

APPENDIX

D

Lachlan River Bridge Modification Project

**Biodiversity
Assessment Report**

STOCKINBINGAL TO PARKES REVIEW OF ENVIRONMENTAL FACTORS



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ARTC INLAND RAIL

**STOCKINBINGAL TO
PARKES (S2P) –
LACHLAN RIVER BRIDGE**

**BIODIVERSITY
ASSESSMENT REPORT**





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GLOSSARY

Biodiversity Assessment Method (BAM)	<p>Biodiversity Assessment Method 2020 that supports the <i>Biodiversity Conservation Act 2016</i>. The BAM is a scientific and legal document that provides:</p> <ul style="list-style-type: none">— a consistent method for the assessment of biodiversity on a proposed development or major project, or clearing site— guidance on how a proponent can avoid and minimise potential biodiversity impacts, and— the number and class of biodiversity credits that need to be offset to achieve a standard of ‘no net loss’ of biodiversity.
Biodiversity	<p>The biological diversity of life is commonly regarded as being made up of the following three components:</p> <ul style="list-style-type: none">— Genetic diversity – the variety of genes (or units of heredity) in any population— Species diversity – the variety of species— Ecosystem diversity – the variety of communities or ecosystems.
BioNet Atlas	<p>The EES database of flora and fauna records (formerly known as the NSW Wildlife Atlas). The Atlas contains records of plants, mammals, birds, reptiles, amphibians, some fungi, some invertebrates (such as insects and snails listed under the <i>Biodiversity Conservation Act 2016</i>) and some fish.</p>
BioNet Vegetation Classification	<p>The master vegetation community-level classification for use in vegetation mapping programs and regulatory biodiversity impact assessment frameworks in NSW. The BioNet Vegetation Classification is published by EES and available at www.environment.nsw.gov.au/research/Visclassification.htm.</p>
Critical habitat	<p>The whole or any part or parts of an area or areas of land comprising the habitat of an endangered species, an endangered population or an endangered ecological community that is critical to the survival of the species, population or ecological community (Department of Environment and Conservation, 2004). Critical habitat is listed under both the <i>Biodiversity Conservation Act 2016</i> and the <i>Environment Protection and Biodiversity Conservation Act 1999</i> and both the State and Federal environment agencies maintain a register of this habitat. Capitalisation of the term ‘Critical Habitat’ in this report refers to the habitat listed specifically under the relevant State and Commonwealth legislation.</p>
Derived vegetation	<p>PCTs that have changed to an alternative stable state because of land management practices since European settlement. Derived communities can have one or more structural components of the vegetation entirely removed or severely reduced, or have developed new structural components where they were previously absent.</p>
Ecological community	<p>An assemblage of species occupying a particular area.</p>
Environment, Energy and Science (EES) Group	<p>Group within DPIE which brings together a range of functions including national park management, biodiversity and conservation, climate change, sustainability, resilience and adaptation, renewable energy and energy security, waste management and resource recovery, and environment protection and mine safety regulation.</p>
Exotic	<p>Introduced from outside the area (Stralberg et al., 2009). Used in the context of this report to refer to species introduced from overseas.</p>

Habitat	An area or areas occupied, or periodically or occasionally occupied, by a species, population or ecological community, including any biotic or abiotic components.
High Threat Weed	Vascular plants not native to Australia that if not controlled will invade and outcompete native species. A list of high threat weeds is available as part of the BAM Calculator (https://www.lmbc.nsw.gov.au/bamcalc)
Hollow bearing tree	A living or dead tree that has at least one hollow. A tree is considered to contain a hollow if: <ul style="list-style-type: none"> a the entrance can be seen b the entrance width is at least 5cm c the hollow appears to have depth (i.e. you cannot see solid wood beyond the entrance) d the hollow is at least 1m above the ground. Trees must be examined from all angles.
IBRA region	A bioregion identified under the Interim Biogeographic Regionalisation for Australia (IBRA) system, which divides Australia into bioregions on the basis of their dominant landscape-scale attributes.
IBRA subregion	A subregion of a bioregion identified under the IBRA system.
Introduced	Not native to the area: not indigenous (Stralberg et al., 2009). Refers to both exotic and non-indigenous Australian native species of plants and animals.
Landscape attributes	In relation to a site or a biodiversity stewardship site, native vegetation cover, vegetation connectivity, patch size and the strategic location of a biodiversity stewardship site.
Likely	Taken to be a real chance or possibility (Department of Environment and Conservation, 2004).
Local population	The population that occurs within the study area, unless the existence of contiguous or proximal occupied habitat and the movement of individuals or exchange of genetic material across the boundary can be demonstrated.
Locality	The area within a 10 kilometre radius of the study area.
Migratory species	Species protected as Migratory under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> . Listed migratory species are those listed in the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), China-Australia Migratory Bird Agreement (CAMBA), Japan-Australia Migratory Bird Agreement (JAMBA) and Republic of Korea – Australia Migratory Bird Agreement (RoKAMBA). Listed migratory species also include any native species identified in an international agreement approved by the Minister (Matthei, 1995). Capitalisation of the term ‘Migratory’ in this report refers to those species listed as Migratory under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
Mitchell landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000.
Plant community type (PCT)	A NSW plant community type identified using the PCT classification system.
Priority Weeds	An introduced species listed under the <i>Biosecurity Act 2015</i> . Under the Act, priority weeds have specific control measures for each region.

Region	A bioregion defined in a national system of bioregionalisation. The Proposal is located within the Sydney Basin Bioregion as defined in the Interim Biogeographic Regionalisation for Australia (IBRA) (Thackway & Cresswell, 1995).
Significant	Important, weighty or more than ordinary
Threatened biodiversity	Threatened species, populations or ecological communities as listed under the <i>Biodiversity Conservation Act 2016</i> , <i>Fisheries Management Act 1994</i> or the <i>Environment Protection and Biodiversity Conservation Act 1999</i> .
Threatened ecological community (TEC)	<p>Critically endangered ecological community, an endangered ecological community or a vulnerable ecological community listed under:</p> <ul style="list-style-type: none"> — Schedule 2 of the Biodiversity Conservation Act 2016 — Schedule 4, 4A and/or 5 of the Fisheries Management Act 1994 — Part 13 of the EPBC Act Environment Protection and Biodiversity Conservation Act 1999.
Threatened species and populations	<p>Critically endangered, endangered or vulnerable threatened species and populations as defined by:</p> <ul style="list-style-type: none"> — Schedule 1 of the Biodiversity Conservation Act 2016 — Schedule 4, 4A and/or 5 of the Fisheries Management Act 1994 — Part 13 of the Environment Protection and Biodiversity Conservation Act 1999. <p>Capitalisation of the terms ‘threatened’, ‘vulnerable’, ‘endangered’ or ‘critically endangered’ in this report refers to listing under the relevant State and/or Commonwealth legislation.</p>
Viable local population	A population that has the capacity to live, develop and reproduce under normal conditions, unless the contrary can be conclusively demonstrated through analysis of records and references (Department of Environment and Climate Change, 2007).
Weeds of National Significance	In 1998, Australian governments endorsed a framework to identify which weed species could be considered (WONS) within an agricultural, forestry and environmental context. Thirty one WONS were identified through this process (Biosis Research, 2003).

ABBREVIATIONS

ARTC	Australian Rail Track Corporation
BAM	Biodiversity Assessment Method 2020
BAR	Biodiversity Assessment Report
BC Act	NSW <i>Biodiversity Conservation Act 2016</i>
BC Regulation	NSW <i>Biodiversity Conservation Regulation 2017</i>
CEMP	Construction Environment Management Plan
DPI	Department of Primary Industries
DPIE	Department of Planning, Industry and Environment (includes the EES Group)
EEC	Endangered Ecological Community
EES	NSW Environment, Energy and Science Group
EP&A Act	NSW <i>Environmental Planning and Assessment Act 1979</i>
EP&A Regulation	NSW <i>Environmental Planning and Assessment Regulation 2000</i>
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
ha	Hectares
IBRA	Interim Biogeographic Regionalisation for Australia
ISEPP	<i>State Environmental Planning Policy (Infrastructure) 2007</i>
LEP	Local Environmental Plan
LGA	Local Government Area
MNES	Matters of National Environmental Significance
NSW	New South Wales
PCT	Plant Community Type
PMST	Commonwealth Protected Matters Search Tool
REF	Review of Environmental Factors
SIS	Species Impact Statement
TEC	Threatened Ecological Community
WoNS	Weeds of National Significance

1 INTRODUCTION

1.1 OVERVIEW

This Biodiversity Assessment Report (BAR) has been prepared to assess impacts as required under Section 5.5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and Matters of National Environmental Significance (MNES) listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and support a Review of Environmental Factors (REF) for the proposal.

The outcome of this assessment, and the consequent decision on whether the proposal will significantly affect listed species, populations, ecological communities or their habitats, will inform whether a Species Impact Statement (SIS) or Biodiversity Development Assessment Report (BDAR) is required to be prepared under Section 7.8 of the *Biodiversity Conservation Act 2016* (BC Act) or the *Fisheries Management Act 1991* (FM Act) and whether a referral under the EPBC Act is required.

1.2 THE PROPOSAL

Australian Rail Track Corporation Limited (ARTC) is the proponent for the Inland Rail Program (Inland Rail), which is a 1,700-kilometre interstate freight rail corridor that will connect Melbourne and Brisbane, via central-west New South Wales (NSW) and Toowoomba in Queensland (QLD).

The Stockinbingal to Parkes (S2P) section, is a key enhancement project for Inland Rail Project. It is a 173-kilometre section of existing rail corridor located in regional NSW between the towns of Stockinbingal and Parkes.

A number of enhancement works (which do not constitute a complete upgrade of the track alignment) are required to be undertaken in this section, including modifications to, construction or removal of various structural and track assets along the alignment. Due to the number of enhancement works required along the S2P corridor, the environmental approvals have been split into four Review of Environmental Factors (REF) packages.

This BAR has been prepared for the modification works to the Lachlan River Bridge (the proposal) in Forbes, NSW (Figure 1.1).

The proposal involves modifying the truss structure of the Lachlan River Bridge by removing metal sections from along the top of the structure and installing new angled frames to maintain structural integrity.

Ancillary works include utilities on the bridge and establishing construction compounds, laydown areas, a crane pad and environmental controls. Patch painting would also be required where lead-based paint has been disturbed by the works. No instream works are required within the Lachlan River.

Inland Rail would operate 24-hours per day and would initially accommodate double-stacked freight trains of up to 1,800m in length and up to 6.5m high. Train speeds would vary according to axle loads and range from 80km to 115km per hour. It is estimated that S2P would be trafficked by an average of around 12 trains per day in 2027, increasing to 18 trains per day in 2039.

1.3 PURPOSE OF THIS REPORT

This report details the methods and results of a biodiversity survey and assessment to identify the distribution and abundance of threatened species, populations, and ecological communities in the area of the proposal to assess the extent and magnitude of ecological impacts associated with the proposal. The report addresses the requirements for assessment of significance under the NSW BC Act, FM Act, and the Commonwealth EPBC Act. Mitigation measures to ameliorate any ecological impacts arising from the proposal are also provided.

The aims of the biodiversity assessment are to:

- describe the characteristics and ecological condition of the vegetation communities and habitats within the study area
- determine the occurrence, or likelihood of occurrence of threatened species, populations and communities listed under the BC Act, FM Act and EPBC Act within the study area
- describe the potential impacts on biodiversity in the study area because of the proposal
- propose measures to mitigate impacts on any ecological values
- undertake a test of significance for threatened species and communities that are confirmed or considered likely to occur within the study area in accordance with section 7.3 of the BC Act and the FM Act to determine whether the proposal is likely to significantly affect threatened species
- undertake assessments in accordance with the Matters of National Environmental Significance: Significant impact guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999 (Department of Environment, 2013) to consider impacts to nationally listed threatened species, ecological communities and migratory species.

This report will determine if a SIS or BDAR (refer Section 7.8 (3) of the BC Act) or SIS (Section 220ZZA of the FM Act) is required as part of the REF for the proposal and whether there is likely to be a significant impact on a MNES that requires referral under the EPBC Act.

1.4 KEY TERMS USED IN THIS REPORT

The following definitions have been used throughout this BAR:

- the proposal – as described in Section 1.2 and illustrated in Figure 1.1
- impact area – this includes all areas to be directly impacted by the proposal, including the direct impact area of proposed bridge modification design and construction footprint (i.e. associated ancillary infrastructure and laydown areas), plus a 10m buffer
- the study area – the impact area and adjacent areas of vegetation and associated habitat surveyed as part of this investigation that may be subject to direct or indirect impacts as a result of a proposal
- the locality – 10km buffer of the study area. For aquatic assessment, the locality refers to the Lachlan River catchment.

Figure 1.1 shows the proposal study area, design and location of the proposal.

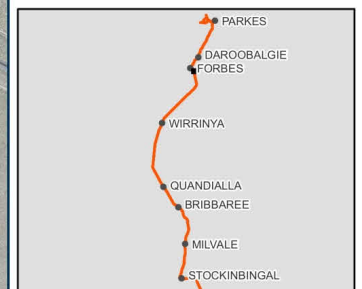
Stockinbinal to Parkes Lachlan River Bridge

Figure 1.1 Proposal Location and Overview



LEGEND

- KM post
- Existing railway
- Main road
- Local road
- - Track
- Watercourse
- ▭ Project study area
- ▭ Proposal site
- ▭ Cadastre



Coordinate System: GDA 1994 MGA Zone 55

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Paper: A3
Scale: 1:3,500

Data Sources: WSP, ARTC, NSWSS



2 LEGISLATIVE CONTEXT

There are two overarching statutory frameworks that govern the environmental planning approvals and assessment process for the construction and operation of the proposal that include biodiversity controls, being the:

- NSW *Environmental Planning and Assessment Act 1979*
- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

The relevant legislation, policies and guidelines for biodiversity matters that have been considered during the preparation of this report are outlined further below.

2.1 ENVIRONMENTAL PLANNING AND ASSESSMENT ACT 1979

The *Environmental Planning and Assessment 1979* (EP&A Act) provides the statutory controls that establish a framework governing what development is permitted or prohibited, and the processes for how assessment and gaining approval for development is undertaken in NSW. It is supported by the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation), which provides additional detail and gives effect to the legislation. Section 5.1 of the EP&A act applies to activities that do not require development consent.

Under Clause 5 of ISEPP, ARTC is identified as a public authority, and therefore is the ‘determining authority’ in its capacity as a rail management corporation where development is subject to Section 5.1 of the EP&A Act. Clause 79 of the ISEPP states that activities (works) for ‘rail infrastructure facilities’ can be undertaken without development consent. Nevertheless, Section 5.5 of the EP&A Act requires ARTC to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the activity.

A Review of Environmental Factors (REF) has been prepared to satisfy ARTC’s duties under Section 5.5 of the EP&A Act to “examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity” and in making decisions on the likely significance of any environmental impacts. This BAR forms part of the REF being prepared for the proposal and assesses the biodiversity impacts of the proposal to meet the requirements of the EP&A Act.

If an activity is ‘likely to significantly affect the environment (including critical habitat) or threatened species, populations or ecological communities, or their habitats’, as defined in Section 5.7 of the EP&A Act, further assessment such as a Species Impact Statement (SIS) or Biodiversity Development Assessment Report (BDAR) would need to be prepared under Section 7.8 of the BC Act corresponding to the impacts assessed in this REF, or an Environmental Impact Statement (EIS) may be required.

2.2 BIODIVERSITY CONSERVATION ACT 2016

The NSW *Biodiversity Conservation Act 2016* (BC Act) came into effect on the 25 August 2017. This Act repealed the *Threatened Species Conservation Act 1995* (TSC Act), *Native Vegetation Act 2003* and parts of the *National Parks and Wildlife Act 1974*. All threatened entities previously listed under the TSC Act have now been listed under the BC Act.

Section 7.3 of the BC Act requires that the significance of the impact on threatened species, and endangered ecological communities is assessed using a five-part test. Where a significant impact is likely to occur, a Species Impact Statement (SIS) must be prepared in accordance with the Secretary’s requirements or, if the proponent elects, a Biodiversity Development Assessment Report (BDAR) must be prepared by an accredited assessor in accordance with the Biodiversity Assessment Method (BAM).

2.3 BIOSECURITY ACT 2015

The *Biosecurity Act 2015* (Biosecurity Act) provides for risk-based management of biosecurity in NSW. It provides a statutory framework to protect the NSW economy, environment, and community from the negative impact of pests, diseases and weeds. The primary object of the Act is to provide a framework for the prevention, elimination and minimisation of biosecurity risks posed by biosecurity matter, dealing with biosecurity matter, carriers and potential carriers, and other activities that involve biosecurity matter.

In NSW, 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.

Priority weeds recorded in the study area and their control measures are detailed in Section 4.4.

2.4 FISHERIES MANAGEMENT ACT 1994

The *Fisheries Management Act 1994* (FM Act) provides for the conservation, protection and management of fisheries, aquatic systems and habitats in NSW. The FM Act establishes mechanisms for:

- the listing of threatened species, populations and ecological communities or key threatening processes
- the declaration of critical habitat, and
- consideration and assessment of threatened species impacts in the development assessment process.

In NSW, legislative responsibility for the conservation of threatened aquatic species, populations and ecological community's rests with the New South Wales Department of Primary Industries (DPI) through administration of Part 7A of the FM Act. Chapter 5 of this report identified threatened species, populations and ecological communities listed under Schedule 4, 4A and 5 of the FM Act which are predicted to occur in the study area. Appendix A and B of this report assesses likely impacts of the proposal on these listed threatened species in accordance with sections 221ZV and 221ZX of the FM Act. In addition, DPI has responsibility for the conservation of all 'fish', which by definition also includes freshwater, estuarine and marine aquatic invertebrates (such as crustaceans, molluscs and polychaetes), as well as marine vegetation, including saltmarshes, mangroves, seagrasses and macroalgae.

Part 7 of the FM Act relates to the protection of aquatic habitats, including providing management of dredging and reclamation works within permanently or intermittently flowing watercourses, as well as the temporary or permanent blockage of fish passage within a watercourse. Prior to undertaking dredging and/or reclamation on water land, Section 199 of the FM Act requires a public authority (ARTC) to give written notice to the Minister of the proposed works and consider any matters raised by the Minister. Permits for these activities (listed under sections 201, 205 or 219 of the *Fisheries Management Act 1994*) do not apply to a public authority (ARTC). Regardless, any construction of watercourse structures and/or crossings need to consider fish habitat class as defined in *Policy and Guidelines for Fish Habitat Conservation and Management* (Department of Primary Industries, 2013), as well as the use of appropriately designed water crossing structures that do not obstruct fish passage (as recommended in *Why do Fish need to Cross the Road? Fish Passage Requirements for Watercourse Crossings* (Fairfull and Witheridge, 2003)). The proposal does not require instream dredging or reclamation and consideration of appropriate design structures is not required.

2.5 WATER MANAGEMENT ACT 2000

Controlled activities carried out in, on, or under waterfront land are regulated by the *Water Management Act 2000* (WM Act). The Natural Resources Access Regulator (NRAR) administers the WM Act and is required to assess the impact of any proposed controlled activity to ensure that no more than minimal harm will be done to waterfront land as a consequence of carrying out the controlled activity. Waterfront land includes the bed and bank of any river, lake or estuary and all land within 40 metres of the highest bank of the river, lake or estuary.

A key objective of the controlled activities provisions of the WM Act as set out in Department of Primary Industries (2012) is to establish and preserve the integrity of riparian corridors (RC). Ideally, the environmental functions of riparian corridors should be maintained or rehabilitated by applying the following principles:

- identify whether or not there is a watercourse present and determine its order in accordance with the Strahler System
- if a watercourse is present, define the riparian corridor/vegetated riparian zone (VRZ) on a map in accordance with Table 2.1
- seek to maintain or rehabilitate a RC/VRZ with fully structured native vegetation in accordance with Table 2.1
- seek to minimise disturbance and harm to the recommended RC/VRZ
- minimise the number of creek crossings and provide perimeter road separating development from the RC/VRZ
- locate services and infrastructure outside of the RC/VRZ. Within the RC/VRZ provide multiple service easements and/or utilise road crossings where possible; and
- treat stormwater run-off before discharging into the RC/VRZ.

Non-riparian corridor works such as infrastructure, can be authorised within the outer riparian corridor, so long as the average width of the vegetated riparian zone can be achieved over the length of the watercourse within the development site.

Table 2.1 Recommended riparian corridor (RC) widths (DPI, 2012)

WATERCOURSE TYPE	VRZ WIDTH (EACH SIDE OF WATERCOURSE)	TOTAL RC WIDTH
First order	10 metres	20 metres + channel width
Second order	20 metres	40 metres + channel width
Third order	30 metres	60 metres + channel width
Forth order and greater	40 metres	80 metres + channel width

Note: Where a watercourse does not exhibit the features of a defined channel with bed and banks, the NRAR may determine that the watercourse is not waterfront land for the purposes of the WM Act.

Under Chapter 7, Part 3 of the WM Act, it is an offence to harm waterfront land, however, it is a defence if the activity is by a determining authority (ARTC) that has complied with Part 5 of the EP&A Act.

The proposal requires the removal of 0.1ha of RC.

2.6 ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The objective of the EPBC Act is to ensure that actions likely to cause a significant impact on MNES undergo an assessment and approval process. Under the EPBC Act, a person must not take an action that has, will have or is likely to have a significant impact on any of the MNES without approval from the Australian Government Minister for the Environment (the Minister). Proposed 'actions' that have the potential to significantly impact on MNES must be referred to the Australian Minister for the Environment for assessment. The purpose of the referral process is to determine whether or not a proposed action will need formal assessment and approval under the EPBC Act, and what assessment method will apply. If the Minister determines that a referred project is a 'controlled action' under the EPBC Act, the approval of the Minister would be required. MNES relevant to this report include threatened species, ecological communities and migratory species.

The EPBC Act has been considered in this assessment through:

- desktop review to determine the listed biodiversity matters that are predicted to occur within the locality of the project and hence could occur, subject to the habitats present
- field surveys for listed threatened biota and migratory species
- assessment of potential impacts on threatened and migratory biota, including assessments of significance in accordance with the EPBC Act significant impact guidelines (Department of the Environment 2013) where relevant
- identification of suitable impact mitigation and environmental management measures for threatened and migratory biota, where required.

3 METHODOLOGY

The following methods have been undertaken in the preparation of this BAR in accordance and where applicable with the Biodiversity Assessment Method (BAM) 2020.

3.1 PERSONNEL

The contributors to the preparation of this report, their qualifications and roles are provided in Table 3.1.

Table 3.1 Personnel

NAME	QUALIFICATIONS	POSITION	ROLE
Alex Cockerill	Bachelor of Science (Hons) Accredited BAM Assessor (BAAS17020)	Ecology National Team Executive	Technical lead
Nathan Cooper	Bachelor of Environmental Science Graduate Diploma (Ornithology)	Senior Ecologist Ecology Team Leader NSW	Technical review, reporting, bat call analysis
Lukas Clews	Bachelor of Science Graduate Certificate in Applied Science Master of Scientific Studies Diploma of Conservation and Land Management Accredited BAM Assessor (BAAS17060)	Principal Ecologist	Reporting and field surveys
Troy Jennings	Bachelor of Biodiversity and Conservation Masters of Wildlife Management Cert III Conservation and Land Management Accredited BAM Assessor (BAAS18172)	Ecologist	Reporting and field surveys
Emily Mitchell	Masters of Information Technology Bachelor of Development Studies Certificate IV Spatial Information Services	GIS consultant	Spatial data management and figure preparation
Kristy McQueen	Bachelor of Science and Mathematics – Biological Oceanography (Hons) Doctor of Philosophy – Marine Science Australian River Assessment System (AusRivAS) Accreditation Accredited BAM Assessor (BAAS18068)	Aquatic Ecologist	Reporting

All work was carried out under the appropriate licenses, including a scientific license as required under Part 2 of the NSW BC Act (License Number: SL100630), and an Animal Research Authority issued by the Department of Primary Industries (Agriculture).

3.2 NOMENCLATURE

Names of vegetation communities used in this report are based on the Plant Community Types (PCT) used in the NSW BioNet Vegetation Classification Database (Environment Energy and Science, 2021).

These names are cross-referenced with those used for Threatened Ecological Communities (TEC) listed under the BC Act and/or the EPBC Act.

Names of plants used in this document follow PlantNET (Royal Botanic Gardens, 2020). Scientific names are used in this report for species of plant. Scientific and common names (where available) are provided in the species results provided in Appendix C. The names of introduced species are denoted with an asterisk (*).

For threatened species of plants, the names used in the Department of Planning, Industry and Environment (DPIE) Threatened Species Website (Environment Energy and Science Group, 2020c) are also provided in Appendix A where these differ from the names used in the PlantNET database.

Names of vertebrate fauna follow the Australian Faunal Directory maintained by the Department of Agriculture Water and the Environment (2020). Common names are used in the report for species of animal.

For threatened species of animals, the names used in the DPIE Threatened Species Website and NSW Department Primary Industries (Department of Primary Industries, 2020b; Environment Energy and Science Group, 2020c).

3.3 DESKTOP ASSESSMENT

The desktop assessment included analysis of the following information sources:

- aerial photographic imagery
- NSW Mitchell Landscapes (Office for Environment & Heritage, 2016)
- Interim Biogeographic Regionalisation of Australia (IBRA version 7.0) (Department of the Environment and Energy, 2016)
- Atlas of Groundwater Dependent Ecosystems (GDE) (Bureau of Meteorology, 2020)
- Directory of Important Wetlands of Australia (Department of Environment and Energy, 2020a)
- priority weed listings for the Hunter region (Department of Primary Industries, 2020a)
- Atlas of Living Australia (Atlas of Living Australia, 2020) – aquatic search within the NSW Western Slopes IBRA region
- broad-scale vegetation mapping projects of the locality specifically the State Vegetation Type Map: Central West/Lachlan Region Version 1.4. VIS_ID 4468 (State Government of NSW and Department of Planning, Industry and Environment 2015)
- previous ecological investigations completed within the study area and surrounds including the Stockinbingal to Parkes Rail Upgrade – REF: Flora and Fauna Assessment Lachlan River Bridge at Forbes (Niche Environment and Heritage, 2018)
- primefacts for individual threatened aquatic species (Department of Primary Industries, 2020b)
- Strahler (1952) stream order mapping.

3.3.1 DATABASE SEARCHES

Threatened species database searches are outlined in Table 3.2.

Table 3.2 Threatened species database searches

DATABASE	SEARCH DATE	AREA SEARCHES	REFERENCE
PlantNET Spatial Search	09/03/2021	LGA	Royal Botanic Gardens (2020)
BioNet Atlas species sighting search	09/03/2021	20km x 20km centred on the study area	Environment Energy and Science Group (2020a)
EPBC Protected Matters Search Tool and SPRAT profiles	09/03/2021	25km buffer on the study area	Department of Environment and Energy (2020b)
NSW Department of Primary Industries (Fishing and Aquaculture) spatial data portal (including key fish habitat mapping, threatened species distribution maps and freshwater fish community status mapping).	07/05/2021	LGA	Department of Primary Industries (2020c)

3.3.2 LIKELIHOOD OF OCCURRENCE ASSESSMENT

A habitat assessment was completed to assess the likelihood of occurrence of each threatened species, population and community (threatened biodiversity) identified with the potential to occur in the study area. All threatened biodiversity identified during background research were considered. The assessment was based on the habitat profile for the species and other habitat information in the Threatened Species Profile Database (Environment Energy and Science Group, 2020c). The assessment also included consideration of the dates and locations of nearby records and information about species populations in the locality. The assessment results are summarised in Chapter 5 and 6 and are provided in full in the likelihood of occurrence assessments (Appendix A and Appendix B).

For this study, the likelihood of occurrence of threatened and migratory species and populations was determined based on the criteria shown in Table 3.3 and Table 3.4.

Table 3.3 Likelihood of occurrence criteria for threatened species and populations of animals

LIKELIHOOD	CRITERIA
Known	The species was observed in the study area either during the current survey or during another survey less than one year prior.
High	A species has a high likelihood of occurrence if: <ul style="list-style-type: none"> — the study area contains or forms part of a large area of high-quality suitable habitat — important habitat elements (i.e. for breeding or important life cycle periods such as winter foraging periods) are abundant within the study area — the species has been recorded recently in similar habitat in the locality — the study area is likely to support resident populations or to contain habitat that is visited by the species during regular seasonal movements or migration.

LIKELIHOOD	CRITERIA
Moderate	<p>A species has a moderate likelihood of occurrence if:</p> <ul style="list-style-type: none"> — the study area contains or forms part of a small area of high-quality suitable habitat — the study area contains or forms part of a large area of marginal habitat — important habitat elements (i.e. for breeding or important life cycle periods such as winter foraging periods) are sparse or absent within the study area — the study area is unlikely to support resident populations or to contain habitat that is visited by the species during regular seasonal movements or migration but is likely to be used occasionally during seasonal movements and/or dispersal.
Low	<p>A species has a low likelihood of occurrence if:</p> <ul style="list-style-type: none"> — potentially suitable habitat exists but the species has not been recorded recently (previous 10 years) in the locality despite intensive survey (i.e. the species is considered to be locally extinct) — the species is considered to be a rare vagrant, likely only to visit the study area very rarely; e.g. during juvenile dispersal or exceptional climatic conditions (e.g. extreme drought conditions in typical habitat of inland birds).
None	Suitable habitat is absent from the study area.

Table 3.4 Likelihood of occurrence criteria for threatened species and populations of plants

LIKELIHOOD	CRITERIA
Known	The species was observed in the study area either during the current survey or during another survey less than one year prior.
High	<p>A species has a high likelihood of occurrence if:</p> <ul style="list-style-type: none"> — the study area contains or forms part of a large area of high-quality suitable habitat that has not been subject to recent disturbance (e.g. fire), the species is known to form a persistent soil seedbank and the species has been recorded recently (within 10 years) in the locality — the species is a cryptic flowering species that has been recorded recently (within 10 years) in the locality and has a large area of high-quality potential habitat within the proposal footprint that was not seasonally targeted by surveys.
Moderate	<p>A species has a moderate likelihood of occurrence if:</p> <ul style="list-style-type: none"> — the species: <ul style="list-style-type: none"> — has a large area of high-quality suitable habitat in the study area that has not been subject to Recent disturbance (e.g. fire) — the species is known to form a persistent soil seedbank, but — the species has not been recorded recently (within 10 years) in the locality — the species: <ul style="list-style-type: none"> — has a small area of high-quality suitable habitat or a large area of marginal habitat in the study area That has not been subject to recent disturbance (e.g. fire) — the species is known to form a persistent soil seedbank — the species has been recorded recently (within 10 years) in the locality — the species is a cryptic flowering species, with a small area of high-quality potential habitat or a large area of marginal habitat within the proposal footprint, that was not seasonally targeted by surveys.

LIKELIHOOD	CRITERIA
Low	A species has a low likelihood of occurrence if: <ul style="list-style-type: none"> — it is not a cryptic species, nor a species known to have a persistent soil seedbank species and was not detected despite targeted searches — the species is a cryptic flowering species, with a small area of high-quality potential habitat or a large area of marginal habitat within the proposal footprint, that was not seasonally targeted by surveys as the species has not been recorded within 50 years in the locality.
None	Suitable habitat is absent from the proposal footprint.

3.4 FIELD SURVEY

The study area was inspected during daylight and nocturnal hours by qualified WSP ecologists on 29 and 30 January 2021. The field survey sought primarily to identify key ecological constraints by assessing the type, extent and condition of vegetation and fauna habitat, especially as it pertained to threatened species and ecological communities.

3.4.1 WEATHER CONDITIONS

Weather conditions during the field survey were reasonably warm to hot (16–32°C), with a moderate to strong wind. Moderate rainfall was recorded during the field survey and also prior to field surveys (Table 3.5). Wet weather and strong winds may have impacted the activity (and therefore detectability) of some species. However, warmer conditions with rainfall can also be beneficial for some species (i.e. amphibians). Overall the warmer and wetter conditions are generally more favourable for species detectability.

Table 3.5 Weather conditions during the survey period

DATE	TEMPERATURE (°C)		RAINFALL (mm)	WIND (DIRECTION / SPEED)
	Minimum	Maximum		
29/01/2021	16	28.2	28.2	NNE 37
30/01/2021	17.2	32	9.4	N 31

Source: Bureau of Meteorology (2021): Forbes Airport (weather station: 065103).

3.4.2 FLORA SURVEYS

The flora survey focused on mapping native and non-native vegetation types and assessing the likelihood of threatened flora species to utilise habitats available within the study area. This was completed using a combination of the following methods:

- random meanders
- rapid point assessments
- vegetation integrity plots.

A detailed overview of terrestrial flora survey methods is presented below.

3.4.2.1 DEFINITION OF NATIVE VEGETATION

Native vegetation is defined in section 1.6 of the BC Act which states that native vegetation and clearing native vegetation have the same meanings as in Part 5A of the *Local Land Services Act 2013*. Part 5A 60B of the *Local Land Services Act 2013* defines the meaning of native vegetation as any of the following types of plants native to New South Wales:

- trees (including any sapling or shrub or any scrub)
- understorey plants
- groundcover (being any type of herbaceous vegetation)
- plants occurring in a wetland.

A plant is native to New South Wales if it was established in New South Wales before European settlement. As such, all areas containing native vegetation, including previously disturbed areas, have been assessed.

3.4.2.2 STRATIFICATION AND VERIFICATION OF EXISTING VEGETATION MAPPING

Preliminary mapping of vegetation community boundaries was undertaken through analysis of existing vegetation mapping and aerial photograph interpretation.

Analysis of the aerial photographs was used to identify areas of disturbance, vegetation structure and likely native versus exotic species composition throughout the study area. This provided an initial definition of vegetation communities into simple structural and disturbance classifications for verification during field surveys.

Data on geology, dominant canopy species, native species richness, vegetation structure and condition was collected across the study area during field surveys to validate and refine this existing vegetation classifications to determine their associated PCT in accordance with the BioNet Vegetation Classification System (Environment Energy and Science Group, 2020b).

3.4.2.3 MAPPING OF VEGETATION ZONES

Field validation (ground-truthing) of the existing vegetation classifications undertaken by regional vegetation mapping of the study area was completed to confirm the vegetation structure, dominant canopy species, native diversity, condition and presence of threatened ecological communities. This was based on random meanders, rapid point assessments and vegetation integrity plots as described below.

Vegetation zones and quality types were identified and mapped following the BAM (Office of Environment & Heritage, 2017a). This was based on field verification of the PCT, class and formation as outlined in BioNet Vegetation Classification.

3.4.2.4 RANDOM MEANDER SURVEY

Random meander surveys are a variation of the transect type survey and were completed in accordance with the technique described by Cropper (1993), whereby the recorder walks in a random meander throughout the study area recording dominant and key plant species (e.g. threatened species, priority weeds), boundaries between various vegetation communities and condition of vegetation. The time spent in each vegetation community was generally proportional to the size of the community and its species richness.

Random meander surveys were conducted to undertake flora and fauna habitat assessments, vegetation mapping and opportunistically search for threatened species within area of suitable habitat.

3.4.2.5 RAPID POINT ASSESSMENT

Rapid point assessments were completed to validate and refine this existing vegetation classification to determine their associated PCT in accordance with the BioNet Vegetation Classification System (Environment Energy and Science Group, 2020b). Data on geology, dominant canopy species, native species richness, vegetation structure and condition were collected at rapid point assessment locations. Five rapid data point assessments were conducted in the study area (see Figure 3.1).

3.4.2.6 VEGETATION INTEGRITY SURVEY PLOTS

One vegetation integrity survey plot (see Table 3.6 and Figure 3.1) was completed within the study area in accordance with the procedure outlined in the BAM 2020 (Department of Planning Industry and Environment, 2020). Vegetation Integrity Plots were used primarily to determine and assign PCT and TECs.

Table 3.6 Location of BAM plot surveys

PLOT ID	PLANT COMMUNITY TYPE	EASTING	NORTHING	ORIENTATION
RedGum1	PCT 11: River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	595124	6303868	331° NW

3.4.2.7 CONDITION OF VEGETATION

Vegetation in the study area was firstly assessed to a PCT and then aligned to a vegetation zone, which is defined in the BAM 2020 as an area of native vegetation on the subject land that is the same PCT and has a similar broad condition state (Office of Environment & Heritage, 2017b). A broad condition state infers that the vegetation has a similar tree cover, shrub cover, ground cover, weediness or combinations of these attributes which determine vegetation condition.

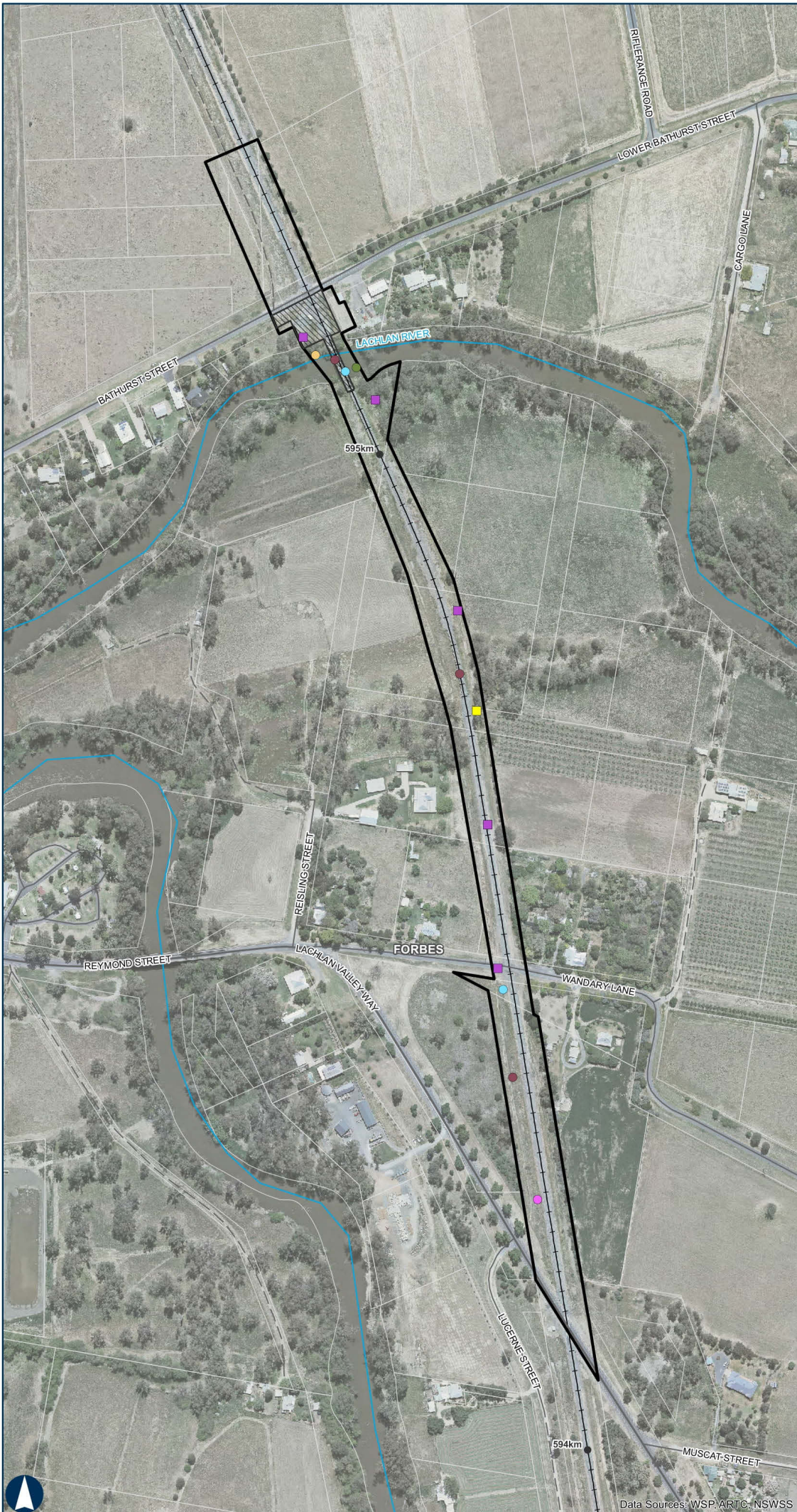
The broad condition states which were applied to vegetation in the study area are summarised in Table 3.7. These factors were defined by using factors such as levels of disturbance, weed invasion and resilience.

Table 3.7 Vegetation broad condition states

CONDITION CATEGORY	DESCRIPTION
Poor	Poor condition vegetation characteristic of PCT 11 located on the Lachlan River and associated drainage line. The vegetation still retains forest structure and the canopy is present but has been structurally and floristically altered by past clearing, weed invasion, and grazing. Native species diversity is relatively low and many characteristic species of PCT 11 are absent from the shrub layer and ground layer. Weeds are common.
Isolated trees	Isolated remnant trees at the edge of the rail corridor.
Regrowth	Vegetation is structurally modified and exhibits a shrubby regrowth form as a result of historic clearing. Canopy is either absent or very sparse with a dense midstorey present.
Derived Native Grassland	Vegetation no longer retains a native canopy or midstratum vegetation. Ground stratum vegetation is generally in good condition with native species dominant where >50% of species are native and native species cover is >50%. The ground layer is dominated by native grasses and forbs and may be floristically similar to some natural native grassland communities. Natural regeneration of tree and shrub species may be present in low numbers (<10% woody plant cover).
Miscellaneous ecosystems	Planted trees and highly disturbed areas with no or limited native vegetation.

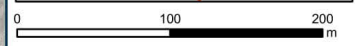
Stockinbingal to Parkes Lachlan River Bridge

Figure 3.1 Location of Survey Effort



LEGEND

- KM post
- Existing railway
- Main road
- Local road
- - Track
- Watercourse
- ▭ Project study area
- ▨ Proposal site
- ▭ Cadastre
- Flora survey**
- BAM quadrat
- Rapid data point
- Fauna survey**
- Anabat
- Bird survey
- Culvert and bridge assessments
- Exit survey
- Habitat assessment



Coordinate System: GDA 1994 MGA Zone 55

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3.4.3 TERRESTRIAL FAUNA SURVEY

This section outlines the fauna survey effort completed for species that have habitat suitable within the study area based on database searches. Fauna surveys for threatened species were undertaken in January 2021. Survey methods are described below and the location of fauna survey effort is shown in Figure 3.1.

3.4.3.1 FAUNA HABITAT ASSESSMENT

Fauna habitat assessments were undertaken to assess the likelihood of threatened species of animal (those species known or predicted to occur within the locality from the literature and database review) occurring within the study area. Fauna habitat assessments were the primary assessment tool in assessing whether threatened species were likely to occur within the study area. Fauna habitat characteristics assessed included:

- structure and floristics of the canopy, understorey and ground vegetation, including the presence of flowering and fruiting trees providing potential foraging resources
- presence of hollow-bearing trees providing roosting and breeding habitat for arboreal mammals, large forest owls, birds and reptiles
- presence of the ground cover vegetation, leaf litter, rock outcrops and fallen timber and potential to provide protection for ground-dwelling mammals, reptiles and amphibians
- presence of waterways (ephemeral or permanent) and water bodies
- presence of man-made structures (e.g. culverts) for roosting/breeding microbats.

The criteria were used to evaluate the condition of habitat values is outlined in Table 3.8.

Table 3.8 Fauna habitat assessment evaluation criteria

HABITAT VALUE	EVALUATION CRITERIA
Good	A full range of fauna habitat components are usually present (for example, old growth trees, fallen timber, feeding and roosting resources) and habitat linkages to other remnant ecosystems in the landscape are intact.
Moderate	Some fauna habitat components are missing or greatly reduced (for example, old-growth trees and fallen timber), although linkages with other remnant habitats in the landscape are usually intact, but sometimes degraded.
Poor	Many fauna habitat elements in low quality remnants have been lost, including old growth trees (for example, due to past timber harvesting or land clearing) and fallen timber, and tree canopies are often highly fragmented. Habitat linkages with other remnant ecosystems in the landscape have usually been severely compromised by extensive clearing in the past.

3.4.3.2 DIURNAL BIRD SURVEYS

Formal 20-minute diurnal bird searches were completed within the study area. Bird surveys were completed by actively walking through the nominated site (transect) over a period of 20 minutes. All birds were identified to the species level, either through direct observation or identification of calls. Two formal bird surveys were completed in the study area, comprising of one during the morning period and the other in the late afternoon. Birds were also recorded opportunistically during all other survey.

3.4.3.3 SPOTLIGHTING

Spotlighting was used to target arboreal, flying and ground-dwelling mammals, as well as, nocturnal birds, reptiles and amphibians. Spotlighting was completed after dusk (30 January 2021) and completed on foot by two ecologists using high-powered headlamps and hand torches for a minimum of one hour. Sighted animals were identified to the species level.

3.4.3.4 MICROBAT SURVEYS

Passive Ultrasonic Anabat Bat detection (Anabat Express unit – Titley Scientific, Brendale QLD) was used to record and identify the echolocation calls of microchiropteran bats foraging at each survey site. Passive monitoring of microchiropteran bats was completed at one location within riverine woodland immediately adjacent to the Lachlan River Bridge. This was achieved by setting an Anabat bat detector to record throughout the night.

Calls were analysed using Analook (Version 4.7) software with reference to ‘Bat Calls of NSW: Region Based Guide to the Echolocation Calls of Microchiropteran Bats’ (Pennay, Law, & Reinhold, 2004).

3.4.3.5 CALL PLAYBACK

Call playback was used to survey for nocturnal birds (i.e. Barking Owl) and nocturnal mammals (i.e. Squirrel Glider), using standard methods (Debus, 1995). Call playback was completed in one location after dusk in riparian habitat associated with the Lachlan River.

For each survey, an initial listening period of 10 to 15 minutes was undertaken, followed by a spotlight search for 10 minutes to detect any animals in the immediate vicinity. The calls of the target species were then played intermittently for five minutes followed by a 10-minute listening period. Calls from (Stewart, 1998) were broadcast using a portable media player and megaphone.

3.4.3.6 MICROBAT EXIT SURVEY

An exit survey was undertaken at dusk in association with the Lachlan River Bridge. The survey was completed for over one hour after dusk to determine microbat presence. The aim of the exit survey was to identify cave dwelling fauna, including microchiropteran bats, that may be using artificial cave habitat in the study area for roosting or breeding purposes. Following the exit survey, the structure was inspected to determine if microbats were using crevices or other microhabitat areas.

3.4.3.7 OPPORTUNISTIC RECORDING OF FAUNA SPECIES AND EVIDENCE OF FAUNA ACTIVITY

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

- significant hollow-bearing trees
- aquatic habitat
- rock outcrops.

3.4.4 AQUATIC SURVEY

This section outlines the aquatic habitat assessment completed for species that have habitat suitable within the study area based on database searches. Aquatic habitat assessments for threatened species were undertaken on 4 February 2021. Survey methods are described below.

3.4.4.1 AQUATIC HABITAT ASSESSMENT

The site habitat assessment was undertaken to validate any pre-existing assessments, online data or other information; and visually assess the quality and quantity of aquatic habitat in and near the rail line crossings against key habitat requirements of the species communities identified during the desktop review. In addition, opportunistic observations of aquatic fauna were also noted during the aquatic habitat assessment.

The aquatic habitat assessment included assessing the following habitat characteristics:

- landscape, topography and surrounding land use
- watercourse type
- water level and flow
- stream width and depth
- shading of the waterway
- riparian vegetation type, scale and abundance
- presence of instream structures, bank overhangs and undercuts, drought and refuge pools, riffle and edge habitats and natural or artificial barriers to fish passage
- visual colour and clarity of water
- any other relevant habitat characteristics that could assist with the termination of with a threatened species or communities we're likely to be present and therefore potentially impacted by the proposal.

4 EXISTING ENVIRONMENT

This chapter provides an overview of the existing environment and potential ecological constraints of the study area based on the desktop analysis and field validation completed.

4.1 LANDSCAPE CONTEXT

An overview of landscape features associated with the study area are presented in Table 4.1.

Table 4.1 Landscape features and planning information

LANDSCAPE FEATURE	OCCURRENCE IN MODIFICATION STUDY AREA
IBRA bioregion	NSW South-western slopes
IBRA subregion	Lower slopes
NSW landscape regions (Mitchell landscapes)	Calarie Plains
Local Government Area (LGA)	Forbes
Local Land Service (LLS) region	Central West
Botanical subregion	Central-west slopes
Rivers, streams and estuaries	The Lachlan River occurs within the study area
Important and local wetlands	No important or local wetlands in study area
Connectivity features	Overall the landscape has been heavily fragmented due to agricultural practices (i.e. cropping and clearing for livestock), development and for the rail corridor and urban development. The Lachlan River provides one of a few remnant vegetation or habitat links in the locality which occurs with the study area. However, this has been already partially severed due to the existing rail corridor.
Areas of geological significance and soil hazard features	No areas of geological significance and soil hazard features occur in the study area.
Areas of outstanding biodiversity value	No areas of outstanding biodiversity values occur in the study area.

4.2 VEGETATION TYPES AND ZONES

The State Vegetation Type Map: Central West/Lachlan Region Version 1.4. VIS_ID 4468 (Office of Environment & Heritage, 2016) maps PCT 11: River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) within the study area along the Lachlan River. The study area is a heavily disturbed rail corridor and much of the original vegetation has been cleared.

The study area now contains a mix of the following vegetation types:

- PCT 11: River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion):
 - poor condition vegetation characteristic of PCT 11 located on the Lachlan River and associated drainage line
 - isolated trees characteristic of PCT 11
 - regrowth trees and shrubs characteristic of PCT 11
 - derived native grassland: these are disturbed grassland areas dominated by a mix of native and exotic species. This vegetation has been assigned to a derived native grassland condition class of PCT 11.
- Miscellaneous ecosystems:
 - planted trees
 - highly disturbed areas with no or limited native vegetation.

In summary, one PCT as identified in the BioNet Vegetation Classification database and Miscellaneous ecosystems were identified as occurring with the study area (see Table 4.2). The vegetation within the study area is illustrated in Figure 4.1. A detailed description of each PCT and Miscellaneous ecosystem recorded is provided below in Section 4.2.1.

Table 4.2 Plant Community Types and Threatened Ecological Communities recorded

VEGETATION TYPE	CONDITION	VEGETATION FORMATION	VEGETATION CLASS	NSW TEC LISTING	EPBC TEC LISTING	AREA WITHIN STUDY AREA (ha)
Native Plant Community Types						
PCT 11: River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Poor condition	Forested Wetlands	Inland Riverine Forests	Not listed	Not listed	0.4
	Isolated trees					<0.1
	Regrowth					<0.1
	Derived native grassland					2.0
Miscellaneous ecosystems¹						
Planted trees	n/a	n/a	n/a	Not listed	Not listed	0.2
Highly disturbed areas with no or limited native vegetation	n/a	n/a	n/a	Not listed	Not listed	0.1
Total						2.9

(1) Miscellaneous ecosystems are commensurate with ‘previously disturbed land’ as classified under the ISCA.

**Stockinbingal to Parkes
Lachlan River Bridge**

Figure 4.1 Plant Community Types



LEGEND

- KM post
- Existing railway
- Main road
- Local road
- - Track
- Watercourse
- ▭ Project study area
- ▨ Proposal site
- ▭ Cadastre
- ▲ Hollow-bearing tree

Plant Community Type (PCT)

- PCT 11 - River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (Poor)
- PCT 11 - River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (Isolated trees)
- PCT 11 - River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (Regrowth)
- PCT 11 - River Red Gum - Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (Derived Native Grassland)
- Miscellaneous ecosystems - Planted trees



0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55
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Date: 3/08/2021 Paper: A3
 Author: WSP Scale: 1:3,500

4.2.1 PCT 11: RIVER RED GUM – LIGNUM VERY TALL OPEN FOREST OR WOODLAND WETLAND ON FLOODPLAINS OF SEMI-ARID (WARM) CLIMATE ZONE (MAINLY RIVERINA BIOREGION AND MURRAY DARLING DEPRESSION BIOREGION)

The study area contains areas of PCT 11: River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) that have been separated into the following four broad condition states:

- poor condition vegetation characteristic of PCT 11 located on the Lachlan River and associated drainage line
- isolated trees characteristic of PCT 11
- regrowth trees and shrubs characteristic of PCT 11
- derived native grassland: these are disturbed grassland areas dominated by a mix of native and exotic species. This vegetation has been assigned to a derived native grassland condition class of PCT 11.

PCT 11: River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) is a tall open forest or woodland with trees to about 20 metres high, dominated by *Eucalyptus camaldulensis* with patches of *Acacia stenophylla*, *Muehlenbeckia florulenta* and *Chenopodium nitrariaceum* as a shrub understorey (Environment Energy and Science, 2021). This PCT occurs on heavy grey clay soil in drainage depressions and flood-outs of major water courses on the floodplains along western sections of Murray, Murrumbidgee and Lachlan Rivers and extending up the Darling River to Wilcannia (Environment Energy and Science Group, 2020b).

The study area contains three patches of poor condition PCT 11 located on the Lachlan River and on a smaller drainage line. Three large remnant isolated *Eucalyptus camaldulensis* trees are present on the eastern edge of the rail corridor. Small patches of regrowth trees and shrubs characteristic of PCT 11 are present near the Lachlan River. The areas of derived native grassland are assigned to PCT 11 as this is the original PCT that would have most likely occurred over the entirety of the study area. The areas of derived native grassland could also be assigned to PCT 250: derived tussock grassland of the central western plains and lower slopes of NSW. However, based on advice from Environment Energy and Science Group and to be consistent with the NSW Biodiversity Assessment Method (Department of Planning Industry and Environment, 2020), we have not identified any derived PCTs.

4.2.1.1 POOR CONDITION PCT 11: RIVER RED GUM - LIGNUM VERY TALL OPEN FOREST OR WOODLAND WETLAND ON FLOODPLAINS OF SEMI-ARID (WARM) CLIMATE ZONE (MAINLY RIVERINA BIOREGION AND MURRAY DARLING DEPRESSION BIOREGION)

The rail corridor is highly disturbed, but there are three areas of remnant woodland dominated by *Eucalyptus camaldulensis* that correspond to PCT 11: River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) located on the Lachlan River and on a smaller drainage line (see Figure 4.1).

A summary of the characteristics of PCT 11 poor condition within the study area is provided in Table 4.3 and depicted in Photo 4.1 and Photo 4.2. The extent of PCT 11 poor condition within the study area is illustrated in Figure 4.1. As can be seen from the plot data in Appendix C and summary description in Table 4.3, the vegetation is in poor condition with low native species richness, extensive weed invasion, and missing structural layers (absent midstorey or shrub layer).

Table 4.3 Summary of PCT 11: River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (Poor condition)

DESCRIPTION	
PCT justification	The canopy is dominated by <i>Eucalyptus camaldulensis</i> and it occurs on the Lachlan River floodplain.
% cleared	42% cleared
Extent in study area	0.4ha
Condition	Poor
Canopy species	<i>Eucalyptus camaldulensis</i>
Shrub species	None recorded in BAM plot
Ground layer species	<i>Echinochloa colona</i> , <i>Persicaria</i> sp., <i>Panicum effusum</i> , <i>Paspalidium constrictum</i> , <i>Cynodon dactylon</i> , <i>Eriochloa pseudoacrotricha</i>
Exotic species	<i>Celtis australis</i> *, <i>Lactuca serriola</i> *, <i>Phoenix canariensis</i> *, <i>Solanum nigrum</i> *, <i>Modiola caroliniana</i> *, <i>Verbena bonariensis</i> *, <i>Malva parviflora</i> *, <i>Avena</i> sp.*, <i>Oxalis</i> sp.*, <i>Echium plantagineum</i> *, <i>Acer negundo</i> *, <i>Heliotropium amplexicaule</i> *

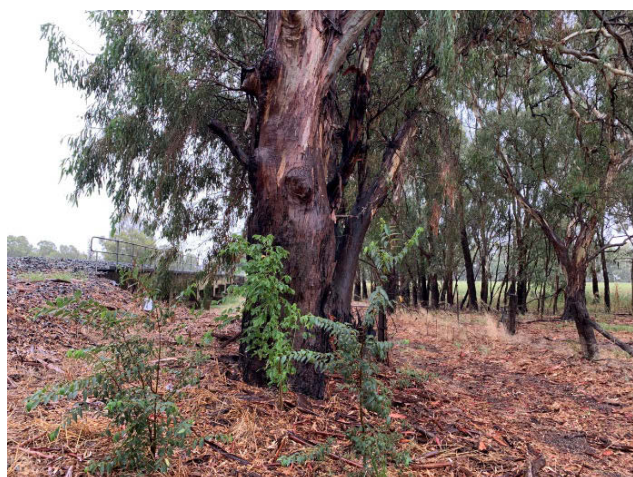


Photo 4.1 PCT 11 on the smaller drainage line in the study area showing canopy of *Eucalyptus camaldulensis* and sparse ground layer



Photo 4.2 PCT 11 on the Lachlan River in the study area showing canopy of *Eucalyptus camaldulensis* and weed dominated ground layer

4.2.1.2 ISOLATED TREES

The study area contains three large old *Eucalyptus camaldulensis* trees at the eastern edge of the rail corridor that were assigned to the isolated tree class. BAM plot surveys were not undertaken in these areas as they were too small to sample adequately, so no quantification of native species richness or percentage cover can be done. There is <0.1ha of isolated trees mapped in the study area. These isolated trees are illustrated in Figure 4.1.

4.2.1.3 REGROWTH

There are some small areas of regrowth native shrub and tree species within the study area (<0.1ha) that have been assigned to a regrowth form of PCT 11. These areas consist of the early seral stage pioneer species *Melia azedarach*. As these areas contain woody native vegetation they have been separated from areas of derived native grassland. BAM plot surveys were not undertaken in these areas as they were too small to sample adequately, so no quantification of native species richness or percentage cover can be done. The extent of PCT 11 regrowth within the study area is illustrated in Figure 4.1.

4.2.1.4 DERIVED NATIVE GRASSLAND

Derived native grasslands are also occasionally referred to as ‘secondary’ native grasslands. A derived native grassland is a ‘native grassland’ that is remaining after removal or dieback of the previously existing woody canopy vegetation (shrubs or trees) to a point where woody vegetation has <10% cover (see Benson, 1996). Consistent with this definition, in this report we define derived native grassland as areas of vegetation that no longer retain a native canopy or midstratum vegetation where the ground stratum (ground layer) vegetation is generally in good condition with native species dominant (>50% of species are native and native species cover is >50%). The ground layer is dominated by native grasses and forbs and may be floristically similar to some natural native grassland communities. Natural regeneration of tree and shrub species may be present in low numbers (<10% woody plant cover).

Based on landscape position on the Lachlan River floodplain and *Eucalyptus camaldulensis* being present in similar situations in the locality, it is likely that the study area would have once contained a woodland dominated by *Eucalyptus camaldulensis* and this previously existing woody canopy vegetation (shrubs and trees) has been removed. It is considered unlikely that the study area would have once contained PCT 45: Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion. Plains Grass (*Austrostipa aristiglumis*) is not present and based on the presence of isolated *Eucalyptus camaldulensis* trees in the study area it is likely that the entire study area was once forested.

The rail corridor is highly disturbed but the vegetation present at the time of the survey was a mix of native and exotic species. BAM plots were not undertaken in the grassland areas because they are not associated with a TEC listed under the BC Act or EPBC Act, so quantification of vegetation quality was not required for the assessment. However, rapid data points were undertaken to characterise these areas. The results of the rapid data point surveys are shown in Table 4.4. Native groundcover species (grasses, herbs, forbs, climbers) have colonised the rail corridor, including growing on ballast directly adjacent to the rail line and were dominant at the time of survey.

The survey was undertaken at a time when most native grass species had finished seeding so some species could not be positively identified to species level and it is likely that native grass and forb species richness in these grassland areas is higher than recorded. At the time of survey native species were dominant, but it is likely that the composition of native and exotic species will be variable between years and seasons depending on prevailing environmental conditions.

The areas of PCT 11 derived native grassland within the study area are depicted in Photo 4.3 and Photo 4.4. The extent of PCT 11 derived native grassland within the study area is illustrated in Figure 4.1.

Table 4.4 Description of PCT 11: River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (Derived Native Grassland)

DESCRIPTION	
Extent in study area	2.0ha
Condition	Derived native grassland
Canopy species	Absent
Shrub species	Scattered <i>Atriplex semibaccata</i>
Ground layer species	<i>Panicum effusum</i> (dominant grass at time of survey), <i>Echinochloa colona</i> , <i>Cynodon dactylon</i> , <i>Carex inversa</i> , <i>Enteropogon acicularis</i> , <i>Paspalidium constrictum</i> , <i>Eriochloa pseudoacrotricha</i>
Exotic species	<i>Lactuca serriola</i> *, <i>Conyza bonariensis</i> *, <i>Eragrostis cilianensis</i> *, <i>Verbena bonariensis</i> *, <i>Argemone ochroleuca</i> *, <i>Lepidium africanum</i> *, <i>Polygonum aviculare</i> *, <i>Sorghum</i> sp.*, <i>Cirsium vulgare</i> *, <i>Modiola caroliniana</i> *, <i>Heliotropium europaeum</i> *, <i>Verbena officinalis</i> *, <i>Avena</i> sp.*, <i>Pavonia hastata</i> *, <i>Alternanthera pungens</i> *, <i>Phyla nodiflora</i> *, <i>Megathyrsus maximus</i> *, <i>Paspalum dilatatum</i> *



Photo 4.3 Derived native grassland in the study area showing dominance of the native grass *Panicum effusum* (brown grass in photo)



Photo 4.4 Derived native grassland in the study area showing dominance of the native grass *Panicum effusum* (brown grass in photo)

4.2.2 MISCELLANEOUS ECOSYSTEMS

Non-native vegetation which did not align to any recognised PCT in NSW was assigned to a miscellaneous ecosystem. Two miscellaneous ecosystems were identified within the study area, including:

- highly disturbed areas with no or limited native vegetation (0.1ha)
- planted trees (0.2ha).

These miscellaneous ecosystems are described below.

4.2.2.1 HIGHLY DISTURBED AREAS WITH NO OR LIMITED NATIVE VEGETATION

Parts of the study area dominated by exotic grasses and other weeds were classed as highly disturbed areas with no or limited native vegetation. These areas are on the northern side of the Lachlan River south of Bathurst Street (see Figure 4.1).

BAM plot surveys were not undertaken in these areas as they were too small to sample adequately, so no quantification of native species richness or percentage cover can be done. The vegetation is dominated by exotic species, particularly *Lactuca serriola**, *Paspalum dilatatum**, *Conyza bonariensis**, *Eragrostis cilianensis**, *Verbena bonariensis**, and *Polygonum aviculare**.

4.2.2.2 PLANTED TREES

The study area contains areas of planted trees that have variously been planted as wind breaks or as ornamental trees. Planted trees present at the edge of the rail corridor include *Eucalyptus leucoxylon*, *Acacia baileyana*, *Melaleuca bracteata*, *Acer negundo**, and *Casuarina* sp. The extent of planted trees within the study area is illustrated in Figure 4.1.

4.3 GROUNDWATER DEPENDENT ECOSYSTEMS

Groundwater dependent ecosystems (GDEs) are communities of plants, animals and other organisms whose extent and life processes are dependent on groundwater (Department of Land and Water Conservation, 2002). When considering GDEs, groundwater is generally defined as the saturated zone of the regolith (the layer of loose rock resting on bedrock, constituting the surface of most land) and its associated capillary fringe, however it excludes soil water held under tension in soil pore spaces (the unsaturated zone or vadose zone) (Eamus, Friend, Loomes, Hose, & Murray, 2006).

The Lachlan River is identified as a low potential aquatic GDE in the Groundwater Dependent Ecosystems Atlas (Bureau of Meteorology, 2020). PCT 11: River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) along the banks of the Lachlan River is identified as a high potential terrestrial GDE Groundwater Dependent Ecosystems Atlas (Bureau of Meteorology, 2020) (Figure 4.2).

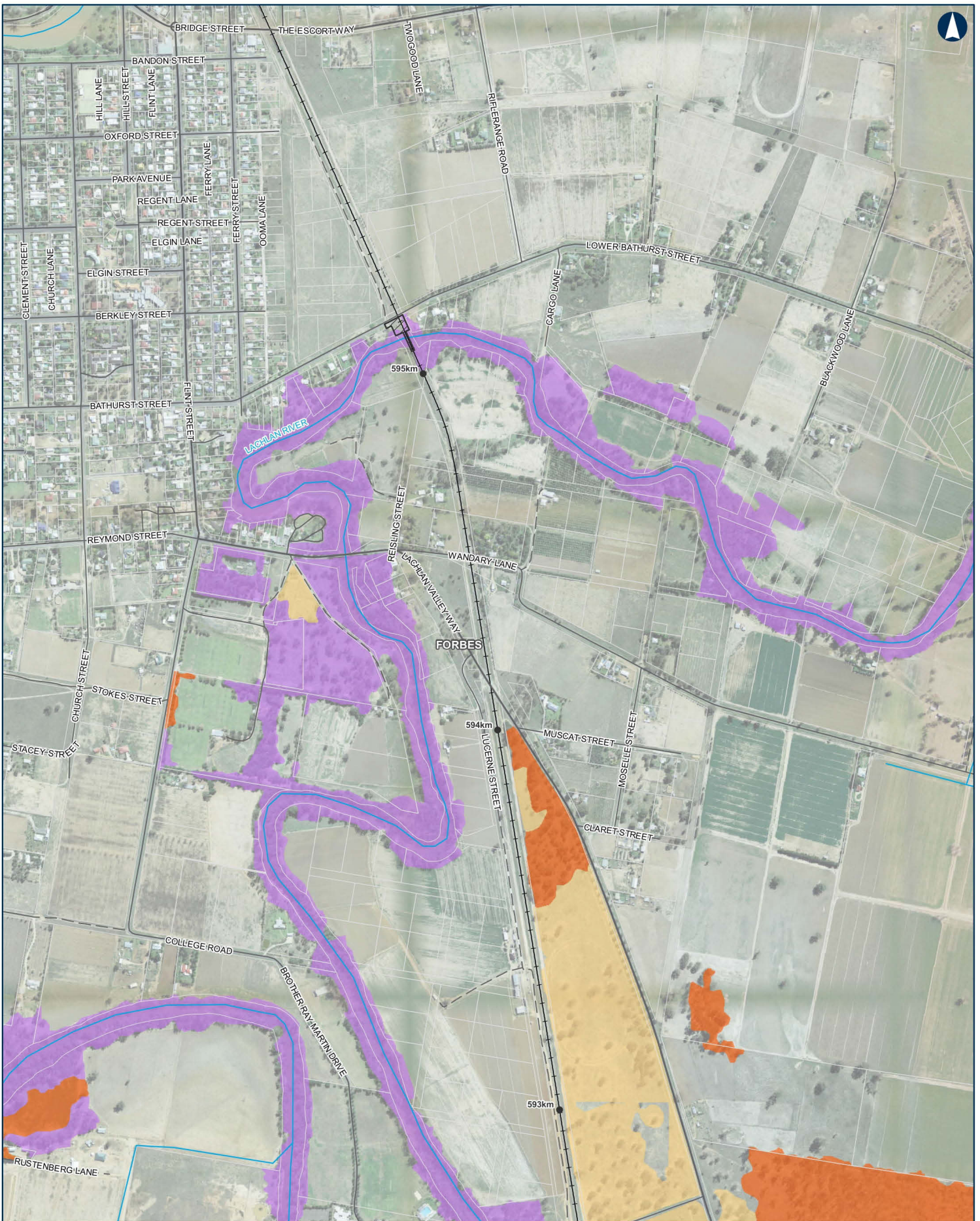
While GDEs are present, the proposal does not involve interference with groundwater so is considered unlikely to directly or indirectly interfere with subsurface or groundwater flows associated with any GDEs in or adjacent to the study area.

4.4 PRIORITY AND HIGH THREAT WEEDS

The study area is considerably disturbed and consequently weed species are common, particularly at roadside edges, along the edge of the rail line, and along access tracks. The exotic species *Lactuca serriola**, *Paspalum dilatatum**, *Conyza bonariensis**, *Eragrostis cilianensis**, *Verbena bonariensis**, and *Polygonum aviculare** are common. The Lachlan River contains a number of *Salix babylonica** and *Acer negundo** trees.

The study area contains a number of weed species that are identified as a high threat weed on the high threat weeds list published in the BAM calculator including *Acer negundo**, *Salix babylonica**, *Heliotropium amplexicaule**, *Alternanthera pungens**, *Phyla nodiflora**, *Megathyrsus maximus** and *Paspalum dilatatum**. These species can be extremely difficult to effectively manage.

*Heliotropium amplexicaule** is the only weed species identified in the study area during the survey that is listed as a priority weed under the *Biosecurity Act 2015* for the Central West region. Willows (*Salix* species including *Salix babylonica**) are listed as Weeds of National Significance (WoNS) under the National Weeds Strategy.



Stockinbinal to Parkes Lachlan River Bridge Figure 4.2 Groundwater Dependent Ecosystems in the Proposal Site

0 125 250 m

Coordinate System: GDA 1994 MGA Zone 55

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Date: 27/09/2021 Paper: A3
 Author: WSP Scale: 1:9,000
 Data Sources: ARTC, NSWSS

- KM post
- Existing railway
- Main road
- Local road
- - - Track
- Watercourse
- Cadastre
- ▨ Proposal site
- Groundwater Dependent Ecosystems**
- High potential terrestrial GDE
- Moderate potential terrestrial GDE
- Low potential terrestrial GDE



The Australian Government is delivering Inland Rail through the Australian Rail Track Corporation (ARTC), in partnership with the private sector.

4.5 FAUNA SPECIES RECORDED

A total of 33 fauna species were recorded during field surveys, including two amphibians, two mammals and 29 birds. Of the recorded fauna species, one is listed as Vulnerable under the BC Act; being the Grey-crowned Babbler (*Pomatostomus temporalis temporalis*).

A comprehensive list of fauna species recorded in the study area is provided in Appendix D. In addition, microbat call sequences recorded via Anabat detectors are provided in Appendix E.

4.6 FAUNA HABITAT

Four fauna habitat types were recorded in the study area and are outlined in Table 4.5. These habitat types are broadly linked to the vegetation types and conditions listed and described in Section 4.2.

Table 4.5 Fauna habitat types

CORRESPONDING VEGETATION TYPE	FAUNA HABITAT
PCT 11 River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Riverine woodland
Lachlan River	Aquatic habitat
Miscellaneous ecosystem – highly disturbed areas	Highly disturbed and exotic vegetation
Miscellaneous ecosystem*	Microhabitats (man-made structures)

*Note – corresponding vegetation type does not align to any specific plant community type in study area, has been assigned to miscellaneous ecosystem as it does provide fauna habitat for species in study area.

4.6.1 RIVERINE WOODLAND

Riverine woodland occurs predominately along the edges of the Lachlan River. The majority of riverine woodland occurrences are dominated by River Red Gum (*Eucalyptus camaldulensis*) occurring along the high banks above the Lachlan River. The stands of River Red Gum are sufficient to support common arboreal mammals, birds and microbats.

Due to historical vegetation disturbance, including agricultural practices (i.e. cropping and livestock grazing) and rail infrastructure, limited shrubby understorey components remained in the study area and the ground cover was dominated by native grasses with competing occurrences of introduced grasses and herbaceous weeds (Photo 4.5). Most of the study area and rail corridor has been disturbed and the loss of important microhabitats, such as large fallen timber and native shrubs, of which usually provide habitat for reptiles and smaller avifauna, are absent. The woodland habitat with grassy understorey provides foraging habitat for common open country bird species typical of open woodland/grassy environments (e.g. Australian Magpies, White-winged Choughs). Riverine woodland and its position along Lachlan River also provide foraging habitat for intermittent occurrences of predatory birds such as Little Eagle and Barn Owls. In areas where remnant large River Red Gum trees persist, hollows exist for larger hollow-dwelling fauna (i.e. arboreal mammals and birds) and roosting microbats.

Overall, the riverine woodland habitat persisted in a low to moderate condition due to the historic disturbance and removal of important microhabitats. This has resulted in a reduction in structural complexity and microhabitat diversity; components that correspond to a lower diversity of fauna. The persistence of remnant larger River Red Gum and native grassy understorey provided more substantial habitat for native fauna that use riverine woodlands. Riverine woodland patches in the study area have limited linkages with other remnant habitats in the landscape, however due to its occurrence along the Lachlan River it did provide connectivity in the broader locality. The region is heavily cleared for agriculture and as a result, is highly fragmented from intact habitat patches. Due to the degraded nature of the habitat and the predominately fragmented landscape, fauna that are likely to use this habitat are those which are well adapted to disturbed habitat and are highly mobile.



Photo 4.5 River Red Gums along rail corridor



Photo 4.6 Lachlan River Bridge

4.6.2 HIGHLY DISTURBED AND EXOTIC VEGETATION

Highly disturbed areas with exotic and planted vegetation was recorded predominantly within the rail corridor immediately adjacent to the existing rail. Largely limited to patchy infestations of exotic grasses, herbaceous weeds and planted trees/shrubs these habitat patches were used predominately by open country bird species for foraging purposes. These patches were heavily dominated with exotic species and as a result were in a low condition class as they lacked important microhabitat features such as native tussocks, open rocky patches, fallen timber and old growth trees with hollows.

4.6.3 AQUATIC HABITAT (SEMI-DEPENDENT AQUATIC SPECIES)

Aquatic habitat associated with the study area is represented in the form of Lachlan River (Photo 4.7). The Lachlan River is mapped as 'key fish habitat' and as such provides potential habitat for FM Act and EPBC Act listed aquatic species. The Lachlan River provides habitat for aquatic species and avifauna (i.e. egrets and ducks) and acts as an important habitat corridor/link in the region. The study area spans the Lachlan River and the surrounding riparian area and riverbanks have been disturbed due to agricultural and rail infrastructure. Aquatic species recorded opportunistically during the survey were those that are common within the region and use disturbed habitats, such as Eastern Sign-bearing Froglet (*Crinia parinsignifera*) and Spotted Grass Frog (*Limnodynastes tasmaniensis*). More detailed assessment of aquatic ecology and habitat for aquatic dependent fauna is stated in Section 4.7 below.



Photo 4.7 Lachlan River

4.6.4 MICROHABITATS

4.6.4.1 HOLLOW-BEARING TREES

The study area was predominately cleared of vegetation for rail infrastructure and agricultural land tenures and did not contain stands of trees of sufficient age to develop hollows. Nevertheless, exceptions occur within stands of River Red Gum along the Lachlan River and riverine woodland adjacent to the study area. River Red Gums were noted to contain hollows of varying size classes, providing potential shelter and breeding habitat for hollow-dependent arboreal mammals (i.e. Brush-tailed Possums and microbats) and birds (i.e. parrots, woodland birds and owls).

4.6.4.2 MAN-MADE STRUCTURES (BRIDGES)

Within the study area Lachlan River Bridge and other associated concrete bridges provide potential habitat for roosting microbats. The concrete structures leading up to the Lachlan River bridge and the bridge itself were of sufficient size to walk through, and all were inspected for presence of microbat habitation (Photo 4.8 and Photo 4.9).

All potential microbat artificial habitat observed within the rail corridor did not record any significant signs of microbat habitation (i.e. bat guano, or stains of guano due to presence of microbats). This might be due to the tight dimensions of concrete gaps and the lack of deep 'cave-like' habitat within these structures. An exit survey and Anabat audio recording were undertaken to identify if microbats were using the structures. No microbats were recorded leaving any of the structures during the field investigation. Microbats were seen flying and foraging along the Lachlan River at dusk, however none were witnessed to directly leave any of the structures. It is unlikely that these artificial structures in the study area act as significant roosting habitat for microbats.



Photo 4.8 Lachlan River Bridge artificial habitat



Photo 4.9 Rail bridge/culvert artificial habitat leading up to Lachlan River Bridge

4.7 AQUATIC HABITAT

4.7.1 NSW DPI KEY FISH HABITAT AND THREATENED SPECIES LISTS AND DISTRIBUTION MAPS

Lachlan River is an 8th order stream under the Strahler stream order mapping and is mapped by DPI as key fish habitat. As it is a permanently flowing waterway it is defined as Class 1 major key fish habitat (Fairfull and Witheridge, 2003) and Type 1 – ‘highly sensitive habitat’ (Department of Primary Industries, 2013), through the presence of snags, aquatic plants and expected threatened species habitat. However, DPI (2016) have mapped the Lachlan River in the vicinity of the proposal as having very poor fish community status. Threatened species distribution maps and database searches indicate that the proposal area has the potential to provide habitat for the following species:

- Western Population of Olive Perchlet (*Ambassis agassizi*) – FM Act listed as an Endangered Population
- Eel Tail Catfish (*Tandanus tandanus*) – FM Act listed as an Endangered Population
- Purple Spotted Gudgeon (*Mogurnda adspersa*) – FM Act listed as Endangered
- Flathead Galaxias (*Galaxias rostratus*) – FM Act listed as a Critically Endangered Species, EPBC Act listed as Critically Endangered; and
- Silver Perch (*Bidyanus bidyanus*) – FM Act listed as a Vulnerable Species, EPBC Act listed as Critically Endangered.

4.7.2 AQUATIC HABITAT ASSESSMENT

The site inspection was undertaken on 4 February 2021. Weather conditions on the day of the inspection were fine and mild with no rain and temperatures ranging between a night time low of 16.7°C and daytime high of 32.4°C (BOM 2021).

The Lachlan River is a major river and has a mean stream width of 15 metres at the proposal site. Approximately 25% of the channel is shaded by continuous riparian vegetation, which consists mainly of River Red Gum *Eucalyptus camaldulensis*, along with exotic trees (i.e. Willow trees *Salix babylonica**), grasses and shrubs. Macrophytes present include reeds (*Phragmites australis*). Habitat and potential refuge at the proposal site include instream structures such as logs and willow trees, bank overhangs and undercuts and some backflow areas. At the time of inspection, the water quality appeared very turbid. Historically, threatened fish in the Lachlan River system have been found in the locality and within the study area (Appendix B), and the presence of Flathead Galaxias, Silver Perch, Olive Perchlet, Southern Purple Spotted Gudgeon and Eel-tailed Catfish cannot be ruled out.

5 THREATENED BIODIVERSITY

This chapter provides an overview of the threatened species, populations and communities recorded or considered likely to use habitat in the study area. Threatened biodiversity is listed as Protected, Vulnerable, Endangered or Critically Endangered under the NSW BC Act. Threatened biodiversity listed under the Commonwealth EPBC Act is detailed in Chapter 6.

5.1 THREATENED ECOLOGICAL COMMUNITIES

No Threatened Ecological Communities listed under the BC Act were recorded within the study area. As outlined in Section 4.2, the vegetation in the study area is a mix of PCT 11: River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) and Miscellaneous ecosystems. PCT 11 is not associated with a TEC listed under the BC Act.

The study area falls within the aquatic ecological community in the natural drainage system of the lowland catchment of the Lachlan River (lowland Lachlan River aquatic ecological community). This EEC includes all native fish and aquatic invertebrates within all natural rivers, creeks, streams and associated lagoons, billabongs, lakes, wetlands, paleochannels, flood-runners, floodplains and effluent streams of the Lachlan River. The community has a diverse assemblage of native species including 19 species of fish, 10 species of crustacean, 8 species of mollusc, 2 species of sponges, and many insects. The listing of the lowland Lachlan River aquatic ecological community has given all native fish and other aquatic animal life within its boundaries the protected status of endangered species.

5.2 THREATENED TERRESTRIAL FLORA SPECIES

The BioNet search identified one threatened flora species listed under the BC Act that has been recorded within the locality of the study area which is *Diuris tricolor* (Appendix A). Supplementary database searches including PlantNet show threatened flora species listed under the BC Act including *Swainsona murrayana* and *Austrostipa wakoolica* have also been recorded in the locality. Six other threatened plant species or their habitats are predicted to occur in the locality based on the results of the PMST (see Appendix A). No threatened plant species are considered to have a moderate or higher likelihood of occurrence in the study area. PCT 11: River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) is not known to provide habitat for any of the threatened flora species returned from the database searches. The derived native grassland is in relatively poor condition and is heavily disturbed so is unlikely to provide habitat for the threatened flora species returned from the database searches.

Diuris tricolor is not known to be associated with *Eucalyptus camaldulensis* dominated forested wetland habitats as this species is found in dry sclerophyll forest, grassy woodland, semi-arid woodland, and grassland habitats. *Swainsona murrayana* is associated with arid shrublands, dry sclerophyll forest, grassy woodland, semi-arid woodland, inland floodplain shrublands, saline wetlands, and grassland habitats and is not known to be associated with the *Eucalyptus camaldulensis* dominated forested wetland habitats. *Austrostipa wakoolica* is known from floodplain grasslands and transition woodland habitats on alluvial soils but is not known to be associated with *Eucalyptus camaldulensis* dominated forested wetland habitats such as PCT 11. As such, based on known habitat associations, these three threatened plant species are considered to have a low likelihood of occurrence in the study area.

5.3 THREATENED TERRESTRIAL FAUNA SPECIES

The desktop database searches and assessments identified 34 threatened species listed under the NSW BC Act (Appendix B). Of the 34 threatened species identified, 17 threatened fauna species listed under the BC Act, were assessed as having a moderate or greater likelihood of occurrence in the study area, based on available habitat and known occurrences in associated habitats in the wider locality (Table 5.1).

Table 5.1 Threatened fauna species listed under the BC Act with a moderate or higher potential to occur

SCIENTIFIC NAME	COMMON NAME	BC ACT ¹	LIKELIHOOD OF OCCURRENCE
Woodland birds (6)			
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V	Moderate – potential habitat in the study area in the form of open woodland.
<i>Chthonicola sagittata</i>	Speckled Warbler	V	Moderate – potential habitat in the study area in the form of open woodland.
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V	Moderate – potential habitat within the study area in the form of open woodland. Known to occur within the greater locality.
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	Moderate – potential habitat within the study area in the form of open woodland. Known to occur within the greater locality.
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V	Recorded – riverine woodland habitat immediately adjacent to study area.
<i>Stagonopleura guttata</i>	Diamond Firetail	V	Moderate – potential habitat within the study area in the form of open woodland.
Birds of prey (4)			
<i>Circus assimilis</i>	Spotted Harrier	V	Moderate – potential foraging habitat within the study area in the form of native grasslands, open woodland and agricultural land.
<i>Falco subniger</i>	Black Falcon	V	Moderate – potential foraging habitat within the study area. Occurrences of individuals may occur whilst foraging in greater locality.
<i>Hieraaetus morphnoides</i>	Little Eagle	V	Moderate – potential foraging habitat within the study area in the form of native grasslands, open woodland and agricultural land.
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	V	Moderate – potential habitat within the study area in the form of Lachlan River and riparian areas.

SCIENTIFIC NAME	COMMON NAME	BC ACT ¹	LIKELIHOOD OF OCCURRENCE
Birds – other (3)			
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	Moderate – limited available habitat within the study area. Occurrences of individuals in the study area cannot be discounted during seasonal contexts.
<i>Lathamus discolor</i>	Swift Parrot	E	Moderate – limited available habitat within the study area. Occurrences of individuals in the study area may occur during seasonal movements.
<i>Polytelis swainsonii</i>	Superb Parrot	V	High – potential habitat within the study area. Presence of remnant Riverine woodland. May occur in study area and use surrounding Red Gum community for hollow-bearing trees.
Mammals (4)			
<i>Myotis macropus</i>	Southern Myotis	V	Moderate – potential habitat in the study area in the form of riparian areas along the Lachlan River.
<i>Petaurus norfolcensis</i>	Squirrel Glider	V	Moderate – potential habitat in the study area in the form of riparian areas (PCT 11) along the Lachlan River.
<i>Phascolarctos cinereus</i>	Koala	V	Moderate – potential habitat available in the study area in the form of PCT 11.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	Moderate – potential habitat in the study area in the form of riparian areas along the Lachlan River.

(1) V = Vulnerable; E = Endangered; CE = Critically Endangered under the BC Act.

5.4 THREATENED AQUATIC SPECIES

The desktop database searches and assessments identified five threatened species/populations and one EEC listed under the FM Act (Appendix B). Five threatened aquatic species listed under the FM Act, were assessed as having a moderate or greater likelihood of occurrence in the study area, based on available habitat and historical occurrences in associated habitats in the wider locality (Table 5.2).

The lower Lachlan River aquatic ecological community also occurs within the study area.

Table 5.2 Threatened aquatic species listed under the FM Act with moderate or higher potential to occur

SCIENTIFIC NAME	COMMON NAME	FM ACT ¹	LIKELIHOOD OF OCCURRENCE
<i>Ambassis agassizii</i>	Olive Perchlet	E2	Moderate – potential habitat within the study area (Lachlan River).
<i>Bidyanus bidyanus</i>	Silver Perch	V	Moderate – potential habitat within the study area (Lachlan River).
<i>Galaxias rostratus</i>	Flathead Galaxias	CE	Moderate – potential habitat within the study area (Lachlan River).
<i>Mogurnda adspersa</i>	Southern Purple Spotted Gudgeon	E	Moderate – potential habitat within the study area (Lachlan River) however more likely to occur in associated tributaries.
<i>Tandanus tandanus</i>	Eel Tail Catfish	E2	Moderate – potential habitat within the study area (Lachlan River).

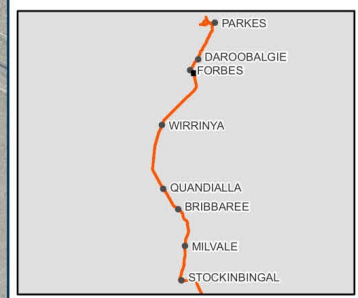
(1) V = Vulnerable, E2 = Endangered population, E = Endangered, CE = Critically Endangered under the FM Act.

**Stockinbinal to Parkes
Lachlan River Bridge**

Figure 5.1 Threatened Biodiversity Listed under the BC Act

LEGEND

- KM post
- Existing railway
- Main road
- Local road
- - Track
- Watercourse
- ▭ Project study area
- ▨ Proposal site
- ▭ Cadastre
- Threatened species**
- Grey-crowned Babbler



0 100 200 m

Coordinate System: GDA 1994 MGA Zone 55
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Date: 3/08/2021
 Author: WSP
 Paper: A3
 Scale: 1:3,500

6 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

Matters of National Environmental Significance (MNES) listed under the EPBC Act are addressed in this chapter. The following biodiversity MNES protected under the EPBC Act were considered for their relevance to the proposal:

- wetlands of international importance (Ramsar) (EPBC Act sections 16 and 17B)
- listed threatened species and communities (EPBC Act sections 18 and 18A)
- listed migratory species (EPBC Act sections 20 and 20A).

6.1 WETLANDS OF INTERNATIONAL IMPORTANCE

No wetlands of international importance occur within the study area. The study area is a considerable distance away from the nearest wetlands of international importance, which are:

- Banrock station wetland complex: 600–700km upstream
- Hattah-kulkyne lakes: 500–600km upstream
- Riverland: 600–700km upstream
- The Coorong, and Lake Alexandrina and Lake Albert wetland: 800–900km upstream.

As such, the proposal is unlikely to impact any wetlands of international importance.

6.2 LISTED THREATENED ECOLOGICAL COMMUNITIES

Results of the Protected Matters Search Tool (PMST) database search identified four TECs listed under the EPBC Act as being likely to occur within the locality as follows:

- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia (listed as Endangered)
- Poplar Box Grassy Woodland on Alluvial Plains (listed as Endangered)
- Weeping Myall Woodlands (listed as Endangered)
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (listed as Critically Endangered).

As outlined in Section 4.2, the only PCT identified within the study area was PCT 11: River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) and Miscellaneous ecosystems. PCT 11 is not associated with a TEC listed under the EPBC Act. No TECs listed under the EPBC Act were present in the study area.

6.3 LISTED THREATENED SPECIES

6.3.1 THREATENED TERRESTRIAL FLORA SPECIES

The PMST search identified eight threatened flora species listed under the EPBC Act that have the potential to occur in the locality of the study area (see Appendix A). However, two of these species are regarded by the NSW Herbarium to be the same species (*Prasophyllum petilum* and *Prasophyllum* sp. Wybong).

No EPBC Act listed threatened plant species are considered to have a moderate or higher likelihood of occurrence in the study area. PCT 11: River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) is not known to provide habitat for any of the threatened flora species returned from the PMST search. The derived native grassland is in relatively poor condition and is heavily disturbed so is unlikely to provide habitat for the threatened flora species returned from the database searches. The likelihood of occurrence assessment is provided in Appendix A.

6.3.2 THREATENED TERRESTRIAL FAUNA SPECIES

Results of the PMST database search identified 19 threatened fauna species listed as threatened under the EPBC Act as either occurring or considered likely to occur in the study area locality (Appendix B). Of these, six threatened fauna species were assessed as having a moderate likelihood of occurring in the study area based on available habitat, mobility and known occurrences in the wider local (Table 6.1).

Table 6.1 Threatened fauna species listed under the EPBC Act with a moderate likelihood of occurrence

SCIENTIFIC NAME	COMMON NAME	EPBC ACT ¹	LIKELIHOOD OF OCCURRENCE
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	Moderate – limited available habitat within the study area. Occurrences of individuals in the study area cannot be discounted during seasonal contexts.
<i>Hirundapus caudacutus</i>	White-throated Needletail	V	Moderate – although local records are sparse, due to wide ranging habitats may occur in aerial habitats over the study area on a seasonal basis.
<i>Lathmus discolor</i>	Swift Parrot	CE	Moderate – although records are sparse, potential habitat recorded in the study area in the form of riverine woodland. Could occur in study area during seasonal movements.
<i>Phascolarctos cinereus</i>	Koala	V	Moderate – potential habitat available in the study area in the form of PCT 11. Although there were no records for this species in the locality, small patches of River Red Gum woodland dominated by <i>Eucalyptus camaldulensis</i> (primary food tree species) was recorded in the study area.
<i>Polytelis swainsonii</i>	Superb Parrot	V	High – potential habitat within the study area. Presence of remnant riverine woodland. May occur in study area and use surrounding Red Gum community for hollow-bearing trees.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	Moderate – potential habitat in the study area in the form of riparian areas along the Lachlan River.

(1) V = Vulnerable, CE = Critically Endangered under the EPBC Act.

6.3.2.1 KOALA

The Koala was not recorded in the study area during the field survey informing this report, and no records for this species were returned from the Atlas of NSW Wildlife database (Department of Planning Industry and Environment, 2021). Nevertheless, whilst the rail corridor is predominately disturbed, small areas of remnant riverine woodland dominated by *Eucalyptus camaldulensis* occurred therein. *Eucalyptus camaldulensis* is listed as a primary Koala food tree species for the Forbes Shire Council area (Australia Koala Foundation, 2015).

Majority of remnant vegetation occurs in the riparian area along the Lachlan River, where the presence of moderate to large *Eucalyptus camaldulensis* occur. The riparian area provides a narrow corridor and linkage to the surrounding landscape and it has the potential to act as a corridor for Koalas to move through the greater locality. It is important to also note that the majority of the surrounding landscape has been subject to historical disturbances with large expanses of habitat cleared in the proposal locality. As a result, study area may be too isolated from large habitat remnants that may otherwise sustain a population of Koala in the study area.

EPBC ACT KOALA HABITAT ASSESSMENT TOOL

The Koala Habitat Assessment Tool within the ‘EPBC Act referral guidelines for the vulnerable Koala’ (Department of the Environment, 2014) was used to determine whether Koala habitat in the study area classifies as ‘habitat critical to the survival of the Koala’ (Figure 6.1). To be classified as habitat critical to the survival of the Koala vegetation must score 5 or above using the habitat assessment tool. A summary of the key assessment criteria (inland population criteria) and scoring for the study area against the referral guidelines is provided in Table 6.2 and illustrated in Figure 6.1.

Koala habitat in the study area scored 3 out of 10 (Table 6.2) using the Koala Habitat Assessment Tool. Therefore, habitat in the study area is not likely to constitute habitat critical to the survival of the species.

Table 6.2 Koala habitat assessment tool (inland population criteria)

ATTRIBUTE	SCORE	HABITAT APPRAISAL	
Koala occurrence	0	Desktop	No Koala records exist within the proposal locality
		On-site	No Koala individuals or traces of Koalas (scats, scratching etc.) were recorded in the study area during field surveys
Vegetation structure and composition	2	Desktop	One food tree species that alone accounts for >50% of the vegetation in the relevant strata
		On-site	
Habitat connectivity	0	The study area is not part of contiguous landscape ≥ 500 ha	
Key existing threats	1	Desktop	No records of Koala exist in the proposal locality. No records of Koala mortality or dog attack were identified within 2km of the proposal study area. The study area encompasses an existing rail corridor that may increase roadkill risk.
		On-site	The status of wild dog populations and level of predation is not known. No evidence of Koala activity or mortality from vehicle strike was observed in the proposal study area during field surveys.

ATTRIBUTE	SCORE	HABITAT APPRAISAL
Recovery value	0	The study area consisted of a disturbed active rail corridor, which contained small areas of remnant woodland dominated by <i>Eucalyptus camaldulensis</i> . The study area was subject to existing edge effects and fragmentation, with large expanses of habitat cleared in the proposal locality for agricultural land use, effectively isolating the study area from large habitat remnants.
Total	3	Decision: a score of 3 obtained, therefore study area is not likely to contain critical habitat.

A comparison of the proposal's potential impacts was assessed against Figure 2 of the 'EPBC Act referral guidelines for the vulnerable Koala' (Department of the Environment, 2014) to determine where impacts were likely to be adverse. As illustrated in Figure 6.1, it was concluded that the proposal is unlikely to have an adverse impact on the habitat critical for the species due to the following:

- Forbes does not occur as an 'Area of Regional Koala Significance' (Department of Environment and Energy, 2020c)
- the Atlas of NSW Wildlife database did not contain Koala records within 10km of the proposal study area (Department of Planning Industry and Environment, 2021)
- the proposal is likely to impact <0.1ha of potential Koala habitat and largely consist of tree trimming to enable crane movement.

The EPBC Act significant impact assessment concluded that the proposal is unlikely to have a significant impact on the Koala (Appendix F).

Attribute	Score	Inland	Coastal
Koala occurrence	+2 (high)	Evidence of one or more koalas within the last 5 years.	Evidence of one or more koalas within the last 2 years.
	+1 (medium)	Evidence of one or more koalas within 2 km of the edge of the impact area within the last 10 years.	Evidence of one or more koalas within 2 km of the edge of the impact area within the last 5 years.
	0 (low)	None of the above.	None of the above.
Vegetation composition	+2 (high)	Has forest, woodland or shrubland with emerging trees with 2 or more known koala food tree species, OR 1 food tree species that alone accounts for >50% of the vegetation in the relevant strata.	Has forest or woodland with 2 or more known koala food tree species, OR 1 food tree species that alone accounts for >50% of the vegetation in the relevant strata.
	+1 (medium)	Has forest, woodland or shrubland with emerging trees with only 1 species of known koala food tree present.	Has forest or woodland with only 1 species of known koala food tree present.
	0 (low)	None of the above.	None of the above.
Habitat connectivity	+2 (high)	Area is part of a contiguous landscape ≥ 1000 ha.	Area is part of a contiguous landscape ≥ 500 ha.
	+1 (medium)	Area is part of a contiguous landscape < 1000 ha, but ≥ 500 ha.	Area is part of a contiguous landscape < 500 ha, but ≥ 300 ha.
	0 (low)	None of the above.	None of the above.
Key existing threats	+2 (high)	Little or no evidence of koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence. Areas which score 0 for koala occurrence and have no dog or vehicle threat present	
	+1 (medium)	Evidence of infrequent or irregular koala mortality from vehicle strike or dog attack at present in areas that score 1 or 2 for koala occurrence, OR Areas which score 0 for koala occurrence and are likely to have some degree dog or vehicle threat present.	
	0 (low)	Evidence of frequent or regular koala mortality from vehicle strike or dog attack in the study area at present, OR Areas which score 0 for koala occurrence and have a significant dog or vehicle threat present.	
Recovery value	+2 (high)	Habitat is likely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	
	+1 (medium)	Uncertain whether the habitat is important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	
	0 (low)	Habitat is unlikely to be important for achieving the interim recovery objectives for the relevant context, as outlined in Table 1.	

Figure 6.1 Assessment of habitat critical to the survival of the Koala (inland population criteria)

6.4 LISTED MIGRATORY SPECIES

Migratory species are protected under international agreements to which Australia are a signatory, including JAMBA, CAMBA, RoKAMBA and the Bonn Convention on the Conservation of Migratory Species of Wild Animals. Migratory species are considered MNES and are protected under the EPBC Act.

Based on EPBC protected matters area search and other desk-top database searches, 14 migratory species have been recorded or have potential habitat within the wider locality of the study area (Appendix B).

Of the 14 migratory species identified, two species are considered to have a moderate or higher likelihood of occurrence based on the habitat available within the study area (Table 6.3).

Table 6.3 Migratory species listed under the EPBC Act with a moderate or higher potential to occur

SCIENTIFIC NAME	COMMON NAME	EPBC ACT ¹	LIKELIHOOD OF OCCURRENCE
<i>Apus pacificus</i>	Fork-tailed Swift	Ma	Moderate – May occur in aerial habitats over the study area on a seasonal basis.
<i>Hirundapus caudacutus</i>	White-throated Needletail	V; M	Moderate – although local records are sparse, due to wide ranging habitats may occur in aerial habitats over the study area on a seasonal basis.

Whilst terrestrial, and marine migratory species of bird may potentially use the study area, the site would not be classed as ‘important habitat’ as defined by the ‘*Significant Impact Guidelines 1.1 – Matters of National Environmental Significance*’ (Department of the Environment, 2013a) as the site did not contain:

- habitat utilised by a migratory species occasionally or periodically within a region that supports an ecological significant proportion of the population of the species
- habitat utilised by a migratory species which is at the limit of the species range
- habitat within an area where the species is declining.

There are no important habitats for Migratory birds as outlined in the *Draft Referral guideline for 14 birds listed as migratory species under the EPBC Act* (Department of the Environment, 2015). As such, it is not likely that the proposal would significantly affect migratory species and therefore this group has not been considered further.

One species of migratory bird, the White-throated Needletail, is however listed as Vulnerable, and as such, the study area could be considered to contain potential habitat where the species is declining. As this species is listed as migratory and threatened under the EPBC Act, an assessment of significance is carried out using the threatened species criteria.

6.5 THREATENED AQUATIC SPECIES

The PMST search and other database searches identified six threatened species listed under the EPBC Act (Appendix B). Two of these threatened aquatic species were assessed as having a moderate or greater likelihood of occurrence in the study area, based on available habitat in the proposal area (Table 6.4).

Table 6.4 Threatened aquatic species listed under the EPBC Act with a moderate or higher likelihood of occurrence

SCIENTIFIC NAME	COMMON NAME	EPBC ACT ¹	LIKELIHOOD OF OCCURRENCE
<i>Bidyanus bidyanus</i>	Silver Perch	CE	Moderate – potential habitat within the study area (Lachlan River).
<i>Galaxias rostratus</i>	Flathead Galaxias	CE	Moderate – potential habitat within the study area (Lachlan River).

(1) CE = Critically Endangered under the EPBC Act

7 POTENTIAL IMPACTS

This chapter contains a description of the potential impacts of the proposal on biodiversity. The impacts are separated into direct, indirect and cumulative categories, and are based on a worst-case scenario from the 100% design impact area. Table 7.1 describes the direct and indirect impacts against the different proposal phases where they could be experienced. Potential aquatic impacts are limited to indirect impacts (including erosion and sedimentation, and changes in hydrology and water quality) and are described separately in Section 7.2.7, whilst cumulative impacts are detailed in Section 7.3.

Table 7.1 Summary of potential impacts to biodiversity

IMPACT	CONSTRUCTION PHASE	OPERATION PHASE
Direct impacts		
Removal of native vegetation	✓	
Removal of threatened fauna habitat	✓	
Injury and mortality	✓	✓
Modification works to the Lachlan River Bridge	✓	
Removal of hollow-bearing trees	✓	
Indirect impacts		
Wildlife connectivity and habitat fragmentation	✓	✓
Edge effects on adjacent native vegetation	✓	✓
Weed dispersal	✓	✓
Invasion and spread of pathogens and disease	✓	✓
Dust and light pollution	✓	✓
Noise and vibration disturbing fauna	✓	✓
Aquatic impacts	✓	✓

7.1 DIRECT IMPACTS

7.1.1 REMOVAL OF NATIVE VEGETATION

The construction of the proposal will require the removal of approximately 0.1ha of native vegetation from PCT 11 consisting of approximately 0.08ha of derived native grasslands and approximately 0.02ha of poor condition vegetation (see Table 7.2). In addition, some River Red Gums located to the south of the crane pad will require trimming to enable full movement of the crane arm.

Table 7.2 Potential direct impacts on native vegetation from the 100% design impact area

VEGETATION TYPE	CONDITION	VEGETATION FORMATION	VEGETATION CLASS	NSW TEC LISTING	EPBC TEC LISTING	AREA WITH STUDY AREA (ha)	POTENTIAL IMPACT (ha)
Native Plant Community Types							
PCT 11: River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)	Poor condition	Forested Wetlands	Inland Riverine Forests	Not listed	Not listed	0.37	0.02
	Isolated trees					0.05	–
	Regrowth					0.03	–
	Derived native grassland					2.01	0.08
Miscellaneous ecosystems							
Planted trees	n/a	n/a	n/a	Not listed	Not listed	0.21	–
Highly disturbed areas with no or limited native vegetation	n/a	n/a	n/a	Not listed	Not listed	0.10	–
						Total	0.1

7.1.2 REMOVAL OF THREATENED FAUNA HABITAT

Potential impacts to threatened fauna species from the proposal is estimated to include the removal of approximately 0.1ha of PCT 11.

Table 7.3 Impact on threatened fauna and their habitats

SCIENTIFIC NAME	COMMON NAME	BC ACT ¹	EPBC ACT ²	ASSOCIATED PCTS	POTENTIAL HABITAT IMPACTED BY PROPOSAL (ha)
Woodland birds (6)					
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V	–	PCT 11 (poor condition)	0.1
<i>Chthonicola sagittata</i>	Speckled Warbler	V	–	PCT 11 (poor condition)	0.1
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V	–	PCT 11 (poor condition)	0.1
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	–	PCT 11 (poor condition)	0.1
<i>Pomatostomus temporalis temporalis</i>	Grey-crowned Babbler (eastern subspecies)	V	–	PCT 11 (poor condition and DNG)	0.1
<i>Stagonopleura guttata</i>	Diamond Firetail	V	–	PCT 11 (poor condition and DNG)	0.1
Birds of prey (4)					
<i>Circus assimilis</i>	Spotted Harrier	V	–	PCT 11 (poor condition and DNG)	0.1
<i>Falco subniger</i>	Black Falcon	V	–	PCT 11 (poor condition and DNG)	0.1
<i>Hieraaetus morphnoides</i>	Little Eagle	V	–	PCT 11 (poor condition and DNG)	0.1
<i>Haliaeetus leucogaster</i>	White-bellied Sea-eagle	V	–	PCT 11 (poor condition and DNG)	0.1
Birds – other (4)					
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	CE	PCT 11 (poor condition)	0.1
<i>Hirundapus caudacutus</i>	White-throated Needletail	–	V; M	PCT 11 (poor condition)	0.1
<i>Lathamus discolor</i>	Swift Parrot	CE	CE	PCT 11 (poor condition)	0.1
<i>Polytelis swainsonii</i>	Superb Parrot	V	V	PCT 11 (poor condition and DNG)	0.1

SCIENTIFIC NAME	COMMON NAME	BC ACT ¹	EPBC ACT ²	ASSOCIATED PCTS	POTENTIAL HABITAT IMPACTED BY PROPOSAL (ha)
Mammals (4)					
<i>Myotis macropus</i>	Southern Myotis	V		PCT 11 (poor condition)	0.1
<i>Petaurus norfolcensis</i>	Squirrel Glider	V	V	PCT 11 (poor condition)	0.1
<i>Phascolarctos cinereus</i>	Koala	V	V	PCT 11 (poor condition)	0.1
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	PCT 11 (poor condition)	0.1

(1) Vulnerable (V), Endangered (E), Critically Endangered (CE) as listed on the BC Act.

(2) Vulnerable (V), Endangered (E), Critically Endangered (CE), Migratory (M) as listed on the EPBC Act.

7.1.3 INJURY AND MORTALITY

Fauna injury or death has the greatest potential to occur during construction when vegetation and habitats are being cleared. The extent of this impact would be proportionate to the extent of vegetation that is cleared. Less mobile species (e.g. ground dwelling reptiles and frogs), or those that are nocturnal and nest or roost in trees during the day (e.g. arboreal mammals and microchiropteran bat species), may find it difficult to rapidly move away from the clearing when disturbed. Fauna injury and mortality also have the potential to occur during operation of the rail corridor as a result of collision with survey/maintenance vehicles and through increased rail movements with double-stacked containers.

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

Due to historic land clearing practices, fauna habitats available in the study area were structurally simplified and consistent with derived native grassland and poor condition/regrowth forms of PCT 11: River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion). The lack of structural habitat complexity and the paucity of important microhabitat features restricts the study area's ability to support an otherwise diverse fauna. Although riverine woodland in the study area is likely to be used as a movement corridor for more mobile species of animal, such as birds, vehicle strike during construction works is not likely to be significant. Likewise, and owing to the existing operational rail corridor, wildlife train strike during operation is not likely to increase considerably and the impacts are not likely to be significant.

7.1.4 MODIFICATION WORKS TO THE LACHLAN RIVER BRIDGE

Although microbats were not observed to be using the Lachlan River Bridge during the site inspection, there is possibility that microbats may intermittently use the structure under suitable seasonal conditions. It is unlikely that the structure acts as significant roosting habitat for individuals as no signs of a large-scale presence of any species could be found and a low microbat activity was recorded via the Anabat recording device. Modification works to the existing Lachlan River Bridge has the potential to disturb roosting microbats. Requirements for an inspection of the structure will be implemented prior to commencing modification works to the Lachlan River Bridge.

7.1.5 REMOVAL OF HOLLOW-BEARING TREES

The proposal may include the loss of hollow-bearing trees and has the potential to affect native animals such as:

- hollow-nesting and canopy-nesting birds
- hollow-dependent bats
- arboreal mammals
- reptiles.

Whilst no hollow-bearing trees were observed in the proposal impact area, a complete hollow-bearing tree inventory was not completed during the site inspection. Although the potential impact to hollow tree resources is likely to be negligible, such resources will require confirmation during pre-clearing surveys.

7.2 INDIRECT IMPACTS

7.2.1 WILDLIFE CONNECTIVITY AND HABITAT FRAGMENTATION

Habitat fragmentation *per se* relates to the physical dividing up of once continuous habitats into separate smaller fragments. Habitats recorded in the study area are those that remain or have formed since the initial broad-scale habitat clearing that occurred in the locality. Within the study area, this is largely associated with riverine woodland occurring along the banks of the Lachlan River. No instream works are anticipated and as a result, no direct aquatic habitat disturbance is expected.

The current rail line and roads divide habitats in the study area. However, functional habitat connectivity for more mobile species (e.g. birds, flying-foxes, insectivorous bats, insects, plants) is still present. The current rail line and roads do not totally prevent fauna movement between habitat fragments (fauna can and likely do cross the rail line) but the rail line does present a hazard to movement.

The proposal is unlikely to break apart continuous habitats into separate smaller fragments and it is unlikely to result in an increase to the isolation of habitats beyond that currently experienced in the study area.

The predicted level of isolation from the proposal is not likely to be enough to prevent the breeding and dispersal of plant pollinators or the dispersal of plant propagules (i.e. seed or other vegetative reproductive material) between habitat patches. Functional connectivity for many species would remain in the study area. This impact would be of low magnitude and mitigation measures are not deemed necessary.

7.2.2 EDGE EFFECTS ON ADJACENT NATIVE VEGETATION AND HABITAT

The development of linear infrastructure is known to cause disturbance in terms of reducing habitat quality in adjacent areas. This is due to the greater potential for edge effects and habitat fragmentation and barrier effects due to the high perimeter to area ratio of linear developments. The proposal would be built in an area that is currently subject to a high level of edge effects from the existing rail line and adjacent roads and agricultural land tenures. Vegetation patches were suffering from weed invasion and the habitats that would be impacted by the proposal are edge habitats without any undisturbed core. There is unlikely to be any further impacts from edge effects resulting from the proposal. This impact would be of low magnitude and mitigation measures are not deemed necessary.

7.2.3 WEED DISPERSAL

The proposal has the potential to further disperse weeds into nearby areas of native vegetation. The greatest potential for weed dispersal and establishment associated with the proposal would include earthworks, movement of soil and attachment of seed (and other propagules) to vehicles and machinery where these are utilised within or adjacent to retained vegetation. The clearing of native vegetation for the proposal, including earthworks would increase the potential for weed invasion into adjacent patches of native vegetation. Management measures would be required to minimise the risk of introduction and spread of weeds. With appropriate weed management, the overall impact of weed invasion on retained vegetation is likely to decrease in the medium to long term. Weeds must be managed during construction.

7.2.4 INVASION AND SPREAD OF PATHOGENS AND DISEASE

Plant and animal pathogens can affect threatened biodiversity through direct mortality and modification to vegetation structure and composition. The following pathogens are considered to have potential to affect the biodiversity within the proposal impact area and are the subject of Key Threatening Process listings:

- Amphibian Chytrid Fungus (*Batrachochytrium dendrobatidis*)
- Exotic Rust Fungi (order Pucciniales, e.g. Myrtle rust fungus *Uredo rangelii*)
- Phytophthora Root Rot Fungus (*Phytophthora cinnamomi*).

These three pathogens have all been recorded in the bioregion and have potential to occur within the study area at present or in the future. The main way in which Exotic Rust Fungi and Phytophthora Root Rot Fungus may be spread is through the movement of infected plant material and/or soil. The construction and operation of the proposal may increase the risk of disturbing and spreading these pathogens. With the implementation of hygiene procedures for the use of vehicles and the importation of materials to the impact area, the risk of introducing these pathogens would, however, be low.

Amphibian Chytrid Fungus can be spread through the movement of infected animals or water (including mud or moist soil) from infected areas. With the implementation of hygiene procedures for the use of vehicles and the importation of materials to the proposal footprint, the risk of introducing this pathogen to uninfected areas is low.

7.2.5 DUST AND LIGHT POLLUTION

The proposal site generates minimal dust and air pollutants from the passing of freight trains. There would be dust and particulate matter disturbed from construction activities. The total amount of dust generated would depend on the properties of the disturbed spoil on site (silt and moisture content), the construction activities undertaken and the prevailing meteorological conditions. Elevated levels of dust may be deposited onto the foliage of vegetation during construction which has the potential to reduce photosynthesis and transpiration and cause abrasion and radioactive heating resulting in reduced growth rates and decreases in overall health of the vegetation. However, deposition of dust on foliage is likely to be highly localised, intermittent, and temporary (particularly during the wetter seasons) and is therefore not considered likely to be a major impact.

While the construction works would occur generally during day-time hours, some lighting may be required outside of standard working hours, including temporary spotlights in support of short-duration night works (when required) and headlights from staff and construction vehicles accessing the site. This would occur for a short duration each day and for a short time within the proposal construction program. Minor security lighting may also be required at the compound sites, at site access, storage and laydown ancillary areas. The potential impacts from lighting would be short-term. The lighting may result in impacts to nocturnal fauna. Common nocturnal species such as possums and microbats may avoid the habitat in the proposal impact area during construction as temporary 'daylight' conditions would be created by the temporary spotlights. This impact is considered temporary and would not have long lasting effects on biodiversity. The magnitude of this impact would be low and mitigation measures are not deemed necessary. As there would be an increase in the frequency of freight trains during operation there would be an increase in frequency of train headlights. There would be an incremental increase in frequency, rather than there being any new areas where there is a potential for light spill into adjacent habitats.

7.2.6 NOISE AND VIBRATION DISTURBING FAUNA

Considering the existing levels of noise and vibration from the rail line it is unlikely there would be a significant increase in noise and vibration that would result in any increased impacts to biodiversity within the study area. There is, however, potential for impacts to locally common fauna from noise and vibration during construction, which may result in fauna temporarily avoiding habitats adjacent to the construction. The magnitude of this impact would be low and mitigation measures are not deemed necessary.

7.2.7 AQUATIC IMPACTS

No instream works are anticipated in association with the Lachlan River. As such, direct impacts to aquatic habitat or to threatened aquatic species or the lowland Lachlan River aquatic ecological community are not expected. However, the proposal could potentially cause indirect impacts to receiving waterways from the construction areas in close proximity to the Lachlan River. Potential indirect impacts to aquatic habitat and water quality during construction could include:

- unmanaged construction activities (such as earthworks and removal of vegetation) could result in soil erosion, siltation and off-site movement of eroded sediments by surface water runoff, that may contribute to increased levels of turbidity, contaminants (e.g. nutrients) and sediment deposition, decreased dissolved oxygen, and change pH levels in surrounding waterways
- accidental fuel and chemical spills and contaminated runoff from construction vehicles, plant, equipment or chemical storage areas have the potential to runoff into the Lachlan River
- accidental spills and subsequent water pollution from removal of lead based paint and repainting. Lead from lead-based paint is known to accumulate in aquatic fauna through either direct absorption and or ingestion with food. It can affect growth, reproduction, immune response and survival in a range of aquatic species, in addition to bioaccumulating in higher order species.

The existing hydrological conditions of the proposal site are already affected by altered landform because of surrounding land uses. However, during operation a minor increase in impervious surfaces may result in an increased volume of runoff, which could lead to increased scouring, erosion and sedimentation. Run-off may carry increased sediment loads and nutrients (such as nitrogen and phosphorus), surrounding waterbodies and streams within and adjacent to the proposal site.

Further consideration of surface water is considered in the Surface Water Impact Assessment (WSP, 2021).

7.3 CUMULATIVE IMPACTS

Table 7.4 details the cumulative native vegetation and habitat impacts associated with S2P.

The cumulative impact of multiple Inland Rail projects occurring in the vicinity of the proposal will likely include the continued loss of biodiversity in the region. The projects have the potential to contribute to the cumulative loss of habitat and will place further pressure on the local threatened flora and fauna species and ecological communities. The cumulative impacts that are most likely to occur with these projects are the direct impacts on PCTs. As shown in Table 7.4 the contribution of the Inland Rail projects to cumulative impacts to the local occurrence of mapped PCTs is negligible. A significant impact is therefore not expected.

Table 7.4 Cumulative native vegetation impacts associated with S2P

PLANT COMMUNITY TYPE	ENHANCEMENT WORKS				CUMULATIVE IMPACT	LOCAL OCCURRENCE (WITHIN 10km)	OVERALL PROPORTIONAL IMPACT
	Horizontal Clearances	Lachlan River Bridge	Wyndham Ave Bridge	Daroobalgie Crossing Loop			
PCT 76 ¹ derived native grassland	2.1		3.4	4.6	10.1	12,290.5	0.09%
PCT 76 ¹ regrowth			0.1	1.1	1.2		
PCT 76 ¹ isolated trees				0.1	0.1		
PCT 76 ¹ moderate condition				0.1	0.1		
PCT 80 ² derived native grassland	1.1				1.1	2,769.4	0.04%
PCT 26 ³ (poor condition)	<0.1				<0.1	194.2	<0.05%
PCT 11 ⁴ (poor condition and derived native grassland)		0.1			0.1	855.9	0.01%
PCT 5 ⁵ derived native grassland			<0.1		<0.1	144.9	<0.07%
Total	3.3	0.1	3.6	5.9	12.9	16,254.9	0.08%

- (1) PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions. Commensurate with a TEC under the BC Act and EPBC Act.
- (2) PCT 80: Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion. Commensurate with a TEC under the BC Act and EPBC Act.
- (3) PCT 26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion. Commensurate with a TEC under the BC Act.
- (4) PCT 11: River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion). Not a TEC.
- (5) PCT 5: River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion. Not a TEC.

8 MITIGATION

This chapter outlines the impact mitigation measures and safeguards recommended for the proposal. These measures would be refined during the detailed design phase of the proposal and be included in a flora and fauna management sub-plan of the construction environment management plan (CEMP). The mitigation measures for flora and fauna/ biodiversity management are outlined in Table 8.1 and Table 8.2.

Table 8.1 Mitigation measures for detailed design/pre-construction

REFERENCE	ISSUE / IMPACT	MITIGATION MEASURES – DETAILED DESIGN/PRE-CONSTRUCTION
BD1	Avoiding impacts on biodiversity	Construction planning would avoid or minimise the need to remove and/or disturb native vegetation and fauna habitat.
BD2		Vegetation clearing would be limited to the minimum necessary to construct the proposal and allow for its effective operation.

Table 8.2 Mitigation measures for construction

REFERENCE	ISSUE / IMPACT	MITIGATION MEASURES – CONSTRUCTION
BD3	Managing the potential for biodiversity impacts during construction	A biodiversity management plan would be prepared prior to construction and implemented as part of the CEMP. The plan would include measures to manage biodiversity and minimise the potential for impacts during construction. The plan would be prepared in accordance with relevant legislation, guidelines and standards. The plan would include, but not be limited to: <ul style="list-style-type: none"> — locations and requirements for pre-clearing surveys, including breeding habitats (including burrows, trees, logs and structures, including Lachlan River Bridge) and habitat for threatened flora species — the clearing extents/site boundary/limit of works is clearly defined with flagging or marking tape, signage or other suitable means to delineate no go areas — establishing protocols for the staged clearing of vegetation and safe tree felling and log removal to reduce the risk of fauna mortality — establish daily checks in machinery and excavations for presence of fauna to reduce the risk of fauna mortality — animal handling protocols, including relocation and emergency care — an unexpected finds protocol — measures to manage biosecurity risks in accordance with the <i>Biosecurity Act 2015</i> — erosion and sediment control measures.
BD4		The trimming of canopy trees along the Lachlan River should be completed in consultation with qualified arborist and minimised where possible.
BD5		Exclusion areas would be established and maintained around native vegetation to be retained, particularly areas of biodiversity value adjoining the proposal site that are located in close proximity to work areas.
BD6		Stockpile sites would be located outside of riparian habitat.

REFERENCE	ISSUE / IMPACT	MITIGATION MEASURES – CONSTRUCTION
BD7	Rehabilitation of vegetation subject to temporary disturbance	<p>A rehabilitation strategy would be based on the Inland Rail Landscape and Rehabilitation Strategy, the Inland Rail Landscape and Rehabilitation Framework and property-specific reinstatement commitments. This would guide the approach to rehabilitation of disturbed areas following the completion of construction. The strategy would include:</p> <ul style="list-style-type: none"> — clear objectives and timeframes for rehabilitation works (including the biodiversity outcomes to be achieved) — details of the actions and responsibilities to progressively rehabilitate, regenerate, and/or revegetate areas, consistent with the agreed objectives — identification of flora species and sources — procedures for monitoring the success of rehabilitation — corrective actions should the outcomes of rehabilitation not conform to the objectives adopted.

9 ASSESSMENTS OF SIGNIFICANCE

9.1 ASSESSMENT OF SIGNIFICANCE

The proposal is being assessed under the EP&A Act. Section 5.5 of the EP&A Act requires that a determining authority examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposal and that assessment of significance is undertaken to assess the likelihood of significant impact upon threatened species, populations or ecological communities listed under the BC Act. The test for determining whether the proposal is likely to affect threatened species, populations or ecological communities or their habitats is in Section 7.3 of the BC Act. For threatened biodiversity listed under the EPBC Act, significance assessments have been completed in accordance with the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines* (Department of the Environment, 2013b).

Assessments of significance have been conducted for each threatened species, population or ecological community recorded or considered to have a moderate to high likelihood of occurrence in the study area (Appendix F). Combined assessments of significance have been conducted for groups of species that have similar life history and habitat requirements (e.g. raptors), suggesting a similar response to project impacts.

Assessments of significance have been undertaken in accordance with the following published guidelines:

- Threatened species assessment guidelines – assessment of significance for BC Act listed biodiversity (Department of Environment and Climate Change, 2007)
- Significant Impact Guidelines 1.1 – Matters of National Environmental Significance for EPBC Act listed biodiversity (Department of the Environment, 2013b)
- Referral guidelines for species listed under the EPBC Act (Department of the Environment and Energy, 2017)
- Threatened species assessment guidelines – The assessment of significance for FM Act listed biodiversity (Department of Primary Industries, 2008).

The results of the significance assessments are summarised in Table 9.1. No ecological communities, populations or threatened species were considered likely to be significantly impacted by the proposal.

Table 9.1 Summary of outcome of Assessment of Significance for threatened entities

SCIENTIFIC NAME	COMMON NAME	BC ACT ¹	EPBC ACT ²	FM ACT ³	OUTCOME OF ASSESSMENT	
					BC Act	EPBC Act
Birds – blossom nomads						
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	CE		Not significant	Not significant
<i>Lathamus discolor</i>	Swift Parrot	E	CE		Not significant	Not significant
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V		Not significant	Not significant
Birds – woodland birds						
<i>Artamus cyanopterus</i>	Dusky Woodswallow	V	–		Not significant	N/A
<i>Chthonicola sagittata</i>	Speckled Warbler	V	–		Not significant	N/A
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V	–		Not significant	N/A
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	–		Not significant	N/A

SCIENTIFIC NAME	COMMON NAME	BC ACT ¹	EPBC ACT ²	FM ACT ³	OUTCOME OF ASSESSMENT	
					BC Act	EPBC Act
<i>Pomatostomus temporalis temporalis</i>	Grey-Crowned Babbler (Eastern subspecies)	V	–		Not significant	N/A
<i>Stagonopleura guttata</i>	Diamond Firetail	V	–		Not significant	N/A
<i>Hirundapus caudacutus</i>	White-throated Needletail	–	V; M		N/A	Not significant
Birds – raptors						
<i>Circus assimilis</i>	Spotted Harrier	V	–		Not significant	N/A
<i>Falco subniger</i>	Black Falcon	V	–		Not significant	N/A
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	Ma		Not significant	N/A
<i>Hieraaetus morphnoides</i>	Little Eagle	V	–		Not significant	N/A
Mammals - microchiropteran bats						
<i>Myotis macropus</i>	Southern Myotis	V	–		Not significant	N/A
Mammals – arboreal mammals						
<i>Phascolarctos cinereus</i>	Koala	V	V		Not significant	Not significant
<i>Petaurus norfolcensis</i>	Squirrel Glider	V	–		Not significant	N/A
Fish						
<i>Ambassis agassizi</i>	Olive Perchlet	–	–	EP	Not significant	N/A
<i>Bidyanus bidyanus</i>	Silver Perch	–	CE	V	Not significant	Not significant
<i>Galaxias rostratus</i>	Flathead Galaxias	–	CE	CE	Not significant	Not significant
<i>Mogurnda adspersa</i>	Southern Purple Spotted Gudgeon	–	–	E1	Not significant	N/A
<i>Tandanus tandanus</i>	Eel Tail Catfish	–	–	EP	Not significant	N/A

- (1) Vulnerable (V), Endangered (E1), Critically Endangered (CE) as listed on the BC Act.
- (2) Vulnerable (V), Endangered (E), Critically Endangered (CE), Migratory (M), Marine (Ma) as listed on the EPBC Act.
- (3) Vulnerable (V), Endangered (E1), Endangered Population (EP), Critically Endangered (CE) as listed on the FM Act.

10 CONCLUSION

The study area is a heavily disturbed rail corridor and most of the original vegetation has been cleared. The study area contained a mix of the following vegetation types:

- PCT 11: River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)
 - poor condition vegetation characteristic of PCT 11 located on the Lachlan River and associated drainage line
 - isolated trees characteristic of PCT 11
 - derived native grassland: these are disturbed grassland areas dominated by a mix of native and exotic species. This vegetation has been assigned to a derived native grassland condition class of PCT 11
 - regrowth trees and shrubs characteristic of PCT 11.
- Miscellaneous ecosystems:
 - highly disturbed areas with no or limited native vegetation
 - planted trees.

A total of 2.6ha of PCT 11 River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) was recorded in the study area.

No TECs listed under the BC Act or EPBC Act were recorded in the study area.

One EEC listed under the FM Act occurs in the study area: lower Lachlan River aquatic ecological community, however the proposal will not result in any direct impact on this EEC and potential indirect impacts can be mitigated and are unlikely to be significant. Five threatened fish species are considered to have moderate or higher likelihood of occurrence in the study area however the impacts of the proposal on the aquatic environment are considered relatively minor as they do not require instream works and result in the removal of 0.1ha of mostly poor-quality riparian vegetation. As such the assessment of significance of impact of the proposal on these aquatic threatened species, populations and EEC listed under the FM Act and EPBC Act was assessed as not significant.

No threatened plant species listed under the BC Act or EPBC Act are considered to have a moderate or higher likelihood of occurrence in the study area. PCT 11: River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) is not known to provide habitat for any of the threatened flora species returned from the database searches. The derived native grassland is in relatively poor condition and is heavily disturbed so is unlikely to provide habitat for the threatened flora species returned from the database searches.

Due to historic land clearing practices, fauna habitats associated with the study area were degraded, structurally simplified, and mostly consistent with modified grassland states. The lack of structural habitat complexity and the paucity of important microhabitat features restricted the study area's ability to support an otherwise diverse fauna. Nevertheless, a thin strip of riverine woodland occurred on the banks of the Lachlan River, which provided more substantial habitat for native fauna. Although riparian vegetation associated with the Lachlan River is likely to act a movement corridor in the broader landscape, within the study area, there is limited linkages with other remnant habitats with the region heavily cleared for agriculture.

The Grey-crowned Babbler, which is listed as Vulnerable under the BC Act, was recorded adjacent to the study area during the field survey. A further 21 threatened species of animal were considered moderately likelihood to occur based on the presence of potential habitat.

The enhancement works associated with the S2P corridor have the potential to contribute to the cumulative loss of habitat. A combined total of approximately 12.9ha of native vegetation communities and habitats will be impacted by enhancement works associated with the S2P project, which equates to <0.1% of the local occurrence of mapped PCTs. A significant cumulative impact is therefore not expected.

Although efforts have been made to avoid, minimise and mitigate potential ecological impacts from the proposal, some residual impacts would occur. This biodiversity assessment identified that the proposal's impacts, both proportionally and ecologically, is not likely to have a significant impact on any threatened biodiversity listed under the BC Act or EPBC Act. Accordingly, a SIS and EPBC Act Referral are not considered a requirement for the proposal.

11 LIMITATIONS

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11.5 FIELD SURVEY LIMITATIONS

No sampling technique can eliminate the possibility that a species is present on a site. For example, some species of plant may be present in the soil seed bank and some fauna species use habitats on a sporadic or seasonal basis and may not be present on site during surveys. The conclusions in this report are based upon previous studies, data acquired for the site and the environmental field surveys and are, therefore, merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of species. Also, it should be recognised that site conditions, including the presence of threatened species, can change with time.

Given the nature and access restrictions of some sections of the study area (i.e. active rail corridor) some areas were unable to be inspected due to safety concerns and time limitations. Where access was not available biodiversity values were extrapolated from a distance with the aid of binoculars. Additionally, given time restrictions targeted threatened species surveys were not completed as part of this assessment.

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APPENDIX

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Lachlan River Bridge Modification Project

Biodiversity Assessment Report

Appendix A Threatened flora
likelihood of occurrence assessment

STOCKINBINGAL TO PARKES REVIEW OF ENVIRONMENTAL FACTORS



Table A.1 Likelihood of occurrence assessment for threatened flora species

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Androcalva procumbens</i> (syn. <i>Commersonia procumbens</i>)	–	V	V	Endemic to NSW, mainly confined to the Dubbo-Mendooran-Gilgandra region, but also in the Pilliga and Nymagee areas. Recent collections made from the Upper Hunter region, and additional populations found in Goonoo SCA in response to the 2007 fires. Grows in sandy sites, often along roadsides. Recorded in <i>Eucalyptus dealbata</i> and <i>Eucalyptus sideroxylon</i> communities, <i>Melaleuca uncinata</i> scrub, under mallee eucalypts with a <i>Calytrix tetragona</i> understorey, and in a recently burnt Ironbark and Callitris area. Also, in <i>Eucalyptus fibrosa</i> subsp. <i>nubila</i> , <i>Eucalyptus dealbata</i> , <i>Eucalyptus albens</i> and <i>Callitris glaucophylla</i> woodlands north of Dubbo. Other associated species include <i>Acacia triptera</i> , <i>Callitris endlicheri</i> , <i>Eucalyptus melliodora</i> , <i>Allocasuarina diminuta</i> , <i>Philotheca salsolifolia</i> , <i>Xanthorrhoea species</i> , <i>Exocarpos cupressiformis</i> , <i>Leptospermum parvifolium</i> and <i>Kunzea parvifolia</i> . Fruiting period is summer to autumn. Flowers from August to December. It has been recorded colonising disturbed areas such as roadsides, the edges of quarries and gravel stockpiles and a recently cleared easement under power lines.	PMST	Low. This species was not recorded in the study area during the surveys. Furthermore, this species has not been recorded in the locality and is not known to be associated with PCT 11. As such, this species is considered to have a low likelihood of occurrence in the study area.

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Austrostipa metatoris</i>	A spear-grass	V	V	A perennial spear-grass that grows in tussocks to one metre tall. Grows in sandy areas of the Murray Valley; habitats include sandhills, sandridges, undulating plains and flat open mallee country, with red to red-brown clay-loam to sandy-loam soils. Associated species include <i>Eucalyptus populnea</i> , <i>Eucalyptus intertexta</i> , <i>Callitris glaucophylla</i> , <i>Casuarina cristata</i> , <i>Santalum acuminatum</i> and <i>Dodonaea viscosa</i> . Flowers in response to rain.	PMST	Low. This species has not been recorded in the locality and is not known to be associated with PCT 11. The study area is to the east of the known distribution. <i>Austrostipa metatoris</i> is known from floodplain grasslands and transition woodland habitats on alluvial soils but is not known to be associated with <i>Eucalyptus camaldulensis</i> dominated forested wetland habitats such as PCT 11. As such, based on known habitat associations, <i>Austrostipa metatoris</i> is considered to have a low likelihood of occurrence in the study area.

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Austrostipa wakoolica</i>	A spear-grass	E	E	Confined to the floodplains of the Murray River tributaries of central-western and south-western NSW, with localities including Manna State Forest, Matong, Lake Tooim, Merran Creek, Tulla, Cunninyeuk and Mairjimmy State Forest (now part of South West Woodland Nature Reserve). Grows on floodplains of the Murray River tributaries, in open woodland on grey, silty clay or sandy loam soils; habitats include the edges of a lignum swamp with box and mallee; creek banks in grey, silty clay; mallee and lignum sandy-loam flat; open Cypress Pine forest on low sandy range; and a low, rocky rise. Associated species include <i>Callitris glaucophylla</i> , <i>Eucalyptus microcarpa</i> , <i>E. populnea</i> , <i>Austrostipa eremophila</i> , <i>A. drummondii</i> , <i>Austrodanthonia eriantha</i> and <i>Einadia nutans</i> . Flowers from October to December, mainly in response to rain. Seed dispersal is mainly by wind, rain and flood events; the awn and sharp point of the floret appear to be an adaptation for burying the seed into the soil; grass seed is traditionally believed to be viable for three to five years, so a long-lived seed bank is considered unlikely for this species. Recorded as common in the Mairjimmy State Forest population.	PMST	Low. <i>Austrostipa wakoolica</i> is known from floodplain grasslands and transition woodland habitats on alluvial soils but is not known to be associated with <i>Eucalyptus camaldulensis</i> dominated forested wetland habitats such as PCT 11. As such, based on known habitat associations, this species is considered to have a low likelihood of occurrence in the study area.
<i>Diuris tricolor</i>	Pine Donkey Orchid	V	-	The Pine Donkey Orchid is a terrestrial species (it grows from the ground rather than from rocks or vegetation). Sporadically distributed on the western slopes of NSW, extending from south of Narrandera all the way to the north of NSW. Localities in the south include Red Hill north of Narrandera, Coolamon, and several sites west of Wagga Wagga. Condobolin-Nymagee road, Wattamondara towards Cowra, Eugowra, Girilambone, Dubbo and Cooyal, in the Central West. Pilliga SCA, Pilliga National Park and Bibblewindi State Forest in the north and Muswellbrook in the east. Occurs in disturbed areas and <i>Callitris</i> pine forests.	Bionet, Plantnet	Low. <i>Diuris tricolor</i> is not known to be associated with <i>Eucalyptus camaldulensis</i> dominated forested wetland habitats as this species is found in dry sclerophyll forest, grassy woodland, semi-arid woodland, and grassland habitats. As such, based on known habitat associations, this species is considered to have a low likelihood of occurrence in the study area.

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Prasophyllum</i> sp. <i>Wybong</i> syn. <i>Prasophyllum petilum</i>	Tarengo leek-orchid	E	CE	Endemic to NSW, it is known from near Ilford, Premer, Muswellbrook, Wybong, Yeoval, Inverell, Tenterfield, Currabubula and the Pilliga area. Most populations are small, although the Wybong population contains by far the largest number of individuals. Grows in open sites within Natural Temperate Grassland at the Boorowa and Delegate sites. Also grows in grassy woodland in association with River Tussock <i>Poa labillardieri</i> , Black Gum <i>Eucalyptus aggregata</i> and tea-trees <i>Leptospermum</i> spp. near Queanbeyan and within the grassy groundlayer dominated by Kangaroo Grass under Box-Gum Woodland at Ilford (and Hall, ACT). Flowers in October at Boorowa and Ilford, and December at sites near Queanbeyan and Delegate.	PMST	Low. This species has not been recorded in the locality and is not known to be associated with PCT 11. The study area is outside of the known distribution of this species, so it is considered to have a low likelihood of occurrence.
<i>Swainsona murrayana</i>	Slender Darling-pea	V	V	Found in heavy soils and is also found on grey and red to brown clay and clay-loam soils in Bladder Saltbush, herbland, Black Box woodland and grassland communities and is frequently associated with <i>Maireana</i> species.	PMST	Low. <i>Swainsona murrayana</i> is associated with arid shrublands, dry sclerophyll forest, grassy woodland, semi-arid woodland, inland floodplain shrublands, saline wetlands, and grassland habitats and is not known to be associated with the <i>Eucalyptus camaldulensis</i> dominated forested wetland habitats such as PCT 11. As such, based on known habitat associations, this species is considered to have a low likelihood of occurrence in the study area.

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Swainsona recta</i>	Small Purple-pea	E	E	Small Purple-pea was recorded historically from places such as Carcoar, Culcairn and Wagga Wagga where it is probably now extinct. Populations still exist in the Queanbeyan and Wellington-Mudgee areas. Over 80% of the southern population grows on a railway easement. Before European settlement Small Purple-pea occurred in the grassy understorey of woodlands and open-forests dominated by Blakely's Red Gum <i>Eucalyptus blakelyi</i> , Yellow Box <i>E. melliodora</i> , Candlebark Gum <i>E. rubida</i> and Long-leaf Box <i>E. goniocalyx</i> . Grows in association with understorey dominants that include Kangaroo Grass <i>Themeda australis</i> , poa tussocks <i>Poa</i> spp. and spear-grasses <i>Austrostipa</i> spp. Plants die back in summer, surviving as a rootstock until they shoot again in autumn. Flowers throughout spring, with a peak in October.	PMST	Low. <i>Swainsona recta</i> is associated with dry sclerophyll forest, grassy woodland, grasslands, and grassy woodland habitats and is not known to be associated with the <i>Eucalyptus camaldulensis</i> dominated forested wetland habitats such as PCT 11. As such, based on known habitat associations, this species is considered to have a low likelihood of occurrence in the study area.
<i>Tylophora linearis</i>	-	V	E	Majority of records occur in the central western region. Records from Goonoo, Pillaga West, Pillaga East, Bibblewindi, Cumbil and Eura State Forests, Coolbaggie NR, Goobang NP and Beni SCA. Also has been recorded Hiawatha State Forest near West Wyalong in the south and there are old records as far north as Crow Mountain near Barraba and near Glenmorgan in the western Darling Downs. Grows in dry scrub and open forest. Recorded from low-altitude sedimentary flats in dry woodlands of <i>Eucalyptus fibrosa</i> , <i>Eucalyptus sideroxylon</i> , <i>Eucalyptus albens</i> , <i>Callitris endlicheri</i> , <i>Callitris glaucophylla</i> and <i>Allocasuarina luehmannii</i> . Also grows in association with <i>Acacia hakeoides</i> , <i>Acacia lineata</i> , <i>Melaleuca uncinata</i> , <i>Myoporum</i> species and <i>Casuarina</i> species. Flowers in spring, with flowers recorded in November or May with fruiting probably 2 to 3 months later.	PMST	Low. This species has not been recorded in the locality and is not known to be associated with PCT 11 so it is considered to have a low likelihood of occurrence.

APPENDIX

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Lachlan River Bridge Modification Project

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Appendix B Threatened fauna
likelihood of occurrence assessment

STOCKINBINGAL TO PARKES REVIEW OF ENVIRONMENTAL FACTORS



Table B.1 Likelihood of occurrence assessment for threatened fauna species

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Birds (44)						
<i>Actitis hypoleucos</i>	Common Sandpiper		M	The Common Sandpiper frequents a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity. It is mostly encountered along muddy margins or rocky shores and rarely on mudflats. It has been recorded in estuaries and deltas of streams, banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The muddy margins utilised by the species are often narrow, and may be steep. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags. Roost sites are typically on rocks or in roots or branches of vegetation, especially mangroves. The species is known to perch on posts, jetties, moored boats and other artificial structures, and to sometimes rest on mud or 'loaf' on rocks.	PMST	Low – No associated habitat within study area
<i>Anseranas semipalmata</i>	Magpie Goose	V		Common in the Australian northern tropics, but had disappeared from south-east Australia by 1920 due to drainage and overgrazing of reed swamps used for breeding. Since the 1980s there have been an increasing number of records in central and northern NSW. Vagrants can follow food sources to south-eastern NSW. Mainly found in shallow wetlands (less than 1m deep) with dense growth of rushes or sedges. Activities are centred on wetlands, mainly those on floodplains of rivers and large shallow wetlands formed by run-off; breeding can occur in both summer and winter dominated rainfall areas and is strongly influenced by water level; most breeding now occurs in monsoonal areas; nests are formed in trees over deep water; breeding is unlikely in south-eastern NSW.	Bionet	Low – marginal habitat within the study area, preferred habitat not in study area.

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Anthochaera phrygia</i>	Regent Honeyeater	CE	CE	Inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. It inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. It feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. Key eucalypt species include Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany.	PMST	Moderate – limited available habitat within the study area. Occurrences of individuals in the study area may occur during seasonal movements.
<i>Apus pacificus</i>	Fork-tailed Swift		M	Breeds in the northern hemisphere, wintering south to Australia. It is almost exclusively aerial, flying from less than 1m to at least 300m above ground. It mostly occurs over inland plains but sometimes above foothills or in coastal areas over cliffs, beaches, islands and well out to sea. It also occurs over towns and cities. It mostly occurs over dry and/or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh, grassland, spinifex sandplains, farmland and sand-dunes. It sometimes occurs above forests. It probably roosts aerially, but has occasionally been observed to land.	Bionet, PMST	Moderate – May occur in aerial habitats over the study area on a seasonal basis.

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Artamus cyanopterus cyanopterus</i>	Dusky Woodswallow	V		Dusky woodswallows are widespread in eastern, southern and south western Australia. The species occurs throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range. Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and groundcover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland.	Bionet	Moderate – potential habitat in the study area in the form of riverine woodland
<i>Botaurus poiciloptilus</i>	Australasian Bittern	E	E	Australasian Bitterns are widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (<i>Typha</i> spp.) and spikerushes (<i>Eleocharis</i> spp.). Breeding occurs in summer from October to January; nests are built in secluded places in densely vegetated wetlands on a platform of reeds.	Bionet, PMST	Low – no available habitat within the study area. Preferred habitat not in study area.
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper		M	Occurs in a variety of habitats: tidal mudflat, mangrove swamps, saltmarshes, shallow fresh, brackish, salt inland swamps and lakes; flooded and irrigated paddocks, sewage farms and commercial saltfields.	Bionet, PMST	Low – no available habitat within the study area. Preferred habitat not in study area.

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Calidris ferruginea</i>	Curlew Sandpiper	E	CE; M	Occur around the coasts and are also quite widespread inland, though in smaller numbers. Records occur in all states during the non-breeding period, and also during the breeding season when many non-breeding one-year old birds remain in Australia rather than migrating north. mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes, and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters.	PMST	Low – no available habitat within the study area. Preferred habitat not in study area.
<i>Calidris melanotos</i>	Pectoral Sandpiper		M	In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species frequents coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. It is usually found in coastal or near coastal habitat but occasionally further inland. It prefers wetlands that have open fringing mudflats and low, emergent or fringing vegetation, such as grass or samphire. It has also been recorded in swamp overgrown with lignum. They forage in shallow water or soft mud at the edge of wetlands.	PMST	Low – no available habitat within the study area. Preferred habitat not in study area.

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Chthonicola sagittata</i>	Speckled Warbler	V		The Speckled Warbler has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the Grampians. The species is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast. There has been a decline in population density throughout its range, with the decline exceeding 40% where no vegetation remnants larger than 100ha survive. Lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. The diet consists of seeds and insects, with most foraging taking place on the ground around tussocks and under bushes and trees.	Bionet	Moderate – potential habitat within the study area in the form of riverine woodland. Known to occur within the greater locality.
<i>Circus assimilis</i>	Spotted Harrier	V		Grassy open woodland, inland riparian woodland, grassland and shrub steppe. Most commonly found in native grassland but also in agricultural areas.	Professional opinion	Moderate – potential foraging habitat within the study area in the form of native grasslands, riverine woodland and agricultural land.

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (eastern subspecies)	V		The Brown Treecreeper is endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. It is less commonly found on coastal plains and ranges. Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (<i>Eucalyptus camaldulensis</i>) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains. Sedentary, considered to be resident in many locations throughout its range; present in all seasons or year-round at many sites; territorial year-round, though some birds may disperse locally after breeding.	Bionet	Moderate – potential habitat within the study area in the form of riverine woodland. Known to occur within the greater locality.
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V		The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. Feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees and small branches and twigs in the tree canopy.	Bionet	Moderate – potential habitat within the study area in the form of riverine woodland. Known to occur within the greater locality.

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Epthianura albifrons</i>	White-fronted Chat	V		The White-fronted Chat is found across the southern half of Australia, from southernmost Queensland to southern Tasmania, and across to Western Australia as far north as Carnarvon. Found mostly in temperate to arid climates and very rarely sub-tropical areas, it occupies foothills and lowlands up to 1000m above sea level. In NSW, it occurs mostly in the southern half of the state, in damp open habitats along the coast, and near waterways in the western part of the state. Along the coastline, it is found predominantly in saltmarsh vegetation but also in open grasslands and sometimes in low shrubs bordering wetland areas.	Bionet	Low – no preferred habitat within the study area.
<i>Falco hypoleucos</i>	Grey Falcon	E	V	Sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. The breeding range has contracted since the 1950s with most breeding now confined to arid parts of the range. There are possibly less than 5000 individuals left. Population trends are unclear, though it is believed to be extinct in areas with more than 500 mm rainfall in NSW. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey.	PMST	Low – Marginal habitat in study area. Irregular occurrences of individuals may occur whilst foraging in greater locality.

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Falco subniger</i>	Black Falcon	V		Widely, but sparsely, distributed in New South Wales, mostly occurring woodland, shrubland and grassland in the arid and semi-arid zones, especially wooded watercourses and agricultural land with scattered remnant trees. It is usually associated with streams or wetlands, visiting them in search of prey and often using standing dead trees as lookout posts. Habitat selection is generally influenced more by prey densities than by specific aspects of habitat floristics or condition, although in agricultural landscapes it tends to nest in healthy, riparian woodland remnants with a diverse avi-fauna.	Bionet	Moderate – potential foraging habitat within the study area. Occurrences of individuals may occur whilst foraging in greater locality.
<i>Gallinago hardwickii</i>	Latham's Snipe		M	Occurs in freshwater or brackish wetlands generally near protective vegetation cover. This species feeds on small invertebrates, seeds and vegetation. It migrates to the northern hemisphere to breed.	PMST	Low – no available habitat within the study area.
<i>Gelochelidon nilotica</i>	Gull-billed Tern		M	Gull-billed Terns are found in freshwater swamps, brackish and salt lakes, beaches and estuarine mudflats, floodwaters, sewage farms, irrigated croplands and grasslands. They are only rarely found over the ocean.	Bionet	Low – no preferred habitat within the study area.
<i>Grantiella picta</i>	Painted Honeyeater	V	V	The Painted Honeyeater is nomadic and occurs at low densities throughout its range. The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. Inhabits Boree/ Weeping Myall (<i>Acacia pendula</i>), Brigalow (<i>A. harpophylla</i>) and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus <i>Amyema</i> . Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.	PMST	Low – limited available habitat within the study area. Lack of high densities of preferred foraging resources (mistletoes).

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	V	Ma	The White-bellied Sea-eagle is distributed around the Australian coastline, including Tasmania, and well inland along rivers and wetlands of the Murray Darling Basin. In New South Wales it is widespread along the east coast, and along all major inland rivers and waterways. Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts'. Feed mainly on fish and freshwater turtles, but also waterbirds, reptiles, mammals and carrion.	Bionet, PMST	Moderate – potential habitat within the study area in the form of Lachlan River and riparian areas.
<i>Hieraaetus morphnoides</i>	Little Eagle	V		The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. Preys on birds, reptiles and mammals, occasionally adding large insects and carrion.	Bionet	Moderate – potential foraging habitat within the study area in the form of native grasslands, riverine woodland and agricultural land.

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Hirundapus caudacutus</i>	White-throated Needletail		V; M	Widespread in eastern and south-eastern Australia. In eastern Australia, it is recorded in all coastal regions of Queensland and NSW, extending inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. It is almost exclusively aerial, from heights of less than 1m up to more than 1000m above the ground. Because they are aerial, it has been stated that conventional habitat descriptions are inapplicable, but there are, nevertheless, certain preferences exhibited by the species. Although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. They also commonly occur over heathland, but less often over treeless areas, such as grassland or swamps. When flying above farmland, they are more often recorded above partly cleared pasture, plantations or remnant vegetation at the edge of paddocks. In coastal areas, they are sometimes seen flying over sandy beaches or mudflats and often around coastal cliffs and other areas with prominent updraughts, such as ridges and sand-dunes.	PMST	Moderate – although local records are sparse, due to wide ranging habitats may occur in aerial habitats over the study area on a seasonal basis.
<i>Hydroprogne caspia</i>	Caspian Tern		M	The Caspian Tern is found in sheltered coastal embayments preferring sandy or muddy margins. Also found in near-coastal or inland terrestrial wetlands. It forages in open wetlands, preferring sheltered shallow water near the margins. It usually breeds in low islands, cays, spits, banks, ridges, beaches of sand or shell, terrestrial wetlands and stony or rocky islets or banks and occasionally among beach-cast debris above the high-water mark or at artificial sites, including islands in reservoirs, or on dredge-spoil. Generally roosting occurs on bare exposed sand or shell spits, banks or shores.	Bionet	Low – no preferred habitat within the study area.

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Lathamus discolor</i>	Swift Parrot	E	CE	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany <i>Eucalyptus robusta</i> , Spotted Gum <i>Corymbia maculata</i> , Red Bloodwood <i>C. gummifera</i> , Mugga Ironbark <i>E. sideroxylon</i> , and White Box <i>E. albens</i> . Commonly used lerp infested trees include Inland Grey Box <i>E. microcarpa</i> , Grey Box <i>E. moluccana</i> and Blackbutt <i>E. pilularis</i> .	PMST	Moderate – limited available habitat within the study area. Occurrences of individuals in the study area may occur during seasonal movements.
<i>Leipoa ocellata</i>	Malleefowl	E	V; M	The stronghold for this species in NSW is the mallee in the south west centred on Mallee Cliffs NP and extending east to near Balranald and scattered records as far north as Mungo NP. West of the Darling River a population also occurs in the Scotia mallee including Tarawi NR and Scotia Sanctuary, and is part of a larger population north of the Murray River in South Australia. Predominantly inhabit mallee communities, preferring the tall, dense and floristically-rich mallee found in higher rainfall (300–450mm mean annual rainfall) areas. Utilises mallee with a spinifex understorey, but usually at lower densities than in areas with a shrub understorey. Less frequently found in other eucalypt woodlands, such as Inland Grey Box, Ironbark or Bimble Box Woodlands with thick understorey, or in other woodlands such dominated by Mulga or native Cypress Pine species. Prefers areas of light sandy to sandy loam soils and habitats with a dense but discontinuous canopy and dense and diverse shrub and herb layers.	PMST	Low – no available habitat within the study area.

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Melanodryas cucullata cucullata</i>	Hooded Robin (South-Eastern)	V		Found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. However, it is common in few places, and rarely found on the coast. It is considered a sedentary species, but local seasonal movements are possible. The south-eastern form (subspecies <i>cucullata</i>) is found from Brisbane to Adelaide and throughout much of inland NSW, with the exception of the extreme north-west, where it is replaced by subspecies <i>picata</i> . Two other subspecies occur outside NSW. Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	Bionet	Low – marginal available habitat within the study area. Rare occurrences of individuals during seasonal movements may occur.
<i>Motacilla flava</i>	Yellow Wagtail		M	This species occurs in a range of habitats including estuarine habitats such as sand dunes, mangrove forests and coastal saltmarshes. This species also occurs in open grassy areas including disturbed sites such as sports grounds and has been recorded on the edges of wetlands, swamps, lakes and farm dams. This species migrates from Asia to Australia in spring-summer. It has been recorded in the estuarine areas of the Hunter River in Newcastle NSW and in QLD and the north of NT and WA.	PMST	Low – marginal available habitat within the study area. Rare occurrences of individuals during seasonal movements may occur.

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Myiagra cyanoleuca</i>	Satin Flycatcher		M	Widespread in eastern Australia. In Queensland, it is widespread but scattered in the east. In NSW, they are widespread on and east of the Great Divide and sparsely scattered on the western slopes, with very occasional records on the western plains. In Victoria, the species is widespread in the south and east, in the area south of a line joining Numurkah, Maldon, the northern Grampians, Balmoral and Nelson. Inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests. Satin Flycatchers mainly inhabit eucalypt forests, often near wetlands or watercourses. They generally occur in moister, taller forests, often occurring in gullies. They also occur in eucalypt woodlands with open understorey and grass ground cover, and are generally absent from rainforest. In south-eastern Australia, they occur at elevations of up to 1400m above sea level, and in the ACT, they occur mainly between 800m above sea level and the treeline.	PMST	Low – no available habitat within the study area. Irregular occurrences of individuals during seasonal movements may occur.
<i>Numenius madagascariensis</i>	Eastern Curlew		CE; M	Inhabits coastal estuaries, mangroves, mud flats and sand pits. It is a migratory shorebird which generally inhabits sea and lake shore mud flats, deltas and similar areas, where it forages for crabs and other crustaceans, clam worms and other annelids, molluscs, insects and other invertebrates. Its migration route ranges from its wintering grounds in Australia to its breeding grounds in northern China, Korea and Russia.	PMST	Low – no available habitat within the study area.

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Oxyura australis</i>	Blue-billed Duck	V		The Blue-billed Duck is endemic to south-eastern and south-western Australia. It is widespread in NSW, but most common in the southern Murray-Darling Basin area. Birds disperse during the breeding season to deep swamps up to 300km away. It is generally only during summer or in drier years that they are seen in coastal areas. Prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation. The species is completely aquatic, swimming low in the water along the edge of dense cover.	Bionet	Low – lack of preferred habitat in the form of waterbodies (swamps/wetlands) with dense aquatic vegetation for cover.
<i>Pandion cristatus</i> (syn. <i>P. haliaetus</i>)	Eastern Osprey	V	M	Eastern Ospreys are found right around the Australian coast line, except for Victoria and Tasmania. They are common around the northern coast, especially on rocky shorelines, islands and reefs. The species is uncommon to rare or absent from closely settled parts of south-eastern Australia. There are a handful of records from inland areas. Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water.	PMST	Low – marginal habitat within the study area. Rare occurrences in locality may occur.

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Polytelis swainsonii</i>	Superb Parrot	V	V	Found throughout eastern inland NSW. On the South-western Slopes their core breeding area is roughly bounded by Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west. Birds breeding in this region are mainly absent during winter, when they migrate north to the region of the upper Namoi and Gwydir Rivers. The other main breeding sites are in the Riverina along the corridors of the Murray, Edward and Murrumbidgee Rivers where birds are present all year round. Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest. In the Riverina the birds nest in the hollows of large trees (dead or alive) mainly in tall riparian River Red Gum Forest or Woodland. On the South West Slopes nest trees can be in open Box-Gum Woodland or isolated paddock trees. Tree species known to be used are Blakely's Red Gum, Yellow Box, Apple Box and Red Box. Feed in trees and understorey shrubs and on the ground and their diet consists mainly of grass seeds and herbaceous plants. Also eaten are fruits, berries, nectar, buds, flowers, insects and grain.	Bionet, PMST	High – potential habitat within the study area. Presence of remnant riverine woodland. May occur in study area and utilise surrounding Red Gum community for hollow-bearing trees.

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Pomatostomus temporalis temporalis</i>	Grey-Crowned Babbler (Eastern subspecies)	V		The eastern form of the species formerly ranged throughout eastern Australia from South Australia, through Victoria and broadly through NSW and central Queensland but is now extinct in South Australia, coastal Victoria and the ACT. In NSW, it occurs on the western slopes and plains but is less common at the higher altitudes of the tablelands. Isolated populations are known from coastal woodlands on the North Coast, in the Hunter Valley and from the South Coast near Nowra. Grey-crowned Babblers occupy open woodlands dominated by mature eucalypts, with regenerating trees, tall shrubs, and an intact ground cover of grass and forbs. The species builds conspicuous dome-shaped nests and breeds co-operatively in sedentary family groups of 2-13. Grey-crowned Babblers are insectivorous and forage in leaf litter and on bark of trees.	Bionet	Recorded – riverine woodland habitat immediately adjacent to study area
<i>Rhipidura rufifrons</i>	Rufous Fantail		M	Occurs in a range of habitats including the undergrowth of rainforests/wetter eucalypt forests/gullies, monsoon forests paperbarks, sub-inland and coastal scrubs, mangroves, watercourses, parks and gardens. When migrating they may also be recorded on farms, streets and buildings. Migrates to SE Australia in October-April to breed, mostly in or on the coastal side of the Great Dividing Range.	PMST	Low – no available habitat within the study area. Irregular occurrences of individuals during seasonal movements may occur.

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Rostratula australis</i> (<i>syn. R. benghalensis</i>)	Australian Painted Snipe (Painted Snipe)	E1	E	The Australian Painted Snipe is restricted to Australia. Most records are from the south east, particularly the Murray Darling Basin, with scattered records across northern Australia and historical records from around the Perth region in Western Australia. In NSW many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella. Other important locations with recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds.	PMST, Bionet	Low – no available habitat within the study area.
<i>Stagonopleura guttata</i>	Diamond Firetail	V		Distributed through central and eastern NSW, extending north into southern and central Queensland and south through Victoria to the Eyre Peninsula, South Australia. In NSW, the species occurs predominantly west of the Great Dividing Range, although populations are known from drier coastal areas. Occurs in a range of eucalypt dominated communities with a grassy understorey including woodland, forest and mallee. Most populations occur on the inland slopes of the dividing range. Firetails nest in trees and bushes, and forage on the ground, largely for grass seeds and other plant material, but also for insects.	Bionet	Moderate – potential habitat within the study area in the form of open woodland.

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Stictonetta naevosa</i>	Freckled Duck	V		Found primarily in south-eastern and south-western Australia, occurring as a vagrant elsewhere. It breeds in large temporary swamps created by floods in the Bulloo and Lake Eyre basins and the Murray-Darling system, particularly along the Paroo and Lachlan Rivers, and other rivers within the Riverina. The duck is forced to disperse during extensive inland droughts when wetlands in the Murray River basin provide important habitat. The species may also occur as far as coastal NSW and Victoria during such times. Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds.	Bionet	Low – no available habitat within the study area.
<i>Tringa glareola</i>	Wood Sandpiper		M	In Australia the Wood Sandpiper shuns coastal mudflats, instead occurring in shallow, freshwater wetlands, usually where there is grass or aquatic plants protruding above the water, and often with trees and much fallen timber.	Bionet, PMST	Low – no available habitat within the study area.
<i>Tringa nebularia</i>	Common Greenshank		M	Occurs in a range of inland and coastal environments. Inland, it occurs in both permanent and temporary wetlands, billabongs, swamps, lakes floodplains, sewage farms, saltworks ponds, flooded irrigated crops. On the coast, it occurs in sheltered estuaries and bays with extensive mudflats, mangrove swamps, muddy shallows of harbours and lagoons, occasionally rocky tidal ledges. It generally prefers wet and flooded mud and clay rather than sand.	Bionet, PMST	Low – no available habitat within the study area.
<i>Tringa stagnatilis</i>	Marsh Sandpiper		M	Occurs in coastal and inland wetlands (salt or fresh water), estuarine and mangrove mudflats, beaches, shallow or swamps, lakes, billabongs, temporary floodwaters, sewage farms and saltworks ponds.	Bionet, PMST	Low – no available habitat within the study area.

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Fish (9)						
<i>Maccullochella macquariensis</i>	Trout Cod	E1	E	Trout Cod occur in the cooler upper reaches of the Murray river, specifically between Yarrowonga Weir and Strathmerton. Piles of large woody debris known as 'snags', that occur in relatively deep, flowing water, are favoured habitats for Trout Cod.	PMST DPI Spatial Viewer ALA Dataset	Low – the proposal study area and locality are outside of the known distribution of this species
<i>Maccullochella peelii</i>	Murray Cod		V	The Murray Cod was historically distributed throughout the Murray-Darling Basin (the Basin), which extends from southern Queensland, through New South Wales (NSW), the Australian Capital Territory (ACT) and Victoria to South Australia, with the exception of the upper reaches of some tributaries. The species still occurs in most parts of this natural distribution, up to approximately 1000m above sea level. It utilises a diverse range of habitats from clear rocky streams, such as those found in the upper western slopes of NSW (including the ACT), to slow-flowing, turbid lowland rivers and billabongs. Preferred microhabitat consists of complex structural features in streams such as large rocks, snags (pieces of large submerged woody debris), overhanging stream banks and vegetation, tree stumps, logs, branches and other woody structures.	PMST SPRAT distribution map ALA Dataset	Low – the proposal study area and locality are outside of the known distribution of this species. ALA database records of this species are mainly from the Murray River in Victoria with some records to the north west of Wagga Wagga in the Murrumbidgee River

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Macquaria australasica</i>	Macquarie Perch	E	E	Macquarie Perch are found in the Murray-Darling Basin (particularly upstream reaches) of the Lachlan, Murrumbidgee and Murray rivers, and parts of south-eastern coastal NSW, including the Hawkesbury/Nepean and Shoalhaven catchments. Macquarie Perch are found in both river and lake habitats; especially the upper reaches of rivers and their tributaries. It prefers clear water and deep, rocky holes with lots of cover. As well as aquatic vegetation, additional cover may comprise of large boulders, debris and overhanging banks. Spawning occurs just above riffles (shallow running water).	PMST DPI Spatial Viewer ALA Dataset	Low – the known distribution of this species is within the locality but is 100km to the east and outside of the study area. ALA dataset has no records in the past 100 years within the study area or locality
<i>Bidyanus bidyanus</i>	Silver Perch	V	CE	The most abundant remaining natural population occurs in the central Murray River downstream of Yarrawonga Weir as well as several of its anabranches and tributaries. The central Murray population is considered secure and self-sustaining. There have also been reports of self-sustaining populations in other rivers, including the MacIntyre and Macquarie Rivers in northern NSW and the Warrego River in Queensland, mostly from recreational anglers. It prefers fast-flowing waters but is also known from rivers, lakes and reservoirs.	DPI Spatial Viewer ALA Dataset	Moderate – potential habitat within the study area (Lachlan River).
<i>Ambassis agassizi</i>	Olive Perchlet	E2		The population is now found in limited sites in the Darling River drainage and an isolated population in the central Lachlan catchment. Inhabit rivers, creeks, ponds and swamps. They are usually found in slow flowing or still waters. Prefers sheltered areas such as overhanging vegetation, aquatic macrophyte beds, logs, dead branches and boulders during the day, and disperse to feed during the night.	DPI Spatial Viewer ALA Dataset	Moderate – potential habitat within the study area (Lachlan River).

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Tandanus tandanus</i>	Eel Tail Catfish	E2		Eel Tailed Catfish are naturally distributed throughout the Murray-Darling Basin and in the Eastern drainages NSW north of Newcastle. Occupies a wide range of habitats including rivers, creeks, lakes, billabongs and lagoons. It inhabits flowing streams but prefers slow and still waters and can be found in clear or turbid water over substrates including mud, gravel and rock.	DPI Spatial Viewer ALA Dataset	Moderate – potential habitat within the study area (Lachlan River).
<i>Galaxias rostratus</i>	Flathead Galaxias	CE	CE	Flathead Galaxias are found in still or slow moving water bodies such as wetlands and lowland streams. The species has been recorded forming shoals. They have been associated with a range of habitats including rock and sandy bottoms and aquatic vegetation. The last record in the Murrumbidgee River was in 1971, and it is thought that the species may be locally extinct from the lower Murray, Murrumbidgee, Macquarie and Lachlan Rivers. In addition, only very small numbers of specimens have been sampled from wetlands of the Murray River floodplain between Hume Dam and Lake Mulwala and the upper Murray River near Tintaldra.	DPI Spatial Viewer ALA Dataset	Moderate – potential habitat within the study area (Lachlan River).
<i>Mogurnda adspersa</i>	Southern Purple Spotted Gudgeon	E		Southern Purple Spotted Gudgeon are a benthic species that can be found in a variety of habitat types such as rivers, creeks and billabongs with slow-moving or still waters or in streams with low turbidity. Cover in the form of aquatic vegetation, overhanging vegetation from river banks, leaf litter, rocks or snags are important for the species. Most remnant populations in NSW occur in small to medium sized streams. They feed mainly on terrestrial insects and their larvae, worms, small fish, tadpoles, and some plant matter. Eggs are deposited in clusters on solid objects such as rocks, wood or broadleafed plants.	DPI Spatial Viewer ALA Dataset	Moderate – potential habitat within the study area (Lachlan River) however more likely to occur in associated tributaries.

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Nannoperca australis</i>	Southern Pygmy Perch	E	V	The Southern Pygmy Perch is found in well vegetated, slow-flowing or still waters including streams, lakes, billabongs and other types of wetlands. The species is carnivorous, feeding on a range of aquatic crustaceans and insects. Breeding occurs from late winter to early spring in response to rising water temperatures. Each female can produce up to 4000 small, transparent, non-adhesive eggs which are scattered over vegetation or rocks on the bottom.	DPI Spatial Viewer ALA Dataset	Low – the known distribution of this species is within the locality but is 100km to the east and outside of the study area. ALA dataset has no records in the past 100 years within the study area or locality
Mammals (6)						
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat	V	V	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (<i>Petrochelidon ariel</i>), frequenting low to mid-elevation dry open forest and woodland close to these features. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in sandstone caves and overhangs. They remain loyal to the same cave over many years. Found in well-timbered areas containing gullies.	PMST	Low – marginal foraging habitat within the study area. Lack of important breeding habitat (i.e. caves).

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Dasyurus maculatus maculatus</i>	Spotted-Tailed Quoll (Southern Subspecies)	V	E	Found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania. Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. Females occupy home ranges up to about 750 hectares and males up to 3500 hectares. Are known to traverse their home ranges along densely vegetated creeklines.	Bionet, PMST	Low – marginal foraging habitat within the study area. Lack of extensive vegetation tracts and microhabitats to persist in study area.
<i>Nyctophilus corbeni</i>	Corben's Long-eared Bat	V	V	Overall, the distribution of the south eastern form coincides approximately with the Murray Darling Basin with the Pilliga Scrub region being the distinct stronghold for this species. Inhabits a variety of vegetation types, including mallee, bullock (<i>Allocasuarina leuhmanni</i>) and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. Roosts in tree hollows, crevices, and under loose bark.	PMST	Low – No preferred habitat available in the study area. May occur in greater locality.
<i>Myotis macropus</i>	Southern Myotis	V		The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. They generally roost in groups of 10–15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, road culverts, buildings, under bridges and in dense foliage.	Professional opinion	Moderate – potential habitat in the study area in the form of riparian areas along the Lachlan River.
<i>Petaurus norfolcensis</i>	Squirrel Glider	V		The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey.	Professional opinion	Moderate – potential habitat in the study area in the form of riparian areas (PCT 11) along the Lachlan River.

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
<i>Phascolarctos cinereus</i>	Koala	V	V	The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. It was briefly historically abundant in the 1890s in the Bega District on the south coast of NSW, although not elsewhere, but it now occurs in sparse and possibly disjunct populations. Koalas are also known from several sites on the southern tablelands. Inhabit eucalypt woodlands and forests. Feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. Some preferred species include Forest Red Gum, Grey Gum. In coastal areas, Tallowwood and Swamp Mahogany are important food species, while in inland areas White Box, Bimble Box and River Red Gum are favoured. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.	PMST	Moderate – potential habitat available in the study area in the form of PCT 11.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	V	V	Grey-headed Flying-foxes are generally found within 200km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. Can travel up to 50km from the camp to forage; commuting distances are more often <20km. Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines.	PMST	Moderate – potential habitat in the study area in the form of riparian areas (PCT 11) along the Lachlan River.

SCIENTIFIC NAME	COMMON NAME	BC/ FM ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Reptiles (1)						
<i>Aprasia parapulchella</i>	Pink-tailed Worm Lizard	V	V	This lizard is known from four sites in eastern Australia: near Canberra in the ACT, Tarcutta and Bathurst in NSW, and near Bendigo in Vic. In general, lizards occur in open grassland habitats that have a substantial cover of small rocks. Lizards also show a preference for sunny aspects, avoiding S facing slopes. Some specimens have been collected from grassland sites that appear not to support any native grasses and several animals have been found on the edge of <i>Callitris enlicheri</i> woodland and <i>Eucalyptus macrorhyncha</i> woodland. A burrowing species, it is usually found under rocks on well-drained soil and in ant nests, occasionally with several individuals found under the same rock.	PMST	Low – no available habitat within the study area. Lack of important microhabitat (i.e. native grassland with friable rocky habitat)

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Appendix C BAM plot floristic data

STOCKINBINGAL TO PARKES REVIEW OF ENVIRONMENTAL FACTORS



			Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	High Threat
Plot name: River Red 1			# spp	Count	Count	Count	Count	Count	Count	Count	Count	Count
Date: 29/01/2021			19	6	1	0	4	1	0	0	13	2
Species	Cover	Abundance	Sum cover	Cover	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum
			33.5	31.4	30	0	1.2	0.2	0	0	2.1	0.5
<i>Eucalyptus camaldulensis</i>	30	7	TG		30							
<i>Acer negundo</i>	0.2	1	HT									0.2
<i>Heliotropium amplexicaule</i>	0.3	10	HT									0.3
<i>Panicum effusum</i>	0.5	50	GG				0.5					
<i>Paspalum constrictum</i>	0.3	20	GG				0.3					
<i>Cynodon dactylon</i>	0.3	20	GG				0.3					
<i>Eriochloa pseudoacrotricha</i>	0.1	2	GG				0.1					
<i>Persicaria sp.</i>	0.2	2	FG					0.2				
<i>Celtis australis</i>	0.2	2	EX								0.2	
<i>Lactuca serriola</i>	0.1	5	EX								0.1	
<i>Phoenix canariensis</i>	0.2	3	EX								0.2	
<i>Solanum nigrum</i>	0.1	2	EX								0.1	
<i>Modiola caroliniana</i>	0.1	5	EX								0.1	
<i>Verbena bonariensis</i>	0.1	5	EX								0.1	
<i>Malva parviflora</i>	0.1	2	EX								0.1	
<i>Avena sp.</i>	0.1	10	EX								0.1	
<i>Oxalis sp. exotic</i>	0.1	1	EX								0.1	
<i>Echium plantagineum</i>	0.1	2	EX								0.1	
<i>Echinochloa colona</i>	0.4	20	EX								0.4	

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Appendix D Recorded fauna species

STOCKINBINGAL TO PARKES REVIEW OF ENVIRONMENTAL FACTORS



Table D.1 Recorded fauna

SCIENTIFIC NAME	COMMON NAME	NATIVE (N) / INTRODUCED (I)	BC ACT	EPBC ACT
Amphibians (2)				
<i>Crinia parinsignifera</i>	Eastern Sign-bearing Froglet	N		
<i>Limnodynastes tasmanensis</i>	Spotted Marsh Frog	N		
Birds (29)				
<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	N		
<i>Anas superciliosa</i>	Pacific Black Duck	N		
<i>Anthochaera carunculata</i>	Red Wattlebird	N		
<i>Artamus leucorhynchus</i>	White-breasted Woodswallow	N		
<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	N		
<i>Cacatua sanguinea</i>	Little Corella	N		
<i>Colluricincla harmonica</i>	Grey Shrike-thrush	N		
<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike	N		
<i>Corcorax melanorhamphos</i>	White-winged Chough	N		
<i>Dacelo novaeguineae</i>	Laughing Kookaburra	N		
<i>Entomyzon cyanotis</i>	Blue-faced Honeyeater	N		
<i>Eolophus roseicapillus</i>	Galah	N		
<i>Grallina cyanoleuca</i>	Magpie-lark	N		
<i>Hirundo neoxena</i>	Welcome Swallow	N		
<i>Lichenostomus chrysops</i>	Yellow-faced Honeyeater	N		
<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater	N		
<i>Malurus cyaneus</i>	Superb Fairy-wren	N		
<i>Manorina melanocephala</i>	Noisy Miner	N		
<i>Neochmia temporalis</i>	Red-browed Finch	N		
<i>Ninox novaeseelandiae</i>	Southern Boobook	N		
<i>Passer domesticus</i>	House Sparrow	I		
<i>Philemon citreogularis</i>	Little Friarbird	N		
<i>Platycercus eximius</i>	Eastern Rosella	N		
<i>Pomatostomus temporalis</i>	Grey-crowned Babbler	N	V	
<i>Strepera graculina</i>	Pied Currawong	N		
<i>Taeniopygia bichenovii</i>	Double-barred Finch	N		
<i>Todiramphus sanctus</i>	Sacred Kingfisher	N		

SCIENTIFIC NAME	COMMON NAME	NATIVE (N) / INTRODUCED (I)	BC ACT	EPBC ACT
<i>Turdus merula</i>	Common Blackbird	I		
<i>Zosterops lateralis</i>	Silvereye	N		
Mammals (2)				
<i>Ozimops petersi</i>	Inland Free-tailed Bat	N		
<i>Trichosurus vulpecula</i>	Common Brush-tail Possum	N		

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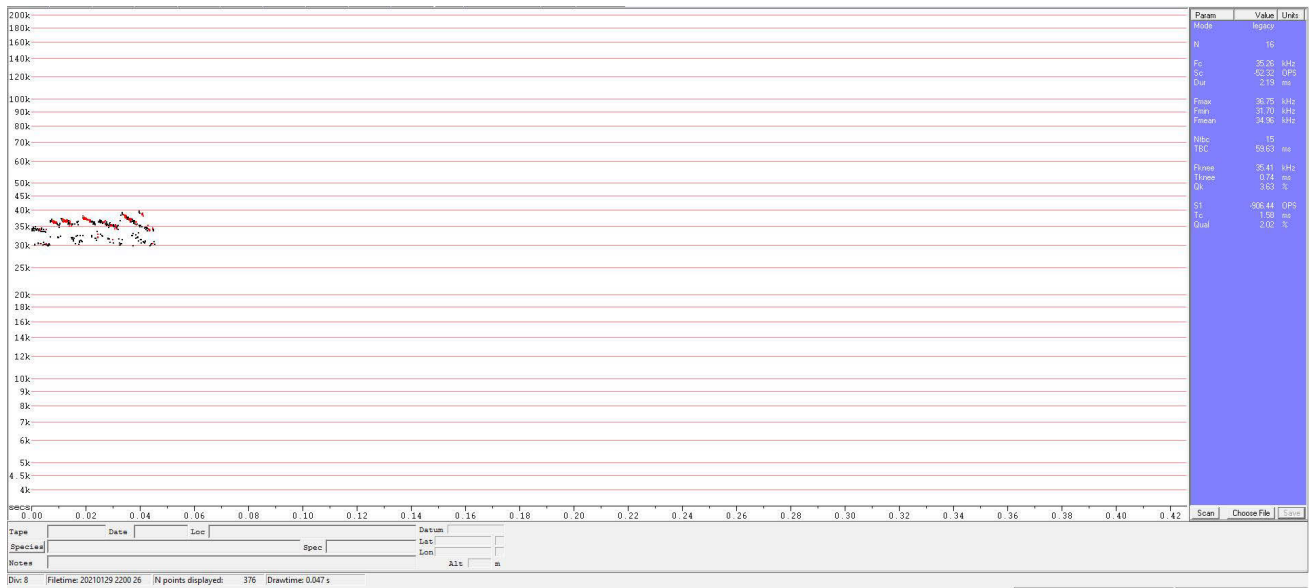
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Appendix E Bat call sonograms

STOCKINBINGAL TO PARKES REVIEW OF ENVIRONMENTAL FACTORS





An example of Inland Free-tailed Bat (*Ozimops petersi*) recorded from the study area

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Appendix F Assessments of significance

STOCKINBINGAL TO PARKES REVIEW OF ENVIRONMENTAL FACTORS



F1 BC ACT ASSESSMENT OF SIGNIFICANCE

The proposed works would be assessed under Part 5 of the EP&A Act. As such, Section 7.3 of the BC Act outlines the ‘test of significance’ that is to be undertaken to assess the likelihood of significant impact upon threatened species or ecological communities listed under the BC Act. Assessments of significance have been completed for the following threatened species listed under the BC Act:

- Woodland birds (Dusky Woodswallow, Speckled Warbler, Brown Treecreeper, Varied Sittella, Grey-crowned Babbler, Diamond Firetail, and Superb Parrot)
- Bird of prey (Spotted Harrier, Black Falcon, Little Eagle, White-bellied Sea-eagle)
- Blossom Nomads (Regent Honeyeater, Swift Parrot & Grey-headed Flying-fox)
- Arboreal mammals (Koala & Squirrel Glider)
- Southern Myotis.

F1.1 WOODLAND BIRDS

Threatened woodland birds have been grouped for assessment owing to a broad overlap in ecology and habitat preferences, and potential impacts as result of the proposal. Threatened woodland birds for this impact assessment include:

- Dusky Woodswallow (*Artamus cyanopterus*)
- Speckled Warbler (*Chthonicola sagittata*)
- Brown Treecreeper (eastern subspecies) (*Climacteris picumnus victoriae*)
- Varied Sittella (*Daphoenositta chrysoptera*)
- Grey-Crowned Babbler (eastern subspecies) (*Pomatostomus temporalis temporalis*)
- Diamond Firetail (*Stagonopleura guttata*).

All the above-mentioned species are listed as Vulnerable under the BC Act.

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

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

Threatened woodland birds are currently known by the observation of Grey-crowned Babbler immediately adjacent to the study area during the field survey informing this report. As the site investigation was relatively short in nature and threatened woodland birds are not always easily detectable, this assessment is therefore based on the presence of potentially suitable habitat for the remaining threatened woodland birds. The proposal would impact on <0.1ha of known and potential habitat in the form of PCT 11 (poor condition) of which the impact would also include the trimming of trees along the bank of the Lachlan River to enable movement of the crane arm. Threatened woodland birds using the study area are likely to be part of a viable population that extends through the locality and are likely to present in other parts of the locality as there is a large amount (~840ha) of potentially suitable habitat in the form of PCT 11 mapped as occurring in the locality. The proportional impact to this potential habitat is very small as outlined in the main report. Due to the narrow linear impact expected within an existing highly disturbed rail corridor, it is considered unlikely that local population of threatened woodland birds would be restricted to the study area and the proposal is not likely to have an adverse effect on the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

2 in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity—

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable.

3 in relation to the habitat of a threatened species or ecological community—

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

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

It is estimated that proposal would impact on <0.1ha of known and potential threatened woodland bird habitat in the form of PCT 11 (poor condition) of which the impact would also include the trimming of trees along the bank of the Lachlan River to enable movement of the crane arm.

Habitat in the study area is already fragmented at a local scale by the rail line, adjacent roads, and agricultural use. Landscape scale fragmentation is unlikely to occur from the proposal as the work would involve removing vegetation from patch edges rather than breaking apart of large blocks of vegetation into many smaller patches. Importantly, the proposal would not result in the breaking apart of large blocks of high-quality habitats. No further habitat fragmentation on a landscape scale would occur because of the proposal. The proposal will impact <0.1ha linear habitat in an existing disturbed rail corridor, the quality and importance of which is not considered to be significant to the long-term survival of any local population of threatened woodland birds.

Using the Grey-crowned Babbler as a case study, the study area occurred in a priority management area that is mapped between Young in the south and Parkes in the north. A total of six priority management areas have been mapped in NSW, broadly including the Hunter Valley, far North Coast, Pilliga forests, Dubbo and south-western NSW between Wagga Wagga and Balranald. However, known and potential habitat in the study area is not considered important to the long-term survival of these species. The proposal will impact <0.1ha of narrow and linear habitat in an existing highly disturbed rail corridor, the quality and importance of which is not considered to be significant to the long-term survival of any local population of threatened woodland bird.

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

The proposal is not likely to impact on any declared area of outstanding biodiversity value.

5 whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

A KTP is a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, population or ecological community. Key threatening processes are listed under the BC Act and at the present there are currently 38 listed KTPs. With respect to threatened woodland birds, the proposal is consistent with three KTPs; being clearing of native vegetation, removal of dead wood and dead trees and potentially loss of hollow-bearing trees. The extent of native vegetation clearing and habitat removal associated with the proposal is relatively small and considered negligible in terms of the available habitat for these species within the proposal locality.

Conclusion

In summary, the proposal is considered unlikely to result in a significant effect on threatened woodland birds. Approximately <0.1ha of known and potential habitat would be affected by the proposal, as well as the trimming of some canopy trees on the bank of the Lachlan River to enable movement of the crane arm. Threatened woodland birds using the study area are likely to be part of a viable population that extends through the locality and due to the narrow and linear impact expected within an existing highly disturbed rail corridor, it is considered unlikely that local population of threatened woodland birds would be restricted to the study area. Given the extent of potentially suitable habitat that exists in the locality and the very small proportional impact likely to occur from the proposal, potential impacts to threatened woodland birds are unlikely to be significant.

F1.2 BIRDS OF PREY

Threatened birds of prey have been grouped for assessment owing to family similarities and overlap in ecology and habitat preferences, and potential impacts as result of the proposal. Threatened birds of prey for the impact assessment are:

- Spotted Harrier (*Circus assimilis*)
- Black Falcon (*Falco subniger*)
- Little Eagle (*Hieraaetus morphnoides*)
- White-bellied Sea-eagle (*Haliaeetus leucogaster*).

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

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

Threatened birds of prey were not recorded in the study area during surveys and therefore, this assessment is based on the presence of potentially suitable habitat. The proposal would impact approximately 0.1ha of known and potential habitat in the form of PCT 11 (poor condition and derived native grassland) of which the impact would also include the trimming of trees on the bank of the Lachlan River to enable crane arm movement. Due to the mobility and large home range of these species and the general narrow and linear impact associated with the proposal, any identified population of threatened birds of prey would not be restricted to habitat within the study area. Threatened birds of prey using the study area are likely to be part of a viable population that extends through the proposal locality and are likely to be present in other parts of the locality as there is a large amount (~840ha) of potentially suitable habitat in the form of PCT 11 mapped as occurring in the locality. For some species, such as the Little Eagle, the viable population includes all individuals occurring in NSW. Due to the narrow and linear impact expected within an existing highly disturbed rail corridor, the proposal is not likely to have an adverse effect on the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

2 in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity—

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable.

3 in relation to the habitat of a threatened species or ecological community—

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

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

It is estimated that the proposal would impact on approximately 0.1ha of potential habitat in the form of PCT 11 (poor condition and derived native grassland). These habitats occurred on the verge of an existing disturbed rail corridor.

Habitat within the study area is already fragmented at a local scale by the rail line, adjacent roads, and agricultural use. Landscape scale fragmentation is unlikely to occur from the proposal as the work would involve removing vegetation from patch edges rather than breaking apart of large blocks of vegetation into many smaller patches. Importantly, the proposal would not result in the breaking apart of large blocks of high-quality habitats. No further habitat fragmentation on a landscape scale would occur because of the proposal. As the proposal impact area is largely confined to previously disturbed areas, the proposal would not adversely fragment or isolate any previously undisturbed patches of habitat. Furthermore, given these species' high mobility and that similar and likely more significant habitat occurs widely in the locality, it is considered unlikely that habitat would become further isolated or fragmented significantly beyond that currently existing in the study area and wider locality.

Using the Black Falcon as a case study, the study area occurred in a priority management area that is mapped between Molong in the east and Condobolin in the west. An additional two priority management areas have been mapped in NSW, broadly including Tamworth/Gunnedah and south-western NSW between Narrandera and Balranald. However, potential habitat in the study area is not considered important to the long-term survival of these species. The proposal will impact approximately 0.1ha of narrow and linear habitat in an existing highly disturbed rail corridor. Although the loss of native vegetation would be an incremental loss of local habitat, the quality and importance is not considered to be significant to the long-term survival of any local population of threatened birds of prey.

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

The proposal is not likely to impact on any declared area of outstanding biodiversity value.

5 whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

A KTP is a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, population or ecological community. Key threatening processes are listed under the BC Act and at the present there are currently 38 listed KTPs. With respect to threatened birds of prey, the proposal is consistent with one KTP; being clearing of native vegetation. Although it is an incremental loss of suitable habitat in the locality, the extent of native vegetation clearing and habitat removal associated with the proposal is considered negligible in terms of available habitat for these species within the proposal locality.

Conclusion

In summary, the proposal is considered unlikely to result in a significant effect on threatened birds of prey. Approximately 0.1ha of potential habitat would be affected by the proposal. Threatened birds of prey using the study area are likely to be part of a viable population that extends through the locality and due to the narrow and linear impact expected within an existing highly disturbed rail corridor, it is considered unlikely that local population of threatened birds of prey would be restricted to the study area. Given the extent of potentially suitable habitat that exists in the locality and the very small proportional impact likely to occur from the proposal, any impacts to threatened birds of prey are unlikely to be significant.

F1.3 REGENT HONEYEATER

The Regent Honeyeater is listed as Critically Endangered under the BC Act. The current distribution of the Regent Honeyeater is extremely patchy with a small number of known breeding sites. The Regent Honeyeater may use different areas in different years depending on the availability of food sources; potentially moving large distances to access select species which provide reliable nectar flow. The study area occurred towards the species historical western extremity, and whilst the species is not currently known from the proposal locality (Atlas of NSW Wildlife database), historical records for the species occur to the east in association with Back Yamma State Forest. A precautionary approach has been taken and the Regent Honeyeater is considered moderately likely to occur based on the presence of a very small area <0.1ha (0.01ha of poor condition PCT 11) of potential habitat (PCT 11 poor condition).

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

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

The Regent Honeyeater was not recorded in the study area during onsite surveys and there are no previous records for the species known for the study area or wider locality (Atlas of NSW Wildlife database). Nevertheless, historical records for the species occur to the east of the study area in association with Back Yamma State Forest. Therefore, this assessment is based on the presence of potentially suitable habitat.

Whilst there appears to be regular movements by the species, a high level of variability exists in the timing and pattern of movements between years in response to the varying distribution of blossom throughout its range. The proposal would impact <0.1ha of potential foraging habitat in the form of PCT 11 (poor condition). Although the dominant canopy species recorded in the study area (River Red Gum (*Eucalyptus camaldulensis*)) is not currently regarded as a key tree species for the Regent Honeyeater, it is considered a potential nectar source. Key tree species include, *Eucalyptus albens* (White Box), *Eucalyptus sideroxylon* (Mugga Ironbark), *Eucalyptus melliodora* (Yellow Box), *Eucalyptus leucoxylon* (Yellow Gum), *Corymbia maculata* (Spotted Gum) and *Eucalyptus robusta* (Swamp Mahogany).

In examining the life cycle of the Regent Honeyeater, it is considered unlikely that the species would breed in the study area or locality. Within its current distribution there are four known key breeding areas where the species is regularly recorded, including the Bundarra-Barraba, Capertee Valley and Hunter Valley districts in NSW and the Chiltern area in Victoria.

Due to the nomadic nature of Regent Honeyeaters in relation to annual resource distribution and the general narrow and linear impact associated with the proposal, any identified population of Regent Honeyeater would not be restricted to habitat in the study area. Although the proposal will add incrementally to the loss of a small amount (<0.1ha) of potential foraging habitat in the locality, the proportional impact is very small and would include be the trimming of canopy trees on the bank of the Lachlan River to enable movement of the crane arm. Therefore, the proposal is not likely to have an adverse effect on the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

2 in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity—

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable.

3 in relation to the habitat of a threatened species or ecological community—

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

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

It is estimated that proposal would impact on <0.1ha of potential habitat for the Regent Honeyeater in the form of PCT 11 (poor condition).

Habitat within the study area is already fragmented at a local scale by the rail line, adjacent roads, and agricultural use. Landscape scale fragmentation is unlikely to occur from the proposal as the work would involve removing vegetation from patch edges rather than breaking apart of large blocks of vegetation into many smaller patches. Importantly, the proposal would not result in the breaking apart of large blocks of high-quality habitats. No further habitat fragmentation on a landscape scale would occur because of the proposal. Isolation of habitats is likely to increase by a small extent as the distance between patches on either side of the rail line would be increased. Nonetheless, the Regent Honeyeater is a highly mobile and nomadic species that would not be impacted by marginal increases to existing barriers and fragmentation in the proposal locality.

The habitat in the study area is not likely to be important to the long-term survival of the Regent Honeyeater. A total of four priority management sites (and therefore important habitat areas) have been mapped in NSW. The closest priority management sites to the study area occur in association with the Capertee Valley and Mudgee/Wollar management sites to the study area's east and north-east respectively. Potential habitat in the study area is not considered important to the long-term survival of these species, with the proposal likely to impact <0.1ha of narrow and linear habitat in an existing highly disturbed rail corridor. Although the loss of native vegetation would be an incremental loss of local habitat, the quality and importance are not considered to be significant to the long-term survival of the Regent Honeyeater.

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

The proposal is not likely to impact on any declared area of outstanding biodiversity value.

5 whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

A KTP is a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, population or ecological community. Key threatening processes are listed under the BC Act and at the present there are currently 38 listed KTPs. With respect to the Regent Honeyeater, the proposal is consistent with one KTP; being clearing of native vegetation. Although it is an incremental loss of potentially suitable habitat in the locality, the extent of native vegetation clearing and habitat removal associated with the proposal is small in terms of the available habitat for this species within the proposal locality.

Conclusion

In summary, the proposal is considered unlikely to result in a significant effect on the Regent Honeyeater. Less than 0.1ha of potential habitat would be affected by the proposal. Regent Honeyeaters using the study area are likely to use habitat that extends through the locality and due to the narrow and linear impact expected within an existing highly disturbed rail corridor, it is considered unlikely that local population of Regent Honeyeater would be restricted to the study area. Given the extent of potentially suitable habitat that exists in the locality and the very small proportional impact likely to occur from the proposal, any impacts to the Regent Honeyeater is unlikely to be significant.

F1.4 SWIFT PARROT

The Swift Parrot is listed as Endangered under the BC Act and is known to be associated with PCT 11 and there are records for this species to the east of Forbes in association with Back Yamma State Forest. A very small area of potential habitat (PCT 11 poor condition) was recorded in the study area and the survey was completed outside of the season when Swift Parrots are on the mainland in January 2021. As Swift Parrots were not detectable during the survey, a precautionary approach has been taken and the species is considered moderately likely to occur based on the presence of potential habitat.

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

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

During the field survey informing this report, the Swift Parrot population was located in their summer breeding grounds in Tasmania (September to April). Therefore, this assessment is based on the presence of potentially suitable habitat. The Swift Parrot consists of a single population and on the mainland during the winter months they are widely nomadic in response to the varying distribution of blossom. Swift Parrot movements locally vary from year to year in response to resources in their range. The proposal would <0.1ha of potential foraging habitat in the form of PCT 11 (poor condition). Previous records for the Swift Parrot occur to the east of the study area, in association with Back Yamma State Forest and the dominant canopy species within and adjacent to the study area is listed as Swift Parrot habitat in the National Recovery Plan for the Swift Parrot. *Eucalyptus camaldulensis* represents a resource that Swift Parrots are known to use, particularly where it occurs with heavy lerp infestations.

Due to the nomadic nature of Swift Parrots in relation to annual resource distribution on the mainland and the general narrow and linear impact associated with the proposal, any identified population of Swift Parrot would not be restricted to habitat in the study area. Swift Parrots are likely to be present in other parts of the locality as there is a large amount (~840ha) of potentially suitable habitat in the form of PCT 11 mapped as occurring in the locality. The proportional impact to this potential habitat is very small and considered negligible. Therefore, due to the narrow and linear impact expected within an existing highly disturbed rail corridor, the proposal is not likely to have an adverse effect on the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

2 in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity—

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable.

3 in relation to the habitat of a threatened species or ecological community—

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

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

It is estimated that proposal would impact <0.1ha of potential habitat for the Swift Parrot in the form of PCT 11 (poor condition).

Habitat within the study area is already fragmented at a local scale by the rail line, adjacent roads, and agricultural development. Landscape scale fragmentation is unlikely to occur from the proposal as the work would involve removing vegetation from patch edges rather than breaking apart of large blocks of vegetation into many smaller patches. Importantly, the proposal would not result in the breaking apart of large blocks of high-quality habitats. No further habitat fragmentation on a landscape scale would occur because of the proposal. Isolation of habitats is likely to increase by a small extent as the distance between patches on either side of the rail line would be increased. Nonetheless, the Swift Parrot is a highly mobile and nomadic species that would not be impacted by marginal increases to existing barriers and fragmentation in the proposal locality.

The habitat in the study area is not likely to be important to the long-term survival of the Swift Parrot. A total of five priority management areas (and therefore important habitat areas) and three priority management sites have been mapped in NSW. The closest priority management area to the study area occurs to the south of Cowra. Potential habitat in the study area is not considered important to the long-term survival of these species, with the proposal likely to impact <0.1ha of narrow and linear habitat in an existing highly disturbed rail corridor. Although the loss of native vegetation would be an incremental loss of local habitat, the quality and importance is not considered to be significant to the long-term survival of any local population of Swift Parrot.

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

The proposal is not likely to impact on any declared area of outstanding biodiversity value.

5 whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

A KTP is a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, population or ecological community. Key threatening processes are listed under the BC Act and at the present there are currently 38 listed KTPs. With respect to the Swift Parrot, the proposal is consistent with one KTP; being clearing of native vegetation. Although it is an incremental loss of suitable habitat in the locality, the extent of native vegetation clearing and habitat removal associated with the proposal is small in terms of the available habitat for these species within the proposal locality.

Conclusion

In summary, the proposal is considered unlikely to result in a significant effect on the Swift Parrot. Less than 0.1ha of potential habitat would be affected by the proposal. Swift Parrots using the study area are likely to use habitat that extends through the locality and due to the narrow and linear impact expected within an existing highly disturbed rail corridor, it is considered unlikely that local population of Swift Parrot would be restricted to the study area. Given the extent of potentially suitable habitat that exists in the locality and the very small proportional impact likely to occur from the proposal, any impacts to the Swift Parrot is unlikely to be significant.

F1.5 GREY-HEADED FLYING-FOX

The Grey-headed Flying-fox (*Pteropus poliocephalus*) is listed as Vulnerable under the BC Act and is known to be associated with PCT 11 and there are records for this species in the greater locality. A very small area of potential habitat (PCT 11 poor condition) was recorded in the study area. As the Grey-headed Flying-fox was not detectable during the survey, a precautionary approach has been taken and the species is considered moderately likely to occur based on the presence of potential habitat.

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

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

The Grey-headed Flying-fox was not recorded during surveys, this assessment is based on the presence of potentially suitable habitat.

The Grey-headed Flying-fox occurs in the coastal belt from Rockhampton in central Queensland to Melbourne in Victoria. However, only a small proportion of this range is used at any one time, as the species selectively forages where food is available. As a result, patterns of occurrence and relative abundance within its distribution vary widely between seasons and between years. At a local scale, the species is generally present intermittently and irregularly. Furthermore, there are no separate or distinct populations of Grey-headed Flying-fox due to the constant genetic exchange and movement between camps throughout their entire range, which suggests that there is one single interbreeding population.

The proposal would <0.1ha of potential foraging habitat in the form of PCT 11 (poor condition). There are few records of the species within the locality, with the closest records for the Grey-headed Flying-fox occurring in the township of Parkes (~30km north of study area). Grey-headed Flying-foxes are nomadic in their foraging behaviour and during significant blossom events can occur in areas where they don't regularly occur. The study area provides blossom resources in the form of *Eucalyptus camaldulensis* and other *Eucalyptus* species which, during blossom events, may provide some foraging habitat for the species.

Due to the nomadic nature of Grey-headed Flying-foxes in relation to blossom resource distribution and the general narrow and linear impact associated with the proposal, any identified population of Grey-headed Flying-fox would not be restricted to habitat in the study area. Grey-headed Flying-foxes are likely to be present in other parts of the locality as there is a large amount (~840ha) of potentially suitable habitat in the form of PCT 11 mapped as occurring in the locality. The proportional impact to this potential habitat is very small and considered negligible. Therefore, due to the narrow and linear impact expected within an existing highly disturbed rail corridor, the proposal is not likely to have an adverse effect on the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

2 in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity—

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable.

3 in relation to the habitat of a threatened species or ecological community—

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

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

It is estimated that proposal would impact <0.1ha of potential habitat for the Grey-headed Flying-fox in the form of PCT 11 (poor condition).

Habitat within the study area is already fragmented at a local scale by the rail line, adjacent roads, and agricultural development. Landscape scale fragmentation is unlikely to occur from the proposal as the work would involve removing vegetation from patch edges rather than breaking apart of large blocks of vegetation into many smaller patches. Importantly, the proposal would not result in the breaking apart of large blocks of high-quality habitats. No further habitat fragmentation on a landscape scale would occur because of the proposal. Isolation of habitats is likely to increase by a small extent as the distance between patches on either side of the rail line would be increased. Nonetheless, the Grey-headed Flying-fox is a highly mobile and nomadic species that would not be impacted by marginal increases to existing barriers and fragmentation in the proposal locality.

The habitat in the study area is not likely to be important to the long-term survival of the Grey-headed Flying-fox. No breeding camps occur within the study area or in close proximity (<10km). Potential habitat in the study area is not considered important to the long-term survival of these species, with the proposal likely to impact <0.1ha of narrow and linear habitat in an existing highly disturbed rail corridor. Although the loss of native vegetation would be an incremental loss of local habitat, the quality and importance is not considered to be significant to the long-term survival of any local population of Grey-headed Flying-fox.

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

The proposal is not likely to impact on any declared area of outstanding biodiversity value.

5 whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

A KTP is a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, population or ecological community. Key threatening processes are listed under the BC Act and at the present there are currently 38 listed KTPs. With respect to the Grey-headed Flying-fox, the proposal is consistent with one KTP; being clearing of native vegetation. Although it is an incremental loss of suitable habitat in the locality, the extent of native vegetation clearing and habitat removal associated with the proposal is small in terms of the available habitat for these species within the proposal locality.

Conclusion

In summary, the proposal is considered unlikely to result in a significant effect on the Grey-headed Flying-fox. Less than 0.1ha of potential habitat would be affected by the proposal. Grey-headed Flying-fox using the study area are likely to use habitat that extends through the locality and due to the narrow and linear impact expected within an existing highly disturbed rail corridor, it is considered unlikely that local population of Grey-headed Flying-fox would be restricted to the study area. Given the extent of potentially suitable habitat that exists in the locality and the very small proportional impact likely to occur from the proposal, any impacts to the Grey-headed Flying-fox is unlikely to be significant.

F1.6 SUPERB PARROT

The Superb Parrot is listed as Vulnerable under the BC Act. Whilst this species was not recorded in the study area during field survey informing this report, they have previously been recorded flying over the study area.

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

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

Although not recorded during field survey informing this report, Superb Parrots have previously been recorded flying over the study area and greater locality. The proposal would impact on approximately 0.1ha of habitat in the form of PCT 11 (poor condition and derived native grassland) of which the impact would also include the trimming of trees on the bank of the Lachlan River to enable crane arm movement. Superb Parrots using the study area are likely to be part of a viable population that extends through the locality and are likely to be present in other parts of the locality as there is a large amount (~840ha) of potentially suitable habitat in the form of PCT 11 mapped as occurring in the locality. The proportional impact to this potential habitat is very small as outlined in main report. Due to the narrow linear impact expected within an existing highly disturbed rail corridor, it is considered unlikely that local population of Superb Parrot would be restricted to the study area and the proposal is not likely to have an adverse effect on the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

2 in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity—

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable.

3 in relation to the habitat of a threatened species or ecological community—

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

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

It is estimated that proposal would impact on approximately 0.1ha of potential habitat for the Superb Parrot in the form of PCT 11 (poor condition and derived native grassland).

Habitat within the study area is already fragmented at a local scale by the rail line, adjacent roads, and agricultural use. Landscape scale fragmentation is unlikely to occur from the proposal as the work would involve removing vegetation from patch edges rather than breaking apart of large blocks of vegetation into many smaller patches. Importantly, the proposal would not result in the breaking apart of large blocks of high-quality habitats. No further habitat fragmentation on a landscape scale would occur because of the proposal. Isolation of habitats is likely to increase by a small extent as the distance between patches on either side of the rail line would be increased.

The habitat in the study area is not likely to be important to the long-term survival of the Superb Parrot. One priority management area (and therefore important habitat areas) and three priority management sites have been mapped in NSW, broadly occurring between Yass and Molong in the east, and Griffith and Deniliquin in the west. The study area and the Forbes locality were not included in the priority management area. Potential habitat in the study area is not considered important to the long-term survival of these species, with the proposal likely to impact approximately 0.1ha of narrow and linear habitat in an existing highly disturbed rail corridor. Although the loss of native vegetation would be an incremental loss of local habitat, the quality and importance is not considered to be significant to the long-term survival of any local population of Superb Parrot.

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

The proposal is not likely to impact on any declared area of outstanding biodiversity value.

5 whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

A KTP is a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, population or ecological community. Key threatening processes are listed under the BC Act and at the present there are currently 38 listed KTPs. With respect to the Superb Parrot, the proposal is consistent with three KTPs; being clearing of native vegetation, removal of dead wood and dead trees, and potentially the loss of hollow-bearing trees. The extent of native vegetation clearing and habitat removal associated with the proposal is relatively small in terms of the available habitat for these species within the proposal locality.

Conclusion

In summary, the proposal is considered unlikely to result in a significant effect on the Superb Parrot. Approximately 0.1ha of potential habitat would be affected by the proposal. Superb Parrots using the study area are likely to use habitat that extends through the locality and due to the narrow and linear impact expected within an existing highly disturbed rail corridor, it is considered unlikely that local population of Superb Parrot would be restricted to the study area. Given the extent of potentially suitable habitat that exists in the locality and the very small proportional impact likely to occur from the proposal, any impacts to the Superb Parrot is unlikely to be significant.

F1.7 KOALA

The Koala was not recorded in the study area during the field survey informing this report, and no records for this species were returned from the Atlas of NSW Wildlife database. Nevertheless, whilst the rail corridor was highly disturbed, small areas of remnant woodland dominated by *Eucalyptus camaldulensis* occurred therein. *Eucalyptus camaldulensis* is listed as a primary Koala food tree species for the Forbes Shire Council area (Australia Koala Foundation, 2015).

The Lachlan River provides a linear remnant and corridor of *Eucalyptus camaldulensis* dominated woodland within the proposal study area. Koala habitat has been subject to historical disturbances with large expanses of habitat cleared in the proposal locality. Remaining vegetated areas within and adjacent to the study area have been structurally simplified in association with agricultural land use. As a result the study area is partly isolated from large habitat remnants that may otherwise sustain a population of Koala.

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

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

The Koala was not recorded in the study area during the field survey informing this report, and no records for this species were returned from the Atlas of NSW Wildlife database. Nevertheless, whilst the rail corridor was highly disturbed, a small area of remnant woodland dominated by *Eucalyptus camaldulensis* occurred therein. *Eucalyptus camaldulensis* is listed as a primary Koala food tree species for the Forbes Shire Council area. The proposal would impact <0.1ha of habitat in the form of PCT 11 (poor condition) of which the impact would also include the trimming of some trees on the bank of the Lachlan River to enable movement of the crane arm. Any population of Koala potentially using the study area are likely to be part of a viable population extending throughout the locality and are likely to be present in other parts of the locality. A large amount of potentially suitable habitat (~840ha) in the form of PCT 11 was mapped as occurring in the locality. The proportional impact to this potential habitat is very small as outlined in the main report and therefore is considered negligible. Due to the narrow linear impact expected within an existing highly disturbed rail corridor, it is considered unlikely that local population of Koala would be restricted to the study area and the proposal is not likely to have an adverse effect on the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

2 in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity—

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable.

3 in relation to the habitat of a threatened species or ecological community—

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

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

It is estimated that proposal would impact <0.1ha of potential habitat for the Koala in the form of PCT 11 (poor condition).

Habitat within the study area is already fragmented at a local scale by the rail line, adjacent roads, and agricultural use. Landscape scale fragmentation is unlikely to occur from the proposal as the work would involve removing vegetation from patch edges rather than breaking apart of large blocks of vegetation into many smaller patches. Importantly, the proposal would not result in the breaking apart of large blocks of high-quality habitats. No further habitat fragmentation on a landscape scale would occur because of the proposal. Isolation of habitats is likely to increase by a small extent as the distance between patches on either side of the rail line would be increased.

The habitat in the study area is not likely to be important to the long-term survival of the Koala. The majority of this species distribution in NSW is nominated as a priority management area. However, the closest priority management sites included the Western Slopes and Plains, Blue Mountains and Hawkesbury, and Southern Highlands management sites. Potential habitat recorded in the study area is not considered important to the long-term survival of the species, with the proposal likely to impact <0.1ha of narrow and linear habitat in an existing highly disturbed rail corridor. Although the loss of native vegetation would be an incremental loss of local habitat, the quality and importance are not considered to be significant to the long-term survival of any local population of Koala.

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

The proposal is not likely to impact on any declared area of outstanding biodiversity value.

5 whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

A KTP is a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, population or ecological community. Key threatening processes are listed under the BC Act and at the present there are currently 38 listed KTPs. With respect to the Koala, the proposal is consistent with one KTP; being clearing of native vegetation. The extent of native vegetation clearing and habitat removal associated with the proposal is relatively small in terms of the available habitat for these species within the proposal locality.

Conclusion

In summary, the proposal is considered unlikely to result in a significant effect on the Koala. Whilst, <0.1ha of potential habitat would be affected by the proposal, the Koala was not recorded in the study area during the field surveys and the species is not known from the locality via records returned from the Atlas of NSW Wildlife database. Koalas potentially using the study area are likely to use habitat that extends through the locality and due to the narrow and linear impact expected within an existing highly disturbed rail corridor, it is considered unlikely that local population of Koala would be restricted to the study area. Given the extent of potentially suitable habitat that exists in the locality and the very small proportional impact likely to occur from the proposal, any impacts to the Koala is unlikely to be significant.

F1.8 SOUTHERN MYOTIS

The Southern Myotis (*Myotis macropus*) was not recorded in the study area during the field survey informing this report, and no records for this species were returned from the Atlas of NSW Wildlife database. Nevertheless, whilst the rail corridor was highly disturbed, small areas of remnant riparian woodland dominated by *Eucalyptus camaldulensis* occurred therein which provides some potential habitat for the species.

The Lachlan River provides a linear remnant and corridor of *Eucalyptus camaldulensis* dominated riparian woodland within the proposal study area. Due to the habitat occurring adjacent to a permanent waterbody (Lachlan River) and the presence of both hollow-bearing trees and artificial structures, there is potential for the species to occur and utilise this habitat. Southern Myotis generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. They forage over streams and pools catching insects and small fish by raking their feet across the water surface. In relation to the proposal, no known hollow-bearing trees will be impacted, nor will artificial structures be significantly impacted or modified. Approximately 0.1ha of PCT 11 riparian woodland will be impacted, and as a precaution an assessment of significance has been undertaken for the species.

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

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

The Southern Myotis was not recorded in the study area during the field survey informing this report, and no records for this species were returned from the Atlas of NSW Wildlife database. Nevertheless, whilst the rail corridor was highly disturbed, small areas of remnant riparian woodland dominated by *Eucalyptus camaldulensis* occurred therein which provides some potential habitat for the species. The proposal would impact <0.1ha of habitat in the form of PCT 11 (poor condition) of which the impact would also include the trimming of some trees on the bank of the Lachlan River to enable movement of the crane arm. No hollow-bearing trees be will impacted nor will artificial structures be significantly disturbed or removed. In addition, no aquatic works or hydrological impacts are anticipated due to the proposal. The proportional impact to this potential habitat is very small as outlined in the main report and therefore is considered negligible. Due to the narrow linear impact expected within an existing highly disturbed rail corridor, it is considered unlikely that local population of Southern Myotis would be restricted to the study area and the proposal is not likely to have an adverse effect on the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

2 in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity—

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable.

3 in relation to the habitat of a threatened species or ecological community—

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

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

It is estimated that proposal would impact <0.1ha of potential habitat for the Southern Myotis in the form of PCT 11 (poor condition).

Habitat within the study area is already fragmented at a local scale by the rail line, adjacent roads, and agricultural use. Landscape scale fragmentation is unlikely to occur from the proposal as the work would involve removing vegetation from patch edges rather than breaking apart of large blocks of vegetation into many smaller patches. Importantly, the proposal would not result in the breaking apart of large blocks of high-quality habitats. No further habitat fragmentation on a landscape scale would occur because of the proposal. Isolation of habitats is likely to increase by a small extent as the distance between patches on either side of the rail line would be increased. Nonetheless, the Southern Myotis is a highly mobile species that would not be impacted by marginal increases to existing barriers and fragmentation in the proposal locality.

The habitat in the study area is not likely to be important to the long-term survival of the Southern Myotis. The majority of this species distribution in NSW is situated along the east coast which is nominated as a priority management area. However, the closest priority management site includes areas surrounding the Murrumbidgee river catchment further south (~220km). Potential habitat recorded in the study area is not considered important to the long-term survival of the species, with the proposal likely to impact <0.1ha of narrow and linear habitat in an existing highly disturbed rail corridor. Although the loss of native vegetation would be an incremental loss of local habitat, the quality and importance are not considered to be significant to the long-term survival of any local population of Southern Myotis.

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

The proposal is not likely to impact on any declared area of outstanding biodiversity value.

5 whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

A KTP is a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, population or ecological community. Key threatening processes are listed under the BC Act and at the present there are currently 38 listed KTPs. With respect to the Southern Myotis, the proposal is consistent with one KTP; being clearing of native vegetation. The extent of native vegetation clearing and habitat removal associated with the proposal is relatively small in terms of the available habitat for these species within the proposal locality.

Conclusion

In summary, the proposal is considered unlikely to result in a significant effect on the Southern Myotis. Whilst, <0.1ha of potential habitat would be affected by the proposal, the Southern Myotis was not recorded in the study area during the field surveys and the species is not known from the locality via records returned from the Atlas of NSW Wildlife database. No hollow-bearing trees be will impacted nor will artificial structures be significantly disturbed or removed. In addition, no aquatic works or hydrological impacts are anticipated due to the proposal. The proportional impact to this potential habitat is very small as outlined in the main report and therefore is considered negligible. Given the extent of potentially suitable habitat that exists in the locality and the very small proportional impact likely to occur from the proposal, any impacts to the Southern Myotis is unlikely to be significant.

F1.9 SQUIRREL GLIDER

The Squirrel Glider (*Petaurus norfolcensis*) was not recorded in the study area during the field survey informing this report, however, the species is known to occur in the greater locality. The species is widely though sparsely distributed in eastern Australia, from northern Queensland to western Victoria. It inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and prefers mixed species stands with a shrub or Acacia midstorey. It also requires abundant tree hollows for refuge and nest sites.

Whilst the rail corridor was highly disturbed, small areas of remnant riparian woodland dominated by *Eucalyptus camaldulensis* occurred. The Lachlan River provides a linear remnant and corridor of *Eucalyptus camaldulensis* dominated riparian woodland within the proposal study area. This habitat has been subject to historical disturbances with large expanses of habitat cleared in the proposal locality. Remaining vegetated areas within and adjacent to the study area have been structurally simplified in association with agricultural land use. Approximately 0.1ha of PCT 11 riparian woodland will be impacted. No hollow-bearing trees will be impacted due to the proposal.

Although the species was not recorded in the study area during field surveys, due to records in the greater locality, presence of remnant vegetation and intact connectivity along the river, it was deemed an assessment of significance be undertaken as a precautionary to assess the impact to the species.

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

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

The Squirrel Glider was not recorded in the study area during the field survey informing this report, however, the species is known to occur in the greater locality. Nevertheless, whilst the rail corridor was highly disturbed, a small area of remnant woodland dominated by *Eucalyptus camaldulensis* occurred therein. The proposal would impact <0.1ha of habitat in the form of PCT 11 (poor condition) of which the impact would also include the trimming of some trees on the bank of the Lachlan River to enable movement of the crane arm. No known hollow-bearing trees will be impacted. Any population of Squirrel Glider potentially using the study area are likely to be part of a viable population extending throughout the locality and are likely to be present in other parts of the locality. A large amount of potentially suitable habitat (~840ha) in the form of PCT 11 was mapped as occurring in the locality. The proportional impact to this potential habitat is very small as outlined in the main report and therefore is considered negligible. Due to the narrow linear impact expected within an existing highly disturbed rail corridor, it is considered unlikely that local population of Squirrel Glider would be restricted to the study area and the proposal is not likely to have an adverse effect on the life cycle of the species such that a viable local population is likely to be placed at risk of extinction.

2 in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity—

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction

Not applicable.

3 in relation to the habitat of a threatened species or ecological community—

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

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

It is estimated that proposal would impact <0.1ha of potential habitat for the Squirrel Glider in the form of PCT 11 (poor condition). No hollow-bearing trees will be impacted.

Habitat within the study area is already fragmented at a local scale by the rail line, adjacent roads, and agricultural use. Landscape scale fragmentation is unlikely to occur from the proposal as the work would involve removing vegetation from patch edges rather than breaking apart of large blocks of vegetation into many smaller patches. Importantly, the proposal would not result in the breaking apart of large blocks of high-quality habitats. No further habitat fragmentation on a landscape scale would occur because of the proposal. Isolation of habitats is likely to increase by a small extent as the distance between patches on either side of the rail line would be increased.

The habitat in the study area is not likely to be important to the long-term survival of the Squirrel Glider. The majority of this species distribution in NSW is predominately along the east coast of NSW. The closest priority management site occurs to the south (~230km) in association with Wagga Wagga and Albury LGA management site. Potential habitat recorded in the study area is not considered important to the long-term survival of the species, with the proposal likely to impact <0.1ha of narrow and linear habitat in an existing highly disturbed rail corridor. Although the loss of native vegetation would be an incremental loss of local habitat, the quality and importance are not considered to be significant to the long-term survival of any local population of Squirrel Glider.

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

The proposal is not likely to impact on any declared area of outstanding biodiversity value.

5 whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

A KTP is a process that threatens, or may have the capability to threaten, the survival or evolutionary development of species, population or ecological community. Key threatening processes are listed under the BC Act and at the present there are currently 38 listed KTPs. With respect to the Squirrel Glider, the proposal is consistent with three KTPs; being clearing of native vegetation, removal of dead wood and dead trees, and potentially the loss of hollow-bearing trees. The extent of native vegetation clearing and habitat removal associated with the proposal is relatively small in terms of the available habitat for these species within the proposal locality.

Conclusion

In summary, the proposal is considered unlikely to result in a significant effect on the Squirrel Glider. Whilst, <0.1ha of potential habitat would be affected by the proposal, impact would largely be the trimming of some trees on the bank of the Lachlan River. Squirrel Glider potentially using the study area are likely to use habitat that extends through the locality and due to the narrow and linear impact expected within an existing highly disturbed rail corridor, it is considered unlikely that local population of Squirrel Glider would be restricted to the study area. Given the extent of potentially suitable habitat that exists in the locality and the very small proportional impact likely to occur from the proposal, any impacts to the Squirrel Glider is unlikely to be significant.

F2 EPBC ACT ASSESSMENTS OF SIGNIFICANCE

For threatened biodiversity listed under the EPBC Act, significance assessments have been completed in accordance with the *EPBC Act Policy Statement 1.1 Significant Impact Guidelines* (Department of Environment, 2013). These significance assessments have been prepared for the following threatened species:

- White-throated Needletail (*Hirundapus caudacutus*)
- Regent Honeyeater (*Anthochaera phrygia*)
- Swift Parrot (*Lathamus discolor*)
- Grey-headed Flying-fox (*Pteropus poliocephalus*)
- Koala (*Phascolarctos cinereus*)
- Superb Parrot (*Polytelis swainsonii*).

F2.1 WHITE-THROATED NEEDLETAIL

The White-throated Needletail (*Hirundapus caudacutus*) is listed as Vulnerable and Migratory under the EPBC Act.

This species previously recorded in aerial habitats in the proposal locality. The study area only provides aerial foraging habitat for this species. The proposal will result in the removal of > 0.1ha of potential habitat for the species that is likely utilised for foraging as part of a far larger home range.

The following assessment has been undertaken following the Matters of National Environmental Significance, Significant Impact Guidelines 1.1. Under the Act, important populations are:

- likely to be key source populations either for breeding or dispersal
- likely to be necessary for maintaining genetic diversity, and/or
- at or near the limit of the species range.

IS THIS PART OF AN IMPORTANT POPULATION?

The White-throated Needletail is a migratory species and occurs in Australia only between late spring and early autumn, but mostly in summer. This species is a non-breeding migrant with breeding taking place in Northern Asia (Birdlife Australia, 2020). The White-throated Needletail feeds on flying insects, such as termites, ants, beetles and flies. They catch the insects in flight in their wide gaping beaks. They have been recorded roosting in trees in forests and woodlands, both among dense foliage in the canopy or in hollows. Probably recorded most often above wooded areas, including open forest and rainforest (Birdlife Australia, 2020). This species is not or near the limit of its range as it occurs over eastern and northern Australia and in Northern Asia (Birdlife Australia, 2020).

White-throated Needletail is almost exclusively aerial and although they occur over most types of habitat, they are probably recorded most often above wooded areas, including open forest and rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. They also commonly occur over heathland, but less often over treeless areas, such as grassland or swamps.

The study area does not contain key resources for breeding or dispersal, does not occur at the limit of the species distribution range and is unlikely to be necessary for maintaining genetic diversity populations which may occur. However, the species is a migratory species and the individuals which migrate to Australia would be considered as one population and therefore any individuals within the study area is considered to form part of an 'important population'.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will result in one or more of the following:

1 Lead to a long-term decrease in the size of an important population of a species

This species occurs widely within NSW and QLD whilst in Australia and suitable foraging resources could be accessed widely throughout the locality and beyond. Forage over most types of habitat, they are recorded most often above wooded areas, including habitat identified in the study area. The species may use the study area for aerial foraging on an intermittent basis but is not known to breed in Australia. It is unlikely that the impact of a small area <0.1ha of potential aerial foraging habitat (PCT 11 poor condition) is likely to have a significant impact upon for this species to lead to a long-term decrease in the size of its population.

2 Reduce the area of occupancy of an important population

The proposal will impact a small area <0.1ha of potential (PCT 11 poor condition) aerial foraging habitat for this species. This species forages on the wing and the vegetation within the study area is likely to provide aerial foraging habitat for this species. This species occurs widely within NSW and QLD whilst in Australia and suitable foraging resources could be accessed widely throughout the locality and beyond. It is unlikely that the impact of <0.1ha of potential foraging habitat would significantly impact upon available resources for this species to the point that it would significantly reduce of the area of occupancy for the species.

3 Fragment an existing important population into two or more populations

Habitat connectivity is not likely to be affected by the proposal. The majority of the study area occurs within or adjacent to previously disturbed land (rail corridor and agriculture). Approximately <0.1ha of habitat is likely to be affected by the proposal with vegetation removal largely limited to a linear disturbance corridor. As the study area is linear in nature and largely avoids significant vegetation, the proposal would not further fragment or isolate any previously undisturbed patches of habitat than what already exists in the study area and locality. Furthermore, the White-throated Needle-tail is a highly mobile and aerial species able to transverse fragmented landscapes to isolated patches of vegetation. As potential habitat within the study area already occurs within a highly fragmented landscape, it is considered unlikely that the disturbance of habitat in the study area would fragment the existing population into two or more populations.

4 Adversely affect habitat critical to the survival of a species

No critical habitat is listed for this species under the EPBC Act. Habitat critical to the survival of a species may also include areas that are not listed on the Register of Critical Habitat if they are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long-term evolutionary development, or
- for the reintroduction of populations or recovery of the species or ecological community.

The proposal will impact a small area <0.1ha of potential aerial foraging habitat for this species. The White-throated Needle-tail is a migratory species and breeds in northern Asia. This species forages on the wing and the vegetation within the study area provides habitat for the larval stages of the aerial insects this species feeds on. This species occurs widely within NSW and QLD whilst in Australia and suitable foraging resources could be accessed widely throughout the locality and beyond. Therefore, this would not meet the above criteria and the study area is not critical to the survival of the White-throated Needle-tail.

5 Disrupt the breeding cycle of an important population

White-throated Needle-tail does not breed within Australia. The removal of approximately <0.1ha of potential foraging habitat is unlikely to disrupt their movements to Northern Asia breeding grounds. As such the proposal is unlikely to affect the breeding cycle of a population of White-throated Needle-tail.

6 Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposal will impact approximately <0.1ha of potential foraging habitat for the White-throated Needle-tail. This impact will predominately be trimming of trees for the use of machinery (i.e. cranes) and is considered negligible and unlikely to cause the species to decline.

7 Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

It is not likely that invasive species (such as introduced predators) that are harmful to the White-throated Needle-tail would become further established as a result of the proposal.

8 Introduce disease that may cause the species to decline

No. There are no known diseases that are likely to increase in the area as a result of the proposal.

9 Interfere substantially with the recovery of the species

As this species does not breed in Australia and forages on the wing and has the potential to occur intermittently within the locality, the proposal is not likely to interfere with the recovery of this species.

Conclusion

The study area only provides aerial foraging habitat with no breeding occurring within Australia. The White-throated Needletail may use the study area for aerial foraging on an intermittent basis and the proposal is not likely to have a significant impact upon available resources for this species in the vicinity of the study area or its wider locality. Therefore, the habitat to be impacted is not considered important to the long-term survival of the White-throated Needletail.

F2.2 REGENT HONEYEATER

Regent Honeyeater (*Anthochaera phrygia*) is listed as Critically Endangered under the EPBC Act.

The current distribution of the Regent Honeyeater is extremely patchy with a small number of known breeding sites. The Regent Honeyeater may use different areas in different years depending on the availability of food sources; potentially moving large distances to access select species which provide reliable nectar flow. The study area occurred towards the species historical western extremity, and whilst the species is not currently known from the proposal locality (Atlas of NSW Wildlife database), historical records for the species occur to the east in association with Back Yamma State Forest. A precautionary approach has been taken and the Regent Honeyeater is considered moderately likely to occur based on the presence of a very small area <0.1ha (approximately 0.01ha of PCT 11 poor condition) of potential habitat.

An action is likely to have a significant impact on a Critically Endangered or Endangered species if there is a real chance or possibility that it will:

1 Lead to a long-term decrease in the size of a population

The Regent Honeyeater was not recorded in the study area during onsite surveys and there are no previous records for the species known for the study area or wider locality (Atlas of NSW Wildlife database). Nevertheless, historical records for the species occur to the east of the study area in association with Back Yamma State Forest. Therefore, this assessment is based on the presence of potentially suitable habitat.

Whilst there appears to be regular movements by the species, a high level of variability exists in the timing and pattern of movements between years in response to the varying distribution of blossom throughout its range. The proposal would impact <0.1ha of potential foraging habitat in the form of PCT 11 (poor condition). Although the dominant canopy species recorded in the study area (River Red Gum (*Eucalyptus camaldulensis*)) is not currently regarded as a key tree species for the Regent Honeyeater, it is considered a potential nectar source. Key tree species include, *E. albens* (White Box), *E. sideroxylon* (Mugga Ironbark), *E. melliodora* (Yellow Box), *E. leucoxylon* (Yellow Gum), *Corymbia maculata* (Spotted Gum) and *E. robusta* (Swamp Mahogany).

In examining the life cycle of the Regent Honeyeater, it is considered unlikely that the species would breed in the study area or locality. Within its current distribution there are four known key breeding areas where the species is regularly recorded, including the Bundarra-Barraba, Capertee Valley and Hunter Valley districts in NSW and the Chiltern area in Victoria.

Due to the nomadic nature of Regent Honeyeaters in relation to annual resource distribution and the general narrow and linear impact associated with the proposal, any identified population of Regent Honeyeater would not be restricted to habitat in the study area. Although the proposal will add incrementally to the loss of a small amount (<0.1ha) of potential foraging habitat in the locality, the proportional impact is very small. Therefore, the proposal is not likely to lead to a long-term decrease in the size of the Regent Honeyeater population.

2 Reduce the area of occupancy of the species

The current distribution of the Regent Honeyeater is extremely patchy with a small number of known breeding sites. The Regent Honeyeater may use different areas in different years depending on the availability of food sources; potentially moving large distances to access select species which provide reliable nectar flow. Formerly distributed in south-eastern Australia from the Adelaide region in South Australia to 100km north of Brisbane in Queensland, there has been a distinct contraction in the Regent Honeyeaters range. The western edge of its New South Wales range occurs as far inland as Narrabri, Warrumbungle National Park, Dubbo, Parkes and Finley. The current distribution of Regent Honeyeater is illustrated in Figure F.1.

The study area occurred towards the species western extremity, and whilst the species is not currently known from the proposal locality (Atlas of NSW Wildlife database), historical records for the species occur to the east in association with Back Yamma State Forest to the east. If the Regent Honeyeater was to use habitat resources available in the study area, the proposal would impact <0.1ha of potential foraging habitat in the form of PCT 11 (poor condition). While the proposal would lead to a small incremental loss of potentially suitable habitat, the proportional impact to similar habitats in the locality is very low, and the impact is not considered important in regard to its context and intensity.

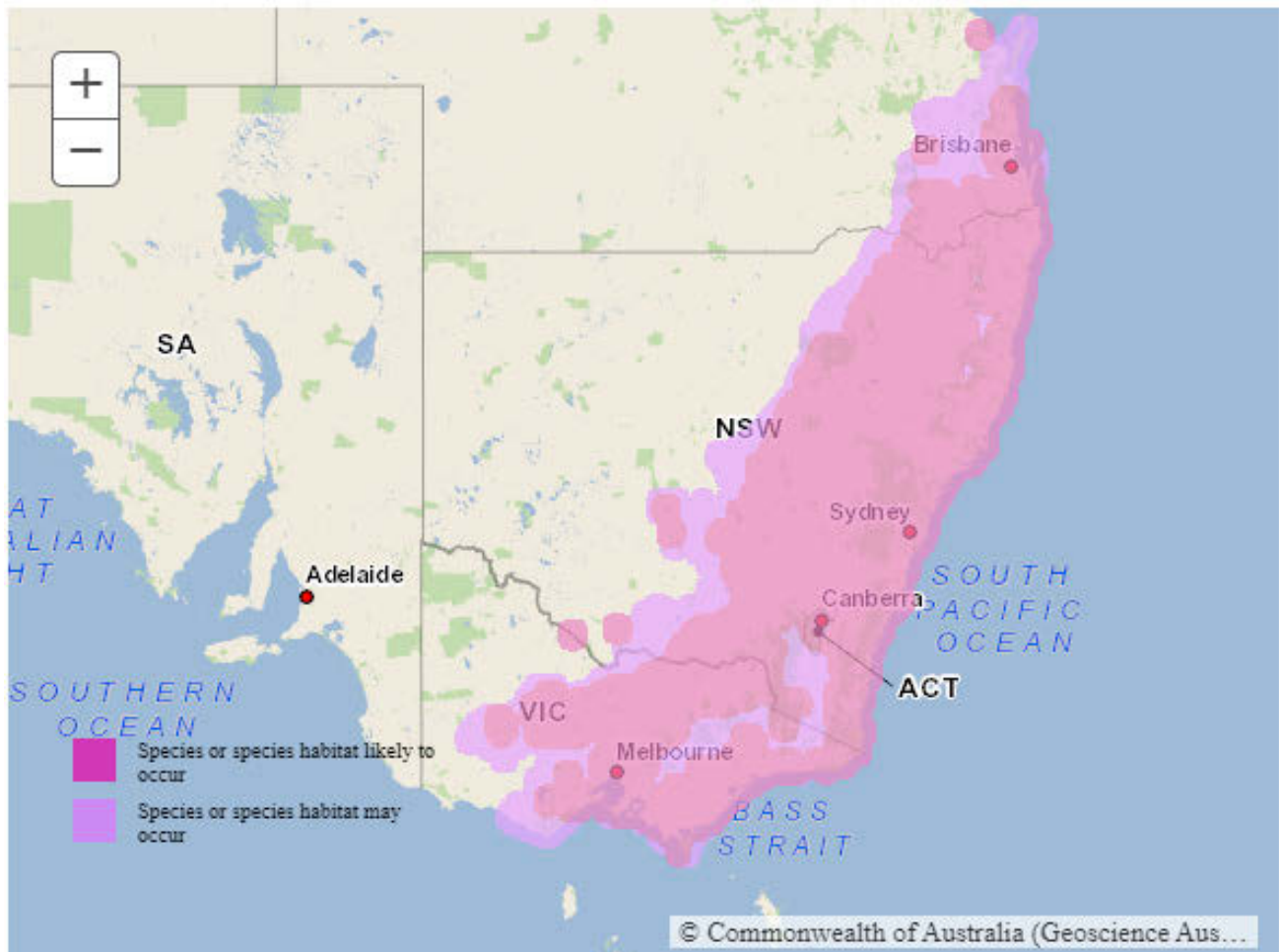


Figure F.1 Distribution map for Regent Honeyeater (Department of the Environment, 2021d)

3 Fragment an existing population into two or more populations

Habitat connectivity is not likely to be affected by the proposal. The majority of the study area occurs within or adjacent to previously disturbed land (rail corridor and agriculture). Less than <0.1ha of potential foraging habitat is likely to be affected by the proposal with vegetation removal largely limited to a linear disturbance corridor. As the study area is linear in nature and largely avoids significant vegetation, the proposal would not further fragment or isolate any previously undisturbed patches of habitat than what already exists due to rail corridor. Furthermore, given that these species are highly mobile and nomadic, the proposal would not present a significant barrier to these species. It is not considered likely that habitat would become further isolated or fragmented significantly beyond that currently existing in the study area.

4 Adversely affect habitat critical to the survival of a species

No critical habitat has been listed for the Regent Honeyeater to date. As outlined in the National Recovery Plan, habitat critical to the survival of the Regent Honeyeater includes:

- any breeding or foraging areas where the species is likely to occur
- any newly discovered breeding or foraging locations.

The Regent Honeyeater was not recorded in the study area during onsite surveys and there are no previous records for the species known for the study area or wider locality (Atlas of NSW Wildlife database). While the species exhibits a high level of variability in the timing and pattern of movements between years in response to the varying distribution of blossom throughout its range, the proposal would impact <0.1ha of potential foraging habitat. The dominant canopy species (*Eucalyptus camaldulensis*) in the study area is not known as a key tree species for the Regent Honeyeater and the four known breeding areas where the species is regularly recorded occur distantly to the south (Chiltern area, Victoria), east (Capertee Valley, NSW) and north-east (Bundarra-Barraba and Hunter Valley districts in NSW) of the proposal. Accordingly, it is unlikely that this proposal will adversely affect habitat critical to the survival of these species.

5 Disrupt the breeding cycle of a population

Within the Regent Honeyeaters current distribution there are four known key breeding areas where the species is regularly recorded. These are the Bundarra-Barraba, Capertee Valley and Hunter Valley districts in New South Wales, and the Chiltern area in north-east Victoria. The study area does not occur within these known breeding areas. Furthermore, this species is highly mobile and is known to disperse widely. Less than <0.1ha of potential marginal foraging habitat likely to be affected is representative of larger patches of locally occurring resources that would be accessible to this species. Therefore, the removal of about <0.1ha of potential marginal foraging habitat is unlikely to disrupt the breeding cycle of a population of Regent Honeyeater.

6 Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Due to the nomadic nature of Regent Honeyeaters in relation to annual resource distribution and the general narrow and linear impact associated with the proposal, any identified population of Regent Honeyeater would not be restricted to habitat in the study area. Although the proposal will add incrementally to the loss of a small amount (<0.1ha) of potential foraging habitat in the locality, the proportional impact is very small and considered negligible. Therefore, while the potential marginal foraging habitat would be impacted, it is unlikely to be of an extent that would cause this species to decline.

7 Result in invasive species that are harmful to an Endangered species becoming established in the Endangered species' habitat

It is not likely that invasive species (such as introduced predators) that are potentially harmful to the Regent Honeyeater would become further established as a result of the proposal.

8 Introduce disease that may cause the species to decline

No. It is unlikely that disease would be increased by the proposal.

9 Interfere with the recovery of the species

Recovery strategies outlined in Regent Honeyeater Recovery Plan include:

- improve the extent and quality of regent honeyeater habitat
- bolster the wild population with captive-bred birds until the wild population becomes self-sustaining
- increase understanding of the size, structure, trajectory and viability of the wild population
- maintain and increase community awareness, understanding and involvement in the recovery program.

The proposal would be conflict with the first objective to a small extent by not improving the extent of habitat for the Regent Honeyeater. It is unlikely that the impact of a small area of marginal habitat would significantly exacerbate the recovery of the species and significantly impact this species.

Conclusion

In summary, the proposal is considered unlikely to result in a significant impact to the Regent Honeyeater. Less than <0.1ha of potential habitat would be affected by the proposal. Although the Regent Honeyeater is not known from the study area or wider locality (Atlas of NSW Wildlife database), the irregular distribution of blossom resources, which is a key driver of nomadism of this species, may cause this species to occasionally forage within the study area intermittently during periods of seasonal blossom variation.

Regent Honeyeaters using the study area are likely to use habitat that extends through the locality and due to the narrow and linear impact expected within an existing highly disturbed rail corridor, it is considered unlikely that local population of Regent Honeyeater would be restricted to the study area. Therefore, the predicted impacts to the potential habitat for this species is likely to be minor given the mapped extent of similar vegetation in the locality. The impacts to this species are not considered to be important in regard to the context and intensity.

F2.3 SWIFT PARROT

The Swift Parrot (*Lathamus discolor*) is listed as Critically Endangered under the EPBC Act.

Whilst the Swift Parrot is not currently known from the proposal locality (Atlas of NSW Wildlife database), recent records for the species occur to the east of the study area in association with Back Yamma State Forest and the species is known to be associated with PCT 11. A very small area of potential habitat (PCT 11 poor condition) was recorded in the study area and the survey was completed outside of the season when Swift Parrots are on the mainland in January 2021. As Swift Parrots were not detectable during the survey, a precautionary approach has been taken and the species is considered moderately likely to occur based on the presence of potential habitat.

An action is likely to have a significant impact on a Critically Endangered or Endangered species if there is a real chance or possibility that it will:

1 Lead to a long-term decrease in the size of a population

On the mainland during the winter months Swift Parrots are widely nomadic in response to the varying distribution of blossom. Swift Parrot movements locally vary from year to year in response to resources in their range. The proposal would impact <0.1ha of potential foraging habitat in the form of PCT 11 (poor condition). Previous records for the Swift Parrot occur to the east of the study area, in association with Back Yamma State Forest and the dominant canopy species within and adjacent to the study area is listed as Swift Parrot habitat in the National Recovery Plan for the Swift Parrot. *Eucalyptus camaldulensis* represents a resource that Swift Parrots are known to use, particularly where it occurs with heavy lerp infestations.

Due to the nomadic nature of Swift Parrots in relation to annual resource distribution on the mainland and the general narrow and linear impact associated with the proposal, any identified population of Swift Parrot would not be restricted to habitat in the study area. Swift Parrots are likely to be present in other parts of the locality as there is a large amount (~840ha) of potentially suitable habitat in the form of PCT 11 mapped as occurring in the locality. Although the proposal will add incrementally to the loss of a small amount (<0.1ha) of potential foraging habitat in the locality, the proportional impact is very small as outlined in main report. Therefore, the proposal is not likely to lead to a long-term decrease in the size of the Swift Parrot population.

2 Reduce the area of occupancy of the species

The Swift Parrot breeds in Tasmania during the austral summer and the entire population migrates north to mainland Australia for the austral winter. Whilst on the mainland the Swift Parrot disperses widely, foraging on flowers and lerp in *Eucalyptus* spp. mainly in Victoria and New South Wales (National Recovery Plan for the Swift Parrot *Lathamus discolor*, 2011). The Swift Parrot uses different areas in different years depending on the availability of food sources. In New South Wales, Swift Parrots forage in forests and woodlands throughout the coastal and western slopes regions, whereby coastal regions support larger numbers of birds when inland habitats are subject to drought. The current distribution of Swift Parrot is illustrated in Figure F.2.

If the Swift Parrot was to use habitat resources available in the study area, the proposal would impact <0.1ha of potential foraging habitat in the form of PCT 11 (poor condition). While the proposal would lead to a small incremental loss of potentially suitable habitat. The proportional impact to similar habitats in the locality is very small and considered negligible and the impact is not considered important in regard to its context and intensity.

3 Fragment an existing population into two or more populations

Habitat connectivity is not likely to be affected by the proposal. The majority of the study area occurs within or adjacent too previously disturbed land (rail corridor and agriculture). Less than <0.1ha of potential foraging habitat is likely to be affected by the proposal with vegetation removal largely limited to a linear disturbance corridor. As the study area is linear in nature and largely avoids significant vegetation, the proposal would not further fragment or isolate any previously undisturbed patches of habitat than what already exists in the study area and locality. Furthermore, given that the Swift Parrot is highly mobile and nomadic, the proposal would not present a significant barrier. It is not considered likely that habitat would become further isolated or fragmented significantly beyond that currently existing in the study area.

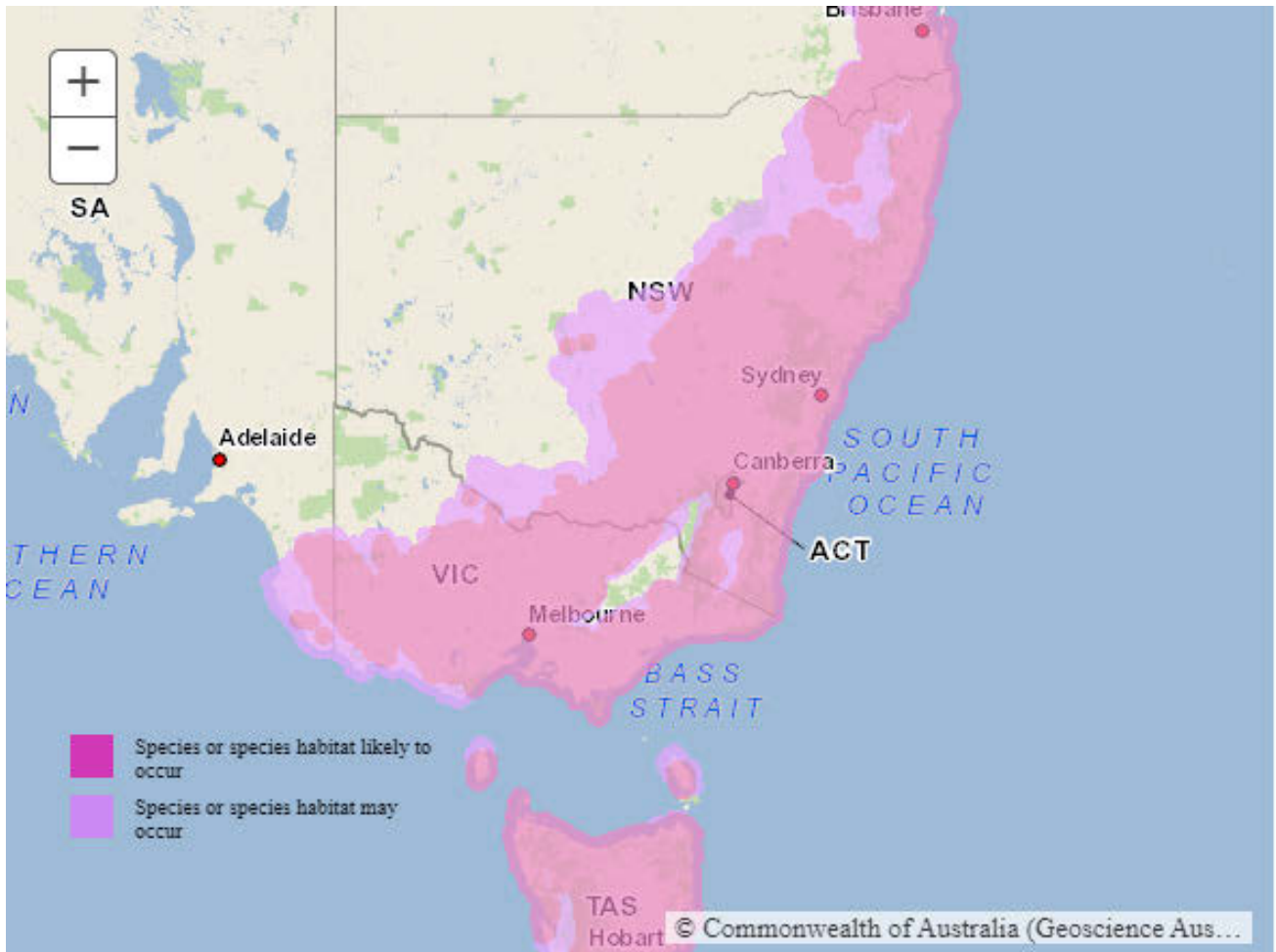


Figure F.2 Distribution map for Swift Parrot (Department of the Environment, 2021d)

4 Adversely affect habitat critical to the survival of a species

No critical habitat has been listed for the Swift Parrot to date. As outlined in the National Recovery Plan, of particular importance for conservation management are habitats that are used:

- for nesting
- by large proportions of the Swift Parrot population
- repeatedly between seasons (site fidelity)
- for prolonged periods of time (site persistence).

Although there are no previous records for the Swift Parrot known from the study area or proposal locality (Atlas of NSW Wildlife database), the species has been recorded to the east of the study area in association with Back Yamma State Forest. While the species exhibits variability in the pattern of movements between years in response to the varying distribution of blossom and lerp throughout its range, potential habitat in the study area is not considered critical to the survival of the species. The proposal would impact <0.1ha of narrow and linear habitat in an existing highly disturbed rail corridor. Although the loss of native vegetation would be an incremental loss of local habitat, the quality and importance are not considered to be significant to the long-term survival of any local population of Swift Parrot.

5 Disrupt the breeding cycle of a population

The Swift Parrots breeds in Tasmania during spring and summer, migrating to south-eastern Australia during autumn and winter. While Swift Parrots are dependent on flowering and lerp resources across a wide range of habitats (woodlands and forests) within their NSW wintering grounds, the removal of <0.1ha of potential foraging habitat is unlikely to disrupt their movements to Tasmanian breeding grounds. As such the proposal is unlikely to affect the breeding cycle of a population of Swift Parrot.

6 Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

During the winter months when the Swift Parrot resides on mainland Australian, they are widely nomadic in response to the varying distribution of blossom and lerp. Due to the general narrow and linear impact associated with the proposal, any identified population of Swift Parrot would not be restricted to habitat in the study area. Swift Parrots are likely to be present in other parts of the locality as there is a large amount (~840ha) of potentially suitable habitat in the form of PCT 11 mapped as occurring in the locality. Although the proposal will add incrementally to the loss of a small amount (<0.1ha) of potential foraging habitat in the locality, the proportional impact is very small and considered negligible. Therefore, while the potential marginal foraging habitat would be impacted, it is unlikely to be of an extent that would cause this species to decline.

7 Result in invasive species that are harmful to an Endangered species becoming established in the Endangered species' habitat

It is not likely that invasive species (such as introduced predators) that are potentially harmful to the Swift Parrot would become further established as a result of the proposal.

8 Introduce disease that may cause the species to decline

No. It is unlikely that disease would be increased by the proposal.

9 Interfere with the recovery of the species

Recovery strategies outlined in Swift Parrot Recovery Plan include:

- identify the extent and quality of habitat
- manage and protect swift parrot habitat at the landscape scale
- monitor and manage the impact of collisions, competition and disease
- monitor population and habitat.

The proposal would be conflict with the second recovery action, to manage and protect swift parrot habitat at the landscape scale. However, it is unlikely that the impact of a small area of marginal habitat would significantly exacerbate the recovery of the species and significantly impact this species.

Conclusion

In summary, the proposal is considered unlikely to result in a significant impact to the Swift Parrot. Less than 0.1ha of potential habitat would be affected by the proposal. Although the Swift Parrot is not known from the study area or wider locality (Atlas of NSW Wildlife database), the irregular distribution of blossom and lerp resources, which is a key driver of nomadism of this species, may cause this species to occasionally forage within the study area intermittently during periods of seasonal variation.

Swift Parrots using the study area are likely to use habitat that extends through the locality and due to the narrow and linear impact expected within an existing highly disturbed rail corridor, it is considered unlikely that local population of Swift Parrot would be restricted to the study area. Therefore, the predicted impacts to the potential habitat for this species is likely to be minor given the mapped extent of similar vegetation in the locality. The impacts to this species are not considered to be important in regard to the context and intensity.

F2.4 GREY-HEADED FLYING-FOX

The Grey-headed Flying-fox (*Pteropus poliocephalus*) is listed as Vulnerable under the EPBC Act.

The study area provides foraging habitat for this species, no breeding camps occur within or in close proximity to the proposal. The proposal will result in the removal of <0.1ha of potential habitat for the species that is likely utilised for foraging as part of a far larger home range.

The following assessment has been undertaken following the Matters of National Environmental Significance, Significant Impact Guidelines 1.1. Under the Act, important populations are:

- likely to be key source populations either for breeding or dispersal
- likely to be necessary for maintaining genetic diversity, and/or
- at or near the limit of the species range.

IS THIS PART OF AN IMPORTANT POPULATION?

Grey-headed Flying-foxes occur across a range of wooded habitats where their favored food, eucalypt blossom occurs. They set up roosting camps in association with blossom availability, which are usually situated in dense vegetation and associated with water. Grey-headed Flying-foxes can migrate up to 75km north during the winter and during this time young flying-foxes establish camps.

With reference to DoEE's National Flying-fox monitoring viewer, there are no recorded Flying-fox camps within the study area (DoEE 2021). The closest recorded camps to the study area include:

- Parkes (Kelly Rd camp #834) – approximately 30km to the north of the study area, according to the National Flying Fox monitoring viewer this camp has not recorded Grey-headed Flying-fox, but Little Red Flying-foxes, and of that species only 1-499 individuals in 2019
- Grenfell (camp #916) – approximately 58km to the south-east of the study area, according to the National Flying Fox monitoring viewer this camp last recorded Grey-headed Flying-fox in 2018 with a total of 1-499 individuals present
- Orange (Ploughmans lane camp #818) – approximately 100km to the east of the study area, according to the National Flying Fox monitoring viewer this camp last recorded Grey-headed Flying-fox in 2019 with a total of 500-2500 individuals.

Occurrences of this species within the study area are not at the limits of the species' distribution, nor are any maternity camps present in the study area, and as such the habitat within the study area can only be considered to represent a part of the foraging range of widely occurring individuals. However, the Grey-headed Flying-fox has no separate or distinct populations (DoE 2014a). The species constantly exchanges genetic information between camps throughout its geographic range. Therefore, the species occurs as one population and therefore any individuals that occur in the study area would be considered to form part of 'an important population'.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will result in one or more of the following:

1 Lead to a long-term decrease in the size of an important population of a species

The proposal would impact approximately <0.1ha of potential foraging habitat in the form of PCT 11 (poor condition). Due to the nomadic nature of Grey-headed Flying-fox and their ability to forage up to 50km from roost sites, the Grey-headed Flying-fox would not be restricted to habitat in the study area. Grey-headed Flying-fox are likely to be present in other parts of the locality as there is a large amount (~840ha) of potentially suitable habitat in the form of PCT 11 mapped as occurring in the locality. Although the proposal will add incrementally to the loss of a small amount (<0.1ha) of potential foraging habitat in the locality, the proportional impact is very small. Therefore, the proposal is not likely to lead to a long-term decrease in the size of the Grey-headed Flying-fox population.

2 Reduce the area of occupancy of an important population

The project would result in the removal of up to <0.1ha of potential foraging habitat in the form of PCT 11 (poor condition). The removal of <0.1ha of vegetation, that contains varying sources of blossom and fruit trees that form part of the Grey-headed flying fox diet, does not comprises a significant proportion of foraging habitat available to the species in the surrounding locality. The removal of this <0.1ha of potential foraging habitat would have a minimal impact on the area of occupancy of the species.

3 Fragment an existing important population into two or more populations

Habitat connectivity is not likely to be affected by the proposal. The majority of the study area occurs within or adjacent too previously disturbed land (rail corridor and agriculture land). Approximately <0.1ha of potential foraging habitat is likely to be affected by the proposal with vegetation removal largely limited to a linear disturbance corridor. As the study area is linear in nature and largely avoids significant vegetation, the proposal would not further fragment or isolate any previously undisturbed patches of habitat than what already exists in the study area and locality. Furthermore, given that the Grey-headed Flying-fox is highly mobile and nomadic, the proposal would not present a significant barrier. It is not considered likely that habitat would become further isolated or fragmented significantly beyond that currently existing in the study area.

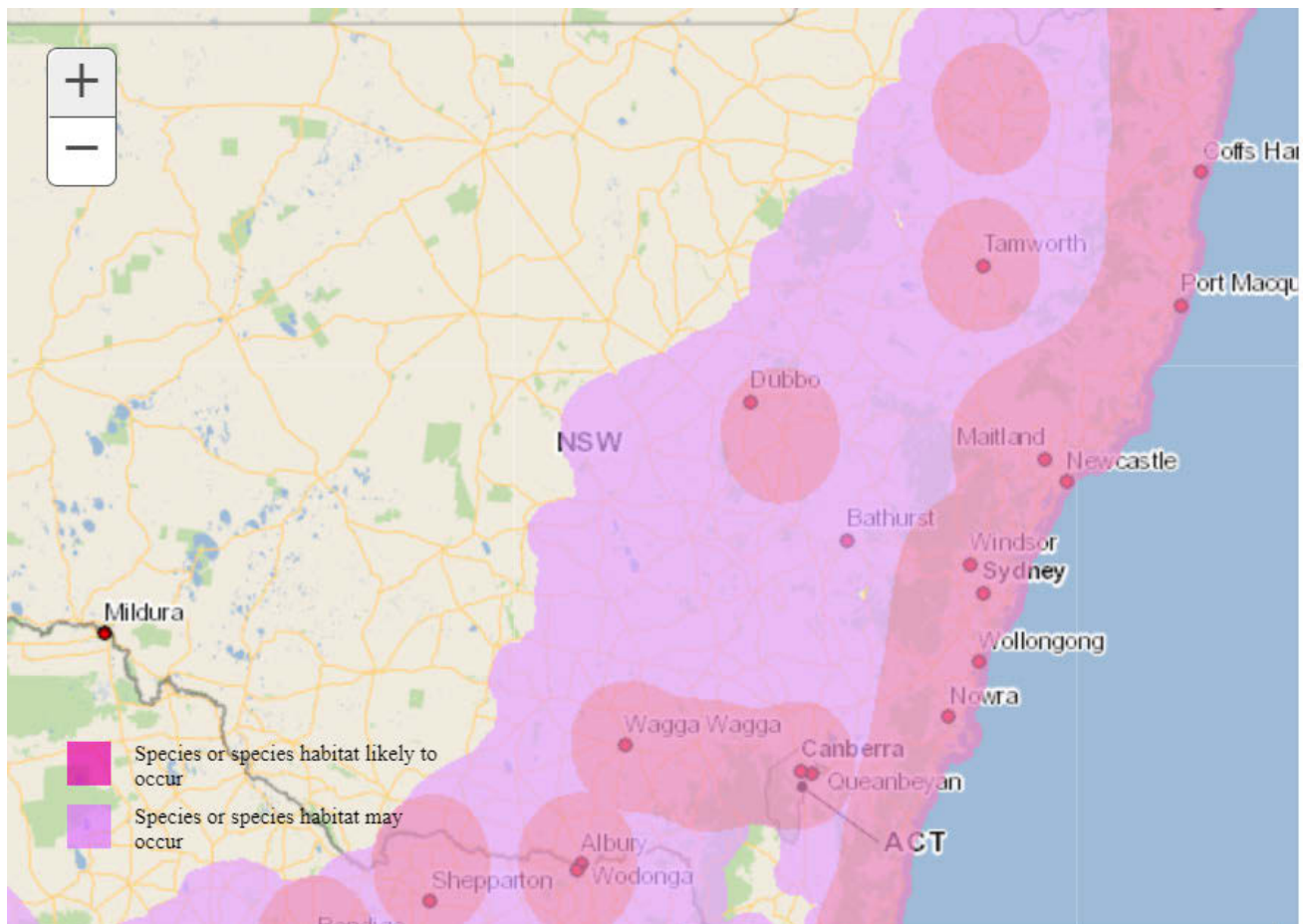


Figure F.3 Distribution map for Grey-headed Flying-fox (Department of the Environment, 2021d)

4 Adversely affect habitat critical to the survival of a species

No critical habitat is listed for this species under the EPBC Act. Habitat critical to the survival of a species may also include areas that are not listed on the Register of Critical Habitat if they are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long-term evolutionary development, or
- for the reintroduction of populations or recovery of the species or ecological community.

The foraging habitat within the study area meets the DECCW (2009) criteria for habitat critical for the survival of Grey-headed Flying-fox due to its proximity to existing camps (within 50km) but removal of <0.1ha of foraging habitat is unlikely to significantly impact on this species, given the abundance of higher quality myrtaceous foraging habitat within the greater locality.

5 Disrupt the breeding cycle of an important population

No roost sites/camps occur within the study area nor would the proposed action affect any roosts/camps in the locality. Therefore, it is unlikely that the proposed action would disrupt the breeding cycle of the population of Grey-headed Flying-fox.

6 Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

No. The action proposed would only affect approximately <0.1ha of suitable foraging habitat for this species. As this species is known to forage up to 50km from roost sites, the action proposed is unlikely to significantly affect the availability of quality habitat for this species.

7 Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

It is not likely that invasive species (such as introduced predators) that are harmful to the Grey-headed Flying-fox would become further established as a result of the proposed action.

8 Introduce disease that may cause the species to decline

No. There are no known diseases that are likely to increase in the area as a result of the proposed action.

Australian flying-foxes, including the Grey-headed Flying-fox, are natural reservoirs for at least three diseases- Australian Bat Lyssavirus (ABL), Hendra virus and Menangle virus. While injured and orphaned Grey-headed Flying-foxes have a higher chance of testing positive for ABL, it is unlikely the proposed action will introduce this disease.

White-nosed syndrome, a fungal disease causing widespread concern due to its impact upon bat populations in North America, has only been identified in microbats. The disease has not been identified in Australia.

9 Interfere substantially with the recovery of the species

Due to the relatively small foraging habitat likely to be affected by the proposed action (about <0.1ha) and as no roost camps are located in the study area, the proposed action is not likely to interfere with the recovery of this species.

Conclusion

The Grey-headed Flying-fox frequents habitats that contain eucalypt blossom and native fruits such as figs, which are their favored foods. The study area contains eucalypt dominated communities, these include those that are favored by this species. A relatively small amount of foraging habitat <0.1ha will be affected by the proposed action, although this is unlikely to be significant to local populations, due to the abundance of similar and greater quality foraging habitat elsewhere within the study area and in the wider locality. There are no Grey-headed Flying-fox camps within the subject site.

The proposed action is not considered to fragment any locally occurring populations, disrupt their breeding cycles, introduce disease that may cause the species to decline or interfere with the recovery of the species. The proposed action therefore considered unlikely to have a significant impact on the Grey-headed Flying-Fox.

F2.5 KOALA

The Koala (*Phascolarctos cinereus*) is listed as Vulnerable under the EPBC Act. The following assessment has been undertaken following the Matters of National Environmental Significance, Significant Impact Guidelines 1.1. Under the Act, important populations are:

- likely to be key source populations either for breeding or dispersal
- likely to be necessary for maintaining genetic diversity, and/or
- at or near the limit of the species range.

IS THIS PART OF AN IMPORTANT POPULATION?

The Koala was not recorded in the study area during the field survey informing this report, and no records for this species were returned from the Atlas of NSW Wildlife database. Riverine woodland occurring along the banks of the Lachlan River consisted of primarily of *Eucalyptus camaldulensis*, which is listed as a primary Koala food tree species for the Forbes Shire Council area. The study area may be used on an intermittent basis during local movements, but it is not likely to represent important habitat. Although the study area provided primary feed tree species and marginal potential foraging habitat, similar habitat occurs more widely within the locality.

This species, if occurring within the study area, would not be at the limit of its known range; nor would the population there be likely to be a key source population or necessary for maintaining genetic diversity. Therefore, it is considered that a population of Koala, if present, is unlikely to be an ‘important population’.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will result in one or more of the following:

1 Lead to a long-term decrease in the size of an important population of a species

Not applicable. Koala potentially occurring in the study area is not considered part of an important population.

2 Reduce the area of occupancy of an important population

Not applicable. Koala potentially occurring in the study area is not considered part of an important population.

3 Fragment an existing important population into two or more populations

Not applicable. Koala potentially occurring in the study area is not considered part of an important population.

4 Adversely affect habitat critical to the survival of a species

No critical habitat is listed for the Koala under the EPBC Act. However, the Koala Habitat Assessment Tool within the ‘EPBC Act referral guidelines for the vulnerable Koala’ was used to determine whether Koala habitat in the study area classifies as ‘habitat critical to the survival of the Koala’ (Section 6.3.2.1 main report). To be classified as habitat critical to the survival of the Koala vegetation must score 5 or above using the habitat assessment tool. A summary of the key assessment criteria and scoring for the study area against the referral guidelines is provided in Table 6.2 and illustrated in Figure 6.1 of the main report body.

Using the Koala Habitat Assessment Tool, Koala habitat in the study area scored 3 out of 10 (Table 6.2). Therefore, habitat in the study area is not likely to constitute habitat critical to the survival of the species. A comparison of the proposal’s potential impacts was assessed against Figure 2 of the ‘EPBC Act referral guidelines for the vulnerable Koala’ to determine where impacts were likely to be adverse. As illustrated in Table 6.2, it was concluded that the proposal is unlikely to have an adverse impact on the habitat critical for the species due to the following:

- Forbes does not occur as an ‘Area of Regional Koala Significance’. With relevance to the study area, such areas are mapped to the east in association with Queen Charottes Creek, south of Bathurst
- the Atlas of NSW Wildlife database did not contain Koala records within 10km of the proposal study area
- the proposal is likely to impact <0.1ha of potential Koala habitat.

5 Disrupt the breeding cycle of an important population

Not applicable. Koala potentially occurring in the study area is not considered part of an important population.

6 Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The Koala was not recorded in the study area during field surveys and no records for this species were returned from the Atlas of NSW Wildlife database. Nevertheless, whilst the rail corridor was highly disturbed, small areas of remnant woodland dominated by *Eucalyptus camaldulensis* occurred therein. *Eucalyptus camaldulensis* is listed as a primary Koala food tree species for the Forbes Shire Council area. The proposal would impact on <0.1ha of habitat in the form of PCT 11 (poor condition). Any population of Koala potentially using the study area are likely to be part of a viable population extending throughout the locality and are likely to be present in other parts of the locality. A large amount of potentially suitable habitat (~840ha) in the form of PCT 11 was mapped as occurring in the locality. The proportional impact to this potential habitat is very small and considered negligible. Due to the narrow and linear impact expected within an existing highly disturbed rail corridor, it is considered unlikely that a local population of Koala would be restricted to the study area. While a small amount potential marginal foraging habitat would be impacted, it is unlikely to be of an extent that would cause this species to decline.

7 Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat

It is not likely that invasive species (such as introduced predators) that are harmful to the Koala would become further established as a result of the proposal.

8 Introduce disease that may cause the species to decline

It is unlikely that the proposal would significantly fragment a koala population to the point where dispersal is limited and therefore disease transmission between individuals is increased. As *Chlamydia* bacteria in Koalas and Koala Retrovirus is primarily transmitted between Koala individuals (DECC, 2008), it is unlikely that the proposal would introduce disease that may cause the species to decline.

9 Interfere substantially with the recovery of the species

A recovery plan for the Koala has not been prepared under the EPBC Act.

The proposal would not interfere with the Saving Our Species (OEH, 2017) recovery strategy or Approved Recovery Plan (DECC, 2008). The study area did not occur within any priority management or koala management sites for the species (OEH, 2017; DECC, 2008).

Conclusion

In summary, the proposal is considered unlikely to result in a significant impact to the Koala. Whilst, <0.1ha of potential habitat would be affected by the proposal, the Koala was not recorded in the study area during field surveys and the species is not known from the locality via records returned from the Atlas of NSW Wildlife database. Koalas potentially using the study area are likely to use habitat that extends through the locality and due to the narrow and linear impact expected within an existing highly disturbed rail corridor, it is considered unlikely that a local population of Koala would be restricted to the study area. Therefore, the predicted impacts to the potential habitat for this species is likely to be minor given the mapped extent of similar vegetation in the locality. The impacts to this species are not considered to be important in regard to the context and intensity.

F2.6 SUPERB PARROT

The Superb Parrot (*Polytelis swainsonii*) is listed as Vulnerable under the EPBC Act. The following assessment has been undertaken following the Matters of National Environmental Significance, Significant Impact Guidelines 1.1.

Under the Act, important populations are:

- likely to be key source populations either for breeding or dispersal;
- likely to be necessary for maintaining genetic diversity, and/or
- at or near the limit of the species range.

IS THIS PART OF AN IMPORTANT POPULATION?

Although not recorded in the study area during onsite field surveys, Superb Parrots have previously been recorded flying over the study area and there are previous records for the species in the proposal locality. Small areas of potential habitat were recorded in the study area in the form of PCT 11 (poor condition and derived native grassland). Habitat areas occurred as disjunct patches of modified woodland, within a fragmented landscape, having previously been disturbed by the existing rail corridor, agricultural cropping and grazing.

It was estimated that the proposal will involve the removal of approximately 0.1ha of foraging habitat for this species. This species is considered as one single population across its range with majority of breeding occurring in the Riverina and South-west Slopes of NSW. Local occurrences of this species are likely part of key source populations for breeding and dispersal. Therefore, individuals that occur within the area are considered as part of ‘an important population’.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

1 Lead to a long-term decrease in the size of an important population of a species

Although not recorded during onsite surveys, Superb Parrots have previously been recorded flying over the study area and greater locality. The proposal would impact on approximately 0.1ha of habitat in the form of PCT 11 (poor condition and derived native grassland). Superb Parrots using the study area are likely to be part of a viable population that extends through the locality and are likely to be present in other parts of the locality as there is a large amount (~840ha) of potentially suitable habitat in the form of PCT 11 mapped as occurring in the locality. Although the proposal will add incrementally to the loss of a small amount (0.1ha) of potential foraging habitat in the locality, the proportional impact is very small and considered negligible. Due to the narrow and linear impact expected within an existing highly disturbed rail corridor, the proposal is not likely to lead to a long-term decrease in the size of the Superb Parrot population.

2 Reduce the area of occupancy of an important population

The Superb Parrot occurs only in south-eastern Australia. The Superb Parrot is found in NSW and northern Victoria, where it occurs on the inland slopes of the Great Divide and on adjacent plains, especially along the major river-systems.

In NSW, it mostly occurs west of the Great Divide, where it mainly inhabits the Riverina, the South-west Slope and Southern Tableland Regions. Its range extends north to around Narrabri and Wee Waa in the North-west Plain Region, from a line joining Coonabarabran and Narrabri, and extending at least as far west as Tottenham and Quambone. The breeding range of the Superb Parrot is divided into three main areas:

- along the Murray and Edward Rivers
- along the Murrumbidgee River
- in a triangle bounded by Molong, Yass and Young.

If the Superb Parrot was to use habitat resources available in the study area, the proposal would impact approximately 0.1ha of potential foraging habitat in the form of PCT 11 (poor condition and derived native grassland). While the proposal would lead to a small incremental loss of potentially suitable habitat, the proportional impact to similar habitats in the locality is very low, and the impact is not considered important in regard to its context and intensity.

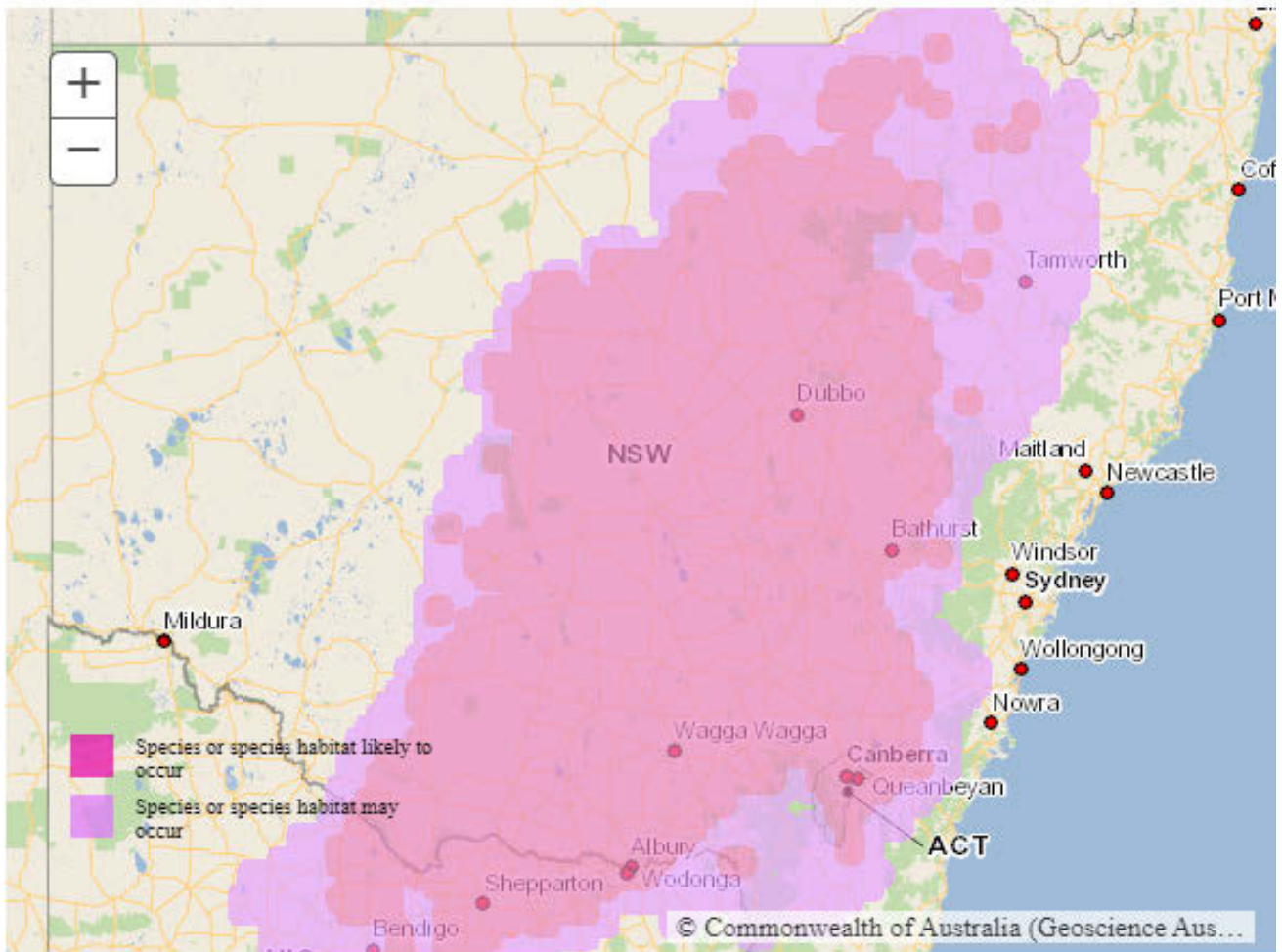


Figure F.4 Distribution map for Superb Parrot (Department of the Environment, 2021d)

3 Fragment an existing important population into two or more populations

Habitat connectivity is not likely to be affected by the proposal. The majority of the study area occurs within or adjacent to previously disturbed land (rail corridor and agriculture). Approximately 0.1ha of foraging habitat is likely to be affected by the proposal with vegetation removal largely limited to a linear disturbance corridor. As the study area is linear in nature and largely avoids significant vegetation, the proposal would not further fragment or isolate any previously undisturbed patches of habitat than what already exists in the study area and locality. Furthermore, the Superb Parrot is a highly mobile species able to transverse fragmented landscapes to isolated patches of vegetation. It is known that part of the population undertakes regular seasonal movements from breeding areas to foraging habitats across central and north-central NSW, often coinciding with flowering eucalypts. In addition, it is also known that when Superb Parrots undertake local movements they prefer to move along wooded corridors and limit traversing extensive open areas. As potential habitat within the study area already occurs within a highly fragmented landscape, it is considered unlikely that the disturbance of habitat in the study area would fragment the existing population into two or more populations.

4 Adversely affect habitat critical to the survival of a species

Critical habitats are areas of land that are crucial to the survival of particular threatened species, populations and ecological communities. No ‘critical habitat’ has been listed for the Superb Parrot under the EPBC Act. Habitat critical to the survival of species also refers to areas that are necessary:

- for activities such as foraging, breeding, roosting, or dispersal
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators)
- to maintain genetic diversity and long-term evolutionary development
- for the reintroduction of populations or recovery of the species or ecological community.

Potential habitat in the study area is not considered critical to the survival of the species. The proposal would impact approximately 0.1ha of narrow and linear habitat in an existing highly disturbed rail corridor. Although the loss of native vegetation would be an incremental loss of local habitat, the quality and importance are not considered to be significant to the long-term survival of a local population of Superb Parrot.

5 Disrupt the breeding cycle of an important population

Approximately 0.1ha potential habitat would be disturbed as part of the proposal. Superb Parrots nest in large hollow-bearing trees usually River Red Gums, Blakely’s Red Gum and Box eucalypts. Preferred nest trees are located along watercourses and within 10km of foraging habitat. Whilst the study area has the presence of hollow-bearing trees, the location of these do not occur within the impact area and thus will not impact breeding habitat, the predominate impact will be trimming of canopy trees on the bank of the Lachlan River to enable movement of the crane arm. It is unlikely that the removal of 0.1ha of potential habitat would disrupt the breeding cycle of this population, as this would be a small proportion of available resources within the greater locality.

6 Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Due to the general narrow and linear impact associated with the proposal, a population of Superb Parrot would not be restricted to habitat in the study area. Superb Parrots are likely to be present in other parts of the locality as there is a large amount (~840ha) of potentially suitable habitat in the form of PCT 11 mapped as occurring in the locality. Although the proposal will add incrementally to the loss of a small amount (0.1ha) of potential habitat in the locality, the proportional impact is very small and considered negligible. Therefore, while the potential foraging habitat would be impacted, it is unlikely to be of an extent that would cause this species to decline.

7 Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species’ habitat

Habitat for this species within the study area is in highly disturbed condition and is subject to weed and pest invasion. In addition, the majority of the study area occurred in an existing highly disturbed rail corridor, border by agricultural properties that have been long subjected to high disturbances relating to agricultural practices such as cropping, grazing, burning and the application of fertilisers. Therefore, it is considered unlikely that the proposal would substantially reduce the quality or integrity of the Superb Parrots habitat or increase spread of invasive species. Additionally, mitigation measures will be developed to minimise the likelihood of an increase or establishment of invasive species into the habitat of this species.

8 Introduce disease that may cause the species to decline

No. It is unlikely that disease would be increased by the proposal.

9 Will the action interfere with the recovery of the species?

A national recovery plan for Superb Parrot has been developed by the then Department of Sustainability and Environment. The recovery plan outlined four recovery objectives for this species, including:

- determine population trends
- increase knowledge of ecological requirements
- develop and implement threat abatement strategies
- increase community involvement and awareness of recovery program.

The proposal will not impact upon any of the objectives of the national recovery plan for this species.

Conclusion

In summary, the proposal is considered unlikely to result in a significant impact to the Superb Parrot. Approximately 0.1ha of potential habitat would be affected by the proposal. Superb Parrots potentially using the study area are likely to use habitat that extends through the locality and due to the narrow and linear impact expected within an existing highly disturbed rail corridor, it is considered unlikely that a local population of Superb Parrot would be restricted to the study area. Therefore, the predicted impacts to the potential habitat for this species is likely to be minor given the mapped extent of similar vegetation in the locality. The impacts to this species are not considered to be important in regard to the context and intensity.

F3 FM ACT ASSESSMENT OF SIGNIFICANCE

The proposal is being assessed under the EP&A Act. Section 5.5 of the EP&A Act requires that a determining authority examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of the proposal and that assessment of significance is undertaken to assess the likelihood of significant impact upon threatened species, populations or ecological communities listed under the FM Act. The test for determining whether the proposal is likely to affect threatened species, populations or ecological communities or their habitats is in Division 12 of the FM Act.

Section 221ZV Determination of whether proposed development or activity likely to significantly affect threatened species, population or ecological community.

The following is to be taken into account for the purposes of determining under this Division whether a proposed development or activity is likely to significantly affect threatened species, populations or ecological communities (unless it is carried out in critical habitat)—

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

SILVER PERCH

Silver perch, also known as bidyan or black or silver bream, are a moderate to large freshwater fish native to the Murray-Darling river system. They were once widespread and abundant throughout most of this area, except for cooler high altitude streams. However, they have now declined to low numbers or disappeared from most of their former range.

Silver Perch have been found in a wide range of habitats and climates across the Murray-Darling Basin. They are generally found in faster-flowing water including rapids and races and more open sections of river. Individuals sometimes form large shoals in open water. They are omnivorous, feeding on a variety of small prey including aquatic insects, molluscs, worms, crustaceans, zooplankton and algae. Males reach sexual maturity at three years of age, when around 25cm in length, and females at four to five years, when around 29cm. Adult Silver Perch can move large distances, often associated with spawning activity in spring and summer. Juveniles disperse over large distances, and are often seen at fishways travelling upstream in large schools. Females can lay 300,000 or more non-adhesive, floating eggs that are about 2.7mm in diameter. They are mostly released in one spawning, and hatch after approximately 30 hours. Eggs and larvae passively drift with the river current for a number of days.

Threats include:

- modification of natural river flows and temperature regimes due to the construction of dams and weirs lead to disrupted cues for migration and spawning and reduce opportunities for dispersal and availability of food
- loss of riparian (river bank) vegetation by deliberate removal result in sedimentation, increased salinity and declines in water quality subsequently degrading instream habitats important to Silver Perch
- loss of submerged macrophytes which are important nursery areas for juvenile Silver Perch and important sites for feeding at all life stages
- competition from introduced species such as Carp, Redfin Perch and Gambusia
- stocking of inappropriate genetic strains, poor quality Silver Perch or Silver Perch hybrids
- Silver Perch are one of several native fish species found to be highly susceptible to the EHN (Epizootic Haematopoietic Necrosis Virus) disease, which is carried by the introduced Redfin Perch.

The distribution maps for this species include the study area and the study area does have some habitat preferences for this species such as open sections of water however it lacks fast flowing rapids and races. The habitat at the study area has been highly modified and the status of fish communities in this section of the Lachlan River is defined as very poor (DPI, 2016). As such, the study area is considered unlikely to provide important habitat for this species.

The proposal requires the removal of 0.1ha of native riparian vegetation and may result in increased turbidity in the water column during construction however the proposal does not require any instream works such as dredging or reclamation. The level of impact to the aquatic environment is relatively minor and the habitat being impacted is not considered to be important habitat for refuge and breeding. As such, the proposal is unlikely to have an adverse effect on the life cycle of the Silver Perch such that a viable local population of the species is likely to be placed at risk of extinction.

FLATHEAD GALAXIAS

Flathead Galaxias, also commonly known as Murray Jollytail, is a small native fish species from the family Galaxiidae. The species is endemic to the southern tributaries of the Murray-Darling River system; the Murray, Murrumbidgee and Lachlan Rivers and their tributaries and the upper Macquarie River catchment.

Flathead Galaxias has experienced significant declines in distribution and abundance in all river systems in NSW. Extensive scientific sampling over the last two decades has recorded extremely few specimens. The last record in the Murrumbidgee River was in 1971, and it is thought that the species may be locally extinct from the lower Murray, Murrumbidgee, Macquarie and Lachlan Rivers. In addition, only very small numbers of specimens have been sampled from wetlands of the Murray River floodplain between Hume Dam and Lake Mulwala and the upper Murray River near Tintaldra.

Flathead Galaxias is generally found mid-water in still and gently moving waters of small streams, lakes, lagoons, billabongs and backwaters. Its habitat consists of coarse sand or mud substrate and aquatic vegetation. Flathead Galaxias feeds predominately on aquatic insects and crustaceans. Spawning occurs in spring, when water temperatures are above 10.5°C. The species produces 2000-7000 transparent, slightly adhesive demersal eggs, with fecundity increasing with length of fish. The eggs hatch after 9 days at temperatures between 9-14°C. Fry are 6-8mm long after hatching. Individuals probably mature in their first year (approximately 80mm long).

Threats include:

- spawning or recruitment failure due to water regulation and cold water release from impoundments
- loss of or altered connectivity between rivers and floodplains
- loss of or degradation of habitats in lakes, wetlands and billabongs such as the loss of aquatic vegetation like Ribbon Weed (*Vallisneria* spp)
- predatory and competitive interactions with introduced species such as Carp (*Cyprinus carpio*), Redfin Perch (*Perca fluviatilis*) and Gambusia (*Gambusia holbrooki*)
- construction of barriers to migration and recolonisation such as weirs and dams without fish ways
- habitat modifications as a result of agricultural practices including siltation and loss of riparian vegetation
- pollution from domestic, agricultural and industrial sources.

The distribution maps for this species include the study area and the study area does have suitable refuge habitat for this species through the presence of some emergent reeds, bank overhangs and undercuts for refuge and instream habitat features such as logs. However, the study area lacks coarse sand and extensive areas of macrophytes which preferred habitat features for this species. In addition, the habitat at the study area has been highly modified and the status of fish communities in this section of the Lachlan River is defined as very poor (DPI, 2016). As such, the study area is considered unlikely to provide important habitat for this species.

The proposal requires the removal of 0.1ha of native riparian vegetation and may result in increased turbidity in the water column during construction however the proposal does not require any instream works such as dredging or reclamation. The level of impact to the aquatic environment is relatively minor and the habitat being impacted is not considered to be important habitat for this species. As such, the proposal is unlikely to have an adverse effect on the life cycle of the Flathead Galaxias such that a viable local population of the species is likely to be placed at risk of extinction.

SOUTHERN PURPLE SPOTTED GUDGEON

The Southern Purple Spotted Gudgeon is a small-bodied freshwater fish native to Australia. Two populations of Southern Purple Spotted Gudgeon occur in NSW; an eastern population found in coastal catchments north of the Clarence River, and a western population found throughout the Murray-Darling Basin. While once abundant and widely distributed, populations of Southern Purple Spotted Gudgeon have now declined to the extent that they are listed as an endangered species in NSW.

Southern Purple Spotted Gudgeon are a benthic species that can be found in a variety of habitat types such as rivers, creeks and billabongs with slow-moving or still waters or in streams with low turbidity. Cover in the form of aquatic vegetation, overhanging vegetation from river banks, leaf litter, rocks or snags are important for the species. Most remnant populations in NSW occur in small to medium sized streams. They feed mainly on terrestrial insects and their larvae, worms, small fish, tadpoles, and some plant matter. Males reach maturity at about 4.5cm and females at about 5cm in length. Males have an elaborate courtship display and spawning occurs over summer when water temperatures are warmer. Females may lay several batches of eggs per season (30–1,300 per batch). The eggs are small (2–4 mm long), elongated, sticky and transparent. They are deposited in clusters on solid objects such as rocks, wood or broadleaved plants. The male guards and fans the eggs until they hatch (3–8 days). Newly hatched larvae are approximately 4 mm long.

Threats include:

- predation by introduced fish such as Eastern Gambusia (*Gambusia holbrooki*) and Redfin Perch (*Perca fluviatilis*)
- habitat disturbance by common carp (*Cyprinus carpio*)
- loss of favourable habitat, particularly aquatic plants
- fluctuations in water levels and flow as a result of river regulation have a significant impact on the inundation frequency for wetland habitats including habitats important for Southern Purple Spotted Gudgeon reproduction and recruitment
- thermal pollution
- increased turbidity and damage of stream banks by livestock access
- decreased water quality due to agricultural runoff and siltation
- local extinctions may not be naturally recolonised because of the species' inability to disperse the long distances required. Populations are generally small and isolated from each other, and therefore vulnerable to localised extinctions from severe events.

The distribution maps for this species do not include the study area, but consist of tributaries and anabranches of the Lachlan River. The study area has some habitat features for this species through the presence of some emergent reeds, bank overhangs and undercuts for refuge and instream habitat features such as logs. However, the study area lacks extensive areas of macrophytes for refuge and rocks and broad-leaved plants for spawning, which are habitat requirements for this species. In addition, the habitat at the study area has been highly modified and the status of fish communities in this section of the Lachlan River is defined as very poor (DPI, 2016). As such, the study area is considered unlikely to provide important habitat for this species.

The proposal requires the removal of 0.1ha of native riparian vegetation and may result in increased turbidity in the water column during construction however the proposal does not require any instream works such as dredging or reclamation. The level of impact to the aquatic environment is relatively minor and the habitat being impacted is not considered to be important habitat for this species. As such, the proposal is unlikely to have an adverse effect on the life cycle of the Southern Purple Spotted Gudgeon such that a viable local population of the species is likely to be placed at risk of extinction

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

WESTERN POPULATION OF OLIVE PERCHLET

Olive Perchlet are a small native fish that occur in both eastern (coastal) and western (Murray-Darling) drainages in NSW, but these populations may be genetically distinct. The western population of the Olive Perchlet was once widespread throughout the Murray-Darling system of South Australia, Victoria, western New South Wales and southern Queensland. This population has suffered a serious decline and is now found only at a few sites in the Darling River drainage. The species is extinct in Victoria and has not been found in South Australia since 1983.

Olive Perchlet inhabit rivers, creeks, ponds and swamps. They are usually found in slowflowing or still waters where they are usually found in sheltered areas such as overhanging vegetation, aquatic macrophyte beds, logs, dead branches and boulders during the day, and disperse to feed during the night. Males and females reach sexual maturity at one year of age, and live for 2-4 years. Spawning occurs from October to December, when water temperatures increase to approximately 23°C. Females lay 200–700 eggs which attach to aquatic plants and rocks on the streambed. Olive Perchlet feed on a range of zooplankton and aquatic and terrestrial insects.

Threats include:

- predation by introduced fish species such as Gambusia (*Gambusia holbrooki*) and Redfin Perch (*Perca fluviatilis*)
- habitat degradation, including the removal of vegetation, logs and snags
- rapid fluctuations in water levels as a result of river regulation resulting in negative impacts on reproduction and recruitment
- spawning failures due to cold water releases from dams (temperature pollution)
- loss of instream aquatic vegetation through the impacts of river regulation and carp (*Cyprinus carpio*).

The distribution maps for this species include the study area and the study area does have suitable refuge habitat for this species through the presence of some emergent reeds, bank overhangs and undercuts for refuge and instream habitat features such as logs. However, the study area lacks suitable habitat for breeding such as aquatic plants and rocks. In addition, the habitat at the study area has been highly modified and the status of fish communities in this section of the Lachlan River is defined as very poor (DPI, 2016). As such, the study area is considered unlikely to provide important habitat for this species.

The proposal requires the removal of 0.1ha of native riparian vegetation and may result in increased turbidity in the water column during construction however the proposal does not require any instream works such as dredging or reclamation. The level of impact to the aquatic environment is relatively minor and the habitat being impacted is not considered to be important habitat for refuge and breeding. As such, the proposal is unlikely to have an adverse effect on the life cycle of the Western Population of Olive Perchlet such that a viable local population of the species is likely to be placed at risk of extinction.

MURRAY-DARLING POPULATION OF EEL-TAILED CATFISH

Eel-Tailed Catfish, also commonly known as Freshwater Catfish, is an Australian endemic species. The western population was once highly abundant and widespread throughout the Murray-Darling River System in NSW, Queensland, Victoria and South Australia (with the exception of the cooler parts of the southern tributaries). However, in NSW most riverine populations have declined significantly since the 1970s, and the species is no longer common in many areas where it was formally abundant.

Eel tailed catfish is a non-migratory, benthic (bottom dwelling) species. It is relatively sedentary and adults typically only move within a 5km range. Individuals are more active at night compared with during the day. The species inhabits a diverse range of freshwater environments including rivers, creeks, lakes, billabongs and lagoons. It prefers clear, sluggish or still waters, but can also be found in flowing streams with turbid waters. Substrates range from mud to gravel and rock. Individuals are sexually mature at 3–5 years of age and spawn in spring/summer when water temperatures are 20–24°C. Males construct and defend a nest up to 2 metres in diameter, made from pebbles and gravel. The eggs are large (~3 mm) and non-adhesive which settle towards the centre of the nest. The male fish remains with the nest to fan, clean and guard the eggs, which hatch after about 7 days. Larvae are approximately 7 mm long at hatching. Eel-Tailed Catfish is predominantly an opportunistic carnivore, feeding mainly on small fish, freshwater prawns, yabbies, snails, aquatic insects and zooplankton.

Threats include:

- loss of suitable habitat (lakes, billabongs, lagoons) through river regulation
- competitive and predatory interactions with introduced species such as Common Carp (*Cyprinus carpio*) and Redfin Perch (*Perca fluviatilis*)
- loss of habitat and spawning sites through siltation
- reduced success of spawning and recruitment due to alterations to flow patterns and flooding regimes
- reduced habitat and loss of temperature spawning cues due to cold-water discharge from the base of large dams and high-level weirs
- run-off of chemical pollution into waterways, including agricultural pesticides
- historical commercial and recreational overfishing.

The distribution maps for this species include the study area and the study area does have suitable refuge habitat for this species through the presence of some emergent reeds, bank overhangs and undercuts for refuge and instream habitat features such as logs. However, the study area lacks suitable habitat for breeding such as pebble and or gravel substrate found in riffle sections. In addition, the habitat at the study area has been highly modified and the status of fish communities in this section of the Lachlan River is defined as very poor (DPI, 2016). As such, the study area is considered unlikely to provide important habitat for this species.

The proposal requires the removal of 0.1ha of native riparian vegetation and may result in increased turbidity in the water column during construction however the proposal does not require any instream works such as dredging or reclamation. The level of impact to the aquatic environment is relatively minor and the habitat being impacted is not considered to be important habitat for refuge and breeding. As such, the proposal is unlikely to have an adverse effect on the life cycle of the Murray-Darling population of Eel-Tailed Catfish such that a viable local population of the species is likely to be placed at risk of extinction.

- c in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity—**
 - i is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
 - ii is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

The study area occurs within the *aquatic ecological community in the natural drainage system of the lowland catchment of the Lachlan River*. The lower Lachlan River EEC includes all fish and aquatic invertebrates within all natural rivers, creeks, streams and associated lagoons, billabongs, lakes, wetlands, paleochannels, floodrunners, effluent streams (those that flow away from the river) and the floodplains of the Lachlan River within the State of New South Wales.

The proposal does not require instream works and as such is unlikely to impact the extent or composition of this EEC such that its local occurrence is likely to be placed at risk of extinction.

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

The proposal is unlikely to impact instream habitat however it does require the removal of 0.1ha of riparian vegetation, consisting of approximately 0.08ha of derived native grasslands and approximately 0.02ha of poor quality derived native grassland. The riparian corridor has already been fragmented through past clearing and the proposal is unlikely to result in further fragmentation of riparian habitat. The riparian vegetation to be removed is not considered important habitat to the long-term survival of the aquatic threatened species, populations, and EECs in the locality.

- e whether the proposed development or activity is likely to have an adverse effect on any critical habitat (either directly or indirectly),**

N/A

- f whether the proposed development or activity is consistent with a Priorities Action Statement,**

The priorities action statement for the lowland Lachlan River aquatic EEC includes several recovery actions that are not directly relevant to the proposal and relate to actions required by DPI to ensure the protection of the EEC. Habitat rehabilitation is however of relevance and will be undertaken as part of a rehabilitation strategy for the area of impact (outside of the operational area) following completion of works.

- g whether the proposed development constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.**

Of the eight key threatening processes (KTP's) listed under the FM Act, only one applies to the proposal:

- degradation of native riparian vegetation along New South Wales water courses.

Riparian vegetation degradation along NSW watercourses has been listed as a KTP because of its negative impacts on many threatened species, populations and ecological communities. The following are of relevance to this assessment:

- Silver perch (vulnerable)
- Southern Purple-Spotted gudgeon (endangered)
- Olive perchlet (endangered population).

Compounds and stockpile sites would be located an appropriate distance from riparian habitat to avoid indirect impacts on aquatic habitat and direct impacts on in-stream vegetation and native vegetation on the banks of watercourses would be avoided as far as practicable. Following completion of works, disturbed areas outside of the operation area will be restored in accordance with a rehabilitation strategy. As such, the proposal is unlikely to significantly contribute to this KTP.

F4 ASSESSMENT OF SIGNIFICANCE: EPBC ACT

SILVER PERCH

Silver Perch *Bidyanus bidyanus* is listed as a Critically Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Department of Agriculture Water and the Environment, 2013).

Silver perch, are a moderate to large freshwater fish native to the Murray-Darling river system. They were once widespread and abundant throughout most of this area, except for cooler high altitude streams. However, they have now declined to low numbers or disappeared from most of their former range.

Silver Perch have been found in a wide range of habitats and climates across the Murray-Darling Basin. They are generally found in faster-flowing water including rapids and races and more open sections of river. Individuals sometimes form large shoals in open water. They are omnivorous, feeding on a variety of small prey including aquatic insects, molluscs, worms, crustaceans, zooplankton and algae. Males reach sexual maturity at three years of age, when around 25cm in length, and females at four to five years, when around 29cm. Adult Silver Perch can move large distances, often associated with spawning activity in spring and summer. Juveniles disperse over large distances, and are often seen at fishways travelling upstream in large schools. Females can lay 300,000 or more non-adhesive, floating eggs that are about 2.7mm in diameter. They are mostly released in one spawning, and hatch after approximately 30 hours. Eggs and larvae passively drift with the river current for a number of days.

FLATHEAD GALAXIAS

Flathead Galaxias *Galaxias rostratus* is listed as a Critically Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Department of Agriculture Water and the Environment, 2016).

Flathead Galaxias is endemic to the southern tributaries of the Murray-Darling River system; the Murray, Murrumbidgee and Lachlan Rivers and their tributaries and the upper Macquarie River catchment.

Flathead Galaxias has experienced significant declines in distribution and abundance in all river systems in NSW. Extensive scientific sampling over the last two decades has recorded extremely few specimens. The last record in the Murrumbidgee River was in 1971, and it is thought that the species may be locally extinct from the lower Murray, Murrumbidgee, Macquarie and Lachlan Rivers. In addition, only very small numbers of specimens have been sampled from wetlands of the Murray River floodplain between Hume Dam and Lake Mulwala and the upper Murray River near Tintaldra.

Flathead Galaxias is generally found mid-water in still and gently moving waters of small streams, lakes, lagoons, billabongs and backwaters. Its habitat consists of coarse sand or mud substrate and aquatic vegetation. Flathead Galaxias feeds predominately on aquatic insects and crustaceans. Spawning occurs in spring, when water temperatures are above 10.5°C. The species produces 2000–7000 transparent, slightly adhesive demersal eggs, with fecundity increasing with length of fish. The eggs hatch after 9 days at temperatures between 9–14°C. Fry are 6–8mm long after hatching. Individuals probably mature in their first year (approximately 80mm long).

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of a population

The proposal will result in the loss of 0.1ha of riparian vegetation and may result in some short-term increase in turbidity levels however this is unlikely to lead to a decrease in the size of a population of either Silver Perch or Flathead Galaxias in the locality.

- reduce the area of occupancy of the species

The predicted distribution of the Silver Perch has been mapped by DPI as along the length of the Lachlan River while the predicted distribution of the Flathead Galaxias is in tributaries of the Lachlan River. The proposal will have relatively minor impacts on the aquatic environment and will not result in a reduction in the area of occupancy for these species.

- fragment an existing population into two or more populations

There are no known populations of Silver Perch or Flathead Galaxias occurring in the study area (ALA database) and as the proposal will have relatively minor impacts on the aquatic environment, it will not fragment any existing population.

- adversely affect habitat critical to the survival of a species

The study area has not been identified as habitat critical to the survival of either Silver Perch or Flathead Galaxias.

- disrupt the breeding cycle of a population

The study area has not been identified as having important breeding habitat for either Silver Perch or Flathead Galaxias such as macrophytes. In addition, the Lachlan River in the vicinity of the study area has been mapped as very poor fish community status (DPI, 2016). As such, the proposal will not disrupt the breeding cycle of a population of either species.

- modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

Riparian vegetation not only provides bank stability, but the roots also provide habitat in bank overhangs and undercuts. The proposal will result in a minor impact to riparian vegetation, hence potential impacts to aquatic habitat through the root system will also be minor. The majority of the riparian vegetation in the study area is derived grassland in poor condition and is not considered quality habitat, thus the proposal is unlikely to result in a decline in quality habitat to the extent that Silver Perch or Flathead Galaxias are likely to decline.

- result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

The study area has a history of past disturbance and a subsequent high level of weed invasion. The proposal is unlikely to exacerbate the existing poor condition of the riparian vegetation and as there are no instream works, the proposal is unlikely to result in an increase in exotic macrophytes. Thus the proposal is unlikely to result in an invasive species that is harmful to Silver Perch or Flathead Galaxias.

- introduce disease that may cause the species to decline, or

The proposal is unlikely to result in the introduction of a harmful disease.

- interfere with the recovery of the species.

The proposal will have a relatively minor impact on riparian vegetation and turbidity in the short term, and it does not involve instream works. As such, it is considered unlikely to interfere with the recovery of either Silver Perch or Flathead Galaxias.