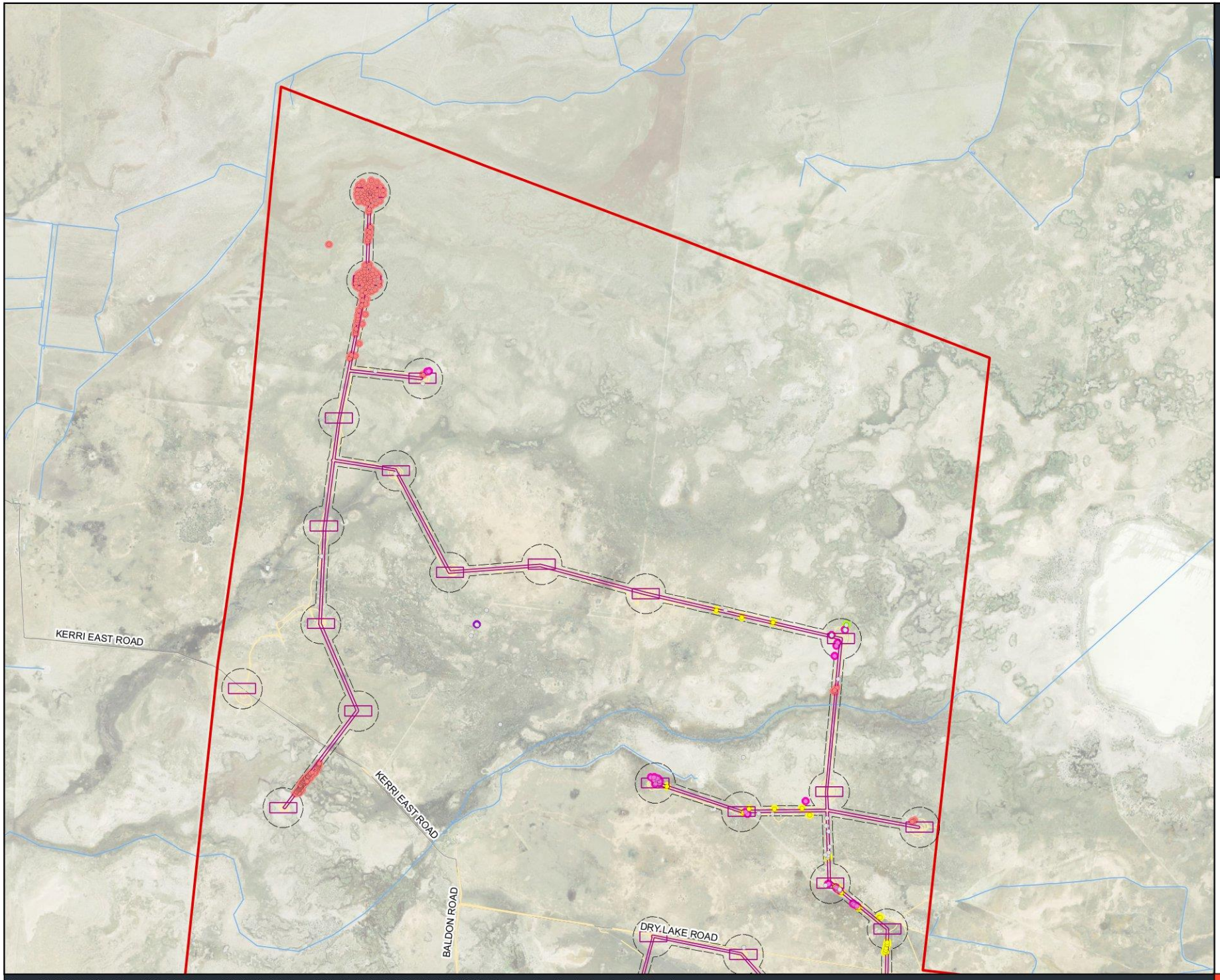
Table 3.5 Threatened flora species with a moderate or higher likelihood of occurrence

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Associated native vegetation and PCTs	Survey months
Brachyscome papillosa	Mossgiel Daisy	V	V	No	PCTs 16, 24, 153, 157, 160, 163 & 164.	Sep-Nov
Eleocharis obicis	Spike-Rush	V	V	No	PCTs 16, 17, 24, 157, 160, 163, 164 & 236. Includes periodically waterlogged man-made sites such as table drains and farm dams.	Oct-Nov
Eucalyptus leucoxylon subsp. *pruinosa*	Yellow Gum	V	–	No	PCT 16.	All year
Lepidium monoplocoides	Winged Pepper-cress	E	E	No	PCT 16, 24, 46, 153, 160 &163.	Sept-Dec
Leptorhynchos orientalis	Lanky Buttons	E	–	No	PCT 24.	Sept-Nov
Maireana cheelii	Chariot Wheels	V	V	No	PCT 157 & 164.	Sept-Dec
Swainsona murrayana	Slender Darling-pea	V	V	No	PCT 16, 28, 157& 164.	Sept

(1) Listed under the *Biodiversity and Conservation Act 2016*: E = Endangered, V = Vulnerable

(2) Listed under the *Environmental Protection and Biodiversity Conservation Act 1999*: E = Endangered; v = Vulnerable

(3) SAII= Serious and Irreversible Impact



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Tchelery Wind Farm

Figure 3.3
Threatened flora species within the project site

Legend

- Watercourse
- Roads
- Survey Tracks
- Biodiversity Study Area
- Disturbance Area
- Project Site

Assumed Flora Threatened Species

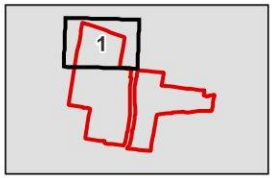
- Gilgai

Threatened Flora Species

- *Brachyscome papillosa*
- *Eleocharis obicis*
- *Lepidium monoplocoides*
- *Maireana cheelii*
- *Pilularia novae-hollandiae*

Threatened Species Polygon (30m buffer)

- *Brachyscome papillosa*
- *Eleocharis obicis*
- *Lepidium monoplocoides*
- *Maireana cheelii*
- *Pilularia novae-hollandiae*



0 0.75 1.5
Kilometers

Coordinate system: GDA 1994 MGA Zone 55

Scale ratio correct when printed at A4

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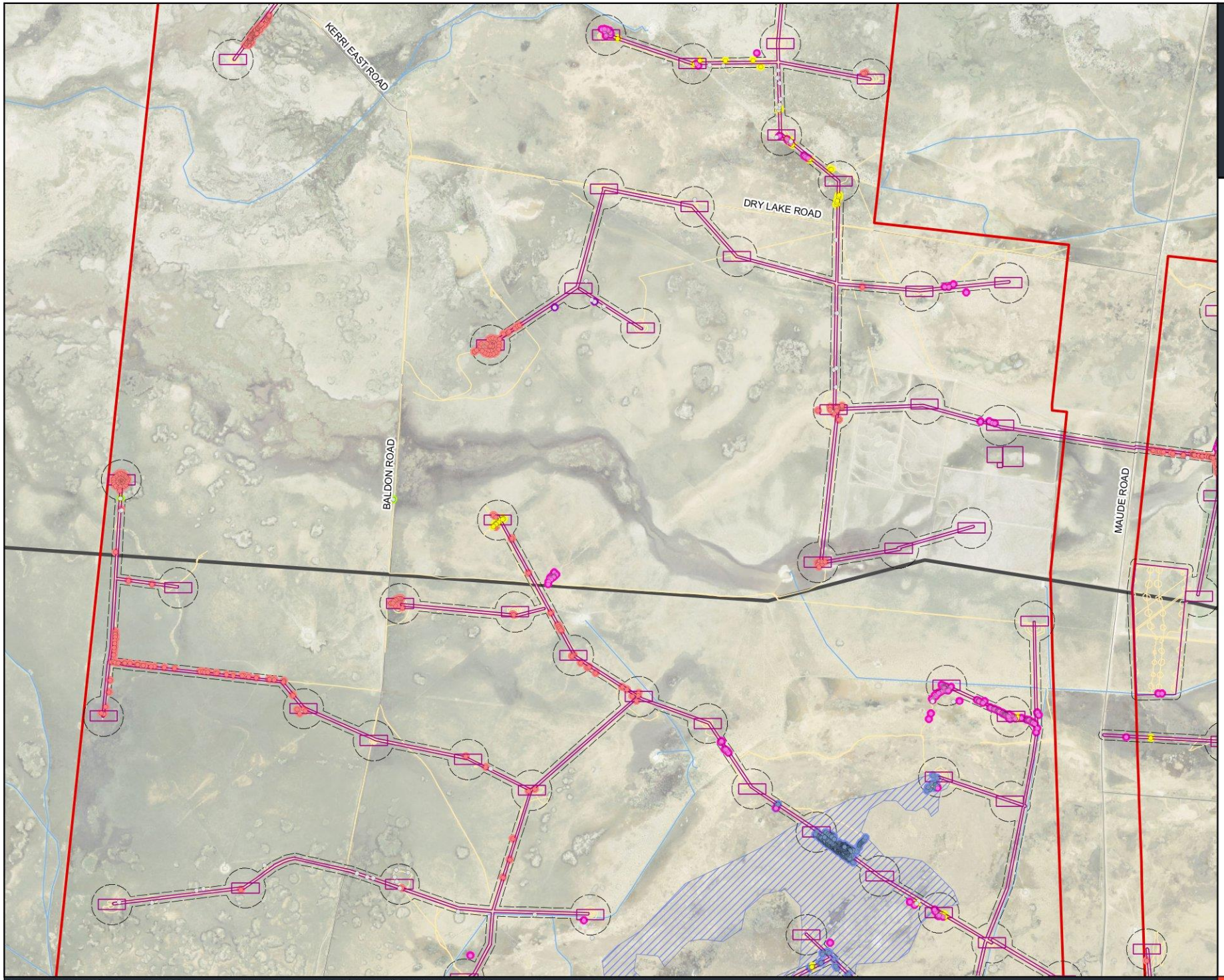

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Tchelery Wind Farm

Figure 3.3
Threatened flora species within the project site

Legend

- Watercourse
- Roads
- Survey Tracks
- Transmission Line
- Biodiversity Study Area
- Disturbance Area
- Project Site

Assumed Flora Threatened Species

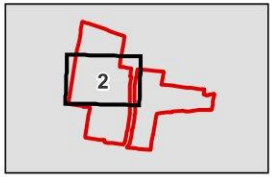
- Gilgai

Threatened Flora Species

- *Brachyscome papillosa*
- *Calotis moorei*
- *Eleocharis obicis*
- *Lepidium monoplocoides*
- *Maireana cheelii*
- *Pilularia novae-hollandiae*

Threatened Species Polygon (30m buffer)

- *Brachyscome papillosa*
- *Calotis moorei*
- *Eleocharis obicis*
- *Lepidium monoplocoides*
- *Maireana cheelii*
- *Pilularia novae-hollandiae*
- Potential Habitat - *Calotis Moorei*



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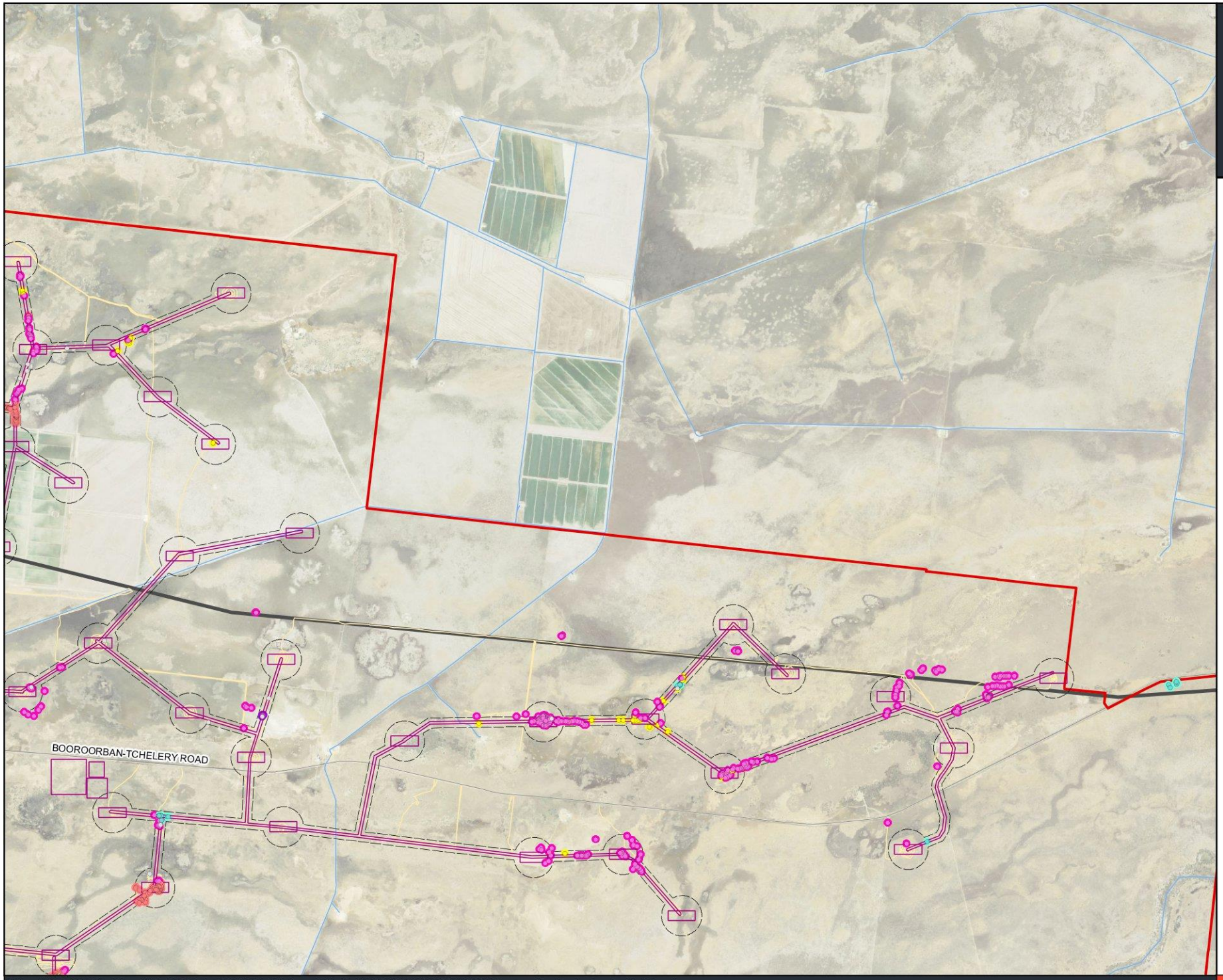

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Tchelery Wind Farm

Figure 3.3
Threatened flora species within the project site

Legend

- Watercourse
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- Survey Tracks
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Assumed Flora Threatened Species

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- *Lepidium monoplocoides*
- *Maireana cheelii*
- *Pilularia novae-hollandiae*
- *Swainsona murrayana*

Threatened Species Polygon (30m buffer)

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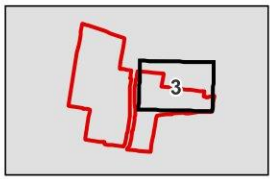
- *Eleocharis obicis*
- *Lepidium monoplocoides*
- *Maireana cheelii*
- *Pilularia novae-hollandiae*
- *Swainsona murrayana*



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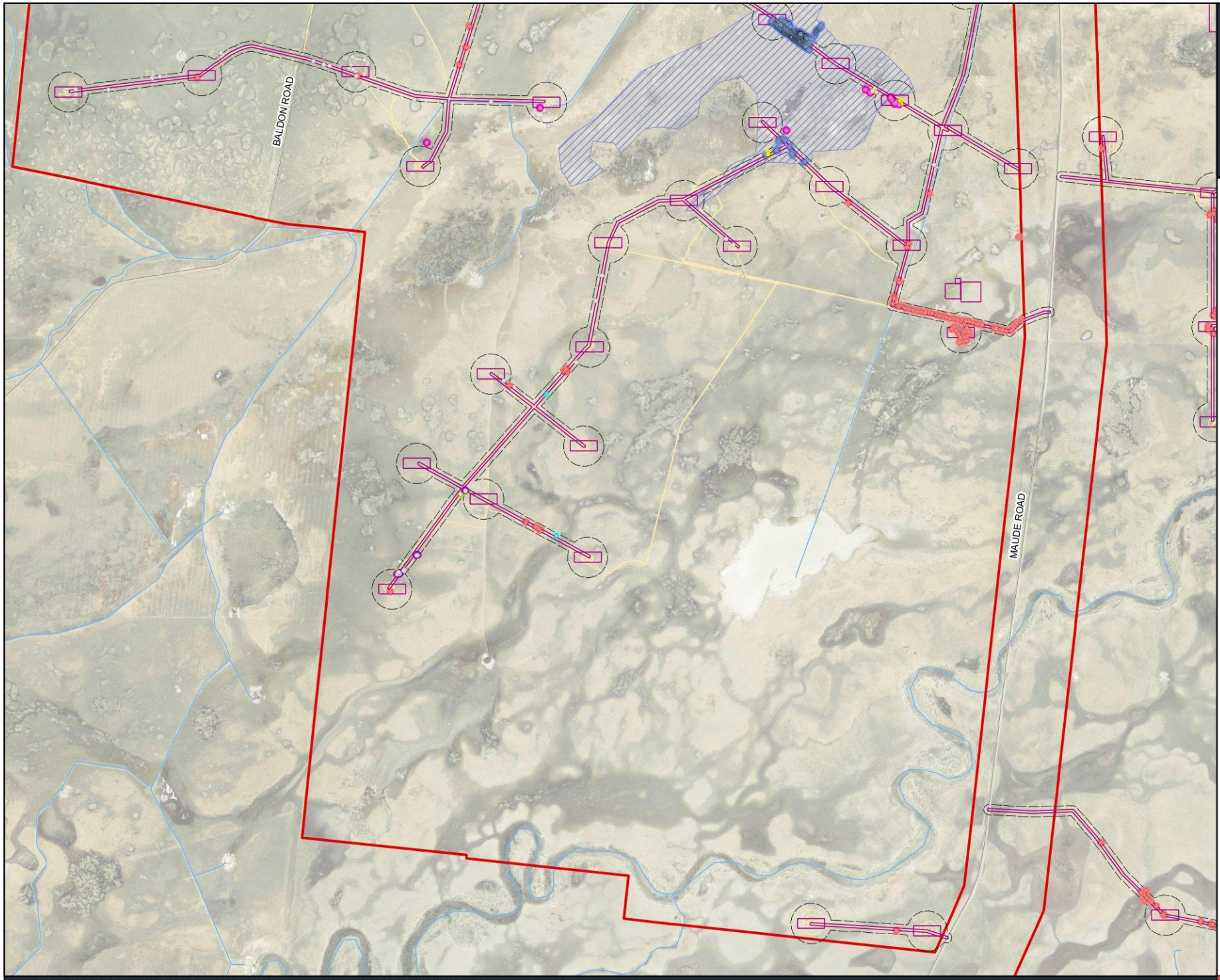

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Tchelery Wind Farm

Figure 3.3
Threatened flora species within the project site

Legend

- Watercourse
- Roads
- Survey Tracks
- Biodiversity Study Area
- Disturbance Area
- Project Site

Assumed Flora Threatened Species

- Gilgai

Threatened Flora Species

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- *Eleocharis obicis*
- *Lepidium monoplocoides*
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- *Pilularia novae-hollandiae*
- *Swainsona murrayana*

Threatened Species Polygon (30m buffer)

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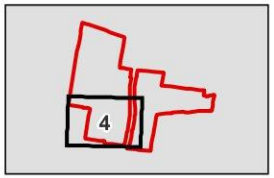
- *Calotis moorei*
- *Eleocharis obicis*
- *Lepidium monoplocoides*
- *Maireana cheelii*
- *Pilularia novae-hollandiae*
- *Swainsona murrayana*



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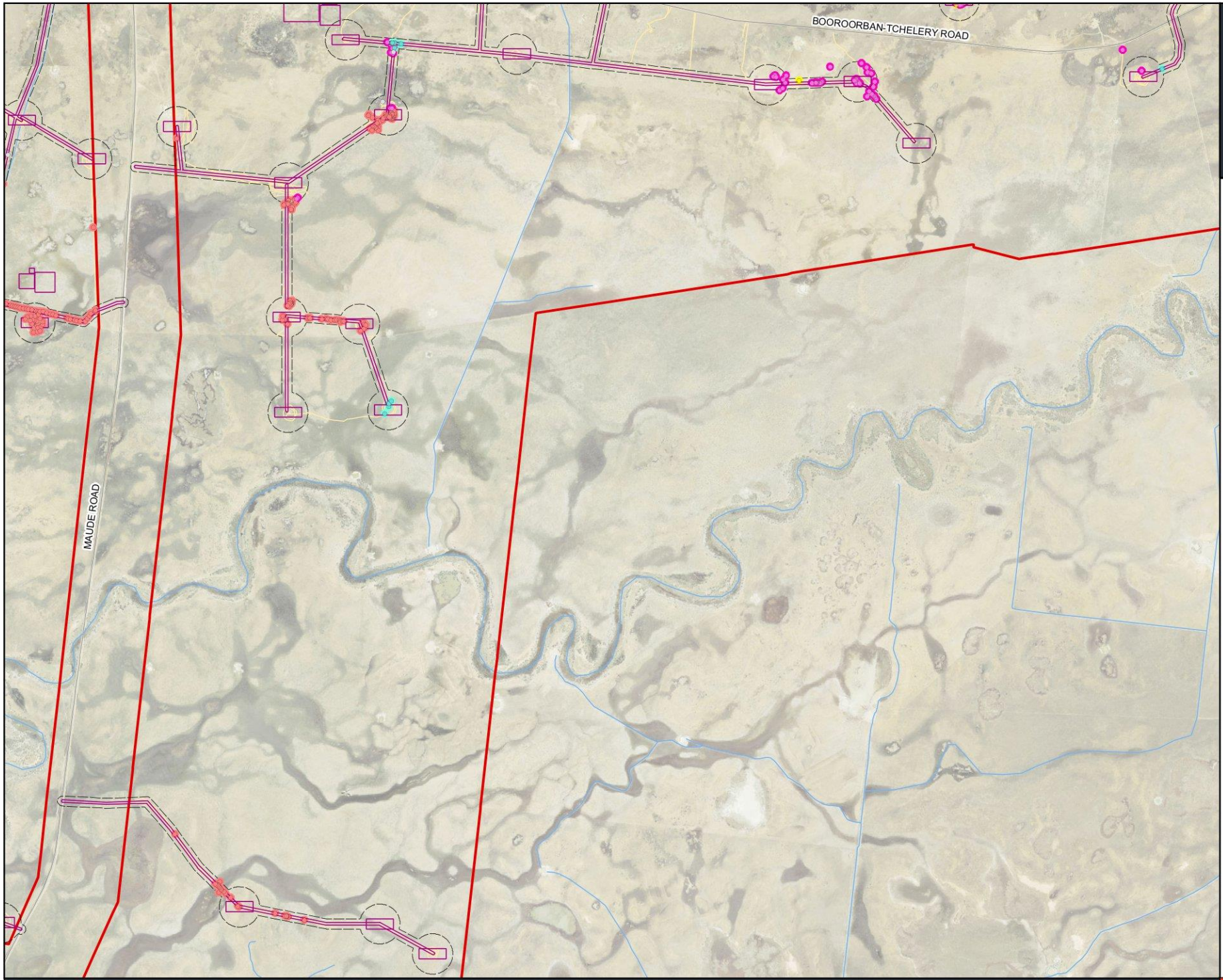

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Tchelery Wind Farm

Figure 3.3
Threatened flora species within the project site

Legend

- Watercourse
- Roads
- Survey Tracks
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- Disturbance Area
- Project Site

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Threatened Species Polygon (30m buffer)

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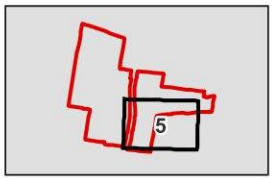

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Candidate threatened fauna species credit species generated from BAM-C and database searches

Database searches have identified 17 threatened fauna species credit species that are predicted or known to occur within the locality of the project. The results of likelihood of occurrence assessments identified that seven threatened fauna species credit species (including dual credit species) have a moderate of higher likelihood of occurrence within the project site (see Appendix B for further detail). A summary of threatened fauna species already recorded or likely to occur within the project site is provided in Table 3.6 and visually represented in Figure 3.4.

Table 3.6 Threatened fauna species with a moderate or higher likelihood of occurrence

Scientific name	Common Name	BC Act[1]	EPBC Act[2]	SAII[3]	Associated native vegetation and PCTs	Survey months
Amphibians						
Litoria raniformis	Southern Bell Frog	E	V	No	PCTs 17 & 24. Alternatively potential habitat also includes lakes, swamps and rivers.	Oct-Jan
Birds						
Burhinus grallarius	Bush Stone-curlew	E	–	No	PCT 28. Species typically associated with grassy woodlands particularly where there is adequate fallen timber.	All year
Haliaeetus leucogaster	White-bellied Sea Eagle	V	–	No	PCTs 16, 17, 24, 28, 58, 153, 157, 160, 163, 164, 166 & 236. Breeding habitat - species requires living or dead mature trees within suitable vegetation within 1 km of a river, lake, large dam or creeks, wetlands and coastlines and the presence of a large stick nest within tree canopy; or adult with nest material; or adults observed duetting within breeding period.	Jul-Dec
Hieraaetus morphnoides	Little Eagle	V	–	No	PCTs 16, 17, 24, 28, 58, 153, 157, 160, 163, 164, 166 & 236. Breeding habitat – species requires nest trees – live (occasionally dead) large old trees within suitable vegetation and the presence of a male and female; or female with nesting material; or an individual on a large stick nest in the top half of the tree canopy.	Aug-Oct
Lophochroa leadbeateri	Major Mitchell's Cockatoo	V	–	–	PCT 16, 28, 58, 153, 163 & 166. Breeding habitat – requires a living or dead tree with hollows greater than 10cm in diameter.	Sept-Dec
Pedionomus torquatus	Plains-wanderer	E	CE	Yes	As per mapped areas.	n/a

Scientific name	Common Name	BC Act[1]	EPBC Act[2]	SAII[3]	Associated native vegetation and PCTs	Survey months
Polytelis swainsonii	Superb Parrot	V	V	No	Potential habitat occurs in PCT 28. Breeding habitat – Living or dead *E. blakelyi, E. melliodora, E. albens, E. camaldulensis, E. microcarpa, E. polyanthemos, E. mannifera, E. intertexta* with hollows greater than 5 cm diameter; greater than 4 m above ground or trees with a DBH of greater than 30 cm; or two or more birds seen on site.	Sept-Nov

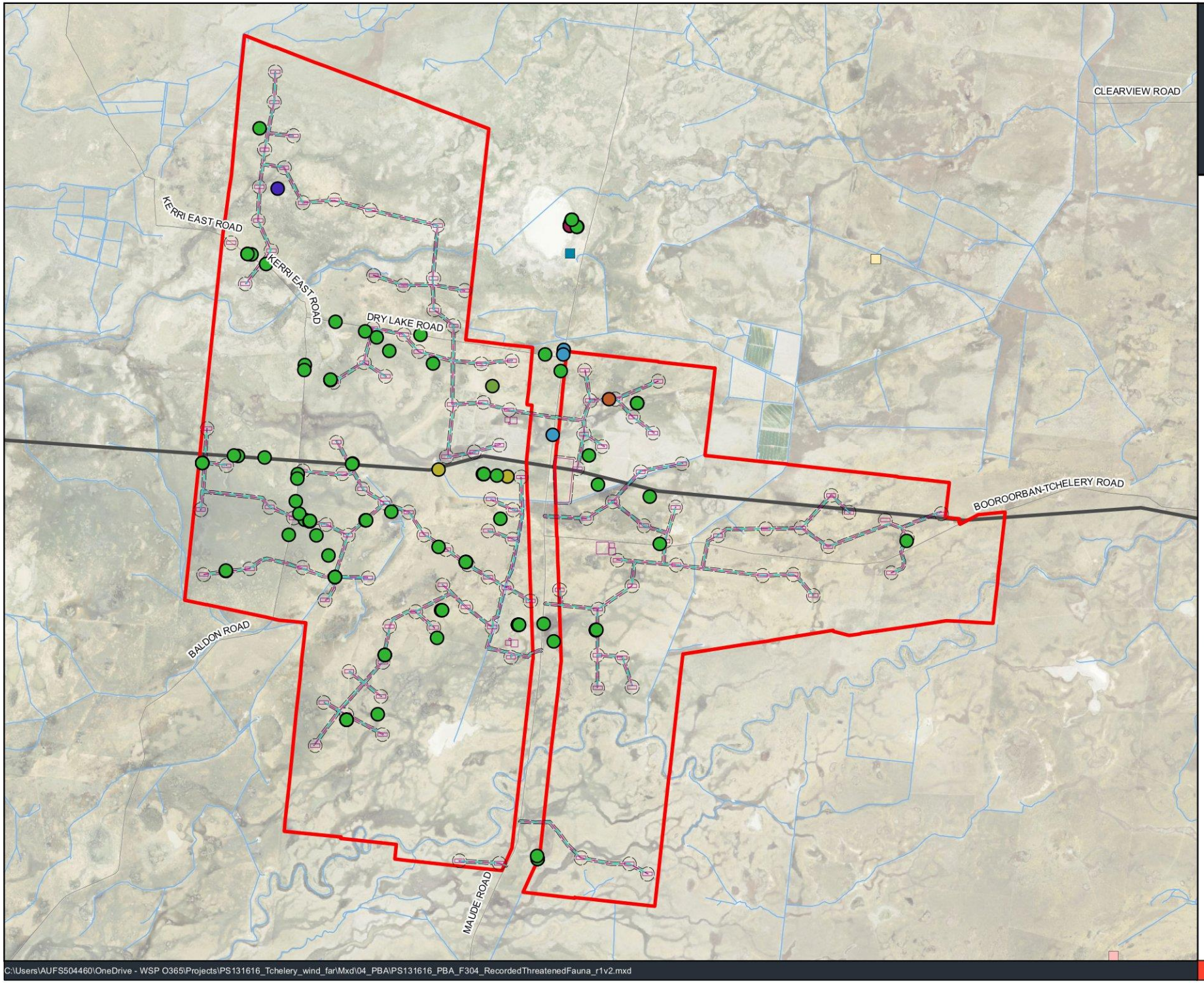
(1) Listed under the *Biodiversity and Conservation Act 2016*: E = Endangered, V = Vulnerable

(2) Listed under the *Environmental Protection and Biodiversity Conservation Act 1999*: E = Endangered; V = Vulnerable

(3) SAII= Serious and Irreversible Impact

3.2.2 Identification of prescribed impacts

Wind farms are specifically listed as a prescribed impact and further assessment would occur during BDAR and EIS stages.



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Tchelery Wind Farm

Figure 3.4
Records of threatened fauna species within the project site

Legend

Threatened Species Record (WSP 2023)

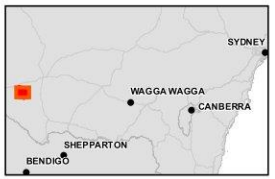
Common Name

- Black Falcon (2)
- Curlew Sandpiper (1)
- Flame Robin (1)
- Fork-tailed Swift (1)
- Major Mitchell's Cockatoo (3)
- Rainbow Bee-eater (1)
- Red-necked Stint (4)
- Sharp-tailed Sandpiper (4)
- Spotted Harrier (2)
- White-fronted Chat (98)

Threatened Species Record (Bionet 2022)

Common Name

- Grey-crowned Babbler (eastern subspecies) (1)
- Major Mitchell's Cockatoo (1)
- Plains-wanderer (1)
- Superb Parrot (1)
- Watercourse
- Roads
- Transmission Line
- Internal roads and access tracks
- Biodiversity Study Area
- Disturbance Area
- Project Site



Coordinate system: GDA 1994 MGA Zone 55

Scale ratio correct when printed at A4

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3.3 Matters of National Environmental Significance

3.3.1 Threatened ecological communities

Desktop assessment identified five threatened ecological communities listed under the EPBC Act with potential to occur within the project site. Of these two have been identified to have a moderate or higher likelihood of occurrence within the project site based on their alliance to native vegetation recorded either through broad scale State vegetation mapping (SVM) or preliminary field verification by WSP, geographic distribution and determinants provided in the final determinations or listing advice for each TEC. These two communities are considered candidate threatened ecological communities and include:

- Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions – Endangered
- Weeping Myall Woodlands – Critically Endangered.

An overview of each threatened ecological community, its threat status and associated PCTs is presented in Table 3.7. TEC's as predicted via broad scale mapping and recorded during previous field surveys can be seen in Figure 3.3. Field surveys would be required to analyse, understand, confirm and assess the full extent of all potential and recorded TEC's within the project site.

Table 3.7 Threatened ecological communities listed under the EPBC Act and associated PCTs

TEC name	EPBC Act[1]	Associated PCT[2]	Likelihood of occurrence
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	E	PCT 22 (not mapped by SVM however identified as part of preliminary field surveys within the project site)	**Recorded**. This TEC was included in the PMST and is associated with PCT 22 mapped within the project site. The project site occurs within the indicative mapped area for this TEC (Environment Australia 2003) and is within the Riverina bioregion as is required by the Listing advice for this TEC (ESSS 2000). This TEC is distributed widely across Riverina and Murray-Darling Depression bioregions, as patches within open forests or woodlands dominated by other species. It is commonly associated with clayey and/or alkaline sub-soils.
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-east Australia[2]	E	–	**Low**. This TEC was included in the PMST results but is not associated with any of the PCTs mapped on the site by the SVM or by limited vegetation mapping completed by WSP. The project site occurs within the indicative mapped area for this TEC. However, based on the typical habitat requirements of this TEC, such as productive soils derived from alluvial or colluvial (DEWHA 2010), the project site is unlikely to support this TEC.
Natural Grasslands of the Murray Valley Plain	CE	PCT 44 & 46	**Low**. This TEC has been associated with PCT 44 & 46 (BioNet 2022a) which are mapped within the project site by SVTM. However, it is believed that these PCTs have a low likelihood of occurrence due to geographical restrictions provided by BioNet (2022a). Additionally, this TEC is associated with the south-eastern edge of the Hay Plain from Deniliquin in the west to Urana in the east where rainfall exceeds 350 mm. Tchelery station occurs west of Deniliquin and has an annual average rainfall less than 350 mm (314 mm, BOM 2022). Further, grassland vegetation sampled from the western portions of the Hay Plain have been identified to align with derived Acacia shrubland and grassy chenopod communities as opposed to native grassland vegetation (McDougall 2008). Further, the project site does not fall within the indicative distribution map for this TEC where the northern boundary is generally associated with the Murray Catchment Authority Area (DSEWPaC 2012b). Nevertheless, DSEWPaC (2012b) does state that the 'may occur' boundary is not definitive and may change as mapping data becomes available. Therefore, the likelihood of this TEC occurring within the project site is low, although this can only be determined with confidence through vegetation survey of the site.

TEC name	EPBC Act[1]	Associated PCT[2]	Likelihood of occurrence
Plains mallee box woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions[2]	CE	PCT 170 & 173	**Low**. This TEC was included in the PMST results but is not associated with any of the PCTs mapped on the site by the SVM or by limited mapping completed by WSP. In addition, the project site occurs outside of the indicative mapped area for this TEC.
Weeping Myall Woodlands	CE	PCT 26	**Recorded**. This TEC was included in the PMST results and is associated with PCT 26 mapped within the project site. The project site occurs within the indicative mapped area for this TEC (DEWHA 2008) and the property may include suitable habitat for this TEC, including flat areas and gilgais on relict alluvial plains, grey clay or clay loam soils (TSSC 2009).

(1) Listed under the *Environmental Protection and Biodiversity Conservation Act* (EPBC Act)

(2) Associated PCTs as provided by BioNet Atlas and/or NSW Scientific committee that relate to the project – i.e. have potential to occur within the project site.

3.3.2 Threatened flora species

Database searches have identified a total of 11 threatened flora species, listed under the EPBC Act, that are predicted or known to occur within the locality of the project. The results of likelihood of occurrence assessments have identified a total of five threatened flora species to have a moderate or higher likelihood of occurrence within the project site (see Appendix A for further detail). A summary of threatened flora species likely to occur within the project site is provided in Table 3.8 and visually represented in Figure 3.3.

Table 3.8 Summary of EPBC listed threatened flora species with a moderate or higher likelihood of occurrence

Scientific name	Common name	EPBC Act[1]	Associated native vegetation and PCTs
Brachyscome papillosa	Mossgiel Daisy	V	PCTs 16, 24, 153, 157, 160, 163 & 164
Eleocharis obicis	Spike-Rush	V	PCTs 17, 24, 157, 160, 163, 164 & 236. Includes periodically waterlogged man-made sites such as table drains and farm dams
Lepidium monoplocoides	Winged Pepper-cress	E	PCT 16, 24, 153, 160 & 163
Maireana cheelii	Chariot Wheels	V	PCT 157 & 164
Swainsona murrayana	Slender Darling-pea	V	PCT 16, 28, 157& 164

(1) Listed under the *Environmental Protection and Biodiversity Conservation Act 1999*: E = Endangered; V = Vulnerable

3.3.3 Threatened fauna species

Database searches have identified a total of 28 threatened fauna species, listed under the EPBC Act, that are predicted or known to occur within the locality of the project. The results of likelihood of occurrence assessments have identified a total of five threatened fauna species to have a moderate or higher likelihood of occurrence within the project site (see Appendix B for further detail). A summary of threatened fauna species likely to occur within the project site is provided in Table 3.9 and visually represented in Figure 3.3.

Table 3.9 Summary of EPBC listed threatened fauna species with a moderate or higher likelihood of occurrence

Scientific name	Common name	EPBC Act[1]	Associated native vegetation and PCTs
Amphibians			
Litoria raniformis	Southern Bell Frog	E	PCTs 16, 17, & 24. Alternatively potential habitat also includes lakes, swamps and rivers.
Birds			
Hirundapus caudacutus	White-throated Needletail	V, M	PCTs 16, 17, 24, 157 & 160
Lathamus discolor	Swift Parrot	CE	No associated PCTs within the project site. However, there are multiple records to the west (around Mildura) and to the south (Moulamein) indicating that the Swift Parrot may occasionally fly over the proposed development.
Pedionomus torquatus	Plains-wanderer	CE	No associated PCTs recorded in the project site however the species is known to occur to the west in Yanga National Park.
Polytelis swainsonii	Superb Parrot	V	PCTs 16 & 28

(1) Listed under the *Environmental Protection and Biodiversity Conservation Act 1999*: E = Endangered; V = Vulnerable, M = Migratory

3.3.4 Migratory species

Database searches have identified a total of 11 migratory and marine bird species, listed under the EPBC Act, that are predicted or known to occur within the locality of the project. The results of likelihood of occurrence assessments for these migratory bird species identify that eight species have a moderate or higher likelihood of occurrence within the project site (see Appendix B for further detail). A summary of migratory fauna species likely to occur within the project site is provided in Table 3.10 and visually represented in Figure 3.4.

Table 3.10 Summary of EPBC listed migratory fauna species with a moderate or higher likelihood of occurrence

Scientific name	Common name	EPBC Act[1]
Apus pacificus	Fork-tailed Swift	M
Calidris acuminata	Sharp-tailed Sandpiper	M
Calidris ferruginea	Curlew Sandpiper	M
Calidris ruficollis	Red-necked Stint	M
Merops ornatus	Rainbow Bee-eater	M
Microcarbo melanoleucos	Little Pied Cormorant	M
Pelecanus conspicillatus	Australian Pelican	M
Threskiornis spinicollis	Straw-necked Ibis	M

(1) Listed under the *Environmental Protection and Biodiversity Conservation Act* 1999: E = Endangered; V = Vulnerable, M = Migratory

One species, Straw-necked Ibis, was observed to be foraging within the project site. This species is known to breed at the Gayini Nimmia-Caira wetland area which is approximately 45 km north of the subject site. Movement associated with this species is likely to fall within the RSA.

3.3.5 Listed marine species

Listed marine species are not likely to form an important biodiversity constraint for the project and would be assessed in further detail as part of the BDAR and EIS.

3.3.6 World and National Heritage

No World Heritage Properties or National Heritage Places are located within or nearby the project site.

3.3.7 Wetlands of national and international importance

Wetlands are important habitat for a diverse range of animals including waterbirds, amphibians, invertebrates and fish species as well as aquatic and water loving plants such as sedges and rushes. Tree species such as River Red Gum also rely on these environments. Wetlands are important provide strategic refuge during drought and frequently support threatened species. Most of the migratory bird species listed under international convention agreements with Australia may be found in these wetlands.

3.3.7.1 Nationally important wetlands

Two nationally important wetlands were identified in the broader region, these being Lowbidgee Floodplain in Yanga National Park and Black Swamp and Coopers Swamp along the Cobb Highway. Both of these nationally important wetlands occur more than 50 km from the project site.

No nationally important wetlands are within the project site.

3.3.7.2 Wetlands of International Importance (RAMSAR wetlands)

Four RAMSAR wetlands or Wetlands of International Importance were identified by database searches. However, none of them are within 10 km of the project site, with the closest wetland occurring more than 100 km away.

3.4 Aquatic and riparian environment

The project site is generally flat and mostly dry, but has some key aquatic and riparian environments, including the following:

- Abercombie Creek: A 9th order stream in the northern part of the project site, containing some Black Box treed areas along with Lignum shrubland
- The Forest Creek: A 9th order meandering stream in the southern part of the project site, containing some Black Box treed areas along with Lignum shrubland

Dry Lake is also located just to the north of the project site. It is often under cultivation and dry but during recent flooding was filled for the first time in over a decade (landowner pers. comm.).

The project site also contains many gilgai / waterholes where water collects in wet times, spread across the landscape.

4 Biodiversity constraints

Biodiversity values identified as known, predicted or likely to occur within the project site have been assigned to a three-tier biodiversity constraint hierarchy. These Biodiversity values have been mapped based on desktop assessment and preliminary field surveys. This hierarchy has been developed to assist with addressing the principle of avoid and minimise as required under section 8 of the BAM. Biodiversity constraints ranking have been based on the following criteria:

Tier 1 biodiversity constraint – Areas to avoid

Tier 1 biodiversity constraints are areas of very high environmental sensitivity, with environmental approvals considered unlikely or unachievable. Tier 1 constraints are:

- Ramsar Wetlands; and
- World Heritage Areas.

Tier 2 biodiversity constraint – Areas to be avoided if reasonable, or minimise impact

Tier 2 biodiversity constraints are areas of high environmental sensitivity, with environmental approvals considered complex and require additional triggers for biodiversity offsets and demonstration of avoid and minimising impacts on such biodiversity values. Tier 2 biodiversity constraints are:

- National Parks, ecological conservation areas (including flora reserves, state conservation areas, Biodiversity Stewardship Sites, Biobanks; wilderness protection areas)
- threatened ecological communities listed under the EPBC Act
- threatened ecological communities, flora and fauna listed under the BC Act as SAII entities; and
- other important wetlands and water sources for migratory birds protected by international agreements.

Tier 3 biodiversity constraint – Areas to avoid and minimise impact

Tier 3 biodiversity constraints are areas of high environmental sensitivity, with environmental approvals considered complex and uncertain. Avoiding and minimising impact recommended as biodiversity offsets would apply to unavoidable impacts that in some cases would require significant, expensive and perhaps unattainable offsets obligations. Tier 3 biodiversity constraints are:

- threatened species (flora/fauna) – other non-SAII threatened species listed under the BC Act and EPBC Act
- large, contiguous/intact areas of moderate or better-quality woodland vegetation (only patch sizes of > 5 hectares)
- threatened ecological communities listed under the BC Act (non-SAII)
- key fish habitat (most permanent and semi-permanent freshwater habitats including Strahler 4/5 order streams); and
- Riparian corridors (Strahler 4/6 order streams) that require a 40 metre (m) riparian buffer on these features as outlined under Table 14 of the BAM.

5 Future approach

5.1 Native vegetation assessment

Detailed native vegetation survey and mapping would be required to be undertaken in accordance with section 5 of the BAM and Commonwealth requirements. This would include stratifying the vegetation types and broad condition states to define vegetation zones, that would be sampled using vegetation integrity survey plots in accordance with section 5.3.4 of the BAM. These native vegetation surveys would determine the vegetation integrity scores for each vegetation zone that would run the BAM Credit Calculator and inform impacts and potential biodiversity offset requirements.

WSP recommends that detailed vegetation mapping and vegetation integrity plots surveys are conducted during the winter survey period. This would allow for vegetation surveys to be conducted following above average autumn rainfall and to better advise targeted spring threatened flora surveys.

5.2 Threatened species surveys

Threatened flora and fauna surveys would be required for species credit species listed under the BAM within the project site. Targeted surveys would also be undertaken with due consideration of Commonwealth survey requirements. Ongoing consultation regarding seasonal survey requirements and preliminary survey findings between WSP and NEOEN is occurring. These surveys would address section 6 of the BAM and Commonwealth survey requirements and would consider each species individual seasonality requirements, including through the BAM Credit Calculator or directly from the Threatened Biodiversity Data Collection.

The targeted flora surveys would be undertaken in accordance with the NSW Guide to Surveying Threatened Plants (Department for Planning and Environment 2020) and any Commonwealth requirements, incorporating random meander searches, parallel traverses and/or two-phase grid-based searches undertaken for candidate species within their known or potential habitat.

Targeted fauna surveys would be undertaken in accordance with the State and Commonwealth fauna survey guidelines for candidate species within their known or potential habitat.

5.3 Preliminary recommendations to avoid and minimise

Based on preliminary field surveys and desktop assessment within the project site the preliminary recommendations regarding the project include:

- avoidance wherever possible of areas that have been identified with threatened ecological communities under both BC Act and EPBC Act, as part of any revised or final design
- it is recommended that avoidance of all threatened flora species recorded wherever possible is implemented as part of any revised or final design. Where design changes are proposed, it is recommended that these areas are also inspected to ensure no threatened flora species occur.

5.4 Consultation with NSW Department of Planning and Environment

Consultation is recommended on the following issues:

- determination of excluded impacts
- use of local benchmark data
- discussion of future vegetation integrity score application
- threatened plant survey methods (including discussion of seasonality issues for certain species)
- threatened fauna survey methods (including seasonality issues); and
- discussion of fauna strike risk assessment method.

Early consultation has commenced with DPE.

6 Conclusion

The project site has been identified to include a number of vegetation formations including Arid Shrublands, Freshwater Wetlands, Grasslands, Saline Wetlands and Semi-arid Woodlands. Based on broad scale vegetation mapping, pre-existing and preliminary field surveys undertaken by WSP, several plant community types (PCTs) identified are considered to potentially form four threatened ecological communities (TECs) listed under the BC Act. These include:

- *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregions – Endangered
- *Allocasuarina luehmannii* Woodland in the Riverina and Murray-Darling Depression Bioregions – Endangered (SAII)
- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions – Endangered
- Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions – Endangered.

In addition, several PCTs identified are considered to potentially form two TECs listed under the EPBC Act. These include:

- Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions – Endangered
- Weeping Myall Woodlands – Critically Endangered.

Pre-existing and preliminary field surveys undertaken by WSP have identified seven threatened flora species listed under the BC Act and EPBC Act to occur within the project site. These are:

- *Brachyscome papillosa* (Mossgiel Daisy) – listed as vulnerable under the BC Act and EPBC Act
- *Calotis moorei* (A Burr-daisy) – listed as endangered and as a Serious and Irreversible Impact (SAII) entity under the BC Act, and as endangered under the EPBC Act
- *Eleocharis obicis* (A Spike-rush) – listed as vulnerable under the BC Act and EPBC Act
- *Lepidium monoplocoides* (Winged Peppercress) – listed as endangered under the BC Act and EPBC Act
- *Maireana cheelii* (Chariot Wheels) – listed as vulnerable under the BC Act and EPBC Act
- *Pilularia novae-hollandiae* (Austral Pillwort) – listed as endangered and SAII entity under the BC Act.
- *Swainsona murrayana* (Slender Darling Pea) – listed as vulnerable under the BC Act and EPBC Act

Database searches have identified an additional 12 threatened flora species as potential candidate of which two have been identified as having a moderate or higher likelihood of occurrence.

Database searches, pre-existing and preliminary surveys undertaken by WSP have identified four threatened fauna species listed under the BC Act and one species listed under the EPBC Act to occur within the locality and are considered highly likely to occur within the project site. In addition, desktop analysis has identified 15 threatened fauna species listed under the BC Act and three threatened fauna species listed under the EPBC Act are predicted to have a moderate of higher likelihood of occurrence within the project site. Eight migratory fauna species have also been recorded or identified to have a moderate of high likelihood of occurrence within the project site.

A BDAR would need to be prepared as part of the EIS, which would further identify and clarify the potential significance of biodiversity impacts associated with the project. The BDAR would be prepared in accordance with BC Act and BAM. Further targeted detailed threatened species seasonal survey would be required to ensure compliance with the BAM along with vegetation integrity plot based native vegetation surveys.

Potential measures would be identified to avoid and minimise any adverse biodiversity effects and further detailed design would reduce the overall amount of vegetation required to be removed.

A Referral under the EPBC Act to the Commonwealth would be required.

7 Limitations

7.1 Scope of services

This biodiversity impact assessment report (the report) has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the client and WSP (scope of services). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

7.2 Reliance on data

In preparing the report, WSP has relied upon data, surveys, analyses, designs, plans and other information provided by the client and other individuals and organisations, most of which are referred to in the report (the data). Except as otherwise stated in the report, WSP has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the report (conclusions) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. WSP will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP.

7.3 Environmental conclusions

In accordance with the scope of services, WSP has relied upon the data and has conducted environmental field monitoring and/or testing in the preparation of the report. The nature and extent of monitoring and/or testing conducted is described in the report.

On all sites, varying degrees of non-uniformity of the vertical and horizontal soil or groundwater conditions are encountered. Hence no monitoring, common testing or sampling technique can eliminate the possibility that monitoring or testing results/samples are not totally representative of soil and/or groundwater conditions encountered. The conclusions are based upon the data and the environmental field monitoring and/or testing and are therefore merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of contaminants or emissions. Also, it should be recognised that site conditions, including the extent and concentration of contaminants, can change with time.

Within the limitations imposed by the scope of services, the monitoring, testing, sampling and preparation of this report have been undertaken and performed in a professional manner, in accordance with generally accepted practices and using a degree of skill and care ordinarily exercised by reputable environmental consultants under similar circumstances. No other warranty, expressed or implied, is made.

7.4 Report for benefit of client

The report has been prepared for the benefit of the client (and no other party) but may be relied upon by determining authorities for consideration. WSP assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of WSP or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Except as provided below parties other than the client should not rely upon the report or the accuracy or completeness of any conclusions and should make their own enquiries and obtain independent advice in relation to such matters.

7.5 Other limitations

WSP will not be liable to update or revise the report to take into account any events or emergent circumstances or facts occurring or becoming apparent after the date of the report.

The scope of services did not include any assessment of the title to or ownership of the properties, buildings and structures referred to in the report nor the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.

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Appendix A

Threatened flora likelihood of occurrence

Table A.1 Threatened flora likelihood of occurrence

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	Habitat suitability[5]	Likelihood of occurrence
Austrostipa wakoolica	A spear grass	E	E	No	BAM-C, PMST, PlantNet	**Habitat description** Grows on floodplains of the Murray River tributaries, in open woodland on grey, silty clay or sandy loam soils; habitats include the edges of lignum swamps with box and mallee; creek banks in grey, silty clay; mallee and lignum sandy-loam flat; open Cypress Pine forest on low sandy range; and a low, rocky rise. Potentially suitable habitat in the form of PCT 17 & 28. **Habitat constraint** Alluvial plains and plains.	Low- potential habitat within the proposed development in the form of PCT 17 & PCT 28. However, the nearest records occur south of Moulamein and occur approximately 80 km away.
Brachyscome muelleroides	Claypan Daisy	V	V	Yes	BAM-C	**Habitat description** Grows in damp areas on the margins of claypans in moist grassland with *Pycnosorus globosus*, *Agrostis avenacea* and *Austrodanthonia duttoniana*. Also, recorded from the margins of lagoons in mud or water, and in association with *Calotis anthemoides*. The Claypan Daisy occurs in the Wagga Wagga, Narranderra, Tocumwal and Walbundrie areas. **Habitat constraint** — Floodplains on grey-brown or red-brown clays and claypans/semi-permanent/ephemeral wet areas. — Wetland-grassland communities on grey-brown or red-brown clay and claypans. **Geographic limitations** Murrumbidgee IBRA subregion — east of the Cobb Highway and south of Griffith.	Low – PCTs associated with this species are unlikely to occur within the project site. Project also falls outside of geographic limitation for this species.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	Habitat suitability[5]	Likelihood of occurrence
Brachyscome papillosa	Mossgiel Daisy	V	V	No	BAM-C, BioNet, PMST, PlantNet	**Habitat description** Recorded primarily in clay soils on Bladder Saltbush (*Atriplex vesicaria*) and Leafless Bluebush (*Maireana aphylla*) plains, but also in grassland and in Inland Grey Box (*Eucalyptus microcarpa*) – Cypress Pine (*Callitris* spp.) woodland. Potentially suitable habitat in the form of PCT 16, 24, 153, 157, 160, 163 & 164.	**Recorded** – suitable habitat and individuals recorded within the project site.
Caladenia arenaria	Sand-hill Spider Orchid	E	E	Yes	BAM-C	**Habitat description** Occurs in woodland with sandy soil, especially that dominated by White Cypress Pine (*Callitris glaucophylla*). Sand-hill Spider Orchid is restricted to the Riverina in NSW and only occurs in five locations between Urana and Narranderra that are severely fragmented. There are no records within proposed study area. Potentially suitable habitat in the form of PCT 28. **Geographic restrictions** Murrumbidgee IBRA subregion — east of Jerilderie.	Low – suitable habitat tentatively recorded within the project site. However, the project falls outside of the species known geographical range.
Calotis moorei	A Burr-daisy	E	E	Yes	BAM-C, PlantNet	**Habitat description** The species grows in sandy soil and appears to be associated with *Acacia* woodlands and chenopod shrublands. Currently the species is only known from four populations in NSW being north-west of Louth, west of Wilcannia, Menindee area and an old record near Deniliquin (DEE 2022d). Potentially suitable habitat in the form of PCTs 23, 153 & 157.	**Recorded** – suitable habitat and individuals recorded within the project site.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	Habitat suitability[5]	Likelihood of occurrence
Convolvulus tedmoorei	Bindweed	E	–	Yes	BAM-C	**Habitat description** This species has been recorded from northern inland areas of South Australia, south-western Queensland and western NSW. There are few known records from NSW: two areas on the Murrumbidgee and Darling River floodplains in central-western NSW (from Toganmain Station, Darlington Point, and from a locality 8 km north-west of Louth); and two other records from east of Broken Hill on the road to Wilcannia, and from the Menindee Road, Scarsdale. Found on the floodplains of the Darling and Murrumbidgee Rivers on self-mulching grey clay soils (Royal Botanical Gardens 2022). Little known from NSW – information based on similar species. Potentially suitable habitat in the form of PCT 17, 24, 157, 160, 163, 164.	Low – suitable habitat tentatively recorded within the project site. However, this species is known only from the Murrumbidgee and Darling River floodplains which are not associated with the project site.
Cullen parvum	Small Scurf-pea	E	–	No	BAM-C	**Habitat description** In known populations in Victoria and NSW, plants are found in grassland, River Red Gum (*Eucalyptus camaldulensis*) Woodland or Box-Gum Woodland, sometimes on grazed land and usually on table drains or adjacent to drainage lines or watercourses, in areas with rainfall of between 450 and 700 mm. **Geographic limit** Murrumbidgee IBRA subregion — Hay Plain and to the east.	Low – PCTs listed as associated habitat unlikely to occur within the project site. Additionally, the project site has a recorded annual rainfall of ~314 mm indicating existing habitat will be unsuitable for this species (Moulmein [Tchelery] BOM 2022).
Eleocharis obicis	Spike-Rush	V	V	No	PlantNet,	**Habitat description** Species grows on heavy clay soils in ephemerally wet situations in low-lying grasslands in depressions and man-made structures such as table drains and farm dams (DEE 2022d). historic records for this species occur from Condobolin and Hay and is thought to be associated with the Lachlan River and its tributaries. Recorded suitable habitat in the form of gilgais within PCT 164. **Habitat constraints** Periodically waterlogged sites (including table drains and farm dams).	**Recorded** – suitable habitat and individuals recorded within the project site.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	Habitat suitability[5]	Likelihood of occurrence
Eucalyptus leucoxylon subsp. *pruinosa*	Yellow Gum	V	–	No	BAM-C	**Habitat description** Associated with the Murray River and its tributaries, this species occurs at the bases of sandy rises and on loamy clay flats between Barham and Euston. Within NSW this species is restricted to four known stands to the west of Moulamein and a cluster of stands around Barham. Potentially suitable habitat in the form of PCT 16.	**Moderate** – nearest records occur approximately 50 km to the southwest of the project site. Suitable habitat found within the project site in the form of vegetation associated with The Forest Creek.
Lepidium monoplocoides	Winged Pepper-cress	E	E	No	BAM-C, PlantNet	**Habitat description** Occurs on seasonally moist to waterlogged sites, on heavy fertile soils, with a mean annual rainfall of around 300–500 mm. Predominant vegetation is usually an open woodland dominated by *Allocasuarina luehmannii* (Buloke) and/or eucalypts, particularly *Eucalyptus largiflorens* (Black Box) or *Eucalyptus populnea* (Poplar Box). Potentially suitable habitat in the form of PCT 16, 24, 153, 160 & 163.	**Recorded** – suitable habitat and individuals recorded within the project site.
Leptorhynchos orientalis	Lanky Buttons	E	–	No	BAM-C	**Habitat description** Grows in woodland or grassland, sometimes on the margins of swamps. Communities include a Bimble Box plain on red-brown soil, dense *Acacia pendula* woodland with herbaceous understorey on red clay to clay-loam, open grassland areas on red soils, and red clay plains at the edge of a Canegrass swamp. Associated species include *Eucalyptus populnea* subsp. *bimbil*, *Acacia pendula*, *Eragrostis australasica*, *Lepidium monoplocoides*, *Enchylaena tomentosa*, *Minuria leptophylla*, *Rhodanthe floribunda*, *R. pygmaea* and *Ptilotus spathulatus.* This species is listed as data deficient. Potentially suitable habitat in the form of PCT 24.	**Moderate** – suitable habitat in the form of PCT 24 likely to occur within the project site.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	Habitat suitability[5]	Likelihood of occurrence
Maireana cheelii	Chariot Wheels	V	V	No	BioNet, PMST, PlantNet	**Habitat description** Usually found on heavier, grey clay soils with *Atriplex vesicaria* (Bladder Saltbush). Recorded on the Hay Plain in *Atriplex vesicaria, Maireana aphylla* and *Acacia homalophylla* shrublands. Soils include heavy brown to red-brown clay-loams, hard cracking red clay, other heavy texture-contrast soils. Tends to grow in shallow depressions, often on eroded or scalded surfaces, and does not extend to the higher soils in the habitat. Potentially suitably habitat in the form of PCT 157 & 164. **Habitat constraint** Heavy grey clay soils and claypans or shallow depressions.	**Recorded** – suitable habitat and individuals recorded within the project site.
Pilularia novae-hollandiae	Austral Pillwort	E	–	Yes	BAM-C	**Habitat description** Grows in shallow swamps and waterways, often among grasses and sedges. It is most often recorded in drying mud as this is when it is most conspicuous. Widespread but not common in seasonally dry depressions and margins of marshes; may grow submerged (Royal Botanical Gardens 2022). Most of the records in the Albury-Urana area were from table drains on the sides of roads. Recorded suitable habitat in the form of gilgais within PCT 164. **Geographical limitations** Murrumbidgee IBRA subregion — East of Deniliquin.	**Recorded** – suitable habitat and individuals recorded within the project site.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	Habitat suitability[5]	Likelihood of occurrence
Sclerolaena napiformis	Turnip Copperburr	E	–	No	BAM-C	**Habitat description** Species associated with patches of remnant grasslands dominated by *Austrostipa nodosa* and *Chloris truncata* on grey cracking clay to red-brown loamy clay. Sites are restricted to level plains with most records occurring within traveling stock routes and reserves that are subject to light livestock grazing which is thought to potentially promote growth of this species. Associated species include *Austrodanthonia duttoniana, Enteropogon acicularis, Austrostipa nodosa, Chloris truncata, Lolium rigidum, Swainsona murrayana, S. plagiotropis, S. procumbens, Rhodanthe corymbiflora, Calotis scabiosifolia, Microseris lanceolata, Acacia pendula* and various chenopods. Suitable habitat for this species is thought to occur from Kerang, Vic to north west of Deniliquin east to Urana with the northern boundary falling to the south of Narrandera (Mavromihalis 2010). **Geographical limitation** — Hay Plain.	Low – PCTs associated with this species unlikely to occur within the project site. Additionally, the project falls outside of the predicted geographically range of this species.
Solanum karsense	Menindee Nightshade	V	V	No	BAM-C, PMST	**Habitat description** Grows in occasionally flooded depressions with heavy soil, including level river floodplains of grey clay with Black Box and Old Man Saltbush, and open treeless plains with solonized brown soils. Habitats are generally lake beds or floodplains of heavy grey clays with a highly self-mulching surface. Also found on sandy floodplains and ridges and in calcareous soils, red sands, red-brown earths and loamy soils. Restricted to the far south-western plains, extending from the Darling River to the Menindee district, mainly occurring between the darling and Lachlan. Potentially suitable habitat in the form of PCT 16, 17, 24, 160 & 166. **Habitat constraints** — Semi-permanent/ephemeral wet areas. **Geographic limitations** — West of Maude.	Low - potential habitat in the form of several plant community types. However, typically associated with the Darling River and Lachlan Rivers that occur well outside of the project locality.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	Habitat suitability[5]	Likelihood of occurrence
Swainsona murrayana	Slender Darling-pea	V	V	No	BAM-C, PMST, PlantNet	**Habitat description** The species is listed to grow in in a variety of habitats including chenopod shrublands, black box woodlands and grasslands. Additionally, the species has been recorded by WSP to occur in Myall woodland during surveys undertaken for Project Energy Connect. It grows on a variety of clay-based soil types including grey, red and brown cracking clays to red-brown earths and loams. Species is thought to require some form of disturbance as it is often recorded in paddocks subject to light grazing or occasional cultivation (DEE 2022b and WSP observation). Potentially suitable habitat in the form of PCT 16, 28, 157& 164.	**Recorded** – suitable habitat and individuals recorded within the project site.
Swainsona plagiotropis	Red Darling Pea	V	–	No	BAM-C	**Habitat description** Grows on flat grassland and in heavy red soil, often on roadsides and especially in table drains. Soils are derived from quaternary sediments and are usually red-brown clay-loams. The species is absent from black low-lying soils. Recorded from roadsides, rail reserves, stock routes and areas of lightly grazed unimproved pasture comprising *Austrodanthonia*, *Enteropogon acicularis* and *Austrostipa* grassland communities.	Low – although suitable habitat in the form of PCT 44 & 46 mapped by broad scale state vegetation mapping, it is unlikely these communities will occur within the project site.
Swainsona pyrophila	Yellow Swainson-pea	V	V	No	PMST	**Habitat description** Grows in mallee scrub on sandy or loamy soil, usually found only after fire. Sites include cleared and burnt mallee scrub on red loam to sand, previously burnt *Eucalyptus dumosa* mallee, disturbed woodland in sheltered aspects, a bulldozed firebreak adjacent to wheat paddocks, roadsides, claypans and at the edge of fire ash. No potential habitat located within the project site.	Low – no associated habitat located within the project site

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	Habitat suitability[5]	Likelihood of occurrence
Swainsona sericea	Silky Swainson-pea	V	–	No	BAM-C, PlantNet	**Habitat Description** Species typically recorded from Box Gum woodland and grasslands, sometimes associated with *Callitris* spp., from the Northern and Southern Tablelands inland to the slopes and plains. A stronghold for this species occurs on the Monaro in Natural Temperate Grasslands and Snow Gum (*Eucalyptus pauciflora*) Woodland. Species habitat within the plains is not well documented. Potentially suitable habitat in the form of PCT 23 & 28.	Low – no records within the locality of the project site.

(1) Listed under the *Biodiversity and Conservation Act 2016*: CE = Critically endangered, E = Endangered, V = Vulnerable

(2) Listed under the *Environmental Protection and Biodiversity Conservation Act 1999*: CE = Critically endangered, E = Endangered, V = Vulnerable

(3) SAII = Serious and Irreversible Impact

(4) Sources include BAM-C = Biodiversity Assessment Method Calculator, PMST = The Department of the Environment and Energy's EPBC Protected Matters Search Tool, BioNet = ESS's Bionet Atlas of NSW Wildlife, ALA = Atlas of Living Australia spatial search tool

(5) Unless otherwise stated (in-text references) all information for habitat suitability has been sourced from BioNet Atlas of NSW Wildlife (DPE 2022b)

Appendix B

Threatened fauna likelihood of occurrence

Table B.1 Likelihood of occurrence for threatened fauna species

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Amphibians								
Litoria raniformis	Southern Bell Frog	E	V	No	PMST, BAM-C	Candidate	**Habitat requirements** In NSW, the species was once distributed along the Murray and Murrumbidgee Rivers and their tributaries, the southern slopes of the Monaro district and the central southern tablelands as far north as Tarana, near Bathurst. Currently, the species is known to exist only in isolated populations in the Coleambally Irrigation Area, the Murrumbidgee floodplain and around Lake Victoria. Usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys. They are also found in irrigated rice crops, particularly where there is no available natural habitat. Predicted habitat occurs within PCTs 17 & 24. Alternatively potential habitat also includes lakes, swamps and rivers.	**Moderate** – one record from 2019 within the locality (with 10 km) and associated habitat within the project site.
Birds								
Actitis hypoleucos	Common Sandpiper	–	M	No	PMST	–	**Habitat requirements** The Common Sandpiper frequents a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity. It is mostly encountered along muddy margins or rocky shores and rarely on mudflats. It has been recorded in estuaries and deltas of streams, banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. Roost sites are typically on rocks or in roots or branches of vegetation, especially mangroves.	Low – may occur under rare climatic conditions that recharge local wetlands.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Anseranas semipalmata	Magpie Goose	V	–	No	BAM-C	Predicted	**Habitat requirements** A vagrant to NSW, normally following food sources to south-eastern NSW. Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges. Activities are centred on wetlands, mainly those on floodplains of rivers and large shallow wetlands formed by run-off; breeding can occur in both summer and winter dominated rainfall areas and is strongly influenced by water level; most breeding now occurs in monsoonal areas; nests are formed in trees over deep water; breeding is unlikely in south-eastern NSW. Predicted habitat occurs within PCTs 16, 24, 160 & 163.	Low – may occur under rare climatic conditions that recharge local wetlands.
Apus pacificus	Fork-tailed Swift	–	M	No	PMST	–	**Habitat requirements** Breeds in the northern hemisphere, wintering south to Australia. It is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground. It mostly occurs over inland plains but sometimes above foothills or in coastal areas over cliffs, beaches, islands and well out to sea. It also occurs over towns and cities. It mostly occurs over dry and/or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh, grassland, spinifex sandplains, farmland and sand-dunes. It sometimes occurs above forests. It probably roosts aerially but has occasionally been observed to land.	**Recorded** – observed fly over the project site during preliminary field surveys.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Ardeotis australis	Australian Bustard	E	–	No	BAM-C	Candidate	**Habitat requirements** The Australian Bustard mainly occurs in inland Australia and is now scarce or absent from southern and south-eastern Australia. In NSW, they are mainly found in the north-west corner and less often recorded in the lower western and central west plains regions. Occasional vagrants are still seen as far east as the western slopes and Riverine plain. Mainly inhabits tussock and hummock grasslands, though prefers tussock grasses to hummock grasses; also occurs in low shrublands and low open grassy woodlands; occasionally seen in pastoral and cropping country, golf courses and near dams. Roosts on ground among shrubs and long grasses or under trees. Forages on insects, young birds, lizards, mice, leaves, seeds and fruit. Dispersive, with irregular widespread movements over long distances; movements are thought to be in response to habitat and climatic conditions; known to converge on areas with high mice numbers and in recently burnt areas. Potential habitat occurs in PCT's 24, 28, 157, 160, 163 & 164. Species typically associated with chenopod shrublands and grassy plains.	Low – although the species can occur locally there is a paucity of regional records.
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	–	No	BAM-C	Predicted	**Habitat requirements** Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland. Potential habitat occurs in PCTs 16, 17, 24, 28, 58, 153, 157, 160, 163, 164, 166 & 236.	**Moderate** – project falls within known distribution for this species. Potential woodland habitats including PCTs 16 have a high likelihood of occurrence.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Burhinus grallarius	Bush Stone-curlew	E	–	No	BAM-C	Candidate	**Habitat requirements** The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common and, in the south-east, it is either rare or extinct throughout its former range. Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber. Largely nocturnal, being especially active on moonlit nights. Potential habitat occurs in PCTs 28. Species typically associated with grassy woodlands.	**Moderate** – Project falls within known distribution for this species. Potential woodland habitats including PCTs 16 have a high likelihood of occurrence.
Botaurus poiciloptilus	Australasian Bittern	E	E	–	PMST, BAM-C	Predicted	**Habitat requirements** In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (*Typha spp.*) and spikerushes (*Eleocharis spp.*). Breeding occurs in summer from October to January; nests are built in secluded places in densely vegetated wetlands on a platform of reeds. Potential habitat associated with PCTs 17, 24 & 160. **Habitat constraint** Brackish or freshwater wetlands	Low – may occur under rare climatic conditions that recharge local wetlands.
Calidris acuminata	Sharp-tailed Sandpiper	–	M	No	PMST	–	**Habitat requirements** Occurs in a variety of habitats: tidal mudflat, mangrove swamps, saltmarshes, shallow fresh, brackish, salt inland swamps and lakes; flooded and irrigated paddocks, sewage farms and commercial saltfields.	**Recorded** – observed fly over the project site during preliminary field surveys.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Calidris ferruginea	Curlew Sandpiper	E	CE; M	Yes	PMST, BAM-C	Predicted / Candidate	**Habitat requirements** Occur around the coasts and are also quite widespread inland, though in smaller numbers. Records occur in all states during the non-breeding period, and also during the breeding season when many non-breeding one year old birds remain in Australia rather than migrating north. 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 recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes, and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters. Potential habitat occurs in PCT 24. Foraging habitat: as per mapped areas. Note: migratory species, key threats occurring overseas. Note that it does not breed in NSW or elsewhere in Australia but relies on successful feeding here to migrate >10,000 km back to its breeding grounds. The species is a dual credit species, with the species credit component mapped as an important area. These mapped areas do NOT require survey as it is presumed that the species is present. Any impact from development could potentially be serious and irreversible. Ecosystem credit areas are unlikely to have potential serious and irreversible impacts. Note that whilst this is a partnership species in NSW it is listed nationally and therefore retained as a potential SAII species.	**Recorded** – observed fly over the project site during preliminary field surveys.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Calidris melanotos	Pectoral Sandpiper	–	M	No	PMST	–	**Habitat requirements** In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species frequents coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. It is usually found in coastal or near coastal habitat but occasionally further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. It has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands.	Low – may occur under rare climatic conditions that recharge local wetlands.
Calidris ruficollis	Red-necked Stint	–	M	No	Recorded	-	**Habitat requirements** The species frequents coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. It is usually found in coastal or near coastal habitat but occasionally further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. It has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands.	**Recorded** – observed fly over the project site during preliminary field surveys.
Certhionyx variegatus	Pied Honeyeater	V	–	No	BAM-C	Predicted	**Habitat requirements** Widespread throughout acacia, mallee and spinifex scrubs of arid and semi-arid Australia. Inhabits wattle shrub, primarily Mulga (*Acacia aneura*), mallee, spinifex and eucalypt woodlands, usually when shrubs are flowering; feeds on nectar, predominantly from various species of emu-bushes (*Eremophila* spp.); also, from mistletoes and various other shrubs (e.g. *Grevillea* spp.); also eats saltbush fruit, berries, seed, flowers and insects. Highly nomadic, following the erratic flowering of shrubs; can be locally common at times. Potential habitat occurs in PCT's 16, 24, 28, 153 & 163.	Low – project site within range but associated vegetation unlikely to provide sufficient foraging resources.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Circus assimilis	Spotted Harrier	V	–	–	BAM-C	Predicted	**Habitat requirements** Occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Preys on terrestrial mammals (e.g. bandicoots, bettongs, and rodents), birds and reptile, occasionally insects and rarely carrion. Potential habitat occurs in PCT's 16, 17, 24, 28, 58, 153, 157, 160, 163, 164, 166 & 236.	**Recorded** within the project site during preliminary field surveys.
Climacteris affinis	White-browed Treecreeper population in Carrathool LGA	E	–	No	BAM-C	Candidate	**Habitat requirements** In NSW, occupies a broad area of western NSW, west from a line from Balranald to Lake Cargelligo then Lightning Ridge. Absent in the far north west. A small population, now recognised as isolated, occurs in Carrathool local government area south of the Lachlan River and Griffith local government areas**.** Occupies a variety of habitats including Mulga, Brigalow, Gidgee, Belah, Bulloke and White Cypress. The species may also occur in habitats adjacent to these habitats, including Coolibah, River Red Gum and Black Box. Forages arboreally in shrubs and on tree trunks and branches. It will also feed on the ground through litter and fallen branches and across bare ground. Diet is insectivorous and may include vegetation such as chenopod fruit. Potential habitat occurs in PCT 58.	Low – little habitat within the project site and nearest record falls to the west of Yanga National Park.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Daphoenositta chrysoptera	Varied Sittella	V	–	No	BAM-C	Predicted	**Habitat requirements** Sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. Inhabits eucalypt forests and woodlands, especially those containing rough- barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Potential habitat occurs in PCTs 16, 28 & 58.	Low – species prefers woodland habitats which are not present in sufficient extent within the project site.
Epthianura albifrons	White-fronted Chat	V	–	–	BAM-C	Predicted	**Habitat requirements** Found across the southern half of Australia the species is mostly found in temperate to arid climates, more specifically along waterways in the western half of NSW. Individuals are typically found foraging on bare or grassy ground singly or in pairs. Potential habitat occurs in PCTs 17, 24, 153, 157, 160, 163, 164, 166 & 236.	**Recorded** within the project site during preliminary and pre-existing surveys.
Falco hypoleucos	Grey Falcon	E	–	–	PMST, BAM-C	Predicted	**Habitat requirements** Sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. The breeding range has contracted since the 1950s with most breeding now confined to arid parts of the range. 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. Potential habitat occurs within PCT's 16, 17, 24, 28, 58, 153, 157, 160, 163, 164, 166 & 236.	**Moderate –** an arid country species that is unlikely to occur outside of climatic stochastic events.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Falco subniger	Black Falcon	V	–	No	BAM-C	Predicted	**Habitat requirements** Widely, but sparsely, distributed in New South Wales, mostly occurring woodland, shrubland and grassland in the arid and semi-arid zones, especially wooded watercourses and agricultural land with scattered remnant trees. It is usually associated with streams or wetlands, visiting them in search of prey and often using standing dead trees as lookout posts. Habitat selection is generally influenced more by prey densities than by specific aspects of habitat floristics or condition, although in agricultural landscapes it tends to nest in healthy, riparian woodland remnants with a diverse avi-fauna. Potential habitat occurs in PCTs 16, 17, 24, 28, 58, 153, 157, 160, 163, 164, 166 & 236.	**High** – multiple records within the locality and suitable habitat located within the proposed development.
Gallinago hardwickii	Latham's Snipe	–	M	No	PMST	–	**Habitat requirements** Occurs in freshwater or brackish wetlands generally near protective vegetation cover. This species feeds on small invertebrates, seeds and vegetation. It migrates to the northern hemisphere to breed.	Low – may occur under rare climatic conditions that recharge local wetlands.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Grantiella picta	Painted Honeyeater	V	V	–	PMST, BAM-C	Predicted	**Habitat requirements** The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. Inhabits Boree/Weeping Myall (*Acacia pendula*), Brigalow (*A. harpophylla*) and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus *Amyema*. Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches. Potential habitat occurs in PCTs 16, 28 & 58. **Habitat constraints** Mistletoes present at a density of greater than five mistletoes per hectare.	Low – no records within the locality and only marginal habitat located within the project site – vegetation with low likelihood of supporting a high enough mistletoe density for this species to occur.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Grus rubicunda	Brolga	V	–	No	BAM-C	Predicted	**Habitat requirements** Formerly found across Australia, except for the south-east corner, Tasmania and the south-western third of the country. It is still abundant in the northern tropics, but very sparse across the southern part of its range. Often feed in dry grassland or ploughed paddocks or even desert claypans, they are dependent on wetlands too, especially shallow swamps, where they will forage with their head entirely submerged. Potential habitat occurs in PCTs 16, 17, 24, 160, 163 & 166.	**Moderate** – project site occurs within known distribution and supports suitable habitat for this species. However, the nearest record for this species falls east near the Cobb highway approximately 50 km away, though the species is highly mobile and cannot be discounted on this premise alone (ALA 2022). Project will likely represent an increase risk of wind turbine strike to this species as there are scattered records within the broader region.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Haliaeetus leucogaster	White-bellied Sea Eagle	V	–	No	BAM-C	Predicted / Candidate	**Habitat requirements** In NSW it is widespread along the east coast, and along all major inland rivers and waterways. Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs in vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Note: The species is highly selective in nesting locations. Breeding habitat is live large old trees within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines AND the presence of a large stick nest within tree canopy; or an adult with nest material; or adults observed duetting within breeding period. Due to the similarities in nest structure and use of the same nests by White-bellied Sea Eagles and Wedge-tailed Eagles, where a nest is observed without a bird present, searches for prey remains/feathers below the structure should be undertaken. The differing diets of both species and distinctive adult feathers, should provide evidence of nest use, however; where prey items/feathers are absent, repeat visits to the nest until a bird is observed should be undertaken. Potential habitat occurs in PCTs 16, 17, 24, 28, 58, 153, 157, 160, 163, 164, 166 & 236.	**Moderate** – project site occurs within known distribution and supports suitable habitat for this species in the form of freshwater wetlands. However, the nearest record for this species occurs near the Cobb highway approximately 50 km to the east, though this species is highly mobile and cannot be discounted on this premise alone (ALA 2022). Project will likely represent an increase risk of wind turbine strike to this species as there are a number of scattered records throughout the broader region.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Hieraaetus morphnoides	Little Eagle	V	–	No	BAM-C	Predicted / Candidate	**Habitat requirements** Found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion. Potential habitat occurs in PCTs 16, 17, 24, 28, 58, 153, 157, 160, 163, 164, 166 & 236. Breeding habitat: nest trees - live (occasionally dead) large old trees within vegetation. Note: breeding habitat is live (occasionally dead) large old trees within suitable vegetation AND the presence of a male and female; or female with nesting material; or an individual on a large stick nest in the top half of the tree canopy.	**High** – species highly mobile and project study are falls within species known distribution. Known from wider locality and cannot be discounted.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Hirundapus caudacutus	White-throated Needletail	–	V, M	No	BAM-C	Predicted	**Habitat requirements** Widespread in eastern and south-eastern Australia. In eastern Australia, it is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. It is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Because they are aerial, it has been stated that conventional habitat descriptions are inapplicable, but there are, nevertheless, certain preferences exhibited by the species. Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. They also commonly occur over heathland, but less often over treeless areas, such as grassland or swamps. When flying above farmland, they are more often recorded above partly cleared pasture, plantations, or remnant vegetation at the edge of paddocks. Potential habitat occurs in PCTs 16, 17, 24, 157 & 160.	**Moderate –** although local records are sparse, due to wide ranging habitats may occur in aerial habitats over the project site on a seasonal basis.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Lathamus discolor	Swift Parrot	E	CE	Yes	PMST	Predicted / Candidate	**Habitat requirements** Migrates to the Australian south-east mainland between February and October. 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 *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Forest Red Gum *E. tereticornis*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. No mapped potential habitat occurs within the project site. Habitat constraints – as per significant habitat areas for species credit species.	**Moderate** – while habitat within the proposed development is limited there are multiple records to the west (around Mildura) and to the south (Moulamein) indicating that the Swift Parrot may occasionally fly over the proposed development. This species cannot be discounted due to the increased risk of bird strike by the proposed development.
Leipoa ocellata	Malleefowl	E	V	–	PMST	Predicted / Candidate	**Habitat requirements** Predominately inhabit mallee communities but may occasionally be found in other woodlands including those dominated by native Cypress Pine species (i.e. PCT 28)	Low – habitat within the proposed development limited and species is unlikely to occur. A single record occurs north of the site near the Sturt Highway.
Limosa limosa	Black-tailed Godwit	–	M	N/A	BAM-C	Predicted / Candidate	**Habitat requirements** Primarily a coastal species which is usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. Further inland, it can also be found on mudflats and in water less than 10 cm deep, around muddy lakes and swamps. Potential suitable habitat in the form of PCT 166.	Low – may occur under rare climatic conditions that recharge local wetlands.
Lophochroa leadbeateri	Major Mitchell's Cockatoo	V	–	–	BioNet, BAM-C	Predicted / Candidate	**Habitat requirements** Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water. Feeds mostly on the ground, especially on the seeds of native and exotic melons and on the seeds of species of saltbush, wattles and cypress pines. Potential habitat occurs in PCT 16, 28, 58, 153, 163 & 166.	**High** – multiple records within the locality and suitable habitat located within the proposed development.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Lophoictinia isura	Square-tailed Kite	V	–	No	BAM-C	Predicted / Candidate	**Habitat requirements** Individuals disperse widely in NSW and comprise a single population. Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe. It is found most commonly in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands. Potential habitat occurs in PCTs 16, 28, 58 & 153.	Low – species requires high quality woodland habitats.
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	V	–	No	BAM-C	Predicted	**Habitat requirements** 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. Potential habitat occurs in PCTs 16, 28 & 58.	**Moderate** – project site falls within known distribution and associated potential habitat found on site.
Merops ornatus	Rainbow Bee-eater	–	M	–	Recorded	–		**Recorded** – observed fly over the project site during preliminary field surveys.
Motacilla flava	Yellow Wagtail	–	M	No	PMST	–	**Habitat requirements** Species utilizes wet meadows, marshland and muddy lakeshores. This species migrates from Asia to Australia.	Low – may occur under rare climatic conditions that recharge local wetlands.
Microcarbo melanoleucos	Little Pied Cormorant	–	M	–	Recorded	–		**Recorded** – observed fly over the project site during preliminary field surveys.
Myiagra cyanoleuca	Satin Flycatcher	–	M	No	PMST	–	**Habitat requirements** Species is found along the east coast of Australia from far northern Queensland to Tasmania in tall forests, preferring wetter habitats such as heavily forested gullies.	Low – species associated with the Great Dividing Range and is unlikely to occur locally.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Ninox connivens	Barking Owl	V	–	No	BAM-C	Predicted / Candidate	**Habitat requirements** Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey found on these fertile riparian soils. Requires very large permanent territories in most habitats due to sparse prey densities. Potential habitat occurs in PCT 16.	Low – local woodland patches are not of sufficient extent and quality to support a territory for this species.
Numenius madagascariensis	Eastern Curlew	–	CE; M	Yes	PMST		**Habitat requirements** It generally occupies coastal lakes, inlets, bays and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats and sometimes saltmarsh of sheltered coasts.	Low – habitat preference to coastal areas. There are scattered records for this species throughout the region and elsewhere across inland Australia. However, this species has been listed to rarely occur inland (DPE 2022b). During long-distance migratory movements birds are considered to potentially cross the proposed development.
Oxyura australis	Blue-billed Duck	V	–	No	BAM-C	Predicted	**Habitat requirements** The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover. It will fly if disturbed but prefers to dive if approached. Potential habitat occurs in PCTs 17, 24 & 160.	Low – a deep water species that is unlikely to be supported by local wetland types.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Pachycephala inornata	Gilbert's Whistler	V	–	No	BAM-C	Predicted	**Habitat requirements** The Gilbert's Whistler occurs in a range of habitats within NSW, though the shared feature appears to be a dense shrub layer. It is widely recorded in mallee shrublands, but also occurs in box-ironbark woodlands, Cypress Pine and Belah woodlands and River Red Gum forests, though at this stage it is only known to use this habitat along the Murray, Edwards and Wakool Rivers. Within the mallee the species is often found in association with an understorey of spinifex and low shrubs including wattles, hakeas, sennas and hop-bushes. In woodland habitats, the understorey comprises dense patches of shrubs, particularly thickets of regrowth Callitris pine. Parasitic 'cherries' (*Exocarpus* species) appear to be an important habitat component in Belah and Red Gum communities, though in the latter case other dense shrubs, such as Lignum and wattles, are also utilised Potential habitat occurs in PCTs 17, 28 & 58.	Low – requires high quality woodlands which do not occur in the vicinity of the study area.
Pedionomus torquatus	Plains-wanderer	E	CE	Yes	PMST, BAM-C	Predicted / Candidate	**Habitat requirements** Plains-wanderers live in semi-arid, lowland native grasslands that typically occur on hard red-brown soils. Habitat structure appears to play a more important role than plant species composition. Preferred habitat of the Plains-wanderer typically comprises 50% bare ground, 10% fallen litter, and 40% herbs, forbs and grasses.	**Moderate** – no mapped important habitat within the project site. However, mapped important habitat occurs 25 km to the east with potential habitat found within the project site when conditions are favourable.
Pelecanus conspicillatus	Australian Pelican	–	M	–	Recorded	–		**Recorded** – observed fly over the project site during preliminary field surveys.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Pezoporus occidentalis	Night Parrot	EX	E	–	PMST	–	**Habitat requirements** The distribution of the Night Parrot has not been well documented, but it is known to be restricted to arid and semi-arid Australia. Is known to occur within Spinifex grasslands in stony or sandy areas and samphire and chenopod associations on floodplains, salt lakes and clay pans.	Low – considered extinct in NSW with no sightings for 124 years.
Pomatostomus temporalis temporalis	Grey-crowned Babbler (Eastern subspecies)	V	–	–	BioNet, BAM-C	Predicted	**Habitat requirements** Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Woodlands on fertile soils in coastal regions. Potential habitat occurs in PCTs 16, 28 & 58.	**High** – multiple records within the locality and suitable habitat located within the proposed development.
Polytelis anthopeplus monarchoides	Regent Parrot (eastern subspecies)	E	V	No	BAM-C	Predicted / Candidate	**Habitat requirements** 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. Potential habitat occurs in PCT 16.	Low – project site falls to the east of the known range for this species.
Polytelis swainsonii	Superb Parrot	V	V	No	BioNet, PMST, BAM-C	Predicted / Candidate	**Habitat requirements** Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. In the Riverina the birds nest in the hollows of large trees (dead or alive) mainly in tall riparian River Red Gum Forest or Woodland. On the South West Slopes nest trees can be in open Box-Gum Woodland or isolated paddock trees. Species known to be used are Blakely's Red Gum, Yellow Box, Apple Box and Red Box. Potential habitat occurs in PCT 28.	**High** – multiple records within the locality and suitable habitat located within the proposed development.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Pyrrholaemus brunneus	Redthroat	V	–	No	BAM-C	Predicted	**Habitat requirements** In NSW the species has been recorded mainly in chenopod shrublands including Old Man Saltbush, Black Bluebush and Dillon Bush shrublands. In other locations it is known from Canegrass and Lignum swamps and depressions, particularly on floodplains. Potential habitat occurs in PCTs 17, 24, 153 & 163	Low – this species is unlikely to occur due to a lack of suitable habitat.
Rostratula australis	Australian Painted Snipe	E	E	–	PMST, BAM-C	Predicted	**Habitat requirements** Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Potential habitat occurs in PCTs 17, 24 & 160.	Low – may occur under rare climatic conditions that recharge local wetlands.
Stagonopleura guttata	Diamond Firetail	V	–	No	BAM-C	Predicted	**Habitat requirements** Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum *Eucalyptus pauciflora* Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Potential habitat occurs in PCTs 16, 28 & 58.	Low – species requires good quality woodland habitats that do not occur within the project site.
Stictonetta naevosa	Freckled Duck	V	–	No	BAM-C	Predicted	**Habitat requirements** Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds. Potential habitat occurs in PCTs 17, 24 & 160.	Low – no records within the locality. Rare occurrences in swamp habitats cannot be discounted.
Threskiornis spinicollis	Straw-necked Ibis	–	M	–	Recorded	–		**Recorded** – observed fly over the project site during preliminary field surveys.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Tyto novaehollandiae	Masked Owl	V	–	No	BAM-C	Predicted / Candidate	**Habitat requirements** Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. Living or dead trees with hollows greater than 20 cm diameter required for breeding. Potential habitat occurs in PCTs 24.	Low – no records within the locality. Rare occurrences along riparian habitats cannot be discounted.
Mammals								
Chalinolobus picatus	Little Pied Bat	V	–	No	BAM-C	Predicted	**Habitat requirements** The Little-Pied Bat is found in inland Queensland and NSW (including Western Plains and slopes) extending slightly into South Australia and Victoria and has been recorded in dry open forest, open woodland, Mulga woodlands, chenopod shrublands, Callitris forest and mallee. The species roosts and breeds in tree hollows, fissures or cracks, buildings, powerpoles, fenceposts, caves, cliff crevices, mine shafts and tunnels. Roost sites in caves are usually warm and dry but the species can tolerate roost temperatures of more than 40 degrees celsius. Potential habitat occurs in PCTs 16, 17, 24, 28, 58, 153, 157, 160, 163, 164 & 166.	Low – species requires good quality woodland habitats.
Myotis macropus	Southern Myotis	V	–	No	BAM-C	Candidate	**Habitat requirements** The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. They generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, road culverts, buildings, under bridges and in dense foliage.	Low – likely to occur in the wider region along higher quality riparian habitats.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Nyctophilus corbeni	Corben's Long-eared Bat	V	V	–	PMST	–	**Habitat requirements** Overall, the distribution of the south eastern form coincides approximately with the Murray Darling Basin with the Pilliga Scrub region being the distinct stronghold for this species. Inhabits a variety of vegetation types, including mallee, bulloke and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. Roosts in tree hollows, crevices, and under loose bark. Potential habitat occurs in PCT 28 & 58.	Low – records restricted to more heavily wooded areas to the northwest of the proposed development. Due to restricted suitable habitat and connectivity with known populations it is considered unlikely for this species to occur within the proposed development.
Phascolarctos cinereus	Koala	V	V	No	PMST, BAM-C	Predicted / Candidate	**Habitat requirements** The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. It was briefly historically abundant in the 1890s in the Bega District on the south coast of NSW, although not elsewhere, but it now occurs in sparse and possibly disjunct populations. Koalas are also known from several sites on the southern tablelands. Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Some preferred species include Forest Red Gum, Grey Gum. In coastal areas, Tallowwood and Swamp Mahogany are important food species, while in inland areas White Box, Bimble Box and River Red Gum are favoured. Home range size varies with quality of habitat, ranging from less than two hectares to several hundred hectares in size. Potential habitat occurs in PCT 13, 15, 16 & 57.	Low – records restricted to the Murray River to the south of the proposed development.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Saccolaimus flaviventris	Yellow-bellied Sheathtail Bat	V	–	No	BAM-C	Predicted	**Habitat requirements** The Yellow-bellied Sheathtail-bat is a wide-ranging species found across northern and eastern Australia. In the most southerly part of its range – most of Victoria, south western NSW and adjacent South Australia – it is a rare visitor in late summer and autumn. There are scattered records of this species across the New England Tablelands and North West Slopes. Potential habitat occurs in PCTs 13, 15, 16, 17, 19, 24, 28, 57, 160 & 181.	**Moderate** – a large bat using a range of habitat types and occasional records cannot be entirely discounted.
Vespadelus baverstocki	Inland Forest Bat	V	–	No	BAM-C	Predicted	**Habitat requirements** This species roosts in tree hollows and abandoned buildings. The single young is carried by its mother until its weight affects her flight, and is then left in the roost at night. Roosts in tree hollows and abandoned buildings. It has been recorded from a variety of woodland formations, including mallee, mulga and River Red Gum. Colony size ranges from a few individuals to more than fifty. Females congregate to raise young. These bats fly rapidly and cover an extensive foraging area. In NSW it has been most regularly captured in the far south west, north from the Murray River to Menindee, and at least as far east as the Balranald-Ivanhoe Road. There is some evidence to suggest that this species also occurs in the central NSW mallee, centred on Nombinnie Nature Reserve, although there has been very little recent survey in this part of the state. There are relatively few records of any Vespadelus species in the north west of NSW and so whether this species does occur here is unknown. Some of the gaps in knowledge on the distribution of this and other bat species in western NSW probably reflects the lack of survey effort in most of this region. Potential habitat occurs in PCTs 13, 15, 16, 28 & 57.	Low – species requires good quality woodland habitats.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Reptiles								
Delma impar	Striped Legless Lizard	V	V	No	PMST	–	**Habitat requirements** The Striped Legless Lizard occurs in the Southern Tablelands, the South West Slopes, the Upper Hunter and possibly on the Riverina. Populations are known in the Goulburn, Yass, Queanbeyan, Cooma, Muswellbrook and Tumut areas. Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Also found in secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland. Habitat is where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo Grass *Themeda australis*, spear-grasses *Austrostipa* spp. and poa tussocks *Poa* spp., and occasionally wallaby grasses *Austrodanthonia* spp. Sometimes present in modified grasslands with a significant content of exotic grasses. Sometimes found in grasslands with significant amounts of surface rocks, which are used for shelter.	Low – no associated habitat within the project site. Species is not considered further.
Tiliqua occipitalis	Western Blue-tongued Lizard	V	–	No	BAM-C	Predicted	**Habitat requirements** Arid areas, often associated with mallee and spinifex. Found in a variety of xeric habitats, often in close association with mixed mallee/ Triodia communities. Potential habitat occurs in PCTs 57 & 153.	Low – the project site is likely east of the known range of this species.

Scientific name	Common name	BC Act[1]	EPBC Act[2]	SAII[3]	Source[4]	BAM–C[5]	Habitat suitability[6]	Likelihood of occurrence
Fish								
Galaxias rostratus	Flathead Galaxias	CE	CE	–	PMST	–	Due to the nature of construction, the project is unlikely to have an impact on any fish species (i.e. Wind turbines unlikely to be built within the confines of creeks, streams and wetland areas). Not considered likely to be affected by the proposed development.	
Maccullochella macquariensis	Trout Cod	E	E	–	PMST	–		
Maccullochella peelii	Murray Cod	–	V	–	PMST	–		
Macquaria australasica	Macquarie Perch	E	E	–	PMST	–		

(1) Listed under the *Biodiversity and Conservation Act 2016*: CE = Critically endangered, E = Endangered, V = Vulnerable

(2) Listed under the *Environmental Protection and Biodiversity Conservation Act 1999*: CE = Critically endangered, E = Endangered, V = Vulnerable, M = Migratory

(3) SAII = Serious and Irreversible Impact

(4) Sources include BAM-C = Biodiversity Assessment Method Calculator, PMST = The Department of the Environment and Energy's EPBC Protected Matters Search Tool, BioNet = ESS's Bionet Atlas of NSW Wildlife, ALA = Atlas of Living Australia spatial search tool

(5) Credit type as output by the BAM-C: Predicted = predicted ecosystem credit species, Candidate = candidate species credit species

(6) Unless otherwise stated (in-text references) all information for habitat suitability has been sourced from BioNet Atlas of NSW Wildlife

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