

APPENDIX D

Biodiversity Site Suitability
Assessment



An example of the gilgai formations common throughout the site



OPPORTUNITIES AND CONSTRAINTS REPORT

SITE SUITABILITY ASSESSMENT – NARROMINE FREIGHT HUB

MAY 2023

Report prepared by
OzArk Environment & Heritage
for Barnson Pty Ltd
and the Australian Rail Track Corporation



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Acknowledgement

OzArk acknowledge Traditional Owners of the area on which this assessment took place and pay respect to their beliefs, cultural heritage, and continuing connection with the land. We also acknowledge and pay respect to the post-contact experiences of Aboriginal people with attachment to the area and to the elders, past and present, as the next generation of role models and vessels for memories, traditions, culture and hopes of local Aboriginal people.

ABBREVIATIONS AND GLOSSARY

AOBV	Areas of Outstanding Biodiversity Value
APZ	Asset Protection Zone
ASL	Above Sea Level
BAM	Biodiversity Assessment Methodology
BAR	Biodiversity Assessment Report
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
BDAR	Biodiversity Development Assessment Report
CBD	Central Business District
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DPIE	NSW Department of Planning, Industry and Environment
EARs	Environmental Assessment Requirements issued by the NSW Department of Planning, Industry and Environment.
EEC	Endangered Ecological Community
EIS	Environmental Impact Statement. A required document for major projects documenting all potential impacts to the environment, including heritage, that may arise due to the development.
EPA Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESCP	Erosion and Sediment Control Plan
FM Act	NSW <i>Fisheries Management Act 1994</i>
GDE	Groundwater Dependent Ecosystem
ha	Hectares
HBT	Hollow Bearing Trees
KFH	Key Fish Habitat
KTP	Key Threatening Process
LEP	Local Environmental Plan
LGA	Local Government Area
mm/cm/m/m ² /km	Millimetres, centimetres, metres, square metres, kilometres
MNES	Matters of National Environmental Significance
NSW	New South Wales
NPW Act	NSW <i>National Parks and Wildlife Act 1974</i>
NPWS	NSW National Parks and Wildlife Service
OEH	Office of the Environment and Heritage. Former government department
PMST	Protected Matters Search Tool
PCT	Plant Community Type
REF	Review of Environmental Factors
RF Act	NSW <i>Rural Fires Act 1997</i>

RoTAP	Rare or Threatened Australian Plant
SEC	Sedimentation Erosion Control
SEPP	State Environmental Planning Policy
TEC	Threatened Ecological Communities
WoNS	Weeds of National Significance

Term	Description
Areas of outstanding biodiversity	<p>An area of outstanding biodiversity value is:</p> <ul style="list-style-type: none"> ○ an area important at a State, national or global scale, and ○ an area that makes a significant contribution to the persistence of at least one of the following: <ul style="list-style-type: none"> i. multiple species or at least one threatened species or ecological community ii. irreplaceable biological distinctiveness iii. ecological processes or ecological integrity iv. outstanding ecological value for education or scientific research. <p>The declaration of an area may relate, but is not limited, to protecting threatened species or ecological communities, connectivity, climate refuges and migratory species (BC Act).</p>
Cumulative impact	<p>The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Refer to Clause 228(2) of the EP&A Regulation 2000 for cumulative impact assessment requirements.</p>
Direct impacts	<p>Are those that directly affect the habitat of species and ecological communities and of individuals using the study area. They include, but are not limited to, death through predation, trampling, poisoning of the animal/plant itself and the removal of suitable habitat (OEH 2018).</p>
Habitat	<p>The area occupied or used, including areas periodically or occasionally occupied or used, by any threatened species or ecological community and includes all the different aspects (both biotic and abiotic) used by species during the different stages of their life cycle (OEH 2018).</p>
Important population	<p>Is a population that is necessary for a species' long-term survival and recovery; this may include populations identified as such in recovery plans, and/or that are:</p> <ul style="list-style-type: none"> ○ key source populations either for breeding or dispersal

Term	Description
	<ul style="list-style-type: none"> ○ populations that are necessary for maintaining genetic diversity, and/or ○ populations that are near the limit of the species range (DE 2013).
Indirect impact	<p>Occur when project-related activities affect species or ecological communities in a manner other than direct loss within the subject site. Indirect impacts may sterilise or reduce the habitability of adjacent or connected habitats. Indirect impacts can include loss of individuals through starvation, exposure, predation by domestic and/or feral animals, loss of breeding opportunities, loss of shade/shelter, reduction in viability of adjacent habitat due to edge effects, deleterious hydrological changes, increased soil salinity, erosion, inhibition of nitrogen fixation, weed invasion, noise, light spill, fertiliser drift, or increased human activity within or directly adjacent to sensitive habitat areas (OEH 2018).</p>
Invasive species	<p>Is an introduced species, including an introduced (translocated) native species, which out-competes native species for space and resources, or which is a predator of native species. Introducing an invasive species into an area may result in that species becoming established. An invasive species may harm listed threatened species or ecological communities by direct competition, modification of habitat or predation.</p>
Local population (in regards to a threatened species)	<p>Comprises those individuals known or likely to occur in the study area, as well as any individuals occurring in adjoining areas (contiguous or otherwise) that are known or likely to utilise habitats in the study area (DECC 2007).</p>
Mitchell landscape	<p>Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000 (OEH 2018).</p>
Mitigation	<p>Action to reduce the severity of an impact.</p>
Mitigation measure	<p>Any measure that prevents, reduces, or controls adverse environmental effects of a project.</p>
Proposal	<p>Is considered to include ‘all activities likely to be undertaken within the subject site to achieve the objective of the proposed development’ (DECC 2007).</p>

Term	Description
Study area	Means the subject site and any additional areas which are likely to be affected by the proposal, either directly or indirectly (OEH 2018).
Study region	Is considered to 'include the lands that surround the subject site for a distance of 10 km' (DECC 2007).
Subject site	Means the area directly affected by the proposal. The subject site includes the footprint of the proposal and any ancillary works, facilities, accesses, or hazard reduction zones that support the construction or operation of the development or activity (OEH 2018).
Target species	A species that is the focus of a study or intended beneficiary of a conservation action or connectivity measure.

EXECUTIVE SUMMARY

OzArk has been engaged by Barnson Pty Ltd (client) on behalf of the Australian Rail Track Corporation (ARTC; proponent), to conduct a biodiversity site suitability assessment of the proposed site of a freight hub associated with the east-west greenfield take-off point for the Narromine to Narrabri (N2N) rail corridor, on the property “Cragie Lea” near Narromine, NSW. An area of c. 800 ha of this property was assessed in April 2021 (the “initial assessment area”) as part of the N2N programme. Subsequently, an area in the northeastern corner of this property was earmarked for future development of a freight hub by Narromine Shire Council (NSC) and was subjected to additional assessments in April 2023. This area, c. 118 ha in size and including part of the road corridor in Cragie Lea Lane, was defined as the “subject site” of this study. An additional area was noted by the client as having potential for development in future; this area, located to the south of the subject site, has been designated the “future expansion area.” This report addresses ecological constraints within the subject site, with discussion of the future expansion area and data drawn from the initial assessment area where necessary. The terms “subject site”, “future expansion area,” and “initial assessment area” are used throughout to indicate these zones.

Field assessment of the subject site identified five Plant Community Types (PCTs) with a combined area of 118.04 ha:

- PCT 45 – Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion.
- PCT 53 – Shallow freshwater wetland sedgeland in depressions on floodplains on inland alluvial plains and floodplains.
- PCT 82 – Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Penepplain Bioregion.
- PCT 201 – Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion.
- PCT 250 – Derived tussock grassland of the central western plains and lower slopes of NSW.

The most common of these was PCT 250 (“Derived tussock grassland of the central western plains and lower slopes of NSW”), which accounted for 96.32 ha. This community varied in condition from poor to good but retained a significant native component throughout. PCT 45 accounted for 12.56 ha, PCT 53 for 4.07 ha, PCT 82 for 2.67 ha and PCT 201 for 0.70 ha. PCT 201 occurs wholly within the road corridor. Four PCTs (45, 53, 82, and 250) occurred within the future expansion area, which contained 26.37 ha of native vegetation.

Two Threatened Ecological Communities (TECs) were identified within the subject site and one within the future expansion area:

- *Biodiversity Conservation Act 2016* (BC Act), Endangered: Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions. (Subject site: 8.79 ha; Future expansion area: 16.62 ha).
- BC Act, Endangered: Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions. (Subject site: 0.70 ha).

A third TEC is considered likely, though survey guidelines recommend that the assessment be conducted in spring:

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), Endangered: Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia. (Subject site: 7.86 ha; Future expansion area: 16.62 ha).

Additional areas of these TECs occur on the northern side of the Cragie Lea Lane road corridor. A greater extent of the BC Act-listed Fuzzy Box Endangered Ecological Community (EEC) occurs on this northern side than within the subject site.

One threatened plant species, Bluegrass (*Dichanthium setosum*), was recorded during the field survey. One small population was recorded within the subject site and one larger population within the future expansion area. Four additional populations were recorded within the initial assessment area during surveys in April 2021. This species is listed as vulnerable under the BC and EPBC Acts. As the subject site is located at the southern limit of the known range of this species, this occurrence is likely to constitute an important population. Consequently, impacts to this species may be deemed significant and could therefore trigger entry into the NSW Biodiversity Offsets Scheme (BOS) and/or referral to the Minister under the EPBC Act.

Six threatened fauna species (four birds and two bats) were detected either during the field surveys or by means of recording devices. All six species are listed as vulnerable under the BC Act, while one, the Superb Parrot (*Polytelis swainsonii*), is also listed as vulnerable under the EPBC Act. As these species are highly mobile, they are likely to make use of both the subject site and future expansion area, as well as much of the road corridor.

A total of 175 threatened species or populations are known or predicted to occur within the three IBRA subregions that fall within 10 km of the subject site. Impacts to 81 of these may occur as a result of clearing of the subject site. Clearing of the future expansion area may result in impacts to 67 of these species. Impacts to up to 42 species identified by a Matters of National Environmental Significance search may result from future development within these areas. Tests of significance have not been conducted for these species; consequently, it cannot be stated with certainty whether these impacts would be significant. In the case of many species, particularly marine and migratory species, the impacts are likely to be negligible.

The field survey identified 44 hollow-bearing trees (42 live and two dead) within the subject site and an additional six (all live) within the future expansion area (**Figure 5-1**). Hollows were classed as either small (< 20 cm diameter) or large (\geq 20 cm diameter) to provide an indication of the species most likely to make use of them. The trees within the subject site contained a total of 28 large and 99 small hollows, as well as one stick nest. Six habitat trees (all live) were recorded within the future expansion area, containing a total of one large and 14 small hollows. Additional habitat trees containing nests and hollows were recorded in the northern side of the road corridor and outside of the western limit of the subject site within the southern road corridor.

The most significant identified constraints associated with any proposal situated in the subject site or future expansion area are the relatively large areas of TEC that would be impacted and the presence of the threatened Bluegrass. Efforts to reduce impacts to these entities are strongly encouraged in order for future development to comply with the requirement to avoid and/or minimise impacts to biodiversity values.

This report covers the current form of the proposal and is intended only to assess constraints and limitations within the proposal site. It does not constitute a finalised biodiversity assessment.

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1 INTRODUCTION

1.1 BRIEF DESCRIPTION OF WORKS

OzArk Environment & Heritage (OzArk) has been engaged by Barnson Pty Ltd (the client), on behalf of Australian Rail Track Corporation (ARTC, the proponent) to undertake a biodiversity site suitability assessment of the proposed site of a freight hub associated with the east-west greenfield take-off point for the Narromine to Narrabri (N2N) rail corridor, on the property “Cragie Lea” near Narromine, NSW. An area of c. 800 ha of this property was assessed in April 2021 (“initial assessment area”) as part of the N2N programme. Subsequently, an area in the northeastern corner of this property was earmarked for future development of a freight hub and was subjected to additional assessments in April 2023. This area, c. 118 ha in size and including part of the road corridor in Cragie Lea Lane, was defined as the “subject site” of this study. An additional area was noted by the client as having potential for development in future; this area, located to the south of the subject site, has been designated the “future expansion area.” This report addresses ecological constraints within the subject site, with discussion of the future expansion area and data drawn from the initial assessment area where necessary.

This assessment was conducted by means of database searches and field surveys. The methodologies employed in conducting this assessment are described in **Section 3**.

1.2 STUDY AREA AND RELEVANT TERMS

The proposal is in the Narromine Local Government Area (LGA). The study area is shown in **Figure 1-1**.

The following terms are used in this report to describe and contextualise the development location (see **Figure 1-1**):

- Search area – the area within a 10 km radius of the subject site. This 10 km buffer has been used to search information sources to establish the landscape context of the subject site.
- Study area – the area within a 1,500 m radius of the subject site.
- Subject site – the footprint of the proposal and the area directly affected by development activities.
- Initial assessment area – an area of approximately 800 ha, comprising the property Cragie Lea east of the existing railway line, that was surveyed by means of a rapid assessment method in April 2021.
- Future expansion area – an area of approximately 30 ha adjacent to the subject site on its southern edge, earmarked for potential future development.

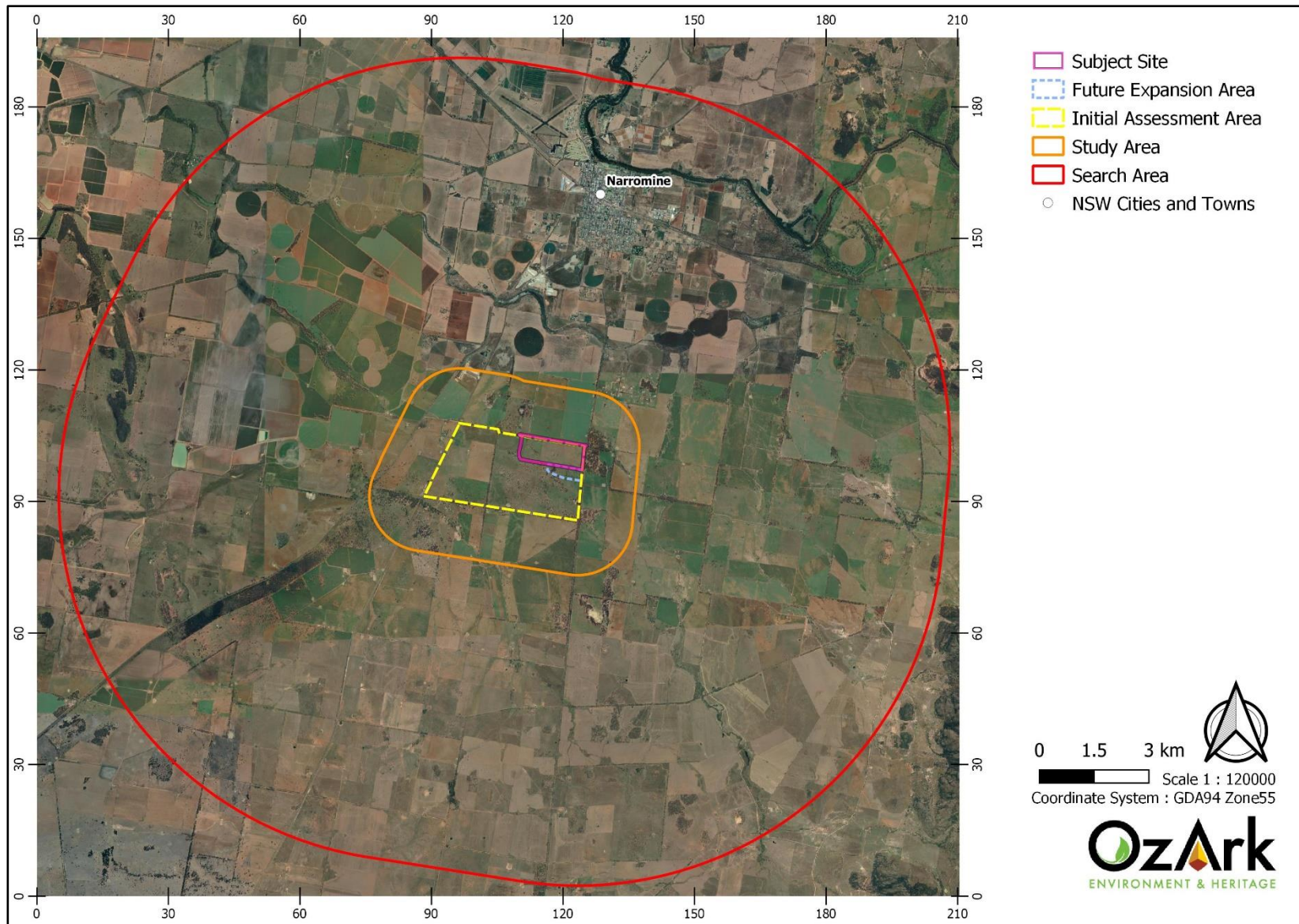


Figure 1-1. Regional location of the subject site and future expansion area.

2 STATUTORY AND PLANNING CONTEXT

2.1 COMMONWEALTH LEGISLATION

2.1.1 Environment Protection & Biodiversity Conservation Act 1999 (EPBC Act)

To assist with assessments of nationally listed matters, the Matters of National Environmental Significance: Significant impact guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999 (DoE 2013) are followed.

Birds listed in the following international agreements are regarded as migratory birds under the EPBC Act.

- China-Australia Migratory Bird Agreement (CAMBA).
- Japan-Australia Migratory Bird Agreement (JAMBA).
- Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

Matters which fall under this legislation are addressed in **Section 5.6** and **Appendix D**.

2.2 STATE LEGISLATION

2.2.1 Environmental Planning and Assessment Act 1979 (EP&A Act)

The EP&A Act is the principal planning legislation for NSW. It provides a framework for the overall environmental planning and assessment of proposals.

Part 5 of this Act requires that a determination be made as to whether a proposed action is likely to significantly affect threatened species or ecological communities, or their habitats listed on Schedule 1 and 2 of the BC Act. Where found, the assessment criteria under Part 7 Section 7.3 of the BC Act (the 'Assessment of Significance') will be drawn upon to determine whether there would be a significant effect on these species and hence whether a Species Impact Statement or Biodiversity Development Assessment Report is required.

2.2.2 Biodiversity Conservation Act 2016 (BC Act)

The BC Act relates to the terrestrial environment and includes threatened species, ecological communities, key threatening processes and other protected animals and plants.

Section 7.3 of the BC Act contains a five-part test of significance for determining whether a proposed development or activity is likely to significantly affect threatened species or ecological communities, or their habitats.

Where a significant impact is likely to occur, the proponent must either opt in to the BOS and prepare a BDAR or prepare a SIS for each significantly impacted BC Act-listed entity.

BC Act-listed communities are addressed in **Section 5.4**. BC Act-listed species are addressed in **Sections 6.1.2.** and **6.1.3.**

2.2.3 Biodiversity Offsets Scheme

Under the BC Act, the Biodiversity Offsets Scheme (BOS) applies to Part 4 developments when clearing thresholds identified in Part 7 of the NSW Biodiversity Conservation Regulation 2017 are exceeded or when a significant impact to a threatened entity is identified. The BOS applies automatically to State Significant Developments (SSDs). For Part 5 activities, entry into the BOS is only triggered if proponents “opt in” to it or if a significant impact to a threatened entity is identified.

The clearing limit that, when exceeded, triggers BOS requirements varies with the minimum lot size associated with the development site. The largest clearing threshold is 2 ha, which applies when the minimum lot size is 1000 ha or more.

If assessed as a Part 4 activity, this proposal would trigger entry into the BOS. If assessed as a Part 5 activity, entry would only be triggered if the proponent opted in, or a significant impact to a threatened species was identified (see **Section 5.4.14** and **Section 5.5**).

2.2.4 NSW Biosecurity Act 2015

The Biosecurity Act aims to manage biosecurity risks from animal and plant pests and diseases, weeds and contaminants in NSW. The Biosecurity Act imposes a general biosecurity duty to ensure that, so far as is reasonably practicable, any biosecurity risk is prevented, eliminated or minimised. The proponent is required to manage the presence of weeds in the study area.

2.2.5 Local Land Services Act 2013

The objects of the Act include ‘to ensure the proper management of natural resources in the social, economic and environmental interests of the State, consistently with the principles of ecologically sustainable development. The Act regulates the clearing of native vegetation.

2.2.6 Fisheries Management Act 1995 (FM Act)

Part 7A of the FM Act and schedules within the Act list threatened aquatic and marine species, populations and ecological communities and key threatening processes which must be considered as part of obligations under Section 5.5 of the EP&A Act.

Section 199 of the FM Act states a public authority must notify the Minister of the NSW Department of Primary Industries – Fisheries (DPI – Fisheries) for any work that constitutes dredging or reclamation in a waterway.

Under section 198A of the FM Act:

"water land" means land submerged by water:

- (a) whether permanently or intermittently, or*
- (b) whether forming an artificial or natural body of water,*

and includes wetlands and any other land prescribed by the regulations as water land to which this Division applies.

No impacts to watercourses are expected to result from this proposal (see **Section 4.4**).

2.2.7 Narromine Local Environmental Plan (2011)

A Local Environmental Plan (LEP) is a legal document prepared by Council and approved by the State Government to regulate land use and development. LEPs guide planning decisions for local governments. The plan allows Council to regulate the ways in which all land both private and public may be used and protected through zoning and development controls.

The Narromine LEP (2011) aims:

- (aa) to protect and promote the use and development of land for arts and cultural activity, including music and other performance arts,
- (a) to encourage economic development through tourism activities, business, employment initiatives and fostering industry growth,
- (b) to protect and conserve the natural environment including surface and ground water, soil, air and native vegetation by encouraging sustainable development,
- (c) to encourage sustainable agricultural practices, including intensive agriculture, by minimising land use conflicts and facilitating farm adjustments.

The initial assessment area contains large areas mapped as sensitive for terrestrial biodiversity in the LEP (**Appendix A**). The subject site extends in places into these sensitive areas.

2.3 STATE ENVIRONMENTAL PLANNING POLICIES UNDER THE EP&A ACT 1979

2.3.1 State Environmental Planning Policy (Transport and Infrastructure) 2021

The Transport and Infrastructure SEPP aims to facilitate the effective delivery of infrastructure across the state, including for railroads and rail infrastructure facilities. It permits development on any land for the purpose of certain rail or rail infrastructure facilities to be carried out by or on behalf of a public authority without consent.

The proposal is not located on land reserved under the *National Parks and Wildlife Act 1974* and does not require development consent or approval under *SEPP (Resilience and Hazards) 2021*, *SEPP (Precincts - Regional) 2021* or *SEPP (Planning Systems) 2021*.

2.3.2 State Environmental Planning Policy (Biodiversity and Conservation) 2021

The *State Environmental Planning Policy (Biodiversity and Conservation) 2021* (Biodiversity and Conservation SEPP) consolidates, transfers and repeals provisions of 11 SEPPs, the following of which are the relevant to the current assessment:

- *State Environmental Planning Policy (Koala Habitat Protection) 2020*, and
- *State Environmental Planning Policy (Koala Habitat Protection) 2021*.

Chapters 3 and 4 of the Biodiversity and Conservation SEPP aims to encourage the 'proper conservation and management of areas of natural vegetation that provide habitat for Koalas to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline'. The Narromine LGA is included in Schedule 2 of the SEPP and hence is subject to the requirements of the SEPP. As the subject site falls on land zoned RU1 – Primary Production within the Narromine Shire Council Local Government Area, the provisions of Chapter 3 of the SEPP apply to any future developments. This requires a consideration of whether the site constitutes potential or core Koala habitat. Potential Koala habitat is defined as areas of native vegetation in which trees listed in Schedule 1 of the SEPP make up 15% or more of the total number of trees. This is likely to apply to certain occurrences of PCT 82 within the road reserve of Cragie Lea Lane, which contain one listed tree, Poplar Box (*Eucalyptus populnea* subsp. *bimbi*). Core Koala habitat refers to areas with extant populations of the Koala, as evidenced by 'breeding females, being females with young, and recent sightings of and historical records of a population.' One historical record (dating to 2004) occurs within the 10 km search area, located c. 1.4 km north of the subject site. It is unlikely that this would be taken to represent evidence of a resident population within the subject site; however, assessments of any future development should involve consideration of the potential impacts of any proposal on the Koala.

3 METHODS

The ecological assessment was carried out in three principal stages:

1. Desktop searches and a review of ecological databases and information to identify threatened species, populations or ecological communities listed in the BC, FM and EPBC Acts that have the potential to occur in the study area.
2. Field surveys of the subject site to collate species lists for the purposes of identifying the vegetation communities present and target predicted threatened species and ecological communities. Where a threatened species or community or habitat feature was identified, the nature and extent of the protected matter was documented and its 'viable local population' or occurrence described.
3. Preparation of this opportunities and constraints report to describe the potential impacts of the proposed activity on native vegetation, protected species, and threatened species, populations, and ecological communities, and provides recommendations to avoid, minimise and mitigate these impacts.

3.1 PROJECT PERSONNEL

OzArk Environment and Heritage Pty Ltd (OzArk) operates under NSW Scientific Research License 101908, and NSW Department of Primary Industries (DPI) Accreditation of a corporation as an animal research establishment Ref No. AW2022/012.

The initial field survey in April 2021 was completed by OzArk Ecologist Dr David Orchard and former OzArk Ecologist Maddy Walsh. Subsequent field surveys (April 2023) and reporting components were completed by Dr David Orchard, with quality control provided by Senior Ecologist Dr Crystal Graham. Key details of personnel are provided in **Table 3-1**.

Table 3-1. Project Personnel.

Name	Position and role	CV Details
Dr Crystal Graham	Senior Ecologist <ul style="list-style-type: none"> • Quality control 	<ul style="list-style-type: none"> • BAM-accredited Assessor #BAAS22024 • Postdoctoral Fellow – Smithsonian Tropical Research Institute • Doctor of Philosophy (Biology) – University of Sydney • Honours in Biology – University of Sydney • Bachelor of Advanced Science – University of Sydney • 4WD Training • First Aid Training • WH&S Induction Training for Construction Work • Worker at Heights Training
Dr David Orchard	Ecologist <ul style="list-style-type: none"> • Initial and subsequent surveys • Reporting 	<ul style="list-style-type: none"> • BAM-accredited Assessor #BAAS21028 • Doctor of Philosophy (Agriculture) – Charles Sturt University • Graduate Diploma in Science (Botany) – University of New England • Bachelor of Arts (Honours)– Australia National University

		<ul style="list-style-type: none"> • First Aid Training • WH&S Induction Training for Construction Work • Rail Industry Worker Card
Madeline Walsh	Ecologist <ul style="list-style-type: none"> • Initial survey 	<ul style="list-style-type: none"> • Bachelor of Environmental Biology – University of Technology Sydney • Honours – Ecology – University of New South Wales • First Aid Training • WH&S Induction Training for Construction Work

3.2 BACKGROUND RESEARCH

Preliminary assessments drew on local experience, previous reporting and information held in government databases and archives. Results of database searches were used to assist in identifying distributions, suitable habitats and known records of threatened species to increase the effectiveness of field investigations. Information sources reviewed included the following:

- NSW Government online aerial imagery (www.maps.six.nsw.gov.au).
- Critical habitat register available on the OEH website at <http://www.environment.nsw.gov.au/criticalhabitat/CriticalHabitatProtectionByDoctype.htm>
- NSW Government Biodiversity Values Map which identifies land with high biodiversity value, as defined by the Biodiversity Conservation Regulation 2017 (<https://www.lmbc.nsw.gov.au>).
- Flora and fauna records and profiles contained in the NSW Threatened Species Database, EPBC Protected Matters Search Tool and DPI threatened fish distribution maps.
- BioNet (www.bionet.nsw.gov.au) Wildlife Atlas and Plant Community Type (VIS) databases.
- Flora of NSW (Harden 1991-2002) and Flora NSW Online (www.plantnet.rbgsyd.nsw.gov.au).
- Regional Scale State Vegetation Map: Central West/Lachlan V1.4. (OEH, 2016)
- Prior assessments of relevant sections of N2N (ARTC 2020)

Database searches were undertaken before the field assessment to identify species known or predicted to occur in the subject site, including those with prior public records within 10 km. The results of these searches led to the identification of key species for field survey effort and targeted searches. Results of the database searches are provided in **Appendix A**.

A series of other background searches were performed to comply with legal standards (**see Table 3-2**).

Table 3-2. Desktop Survey Results

Environmental Considerations	In the study area?
Land identified on the Biodiversity Values Map under the <i>NSW BC Act 2016</i>	Within Study Area but not Subject Site
Area of Outstanding Biodiversity Value (AOBV) under the <i>NSW BC Act 2016</i>	No
Critical habitat nationally?	No
An area reserved or dedicated under the <i>National Parks and Wildlife Act 1974</i> ?	No
Is the proposal located within land reserved or dedicated within the meaning of the <i>Crown Lands Act 1989</i> for preservation of other environmental protection purposes?	No
A World Heritage Area?	No
Environmental Protection Zones in environmental planning instruments?	No
Lands protected under SEPP (Biodiversity and Conservation) 2021	Yes
Lands protected under SEPP Sydney Drinking Water Catchment?	No
Land identified as wilderness under the <i>Wilderness Act 1987</i> or declared as wilderness under the <i>National Parks and Wildlife Act 1974</i> ?	No
Aquatic reserves dedicated under the <i>Fisheries Management Act 1994</i> ?	No
FM Act listed Threatened Ecological Community?	No
Wetland areas dedicated under the Ramsar Wetlands Convention?	No
Land subject to a conservation agreement under the <i>National Parks and Wildlife Act 1974</i> ?	No
Land identified as State Forest under the <i>Forestry Act 1916</i> ?	No
Acid sulphate area?	No
Protected riparian habitat?	No
Mapped Key Fish Habitat?	No

3.3 HABITAT ASSESSMENT

The results of the desktop review and the field assessment were collated and reviewed in the context of local ecological knowledge to determine the likelihood of occurrence of threatened species and ecological communities, and potential impacts of the proposal (**Section 6** and **Appendix D**). For instance, some threatened species may be predicted to occur locally but, on assessment of the site, key habitat elements or conditions are not present, in which case the species would not be present or impacted. Species known or considered to have a moderate-high likelihood of occurring at the site, were then considered as to whether the extent and type of development would be likely to impact on them.

3.4 FIELD SURVEY

The initial field survey was conducted on April 22 and 23, 2021. The survey was conducted between the hours of 0830 and 1530 on April 22 and between the hours of 0900 and 1300 on

April 23. A third site visit was conducted on May 10 to collect the data recorders. This visit took place between the hours of 1430 and 1600 and entailed minor additional survey work.

Additional surveys were conducted in April 2023 to provide more detailed information regarding the proposed site of a freight hub and the associated road corridor. These surveys were conducted on April 3 between 1230 and 1530 and on April 26 between 1300 and 1530.

The objectives of the field survey were to:

- Identify native species and vegetation communities present.
- Identify the presence of any hollow-bearing habitat trees.
- Describe the quality and value of the vegetation and the flora and fauna habitat at the development site.
- Determine if species, populations or ecological communities listed as threatened under the BC Act or EPBC Act are/may be present.
- Determine the significance of impact to any threatened entities present or likely to be present.

3.4.1 Vegetation Community Survey

Vegetation communities were identified in accordance with the online NSW Master Plant Community Type Classification (OEH, 2018a), which is the current state-wide vegetation classification system for PCTs. This classification system is used for vegetation mapping, development assessment and site planning purposes. It describes over 1,500 PCTs across the state, and groups the vegetation communities into vegetation Class and Formation / Sub-formation as per Keith (2004).

In this study PCTs were identified on the basis of the following inputs:

- Regional scale State Vegetation Map: Central West / Lachlan V1.4. (OEH, 2016), which provides predictive mapping of PCTs in and around the subject site. This mapping is indicative only. It is not necessarily accurate at a fine scale for the purposes of the current study.
- State Vegetation Type Map C1.1.M1.1 (DPE, 2022). More recent mapping published after the initial survey. Similar caveats concerning the accuracy of the mapping apply to this dataset.
- Professional ecological knowledge about locally occurring vegetation types and landscape, soil and topographic patterns, including transitions from one community to another and potential for intergrades between plant communities.
- Field survey results confirming the flora species present, vegetation structure, landscape position and soil type at the subject site and the extent and condition of native vegetation.

- Reference to the BioNet Vegetation Classification database, this being used to identify the candidate vegetation communities likely to be present based on the site conditions (flora species present, vegetation structure, bioregion, and landscape position and soil type) and to access the relevant published PCT descriptions.

If any of the PCTs were identified as having potential to be part of a TEC, the relevant identification guidelines (NSW Scientific Committee listing criteria and Commonwealth identification guides) were consulted to determine the status of the vegetation community present on the subject site. These guidelines provide the identification criteria used to positively identify the community as being part of the TEC. The criteria include location, species present, overstorey species, weed cover, number and type of native species including whether certain 'important' native species are present.

Plant identification followed nomenclature in the Royal Botanic Gardens PlantNET online database (Royal Botanic Gardens and Domain Trust, 2023).

3.4.2 Vegetation Survey Methodology

The vegetation survey was conducted according to the following methodology:

- A 20 x 20 m plot was surveyed at each putative PCT location. Single plots were employed for small communities and multiple plots were employed where communities occupied larger areas. Plot size was adjusted to suit the extent of each PCT remnant.
- A total species list was compiled at each plot location.
- The dominant species within each stratum were recorded so as to aid in defining the community type.
- General notes were made at each plot relating to the following traits:
 - Vegetative age class.
 - Level of invasion by exotic species.
 - Leaf litter density.
 - Presence of rock outcrops.
 - Presence of fallen timber.
 - Culverts.
 - Traces and signs of fauna.
 - Soil erosion.
 - Impacts by fauna such as grazing.
- The PCT examples were located within or adjacent to the subject site and their GPS locations recorded (GDA 94 / MGA Zone 55).

- Vehicular and pedestrian traverses were used to determine the boundaries or transition points between PCTs and to record any additional plant species not observed in the survey plots.

3.4.3 Fauna Surveys

Those fauna species present within or close to the subject site were recorded while conducting the botanical survey and while traversing the areas of likely impact searching for habitat trees. Areas of potential habitat, such as rocks, loose bark and coarse woody debris, were examined for cryptic species. Areas of exposed earth and other sites that supported suitable substrate were searched for animal tracks. Other evidence of fauna presence on the subject site, such as scats, feathers and sloughed skins, were also recorded. Two song meters and two bat detectors were used to identify additional species making use of the subject site. These recording devices gathered data between April 22 and May 10, 2021. These recorders were located in the initial assessment area and not within the subject site that has since been assigned. Analysis of data from these recording devices was carried out by Lesryk Environmental. The location of the recorders is indicated in **Figure 3-1** below.

3.5 LIMITATIONS

This report is based upon the species data available at the time of the study, and the environmental conditions, season, and time constraints imposed by the project for the field survey. Specific limitations on this study include the following:

- All surveys were conducted in April, at which time many plant species are unlikely to be in flower and may not produce aboveground material for identification. Thus, flora lists should not be regarded as comprehensive.
- Certain specific fauna survey techniques (e.g. trapping and frog surveys) were not undertaken.
- The field survey was undertaken in the subject site and initial assessment area only and plant community type extents outside of the study area were not confirmed.

To overcome some of these limitations, a 'precautionary approach' for species presence has been adopted where required. If suitable habitat for a particular threatened species is present on the site or known to occur in the study area, then the species is assumed to also be present. The above-mentioned constraints were also considered when preparing the recommendations of avoiding, minimising, and mitigating potential impacts.

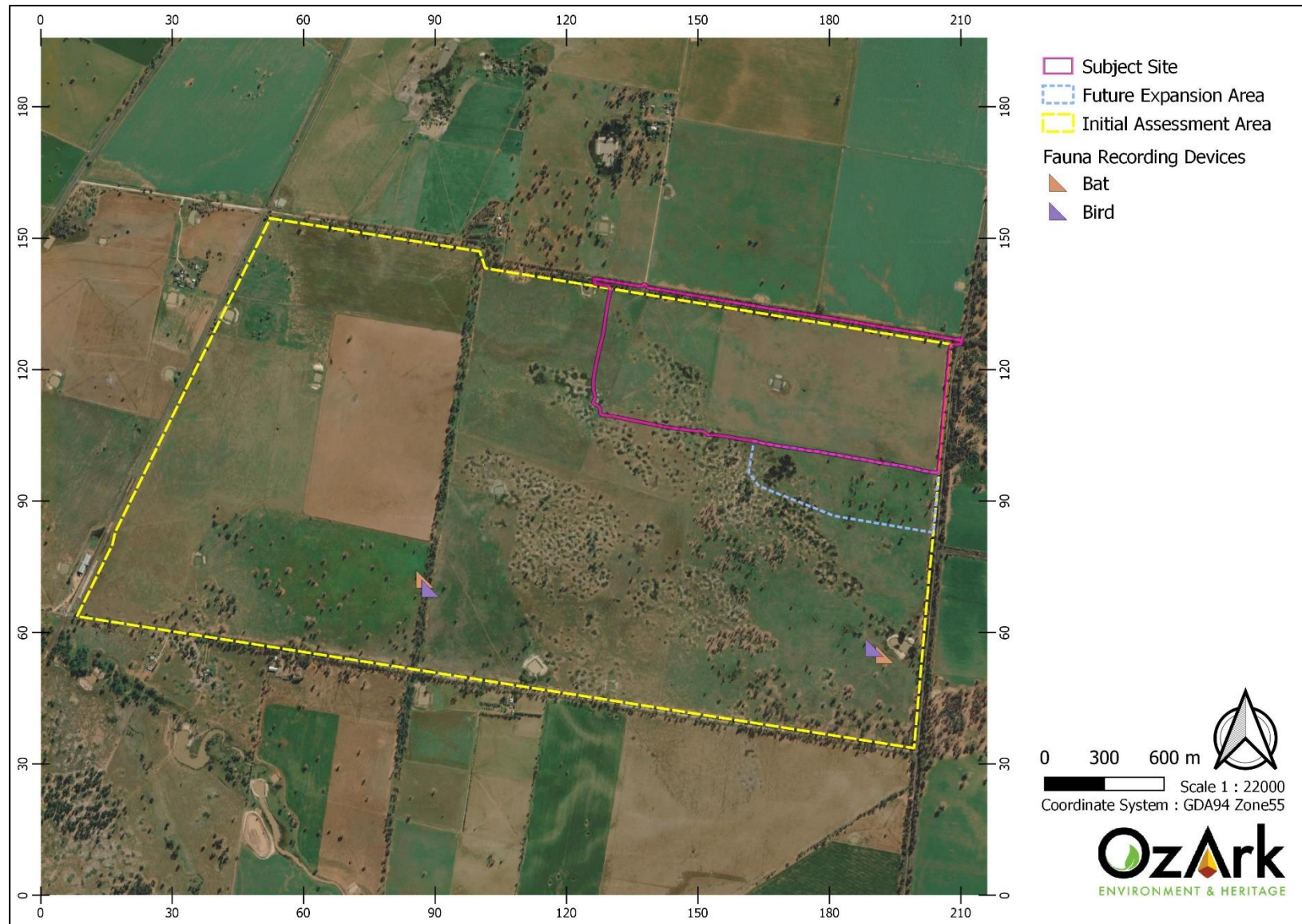


Figure 3-1. Location of bird and bat recording devices within the initial assessment area.

4 EXISTING ENVIRONMENT

4.1 BIOREGION

Under the current Interim Biogeographic Regionalisation of Australia (IBRA 7.0; Thackway & Cresswell, 1995), the search area falls principally within the Bogan-Macquarie Subregion of the Darling Riverine Plains Bioregion. A small area of the Pilliga subregion of the Brigalow Belt South Bioregion occurs in the north of the search area and two small areas of the Inland Slopes Subregion of the NSW South Western Slopes Bioregion occur in the east of the search area. The study area and subject site are wholly within the Bogan-Macquarie Subregion. These subregions are characterised by geology, landforms, soil types and vegetation as described in **Table 4-1**.

Table 4-1. Bioregion and subregion details.

Bioregion	Subregion	Geology	Landform	Soils	Vegetation
Darling Riverine Plains	Bogan-Macquarie	Bogan and Macquarie River alluvial fans of Quaternary age. Western margin is bedrock of the Cobar bioregion. Alluvial sediments from mixed Palaeozoic bedrock bury basement rock to 100m. Underlying sediments of Cretaceous and Jurassic age form part of the Great Artesian Basin	Channels, floodplains, and through flow swamps of past and present river systems.	Grey and brown clays on the plains and depressions with texture contrast soils on the low rises of former levees and channels.	River red gum and river cooba on the channels. White cypress pine and poplar box on coarser levees. Black box, belah, myall and lignum on floodplains. Complex patterns of common reed, cumbungi, and water couch depending on water levels in marshes. Poplar box woodland with wilga, budda, white pine, grey box, yellow box and Blakely's red gum on red soils on fan margins.
NSW South Western Slopes	Inland Slopes ¹	Upper slopes: Ordovician to Devonian folded and faulted sedimentary sequences with inter-bedded volcanic rocks and large areas of intrusive granites. Lower slopes: As for the Upper Slopes but with larger areas of Tertiary and Quaternary alluvium.	Upper slopes: Steep, hilly and undulating ranges and granite basins. Occasional basalt caps, confined river valleys with terrace remnants. Lower slopes: Undulating and hilly ranges and isolated peaks set in wide valleys at the apices of the Riverina alluvial fans.	Upper slopes: Shallow stony soils on steep slopes, texture contrast soils grading from red subsoils on upper slopes to yellow subsoils on lower slopes. Alluvial sands, loams and clays. Lower slopes: Similar to the Upper Slopes but with more extensive red-brown earths on undulating plains and more extensive grey clays on alluvium.	Upper slopes: Open forests and woodlands. Red stringybark on upper slopes with black cypress pine, kurrajong, red ironbark, white gum, white box, yellow box and Blakely's red gum on lower slopes. Merging west to yellow box, grey box and white cypress pine. Rough-barked apple on flats with river oak on upper tributaries and river red gum on lower and larger streams. Lower slopes: Dwyer's gum on granite, red ironbark on sedimentary rocks Hill red gum, white cypress pine and red

					stringybark in the ranges. Grey box woodlands with yellow box, white cypress pine and belah on lower areas. Poplar box, kurrajong, wilga and red box in the north, limited areas of bull mallee, blue mallee, green mallee and congoo mallee in the central west. Myall, rosewood and yarran on grey clays, yellow box, polar box, and belah on alluvial loams. River red gum on all streams with black box in the west with some lignum and river cooba.
Brigalow Belt South	Pilliga	Horizontal Jurassic quartz sandstones, limited shales, Tertiary basalt caps and plugs plus the sediments derived from these rocks.	Stepped sandstone ridges with low cliff faces and high proportion of rock outcrop. Long gentle outwash slopes intersected by sandy stream beds and prior stream channels. A few patches of heavy clay. Includes the spectacular mountain landscape of volcanic domes, plugs and dykes in the Warrumbungles.	Shallow black earths and red loams on basalts. Extensive harsh texture contrast soils, linear patterns of deep yellow sand, stony red brown earths.	White Box with White Cypress Pine and Kurrajong on the basalt hills. Blue-leaved Ironbark, White Gum, black cypress pine, whitewood, and rough-barked apple on stony sandstone plateau and streams. Narrow-leaved ironbark, white cypress pine, red stringy bark, patches of mallee and broom heath on gentler sandstone slopes. Pilliga box with grey box, poplar box, fuzzy box, bull oak, rosewood, wilga and budda on heavier soils in the west and north. River red gum lines all streams.

¹Note that a formal description of the Inland Slopes Subregion is not currently available. The description provided here relates to an earlier division of the New South Wales South Western Slopes Bioregion into two subregions, Upper Slopes and Lower Slopes.

4.2 NSW (MITCHELL) LANDSCAPES

The landscapes of NSW, often known as Mitchell Landscapes, were mapped in 2002 to provide a framework for reporting reserve establishment and for determining over-cleared landscapes (Mitchell, 2002). These landscapes broadly describe areas of similar topography, geology, soils and vegetation. The subject site is wholly contained within the Boggy Cowal Alluvial Plains, while the study area spans the Boggy Cowal Alluvial Plains and Narromine Hills landscapes (**Figure 4-1**). The characteristics of these landscapes are described in **Table 4-2**.

Table 4-2. NSW (Mitchell) Landscapes Within the Survey Area

Landscape	Geology and soils	Landform	Vegetation	Clearing Status
Boggy Cowal Alluvial Plains	Pleistocene fluvial sediments of backplain facies of the Carrabear Formation associated with the Boggy Cowal distributary stream system. Medium to heavy grey cracking clays with extensive gilgai. Carbonate nodules common in the subsoil and worked to gilgai crests,	Local relief to 2 m.	Extensive grasslands with scattered stands of myall (<i>Acacia pendula</i>), bimble box (<i>Eucalyptus populnea</i>), black box (<i>Eucalyptus largiflorens</i>) and belah (<i>Casuarina cristata</i>).	Overcleared. (82% cleared)
Narromine Hills	Low rounded hills standing above the alluvial plain on Ordovician and Devonian quartz sandstone, siltstone, chert and phyllite.	General elevation 240 to 290 m, local relief 40 m. Red-brown texture-contrast soils thicker on the western aspects	Woodlands of grey box (<i>Eucalyptus microcarpa</i>), yellow box (<i>Eucalyptus melliodora</i>), Dwyer's mallee gum (<i>Eucalyptus dwyeri</i>), and white cypress pine (<i>Callitris glaucophylla</i>) with wilga (<i>Geijera parviflora</i>), yarran (<i>Acacia homalophylla</i>) and other shrubs.	Overcleared. (89% cleared)

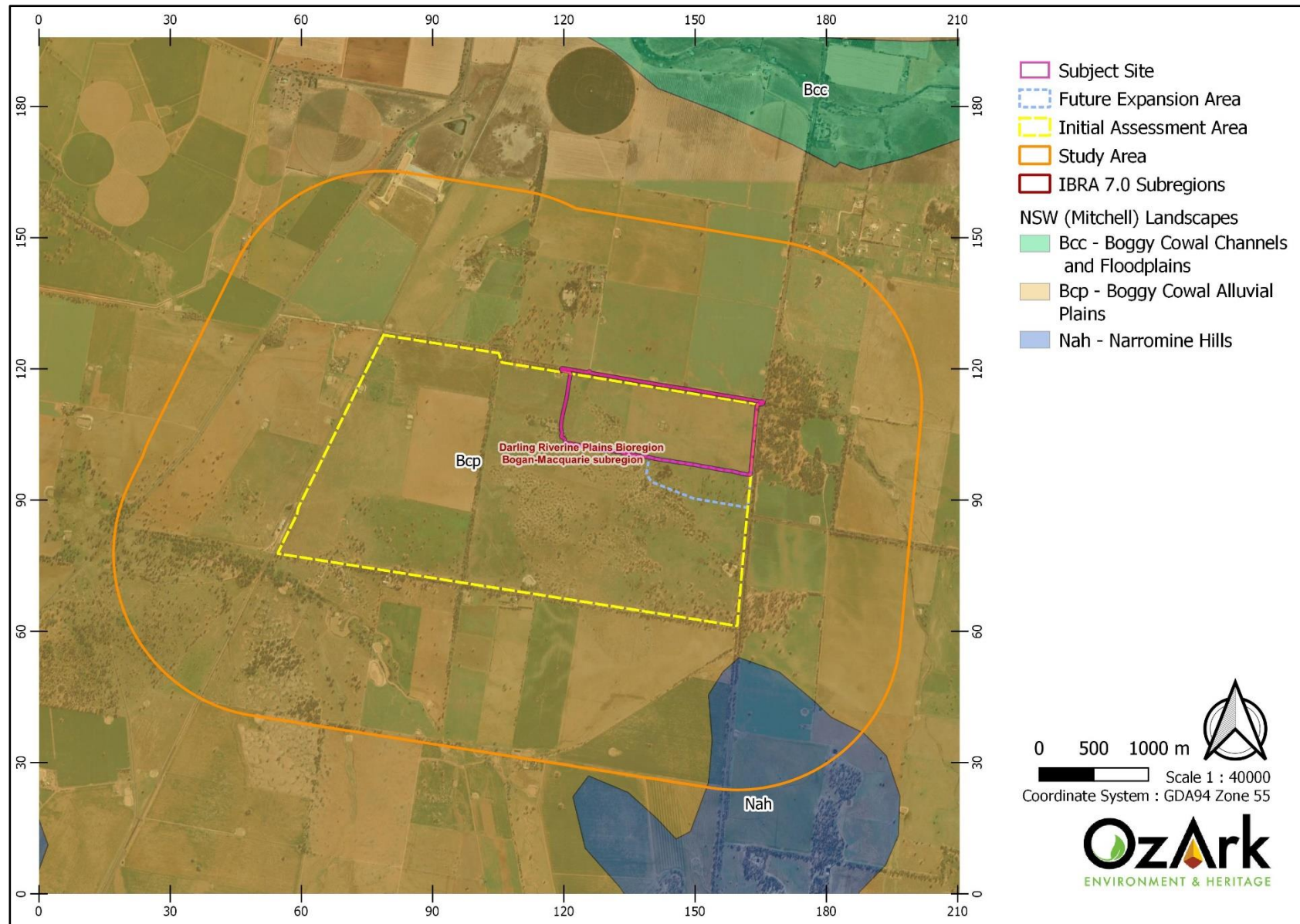


Figure 4-1. IBRA Subregions and Mitchell Landscapes within the study area.

4.3 CLIMATE

The Dubbo Airport automatic weather station (065070) is the closest rainfall and temperature data collection point to the subject site (approximately 32.4 km from site). Climate statistics have been recorded here since 1993.

The study area experiences warm summers, with a mean minimum temperature of 18.4°C and a mean maximum temperature of 33.6°C in January, the warmest month. Winters are cool, with temperatures in the coolest month (July) ranging from a minimum of 3.0°C to a mean maximum of 15.7°C (Bureau of Meteorology, 2023). Climate statistics are given in **Figure 4-2**.

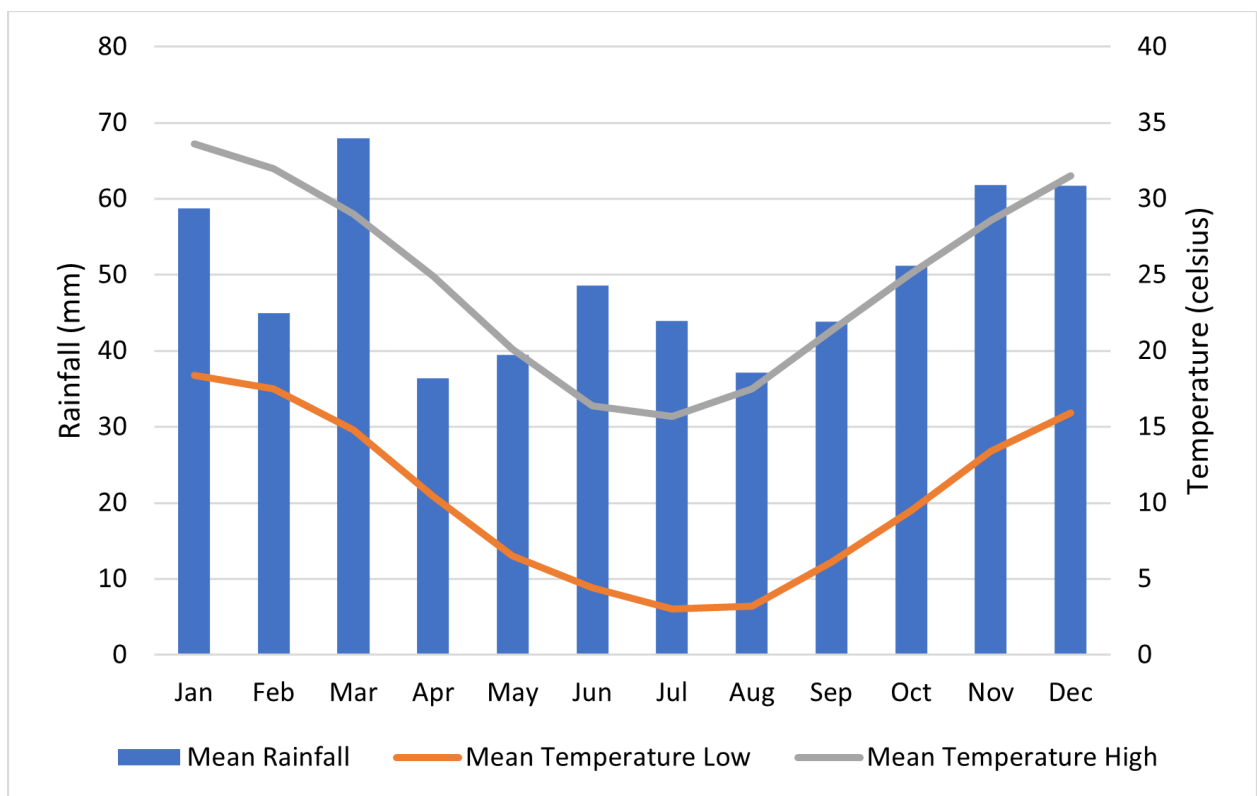


Figure 4-2. Climate statistics for Dubbo Airport (station 065070; BOM, 2023)

During the field surveys the prevailing weather conditions were fine, with no rainfall recorded and mild temperatures. Prior to the initial survey in April 2021, a total of 301.6 mm had been recorded in the region in the preceding two months, well above the combined means for February and March of 113.3 mm. By contrast, in the two months preceding the April 2023 surveys, the site experienced below-average rainfall, recording a total of 74.2 mm of rain during this period.

4.4 WATERCOURSES

No mapped watercourses occur within the subject site. Six mapped watercourses occur within the broader study area (**Figure 4-3**). According to the Strahler ordering system, these consist of:

- Four Strahler 1st order unnamed, minor, non-perennial watercourses.

- One Strahler 2nd order unnamed, minor, non-perennial watercourse.
- One Strahler 3rd order minor, non-perennial watercourse (Yellow Creek).

Note that one of the mapped Strahler 1st order streams is a braided stream, which diverges and then reunites. This is treated as a single stream in this report.

None of the watercourses within the study area are mapped as Key Fish Habitat (KFH) by the Department of Primary Industry – Fisheries or Protected Riparian Land (PRL) by the Department of Planning and Environment, and no impacts to biodiversity in nearby watercourses is expected. While most 3rd order streams are considered KFH, Yellow Creek has not been mapped as such. Assessments referring to Part 7A Division 12 Section 221ZV of the FM Act, or any further considerations of this legislation, are therefore not required.

4.5 GROUNDWATER DEPENDENT ECOSYSTEMS (GDES)

Groundwater plays an important ecological role in directly and indirectly supporting terrestrial and aquatic ecosystems. Groundwater sustains terrestrial and aquatic ecosystems by supporting vegetation and providing discharge to channels, lacustrine and palustrine wetlands, and both the estuarine and marine environment. Aquifer ecosystems are inherently groundwater dependent (QLD Department of Environment and Heritage Protection, 2017).

The Bureau of Meteorology Atlas of GDEs does not identify any areas of potential GDE within the subject site or future expansion area (**Figure 4-3**; Bureau of Meteorology, 2017). Small areas of low-probability GDE occur in the wider landscape. No impacts to these areas are anticipated.

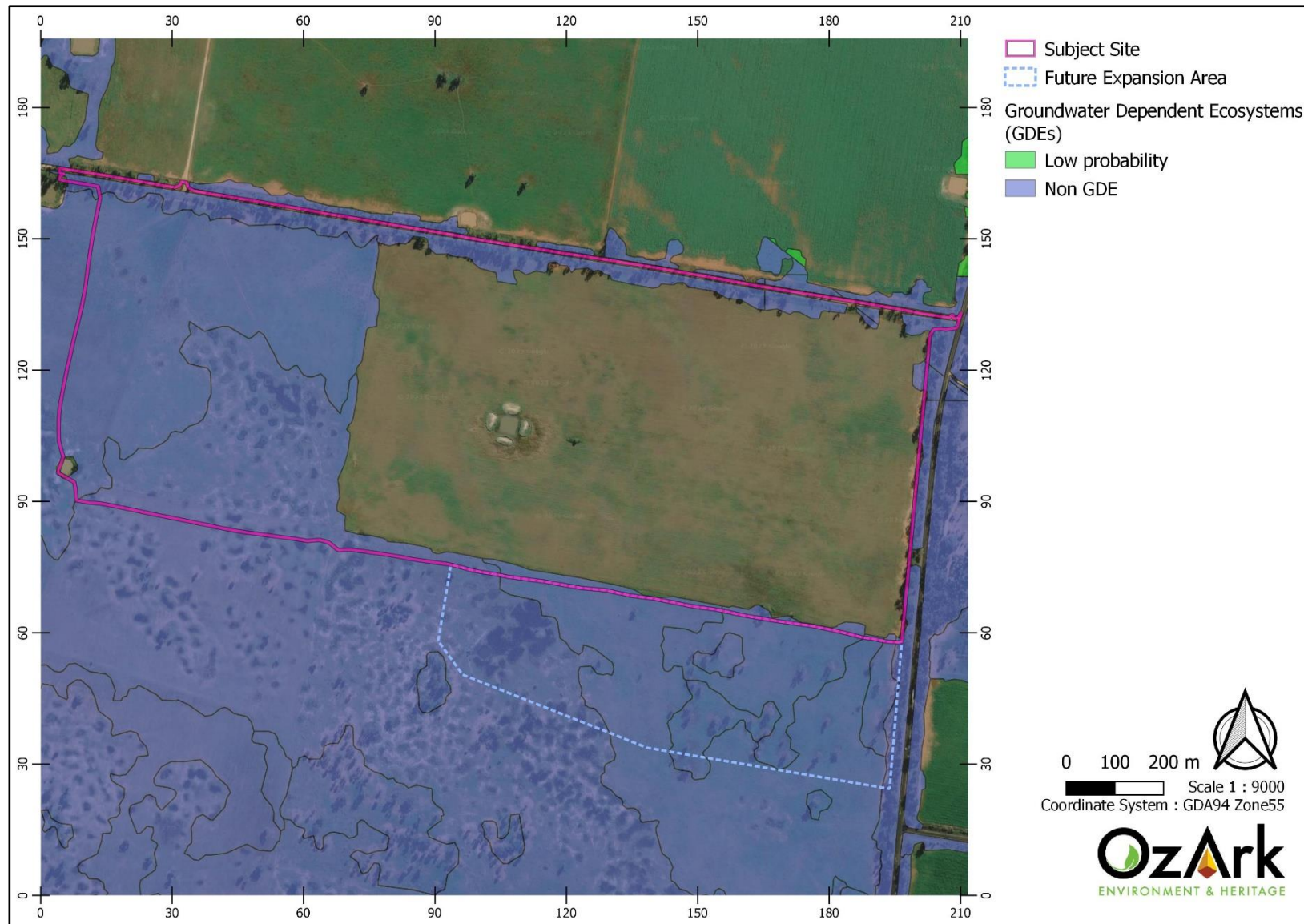


Figure 4-3. Watercourses and Groundwater Dependent Ecosystems (GDEs) within the subject site and future expansion area

5 RESULTS

5.1 FIELD SURVEY

5.1.1 Flora

In total, 208 plant species were recorded during the field surveys in April of 2021 and 2023, of which 149 (71.63%) are native and 59 (28.37%) introduced (**Appendix C**). Of these, 145 species were recorded within the current subject site, comprising 102 native species (70.34%) and 43 introduced species (29.66%). The remaining species were recorded within the wider initial assessment area. This should not be interpreted as a comprehensive list of all species present within the site. Owing to the large size of the subject site, it is likely that additional species are present within the site that could not be detected during the site visit. Additionally, as all surveys were conducted in April, many species would not have had aboveground material to allow for detection and identification.

5.1.2 Weeds

Under the *Biosecurity Act 2015*, “all plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated, or minimised, so far as is reasonably practicable.”

Twelve significant weeds were detected during the survey (**Table 5-1**). These are species listed as either high-threat exotic species (HTE) under the BAM, Weeds of National Significance (WoNS), or priority weeds for the Narromine LGA (PW).

Table 5-1. Significant Weeds Recorded within the Subject Site

Scientific Name	Common Name	HTE	WoNS	PW
<i>Alternanthera pungens</i>	Khaki Weed	Yes	No	No
<i>Bidens subalternans</i>	Greater Beggar's Ticks	Yes	No	No
<i>Carthamus lanatus</i>	Saffron Thistle	Yes	No	No
<i>Cenchrus ciliaris</i>	Buffel Grass	Yes	No	No
<i>Cyperus eragrostis</i>	Umbrella Sedge	Yes	No	No
<i>Eragrostis curvula</i>	African Lovegrass	Yes	No	No
<i>Heliotropium amplexicaule</i>	Blue Heliotrope	Yes	No	Yes
<i>Lycium ferocissimum</i>	African Boxthorn	Yes	Yes	Yes
<i>Phyla canescens</i>	Lippia	Yes	No	No
<i>Paspalum dilatatum</i>	Paspalum	Yes	No	No
<i>Xanthium spinosum</i>	Bathurst Burr	Yes	No	No

5.1.3 Fauna

In total, 62 fauna species were recorded during the field surveys, either by active (field survey) or passive detection (bird and bat loggers). This comprised 46 birds (all native), 15 mammals (12 native and three introduced), and one reptile (native). One detected bat could only be identified to genus level (*Nyctophilus* sp.). All detected fauna species are included in **Appendix C**. As with the flora survey results, this should not be considered a comprehensive list of all fauna species likely to occur within or make use of the subject site. It is worth noting that the bird and bat detectors were not located in the current subject site but instead were positioned in the wider initial assessment area (**Figure 3-1**). However, as bird and bats are wide ranging, it is very likely that those species recorded on the loggers also occur within the subject site.

5.1.4 Habitat features

The field survey identified 44 hollow-bearing trees (42 live and two dead) within the subject site and an additional six (all live) within the future expansion area (**Figure 5-1**). Hollows were classed as either small (< 20 cm diameter) or large (\geq 20 cm diameter) to provide an indication of the species most likely to make use of them. The trees within the subject site contained a total of 28 large and 99 small hollows, as well as one stick nest. Within the future expansion area, the habitat trees contained a total of one large and 14 small hollows. Additional nests were recorded in the northern side of the road corridor and outside of the western limit of the subject site within the southern road corridor.

5.2 PLANT COMMUNITY TYPES

The State Vegetation Type Map C1.1.M1.1 (SVTM; DEP, 2022) predicts that two PCTs occur within the subject site, one (PCT 45) within the paddock and one (PCT 82) largely confined to the corridor of Cragie Lea Lane:

- PCT 45 – Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion.
- PCT 82 – Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregion.

The field survey confirmed the presence of these PCTs within the subject site, though the actual location and extent of the two communities was found to differ from the predictive mapping. The SVTM models much of the paddock as non-native; however, field surveys determined that this area is occupied almost entirely by native groundcover species, with the exception of minor areas of disturbance, and consequently it has been mapped here as a derived grassland community (PCT 250). It was also noted that the area modelled as containing PCT 45 also hosted numerous gilgai-associated wetlands. These were mapped as a separate ephemeral wetland community (PCT 53). The survey also recorded patches of a Fuzzy Box (*Eucalyptus conica*)-dominated community within the road corridor (PCT 201), intergrading with PCT 82. Minor occurrences of a

narrow-leaved eucalypt consistent with Pilliga Box (*E. pilligaensis*) or of a hybrid between Pilliga Box and Grey Box (*E. microcarpa*) were noted in the road corridor. These occurred within PCT 82 and did not appear to form a distinct community. These individuals were mapped to PCT 82.

In total, therefore, five PCTs were recorded within the subject site. The extent of each PCT within the subject site is given in **Table 5-2** and within the future expansion area in **Table 5-3**. Vegetation communities within the site are mapped in **Figure 5-2**.

Vegetation within the site was found to consist of a mosaic of derived and/or natural grasslands, small ephemeral wetlands, isolated remnant trees, and, in the road corridor, remnant woodland communities. The boundaries between certain communities – particularly between PCT 45 and PCT 250, and between PCT 53 and the surrounding grasslands – are likely to vary according to seasonal conditions. The extent of each community mapped within the site is based on conditions at the time of the surveys.

Table 5-2. Confirmed Extent of Each Plant Community Type (PCT) within the Subject Site

PCT ID	PCT Name	Extent within Subject Site (ha)
45	Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	12.56
53	Shallow freshwater wetland sedgeland in depressions on floodplains on inland alluvial plains and floodplains	4.07
82	Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Penepplain Bioregion	2.67
201	Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion	0.70
250	Derived tussock grassland of the central western plains and lower slopes of NSW	96.32
Non-native vegetation, dam surfaces, existing roads or tracks, and bare ground		
Total		118.04

Table 5-3. Confirmed Extent of Each PCT within the Future Expansion Area

PCT ID	PCT Name	Extent within Subject Site (ha)
45	Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	5.05
53	Shallow freshwater wetland sedgeland in depressions on floodplains on inland alluvial plains and floodplains	2.43
82	Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Penneplain Bioregion	4.04
250	Derived tussock grassland of the central western plains and lower slopes of NSW	14.83
Dam surface		0.02
Total		26.37

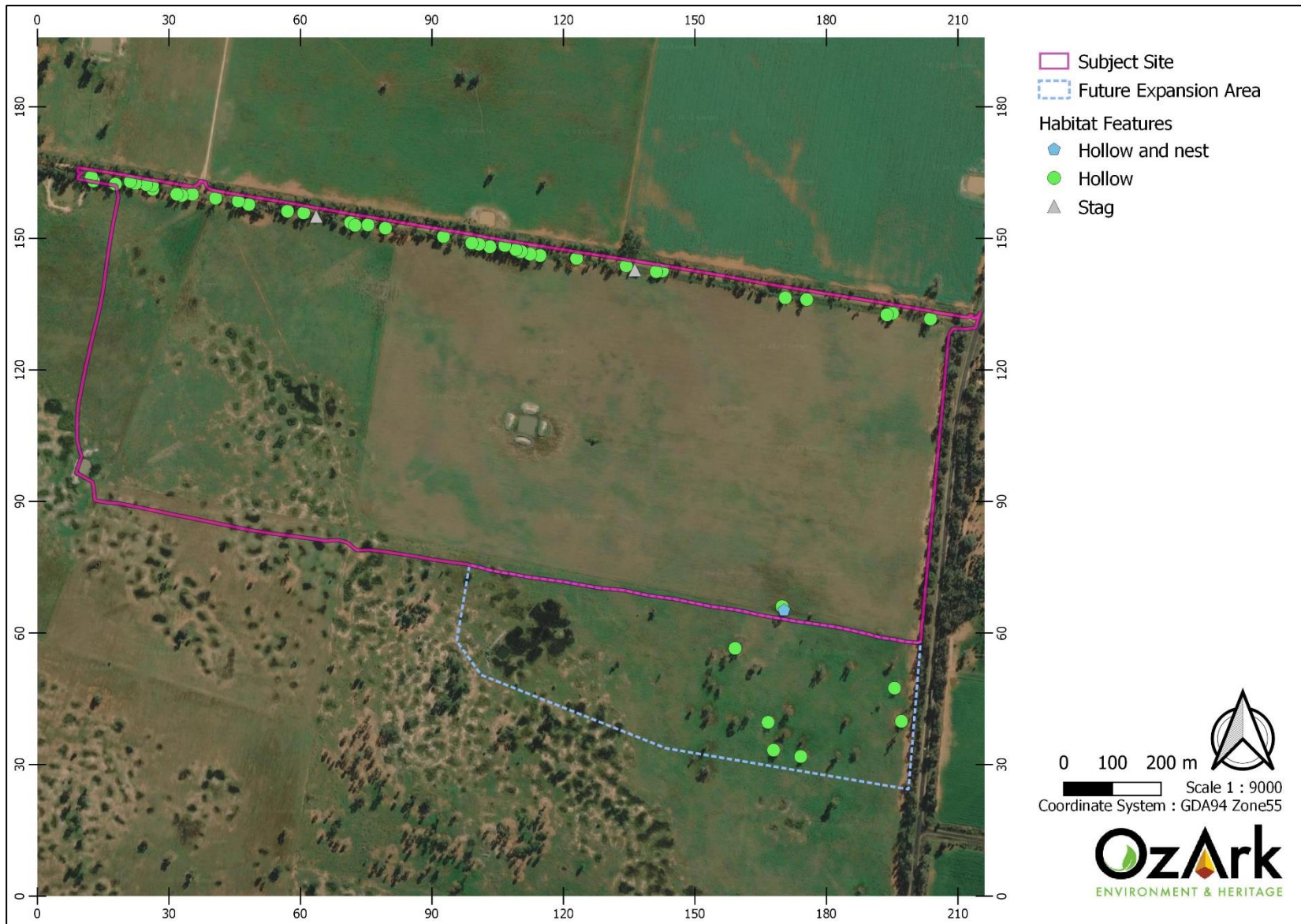


Figure 5-1. Location of habitat features within the subject site and future expansion area.

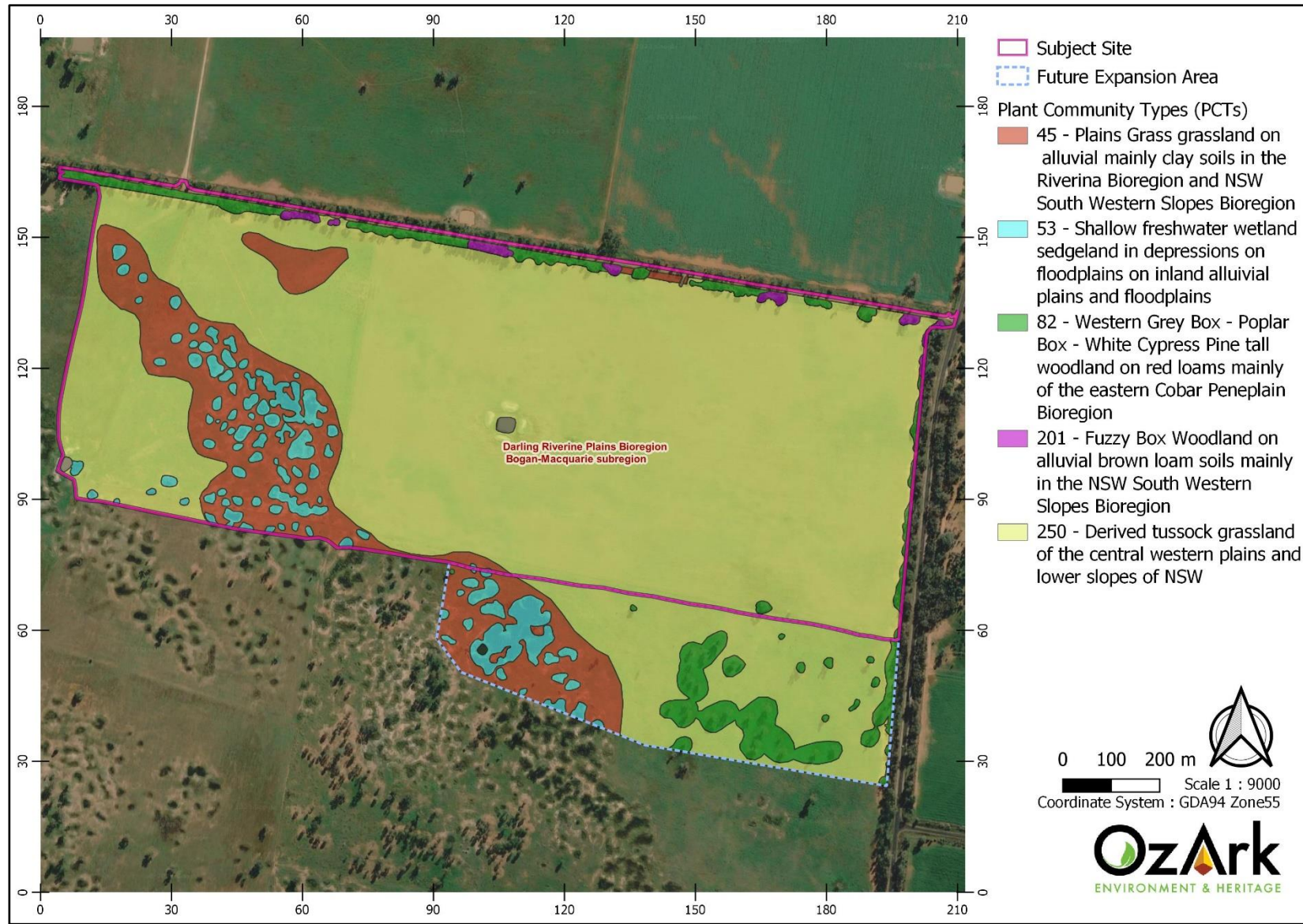


Figure 5-2. Plant Community Types (PCTs) mapped within the subject site and future expansion area.

5.3 THREATENED ECOLOGICAL COMMUNITIES

According to the BioNet Vegetation Classification Database, all PCTs detected within the subject site are associated with Threatened Ecological Communities (TECs). Additionally, several BC Act- and EPBC Act-listed TECs were identified that overlapped in structure or composition with the vegetation recorded within the subject site but were not listed in the BioNet Database. A full list of TECs potentially occurring within the subject site is given in **Table 5-4** below.

Table 5-4. Threatened Ecological Communities (TECs) Associated with Recorded PCTs

PCT ID	PCT Name	Associated TECs
45	Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion	BC Act, CE: Artesian Springs Ecological Community in the Great Artesian Basin.
53	Shallow freshwater wetland sedgeland in depressions on floodplains on inland alluvial plains and floodplains	BC Act, CE: Artesian Springs Ecological Community in the Great Artesian Basin.
82	Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregion	BC Act, E: Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions. EPBC Act, E: Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia.
201	Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion.	BC Act, E: Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions.
250	Derived tussock grassland of the central western plains and lower slopes of NSW	BC Act, CE: White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions. EPBC Act, CE: White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions. BC Act, E: Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions. EPBC Act, E: Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia.

Field survey results for each community were assessed against composition and condition thresholds for each associated TEC. As each PCT occurred in a range of conditions within the subject site, an attempt was made to determine which areas of each mapped PCT might qualify as the associated TEC. Given that the surveys were of only short duration and took place in autumn, it was not possible to assess every patch of each PCT according to the TEC guidelines.

Note that formal guidelines for many TECs specify that surveys should take place in spring or early summer and should be undertaken during periods when the patch in question has not been subject to disturbance; for this reason, reassessment is required during the appropriate season to determine whether each PCT is likely to meet the condition and composition thresholds. Consequently, the assessment and mapping provided here should be regarded as indicative only. The results of this preliminary assessment are given in **Table 5-5**. TECs assessed as occurring or likely to occur within the subject site are mapped in **Figure 5-3**. The extent of each TEC within the subject site and focus area are given in table **Table 5-6** below.

Note that additional areas of the BC Act- and EPBC Act-listed Grey Box EECs and the BC Act-listed Fuzzy Box EEC occur in the northern road corridor of Cragie Lea Lane. It was noted that the Fuzzy Box community in particular was extensive on the northern side of the road.

Table 5-5. Assessment of potential TECs within subject site

PCT ID	Associated TECs	Conditions met
45	BC Act, CE: Artesian Springs Ecological Community in the Great Artesian Basin.	No. Outside TEC distribution and not associated with artesian springs.
53	BC Act, CE: Artesian Springs Ecological Community in the Great Artesian Basin.	No. Outside TEC distribution and not associated with artesian springs.
82	BC Act, E: Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions.	Yes. Areas mapped as PCT 82 were dominated by Grey Box (<i>E. microcarpa</i>) and understorey possessed associated native species. No condition thresholds are specified for the BC Act TEC.
82	EPBC Act, E: Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Likely. Areas mapped as PCT 82 were dominated by Grey Box (<i>E. microcarpa</i>) and understorey possessed associated native species. Many sites appeared to meet the thresholds for consideration as this TEC; however, guidelines specify that surveys should take place in spring and, given the scope of the present survey, closer attention to each individual patch may be required to determine whether it meets the threshold conditions. Some patches fell below the 0.5 ha minimum size threshold and were excluded from consideration.
201	BC Act, E: Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions.	Yes. All areas of PCT 201 belong to this community. The listing applies to all remnant woodland in which Fuzzy Box (<i>Eucalyptus conica</i>) is the dominant species and does not specify a minimum patch threshold.
250	EPBC Act, CE: White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England	No. Sites lacked associated species.

PCT ID	Associated TECs	Conditions met
	Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions.	
250	BC Act, CE: White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions.	No. Sites lacked associated species.
250	BC Act, E: Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penepplain, Nandewar and Brigalow Belt South Bioregions.	Yes (Part). Areas adjacent to or largely enclosed by PCT 82, and where the understorey was consistent with the TEC description, were considered to belong to the derived grassland form of this TEC. Areas of PCT 250 that could not confidently be assumed to have formerly been dominated by Grey Box (<i>Eucalyptus microcarpa</i>) as they may have been derived from other woodland types, such as Fuzzy Box (<i>Eucalyptus conica</i>), were not included in this TEC. While it is likely that much larger areas of PCT 250 were historically derived from a former Grey Box woodland, this cannot be stated with certainty.
250	EPBC Act, E: Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penepplain, Nandewar and Brigalow Belt South Bioregions.	Likely (Part). Areas adjacent to or largely enclosed by PCT 82, and where the understorey was consistent with the TEC description, were provisionally considered to belong to the derived grassland form of this TEC, pending reassessment during the appropriate seasons. Areas of PCT 250 that could not confidently be assumed to have formerly been dominated by Grey Box (<i>Eucalyptus microcarpa</i>), or which were in a degraded condition that did not meet the specified conditions, were not included in this TEC.

Table 5-6. Extent of each TEC within the subject site and future expansion area.

TEC	Extent (Subject Site)	Extent (Future Expansion Area)
BC Act, E: Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penepplain, Nandewar and Brigalow Belt South Bioregions.	8.79 ha	16.62 ha
EPBC Act, E: Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia.	7.86 ha	16.62 ha
BC Act, E: Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions.	0.70 ha	-

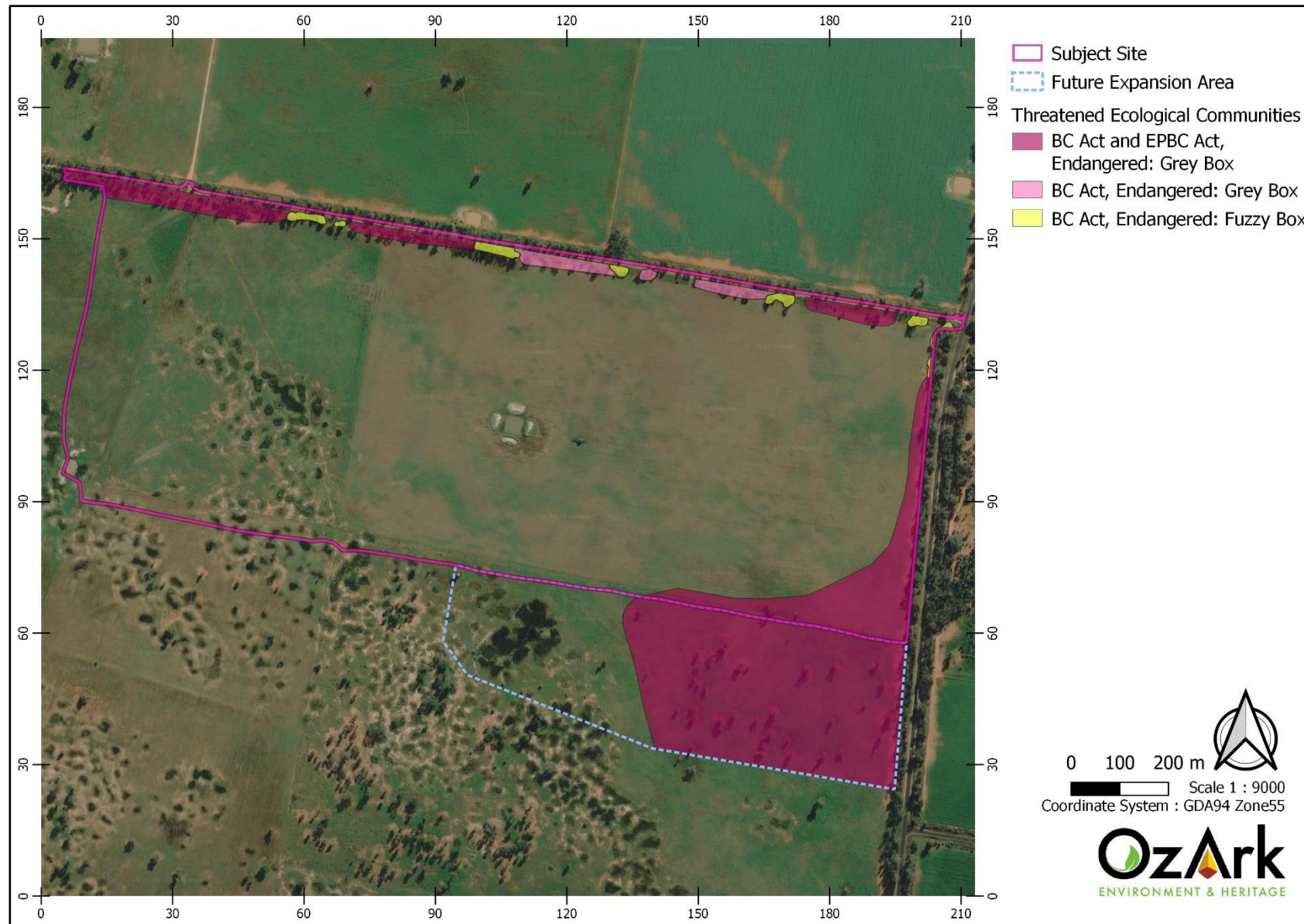


Figure 5-3. Indicative locations of Threatened Ecological Communities (TECs) within the subject site and future expansion area.

5.4 THREATENED SPECIES

5.4.1 Flora

One threatened plant species – Bluegrass (*Dichanthium setosum*) – was recorded during the field survey (**Figure 5-4** and **Figure 5-5**). This species is listed as vulnerable under the BC and EPBC Acts. Two previous records of this species exist within 10 km of the subject site, both dating to November 1892. One small population (c. 30 plants) was recorded within the proposed development footprint of the freight hub and one much larger population in the future expansion area. As only part of the latter population was in flower at the time of the survey, the size of the population is not known; however, it may exceed 200 plants. The recommended survey period for this species extends from November to May but may be contingent on recent rainfall. Surveying 3-4 weeks after significant rainfall is advised. Five further populations were recorded in the initial assessment area in prior surveys (April 2021).

The species is known to occur in gilgai topography and the largest populations recorded within the initial assessment area were in the marginal clays of gilgais. As a large area of gilgai topography is included within the subject site, it is possible that additional undetected populations occur within the potential impact footprint of the proposal. As this population occurs at the southern limit of the known distribution of this species, it likely constitutes an important population as defined under the EPBC Act. Impacts to this species that may lead to permanent reductions in its area of occupancy or that threaten the local population with extinction are therefore likely to be regarded as significant.

Despite the apparent close association between the species and gilgai landforms, the small population recorded within the footprint of the proposed freight hub was not associated with gilgai topography but was instead recorded in the margins of an existing track. It is possible that the species has benefited from alterations to drainage in this area caused by the formation of the track. The possibility that other populations of the species occur away from gilgais, potentially in areas of altered drainage or disturbance, therefore cannot be discounted.

It should be noted that a common relative of *Dichanthium setosum*, Queensland Bluegrass (*D. sericeum*), was also frequently encountered within the site. The general form of the inflorescence of *D. setosum* is shown in **Figure 5-6**. It typically possesses longer, darker and more slender inflorescences than *D. sericeum*; however, microscopic analysis may be needed to confirm identification. The species are typically separated on the basis on the number, length, and colour of racemes in the inflorescence and the size and fertility of the individual spikelets, as well as a range of more informal qualities. The characteristic larger purple spikelets of *D. setosum* are a common trait used to identify the species *in situ* (**Figure 5-7**). However, a range of intermediate forms are commonly reported in sites where both species are known (**Figure 5-8**). These intermediates are considered putative hybrids and are not explicitly protected under state or

federal legislation. In the present case, specimens with ambiguous characteristics were noted within populations of otherwise unambiguous *D. setosum* and *D. sericeum*, and were often found to outnumber “pure” individuals. This included extensive populations of *D. sericeum* and ambiguous individuals in the roadside drains of Cragie Lea Lane. It is expected that these plants would be excluded from the protections offered by the BC Act and EPBC Act listings; however, populations containing large numbers of ambiguous individuals may also harbour undetected examples of the threatened *D. setosum*. Close investigation of these populations is advised prior to undertaking any clearing activities. The locations of these populations are shown in **Figure 5-5**.

Additional threatened flora species may occur within the subject site that were not detected during the field survey. Potential impacts to these species are discussed in **Section 6**.

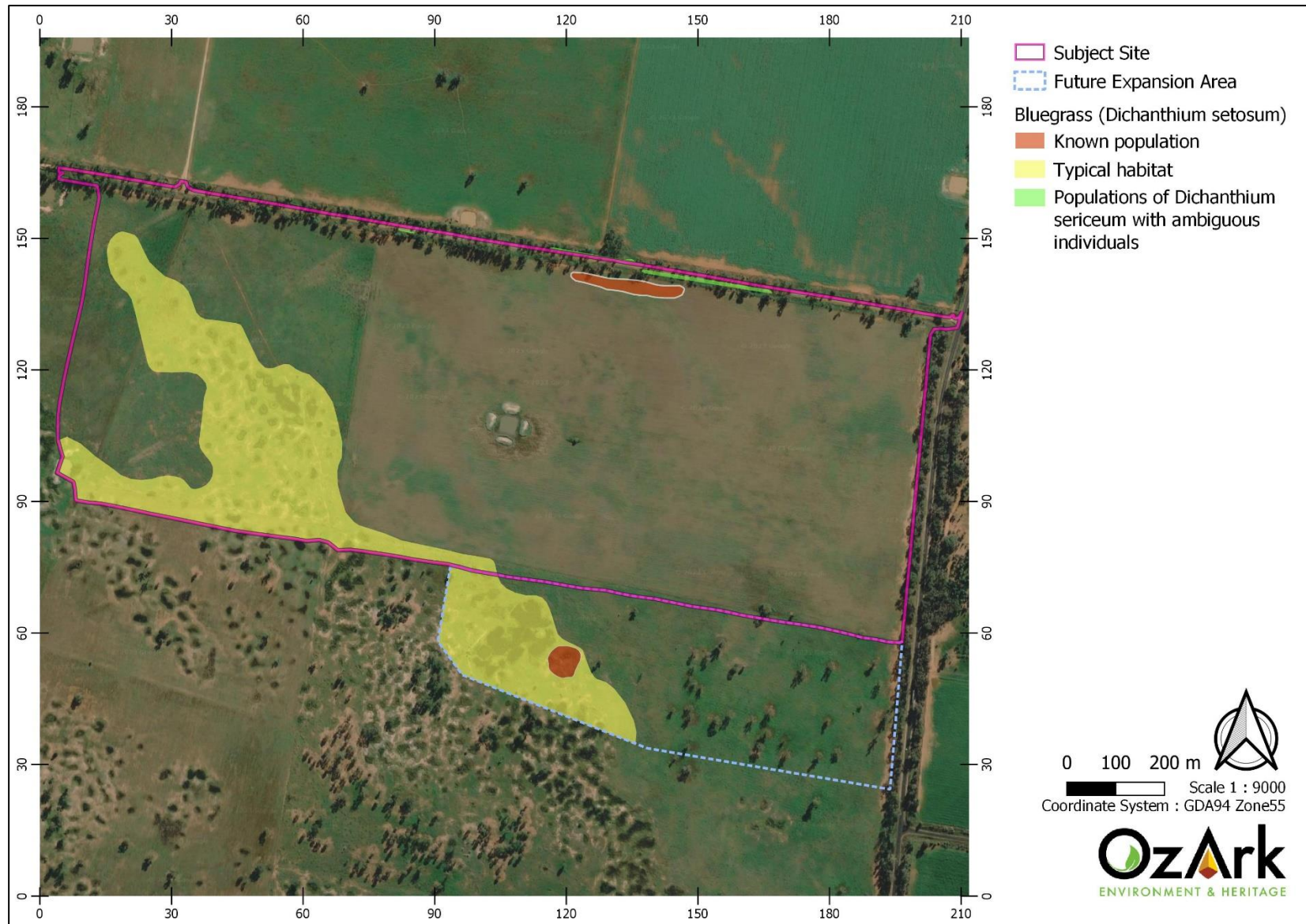


Figure 5-4. Populations of the threatened Bluegrass (*Dichanthium setosum*) recorded within the subject site, future expansion area, and road corridor.



Figure 5-5. Populations of the threatened Bluegrass (*Dichanthium setosum*) recorded within the subject site and road corridor.



Figure 5-6. Inflorescence of the BC Act- and EPBC Act-listed Bluegrass (*Dichanthium setosum*).



Figure 5-7. A spikelet of the threatened Bluegrass (*Dichanthium setosum*; left), showing the characteristic purple colouration found in this species. The spikelets of Queensland Bluegrass (*D. sericeum*; right) tend to be pale in colour. Both spikelets were collected from the subject site.



Figure 5-8. Magnified view of a raceme collected from a putative *Dichanthium setosum* × *D. sericeum* hybrid or intermediate form, collected from the subject site.

The mixture of blue or purple and pale green spikelets in the above may point to the hybrid origin of the sample.

5.4.2 Fauna

Four threatened bird species were detected within the initial assessment area during the field survey in April 2021:

- Superb Parrot (*Polytelis swainsonii*) – BC and EPBC Act: Vulnerable
- Spotted Harrier (*Circus assimilis*) – BC Act: Vulnerable
- Turquoise Parrot (*Neophema pulchella*) – BC Act: Vulnerable
- Grey-crowned Babbler (eastern subspecies; *Pomatostomus temporalis temporalis*) – BC Act: Vulnerable

The Grey-crowned Babbler was also recorded during the subsequent surveys in April 2023, chiefly within the road corridor of Cragie Lea Lane. Two additional threatened fauna species were recorded through bat detector analysis:

- Little Pied Bat (*Chalinolobus picatus*) – BC Act: Vulnerable
- Large Bent-winged Bat (*Miniopterus orianae oceanensis*) – BC Act: Vulnerable

A third bat species, identified only as *Nyctophilus* sp., may represent an additional threatened bat species, Corben's Long-eared Bat (*Nyctophilus corbeni*), which is listed as Vulnerable under the BC and EPBC Acts. This taxon cannot be confidently identified to species level through analysis of bat detector data.

Additional threatened fauna species may occur within the subject site that were not detected during the field survey. Potential impacts to these species are discussed in **Section 6**.

5.5 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

Under the environmental assessment provisions of the EPBC Act, Matters of National Environmental Significance (MNES) and impacts on Commonwealth land are required to be considered to assist in determining whether the proposal should be referred to the Australian Government. The EPBC Act protected matters search has identified four wetlands of international importance, six TECs, 41 threatened species, 9 migratory species and 16 marine species that could possibly occur in the study area (**Appendix A**). A summary of these matters and whether the proposal is likely to impact them is provided in **Table 5-7**.

Table 5-7. EPBC Act, Matters of National Environmental Significance

Factor	Potential Impact
Any impact on a listed threatened species or communities?	Yes
Any impacts on listed migratory species?	Yes
Any impacts on a Ramsar wetland of international importance?	No
Any impacts on a Commonwealth marine environment?	No
Any impacts on a World Heritage property?	No
Any impacts on a National Heritage place?	No
Any impacts on the Great Barrier Reef Marine Park?	No
Does the proposal involve a nuclear action (including uranium mining)?	No
Any impact on a water resource, in relation to coal seam gas development and large coal mining development?	No
Additionally, any impact (direct or indirect) on Commonwealth land?	No

For further discussion of MNES, see **Appendix D**.

6 CONSTRAINTS ASSESSMENT AND IMPACT SUMMARY

This assessment assumes that the proposal would entail the removal of all vegetation within the subject site. Therefore, there would be a range of potential impacts associated with the removal of native vegetation, including:

- Removal of threatened fauna species habitat.
- Removal of threatened plants.
- Injury and mortality of fauna.
- Habitat fragmentation and disruptions to wildlife connectivity.
- Edge effects on adjacent native vegetation and habitat.
- Invasion and spread of weeds.
- Invasion and spread of pests.
- Invasion and spread of pathogens and disease.
- Noise, light and vibration.

This section of the report considers these impacts and the major constraints associated with the proposal in detail.

6.1 CONSTRAINTS ASSESSMENT

The most significant constraints identified during the assessment include the presence of the BC Act-listed EEC *Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions* and *Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions*, and the EPBC Act-listed EEC *Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia*, and the presence of populations of the BC Act- and EPBC Act-listed vulnerable plant, Bluegrass (*Dichanthium setosum*). The presence of hollow-bearing trees, chiefly in the road corridor, is also a significant constraint.

Less significant but still notable constraints include the presence of *Dichanthium* populations that contain ambiguous or hybrid individuals and may contain a small number of threatened individuals, and areas of suitable habitat for the threatened Bluegrass associated with gilgai formations.

Constraints are mapped in **Figure 6-1**. Areas that are not coloured in this figure possess the fewest identified constraints.

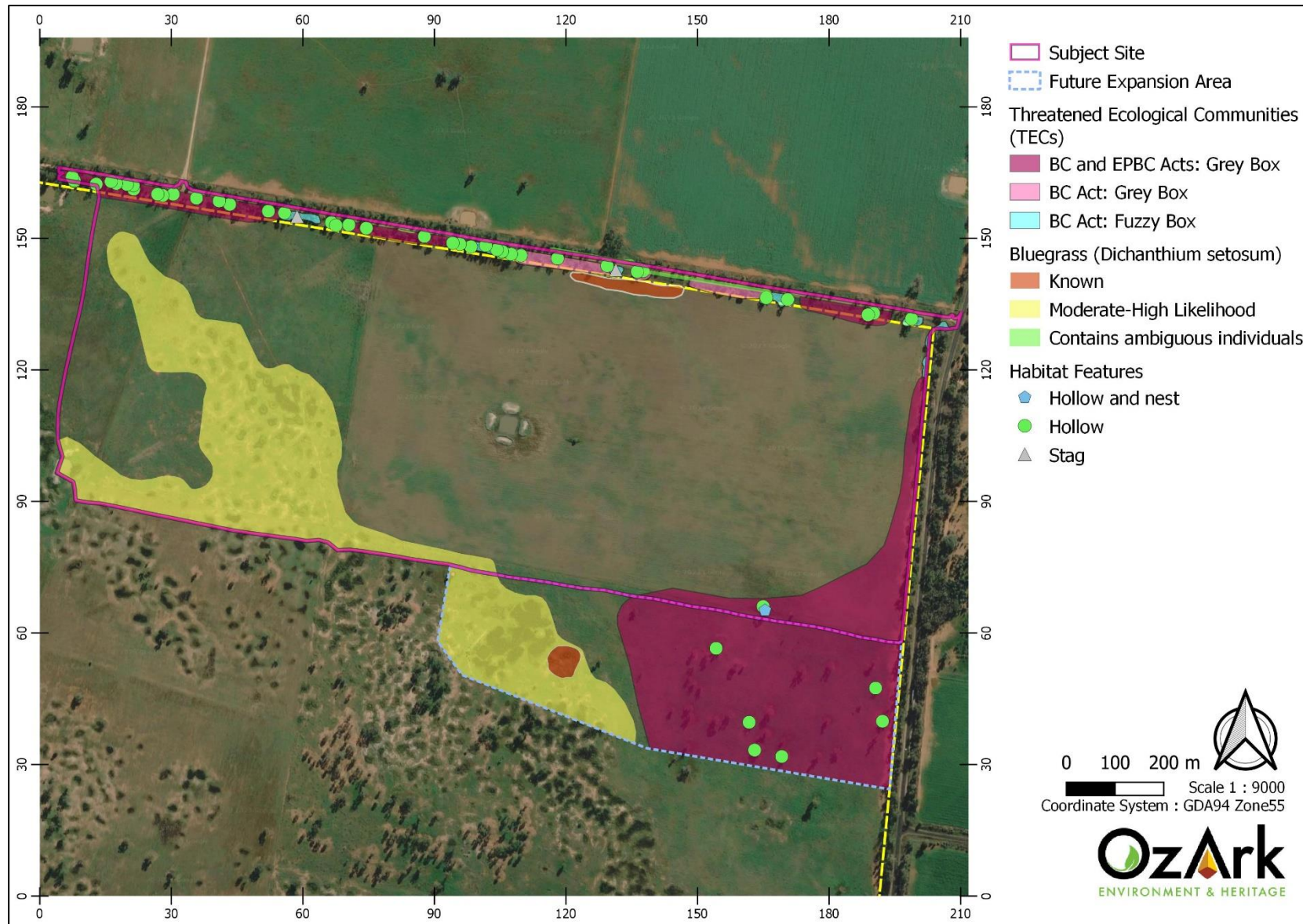


Figure 6-1. Key constraints identified within the subject site and future expansion area.

6.2 CONSTRUCTION IMPACTS

6.2.1 Removal of Native Vegetation

The subject site contains five PCTs and up to 118.04 ha of vegetation would be cleared by this proposal (see **Table 5-2**). The future expansion area contains four PCTs and up to 26.37 ha of native vegetation would be cleared by the proposal (

Table 5-3).

Three Threatened Ecological Communities were assessed as occurring or being likely to occur within the subject site (

Table 6-1). The approximate extent of each TEC within the subject site and future expansion area are indicative based on a rapid survey outside of the recommended survey season.

Table 6-1. Extent of each TEC within the subject site and focus area

TEC	Extent (Subject Site)	Extent (Future Expansion Area)
BC Act, E: Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions.	8.79 ha	16.62 ha
EPBC Act, E: Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	7.86 ha	16.62 ha
BC Act, E: Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions.	0.70 ha	-

Removal of native vegetation and ground disturbance will further exacerbate a number of Key Threatening Processes, including *Clearing of native vegetation*, *Invasion and establishment of exotic vines and scramblers* and *Invasion of native plant communities by exotic perennial grasses*. Key Threatening Processes are considered in more detail in **Appendix E**.

6.2.2 Impacts to BC Act- and EPBC Act-listed threatened flora

Sixty-three BC Act-listed threatened plant species or populations are known or predicted to occur within the three IBRA Subregions that overlap the 10 km search area. Forty-one of these entities are also listed under the EPBC Act. A list of these species, and whether the proposal is likely to impact them, is given in **Table 6-2**, along with the extent of suitable vegetation within subject site and future expansion area. The likelihood and severity of an impact is contingent on the nature of the final impact. Impacts are expected to 16 threatened flora species within the subject site and 13 within the future expansion area.

Table 6-2. BC Act-listed threatened flora species and populations potentially impacted by the proposal.

Scientific Name	Common Name	*NSW Status	+Comm. Status	Records < 10 km	Potential Impact (Subject Site)	Potential Impact (Future Expansion Area)
<i>Caesia parviflora</i> var. <i>minor</i>	Small Pale Grass-lily	E1		N	None expected	None expected

Scientific Name	Common Name	*NSW Status	+Comm. Status	Records < 10 km	Potential Impact (Subject Site)	Potential Impact (Future Expansion Area)
<i>Cynanchum elegans</i>	White-flowered Wax Plant	E1	E	N	None expected	None expected
<i>Tylophora linearis</i>		V	E	N	None expected	None expected
<i>Ammobium craspedioides</i>	Yass Daisy	V	V	N	None expected	None expected
<i>Brachyscome muelleroides</i>	Claypan Daisy	V	V	N	None expected	None expected
<i>Leucochrysum albicans</i> subsp. <i>tricolor</i>	Hoary Sunray	E1	E	N	None expected	None expected
<i>Senecio garlandii</i>	Woolly Ragwort	V		N	None expected	None expected
<i>Lepidium aschersonii</i>	Spiny Peppercross	V	V	N	4.77 ha	2.43 ha
<i>Lepidium monoplocoides</i>	Winged Peppercross	E1	E	N	12.56 ha	5.05 ha
<i>Atriplex infrequens</i>	A saltbush	V	V	N	None expected	None expected
<i>Carex raleighii</i>	Raleigh Sedge	E1		N	None expected	None expected
<i>Eriocaulon australasicum</i>	Austral Pipewort	E1	E	N	4.07 ha	2.43 ha
<i>Bertya opponens</i>	Coolabah Bertya	V	V	N	None expected	None expected
<i>Monotaxis macrophylla</i>	Large-leafed Monotaxis	E1		N	None expected	None expected
<i>Bossiaea fragrans</i>		E4A	CE	N	None expected	None expected
<i>Cullen parvum</i>	Small Scurf-pea	E1		N	None expected	None expected
<i>Indigofera efoliata</i>	Leafless Indigo	E1,3	E	N	None expected	None expected
<i>Pultenaea humilis</i>	Dwarf Bush-pea	V		N	None expected	None expected
<i>Swainsona murrayana</i>	Slender Darling Pea	V	V	N	15.23 ha	9.09 ha
<i>Swainsona plagiotropis</i>	Red Darling Pea	V	V	N	12.56 ha	5.05 ha
<i>Swainsona recta</i>	Small Purple-pea	E1	E	N	0.70 ha	None expected
<i>Swainsona sericea</i>	Silky Swainson-pea	V		N	112.25 ha	23.92 ha
<i>Acacia ausfeldii</i>	Ausfeld's Wattle	V		N	0.70 ha	None expected

Scientific Name	Common Name	*NSW Status	+Comm. Status	Records < 10 km	Potential Impact (Subject Site)	Potential Impact (Future Expansion Area)
<i>Acacia meiantha</i>		E1	E	N	None expected	None expected
<i>Acacia pendula</i>	Acacia pendula population in the Hunter catchment	E2		N	None expected	None expected
<i>Acacia phasmoides</i>	Phantom Wattle	V	V	N	None expected	None expected
^^ <i>Myriophyllum implicatum</i>		E4A,2		N	4.07 ha	2.43 ha
<i>Commersonia procumbens</i>		V	V	N	None expected	None expected
<i>Pilularia novae-hollandiae</i>	Austral Pillwort	E1,3		N	16.63 ha	7.48 ha
<i>Eucalyptus aggregata</i>	Black Gum	V	V	N	None expected	None expected
<i>Eucalyptus alligatrix</i> subsp. <i>alligatrix</i>		V	V	N	None expected	None expected
<i>Eucalyptus camaldulensis</i>	Eucalyptus camaldulensis population in the Hunter catchment	E2		N	None expected	None expected
<i>Eucalyptus cannonii</i>	Capertee Stringybark	V		N	None expected	None expected
<i>Eucalyptus robertsonii</i> subsp. <i>hemisphaerica</i>	Robertson's Peppermint	V	V	N	None expected	None expected
<i>Homoranthus darwinioides</i>	Fairy Bells	V	V	N	None expected	None expected
<i>Homoranthus prolixus</i>	Granite Homoranthus	V	V	N	None expected	None expected
^^ <i>Caladenia arenaria</i>	Sand-hill Spider Orchid	E1,P,2	E	N	None expected	None expected
^^ <i>Caladenia concolor</i>	Crimson Spider Orchid	E1,P,2	V	N	None expected	None expected
^^ <i>Caladenia rosella</i>	Rosella Spider Orchid	E4,P,2	E	N	None expected	None expected
^^ <i>Caladenia tessellata</i>	Thick Lip Spider Orchid	E1,P,2	V	N	None expected	None expected
^^ <i>Cymbidium canaliculatum</i>	Cymbidium canaliculatum population in the Hunter Catchment	E2,P,2		N	None expected	None expected
^^ <i>Diuris tricolor</i>	Pine Donkey Orchid	V,P,2		N	3.37 ha	4.04 ha

Scientific Name	Common Name	*NSW Status	+Comm. Status	Records < 10 km	Potential Impact (Subject Site)	Potential Impact (Future Expansion Area)
<i>Prasophyllum petilum</i>	Tarengo Leek Orchid	E1,P,2	E	N	None expected	None expected
<i>Pterostylis cobarensis</i>	Greenhood Orchid	V,P,2		N	None expected	None expected
<i>Prasophyllum</i> sp. Wybong		P	CE	N	97.02 ha	14.83 ha
<i>Euphrasia arguta</i>		E4A	CE	N	0.70 ha	None expected
<i>Euphrasia collina</i> subsp. <i>muelleri</i>	Mueller's Eyebright	E1	E	N	None expected	None expected
<i>Amphibromus fluitans</i>	Floating Swamp Wallaby-grass	V	V	N	None expected	None expected
<i>Austrostipa wakoolica</i>	A spear-grass	E1	E	N	99.69 ha	18.87 ha
<i>Dichanthium setosum</i>	Bluegrass	V	V	Y	109.58 ha	19.88 ha
<i>Digitaria porrecta</i>	Finger Panic Grass	E1		N	12.56 ha	5.05 ha
<i>Polygala linariifolia</i>	Native Milkwort	E1		N	None expected	None expected
<i>Muehlenbeckia</i> sp. Mt Norman	Scrambling Lignum	V		N	None expected	None expected
<i>Grevillea wilkinsonii</i>	Tumut Grevillea	E4A	E	N	None expected	None expected
<i>Persoonia marginata</i>	Clandulla Geebung	V,P	V	N	None expected	None expected
<i>Cheilanthes sieberi</i> subsp. <i>pseudovellea</i>		E1,3		N	None expected	None expected
<i>Pomaderris cotoneaster</i>	Cotoneaster Pomaderris	E1	E	N	None expected	None expected
<i>Pomaderris queenslandica</i>	Scant Pomaderris	E1		N	None expected	None expected
<i>Boronia granitica</i>	Granite Boronia	V,P	E	N	None expected	None expected
<i>Zieria ingramii</i>	Keith's Zieria	E1	E	N	None expected	None expected
<i>Zieria obcordata</i>	Granite Zieria	E1	E	N	None expected	None expected
<i>Thesium australe</i>	Austral Toadflax	V	V	N	None expected	None expected
<i>Pimelea bracteata</i>		E4A		N	None expected	None expected

*NSW Status: P=Protected, V=Vulnerable, E1=Endangered, E4A=Critically Endangered, 2=Category 2 sensitive species, 3=Category 3 sensitive species.

+Comm. Status: CE=Critically endangered, E=Endangered, V=Vulnerable

6.2.3 Impacts to BC Act- and EPBC Act-listed threatened and migratory fauna species

In total, 112 BC Act-listed threatened fauna species or populations are predicted to occur within the three IBRA Subregions that overlap the 10 km search area. Forty-eight of these species are also listed under the EPBC Act or federally protected by a migratory birds agreement. A list of these species, and whether the proposal is likely to impact them, is given in **Table 6-3**. The likelihood and severity of an impact is contingent on the nature of the final impact. Impacts are expected to 65 threatened fauna species within the subject site and 54 within the future expansion area.

Table 6-3. BC and EPBC Act-listed threatened or migratory fauna potentially impacted by proposal.

Scientific Name	Common Name	NSW Status	Comm. Status	Records < 10 km	Potential Impact (Subject Site)	Potential Impact (Future Expansion Area)
<i>Litoria booroolongensis</i>	Booroolong Frog	E1,P	E	N	None expected	None expected
<i>Litoria raniformis</i>	Southern Bell Frog	E1,P	V	N	4.07 ha	None expected
<i>Crinia sloanei</i>	Sloane's Froglet	V,P	E	N	2.67 ha	4.04 ha
<i>Chthonicola sagittata</i>	Speckled Warbler	V,P		N	3.37 ha	4.04 ha
<i>Circus assimilis</i>	Spotted Harrier	V,P		Y	115.62 ha	26.35 ha
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V,P		N	116.32 ha	26.35 ha
<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	V,P,3		N	None expected	None expected
<i>Hieraaetus morphnoides</i>	Little Eagle	V,P		N	116.32 ha	26.35 ha
<i>Lophoictinia isura</i>	Square-tailed Kite	V,P,3		N	13.26 ha	5.05 ha
<i>Pandion cristatus</i>	Eastern Osprey	V,P,3		N	None expected	None expected
<i>Nettapus coromandelianus</i>	Cotton Pygmy-Goose	E1,P		N	4.07 ha	2.43 ha
<i>Oxyura australis</i>	Blue-billed Duck	V,P		N	None expected	None expected
<i>Stictonetta naevosa</i>	Freckled Duck	V,P		N	None expected	None expected

Scientific Name	Common Name	NSW Status	Comm. Status	Records < 10 km	Potential Impact (Subject Site)	Potential Impact (Future Expansion Area)
<i>Anseranas semipalmata</i>	Magpie Goose	V,P		Y	112.95 ha	22.31 ha
<i>Apus pacificus</i>	Fork-tailed Swift	P	C,J,K	N	Some marginal habitat impacted	Some marginal habitat impacted
<i>Hirundapus caudacutus</i>	White-throated Needletail	P	V,C,J,K	N	116.32 ha	26.35 ha
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E1,P	E	N	4.07 ha	2.43 ha
<i>Ixobrychus flavicollis</i>	Black Bittern	V,P		N	None expected	None expected
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V,P		N	116.32 ha	26.35 ha
<i>Burhinus grallarius</i>	Bush Stone-curlew	E1,P		N	3.37 ha	4.04 ha
<i>^^Calyptorhynchus banksii samueli</i>	Red-tailed Black-Cockatoo (inland subspecies)	V,P,2		N	12.56 ha	5.05 ha
<i>^^Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V,P,2		N	3.37 ha	4.04 ha
<i>^^Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	V,P,2		N	112.25 ha	23.92 ha
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V,P,3		N	None expected	None expected
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E1,P		N	None expected	None expected
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V,P		Y	0.70 ha	None expected
<i>Cuculus optatus</i>	Oriental Cuckoo	P	C,J,K	N	None expected	None expected
<i>Stagonopleura guttata</i>	Diamond Firetail	V,P		Y	112.25 ha	23.92 ha
<i>^^Falco hypoleucos</i>	Grey Falcon	E1,P,2		N	115.62 ha	26.35 ha
<i>Falco subniger</i>	Black Falcon	V,P		Y	116.32 ha	26.35 ha
<i>Grus rubicunda</i>	Brolga	V,P		Y	19.30 ha	11.52 ha
<i>Gelochelidon nilotica</i>	Gull-billed Tern	P	C	N	None expected	None expected

Scientific Name	Common Name	NSW Status	Comm. Status	Records < 10 km	Potential Impact (Subject Site)	Potential Impact (Future Expansion Area)
<i>Hydroprogne caspia</i>	Caspian Tern	P	J	N	None expected	None expected
<i>Thalasseus bergii</i>	Crested Tern	P	J	N	None expected	None expected
<i>Leipoa ocellata</i>	Malleefowl	E1,P	V	N	None expected	None expected
<i>Anthochaera phrygia</i>	Regent Honeyeater	E4A,P	CE	N	0.70 ha	None expected
<i>Certhionyx variegatus</i>	Pied Honeyeater	V,P		N	2.67 ha	4.04 ha
<i>Epthianura albifrons</i>	White-fronted Chat	V,P		N	112.95 ha	22.31 ha
<i>Grantiella picta</i>	Painted Honeyeater	V,P	V	Y	3.37 ha	None expected
<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	V,P		N	0.70 ha	None expected
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V,P		N	3.37 ha	4.04 ha
<i>Ardeotis australis</i>	Australian Bustard	E1,P		Y	115.62 ha	26.35 ha
<i>Pachycephala inornata</i>	Gilbert's Whistler	V,P		N	None expected	None expected
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	V,P		N	3.37 ha	4.04 ha
<i>Petroica boodang</i>	Scarlet Robin	V,P		N	99.69 ha	18.87 ha
<i>Petroica phoenicea</i>	Flame Robin	V,P		N	98.99 ha	18.87 ha
<i>Petroica rodinogaster</i>	Pink Robin	V,P		N	None expected	None expected
<i>Phaethon rubricauda</i>	Red-tailed Tropicbird	V,P	C,J	N	None expected	None expected
<i>Pomatostomus halli</i>	Hall's Babbler	V,P		N	None expected	None expected
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V,P		Y	99.69 ha	18.87 ha
<i>Pycnoptilus floccosus</i>	Pilotbird	P	V	N	None expected	None expected
<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet	V,P,3		N	None expected	None expected

Scientific Name	Common Name	NSW Status	Comm. Status	Records < 10 km	Potential Impact (Subject Site)	Potential Impact (Future Expansion Area)
<i>Glossopsitta pusilla</i>	Little Lorikeet	V,P		N	0.70 ha	None expected
<i>Lathamus discolor</i>	Swift Parrot	E1,P,3	CE	N	99.69 ha	18.87 ha
<i>Neophema pulchella</i>	Turquoise Parrot	V,P,3		Y	3.37 ha	4.04 ha
<i>Polytelis swainsonii</i>	Superb Parrot	V,P,3	V	Y	112.25 ha	23.92 ha
<i>Rostratula australis</i>	Australian Painted Snipe	E1,P	E	N	Some marginal habitat impacted	Some marginal habitat impacted
<i>Actitis hypoleucos</i>	Common Sandpiper	P	C,J,K	N	Some marginal habitat impacted	Some marginal habitat impacted
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	P	C,J,K	N	Some marginal habitat impacted	Some marginal habitat impacted
<i>Calidris ferruginea</i>	Curlew Sandpiper	E1,P	CE,C,J,K	N	Some marginal habitat impacted	Some marginal habitat impacted
<i>Calidris ruficollis</i>	Red-necked Stint	P	C,J,K	N	Some marginal habitat impacted	Some marginal habitat impacted
<i>Gallinago hardwickii</i>	Latham's Snipe	P	J,K	Y	Some marginal habitat impacted	Some marginal habitat impacted
<i>Limosa lapponica</i>	Bar-tailed Godwit	P	C,J,K	N	Some marginal habitat impacted	Some marginal habitat impacted
<i>Limosa limosa</i>	Black-tailed Godwit	V,P	C,J,K	N	Some marginal habitat impacted	Some marginal habitat impacted
<i>Tringa glareola</i>	Wood Sandpiper	P	C,J,K	N	Some marginal habitat impacted	Some marginal habitat impacted
<i>Tringa nebularia</i>	Common Greenshank	P	C,J,K	N	Some marginal	Some marginal habitat impacted

Scientific Name	Common Name	NSW Status	Comm. Status	Records < 10 km	Potential Impact (Subject Site)	Potential Impact (Future Expansion Area)
					habitat impacted	
<i>Tringa stagnatilis</i>	Marsh Sandpiper	P	C,J,K	N	Some marginal habitat impacted	Some marginal habitat impacted
<i>Ninox connivens</i>	Barking Owl	V,P,3		N	7.44 ha	6.47 ha
<i>Ninox strenua</i>	Powerful Owl	V,P,3		N	None expected	None expected
<i>Turnix maculosus</i>	Red-backed Button-quail	V,P		N	100.39 ha	19.88 ha
<i>Tyto longimembris</i>	Eastern Grass Owl	V,P,3		N	None expected	None expected
<i>Tyto novaehollandiae</i>	Masked Owl	V,P,3		N	7.44 ha	6.47 ha
<i>Synemon plana</i>	Golden Sun Moth	E1	CE	N	None expected	None expected
<i>Keyacris scurra</i>	Key's Matchstick Grasshopper	E1		N	None expected	None expected
<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V,P		N	None expected	None expected
<i>Antechinomys laniger</i>	Kultarr	E1,P		N	112.25 ha	23.92 ha
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V,P	E	N	0.70 ha	None expected
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	V,P		N	0.70 ha	None expected
<i>Sminthopsis macroura</i>	Stripe-faced Dunnart	V,P		N	12.56 ha	5.05 ha
<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V,P		Y	20.00 ha	11.52 ha
<i>Macropus dorsalis</i>	Black-striped Wallaby	E1,P		N	None expected	None expected
<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E1,P	V	N	0.70 ha	None expected
<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V,P		N	0.70 ha	None expected
<i>Conilurus albipes</i>	White-footed Tree-rat	E4,P	X	N	None expected	None expected
<i>Leporillus apicalis</i>	Lesser Stick-nest Rat	E4,P	X	N	None expected	None expected

Scientific Name	Common Name	NSW Status	Comm. Status	Records < 10 km	Potential Impact (Subject Site)	Potential Impact (Future Expansion Area)
<i>Leporillus conditor</i>	Greater Stick-nest Rat	E4,P	V	N	None expected	None expected
<i>Pseudomys novaehollandiae</i>	New Holland Mouse	P	V	N	None expected	None expected
<i>Pseudomys oralis</i>	Hastings River Mouse	E1,P	E	N	None expected	None expected
<i>Pseudomys pilligaensis</i>	Pilliga Mouse	V,P	V	N	None expected	None expected
<i>Petaurus australis</i>	Yellow-bellied Glider	V,P		N	None expected	None expected
<i>Petaurus norfolcensis</i>	Squirrel Glider	V,P		N	3.37 ha	4.04 ha
<i>Petaurus norfolcensis</i>	Squirrel Glider in the Wagga Wagga Local Government Area	E2,V,P		N	None expected	None expected
<i>Phascolarctos cinereus</i>	Koala	V,P	V	Y	103.76 ha	21.30 ha
<i>Aepyprymnus rufescens</i>	Rufous Bettong	V,P		N	None expected	None expected
<i>Bettongia lesueur graii</i>	Boodie, Burrowing Bettong (mainland)	E4,P	X	N	None expected	None expected
<i>Petauroides volans</i>	Greater Glider	P	V	N	None expected	None expected
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V,P	V	Y	None expected	None expected
<i>Macrotis lagotis</i>	Bilby	E4,P	V	N	None expected	None expected
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V,P	V	N	0.70 ha	None expected
<i>Chalinolobus picatus</i>	Little Pied Bat	V,P		Y	7.44 ha	6.47 ha
<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V,P		N	None expected	None expected
<i>Myotis macropus</i>	Southern Myotis	V,P		N	None expected	None expected
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	V,P	V	N	3.37 ha	4.04 ha
<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V,P		N	None expected	None expected

Scientific Name	Common Name	NSW Status	Comm. Status	Records < 10 km	Potential Impact (Subject Site)	Potential Impact (Future Expansion Area)
<i>Vespadelus troughtoni</i>	Eastern Cave Bat	V,P		N	None expected	None expected
<i>Hoplocephalus bitorquatus</i>	Pale-headed Snake	V,P		N	4.07 ha	2.43 ha
<i>Aprasia parapulchella</i>	Pink-tailed Legless Lizard	V,P	V	N	96.32 ha	14.83 ha
<i>Delma impar</i>	Striped Legless Lizard	V,P	V	N	None expected	None expected
<i>Aspidites ramsayi</i>	Woma	V,P		N	None expected	None expected
<i>Hemiaspis demelii</i>	Grey Snake	E1,P	E	N	None expected	None expected
<i>Varanus rosenbergi</i>	Rosenberg's Goanna	V,P		N	None expected	None expected
<i>Tympanocryptis lineata</i>	Canberra Grassland Earless Dragon	E4A,P	E	N	None expected	None expected

*NSW Status: P=Protected, V=Vulnerable, E1=Endangered, E2=Endangered Population, E4=Extinct, E4A=Critically Endangered, 2=Category 2 sensitive species, 3=Category 3 sensitive species.

+Comm. Status: CE=Critically endangered, E=Endangered, V=Vulnerable

6.2.4 Matters of National Environmental Significance

Impacts to 42 threatened, migratory or marine species and one TEC identified as Matters of National Environmental Significance may result from this proposal. These matters are discussed in **Appendix D**. Note that this does not include impacts to Bluegrass (*Dichanthium setosum*), which was not identified in the Protected Matters Report. The significance of these impacts should be considered in any future biodiversity assessments associated with this proposal.

6.2.5 Impact to habitat features

Hollow-bearing trees and stags constitute important habitat for threatened bird and bat species, including those detected by recording devices and during the field survey. This proposal would reduce available habitat for these species in the area. The subject site was found to contain 44 hollow-bearing live or dead trees, possessing a total of 28 large (≥ 20 cm) and 99 small (< 20 cm) hollows. The future expansion area contained an additional six hollow-bearing trees, possessing a total of one large and 14 small hollows. Additional hollows were noted in the northern road corridor but were not mapped in detail. One stick nest occurs within the subject site and several more occur adjacent to the subject site, including in the northern road corridor.

6.2.6 Injury and mortality

During the construction phase of the proposal, the removal of hollow logs, felling of trees and removal of stags is likely to disturb fauna.

In addition, fauna may become trapped in or may choose to shelter in machinery that is stored in the study area overnight. If these animals were to remain inside the machinery, or under the wheels or tracks, they may be injured or die once the machinery is in use.

6.3 INDIRECT/OPERATIONAL IMPACTS

6.3.1 Wildlife connectivity and habitat fragmentation

The proposal has the potential to cause habitat fragmentation for wildlife. The removal of the central row of trees and areas of remnant woodland within the subject site would likely disrupt landscape connectivity for many species that rely on enclosed vegetation when moving.

6.3.2 Edge effects on adjacent native vegetation and habitat

Clearing of vegetation has the potential to cause significant edge effects on any surviving or surrounding vegetation. These effects include:

- Changes to the micro-climate.
- Weed proliferation.
- Increases in pest animals.
- Impacts from surrounding areas, e.g. spray-drift from agriculture or litter associated with roadways.
- Increased noise, light, and movement.

While many edge effects are already active in the landscape, owing to the agricultural history of the site and the presence of nearby roads and infrastructure, this proposal has the potential to exacerbate these effects. This should be considered in managing impacts.

6.3.3 Invasion and spread of weeds

Proliferation of weed species is an indirect impact (i.e. not a direct result) of proposal activities. The most likely causes of weed dispersal and importation associated with the proposal include earthworks, movement of soil, and attachment of seed (and other propagules) to vehicles and machinery. Removal of existing vegetation creates niches that allow invasive species to flourish. Weed encroachment spans several listed Key Threatening Processes, including *Invasion and establishment of exotic vines and scramblers*, *Invasion and establishment of Scotch Broom (Cytisus scoparius)*, *Invasion of native plant communities by African Olive Olea europaea subsp. cuspidata*, *Invasion of native plant communities by Chrysanthemoides monilifera*, *Invasion of*

native plant communities by exotic perennial grasses and Invasion, establishment and spread of Lantana (see **Appendix E**).

6.3.4 Invasion and spread of pathogens and disease

Several pathogens known from NSW have the potential to impact on biodiversity due to their movement and infection during construction. Of these, three are listed as a key threatening process under either the EPBC Act and/or BC Act including:

- Dieback caused by *Phytophthora* (Root Rot; EPBC Act and BC Act)
- Infection of frogs by amphibian chytrid fungus causing the disease chytridiomycosis (EPBC Act and BC Act)
- Introduction and establishment of exotic Rust Fungi of the order *Pucciniales* on plants of the family *Myrtaceae* (BC Act).

These pathogens were not observed or tested for in the study area. The most likely causes of pathogen dispersal and importation associated with the proposal include earthworks, movement of soil, and attachment of plant matter to vehicles and machinery.

6.4 CUMULATIVE IMPACTS

The potential biodiversity impacts of the proposal must be considered in light of the long history of clearing and biodiversity loss to which the surrounding lands have been subjected. This proposal will not act alone in contributing to the loss of biodiversity in the region; instead, it will form one contribution to the ongoing and, in some cases, intensifying loss of native biodiversity. The incremental effects of multiple sources of impact (past, present, and future) are referred to as cumulative impacts and provide an opportunity to consider the proposal within a strategic context. These cumulative impacts are having and continue to have a significant impact on biodiversity in the local region. Historical impacts associated with agriculture have profoundly altered the landscape, resulting in widespread and dramatic loss of biodiversity. Development associated with the Inland Rail, development for energy infrastructure, and continuing agricultural impacts represents perhaps the most significant ongoing cause of decline in local biodiversity.

7 CONCLUSION

The following summary of findings is provided to assist with ongoing project planning.

The proposal would clear up to 118.04 ha of vegetation within the subject site belonging to five Plant Community Types (PCTs):

- PCT 45 – Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion.
- PCT 53 – Shallow freshwater wetland sedgeland in depressions on floodplains on inland alluvial plains and floodplains.
- PCT 82 – Western Grey Box - Poplar Box - White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregion.
- PCT 201 – Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion.
- PCT 250 – Derived tussock grassland of the central western plains and lower slopes of NSW.

The most common of these was PCT 250 (96.32 ha), followed by PCT 45 (12.56 ha), PCT 53 (4.07 ha), PCT 82 (2.67 ha), and PCT 201 (0.70 ha). The proposal would additionally clear up to 26.37 ha of vegetation within the future expansion area, belonging to PCTs 45 (5.05 ha), 53 (2.43 ha), 82 (4.04 ha) and 250 (14.83 ha).

Two Threatened Ecological Communities (TECs) were positively identified within the subject site and one within the future expansion area:

- BC Act, Endangered: Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions. (Subject site: 8.79 ha. Future expansion area: 16.62 ha).
- EPBC Act, Endangered: Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia. (Subject site: 7.86 ha. Future expansion area: 16.62 ha).

An additional TEC was provisionally identified within the subject site and future expansion area, pending reassessment during the appropriate season (spring):

- EPBC Act, Endangered: Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia. (Subject site: 7.86 ha. Future expansion area: 16.62 ha).

Additional areas of these TECs occur on the northern side of the Cragie Lea Lane road corridor. A greater extent of the BC Act-listed Fuzzy Box Endangered Ecological Community (EEC) occurs on this northern side than within the subject site.

One threatened plant species, Bluegrass (*Dichanthium setosum*), was recorded during the field survey. One small population was recorded within the subject site and one larger population within the future expansion area. Four additional populations were recorded within the initial assessment area during surveys in April 2021. This species is listed as vulnerable under the BC

and EPBC Acts. As the subject site is located at the southern limit of the known range of this species, this occurrence is likely to constitute an important population. Consequently, impacts to this species may be deemed significant and therefore trigger entry into the Biodiversity Offsets Scheme and/or referral to the Minister under the EPBC Act.

Six threatened fauna species (four birds and two bats) were detected either during the field surveys or by means of recording devices. All six species are listed as vulnerable under the BC Act, while one, the Superb Parrot (*Polytelis swainsonii*), is also listed as vulnerable under the EPBC Act. As these species are highly mobile, they are likely to make use of both the subject site and future expansion area, as well as much of the road corridor.

A total of 175 threatened species or populations are known or predicted to occur within the three IBRA subregions that fall within 10 km of the subject site. Impacts to 81 of these may occur as a result of clearing of the subject site. Clearing of the future expansion area may result in impacts to 67 of these species. Impacts to up to 42 species identified by a Matters of National Environmental Significance search may result from future development within these areas. Tests of significance have not been conducted for these species; consequently, it cannot be stated with certainty whether these impacts would be significant. In the case of many species, particularly marine and migratory species, the impacts are likely to be negligible.

The field survey identified 44 hollow-bearing trees (42 live and two dead) within the subject site and an additional six (all live) within the future expansion area (**Figure 5-1**). Hollows were classed as either small (< 20 cm diameter) or large (\geq 20 cm diameter) to provide an indication of the species most likely to make use of them. The trees within the subject site contained a total of 28 large and 99 small hollows, as well as one stick nest. Six habitat trees (all live) were recorded within the future expansion area, containing a total of one large and 14 small hollows. Additional habitat trees containing nests and hollows were recorded in the northern side of the road corridor and outside of the western limit of the subject site within the southern road corridor.

The most significant identified constraints associated with any proposal situated in the subject site or future expansion area are the relatively large areas of TEC that would be impacted and the presence of the threatened Bluegrass. Efforts to reduce impacts to these entities are strongly encouraged in order for future development to comply with the requirement to avoid and/or minimise impacts to biodiversity values.

This report covers the current form of the proposal and is intended only to assess constraints and limitations within the proposal site. It does not constitute a finalised biodiversity assessment.

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Appendix A - Database search results



Australian Government

Department of Climate Change, Energy,
the Environment and Water

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 26-Apr-2023

[Summary](#)

[Details](#)

[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)

Summary

Matters of National Environment Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar)	4
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	6
Listed Threatened Species:	41
Listed Migratory Species:	9

Other Matters Protected by the EPBC Act

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

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

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

Commonwealth Lands:	3
Commonwealth Heritage Places:	None
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

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

State and Territory Reserves:	None
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	3
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	1
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

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

Ramsar Site Name	Proximity	Buffer Status
Banrock station wetland complex	700 - 800km upstream from Ramsar site	In feature area
Riverland	600 - 700km upstream from Ramsar site	In feature area
The coorong, and lakes alexandrina and albert wetland	800 - 900km upstream from Ramsar site	In feature area
The macquarie marshes	100 - 150km upstream from Ramsar site	In buffer area only

Listed Threatened Ecological Communities [\[Resource Information \]](#)

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

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

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

Community Name	Threatened Category	Presence Text	Buffer Status
Listed Threatened Species			[Resource Information]
Status of Conservation Dependent and Extinct are not MNES under the EPBC Act. Number is the current name ID.			
Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat known to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Lophochroa leadbeateri leadbeateri Major Mitchell's Cockatoo (eastern), Eastern Major Mitchell's Cockatoo [82926]	Endangered	Species or species habitat likely to occur within area	In feature area
Melanodryas cucullata cucullata South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat likely to occur within area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area	In feature area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat known to occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Stagonopleura guttata Diamond Firetail [59398]	Vulnerable	Species or species habitat known to occur within area	In feature area
FISH			
Bidyanus bidyanus Silver Perch, Bidyan [76155]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
Maccullochella macquariensis Trout Cod [26171]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Maccullochella peelii Murray Cod [66633]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Macquaria australasica Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area	In buffer area only
FROG			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Crinia sloanei Sloane's Froglet [59151]	Endangered	Species or species habitat may occur within area	In buffer area only
MAMMAL			
Chalinolobus dwyeri Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat known to occur within area	In feature area
Dasyurus maculatus maculatus (SE mainland population) Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat may occur within area	In feature area
Nyctophilus corbeni Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT) Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat likely to occur within area	In feature area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area	In feature area
PLANT			
Androcalva procumbens [87153]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Austrostipa wakoolica [66623]	Endangered	Species or species habitat may occur within area	In feature area
Homoranthus darwinioides [12974]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Lepidium aschersonii Spiny Peppercreess [10976]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Lepidium monoplocoides Winged Pepper-cress [9190]	Endangered	Species or species habitat may occur within area	In feature area
Prasophyllum petilum Tarengo Leek Orchid [55144]	Endangered	Species or species habitat may occur within area	In buffer area only
Prasophyllum sp. Wybong (C.Phelps ORG 5269) a leek-orchid [81964]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Swainsona murrayana Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Swainsona recta Small Purple-pea, Mountain Swainson-pea, Small Purple Pea [7580]	Endangered	Species or species habitat may occur within area	In buffer area only
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Vincetoxicum forsteri listed as Tylophora linearis [92384]	Endangered	Species or species habitat may occur within area	In buffer area only
REPTILE			
Anomalopus mackayi Five-clawed Worm-skink, Long-legged Worm-skink [25934]	Vulnerable	Species or species habitat may occur within area	In feature area
Aprasia parapulchella Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Hemiaspis damelii Grey Snake [1179]	Endangered	Species or species habitat may occur within area	In feature area
Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [[Resource Information](#)]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Communications, Information Technology and the Arts - Australian Postal Corporation		
Commonwealth Land - Australian Postal Commission [14064]	NSW	In buffer area only

Communications, Information Technology and the Arts - Telstra Corporation Limited		
Commonwealth Land - Australian Telecommunications Commission [14066]	NSW	In buffer area only

Unknown		
Commonwealth Land - [14065]	NSW	In buffer area only

Listed Marine Species [[Resource Information](#)]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis			
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat likely to occur within area overfly marine area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status	
Rostratula australis as Rostratula benghalensis (sensu lato)	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area	
Australian Painted Snipe [77037]				
Extra Information				
EPBC Act Referrals			[Resource Information]	
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Narwonah Materials Distribution Centre	2022/09226		Completed	In feature area
Controlled action				
Parkes to Narromine Section Inland Rail, NSW	2016/7731	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Bioregional Assessments				
SubRegion	BioRegion	Website	Buffer Status	
Central West	Northern Inland Catchments	BA website	In buffer area only	

Caveat

1 PURPOSE

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

The report contains the mapped locations of:

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

2 DISCLAIMER

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

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

3 DATA SOURCES

Threatened ecological communities

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

Threatened, migratory and marine species

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

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

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

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

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

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

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

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

Acknowledgements

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

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

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

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

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BioNET Atlas search – threatened species predicted to occur within the Bogan-Macquarie, Inland Slopes, and Pilliga IBRA subregions.

Key

*NSW Status: P=Protected, V=Vulnerable, E1=Endangered, E2=Endangered population, E4=Extinct, E4A=Critically endangered, 2=Category 2 sensitive species, 3=Category 3 sensitive species.

*Comm. Status: C=CAMBA, J=JAMBA, K=ROKAMBA, CE=Critically endangered, E=Endangered, V=Vulnerable.

Number of Records: P = predicted to occur.

Kingdom	Scientific Name	Common Name	NSW Status	Comm. Status	Total Records
Amphibia	<i>Crinia sloanei</i>	Sloane's Froglet	V,P	E	157
Amphibia	<i>Litoria booroolongensis</i>	Booroolong Frog	E1,P	E	34
Amphibia	<i>Litoria raniformis</i>	Southern Bell Frog	E1,P	V	12
Aves	<i>^Calyptorhynchus banksii samueli</i>	Red-tailed Black-Cockatoo (inland subspecies)	V,P,2		5
Aves	<i>^Calyptorhynchus lathami</i>	Glossy Black-Cockatoo	V,P,2	V	1110
Aves	<i>^Falco hypoleucos</i>	Grey Falcon	V,P,2	V	8
Aves	<i>^Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	V,P,2		57
Aves	<i>Actitis hypoleucos</i>	Common Sandpiper	P	C,J,K	8
Aves	<i>Anseranas semipalmata</i>	Magpie Goose	V,P		168
Aves	<i>Anthochaera phrygia</i>	Regent Honeyeater	E4A,P	CE	229
Aves	<i>Apus pacificus</i>	Fork-tailed Swift	P	C,J,K	57
Aves	<i>Ardeotis australis</i>	Australian Bustard	E1,P		24
Aves	<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V,P		2817
Aves	<i>Botaurus poiciloptilus</i>	Australasian Bittern	E1,P	E	68
Aves	<i>Burhinus grallarius</i>	Bush Stone-curlew	E1,P		27
Aves	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	P	C,J,K	102
Aves	<i>Calidris ferruginea</i>	Curlew Sandpiper	E1,P	CE,C,J,K	6
Aves	<i>Calidris ruficollis</i>	Red-necked Stint	P	C,J,K	7
Aves	<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V,P,3	E	377
Aves	<i>Certhionyx variegatus</i>	Pied Honeyeater	V,P		10
Aves	<i>Chthonicola sagittata</i>	Speckled Warbler	V,P		2563
Aves	<i>Circus assimilis</i>	Spotted Harrier	V,P		209
Aves	<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V,P		6087
Aves	<i>Cuculus optatus</i>	Oriental Cuckoo	P	C,J,K	1
Aves	<i>Daphoenositta chrysoptera</i>	Varied Sittella	V,P		848
Aves	<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	E1,P		12
Aves	<i>Epthianura albifrons</i>	White-fronted Chat	V,P		148

Kingdom	Scientific Name	Common Name	NSW Status	Comm. Status	Total Records
Aves	<i>Falco subniger</i>	Black Falcon	V,P		155
Aves	<i>Gallinago hardwickii</i>	Latham's Snipe	P	J,K	176
Aves	<i>Gelochelidon nilotica</i>	Gull-billed Tern	P	C	11
Aves	<i>Glossopsitta porphyrocephala</i>	Purple-crowned Lorikeet	V,P,3		9
Aves	<i>Glossopsitta pusilla</i>	Little Lorikeet	V,P		748
Aves	<i>Grantiella picta</i>	Painted Honeyeater	V,P	V	137
Aves	<i>Grus rubicunda</i>	Brolga	V,P		218
Aves	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V,P		257
Aves	<i>Hamirostra melanosternon</i>	Black-breasted Buzzard	V,P,3		6
Aves	<i>Hieraaetus morphnoides</i>	Little Eagle	V,P		521
Aves	<i>Hirundapus caudacutus</i>	White-throated Needle-tail	P	V,C,J,K	195
Aves	<i>Hydroprogne caspia</i>	Caspian Tern	P	J	23
Aves	<i>Ixobrychus flavicollis</i>	Black Bittern	V,P		2
Aves	<i>Lathamus discolor</i>	Swift Parrot	E1,P	CE	239
Aves	<i>Leipoa ocellata</i>	Malleefowl	E1,P	V	73
Aves	<i>Limosa lapponica</i>	Bar-tailed Godwit	P	C,J,K	1
Aves	<i>Limosa limosa</i>	Black-tailed Godwit	V,P	C,J,K	2
Aves	<i>Lophoictinia isura</i>	Square-tailed Kite	V,P,3		87
Aves	<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	V,P		917
Aves	<i>Melithreptus gularis gularis</i>	Black-chinned Honeyeater (eastern subspecies)	V,P		683
Aves	<i>Neophema pulchella</i>	Turquoise Parrot	V,P,3		935
Aves	<i>Nettapus coromandelianus</i>	Cotton Pygmy-Goose	E1,P		2
Aves	<i>Ninox connivens</i>	Barking Owl	V,P,3		232
Aves	<i>Ninox strenua</i>	Powerful Owl	V,P,3		26
Aves	<i>Oxyura australis</i>	Blue-billed Duck	V,P		60
Aves	<i>Pachycephala inornata</i>	Gilbert's Whistler	V,P		147
Aves	<i>Pandion cristatus</i>	Eastern Osprey	V,P,3		2
Aves	<i>Petroica boodang</i>	Scarlet Robin	V,P		778
Aves	<i>Petroica phoenicea</i>	Flame Robin	V,P		710
Aves	<i>Petroica rodinogaster</i>	Pink Robin	V,P		2
Aves	<i>Phaethon rubricauda</i>	Red-tailed Tropicbird	V,P	C,J	1
Aves	<i>Polytelis swainsonii</i>	Superb Parrot	V,P,3	V	4669
Aves	<i>Pomatostomus halli</i>	Hall's Babbler	V,P		1

Kingdom	Scientific Name	Common Name	NSW Status	Comm. Status	Total Records
Aves	<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V,P		3123
Aves	<i>Pycnoptilus floccosus</i>	Pilotbird	P	V	1
Aves	<i>Rostratula australis</i>	Australian Painted Snipe	E1,P	E	21
Aves	<i>Stagonopleura guttata</i>	Diamond Firetail	V,P		1856
Aves	<i>Stictonetta naevosa</i>	Freckled Duck	V,P		80
Aves	<i>Thalasseus bergii</i>	Crested Tern	P	J	1
Aves	<i>Tringa glareola</i>	Wood Sandpiper	P	C,J,K	5
Aves	<i>Tringa nebularia</i>	Common Greenshank	P	C,J,K	68
Aves	<i>Tringa stagnatilis</i>	Marsh Sandpiper	P	C,J,K	20
Aves	<i>Turnix maculosus</i>	Red-backed Button-quail	V,P		P
Aves	<i>Tyto longimembris</i>	Eastern Grass Owl	V,P,3		1
Aves	<i>Tyto novaehollandiae</i>	Masked Owl	V,P,3		22
Insecta	<i>Keyacris scurra</i>	Key's Matchstick Grasshopper	E1		5
Insecta	<i>Synemon plana</i>	Golden Sun Moth	V	V	130
Mammalia	<i>Aepyprymnus rufescens</i>	Rufous Bettong	V,P		2
Mammalia	<i>Antechinomys laniger</i>	Kultarr	E1,P		2
Mammalia	<i>Bettongia lesueur graii</i>	Boodie, Burrowing Bettong (mainland)	E4,P	X	2
Mammalia	<i>Cercartetus nanus</i>	Eastern Pygmy-possum	V,P		45
Mammalia	<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V,P	V	46
Mammalia	<i>Chalinolobus picatus</i>	Little Pied Bat	V,P		76
Mammalia	<i>Conilurus albipes</i>	White-footed Tree-rat	E4,P	X	2
Mammalia	<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V,P	E	58
Mammalia	<i>Falsistrellus tasmaniensis</i>	Eastern False Pipistrelle	V,P		20
Mammalia	<i>Leporillus apicalis</i>	Lesser Stick-nest Rat	E4,P	X	1
Mammalia	<i>Leporillus conditor</i>	Greater Stick-nest Rat	E4,P	V	2
Mammalia	<i>Macropus dorsalis</i>	Black-striped Wallaby	E1,P		681
Mammalia	<i>Macrotis lagotis</i>	Bilby	E4,P	V	3
Mammalia	<i>Miniopterus orianae oceanensis</i>	Large Bent-winged Bat	V,P		118
Mammalia	<i>Myotis macropus</i>	Southern Myotis	V,P		20

Kingdom	Scientific Name	Common Name	NSW Status	Comm. Status	Total Records
Mammalia	<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	V,P	V	107
Mammalia	<i>Petauroides volans</i>	Southern Greater Glider	E1,P	E	124
Mammalia	<i>Petaurus australis</i>	Yellow-bellied Glider	V,P	V	2
Mammalia	<i>Petaurus norfolcensis</i>	Squirrel Glider	V,P		1292
Mammalia	<i>Petaurus norfolcensis</i>	Squirrel Glider in the Wagga Wagga Local Government Area	V,P		528
Mammalia	<i>Petrogale penicillata</i>	Brush-tailed Rock-wallaby	E1,P	V	56
Mammalia	<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	V,P		P
Mammalia	<i>Phascolarctos cinereus</i>	Koala	E1,P	E	511
Mammalia	<i>Pseudomys novaehollandiae</i>	New Holland Mouse	P	V	8
Mammalia	<i>Pseudomys oralis</i>	Hastings River Mouse	E1,P	E	1
Mammalia	<i>Pseudomys pilligaensis</i>	Pilliga Mouse	V,P	V	176
Mammalia	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V,P	V	270
Mammalia	<i>Saccolaimus flaviventris</i>	Yellow-bellied Sheath-tail-bat	V,P		170
Mammalia	<i>Scoteanax rueppellii</i>	Greater Broad-nosed Bat	V,P		4
Mammalia	<i>Sminthopsis macroura</i>	Stripe-faced Dunnart	V,P		1
Mammalia	<i>Vespadelus troughtoni</i>	Eastern Cave Bat	V,P		15
Reptilia	<i>Aprasia parapulchella</i>	Pink-tailed Legless Lizard	V,P	V	192
Reptilia	<i>Aspidites ramsayi</i>	Woma	V,P		P
Reptilia	<i>Delma impar</i>	Striped Legless Lizard	V,P	V	4
Reptilia	<i>Hemiaspis damelii</i>	Grey Snake	E1,P	E	8
Reptilia	<i>Hoplocephalus bitorquatus</i>	Pale-headed Snake	V,P		3
Reptilia	<i>Tympanocryptis lineata</i>	Canberra Grassland Earless Dragon	E4A,P	E	4
Reptilia	<i>Varanus rosenbergi</i>	Rosenberg's Goanna	V,P		6
Flora	<i>Caladenia arenaria</i>	Sand-hill Spider Orchid	E1,P,2	E	6
Flora	<i>Caladenia concolor</i>	Crimson Spider Orchid	E1,P,2	V	504
Flora	<i>Caladenia rosella</i>	Rosella Spider Orchid	E4,P,2	E	1

Kingdom	Scientific Name	Common Name	NSW Status	Comm. Status	Total Records
Flora	<i>Caladenia tessellata</i>	Thick Lip Spider Orchid	E1,P,2	V	1
Flora	<i>Cymbidium canaliculatum</i>	Cymbidium canaliculatum population in the Hunter Catchment	E2,P,2		1
Flora	<i>Diuris tricolor</i>	Pine Donkey Orchid	V,P,2		80
Flora	<i>Myriophyllum implicatum</i>		E4A,2		P
Flora	<i>Prasophyllum petilum</i>	Tarengo Leek Orchid	E1,P,2	E	25
Flora	<i>Pterostylis cobarensis</i>	Greenhood Orchid	V,P,2		175
Flora	<i>Acacia ausfeldii</i>	Ausfeld's Wattle	V		3932
Flora	<i>Acacia meiantha</i>		E1	E	P
Flora	<i>Acacia pendula</i>	Acacia pendula population in the Hunter catchment	E2		P
Flora	<i>Acacia phasmoides</i>	Phantom Wattle	V	V	95
Flora	<i>Ammobium craspedioides</i>	Yass Daisy	V	V	825
Flora	<i>Amphibromus fluitans</i>	Floating Swamp Wallaby-grass	V	V	30
Flora	<i>Atriplex infrequens</i>	A saltbush	V	V	1
Flora	<i>Austrostipa wakoolica</i>	A spear-grass	E1	E	P
Flora	<i>Bertya opponens</i>	Coolabah Bertya	V	V	224
Flora	<i>Boronia granitica</i>	Granite Boronia	V,P	E	1
Flora	<i>Bossiaea fragrans</i>		E4A	CE	55
Flora	<i>Brachyscome muelleroides</i>	Claypan Daisy	V	V	1
Flora	<i>Caesia parviflora</i> var. <i>minor</i>	Small Pale Grass-lily	E1		3
Flora	<i>Carex raleighii</i>	Raleigh Sedge	E1		1
Flora	<i>Cheilanthes sieberi</i> subsp. <i>pseudovellea</i>		E1,3		22
Flora	<i>Commersonia procumbens</i>		V	V	298
Flora	<i>Cullen parvum</i>	Small Scurf-pea	E1		7
Flora	<i>Cynanchum elegans</i>	White-flowered Wax Plant	E1	E	P
Flora	<i>Dichanthium setosum</i>	Bluegrass	V	V	13
Flora	<i>Digitaria porrecta</i>	Finger Panic Grass	E1		18
Flora	<i>Eriocaulon australasicum</i>	Austral Pipewort	E1	E	P
Flora	<i>Eucalyptus aggregata</i>	Black Gum	V	V	1
Flora	<i>Eucalyptus alligatrix</i> subsp. <i>alligatrix</i>		V	V	2
Flora	<i>Eucalyptus camaldulensis</i>	Eucalyptus camaldulensis	E2		P

Kingdom	Scientific Name	Common Name	NSW Status	Comm. Status	Total Records
		population in the Hunter catchment			
Flora	<i>Eucalyptus cannonii</i>	Capertee Stringybark	V		8
Flora	<i>Eucalyptus robertsonii</i> subsp. <i>hemisphaerica</i>	Robertson's Peppermint	V	V	P
Flora	<i>Euphrasia arguta</i>		E4A	CE	1
Flora	<i>Euphrasia collina</i> subsp. <i>muelleri</i>	Mueller's Eyebright	E1	E	P
Flora	<i>Grevillea wilkinsonii</i>	Tumut Grevillea	E4A	E	17
Flora	<i>Homoranthus darwinioides</i>	Fairy Bells	V	V	186
Flora	<i>Homoranthus prolixus</i>	Granite Homoranthus	V	V	1
Flora	<i>Indigofera efoliata</i>	Leafless Indigo	E1,3	E	6
Flora	<i>Lepidium aschersonii</i>	Spiny Peppercross	V	V	3
Flora	<i>Lepidium monoplocoides</i>	Winged Peppercross	E1	E	P
Flora	<i>Leucochrysum albicans</i> subsp. <i>tricolor</i>	Hoary Sunray	E1	E	33
Flora	<i>Monotaxis macrophylla</i>	Large-leafed Monotaxis	E1		2
Flora	<i>Muehlenbeckia</i> sp. Mt Norman	Scrambling Lignum	V		1
Flora	<i>Persoonia marginata</i>	Clandulla Geebung	V,P	V	P
Flora	<i>Pilularia novae-hollandiae</i>	Austral Pillwort	E1,3		5
Flora	<i>Pimelea bracteata</i>		E4A		1
Flora	<i>Polygala linariifolia</i>	Native Milkwort	E1		14
Flora	<i>Pomaderris cotoneaster</i>	Cotoneaster Pomaderris	E1	E	P
Flora	<i>Pomaderris queenslandica</i>	Scant Pomaderris	E1		45
Flora	<i>Prasophyllum</i> sp. Wybong		P	CE	P
Flora	<i>Pultenaea humilis</i>	Dwarf Bush-pea	V		8
Flora	<i>Senecio garlandii</i>	Woolly Ragwort	V		72
Flora	<i>Swainsona murrayana</i>	Slender Darling Pea	V	V	6
Flora	<i>Swainsona plagiotropis</i>	Red Darling Pea	V	V	4
Flora	<i>Swainsona recta</i>	Small Purple-pea	E1	E	737
Flora	<i>Swainsona sericea</i>	Silky Swainson-pea	V		234
Flora	<i>Thesium australe</i>	Austral Toadflax	V	V	2
Flora	<i>Tylophora linearis</i>		V	E	200
Flora	<i>Zieria ingramii</i>	Keith's Zieria	E1	E	422
Flora	<i>Zieria obcordata</i>	Granite Zieria	E1	E	26

BioNET Atlas search – threatened ecological communities predicted to occur within the Bogan-Macquarie, Inland Slopes, and Pilliga IBRA subregions

*NSW Status: E3=Endangered Ecological Community, E4B=Critically Endangered Ecological Community,

+Comm. Status: CE=Critically endangered, E=Endangered.

Records: K = known to occur, P = predicted to occur.

Community	NSW status	Comm. status	Records
Alpine Sphagnum Bogs and Associated Fens		E	K
Artesian Springs Ecological Community in the Great Artesian Basin	E4B		K
Brigalow within the Brigalow Belt South, Nandewar and Darling Riverine Plains Bioregions	E3		K
Brigalow-Gidgee woodland/shrubland in the Mulga Lands and Darling Riverine Plains Bioregions	E3		P
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions		E	K
Carex Sedgeland of the New England Tableland, Nandewar, Brigalow Belt South and NSW North Coast Bioregions	E3		K
Central Hunter Valley eucalypt forest and woodland		CE	K
Coolac-Tumut Serpentine Shrubby Woodland in the NSW South Western Slopes and South Eastern Highlands Bioregions	E3		K
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions		E	K
Coolibah-Black Box Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain and Mulga Lands Bioregions	E3		K
Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	E3		K
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia		E	K
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	E3		K
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	E3		K
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland		CE	K
Pilliga Outwash Ephemeral Wetlands in the Brigalow Belt South Bioregion	E3		K
Poplar Box Grassy Woodland on Alluvial Plains		E	K
The community of native species dependent on natural discharge of groundwater from the Great Artesian Basin		E	K
Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion		E	K
Weeping Myall Woodlands		E	K
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and	E4B		K
White Box - Yellow Box - Blakely's Red Gum Grassy Woodland and Derived Native Grassland		CE	K

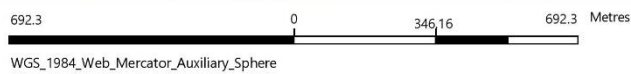
Biodiversity Values Map



Biodiversity Values Map



1: 13,628



This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Legend

- Biodiversity Values that have been mapped for more than 90 days
- Biodiversity Values added within last 90 days

Notes

© NSW Department of Planning and Environment



Biodiversity Values Map and Threshold Report

Results Summary

Date of Calculation	26/04/2023 11:01 AM	BDAR Required*
Total Digitised Area	1,185,050.9 sqm	
Minimum Lot Size Method	LEP	
Minimum Lot Size 10,000sqm = 1ha	4,000,000 sqm	
Area Clearing Threshold 10,000sqm = 1ha	10,000 sqm	
Area clearing trigger Area of native vegetation cleared	Unknown #	Unknown #
Biodiversity values map trigger Impact on biodiversity values map(not including values added within the last 90 days)?	no	no
Date of the 90 day Expiry	N/A	

*If BDAR required has:

- at least one 'Yes': you have exceeded the BOS threshold. You are now required to submit a Biodiversity Development Assessment Report with your development application. Go to <https://customer.lmbc.nsw.gov.au/assessment/AccreditedAssessor> to access a list of assessors who are accredited to apply the Biodiversity Assessment Method and write a Biodiversity Development Assessment Report
- 'No': you have not exceeded the BOS threshold. You may still require a permit from local council. Review the development control plan and consult with council. You may still be required to assess whether the development is "likely to significantly affect threatened species" as determined under the test in s. 7.3 of the Biodiversity Conservation Act 2016. You may still be required to review the area where no vegetation mapping is available.

Where the area of impact occurs on land with no vegetation mapping available, the tool cannot determine the area of native vegetation cleared and if this exceeds the Area Threshold. You will need to work out the area of native vegetation cleared - refer to the BMAT user guide for how to do this.

On and after the 90 day expiry date a BDAR will be required.

Disclaimer

This results summary and map can be used as guidance material only. This results summary and map is not guaranteed to be free from error or omission. The State of NSW and Department of Planning and Environment and its employees disclaim liability for any act done on the information in the results summary or map and any consequences of such acts or omissions. It remains the responsibility of the proponent to ensure that their development application complies with all aspects of the *Biodiversity Conservation Act 2016*.

The mapping provided in this tool has been done with the best available mapping and knowledge of species habitat requirements. This map is valid for a period of 30 days from the date of calculation (above).

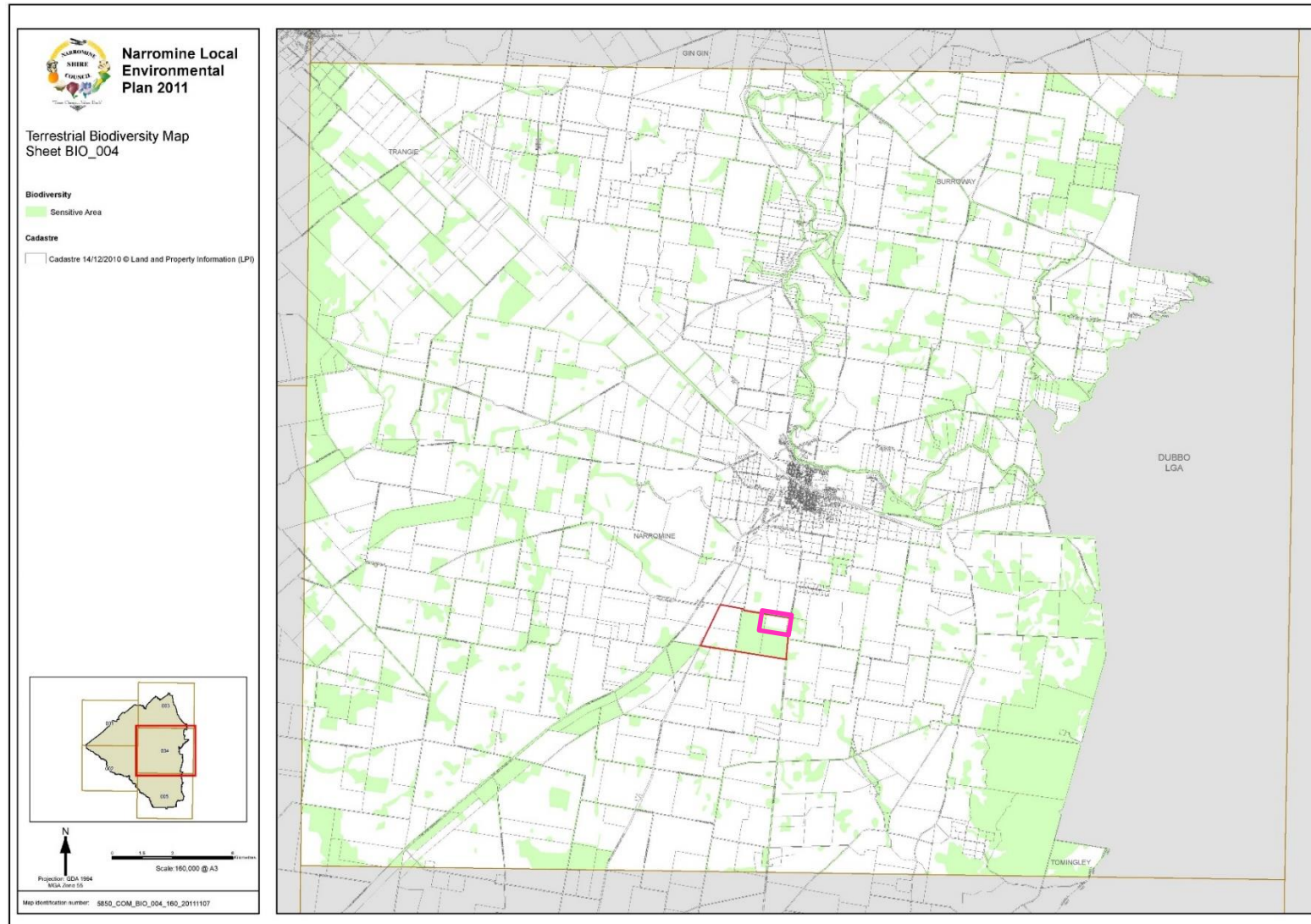
Acknowledgement

I as the applicant for this development, submit that I have correctly depicted the area that will be impacted or likely to be impacted as a result of the proposed development.

Signature _____ Date: 26/04/2023 11:01 AM

Narromine Local Environmental Plan (2011)

Large sections of the initial assessment area (indicated in red) are mapped as sensitive areas for biodiversity. The subject site (pink) contains mapped sensitive areas chiefly in the road corridor.



APPENDIX B – PLANT COMMUNITY TYPES

PCTs recorded within the subject site or future expansion area are depicted below.

PCT	Photographs
45	 <p data-bbox="517 858 1234 887">Small pocket of PCT 45 in foreground. Regrowth of PCT 82 behind.</p> <p data-bbox="1420 1310 1928 1339">Note gilgai (PCT 53) behind grassland (PCT 45)</p>

53



82



201



250



APPENDIX C – FLORA AND FAUNA SURVEY RESULTS

Flora species list

The following table lists all 208 flora species recorded within the subject site during the April 2021 and April 2023 field surveys. Of these, 149 species (71.63%) are native and 59 (28.37%) introduced.

Growth Form ¹	Scientific Name	Common Name	Status ²	HTE ³	WoNS ⁴	PW ⁵
TG	<i>Acacia oswaldii</i>	Umbrella Wattle	N	No	No	No
TG	<i>Acacia pendula</i>	Weeping Myall	N	No	No	No
TG	<i>Acacia salicina</i>	Willow Wattle	N	No	No	No
TG	<i>Alectryon oleifolius</i>	Western Rosewood	N	No	No	No
TG	<i>Allocasuarina luehmannii</i>	Buloke	N	No	No	No
TG	<i>Brachychiton populneus</i>	Kurrajong	N	No	No	No
TG	<i>Callitris glaucophylla</i>	White Cypress Pine	N	No	No	No
TG	<i>Casuarina cristata</i>	Belah	N	No	No	No
TG	<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	N	No	No	No
TG	<i>Eucalyptus melliodora</i>	Yellow Box	N	No	No	No
TG	<i>Eucalyptus microcarpa</i>	Grey Box	N	No	No	No
TG	<i>Eucalyptus pilligaensis</i>	Narrow-Leaved Grey Box	N	No	No	No
TG	<i>Eucalyptus populnea</i> subsp. <i>bimbil</i>	Poplar Box	N	No	No	No
SG	<i>Acacia deanei</i>	Deane's Wattle	N	No	No	No
SG	<i>Acacia lineata</i>	Streaked Wattle	N	No	No	No
SG	<i>Atriplex semibaccata</i>	Creeping Saltbush	N	No	No	No
SG	<i>Chenopodium desertorum</i>	Desert Crumbweed	N	No	No	No
SG	<i>Denhamia cunninghamii</i>	Yellowberry Bush	N	No	No	No
SG	<i>Dodonaea viscosa</i> subsp. <i>spatulata</i>	Stick Hop-bush	N	No	No	No
SG	<i>Duma florulenta</i>	Lignum	N	No	No	No
SG	<i>Enchylaena tomentosa</i>	Ruby Saltbush	N	No	No	No
SG	<i>Eremophila debilis</i>	Winter Apple, Amulla	N	No	No	No
SG	<i>Eremophila mitchellii</i>	Budda, False Sandalwood	N	No	No	No
SG	<i>Geijera parviflora</i>	Wilga	N	No	No	No
SG	<i>Hakea tephrosperma</i>	Hooked Needlewood	N	No	No	No
SG	<i>Maireana decalvans</i>	Black Cotton Bush	N	No	No	No
SG	<i>Maireana microphylla</i>	Small-Leaf Bluebush	N	No	No	No
SG	<i>Myoporum montanum</i>	Western Boobialla	N	No	No	No
SG	<i>Pittosporum angustifolium</i>	Berrigan	N	No	No	No
SG	<i>Rhagodia spinescens</i>	Spiny Saltbush	N	No	No	No
SG	<i>Salsola australis</i>	Buckbush	N	No	No	No
SG	<i>Sclerolaena bicornis</i>	Goathead Burr	N	No	No	No

Growth Form ¹	Scientific Name	Common Name	Status ²	HTE ³	WoNS ⁴	PW ⁵
SG	<i>Sclerolaena birchii</i>	Galvanized Burr	N	No	No	No
SG	<i>Sclerolaena diacantha</i>	Grey Copperburr	N	No	No	No
SG	<i>Sclerolaena muricata</i>	Black Rolyoly	N	No	No	No
SG	<i>Senna artemisioides group</i>	Silver Cassia	N	No	No	No
GG	<i>Anthosachne scabra</i>	Common Wheatgrass	N	No	No	No
GG	<i>Aristida ramosa</i>	Purple Wiregrass	N	No	No	No
GG	<i>Austrostipa aristiglumis</i>	Plains Grass	N	No	No	No
GG	<i>Austrostipa scabra</i>	Speargrass	N	No	No	No
GG	<i>Austrostipa verticillata</i>	Slender Bamboo Grass	N	No	No	No
GG	<i>Bolboschoenus medianus</i>	Marsh Club-rush	N	No	No	No
GG	<i>Bothriochloa decipiens</i> var. <i>decipiens</i>	Red Grass	N	No	No	No
GG	<i>Bothriochloa macra</i>	Red Grass	N	No	No	No
GG	<i>Carex inversa</i>	Knob Sedge	N	No	No	No
GG	<i>Chloris truncata</i>	Windmill Grass	N	No	No	No
GG	<i>Chloris ventricosa</i>	Plump Windmill Grass	N	No	No	No
GG	<i>Cynodon dactylon</i>	Couch	N	No	No	No
GG	<i>Cyperus bifax</i>	Downs Nutgrass	N	No	No	No
GG	<i>Cyperus concinnus</i>	Trim Flat-Sedge	N	No	No	No
GG	<i>Dactyloctenium radulans</i>	Button Grass	N	No	No	No
GG	<i>Dichanthium sericeum</i>	Queensland Bluegrass	N	No	No	No
GG	<i>Dichanthium setosum</i>	Bluegrass	N	No	No	No
GG	<i>Digitaria brownii</i>	Cotton Panic Grass	N	No	No	No
GG	<i>Digitaria divaricatissima</i>	Umbrella Grass	N	No	No	No
GG	<i>Diplachne fusca</i>	Brown Beetle Grass	N	No	No	No
GG	<i>Echinochloa colona</i>	Awnless Barnyard Grass	N	No	No	No
GG	<i>Eleocharis pallens</i>	Pale Spike-Sedge	N	No	No	No
GG	<i>Eleocharis plana</i>	Flat Spike-Sedge	N	No	No	No
GG	<i>Enneapogon nigricans</i>	Nine-Awn Grass	N	No	No	No
GG	<i>Enteropogon acicularis</i>	Curly Windmill Grass	N	No	No	No
GG	<i>Eragrostis brownii</i>	Brown's Lovegrass	N	No	No	No
GG	<i>Eragrostis elongata</i>	Clustered Lovegrass	N	No	No	No
GG	<i>Eragrostis lacunaria</i>	Purple Lovegrass	N	No	No	No
GG	<i>Eragrostis leptostachya</i>	Paddock Lovegrass	N	No	No	No
GG	<i>Eragrostis parviflora</i>	Weeping Lovegrass	N	No	No	No
GG	<i>Eriochloa pseudoacrotricha</i>	Early Spring Grass	N	No	No	No
GG	<i>Fimbristylis dichotoma</i>	Common Fringe-Sedge	N	No	No	No
GG	<i>Juncus aridicola</i>	Rush	N	No	No	No
GG	<i>Juncus radula</i>	Rush	N	No	No	No
GG	<i>Juncus subsecundus</i>	Rush	N	No	No	No

Growth Form ¹	Scientific Name	Common Name	Status ²	HTE ³	WoNS ⁴	PW ⁵
GG	<i>Lachnagrostis filiformis</i>	Common Blown-grass	N	No	No	No
GG	<i>Panicum decompositum</i>	Native Millet	N	No	No	No
GG	<i>Panicum effusum</i>	Hairy Panic	N	No	No	No
GG	<i>Paspalidium aversum</i>	Paspalidium	N	No	No	No
GG	<i>Paspalidium constrictum</i>	Knottybutt Grass	N	No	No	No
GG	<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass	N	No	No	No
GG	<i>Rytidosperma fulvum</i>	Wallaby Grass	N	No	No	No
GG	<i>Sporobolus caroli</i>	Fairy Grass	N	No	No	No
GG	<i>Sporobolus creber</i>	Slender Rat's Tail Grass	N	No	No	No
GG	<i>Tragus australianus</i>	Small Burrgrass	N	No	No	No
GG	<i>Walwhalleya proluta</i>	Rigid Panic	N	No	No	No
FG	<i>Alternanthera denticulata</i>	Lesser Joyweed	N	No	No	No
FG	<i>Alternanthera</i> sp. A Flora of New South Wales (M.Gray 5187)	Joyweed	N	No	No	No
FG	<i>Atriplex spinibractea</i>	Spiny-Fruit Saltbush	N	No	No	No
FG	<i>Calotis cuneifolia</i>	Purple Burr-Daisy	N	No	No	No
FG	<i>Calotis lappulacea</i>	Yellow Burr-Daisy	N	No	No	No
FG	<i>Calotis scapigera</i>	Tufted Burr-Daisy	N	No	No	No
FG	<i>Dianella porracea</i>	Riverine Flax-Lily	N	No	No	No
FG	<i>Dichondra repens</i>	Kidney Weed	N	No	No	No
FG	<i>Dysphania cristata</i>	Crested Goosefoot	N	No	No	No
FG	<i>Eclipta platyglossa</i>	Yellow Eclipta	N	No	No	No
FG	<i>Einadia hastata</i>	Berry Saltbush	N	No	No	No
FG	<i>Einadia nutans</i>	Climbing Saltbush	N	No	No	No
FG	<i>Einadia polygonoides</i>	Climbing Saltbush	N	No	No	No
FG	<i>Epilobium billardierianum</i>	Willowherb	N	No	No	No
FG	<i>Erodium crinitum</i>	Blue Crowfoot	N	No	No	No
FG	<i>Euchiton sphaericus</i>	Star Cudweed	N	No	No	No
FG	<i>Euphorbia dallachyana</i>	Mat Spurge	N	No	No	No
FG	<i>Glinus lotoides</i>	Carpet Weed	N	No	No	No
FG	<i>Goodenia cycloptera</i>	Goodenia	N	No	No	No
FG	<i>Goodenia fascicularis</i>	Goodenia	N	No	No	No
FG	<i>Lepidium pseudohyssopifolium</i>	Peppergrass	N	No	No	No
FG	<i>Lobelia concolor</i>	Poison Pratia	N	No	No	No
FG	<i>Maireana enchylaenoides</i>	Wingless Bluebush	N	No	No	No
FG	<i>Microtis</i> sp.	Onion Orchid	N	No	No	No
FG	<i>Minuria leptophylla</i>	Minnie Daisy	N	No	No	No
FG	<i>Oxalis perennans</i>	Grassland Wood-sorrel	N	No	No	No
FG	<i>Oxalis thompsoniae</i>	Wood-sorrel	N	No	No	No

Growth Form ¹	Scientific Name	Common Name	Status ²	HTE ³	WoNS ⁴	PW ⁵
FG	<i>Portulaca oleracea</i>	Pigweed	N	No	No	No
FG	<i>Pseudognaphalium luteoalbum</i>	Jersey Cudweed	N	No	No	No
FG	<i>Ptilotus semilanatus</i>	Pussytail	N	No	No	No
FG	<i>Ranunculus pentandrus</i>	Buttercup	N	No	No	No
FG	<i>Rumex brownii</i>	Swamp Dock	N	No	No	No
FG	<i>Rumex dumosus</i>	Wiry Dock	N	No	No	No
FG	<i>Rumex stenoglottis</i>	Dock	N	No	No	No
FG	<i>Rumex tenax</i>	Shiny Dock	N	No	No	No
FG	<i>Scleroblitum atriplicinum</i>	Purple Goosefoot	N	No	No	No
FG	<i>Senecio quadridentatus</i>	Cotton Fireweed	N	No	No	No
FG	<i>Senna barclayana</i>	Pepper-Leaf Senna	N	No	No	No
FG	<i>Sida corrugata</i>	Corrugated Sida	N	No	No	No
FG	<i>Sida cunninghamii</i>	Ridged Sida	N	No	No	No
FG	<i>Sida trichopoda</i>	Hairy Sida	N	No	No	No
FG	<i>Solanum americanum</i>	Glossy Nightshade	N	No	No	No
FG	<i>Solanum eremophilum</i>	Nightshade	N	No	No	No
FG	<i>Solanum esuriale</i>	Quena	N	No	No	No
FG	<i>Solenogyne bellioides</i>	Solenogyne	N	No	No	No
FG	<i>Tribulus micrococcus</i>	Yellow Vine	N	No	No	No
FG	<i>Verbena gaudichaudii</i>	Native Vervain	N	No	No	No
FG	<i>Vittadinia cervicularis</i>	New Holland Daisy	N	No	No	No
FG	<i>Vittadinia cuneata</i>	Fuzzweed	N	No	No	No
FG	<i>Vittadinia pterochaeta</i>	Winged New Holland Daisy	N	No	No	No
FG	<i>Wahlenbergia communis</i>	Tufted Bluebell	N	No	No	No
FG	<i>Wahlenbergia gracilentia</i>	Hairy Annual Bluebell	N	No	No	No
FG	<i>Wahlenbergia gracilis</i>	Sprawling Bluebell	N	No	No	No
FG	<i>Wahlenbergia luteola</i>	Yellow Bluebell	N	No	No	No
FG	<i>Wahlenbergia stricta</i>	Tall Bluebell	N	No	No	No
FG	<i>Xerochrysum viscosum</i>	Sticky Everlasting	N	No	No	No
FG	<i>Zaleya galericulata</i>	Hogweed	N	No	No	No
EG	<i>Cheilanthes sieberi</i>	Rock Fern	N	No	No	No
EG	<i>Marsilea drummondii</i>	Common Nardoo	N	No	No	No
EG	<i>Marsilea hirsuta</i>	Nardoo	N	No	No	No
OG	<i>Amyema miquelii</i>	Box Mistletoe	N	No	No	No
OG	<i>Amyema miraculosa</i> subsp. <i>boormanii</i>	Mistletoe	N	No	No	No
OG	<i>Amyema quandang</i>	Grey Mistletoe	N	No	No	No
OG	<i>Convolvulus angustissimus</i>	Bindweed	N	No	No	No
OG	<i>Convolvulus clementii</i>	Desert Bindweed	N	No	No	No
OG	<i>Glycine clandestina</i>	Twining Glycine	N	No	No	No

Growth Form ¹	Scientific Name	Common Name	Status ²	HTE ³	WoNS ⁴	PW ⁵
OG	<i>Glycine tabacina</i>	Variable Glycine	N	No	No	No
TG	<i>Melia azedarach</i>	White Cedar	I	No	No	No
SG	<i>Lycium ferocissimum</i>	African Boxthorn	I	Yes	Yes	Yes
GG	<i>Cenchrus ciliaris</i>	Buffel Grass	I	Yes	No	No
GG	<i>Cyperus eragrostis</i>	Umbrella Sedge	I	Yes	No	No
GG	<i>Eragrostis curvula</i>	African Lovegrass	I	Yes	No	No
GG	<i>Paspalum dilatatum</i>	Paspalum	I	Yes	No	No
GG	<i>Avena fatua</i>	Wild Oats	I	No	No	No
GG	<i>Bromus catharticus</i>	Prairie Grass	I	No	No	No
GG	<i>Cenchrus clandestinus</i>	Kikuyu Grass	I	No	No	No
GG	<i>Chloris virgata</i>	Feathertop Rhodes Grass	I	No	No	No
GG	<i>Echinochloa crus-galli</i>	Barnyard Grass	I	No	No	No
GG	<i>Eragrostis cilianensis</i>	Stinkgrass	I	No	No	No
GG	<i>Sorghum bicolor</i>	Cultivated Sorghum	I	No	No	No
GG	<i>Urochloa panicoides</i>	Liverseed Grass	I	No	No	No
FG	<i>Alternanthera pungens</i>	Khaki Weed	I	Yes	No	No
FG	<i>Bidens pilosa</i>	Cobblers Pegs	I	Yes	No	No
FG	<i>Bidens subalternans</i>	Greater Beggar's Ticks	I	Yes	No	No
FG	<i>Carthamus lanatus</i>	Saffron Thistle	I	Yes	No	No
FG	<i>Heliotropium amplexicaule</i>	Blue Heliotrope	I	Yes	No	No
FG	<i>Phyla canescens</i>	Lippia	I	Yes	No	No
FG	<i>Xanthium spinosum</i>	Bathurst Burr	I	Yes	No	No
FG	<i>Arctotheca calendula</i>	Capeweed	I	No	No	No
FG	<i>Aster subulatus</i>	Wild Aster	I	No	No	No
FG	<i>Chenopodium album</i>	Fat Hen	I	No	No	No
FG	<i>Chondrilla juncea</i>	Skeleton Weed	I	No	No	No
FG	<i>Cirsium vulgare</i>	Spear Thistle	I	No	No	No
FG	<i>Conyza bonariensis</i>	Flaxleaf Fleabane	I	No	No	No
FG	<i>Conyza sumatrensis</i>	Tall Fleabane	I	No	No	No
FG	<i>Echium plantagineum</i>	Paterson's Curse	I	No	No	No
FG	<i>Gomphrena celosioides</i>	Gomphrena Weed	I	No	No	No
FG	<i>Heliotropium europaeum</i>	Potato Weed	I	No	No	No
FG	<i>Hirschfeldia incana</i>	Buchan Weed	I	No	No	No
FG	<i>Hypochaeris glabra</i>	Smooth Catsear	I	No	No	No
FG	<i>Lactuca serriola</i>	Prickly Lettuce	I	No	No	No
FG	<i>Lepidium africanum</i>	African Peppergrass	I	No	No	No
FG	<i>Malva parviflora</i>	Small-Flowered Mallow	I	No	No	No
FG	<i>Marrubium vulgare</i>	White Horehound	I	No	No	No
FG	<i>Medicago arabica</i>	Spotted Burr Medic	I	No	No	No

Growth Form ¹	Scientific Name	Common Name	Status ²	HTE ³	WoNS ⁴	PW ⁵
FG	<i>Medicago minima</i>	Woolly Burr Medic	I	No	No	No
FG	<i>Medicago truncatula</i>	Barrel Medic	I	No	No	No
FG	<i>Polygonum arenastrum</i>	Wireweed	I	No	No	No
FG	<i>Raphanus raphanistrum</i>	Wild Radish	I	No	No	No
FG	<i>Rapistrum rugosum</i>	Turnip Weed	I	No	No	No
FG	<i>Salvia verbenaca</i>	Vervain	I	No	No	No
FG	<i>Schkuhria pinnata</i>	Curious Weed	I	No	No	No
FG	<i>Sisymbrium erysimoides</i>	Smooth Mustard	I	No	No	No
FG	<i>Solanum nigrum</i>	Black-Berry Nightshade	I	No	No	No
FG	<i>Sonchus oleraceus</i>	Common Sowthistle	I	No	No	No
FG	<i>Taraxacum officinale</i>	Dandelion	I	No	No	No
FG	<i>Tribulus terrestris</i>	Caltrop	I	No	No	No
FG	<i>Trifolium glomeratum</i>	Clustered Clover	I	No	No	No
FG	<i>Urtica urens</i>	Small Nettle	I	No	No	No
FG	<i>Verbascum virgatum</i>	Twiggy Mullein	I	No	No	No
FG	<i>Verbena bonariensis</i>	Purpletop	I	No	No	No
FG	<i>Verbena incompta</i>	Purpletop	I	No	No	No
FG	<i>Verbena officinalis</i>	Common Verbena	I	No	No	No
FG	<i>Vicia villosa</i>	Russian Vetch	I	No	No	No
OG	<i>Citrullus amarus</i>	Camel Melon	I	No	No	No
OG	<i>Cucumis myriocarpus</i> subsp. <i>myriocarpus</i>	Paddy Melon	I	No	No	No

¹Growth form: FG = forb, GG = grass and grass-like, SG = shrub, TG = tree, EG = fern, OG = other. ²Status: N = native, I = introduced. ³High-threat exotic species (Yes/No). ⁴Weed of National Significance (Yes/No). ⁵Priority weed for the Central West LLS region (Yes/No).

Fauna species list

The following table lists all 62 fauna species recorded within the subject site during the April 2021 field survey or by means of recording devices. This comprises 46 birds (all native), 15 mammals (12 native and three introduced), and one native reptile.

Class	Common Name	Scientific Name	Detection ¹	Status ²
Aves	Spiny-cheeked Honeyeater	<i>Acanthagenys rufogularis</i>	FS	N
Aves	Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>	FS	N
Aves	Pacific Black Duck	<i>Anas superciliosa</i>	FS	N
Aves	Ringneck	<i>Barnardius zonarius</i>	FS	N
Aves	Little Corella	<i>Cacatua sanguinea</i>	FS	N
Aves	Black-eared Cuckoo	<i>Chrysococcyx osculans</i>	FS	N
Aves	Rufous Songlark	<i>Cincloramphus mathewsi</i>	FS	N
Aves	Spotted Harrier	<i>Circus assimilis</i>	FS	N
Aves	Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>	FS	N
Aves	White-winged Chough	<i>Corcorax melanorhamphos</i>	FS	N
Aves	Australian Raven	<i>Corvus coronoides</i>	FS SM	N
Aves	Pied Butcherbird	<i>Cracticus nigrogularis</i>	FS	N
Aves	Grey Butcherbird	<i>Cracticus torquatus</i>	FS	N
Aves	Laughing Kookaburra	<i>Dacelo novaeguineae</i>	FS SM	N
Aves	White-faced Heron	<i>Egretta novaehollandiae</i>	FS	N
Aves	Black-shouldered Kite	<i>Elanus axillaris</i>	FS	N
Aves	Blue-faced Honeyeater	<i>Entomyzon cyanotis</i>	FS	N
Aves	Galah	<i>Eolophus roseicapilla</i>	FS	N
Aves	Nankeen Kestrel	<i>Falco cenchroides</i>	FS	N
Aves	Australian Hobby	<i>Falco longipennis</i>	FS	N
Aves	Magpie-lark	<i>Grallina cyanoleuca</i>	FS	N
Aves	Australian Magpie	<i>Gymnorhina tibicen</i>	FS	N
Aves	Whistling Kite	<i>Haliastur sphenurus</i>	FS	N
Aves	Welcome Swallow	<i>Hirundo neoxena</i>	FS	N
Aves	Superb Fairy-wren	<i>Malurus cyaneus</i>	FS	N
Aves	Yellow-throated Miner	<i>Manorina flavigula</i>	FS	N
Aves	Noisy Miner	<i>Manorina melanocephala</i>	FS SM	N
Aves	Black Kite	<i>Milvus migrans</i>	FS	N
Aves	Red-browed Finch	<i>Neochmia temporalis</i>	FS	N
Aves	Bluebonnet	<i>Neophema haematogaster</i>	FS	N
Aves	Turquoise Parrot	<i>Neophema pulchella</i>	FS	N
Aves	Crested Pigeon	<i>Ocyphaps lophotes</i>	FS	N
Aves	Striated Pardalote	<i>Pardalotus striatus</i>	FS	N
Aves	Common Bronzewing	<i>Phaps chalcoptera</i>	FS	N
Aves	Eastern Rosella	<i>Platycercus eximius</i>	FS	N

Class	Common Name	Scientific Name	Detection ¹	Status ²
Aves	Superb Parrot	<i>Polytelis swainsonii</i>	FS	N
Aves	Grey-crowned Babbler	<i>Pomatostomus temporalis temporalis</i>	FS	N
Aves	Red-rumped Parrot	<i>Psephotus haematonotus</i>	FS	N
Aves	Grey Fantail	<i>Rhipidura albiscapa</i>	FS	N
Aves	Wille Wagtail	<i>Rhipidura leucophrys</i>	FS	N
Aves	Apostlebird	<i>Struthidea cinerea</i>	FS	N
Aves	Tawny Frogmouth	<i>Podargus strigoides</i>	SM	N
Aves	Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	SM	N
Aves	Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>	SM	N
Aves	Southern Boobook	<i>Ninox novaeseelandiae</i>	SM	N
Aves	Eastern Whipbird	<i>Psophodes olivaceus</i>	SM	N
Mammalia	Red Fox	<i>Vulpes vulpes</i>	SM	I
Mammalia	Sugar Glider	<i>Petaurus breviceps</i>	SM	N
Mammalia	European Hare	<i>Lepus europaeus occidentalis</i>	FS	I
Mammalia	Eastern Grey Kangaroo	<i>Macropus giganteus</i>	FS	N
Mammalia	House Mouse	<i>Mus musculus</i>	FS	I
Mammalia	Gould's Wattled Bat	<i>Chalinolobus gouldii</i>	BD	N
Mammalia	Chocolate Wattled Bat	<i>Chalinolobus morio</i>	BD	N
Mammalia	Little Pied Bat	<i>Chalinolobus picatus</i>	BD	N
Mammalia	Large Bent-winged Bat	<i>Miniopterus orianae oceanensis</i>	BD	N
Mammalia	Southern Freetail Bat	<i>Mormopterus</i> sp. 4	BD	N
Mammalia	Inland Broad-nosed Bat	<i>Scotorepens balstoni</i>	BD	N
Mammalia	Little Broad-nosed Bat	<i>Scotorepens greyii</i>	BD	N
Mammalia	Little Forest Bat	<i>Vespadelus vulturnus</i>	BD	N
Mammalia	White-striped Freetail Bat	<i>Austronomus australis</i>	BD	N
Mammalia	Long-eared Bat	<i>Nyctophilus</i> sp.	BD	N
Reptilia	Skink	<i>Cryptoblepharus</i> sp.	FS	N

¹Method of detection: FS = field survey, SM = song meter, BD = bat detector. ²Status: N = native, I = introduced.

APPENDIX D – MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

The EPBC Act protects nationally and internationally important flora, fauna, ecological communities and heritage places, which are defined in the EPBC Act as matters of national environmental significance. The EPBC Act policy Matters of National Environmental Significance: Significant Impact Guidelines 1.1 (DoE, 2013) forms the basis of determining if impact to protected matters is significant.

An EPBC Act protected matters search has identified four wetlands of international importance, six TECs, 41 threatened species, 9 migratory species and 16 marine species that could possibly occur in the 10 km search area. The tables below offer a summary of these matters and any potential impacts that might result from this proposal.

Wetlands of International Importance

Name	Proximity	Assessment	Likely Impact
Banrock Station Wetland Complex	700 – 800 km	The proposal is not within close proximity of Banrock Station Wetland Complex.	No
Riverland	600 – 700 km	The proposal is not within close proximity of the Riverland.	No
The Coorong, and Lakes Alexandrina and Albert Wetland	800 – 900 km	The proposal is not within close proximity of the Coorong, and Lakes Alexandrina and Albert Wetland.	No
The Macquarie Marshes	100 – 150 km	The proposal is not within close proximity of The Macquarie Marshes	No

EPBC Act-listed Threatened Ecological Communities

Name	Status	Assessment	Likely Impact (Subject Site)	Likely Impact (Future Expansion Area)
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	E	Not recorded on site.	None	None
Grey Box (<i>Eucalyptus microcarpa</i>) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	E	Present within subject site and future expansion area.	Up to 7.86 ha	Up to 16.62 ha
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	CE	Not recorded on site.	None	None
Poplar Box Grassy Woodland on Alluvial Plains	E	Not recorded within subject site or future expansion area, but considered likely to occur within the initial assessment area.	None	None
Weeping Myall Woodlands	E	Not recorded within subject site or future expansion area, but known to occur within the initial assessment area.	None	None
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	CE	Not recorded on site.	None	None

EPBC Act-listed Critically Endangered and Endangered Species

Scientific Name	Common Name	*Comm. Status	Likely Impact (Subject Site)	Likely Impact (Future Expansion Area)
<i>Austrostipa wakoolica</i>	A spear-grass	E	99.69 ha	18.87 ha
<i>Lepidium monoplacoides</i>	Winged Peppercross	E	12.56 ha	5.05 ha
<i>Prasophyllum petilum</i>	Tarengo Leek Orchid	E	None expected	None expected
<i>Prasophyllum</i> sp. Wybong		CE	97.02 ha	14.83 ha
<i>Swainsona recta</i>	Small Purple-pea	E	0.70 ha	None expected
<i>Vincetoxicum forsteri</i> (syn. <i>Tylophora linearis</i>)		E	None expected	None expected
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	0.70 ha	None expected
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	4.07 ha	2.43 ha
<i>Calidris ferruginea</i>	Curlew Sandpiper	CE,C,J,K	Some marginal habitat impacted	Some marginal habitat impacted
<i>Lathamus discolor</i>	Swift Parrot	CE	99.69 ha	18.87 ha
<i>Lophochroa leadbeateri</i>	Major Mitchell's Cockatoo	E	112.25 ha	23.92 ha
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (south-eastern form)	E	3.37 ha	4.04 ha
<i>Rostratula australis</i>	Australian Painted Snipe	E	Some marginal habitat impacted	Some marginal habitat impacted
<i>Bidyanus bidyanus</i>	Silver Perch	CE	None expected	None expected
<i>Maccullochella macquariensis</i>	Trout Cod	E	None expected	None expected
<i>Macquaria australasica</i>	Macquarie Perch	E	None expected	None expected
<i>Dasyurus maculatus maculatus</i>	Spotted-tailed Quoll (SE mainland population)	E	0.70 ha	None expected
<i>Phascolarctos cinereus</i>	Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)	E	103.76 ha	21.30 ha
<i>Crinia sloanei</i>	Sloane's Froglet	E	2.67 ha	4.04 ha
<i>Hemiaspis damelii</i>	Grey Snake	E	None expected	None expected

*Comm. Status: C=CAMBA, J=JAMBA, K=ROKAMBA, CE=Critically endangered, E=Endangered

EPBC Act-listed Vulnerable Species

Scientific Name	Common Name	Comm. Status	Likely Impact (Subject Site)	Likely Impact (Future Expansion Area)
<i>Commersonia procumbens</i> (syn. <i>Androcalva procumbens</i>)		V	None expected	None expected
<i>Homoranthus darwinioides</i>	Fairy Bells	V	None expected	None expected
<i>Lepidium aschersonii</i>	Spiny Peppercross	V	4.77 ha	2.43 ha
<i>Swainsona murrayana</i>	Slender Darling Pea	V	15.23 ha	9.09 ha
<i>Thesium australe</i>	Austral Toadflax, Toadflax	V	None expected	None expected
<i>Aphelocephala leucopsis</i>	Southern Whiteface	V	Some potential habitat impacted	Some potential habitat impacted
<i>Calyptorhynchus lathami lathami</i>	Glossy Black-Cockatoo (South-eastern form)	V	3.37 ha	4.04 ha
<i>Climacteris vicumnae</i>	Brown Treecreeper (south-eastern)	V	0.70 ha	None expected
<i>Falco hypoleucos</i>	Grey Falcon	V	115.62 ha	26.35 ha
<i>Grantiella picta</i>	Painted Honeyeater	V	3.37 ha	None expected
<i>Hirundapus caudacutus</i>	White-throated Needletail	V,C,J,K	116.32 ha	26.35 ha
<i>Leipoa ocellata</i>	Malleefowl	V	None expected	None expected
<i>Neophema chrysostoma</i>	Blue-winged Parrot	V	Some potential habitat impacted	Some potential habitat impacted
<i>Polytelis swainsonii</i>	Superb Parrot	V	112.25 ha	23.92 ha
<i>Stagonopleura guttata</i>	Diamond Firetail	V	112.25 ha	23.92 ha
<i>Maccullochella peelii</i>	Murray Cod	V	None expected	None expected
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	0.70 ha	None expected
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	V	3.37 ha	4.04 ha
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	None expected	None expected
<i>Anomalopus mackayi</i>	Five-clawed Worm-skink, Long-legged Worm-skink	V	Some potential habitat impacted	Some potential habitat impacted
<i>Aprasia parapulchella</i>	Pink-tailed Worm-lizard	V	96.32 ha	14.83 ha

+Comm. Status: C=CAMBA, J=JAMBA, K=ROKAMBA, V=Vulnerable

EPBC Act-listed Migratory and Marine Species

Scientific Name	Common Name	*Comm. Status	Likely Impact (Subject Site)	Likely Impact (Future Expansion Area)
<i>Apus pacificus</i>	Fork-tailed Swift	C,J,K	Some marginal habitat impacted	Some marginal habitat impacted
<i>Bubulcus ibis</i>	Cattle Egret	Marine	None expected	None expected
<i>Hirundapus caudacutus</i>	White-throated Needletail	V,C,J,K	118.04 ha	26.37 ha
<i>Motacilla flava</i>	Yellow Wagtail	C,J,K	None expected	None expected
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	Marine Bonn	PCTs associations not recorded. Impacts to wooded vegetation may affect this species.	PCTs associations not recorded. Impacts to wooded vegetation may affect this species.
<i>Actitis hypoleucos</i>	Common Sandpiper	C,J,K	Some marginal habitat impacted	Some marginal habitat impacted
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	C,J,K	Some marginal habitat impacted	Some marginal habitat impacted
<i>Calidris ferruginea</i>	Curlew Sandpiper	CE,C,J,K	Some marginal habitat impacted	Some marginal habitat impacted
<i>Calidris melanotos</i>	Pectoral Sandpiper	J,K	Some marginal habitat impacted	Some marginal habitat impacted
<i>Chrysococcyx osculans</i>	Black-eared Cuckoo	Marine	PCTs associations not recorded. Some marginal habitat impacted.	PCTs associations not recorded. Some marginal habitat impacted.
<i>Gallinago hardwickii</i>	Latham's Snipe	J,K	Some marginal habitat impacted	Some marginal habitat impacted
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	Marine	118.04 ha	26.37 ha
<i>Lathamus discolor</i>	Swift Parrot	CE	99.69 ha	18.87 ha
<i>Merops ornatus</i>	Rainbow Bee-eater	Marine	PCTs associations not recorded. Impacts to wooded vegetation may affect this species.	PCTs associations not recorded. Impacts to wooded vegetation may affect this species.
<i>Rostratula benghalensis sensu lato</i>	Painted Snipe	E	Some marginal habitat impacted	Some marginal habitat impacted

*Comm. Status: C=CAMBA, J=JAMBA, K=ROKAMBA, Bonn=Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), CE=Critically endangered, E=Endangered, V=Vulnerable.

Appendix E – Key threatening processes

Key Threatening Processes (KTP) predicted as acting on the study area that may be exacerbated by the proposal.

Class	Name	NSW status	Comm. status	Likelihood of Occurrence	Exacerbated by Proposal
Threat	Aggressive exclusion of birds from woodland and forest habitat by abundant Noisy Miners, <i>Manorina melanocephala</i> (Latham, 1802)	KTP	KTP	LIKELY	POTENTIALLY Alteration of woodland structure by removal of understorey may exacerbate this threat.
Threat	Alteration of habitat following subsidence due to longwall mining	KTP		VERY UNLIKELY	NO The proposal does not include any activities that would exacerbate this threat.
Threat	Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands	KTP		VERY UNLIKELY	NO There are no mapped watercourses within the subject site.
Threat	Anthropogenic Climate Change	KTP	KTP	VERY LIKELY	YES Some unavoidable emissions would occur from construction machinery.
Threat	Bushrock removal	KTP		VERY UNLIKELY	NO No bushrock was recorded during the survey.
Threat	Clearing of native vegetation	KTP	KTP	VERY LIKELY	YES Up to 144.41 ha of native vegetation within the subject site and future expansion area would be impacted.
Threat	Competition and grazing by the feral European Rabbit, <i>Oryctolagus cuniculus</i>	KTP	KTP	LIKELY	POTENTIALLY Alteration of vegetation structure, including weed encroachment, may favour this species.
Threat	Competition and habitat degradation by Feral Goats, <i>Capra hircus</i> Linnaeus 1758	KTP	KTP	UNLIKELY	NO The proposal does not include any activities that would exacerbate this threat.
Threat	Competition from feral honey bees, <i>Apis mellifera</i>	KTP		LIKELY	YES Removal of nesting hollows is likely to increase competition between native hollow-dependent fauna and honeybees.

Class	Name	NSW status	Comm. status	Likelihood of Occurrence	Exacerbated by Proposal
Threat	Forest eucalypt dieback associated with over-abundant psyllids and Bell Miners	KTP		UNLIKELY	NO The proposal does not include any activities that would exacerbate this threat.
Threat	Herbivory and environmental degradation caused by feral deer	KTP		UNLIKELY	NO The proposal does not include any activities that would exacerbate this threat.
Threat	High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	KTP		UNLIKELY	NO Fire frequency is not expected to increase significantly as a result of this proposal.
Threat	Importation of Red Fire Ants <i>Solenopsis invicta</i>	KTP	KTP	UNLIKELY	POTENTIALLY Machinery used on site can potentially act as a transport for biosecurity risks. The species is not known to occur nearby but may be capable of establishing colonies under local climatic conditions.
Threat	Infection by <i>Psittacine Circoviral</i> (beak and feather) Disease affecting endangered psittacine species and populations	KTP	KTP	UNLIKELY	POTENTIALLY Loss of tree hollows encourages reuse of hollows and competition for hollows, potentially increasing the rate of transmission.
Threat	Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	KTP	KTP	UNLIKELY	POTENTIALLY Machinery used on site can potentially act as a transport for biosecurity risks.
Threat	Infection of native plants by <i>Phytophthora cinnamomi</i>	KTP	KTP	UNLIKELY	POTENTIALLY Machinery used on site can potentially act as a transport for biosecurity risks.
Threat	Introduction of the Large Earth Bumblebee <i>Bombus terrestris</i>	KTP		VERY UNLIKELY	NO Machinery used on site can potentially act as a transport for biosecurity risks; however, this species is known only from Tasmania and there is a low risk of its introduction in this case.
Threat	Invasion and establishment of exotic vines and scramblers	KTP		UNLIKELY	POTENTIALLY Machinery used on site can potentially act as a transport for biosecurity risks. It is uncertain whether many of the

Class	Name	NSW status	Comm. status	Likelihood of Occurrence	Exacerbated by Proposal
					highest-concern species would successfully establish under local climatic conditions. <i>Citrullus amarus</i> and <i>Cucumis myriocarpus</i> , two vines that are common weeds of agriculture, already occur on site.
Threat	Invasion and establishment of Scotch Broom (<i>Cytisus scoparius</i>)	KTP		UNLIKELY	POTENTIALLY Machinery used on site can potentially act as a transport for biosecurity risks. The nearest recorded population of the species is c. 130 km from the site and it is unclear whether the species could become established under local climatic conditions.
Threat	Invasion and establishment of the Cane Toad (<i>Rhinella marina</i>)	KTP	KTP	UNLIKELY	POTENTIALLY Machinery used on site can potentially act as a transport for biosecurity risks. The Cane Toad is not known from any location in close proximity to the site.
Threat	Invasion of native plant communities by African Olive <i>Olea europaea</i> subsp. <i>cuspidata</i>	KTP		UNLIKELY	POTENTIALLY Machinery used on site can potentially act as a transport for biosecurity risks. The species has been recorded at Wongarboon, c. 50 km from the site, and may be capable of establishing under local climatic conditions.
Threat	Invasion of native plant communities by <i>Chrysanthemoides monilifera</i>	KTP		UNLIKELY	POTENTIALLY Machinery used on site can potentially act as a transport for biosecurity risks. As this species is principally a weed of coastal environments, it is unlikely to pose a significant local threat.
Threat	Invasion of native plant communities by exotic perennial grasses	KTP		VERY LIKELY	YES Machinery used on site can potentially act as a transport for biosecurity risks and disturbance is likely to favour invasive species. Species of concern, including African Lovegrass (<i>Eragrostis curvula</i>), are already known from the site.

Class	Name	NSW status	Comm. status	Likelihood of Occurrence	Exacerbated by Proposal
Threat	Invasion of the Yellow Crazy Ant, <i>Anoplolepis gracilipes</i> (Fr. Smith) into NSW	KTP		UNLIKELY	POTENTIALLY Machinery used on site can potentially act as a transport for biosecurity risks. It is considered unlikely that the species could become established under local climatic conditions.
Threat	Invasion, establishment and spread of Lantana	KTP		UNLIKELY	POTENTIALLY Machinery used on site can potentially act as a transport for biosecurity risks. The species is not known from within c. 289 km and is unlikely to become invasive in the local environment.
Threat	Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants	KTP	KTP	VERY LIKELY	YES Machinery used on site can potentially act as a transport for biosecurity risks and disturbance is likely to favour invasive species. Species of concern, including Kikuyu Grass (<i>Cenchrus clandestinus</i>), are already known from the site. It is likely that many other invasive plant species recorded from the site originated as garden plants.
Threat	Loss of Hollow-bearing Trees	KTP		VERY LIKELY	YES Up to 50 hollow-bearing trees would be impacted by this proposal, comprising 44 in the subject site and an additional six within the future expansion area.
Threat	Loss or degradation (or both) of sites used for hill-topping by butterflies	KTP		VERY UNLIKELY	NO No sites present.
Threat	Predation and hybridisation by Feral Dogs, <i>Canis lupus familiaris</i>	KTP		UNLIKELY	NO The proposal does not include any activities that are likely to exacerbate this threat.
Threat	Predation by <i>Gambusia holbrooki</i> Girard, 1859 (Plague Minnow or Mosquito Fish)	KTP		VERY UNLIKELY	NO No watercourses occur within the subject site or future expansion area and no impacts to watercourses outside of these areas are anticipated.
Threat	Predation by the European Red Fox (<i>Vulpes vulpes</i>)	KTP	KTP	UNLIKELY	NO

Class	Name	NSW status	Comm. status	Likelihood of Occurrence	Exacerbated by Proposal
					The proposal does not include any activities that are likely to exacerbate this threat.
Threat	Predation by the Feral Cat <i>Felis catus</i>	KTP	KTP	UNLIKELY	NO The proposal does not include any activities that are likely to exacerbate this threat.
Threat	Predation, habitat degradation, competition and disease transmission by Feral Pigs	KTP	KTP	UNLIKELY	NO The proposal does not include any activities that are likely to exacerbate this threat.
Threat	Removal of dead wood and dead trees	KTP		VERY LIKELY	YES Stags and fallen timber are known from the subject site, particularly within the road corridor.