APPENDIX D

Horizontal Clearances

Biodiversity Assessment Report

STOCKINBINGAL TO PARKES REVIEW OF ENVIRONMENTAL FACTORS

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ARTC INLAND RAIL

STOCKINBINGAL TO PARKES (S2P) – HORIZONTAL CLEARANCES

BIODIVERSITY ASSESSMENT REPORT

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GLOSSARY

Biodiversity Assessment Method (BAM)	Biodiversity Assessment Method 2020 that supports the *Biodiversity Conservation Act 2016.* The BAM is a scientific and legal document that provides: — 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	The biological diversity of life is commonly regarded as being made up of the following three components: — 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	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 *Biodiversity Conservation Act 2016*) and some fish.
BioNet Vegetation Classification	The master vegetation community-level classification for use in vegetation mapping programs and regulatory biodiversity impact assessment frameworks in NSW. The BioNet Vegetation Classification is published by EES and available at www.environment.nsw.gov.au/research/Visclassification.htm.
Critical habitat	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 *Biodiversity Conservation Act 2016* and the *Environment Protection and Biodiversity Conservation Act 1999* 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.
Derived vegetation	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.
Ecological community	An assemblage of species occupying a particular area.
Environment, Energy and Science (EES) Group	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.
Exotic	Introduced from outside the area (Stralberg et al., 2009). Used in the context of this report to refer to species introduced from overseas.

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: **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 *Environment Protection and Biodiversity Conservation Act 1999.* 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 *Environment Protection and Biodiversity Conservation Act 1999*.
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 *Biosecurity Act 2015*. 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 *Biodiversity Conservation Act 2016*, *Fisheries Management Act 1994* or the *Environment Protection and Biodiversity Conservation Act 1999*.
Threatened ecological community (TEC)	Critically endangered ecological community, an endangered ecological community or a vulnerable ecological community listed under: — 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	Critically endangered, endangered or vulnerable threatened species and populations as defined by: — 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. Capitalisation of the terms ‘threatened’, ‘vulnerable’, ‘endangered’ or ‘critically endangered’ in this report refers to listing under the relevant State and/or Commonwealth legislation.
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 *Biodiversity Conservation Act 2016*
BC Regulation	NSW *Biodiversity Conservation Regulation 2017*
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 *Environmental Planning and Assessment Act 1979*
EP&A Regulation	NSW *Environmental Planning and Assessment Regulation 2000*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ha	Hectares
IBRA	Interim Biogeographic Regionalisation for Australia
ISEPP	*State Environmental Planning Policy (Infrastructure) 2007*
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), and whether a referral under the EPBC Act is required.

No detailed aquatic biodiversity assessment was undertaken as no significant waterbodies occurred within the proposal site or are likely to be affected by the proposal.

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. 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.

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 Biodiversity Assessment Report (BAR) has been prepared for the Horizontal Clearances within the rail corridor between Stockinbingal and Forbes, NSW (the proposal) to accommodate double stack freight trains up to 1800 metres long and 6.5 metres high. The existing horizontal clearances at the six sites shown in Figure 1.1 (the proposal site), do not provide the nominated clearance requirements to allow passage of the double stack freight trains.

The key proposed works at each site as described in Table 1.1 would be subject to detailed design.

Table 1.1 Key proposal features at each site

SITE	KEY FEATURES
Forbes Station and Yard	— Realignment of approximately 500m of the main line by up to 540mm and associated drainage works. — Realignment of approximately 140m of the goods siding track including installation of a new catch point. — Trimming of the platform awning at Forbes Station by 400mm for the full length.
Wirrinya Yard	— Realignment of approximately 520m of track by up to 350mm.
Caragabal Yard	— Realignment of approximately 250m of track by up to 30mm.
Quandialla Yard	— Removal of redundant pipework from a water tank adjacent to the track.
Bribbaree Yard	— Realignment of approximately 900m of track by up to 300mm, including formation and associated drainage works.
Milvale Yard	— Removal of redundant wiring from a water tank adjacent to the track.

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 and the Commonwealth EPBC Act. Mitigation measures to ameliorate 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 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 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) 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 rail 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.

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

INLAND RAIL ARTC

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

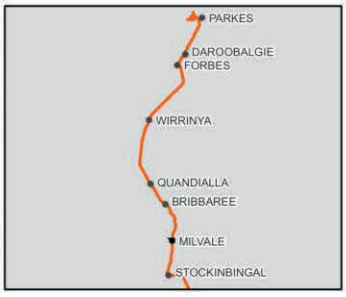
Stockinbingal to Parkes Milvale yard clearances

Figure 1.1 Proposal Location and Overview

MAP 1 OF 6

LEGEND

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



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Date: 3/08/2021 Paper: A3

Author: WSP Scale: 1:3,000

Data Sources: WSP, ARTC, NSWSS

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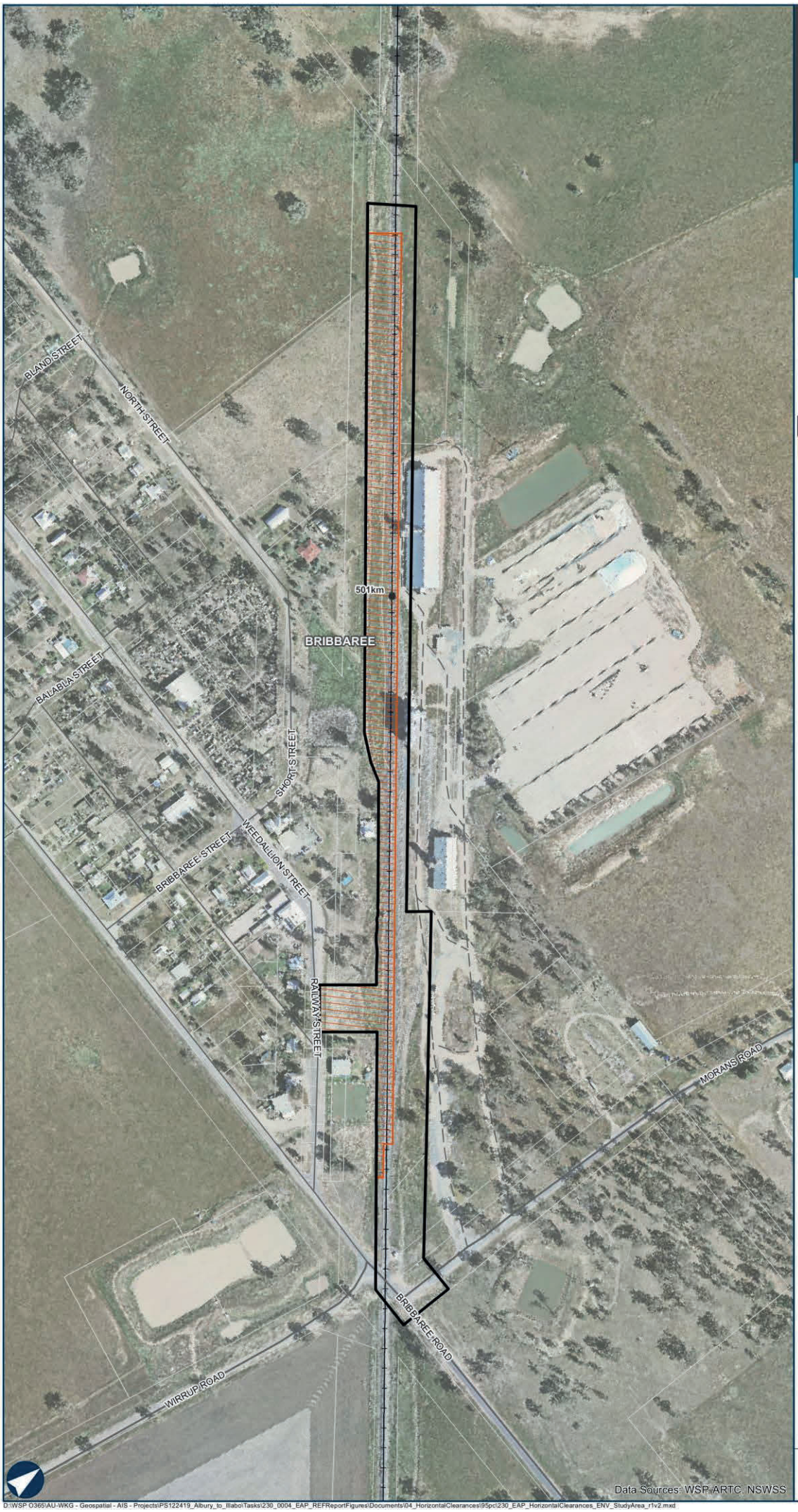

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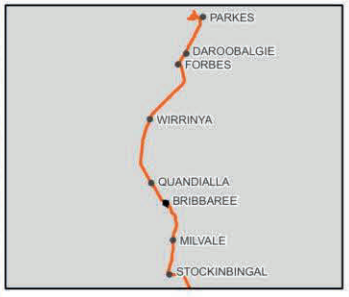
Stockinbingal to Parkes Bribbaree yard clearances

Figure 1.1 Proposal Location and Overview

MAP 2 OF 6

LEGEND

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



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Paper: A3
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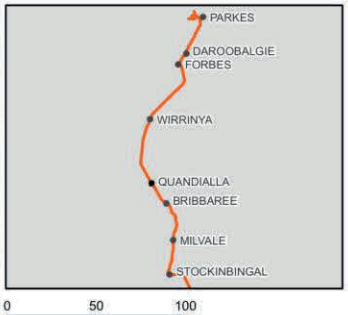
Stockinbingal to Parkes Quandialla yard clearances

Figure 1.1 Proposal Location and Overview

MAP 3 OF 6

LEGEND

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



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Date: 3/08/2021 Paper: A3

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Stockinbingal to Parkes Caragabal yard clearances

Figure 1.1 Proposal Location and Overview

MAP 4 OF 6

LEGEND

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

0 50 100 m

Coordinate System: GDA 1994 MGA Zone 55

Date: 3/08/2021 Paper: A3

Author: WSP Scale: 1:4,000

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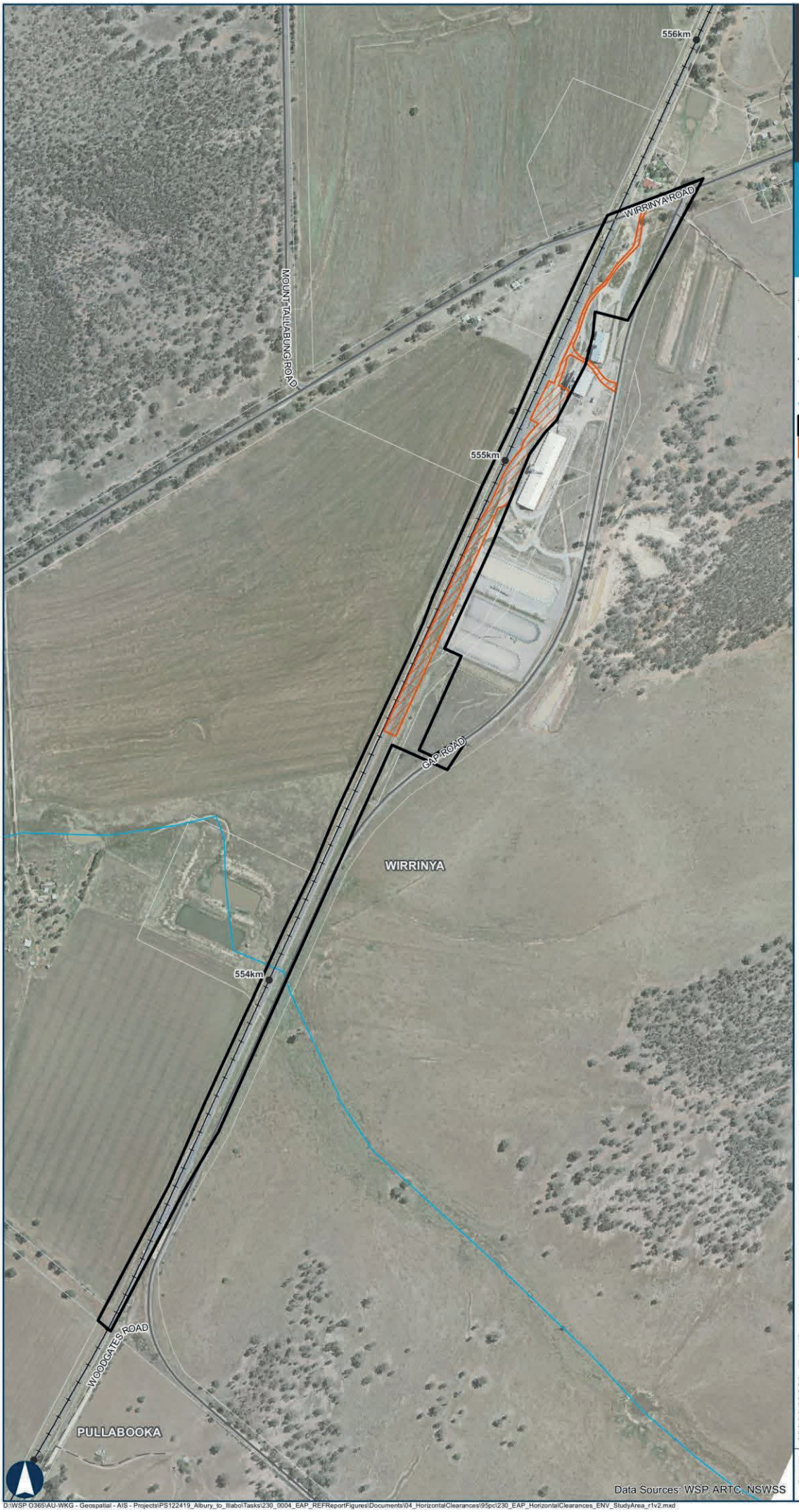

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Stockinbingal to Parkes Wirrinya yard clearances

Figure 1.1 Proposal Location and Overview

MAP 5 OF 6

LEGEND

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

0 50 100 m

Coordinate System: GDA 1994 MGA Zone 55

Date: 3/08/2021 Paper: A3

Author: WSP Scale: 1:7,000

Data Sources: WSP, ARTC, NSWSS

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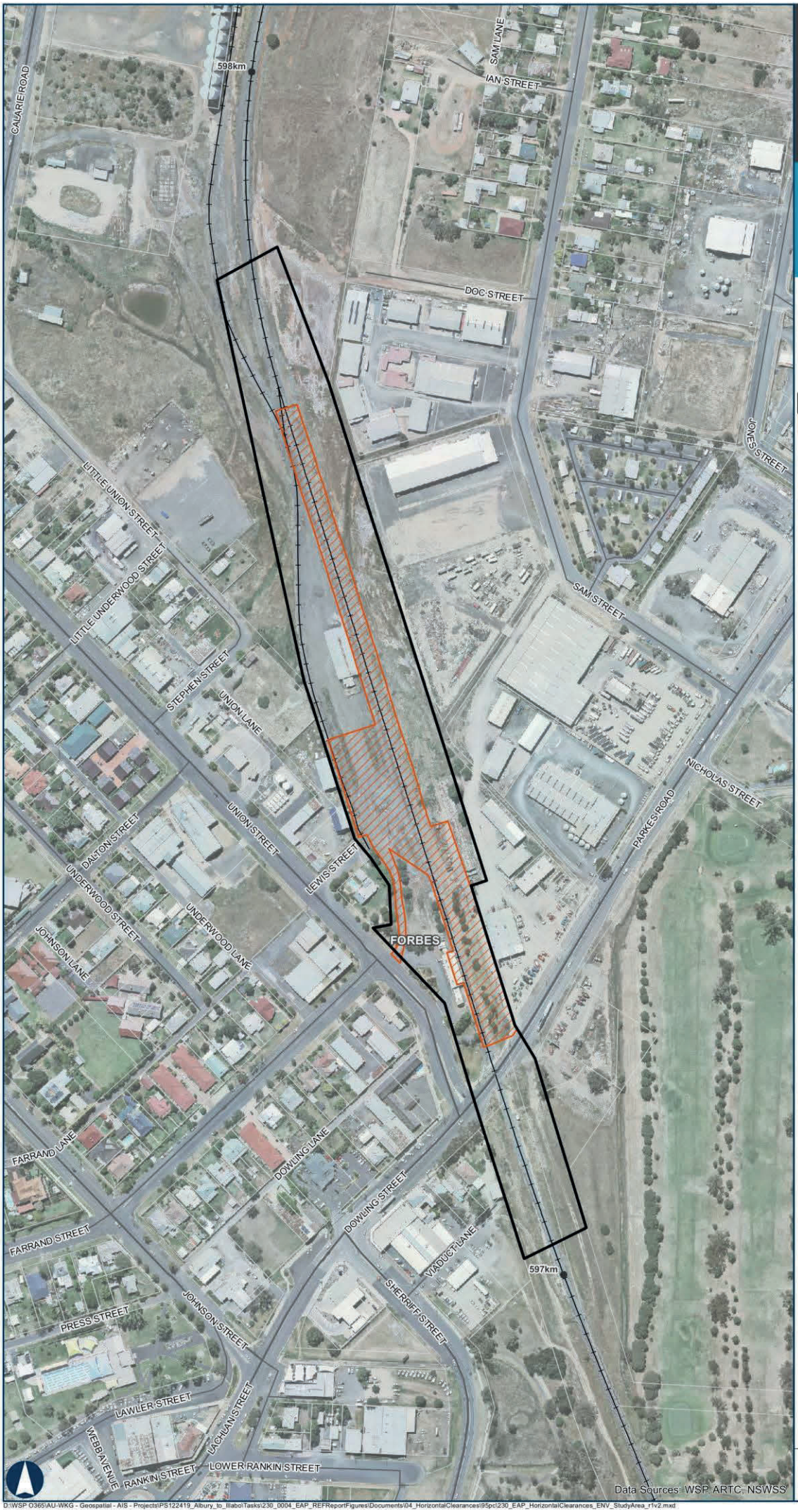

INLAND RAIL

ARTC

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

Stockinbingal to Parkes Forbes Station clearances

Figure 1.1 Proposal Location and Overview

MAP 6 OF 6

LEGEND

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

0 50 100 m

Coordinate System: GDA 1994 MGA Zone 55

Date: 3/08/2021
Author: WSP

Paper: A3
Scale: 1:3,000

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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 an 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.

2.2 BIODIVERSITY CONSERVATION ACT 2016

The NSW *Biodiversity Conservation Act 2016* (BC Act) came into effect on the 25 August 2017 and is the main legislation that identifies and protects threatened species, populations and ecological communities in the NSW.

Sections 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 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).

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 and reporting
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
Mark Stables	Bachelor of Science (Hons) Accredited BAM Assessor (BAAS18097)	Principal Ecologist	Field survey
Gavin Shelley	Bachelor of Environmental Science and Management	Ecologist	Field survey
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

All work was carried out under the appropriate licenses, including a scientific licence 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 PCTs used in the NSW BioNet Vegetation Classification Database (Office of Environment & Heritage, 2020).

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)
- 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 *Flora and Fauna Assessment Horizontal Track Clearances: Bribbaree* and *Wirrinya* (Narla Environmental, 2019).

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	12/03/2021	LGA	Royal Botanic Gardens (2020)
BioNet Atlas species sighting search	12/03/2021	20km x 20km centred on the study area	Environment Energy and Science Group (2020a)
EPBC Protected Matters Search Tool	12/03/2021	25km buffer on the study area	Department of Environment and Energy (2020b)
NSW Department of Primary Industries (Fishing and Aquaculture) spatial data	12/03/2021	LGA	Department of Primary Industries (2020b)

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: — 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.
Moderate	A species has a moderate likelihood of occurrence if: — 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	A species has a low likelihood of occurrence if: — 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	A species has a high likelihood of occurrence if: — 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	A species has a moderate likelihood of occurrence if: — the species: — 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: — 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.
Low	A species has a low likelihood of occurrence if: — 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 between 28–29 January 2021. The study area was also inspected during daylight hours on 7–8 October 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 (16–29.7°C), with a moderate to strong wind. Moderate rainfall was recorded during the field survey and 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 (ºC)		RAINFALL (mm)	WIND (DIRECTION / SPEED)
	Minimum	Maximum		
28/01/2021	19.2	29.7	0.8	54 ESE
29/01/2021	16	28.2	28.2	37 NNE
7/10/2021	8.9	23.1	0	NNW/37
8/10/2021	3.7	21.7	0	ESE/22

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, assessing the likelihood of threatened flora species to use habitats available in the study area and undertaking a targeted threatened flora survey for species with potential habitat in the study area. This was completed using a combination of the following methods:

- random meanders
- rapid point assessments
- vegetation integrity plots
- parallel field traverses.

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 (Department of Planning Industry and Environment, 2020b). 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. Seventeen rapid data point assessments were conducted across the study areas (see Figure 3.2).

3.4.2.6 VEGETATION INTEGRITY SURVEY PLOTS

Four vegetation integrity survey plots (see Table 3.6 and Figure 3.2) were completed across the study areas in accordance with the procedure outlined in the BAM 2020 (Department of Planning Industry and Environment, 2020a). Vegetation Integrity Plots were used primarily to determine and assign PCT and TECs. A schematic diagram illustrating the layout of each vegetation integrity plot is provided in Figure 3.1.

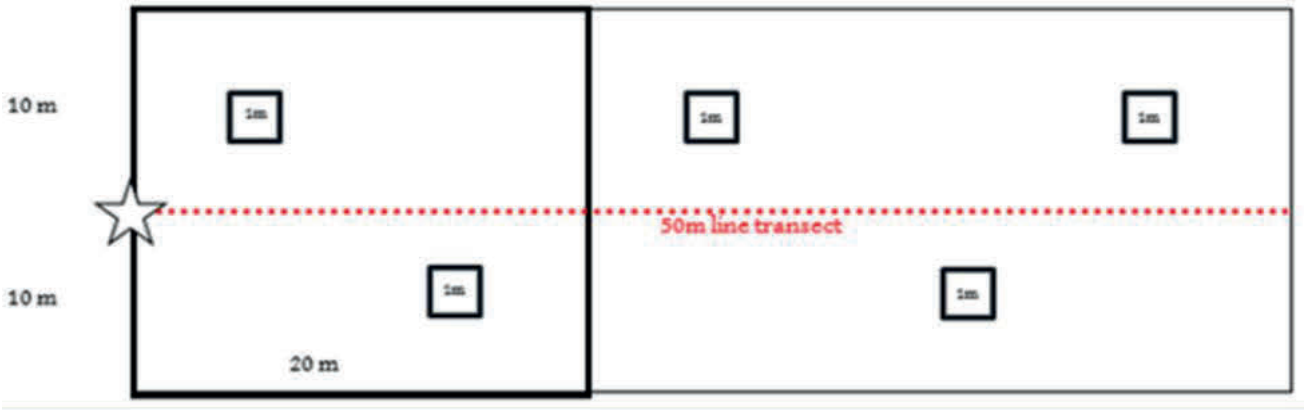

Figure 3.1 Vegetation integrity plot layout

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

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

Table 3.6 Location of BAM plot surveys

PLOT ID	STUDY AREA	PLANT COMMUNITY TYPE	EASTING	NORTHING	ORIENTATION
WGBox1	Bribbaree Yard	PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	581417	6224211	288° W
WMyall1	Caragabal Yard	PCT26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	568702	6255646	174° S
Grass6	Wirrinya Yard	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	573811	6272259	11° N
Grass7	Wirrinya Yard	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	574291	6273187	11° N

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Stockinbingal to Parkes Milvale yard clearances

Figure 3.2 Location of Survey Effort

MAP 1 OF 6

LEGEND

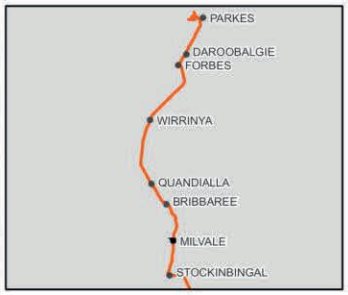
- KM post
- Existing railway
- Main road
- Track
- Watercourse
- Project study area
- Proposal site
- Cadastre

Flora survey

- Rapid data point

Fauna survey

- Bird survey
- Habitat assessment



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Date: 3/08/2021
Author: WSP

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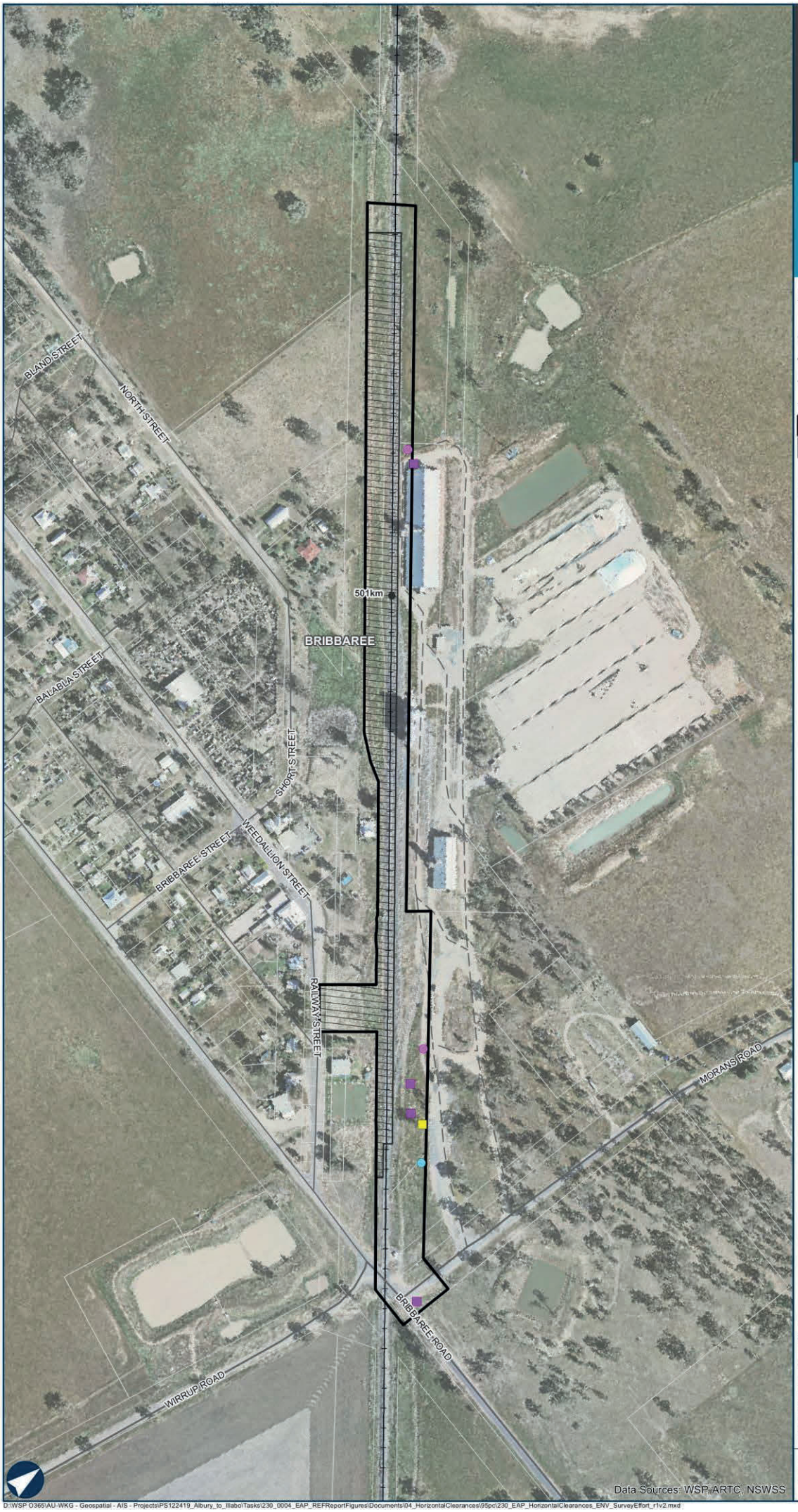

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Stockinbingal to Parkes Bribbaree yard clearances

Figure 3.2 Location of Survey Effort

MAP 2 OF 6

LEGEND

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

Flora survey

- BAM quadrat
- Rapid data point

Fauna survey

- Bird survey
- Habitat assessment

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Date: 3/08/2021 Paper: A3

Author: WSP Scale: 1:4,000

Data Sources: WSP, ARTC, NSWSS

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Stockinbingal to Parkes Quandialla yard clearances

Figure 3.2 Location of Survey Effort

MAP 3 OF 6

LEGEND

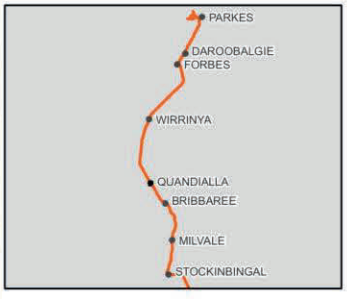
- KM post
- Existing railway
- Main road
- Local road
- Track
- Watercourse
- Project study area
- Proposal site
- Cadastre

Flora survey

- Rapid data point

Fauna survey

- Bird survey
- Habitat assessment



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Stockinbingal to Parkes Caragabal yard clearances

Figure 3.2 Location of Survey Effort

MAP 4 OF 6

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

- Bird survey
- Habitat assessment

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Date: 3/08/2021 Paper: A3

Author: WSP Scale: 1:4,000

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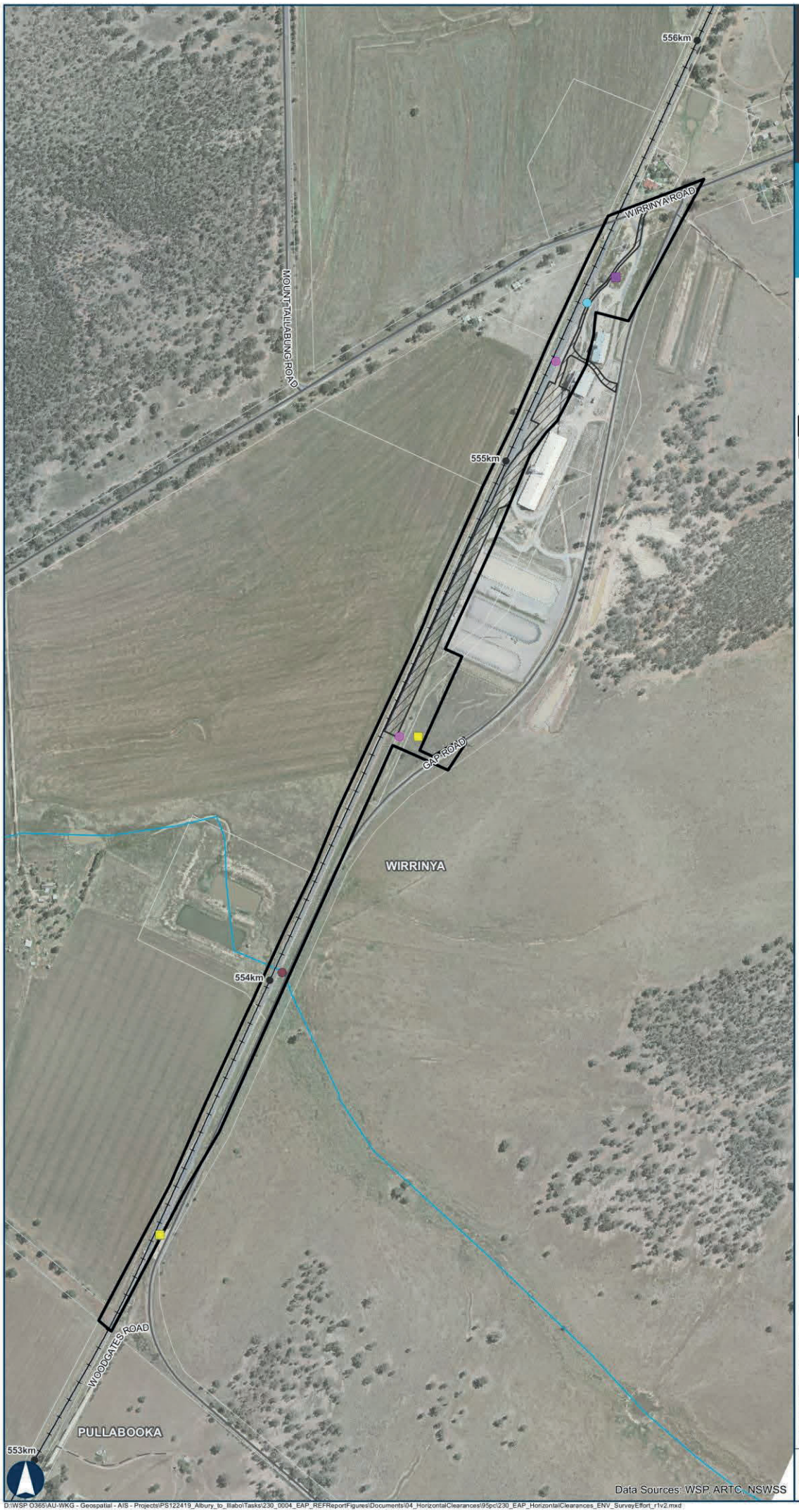

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Stockinbingal to Parkes Wirrinya yard clearances

Figure 3.2 Location of Survey Effort

MAP 5 OF 6

LEGEND

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

Flora survey

- BAM quadrat
- Rapid data point

Fauna survey

- Bird survey
- Culvert and bridge assessments
- Habitat assessment

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Coordinate System: GDA 1994 MGA Zone 55

Date: 3/08/2021 Paper: A3

Author: WSP Scale: 1:7,000

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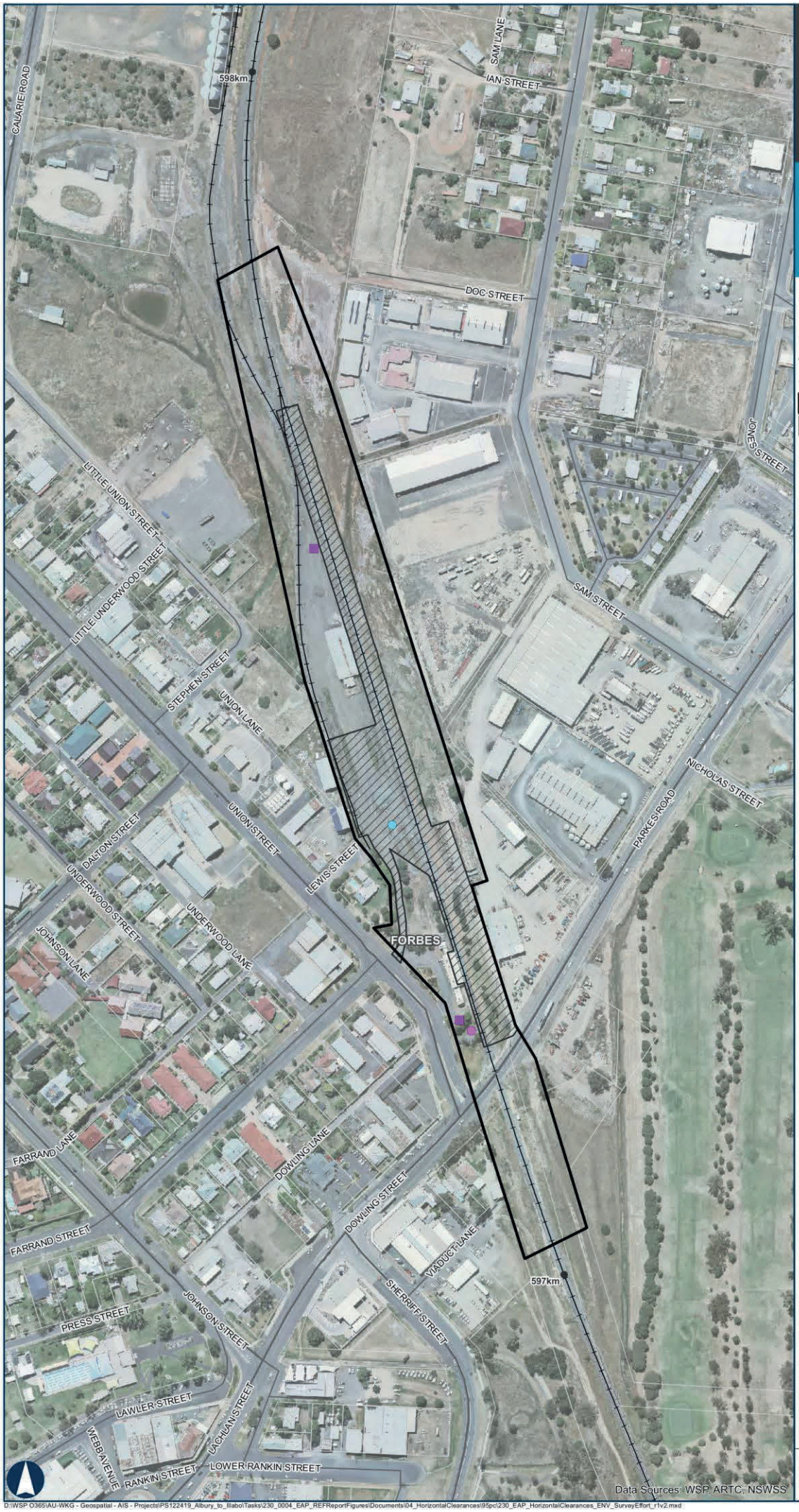

INLAND RAIL

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

Stockinbingal to Parkes Forbes Station clearances

Figure 3.2 Location of Survey Effort

MAP 6 OF 6

LEGEND

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

Flora survey

- Rapid data point

Fauna survey

- Bird survey
- Habitat assessment

0 50 100 m

Coordinate System: GDA 1994 MGA Zone 55

Date: 3/08/2021 Paper: A3

Author: WSP Scale: 1:3,000

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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 (Department of Planning Industry and Environment, 2020a). 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.

Most of the study areas were located in a heavily disturbed rail corridor and much of the original vegetation has been cleared. Consequently, no high condition vegetation was identified. 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.
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.

3.4.2.1 PARALLEL FIELD TRAVERSES

Targeted threatened flora surveys in the form of parallel field traverses were used to search for threatened species assessed as having potentially suitable habitat in the study area. This involved two ecologists searching along parallel traverses across potential habitat for each threatened species with consideration of *Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method* (Department of Planning, Industry and Environment, 2020c). Approximately 14 person hours of parallel field traverses were completed in the study area on 7–8 October 2021.

3.4.3 FAUNA SURVEY

This section outlines the fauna survey effort completed for species that have suitable habitat 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 illustrated in Figure 3.2.

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 were assessed in approximate 20 metre x 50 metre quadrat and 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 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. Bird surveys were completed during different times of the day, but generally occurred during morning hours or late afternoon hours. Birds were also recorded opportunistically during all other survey.

3.4.3.3 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.

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)	Bimbi Plains, Lachlan – Bland Channels and Floodplains & Calarie Plains
Local Government Area (LGA)	Hilltops, Weddin, Forbes
Local Land Service (LLS) region	Central West
Botanical subregion	Central-west slopes
Rivers, streams and estuaries	There are no mapped named rivers, streams or estuaries within any of the study areas. Caragabal Creek is present approximately 480 metres to the south of the Caragabal Loop. An unnamed drainage line crosses under the rail line in the Wirrinya Yard study area. The Forbes Station Yard study area is approximately 220 metres north of the Lachlan River. Bribaree Creek is present approximately 460 metres to the north west of the Bribbaree Yard study area.
Important and local wetlands	No important or local wetlands are present in the study areas.
Connectivity features	Overall the landscape has been heavily fragmented due to agricultural practices (i.e. cropping and clearing for livestock), road and rail, and urban development. However, some connectivity is present along riparian zones and roadside vegetation. The Forbes Station Yard study area are still functionally connected to the Lachlan River corridor. Wirrinya Yard has some connectivity to the vegetation on the Currawong Hills to the west and the Pullabooka State Forest through roadside vegetation. The Caragabal Yard is connected to the Pullabooka State Forest and Little Caragabal State Forest and Caragabal Creek riparian area through roadside vegetation. Quandialla Yard is isolated but there is some limited connectivity to the roadside corridor along Bimbi Quandialla Road and Bland Road. The vegetation within the Bribbaree Yard study area is connected to Bribaree Creek and roadside vegetation along Bribbaree Road and Morans Road. The Millvale Yard study area is connected to roadside vegetation.
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 the vegetation in the locality. The mapping shows that the study areas are in a heavily disturbed rail corridor and much of the original vegetation has been cleared. A summary of mapped vegetation within or near each study area by broad-scale vegetation mapping projects (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)) is as follows:

- There is no vegetation mapped at the Milvale Yard study area but adjacent to PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions.
- The Bribbaree Yard study area is mapped as adjacent to and containing PCT 76.
- The Quandialla Yard study area is not mapped as containing any native vegetation but is near areas mapped as PCT 250: Derived tussock grassland of the central western plains and lower slopes of NSW and PCT 76.
- The Caragabal Yard study area is not mapped as containing any native vegetation but is near areas mapped as PCT 250, PCT 76 and 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.
- The Wirrinya Yard study area is mapped as containing small areas of PCT 250, PCT 80 and PCT 217: Mugga Ironbark – Western Grey Box – cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion.
- The Forbes Station Yard study area is not mapped as containing any native vegetation but is near areas mapped as PCT 11.

Table 4.2 outlines the PCTs that were identified within each of the study areas during the field survey. The PCTs were identified from a mix of BAM plots and rapid data points. The study areas also contain areas that are attributed to Miscellaneous ecosystems: highly disturbed areas with no or limited native vegetation.

The vegetation within the study area is illustrated in Figure 4.1. A detailed description of each PCT and Miscellaneous ecosystems recorded is provided below between Section 4.2.1 and Section 4.2.5.

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)
Milvale Yard clearances						
PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Derived native grassland	Grassy Woodlands	Floodplain Transition Woodlands	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	0.7
Miscellaneous ecosystems	Planted trees	n/a	n/a	Not listed	Not listed	0.1
					Sub-total	**0.8**
Bribbaree Yard clearances						
PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Poor	Grassy Woodlands	Floodplain Transition Woodlands	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	0.1
	Derived native grassland					3.3
	Derived native grassland (not field verified)					0.3
Miscellaneous ecosystems	Highly disturbed areas with no or limited native vegetation	n/a	n/a	Not listed	Not listed	0.1
					Sub-total	**3.8**

VEGETATION TYPE	CONDITION	VEGETATION FORMATION	VEGETATION CLASS	NSW TEC LISTING	EPBC TEC LISTING	AREA WITHIN STUDY AREA (ha)
Quandialla Yard clearances						
PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Derived native grassland	Grassy Woodlands	Floodplain Transition Woodlands	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	0.2
					Sub-total	**0.2**
Caragabal Yard clearances						
PCT 26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Poor	Semi-arid Woodland (Grassy sub-formation)	Riverine Plain Woodlands	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	PCT 26 in the study area did not meet the EPBC Act community condition threshold	0.2
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	Isolated trees	Grassy Woodlands	Floodplain Transition Woodlands	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	0.1
	Derived native grassland					1.4
Miscellaneous ecosystems	Highly disturbed areas with no or limited native vegetation	n/a	n/a	Not listed	Not listed	0.6
	Planted trees					0.1
					Sub-total	**2.4**

VEGETATION TYPE	CONDITION	VEGETATION FORMATION	VEGETATION CLASS	NSW TEC LISTING	EPBC TEC LISTING	AREA WITHIN STUDY AREA (ha)
Wirrinya Yard clearances						
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	Isolated trees	Grassy Woodlands	Floodplain Transition Woodlands	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	0.2
	Derived native grassland					8.0
Miscellaneous ecosystems	Highly disturbed areas with no or limited native vegetation	n/a	n/a	Not listed	Not listed	1.0
					Sub-total	**9.2**
Forbes Station clearances						
PCT11: 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	Forested Wetlands	Inland Riverine Forests	Not listed	Not listed	<0.1
	Derived native grassland					0.5
Miscellaneous ecosystems	Highly disturbed areas with no or limited native vegetation	n/a	n/a	Not listed	Not listed	2.2
	Planted trees					0.3
					Sub-total	**3.1**
					Total	**19.5**

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Stockinbingal to Parkes Milvale yard clearances

Figure 4.1 Plant Community Types

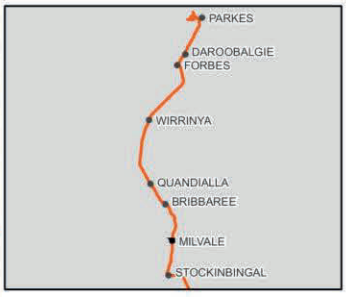
MAP 1 OF 6

LEGEND

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

Plant Community Type (PCT)

- PCT 76 - Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (Derived Native Grassland)
- Miscellaneous ecosystems - Planted trees



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Date: 3/08/2021 Paper: A3

Author: WSP Scale: 1:3,000

Data Sources: WSP, ARTC, NSWSS

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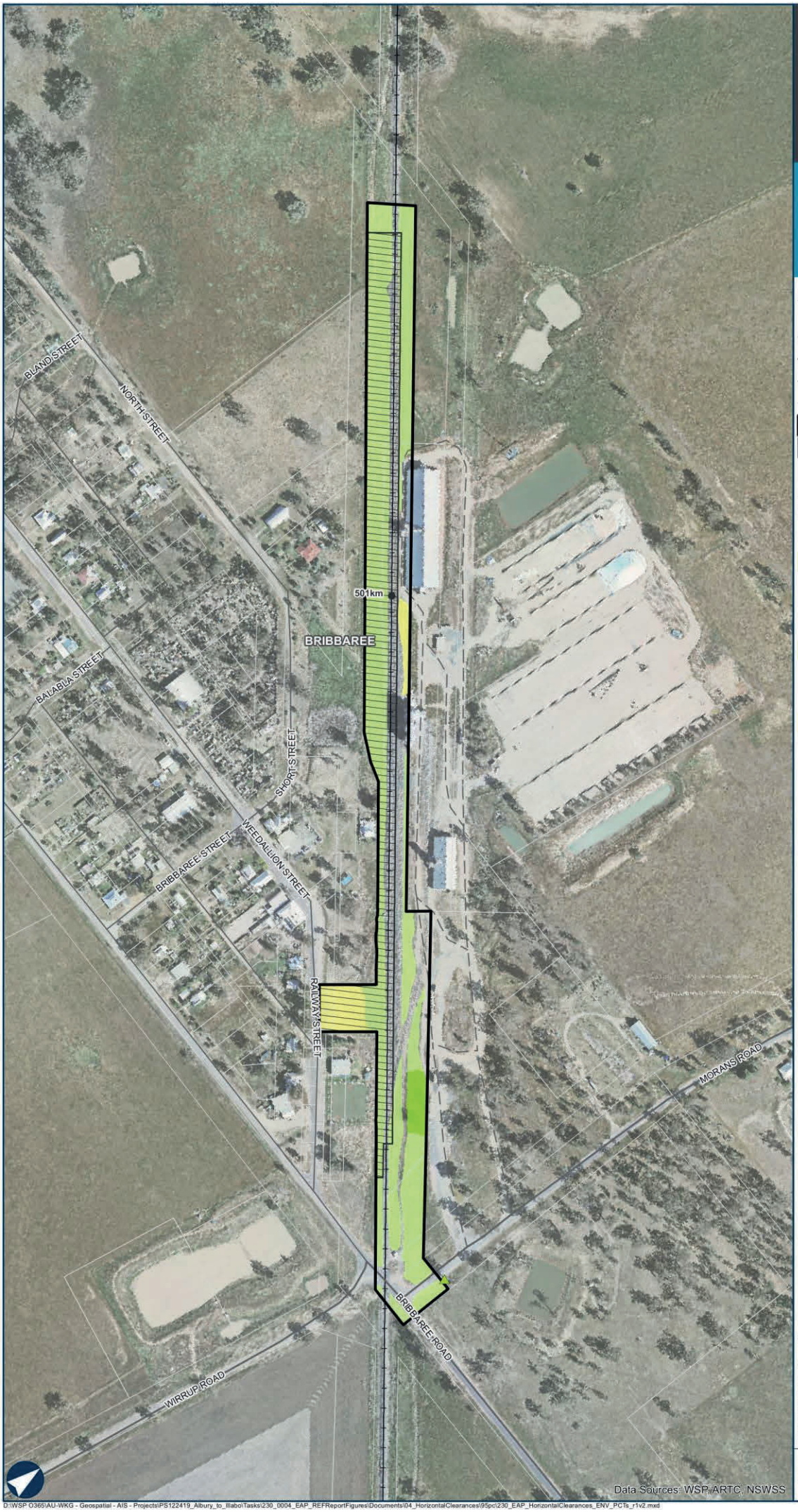

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Stockinbingal to Parkes Bribbaree yard clearances

Figure 4.1 Plant Community Types

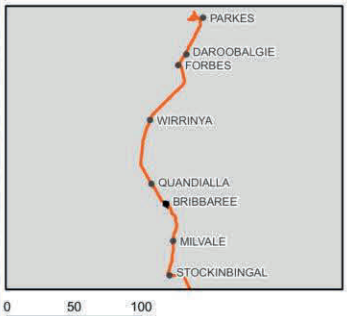
MAP 2 OF 6

LEGEND

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

Plant Community Type (PCT)

- PCT 76 - Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (Poor)
- PCT 76 - Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (Derived Native Grassland)
- Miscellaneous ecosystems - Highly disturbed areas with no or limited native vegetation



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Date: 3/08/2021 Paper: A3

Author: WSP Scale: 1:4,000

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Stockinbingal to Parkes Quandialla yard clearances

Figure 4.1 Plant Community Types

MAP 3 OF 6

LEGEND

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

Plant Community Type (PCT)

- PCT 76 - Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (Derived Native Grassland)

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Coordinate System: GDA 1994 MGA Zone 55

Date: 3/08/2021 Paper: A3

Author: WSP Scale: 1:3,000

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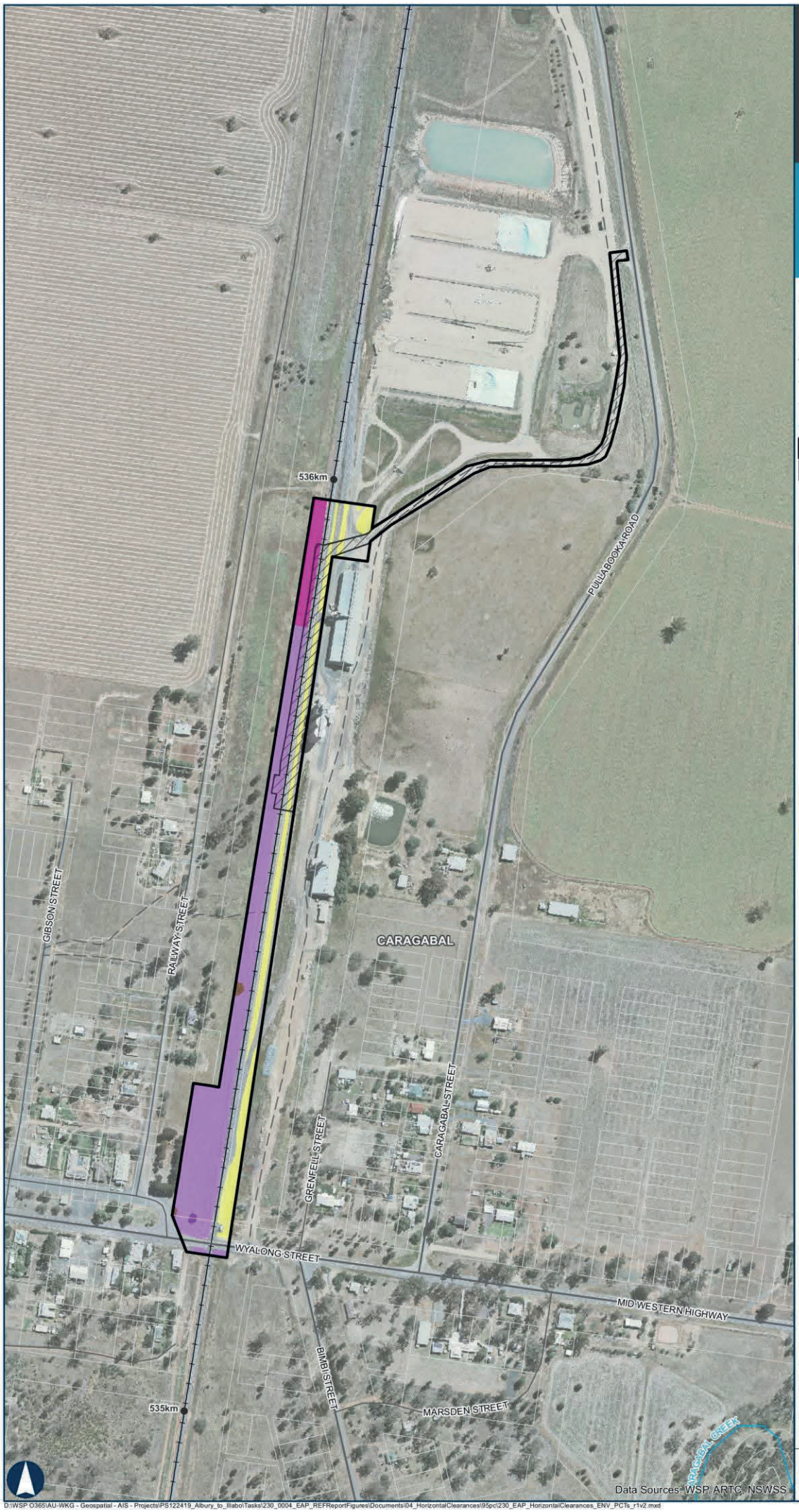

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Stockinbingal to Parkes Caragabal yard clearances

Figure 4.1 Plant Community Types

MAP 4 OF 6

LEGEND

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

Plant Community Type (PCT)

- PCT 26 - Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (Poor)
- 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 (Isolated trees)
- 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 (Derived Native Grassland)
- Miscellaneous ecosystems - Planted trees
- Miscellaneous ecosystems - Highly disturbed areas with no or limited native vegetation

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Date: 3/08/2021 Paper: A3

Author: WSP Scale: 1:4,000

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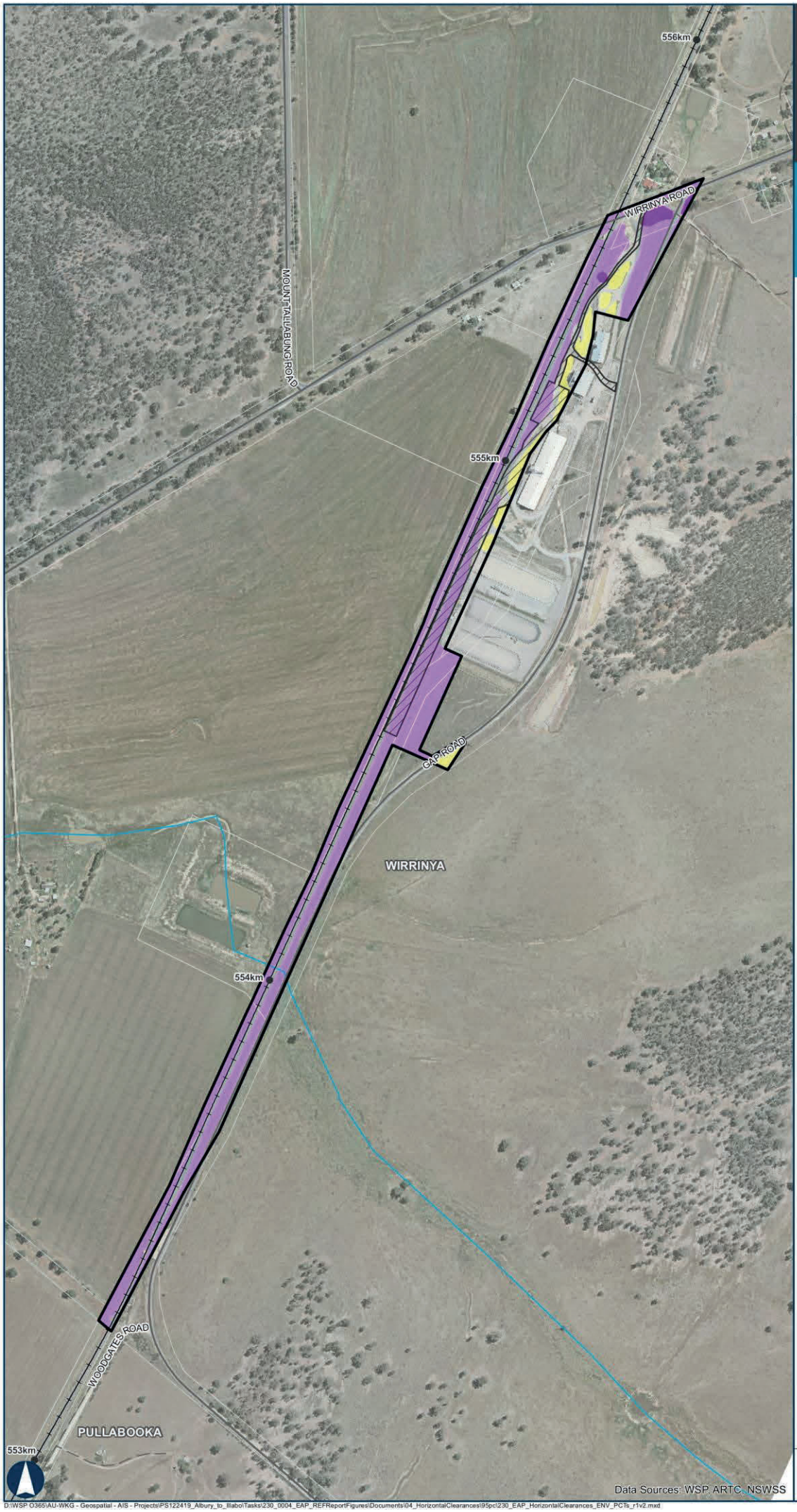

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Stockinbingal to Parkes Wirrinya yard clearances

Figure 4.1 Plant Community Types

MAP 5 OF 6

LEGEND

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

Plant Community Type (PCT)

- 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 (Isolated trees)
- 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 (Derived Native Grassland)
- Miscellaneous ecosystems - Highly disturbed areas with no or limited native vegetation

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Coordinate System: GDA 1994 MGA Zone 55

Date: 3/08/2021

Author: WSP

Paper: A3

Scale: 1:7,000

Data Sources: WSP, ARTC, NSWSS

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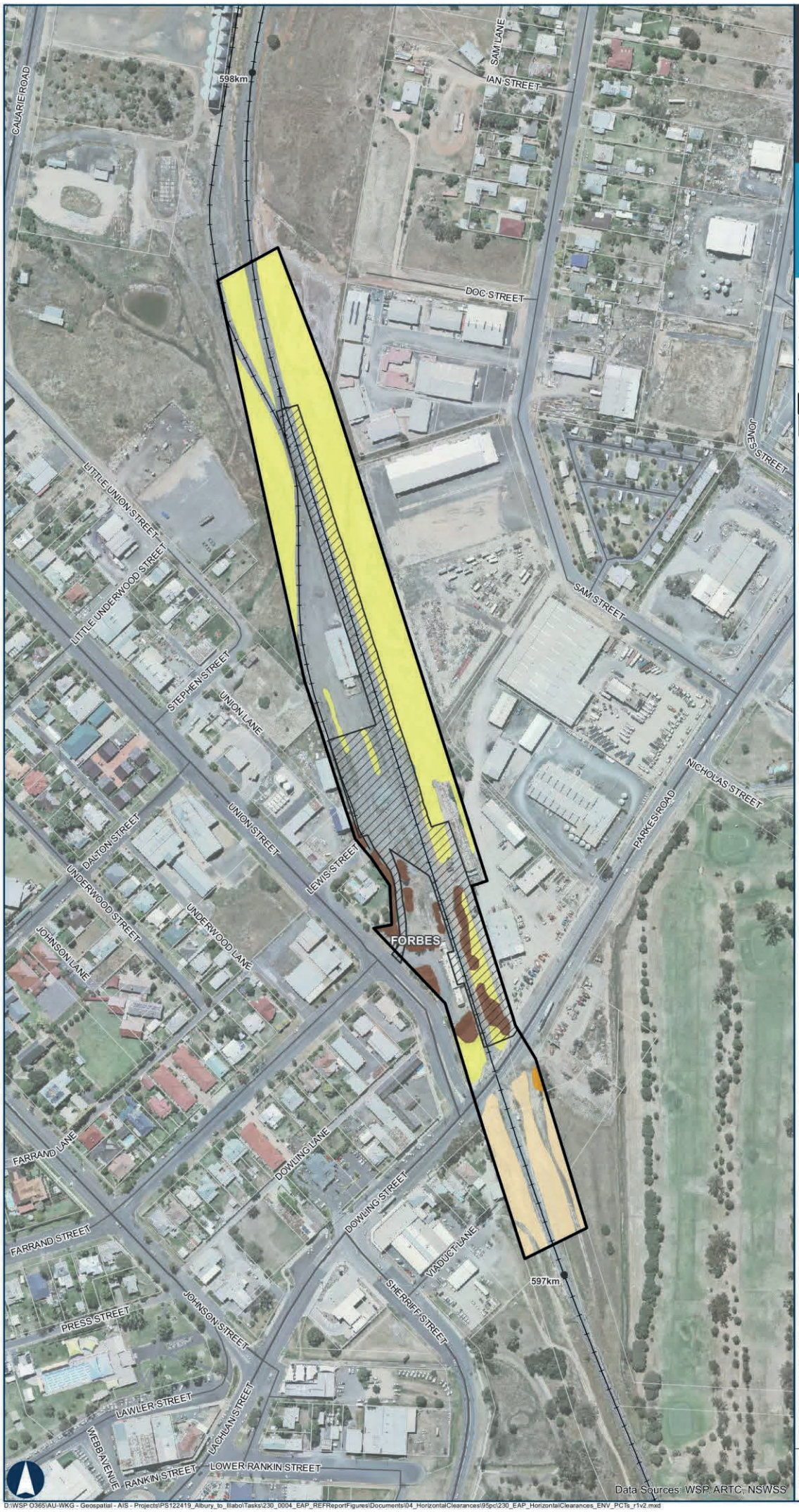

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Stockinbingal to Parkes Forbes Station clearances

Figure 4.1 Plant Community Types

MAP 6 OF 6

LEGEND

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

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) (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) (Derived Native Grassland)
- Miscellaneous ecosystems - Planted trees
- Miscellaneous ecosystems - Highly disturbed areas with no or limited native vegetation

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Coordinate System: GDA 1994 MGA Zone 55

Date: 3/08/2021 Paper: A3

Author: WSP Scale: 1:3,000

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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 Forbes Station study area contained 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 two broad condition states:

- 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.

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 Group, 2020b). 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 Forbes Station study area contained areas of derived native grassland and isolated trees likely to be attributable to PCT 11 located on the southern side of Dowling Street adjacent to the golf course (see Figure 4.1). The areas of derived native grassland are assigned to PCT 11 as this is the original PCT that would have most likely occurred in these areas. Based on advice from Environment Energy and Science Group and to be consistent with the NSW Biodiversity Assessment Method we have not identified any derived PCTs.

4.2.1.1 ISOLATED TREES

The study areas contained some *Eucalyptus camaldulensis* 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. Less than 0.2ha of isolated trees was mapped in the study area.

4.2.1.2 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 Forbes Station study areas 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 areas would have once contained PCT 45: Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion based on the presence of isolated *Eucalyptus camaldulensis* trees in the study area. It is likely that the entirety of both study areas 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. 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 extent of PCT 11 derived native grassland within the study area is illustrated in Figure 4.1.

4.2.2 PCT 26: WEEPING MYALL OPEN WOODLAND OF THE RIVERINA BIOREGION AND NSW SOUTH WESTERN SLOPES BIOREGION

The Caragabal Loop study area contains a small area of PCT 26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion in poor condition (see Figure 4.1). This community was consistent with the BC Act listed TEC Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions (Table 4.2, Section 5.1).

PCT 26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion is a mid-high open woodland up to 8 metres high dominated by *Acacia pendula* with other tree species including *Casuarina cristata*, *Eucalyptus largiflorens* and *Eucalyptus camaldulensis* occurring occasionally (Environment, Energy and Science Group, 2020b). Chenopod shrubs may be common or absent. They include *Rhagodia spinescens, Maireana decalvans, Atriplex nummularia, Chenopodium nitrariaceum, Hakea leucoptera, Santalum lanceolatum, Exocarpos aphyllus* and *Maireana aphylla*. The ground cover may be dense or sparse depending on rainfall (Environment, Energy and Science Group, 2020b). It is dominated by grass species such as *Austrodanthonia caespitosa, Austrodanthonia setacea, Austrostipa aristiglumis, Austrostipa scabra, Austrostipa nodosa* and *Sporobolus caroli* (Environment, Energy and Science Group, 2020b). Saltbush species include *Atriplex spinibractea, Atriplex leptocarpa* and *Atriplex semibaccata* (Environment Energy and Science Group. 2020b). Forb species include *Alternanthera denticulata, Myriocephalus rhizocephalus, Centipeda cunninghamii, Rhodanthe corymbiflora* and *Vittadinia cuneata* var. *cuneate* (Environment, Energy and Science Group, 2020b). PCT 26 occurs on brown clays or loam soils on alluvial plains mainly in the Riverina and NSW South-western Slopes Bioregions of south-western NSW (Environment, Energy and Science Group, 2020b).

4.2.2.1 POOR CONDITION PCT 26: WEEPING MYALL OPEN WOODLAND OF THE RIVERINA BIOREGION AND NSW SOUTH WESTERN SLOPES BIOREGION

The rail corridor at the Caragabal Yard is highly disturbed, but there is a small area containing some *Acacia pendula* trees and native groundcovers that correspond to poor condition PCT 26 (see Figure 4.1).

A summary of the characteristics of PCT 26 poor condition within the study area is in provided in Table 4.3 and depicted in Photo 4.1 and Photo 4.2.

Table 4.3 Summary of PCT 26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (poor condition)

DESCRIPTION	
PCT justification	The vegetation contains *Acacia pendula* trees which are the defining characteristic of this PCT.
% cleared	90% cleared
Extent in study area	0.2ha
Condition	Poor
Canopy species	*Acacia pendula*
Shrub species	Scattered *Sclerolaena birchii* and *Maireana aphylla*
Ground layer species	*Solanum esuriale, Einadia hastata, Zaleya galericulata, Boerhavia dominii, Euphorbia drummondii, Lythrum hyssopifolia, Erodium crinitum, Panicum effusum, Paspalidium constrictum, Dactyloctenium radulans, Eragrostis* sp., *Echinochloa colona, Enteropogon acicularis, Cynodon dactylon*
Exotic species	*Salvia verbenaca*, Hirschfeldia incana*, Lactuca serriola*, Cucumis myriocarpus* subsp. *Myriocarpus*, Heliotropium europaeum*, Amaranthus albus*, Datura* sp**., Argemone ochroleuca subsp. Ochroleuca*, Eragrostis cilianensis*, Xanthium spinosum**

Photo 4.1 PCT 26 in the Caragabal Yard study area showing *Acacia pendula* with native dominant groundcover

Photo 4.2 *Acacia pendula* tree with younger regrowth underneath in the Caragabal Yard study area

4.2.3 PCT 76: WESTERN GREY BOX TALL GRASSY WOODLAND ON ALLUVIAL LOAM AND CLAY SOILS IN THE NSW SOUTH WESTERN SLOPES AND RIVERINA BIOREGIONS

The Milvale Yard, Bribbaree Yard and Quandialla Yard study areas contained areas of PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions that have been separated into the following broad condition states:

- poor: Patches of PCT 76 that are structurally and floristically characteristic of the PCT but are highly disturbed
- 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 76.

PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions was an extensive community occurring on the South Western Plains and western part of the South Western Slopes Botanical Divisions. Over 500,000ha of Western Grey Box was modelled as existing prior to European settlement in the Western Riverina area. Only small remnants remain and most of these have been heavily altered (Environment Energy and Science Group, 2020b).

The Bribbaree Yard study area contained a small area of vegetation with a woodland structure containing small *Eucalyptus microcarpa* trees and areas of derived native grassland assigned to PCT76 (see Figure 4.1). The Milvale Yard and Quandialla Yard study areas contain areas of derived native grassland assigned to PCT76 (see Figure 4.1).

The areas of derived native grassland are assigned to PCT 76, as this is the original PCT that would have most likely occurred in the study areas. 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, we have not identified any derived PCTs.

PCT 76 was consistent with BC Act listed TEC Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions (Table 4.2, Section 5.1).

4.2.3.1 POOR CONDITION PCT 76: WESTERN GREY BOX TALL GRASSY WOODLAND ON ALLUVIAL LOAM AND CLAY SOILS IN THE NSW SOUTH WESTERN SLOPES AND RIVERINA BIOREGIONS

The rail corridor in the Bribbaree Yard study area is highly disturbed, but there is a small areas of woodland dominated by *Eucalyptus microcarpa* that corresponds to PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (see Figure 4.1).

A summary of the characteristics of PCT 76 poor condition within the study area is in provided in Table 4.4 and depicted in Photo 4.3 and Photo 4.4. The extent of PCT 76 poor condition within the study area is illustrated in Figure 4.1.

Table 4.4 Summary of PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (poor condition)

DESCRIPTION	
PCT justification	The canopy is dominated by *Eucalyptus microcarpa.* Characteristic ground stratum species from this PCT are present.
% cleared	92% cleared
Extent in study area	0.1ha
Condition	Poor
Canopy species	*Eucalyptus microcarpa*
Shrub species	Absent
Ground layer species	*Tribulus micrococcus, Lythrum hyssopifolia, Sida corrugata, Einadia nutans, Panicum effusum, Echinochloa colona, Enteropogon acicularis, Dactyloctenium radulans, Eragrostis* sp.
Exotic species	*Heliotropium europaeum*, Echium plantagineum*, Polygonum aviculare*, Amaranthus albus*, Eragrostis cilianensis*, Opuntia stricta*, Hirschfeldia incana*, Lactuca serriola*, Lepidium africanum**

Photo 4.3 PCT 76 Bribbaree Yard showing grass and *Eucalyptus microcarpa* trees

Photo 4.4 PCT 76 at Bribbaree Yard showing *Eucalyptus microcarpa* trees

4.2.3.2 DERIVED NATIVE GRASSLAND

Based on landscape position and *Eucalyptus microcarpa* being present in similar situations in the locality, it is likely that the grassland areas dominated by native species at the Milvale Yard, Bribbaree Yard and Quandialla Yard study areas would have originally contained a woodland dominated by *Eucalyptus microcarpa*. It is considered unlikely that the study areas would have once contained PCT 45: Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion based on the presence of isolated *Eucalyptus microcarpa* trees in the study area and absence of characteristic species of this PCT. Plains Grass (*Austrostipa aristiglumis*) is present but is not a dominant species and the species composition of the grassland areas (see Appendix C) is more closely aligned to the description of the ground stratum provided for PCT 76 in the BioNet Vegetation Classification Database (Environment, Energy and Science Group, 2020b). It is likely that the entirety of these study areas was originally forested, and the trees have been cleared.

The rail corridor is highly disturbed but the vegetation present at the time of the survey was a mix of native and exotic species. 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.

A summary of the characteristics of PCT 76 derived native grassland within the study area is in provided in Table 4.5 and depicted in Photo 4.5 and Photo 4.6.

Table 4.5 Summary of PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (Derived Native Grassland)

DESCRIPTION	
PCT justification	The vegetation contains groundcover species characteristic of this PCT. *Eucalyptus microcarpa* trees are present in areas adjacent to the study areas in similar landscape positions.
% cleared	92% cleared
Extent in study area	6.1ha
Condition	Derived Native Grassland
Canopy species	Absent
Shrub species	Scattered *Sclerolaena birchii*
Ground layer species	*Cynodon dactylon, Echinochloa colona, Eriochloa pseudoacrotricha, Enteropogon acicularis, Panicum effusum, Tribulus micrococcus, Oxalis perennans, Sida corrugata, Euphorbia drummondii, Marsilea* sp., *Eleocharis sp.*, *Lachnagrostis filiformis, Euchiton* sp., *Carex inversa, Dactyloctenium radulans*
Exotic species	*Conyza* sp*., *Lepidium africanum**, *Phalaris* sp.*, *Hordeum* sp.*, *Centaurium erythraea**, *Avena* sp.*, *Polygonum aviculare**, *Eragrostis cilianensis**, *Amaranthus albus**, *Chloris gayana**, *Centaurea solstitialis**, *Paspalum dilatatum**, *Alternanthera pungens**

Photo 4.5 PCT 76 Derived Native Grassland in the Bribaree Yard study area showing ground cover and *Eucalyptus microcarpa* trees in the distance

Photo 4.6 PCT 76 Derived Native Grassland in the Quandialla Yard study area showing native grass dominance

4.2.4 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

The Caragabal Yard and Wirrinya Yard study areas contained areas of 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 that have been separated into the following broad condition states:

- isolated trees characteristic of PCT 80
- 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 80.

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 is a tall woodland up to 25 metres high but averaging about 20 metres co-dominated by *Eucalyptus microcarpa* and *Callitris glaucophylla* with other trees include *Eucalyptus melliodora, Allocasuarina luehmannii, Pittosporum angustifolium* and *Brachychiton populneus* (Environment Energy and Science Group. 2020b). Tall shrub species may include *Geijera parviflora, Eremophila deserti, Santalum acuminatum* and wattles such as *Acacia deanei* subsp. *deanei*, *Acacia hakeoides, Acacia brachybotrya* and *Acacia buxifolia* (Environment Energy and Science Group. 2020b). A sparse to mid-dense ground cover includes short shrubs such as *Einadia nutans* subsp. *nutans* and *Eremophila debilis* with grass species such as *Austrostipa scabra* subsp. *scabra, Austrodanthonia setacea, Austrodanthonia fulva, Elymus scaber* subsp. *scaber, Enteropogon acicularis* and *Aristida ramosa* (Environment Energy and Science Group. 2020b). Forb species include *Calotis cuneifolia, Sida corrugata, Dichondra* sp. A, *Daucus glochidiatus, Oxalis perennans, Arthropodium minus, Bulbine* spp. and *Goodenia pinnatifida* (Environment Energy and Science Group. 2020b). PCT 80 occurs on sandy-loam to clay-loam soils on alluvial or stagnant alluvial plains in the predominantly winter rainfall belt of southern-central NSW with an average annual rainfall of between 400 to 550mm (Environment Energy and Science Group. 2020b).

The Caragabal Yard and Wirrinya Yard study areas contained areas contain isolated trees attributable to PCT 80 and areas of derived native grassland assigned to PCT 80 (see Figure 4.1).

The areas of derived native grassland are assigned to PCT 80, as this is the original PCT that would have most likely occurred in the study areas. 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, we have not identified any derived PCTs.

PCT 80 was consistent with the BC Act listed TEC Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions (Table 4.2, Section 5.1).

4.2.4.1 ISOLATED TREES

The study areas contain some *Eucalyptus microcarpa*, *Callitris glaucophylla,* and *Brachychiton populneus* trees 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 are approximately 0.3ha of isolated trees mapped in the study area. These isolated trees are illustrated in Figure 4.1.

4.2.4.2 DERIVED NATIVE GRASSLAND

Based on landscape position and *Eucalyptus microcarpa, Callitris glaucophylla,* and *Brachychiton populneus* trees being present in similar situations in the locality, it is likely that the grassland areas dominated by native species at the Caragabal Yard and Wirrinya Yard study areas would have originally contained a woodland dominated by these tree species. It is considered unlikely that the study areas would have once contained PCT 45: Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion based on the presence of isolated trees and absence of characteristic species of this PCT. Plains Grass (*Austrostipa aristiglumis*) is present but is not a dominant species and the species composition of the grassland areas (see Appendix C) is more closely aligned to the description of the ground stratum provided for PCT 80 in the BioNet Vegetation Classification Database (Environment Energy and Science Group, 2020b). It is likely that the entirety of these study areas was originally forested, and the trees have been cleared.

The rail corridor is highly disturbed but the vegetation present at the time of the survey was a mix of native and exotic species. 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.

BAM plots Grass6 and Grass7 were undertaken within derived native grassland attributed to PCT 80 at the Wirrinya Yard study area. The results of the floristic survey area as follows (see full results in Appendix C):

- Plot Grass6: 24 native species (61.5% of species are native) with native species cover of 115.3%. Exotic species cover is 4.5%.
- Plot Grass7: 18 native species (81.8% of species are native) with native species cover of 143.4%. Exotic species cover is 11.2%.

The derived native grassland in the Wirrinya Yard study area is the largest and best condition example of PCT 80 derived native grassland in the study areas so was suitable for a BAM plots. The remaining areas of derived native grassland were smaller and subject to rapid data point surveys to characterise the vegetation.

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.

A summary of the characteristics of PCT 80 derived native grassland within the study areas is in provided in Table 4.6 and depicted in Photo 4.7 and Photo 4.8.

Table 4.6 Summary of 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 (Derived Native Grassland)

DESCRIPTION	
PCT justification	The vegetation contains groundcover species characteristic of this PCT. *Eucalyptus microcarpa, Callitris glaucophylla,* and *Brachychiton populneus* trees are present in areas adjacent to the study areas in similar landscape positions.
% cleared	83% cleared
Extent in study area	9.4ha
Condition	Derived Native Grassland
Canopy species	Scattered regrowth (small) *Callitris glaucophylla*
Shrub species	Scattered *Atriplex semibaccata, Maireana decalvans, Salsola australis, Sclerolaena birchii*
Ground layer species	*Anthosachne scabra, Austrostipa aristiglumis, Austrostipa sp., Chloris ventricosa, Cynodon dactylon, Cyperus bifax, Dactyloctenium radulans, Dichanthium sericeum, Echinochloa colona, Enteropogon acicularis, Eragrostis sp., Eriochloa pseudoacrotricha, Juncus sp., Panicum effusum, Paspalidium constrictum, Rytidosperma sp., Calotis lappulacea, Erodium crinitum, Euphorbia drummondii, Leiocarpa websteri, Senna barclayana, Sida corrugata, Solanum esuriale, Tribulus micrococcus, Vittadinia pterochaeta, Zaleya galericulata, Convolvulus erubescens*
Exotic species	*Alternanthera pungens*, Chloris gayana*, Paspalum dilatatum*, Avena sp.*, Carduus pycnocephalus*, Centaurea solstitialis*, Conyza sp.*, Echium plantagineum*, Eragrostis cilianensis*, Heliotropium europaeum*, Lactuca serriola*, Lepidium africanum*, Modiola caroliniana*, Polygonum aviculare*, Rumex crispus*, Scabiosa atropurpurea*, Schkuhria pinnata**

Photo 4.7 PCT80 Derived Native Grassland in the Wirrinya Yard study area showing native dominant groundcover

Photo 4.8 PCT 80 Derived Native Grassland in the Wirrinya Yard study area showing native dominant groundcover and young trees

4.2.5 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 (3.9ha)
- planted trees (0.6ha).

These miscellaneous ecosystems are described below.

4.2.5.1 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 (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** which are typical of disturbed areas in this region.

4.2.5.2 PLANTED TREES

The Milvale Yard, Caragabal Yard and Forbes Station Yard study areas contain a number of planted trees that have variously been planted as ornamental trees or wind breaks/screens. Planted trees present at the edge of the rail corridor include *Eucalyptus* spp*, Casuarina* spp., *Pinus* spp., and *Fraxinus* sp. Among other common horticultural species. The extent of planted trees within the study areas 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, Froend, 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). The associated 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) in the Forbes Station Yard study area is a high potential terrestrial GDE. The remaining PCTs identified from within the study areas are low potential terrestrial GDEs.

While GDEs are likely to be 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 areas are 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 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 *Heliotropium amplexicaule*, Xanthium spinosum*, Alternanthera pungens*, Chloris gayana*,* 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. No Weeds of National Significance (WoNS) listed under the National Weeds Strategy were noted during the survey.

4.5 FAUNA SPECIES RECORDED

A total of 32 fauna species were recorded during field surveys across all sites, including 31 birds and one mammal. No threatened species listed under the BC Act or EPBC Act were recorded in the study areas.

A comprehensive list of fauna species recorded within the study area is provided in Appendix D.

4.6 FAUNA HABITAT

Two fauna habitat types were recorded in the study area and are outlined in Table 4.7. These habitat types are broadly linked to the vegetation types and conditions listed and described in Section 4.2.

Table 4.7 Fauna habitat types

CORRESPONDING VEGETATION TYPE	FAUNA HABITAT
PCT 76, PCT 80, PCT 11 & PCT 26	Open woodland
Miscellaneous ecosystem – highly disturbed areas	Highly disturbed and exotic vegetation

4.6.1 OPEN WOODLAND

Open woodland occurs in small disturbed patches along the rail corridor at Bribbaree Yard. The majority of open woodland occurrences were dominated by *Eucalyptus microcarpa* occurring as medium to larger remnant trees or as recruiting trees in heavily disturbed patches in the study area. The stands of open woodland are sufficient to support common arboreal mammals and birds.

Due to previous vegetation disturbance of agricultural practices (i.e. cropping and livestock use) and rail infrastructure usage, limited shrubby understorey remains within the study area and the ground cover dominated by native grasses with competing occurrences of introduced grasses and herbaceous weeds. 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 (Photo 4.9) (e.g. Australian Magpies, White-winged Choughs). The open woodlands and grassland also provide foraging habitat for intermittent occurrences of predatory birds such as Little Eagle and Barn Owls. Hollow-bearing trees were largely confined to those areas where large *Eucalyptus microcarpa* trees were present. The hollow-bearing tree that occurred within the study area is illustrated in Figure 4.1.

Overall, the woodland habitat persists in a low to moderate condition due to the historic disturbance and removal of important microhabitats, causing a loss in microhabitat diversity, which usually corresponds to a greater diversity of fauna. The persistence of remnant *Eucalyptus microcarpa* and native grassy understorey does provide more substantial habitat for native fauna that utilise grassy open woodlands. However, open woodland patches within each of the study areas retained limited linkages with other remnant habitats in the landscape due historical vegetation removal for agriculture. Consequently, each study area was highly fragmented from large intact habitat patches. Due to the degraded nature of the habitat and the predominately fragmented landscape, fauna species that are likely to use this habitat are those which are well adapted to disturbed habitat and are highly mobile.

Photo 4.9 Open woodland – Bribbaree Yard

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. This habitat was 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 during the field survey. 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 (Photo 4.10 and Photo 4.11).

Photo 4.10 Disturbed habitat with planted trees and shrubs – Forbes Station Yard

Photo 4.11 Exotic grassland and disturbed habitat – Milvale Yard

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 areas. 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

Two Threatened Ecological Communities listed under the BC Act were recorded within the study area:

- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions
- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes Bioregions.

The Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions is composed of the following two PCTs:

- PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (approximately 6.2ha).
- 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 (approximately 9.7ha).

The Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes Bioregions directly correlates to PCT 26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion. There is approximately 0.2ha of this TEC within the study areas.

Of note is that the Final Determination to list Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions under the BC Act (NSW Scientific Committee, 2011) states that “the community generally occurs as an open woodland 15–25m tall but in some locations the overstorey may be absent as a result of past clearing or thinning, leaving only an understorey”. Consequently, we have taken a precautionary approach and have assumed the areas of derived native grassland (i.e. the understorey) that are likely to have originated from the Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions PCT (PCT 76) are part of this TEC.

The location of TECs within the study areas is illustrated in Figure 5.1.

5.2 THREATENED FLORA SPECIES

The database searches identified 13 threatened flora species listed under the BC Act that have the potential to occur in the locality of the study area (see Appendix A). PCT 76, PCT 80 and PCT 26 are known to provide habitat for many of the threatened flora species returned from the database searches. The derived native grasslands at Wirrinya Yard, Bribbaree Yard and Caragabal Yard were in relatively good condition and were dominated by native species so may be suitable as habitat for threatened plant species including *Austrostipa metatoris, Austrostipa wakoolica, Diuris tricolor, Swainsona murrayana* and/or *Swainsona recta*. The habitats at Quandialla Yard, Milvale Yard and Forbes Station Yard are likely to be too disturbed to provide suitable habitat for threatened plant species.

Targeted threatened flora surveys were completed at Forbes Station Yard, Wirrinya Yard, Bribbaree Yard, Caragabal Yard and Milvale Yard in October 2021 during the flowering period for *Austrostipa metatoris, Austrostipa wakoolica, Diuris tricolor, Swainsona murrayana* and *Swainsona recta*. No threatened flora species were recorded during the targeted survey. Consequently, these species are considered to have a low likelihood of occurrence in the study area.

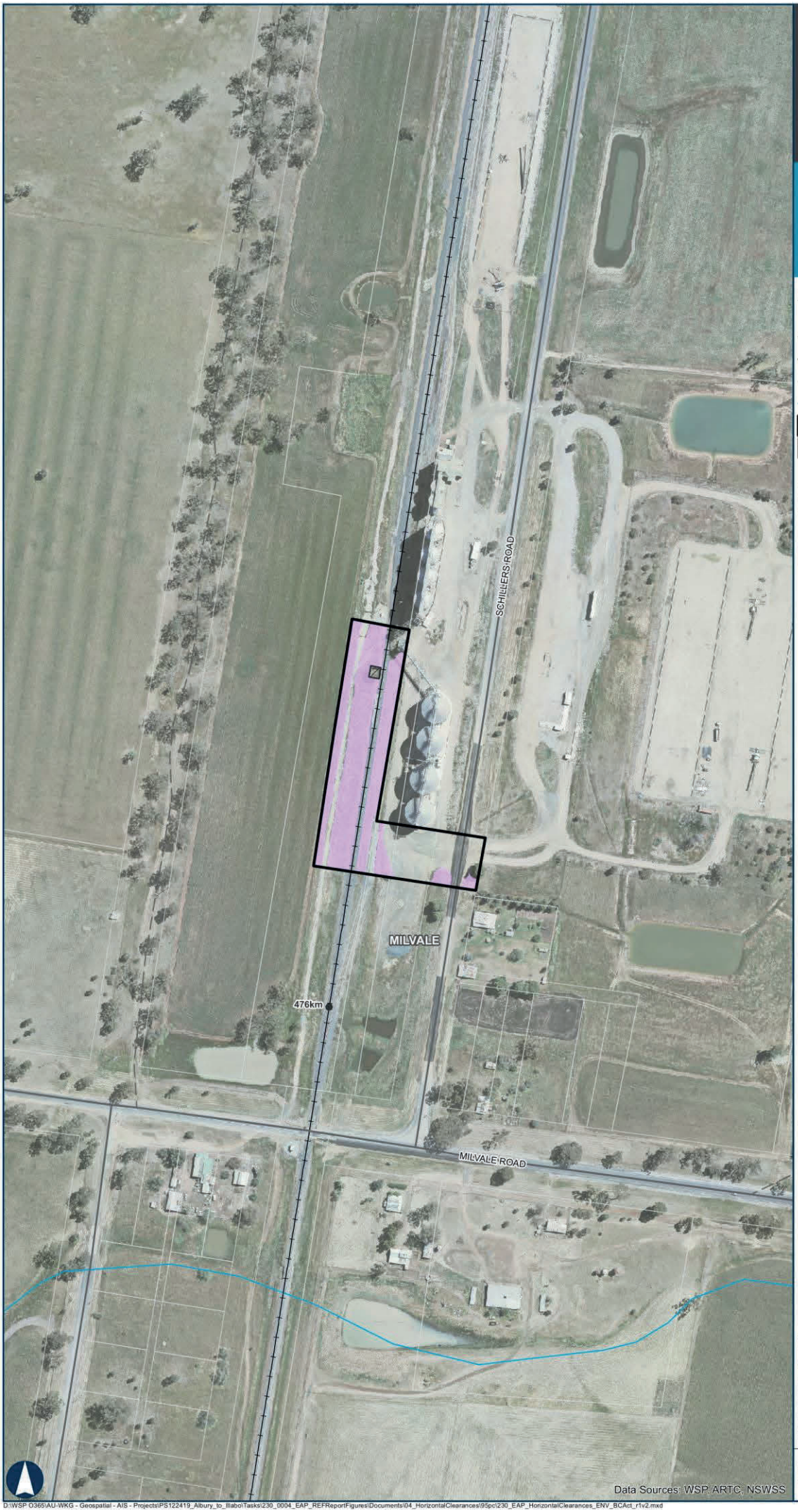
5.3 THREATENED FAUNA SPECIES

The desktop database searches and assessments identified 38 threatened species listed under the NSW BC Act (Appendix B). Of the 33 threatened species identified, nine 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 (3)			
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	**Moderate** – potential habitat in the study area in the form of open woodland.
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V	**Moderate –** potential habitat in study area.
Polytelis swainsonii	Superb Parrot	V	**Moderate** – potential habitat within the study area. Presence of remnant open woodland. May occur in study area and utilise surrounding habitat.
Blossom Nomads (2)			
Glossopsitta pusilla	Little Lorikeet	V	**Moderate** – potential habitat within the study area in the form of open woodland. Known to occur within the greater locality.
Lathamus discolor	Swift Parrot	E	**Moderate** – limited available habitat within the study area. Occurrences of individuals in the study area may occur during seasonal movements.
Birds of prey (3)			
Circus assimilis	Spotted Harrier	V	**Moderate** – potential foraging habitat within the study area in the form of native grasslands, open woodland and agricultural land.
Falco subniger	Black Falcon	V	**Moderate** – potential foraging habitat within the study area. Occurrences of individuals may occur whilst foraging in greater locality.
Hieraaetus morphnoides	Little Eagle	V	**Moderate** – potential foraging habitat within the study area in the form of native grasslands, open woodland and agricultural land.
Mammals (1)			
Phascolarctos cinereus	Koala	V	**Moderate –** potential habitat available in the study area in the form of moderate condition PCT 76 and PCT 80 where remnant *Eucalyptus microcarpa* trees occur.

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



INLAND RAIL ARTC

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Stockinbingal to Parkes Milvale yard clearances

Figure 5.1 Threatened Biodiversity Listed under the BC Act

MAP 1 OF 6

LEGEND

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

Threatened biodiversity listed under the BC Act

- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions

0 50 100 m

Coordinate System: GDA 1994 MGA Zone 55

Date: 3/08/2021 Paper: A3

Author: WSP Scale: 1:3,000

Data Sources: WSP, ARTC, NSWSS

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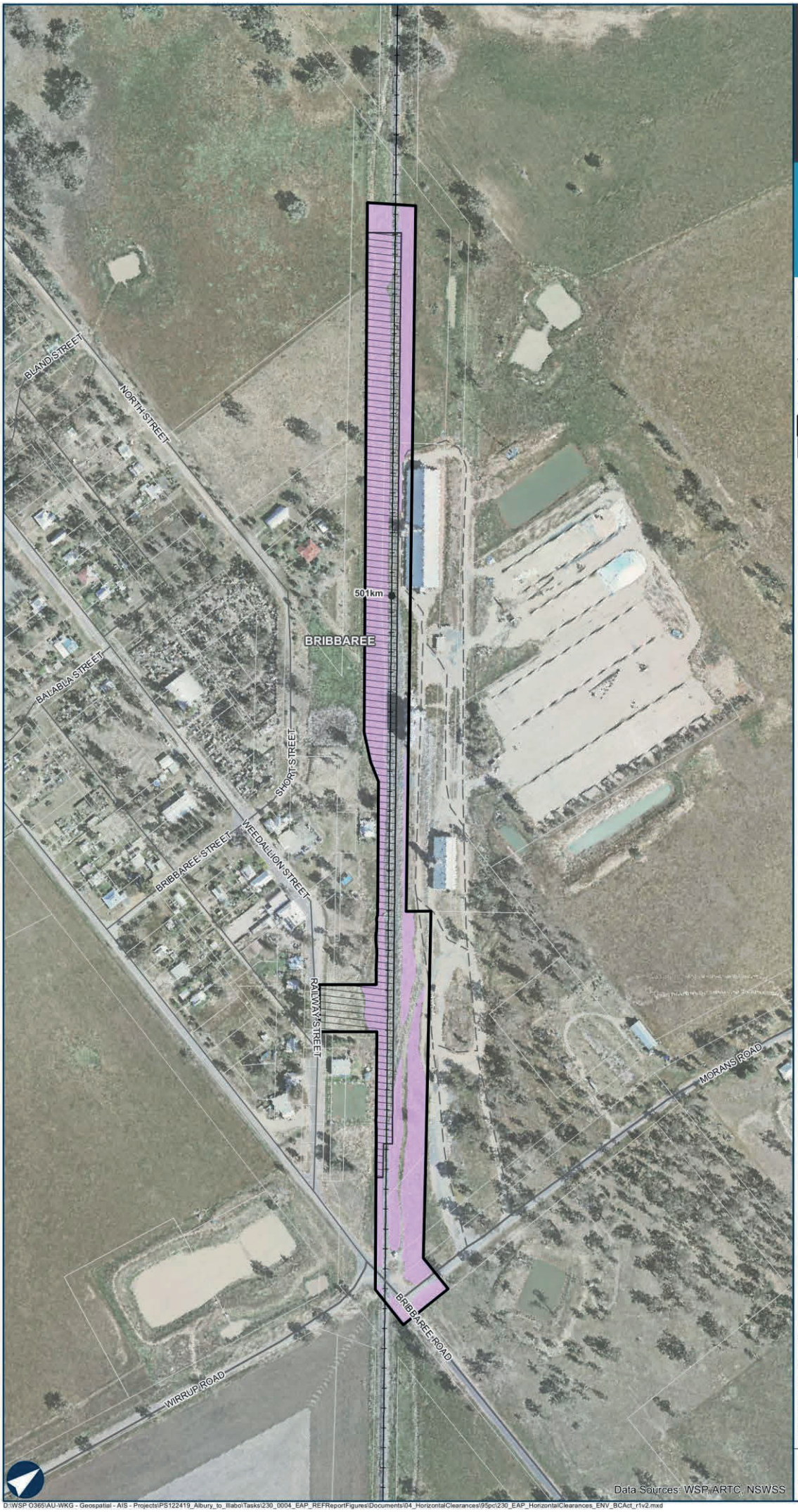

INLAND RAIL

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Stockinbingal to Parkes Bribbaree yard clearances

Figure 5.1 Threatened Biodiversity Listed under the BC Act

MAP 2 OF 6

LEGEND

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

Threatened biodiversity listed under the BC Act

- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions

0 50 100 m

Coordinate System: GDA 1994 MGA Zone 55

Date: 3/08/2021
Author: WSP

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INLAND RAIL ARTC

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Stockinbingal to Parkes Quandialla yard clearances

Figure 5.1 Threatened Biodiversity Listed under the BC Act

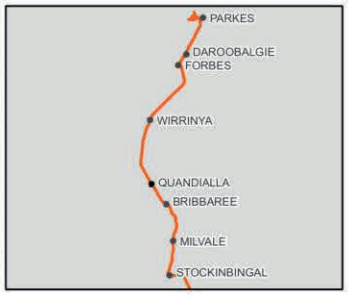
MAP 3 OF 6

LEGEND

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

Threatened biodiversity listed under the BC Act

- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions



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Coordinate System: GDA 1994 MGA Zone 55

Date: 3/08/2021
Author: WSP

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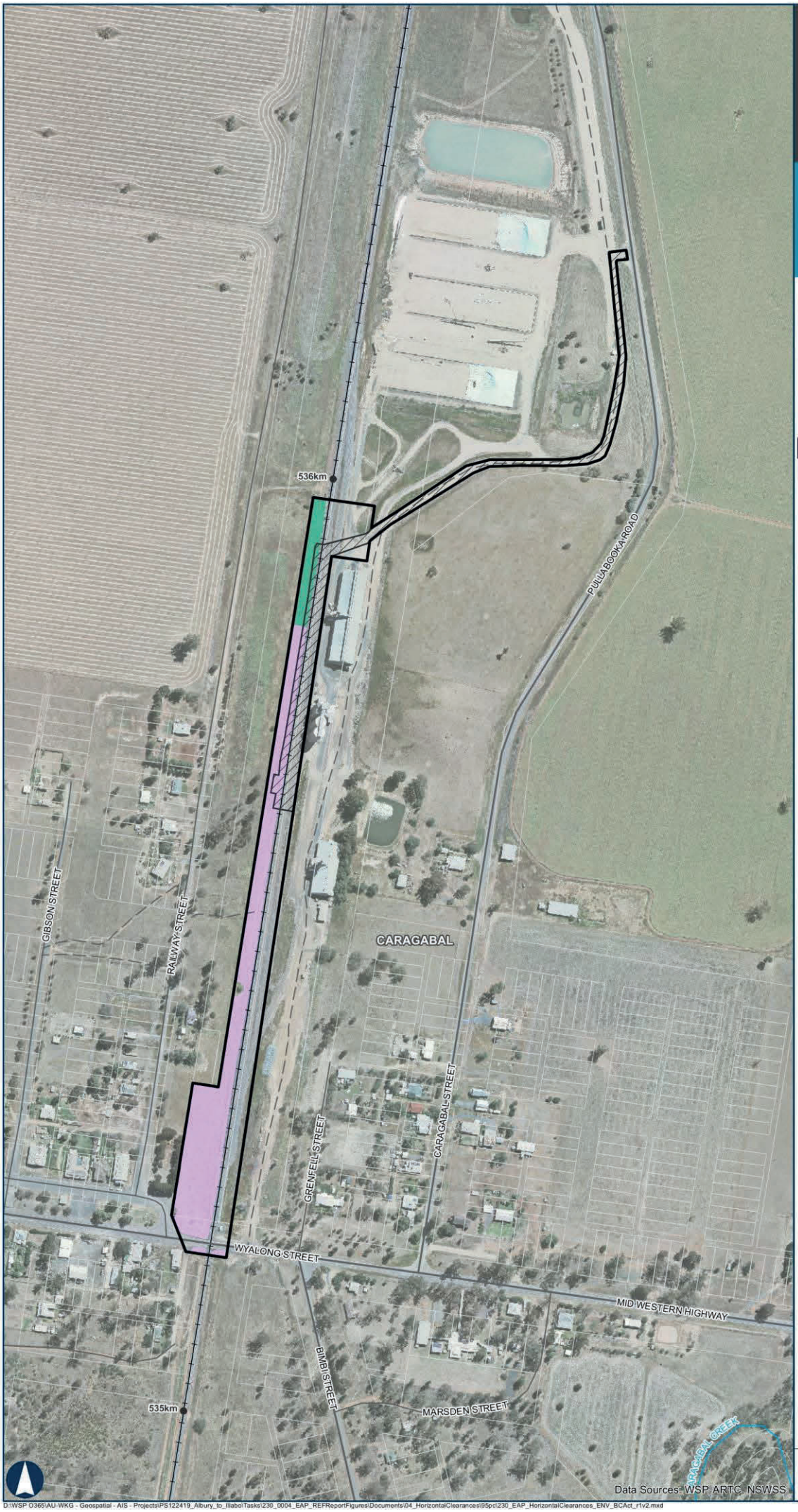

INLAND RAIL

ARTC

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Stockinbingal to Parkes Caragabal yard clearances

Figure 5.1 Threatened Biodiversity Listed under the BC Act

MAP 4 OF 6

LEGEND

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

Threatened biodiversity listed under the BC Act

- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions
- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions

0 50 100 m

Coordinate System: GDA 1994 MGA Zone 55

Date: 3/08/2021 Paper: A3

Author: WSP Scale: 1:4,000

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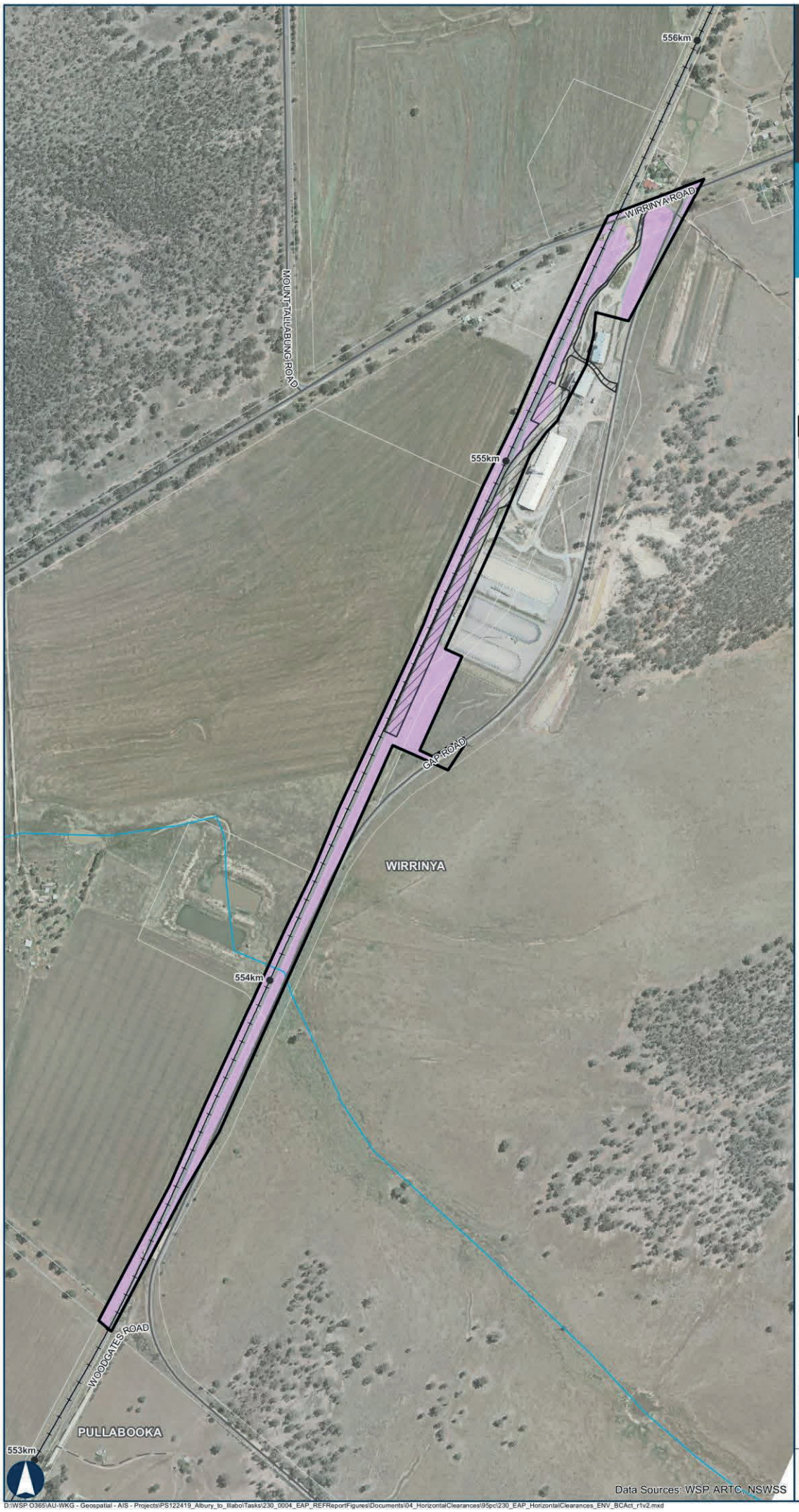

INLAND RAIL

ARTC

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

Stockinbingal to Parkes Wirrinya yard clearances

Figure 5.1 Threatened Biodiversity Listed under the BC Act

MAP 5 OF 6

LEGEND

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

Threatened biodiversity listed under the BC Act

- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions

0 50 100 m

Coordinate System: GDA 1994 MGA Zone 55

Date: 3/08/2021 Paper: A3

Author: WSP Scale: 1:7,000

Data Sources: WSP, ARTC, NSWSS

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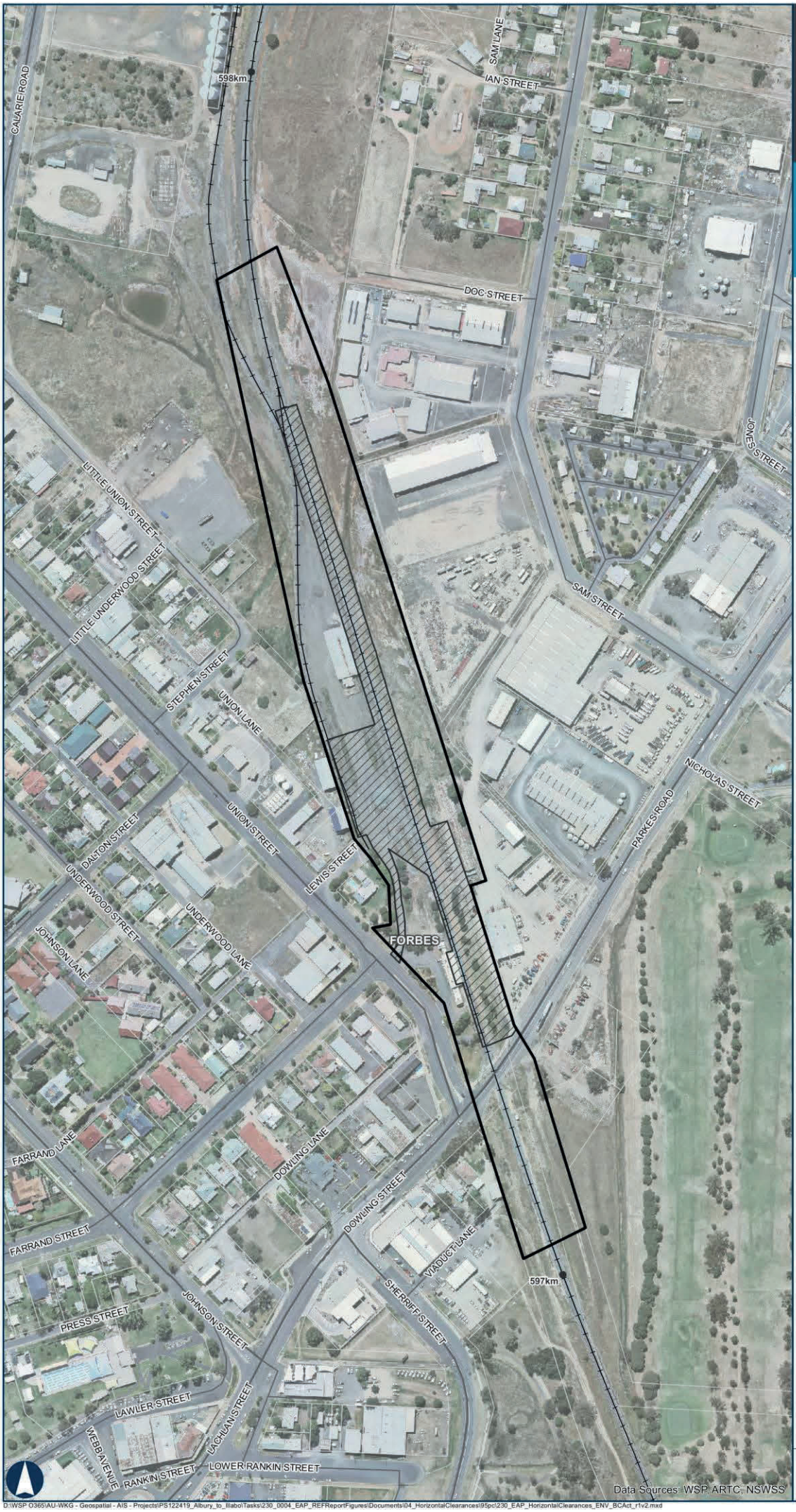

INLAND RAIL ARTC

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

Stockinbingal to Parkes Forbes Station clearances

Figure 5.1 Threatened Biodiversity Listed under the BC Act

MAP 6 OF 6

LEGEND

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

0 50 100 m

Coordinate System: GDA 1994 MGA Zone 55

Date: 3/08/2021 Paper: A3

Author: WSP Scale: 1:3,000

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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 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).

Of these four TECs, the study area contained vegetation corresponding to the EPBC Act listed Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia TEC. Although PCT 26 (Weeping Myall open woodland) was recorded in the study area, it did not meet the condition criteria for the EPBC Act listed TEC (Section 6.2.2).

6.2.1 GREY BOX (EUCALYPTUS MICROCARPA) GRASSY WOODLANDS AND DERIVED NATIVE GRASSLANDS OF SOUTH-EASTERN AUSTRALIA

Within the study area, PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions in derived native grassland and regrowth states form part of this TEC. The location of the EPBC Act listed Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia TEC within the study area is illustrated in Figure 6.2. There are approximately 16ha of this TEC within the study area at Caragabal Yard, Wirrinya Yard and Bribbaree Yard.

As described in Section 4.2.1, the rail corridor is highly disturbed but the vegetation present at the time of the survey was a mix of native and exotic species. 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. To be considered part of the EPBC Act listed Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia TEC the vegetation must meet the description of the TEC including the key diagnostic characteristics and condition thresholds outlined by the Threatened Species Scientific Committee (2010). An examination of the vegetation within the study area compared to the key diagnostic characteristics and condition thresholds for the EPBC Act listed Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia TEC is provided in Section 6.2.1.1 and Section 6.2.1.2 below.

Importantly, the survey was undertaken at the appropriate time of year and during suitable environmental conditions to be able to visually detect dominance of taxa in the ground layer accurately. Most native grasses had largely set seed but were still identifiable to genus and in some cases species level. If this survey was to be undertaken in June or July, or in a year where severe drought was experienced, the grassland areas may appear to be dominated by introduced weed species.

A patch of the EPBC Act listed Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia TEC is defined by the Threatened Species Scientific Committee (Threatened Species Scientific Committee, 2010) as a discrete and continuous area that comprises the ecological community. A patch does not comprise substantial elements of other ecological communities such as woodlands dominated by other tree species but may include small-scale disturbances, such as tracks or breaks (including exposed soil, leaf litter, cryptogams) or small-scale variations in vegetation that do not significantly alter its overall functionality (Threatened Species Scientific Committee, 2010). The patches of this TEC within the study areas contain small-scale disturbances including access tracks, roads and the rail line but these disturbances do not alter ecological functionality such as dispersal of fauna and plant propagules (i.e. seed and pollen), which would still occur. Likewise, the patch contains smaller areas where weeds may be dominant such as the very edge of the rail line, but these areas are mixed with areas that are native species dominant and do not affect ecological functionality. Taking a precautionary approach to the assessment, the areas mapped as part of the EPBC Act listed Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia TEC are considered to be part of a single patch.

6.2.1.1 KEY DIAGNOSTIC CHARACTERISTICS

The key diagnostic characteristics for the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South Eastern Australia ecological community as outlined by the Threatened Species Scientific Committee (Threatened Species Scientific Committee, 2010) as they relate to the vegetation in the study area are outlined in Table 6.1. The vegetation assigned to PCT 76 and PCT 80 meet the key diagnostic criteria for the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South Eastern Australia ecological community as outlined by the Threatened Species Scientific Committee (Threatened Species Scientific Committee, 2010).

Table 6.1 Key diagnostic characteristics for the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South Eastern Australia ecological community (Threatened Species Scientific Committee, 2010)

KEY DIAGNOSTIC CHARACTERISTICS	IS THIS CHARACTERISTIC MET IN THE STUDY AREA
The ecological community occurs on low slopes and plains from central NSW, through northern and central Victoria into South Australia. Disjunct occurrences are known from near Melbourne and in the Flinders-Lofty Block Bioregion of South Australia.	Yes. The vegetation is in the correct location.
The vegetation structure of the ecological community is typically a woodland to open forest.	Yes. There is a small area of *Eucalyptus microcarpa* trees at Bribbaree Yard that form a small woodland stand. The remainder of PCT 76 and PCT 80 within the study areas has grassland structure.
The tree canopy is dominated (≥ 50% canopy crown cover) by *Eucalyptus microcarpa* (Grey Box). Other tree species may be present in the canopy and, in certain circumstances, may be co-dominant with Grey Box but are never dominant on their own. These associated species are listed in Appendix A.	Yes. There is a small area of *Eucalyptus microcarpa* trees at Bribbaree Yard that form a small woodland stand. *Eucalyptus microcarpa* is dominant as there are no other tree species. The remainder of PCT 76 and PCT 80 within the study areas has grassland structure.
The mid layer comprises shrubs of variable composition and cover, from absent to moderately dense. The mid layer usually has a crown cover of less than 30% with local patches up to 40% crown cover.	Yes. The mid layer is generally absent apart from some small localised patches of regrowth.
The ground layer also is highly variable in development and composition, ranging from almost absent to mostly grassy to forb-rich. Ground layer flora commonly present include one or more of the graminoid genera: *Austrodanthonia, Austrostipa, Elymus, Enteropogon, Dianella* and *Lomandra*; and one or more of the chenopod genera: *Atriplex, Chenopodium, Einadia, Enchylaena, Maireana, Salsola* and *Sclerolaena*.	Yes. The ground layer ranges from bare open patches to mostly grassy areas and areas with native forbs. The ground layer contains the graminoid genera *Rytidosperma* (syn. *Austrodanthonia*), *Austrostipa,* and *Enteropogon* and the chenopod genera *Einadia*, *Maireana* and *Salsola.*
Derived grasslands are a special state of the ecological community, whereby the canopy and mid layers have been mostly removed to <10% crown cover but the native ground layer remains largely intact, with 50% or more of the total vegetation cover being native.	Yes. The BAM plots undertaken within the grassland areas in the study area show that native species were dominant with native species cover >100% in the three BAM plots.

6.2.1.2 CONDITION THRESHOLDS

Condition thresholds are intended to function as a set of criteria that assists in identifying when the EPBC Act is likely to apply to an ecological community and provide guidance for when a patch of a threatened ecological community retains sufficient conservation values to be considered as a MNES, as defined under the EPBC Act (Threatened Species Scientific Committee, 2010). Significantly degraded patches will not be a part of the ecological community listed under the EPBC Act (Threatened Species Scientific Committee, 2010).

The condition thresholds for the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South Eastern Australia ecological community as outlined by the Threatened Species Scientific Committee (2010) are outlined in Table 6.2. The vegetation assigned to PCT 76 and PCT 80 meets most of the broadly applicable condition thresholds and thresholds for a derived grassland (≥0.5ha in area) state of the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South Eastern Australia ecological community as outlined by the Threatened Species Scientific Committee (Threatened Species Scientific Committee, 2010). A summary of each study area is as follows:

- Milvale Yard PCT 76 derived native grassland – fails Condition Threshold 5c <12 native species present in the ground layer at any time of the year based on rapid data points.
- Bribbaree Yard PCT 76 derived native grassland and Poor – WGBox1 BAM plot = fails Condition Threshold 2b with only 9 perennial native species present in mid and ground layers at any time of the year. But 72.3% native grass cover. The rapid data point in derived native grassland indicates 14 native species present in the ground layer at any time of the year. Meets condition threshold 5c.
- Quandialla Yard PCT 76 derived native grassland – fails Condition Threshold 5c <12 native species present in the ground layer at any time of the year based on rapid data point.
- Caragabal Yard PCT 80 derived native grassland & isolated trees – rapid data point indicates 13 native species present in the ground layer at any time of the year. Meets condition threshold 5c.
- Wirrinya Yard PCT 80 derived native grassland & isolated trees – BAM plot Grass6 = 107.8% native grass cover, 21 native species present in ground layer. 110.8% perennial native ground layer. BAM plot Grass7 = 120.9% grass cover. 17 native species present in ground layer. 132.1% perennial native ground cover. Meets condition thresholds.

Table 6.2 Condition thresholds for the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South Eastern Australia ecological community (Threatened Species Scientific Committee, 2010)

CATEGORY AND RATIONALE	THRESHOLDS	IS THE THRESHOLD MET
Criteria that are broadly applicable	1a. The minimum patch size is 0.5ha AND 1b. The canopy layer contains Grey Box (*E. microcarpa*) as the dominant or co-dominant tree species AND 1c. The vegetative cover of non-grass weed species in the ground layer is less than 30% at any time of the year.	1a. Yes. The patch size at all study areas is >0.5ha (patch size extends out of the study areas to include adjacent connected vegetation). 1b. Yes for Bribbaree study area. No for remaining study areas as the canopy has been cleared. 1c. Yes. The vegetative cover of non-grass weed species in the ground layer is <30% as measured in the BAM plots.
Additional criteria that apply to smaller woodland patches (0.5 to <2ha in area) with tree crown cover >10%	2a. At least 50% of the vegetative cover in the ground layer comprises perennial native species at any time of the year AND 2b. 8 or more perennial native species (6 or more in the Flinders Lofty Block Bioregion of South Australia) are present in the mid and ground layers at any time of the year.	Not applicable. The patch size for all study areas is >2ha. Thresholds 2a and 2b not applicable.

CATEGORY AND RATIONALE	THRESHOLDS	IS THE THRESHOLD MET
Additional criteria that apply to larger woodland patches with a well-developed canopy (2ha or more in area)	3a. At least 8 trees/ha are hollow bearing or have a diameter at breast height of 60cm or more; AND 3b. at least 10% of the vegetative ground cover comprises perennial native grasses at any time of the year; OR 4a. At least 20 trees/ha have a diameter at breast height of 12cm or more AND 4b. at least 50% of the vegetative cover in the ground layer comprises perennial native species.	There were no hollow-bearing trees at the woodland patch at Bribbaree Yard. Not applicable to other study areas. The patch size is >2ha in area but it is not a woodland with a well-developed canopy. Thresholds 3a not met for the small woodland area at Bribbaree Yard but 3a and 3b not applicable to other study areas. Thresholds 4a and 4b not applicable.
Additional criteria that apply to patches where the canopy is less developed or absent (derived grassland) (≥0.5ha in area)	5a. Woodland density does not meet criteria 3a or 4a, or is a derived grassland with clear evidence that the site formerly was a woodland with a tree canopy dominated or co-dominated by *E. microcarpa* AND 5b. At least 50% of the vegetative cover in the ground layer is made up of perennial native species at any time of the year AND 5c. 12 or more native species are present in the ground layer at any time of the year.	5a. Yes. Woodland density at Bribbaree Yard does not meet criteria 3a or 4a. The remaining study areas contain derived native grassland considered likely to formerly have been a woodland with a tree canopy dominated or co-dominated by *E. microcarpa*. 5b. Yes. At least 50% of the vegetative cover in the ground layer was made up of perennial native species at the time of survey as measured in BAM plots. 5c. Met for some study areas. Milvale Yard and Quandialla Yard had <12 native species in the ground layer at the time of survey based on the rapid data points. Data from the BAM plots indicate that only 9 native species were present in the ground layer at Bribbaree Yard, but rapid data points indicate >12 native species are present. The BAM plots at Wirrinya Yard contained more than 12 native species in the ground layer at the time of survey. Rapid data points indicate >12 native species in the ground layer at Caragabal Yard during the survey.

6.2.2 WEEPING MYALL WOODLANDS

PCT 26 at the Caragabal Yard study area fails to meet the condition criteria to be part of the EPBC Act listed Weeping Myall Woodlands TEC as described in the *Commonwealth Listing Advice on Weeping Myall Woodlands* (Threatened Species Scientific Committee, 2009) as the overstorey must have at least 5% tree canopy cover or at least 25 dead or defoliated mature Weeping Myall trees/ha. BAM plot WMyall1 undertaken in PCT 26 at the Caragabal Yard study area shows the canopy cover of 2% with only four *Acacia pendula* (Weeping Myall) trees.

As PCT 26 does not meet the condition criteria as described in the *Commonwealth Listing Advice on Weeping Myall Woodlands* (Threatened Species Scientific Committee, 2009) it is not considered to be part of the EPBC Act listed Weeping Myall Woodlands TEC.

6.3 LISTED THREATENED SPECIES

6.3.1 THREATENED FLORA SPECIES

The database searches identified 13 threatened flora species listed under the EPBC Act that have the potential to occur in the locality of the study area (see Appendix A). The habitats at Quandialla Yard, Milvale Yard and Forbes Station Yard are likely to be too disturbed to provide suitable habitat for threatened plant species.

PCT 76, PCT 80 and PCT 26 are known to provide habitat for many of the threatened flora species returned from the database searches. The derived native grasslands at Wirrinya Yard, Bribbaree Yard and Caragabal Yard were in relatively good condition and were dominated by native species, so were considered suitable as habitat for four EPBC Act listed threatened flora species. Consequently, a targeted threatened flora survey was undertaken in October 2021 during the flowering period for *Austrostipa metatoris, Austrostipa wakoolica, Swainsona murrayana* and *Swainsona recta*. These species were not recorded during the survey, and are therefore considered to have a low likelihood of occurring in the study area.

6.3.2 THREATENED FAUNA SPECIES

Results of the PMST database search identified 22 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, three 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 6.3).

Table 6.3 Threatened fauna species listed under the EPBC Act with a moderate likelihood of occurrence

SCIENTIFIC NAME	COMMON NAME	EPBC ACT[1]	LIKELIHOOD OF OCCURRENCE
Lathamus discolor	Swift Parrot	CE	**Moderate** – limited available habitat within the study area. Occurrences of individuals in the study area may occur during seasonal movements
Phascolarctos cinereus	Koala	V	**Moderate –** potential habitat available in the study area in the form of moderate condition PCT 76 and PCT 80 where remnant Western Grey Box trees occur.
Polytelis swainsonii	Superb Parrot	V	**Moderate** – potential habitat within the study area. Presence of remnant open woodland. May occur in study area and utilise surrounding habitat.

(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 only one record for this species was returned from the Atlas of NSW Wildlife database (Department of Planning Industry and Environment, 2021). Nevertheless, whilst the study areas were predominately disturbed, small areas of PCT 76 (poor condition), PCT 80 (isolated trees) and PCT 11 (isolated trees) occurred therein. *Eucalyptus camaldulensis* (PCT 11) and *Eucalyptus microcarpa* (PCT 76 and PCT 80) are listed as primary and secondary Koala food tree species respectively for the Forbes Shire Council area (Australia Koala Foundation, 2015).

Although small areas of PCT 76 (poor condition), PCT 80 (isolated trees) and PCT 11 (isolated trees) occurred within and likely adjacent to some of the study areas, 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.

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 6.4 and illustrated in Figure 6.1.

Koala habitat in the proposal study areas scored 3 out of 10 (Table 6.4) 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 6.4 Koala habitat assessment tool (inland population criteria)

ATTRIBUTE	SCORE	HABITAT APPRAISAL	
Koala occurrence	0	Desktop	No Koala records exist within the proposal locality in the last 5 years or within 2km of the impact area within the last 10 years (Department of Planning Industry and Environment, 2021).
		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	Not applicable
		On-site	Habitat ground-truthing was completed during field surveys, which identified one primary (*Eucalyptus camaldulensis*) and one secondary (*Eucalyptus microcarpa*) Koala food tree species.
Habitat connectivity	0	The study area is not part of contiguous landscape ≥500ha	
Key existing threats	1	Desktop	One Koala record exists in the proposal locality based on BioNet database searches of the proposal study areas. 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.
Recovery value	0	The study area consisted of a highly disturbed active rail corridor, which contained small areas of remnant woodland dominated by *Eucalyptus microcarpa*. 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*'. With relevance to the study area, such areas are mapped to the east in association with Queen Charottes Creek, south of Bathurst (Department of Environment and Energy, 2020c)
- Small areas of potential habitat was mapped in the study areas, including PCT 76 (poor condition, ~0.1ha), PCT 80 (isolated trees, ~0.3ha) and PCT 11 (isolated trees, <0.2ha)
- the proposal is not likely to impact areas of potential Koala habitat.

As the proposal is not likely to impact any areas of potential Koala habitat, a significant impact assessment was not prepared for the Koala.

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

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, 18 migratory species have been recorded or have potential habitat within the wider locality of the study area (Appendix B).

The PMST retrieved a number of bird species that are estuarine or freshwater wetland frequenting species and for which there was no suitable habitat within the study area.

No migratory species are considered to have a moderate or higher likelihood of occurrence based on the habitat available within the study area. Whilst terrestrial, and marine migratory species of bird may have rare occurrences to 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.

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Stockinbingal to Parkes Milvale yard clearances

Figure 6.2 Threatened Biodiversity Listed under the EPBC Act

MAP 1 OF 6

LEGEND

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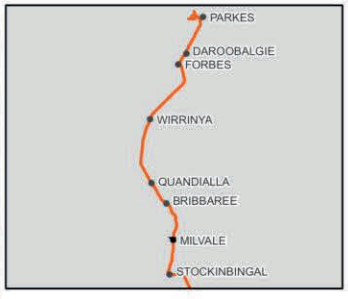

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Author: WSP Scale: 1:3,000

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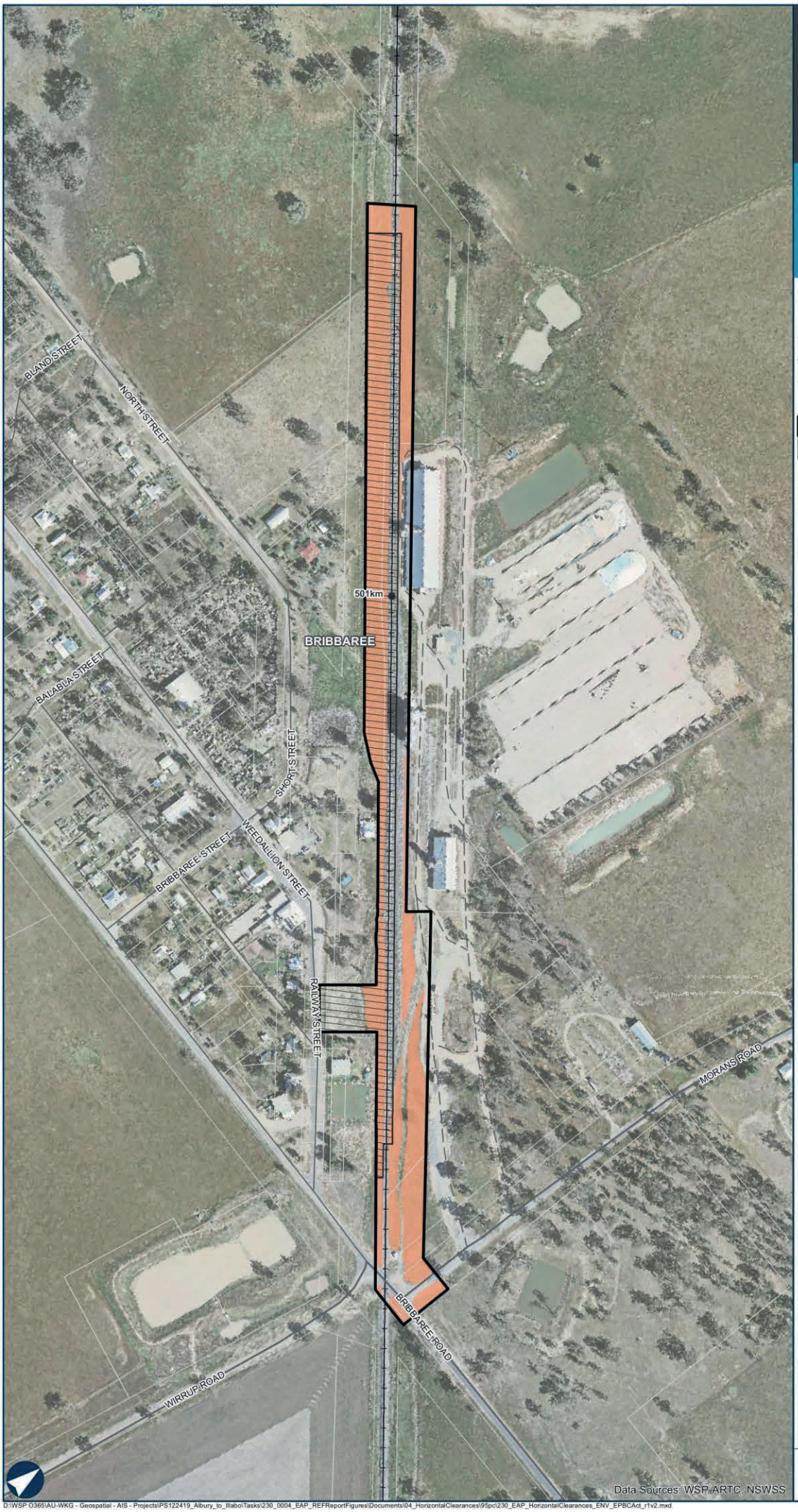

INLAND RAIL ARTC

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

Stockinbingal to Parkes Bribbaree yard clearances

Figure 6.2 Threatened Biodiversity Listed under the EPBC Act

MAP 2 OF 6

LEGEND

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

Threatened biodiversity listed under the EPBC Act

- Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia

0 50 100 m

Coordinate System: GDA 1994 MGA Zone 55

Date: 3/08/2021 Paper: A3

Author: WSP Scale: 1:4,000

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INLAND RAIL

ARTC

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

Stockinbingal to Parkes Quandialla yard clearances

Figure 6.2 Threatened Biodiversity Listed under the EPBC Act

MAP 3 OF 6

LEGEND

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

0 50 100 m

Coordinate System: GDA 1994 MGA Zone 55

Date: 3/08/2021 Paper: A3

Author: WSP Scale: 1:3,000

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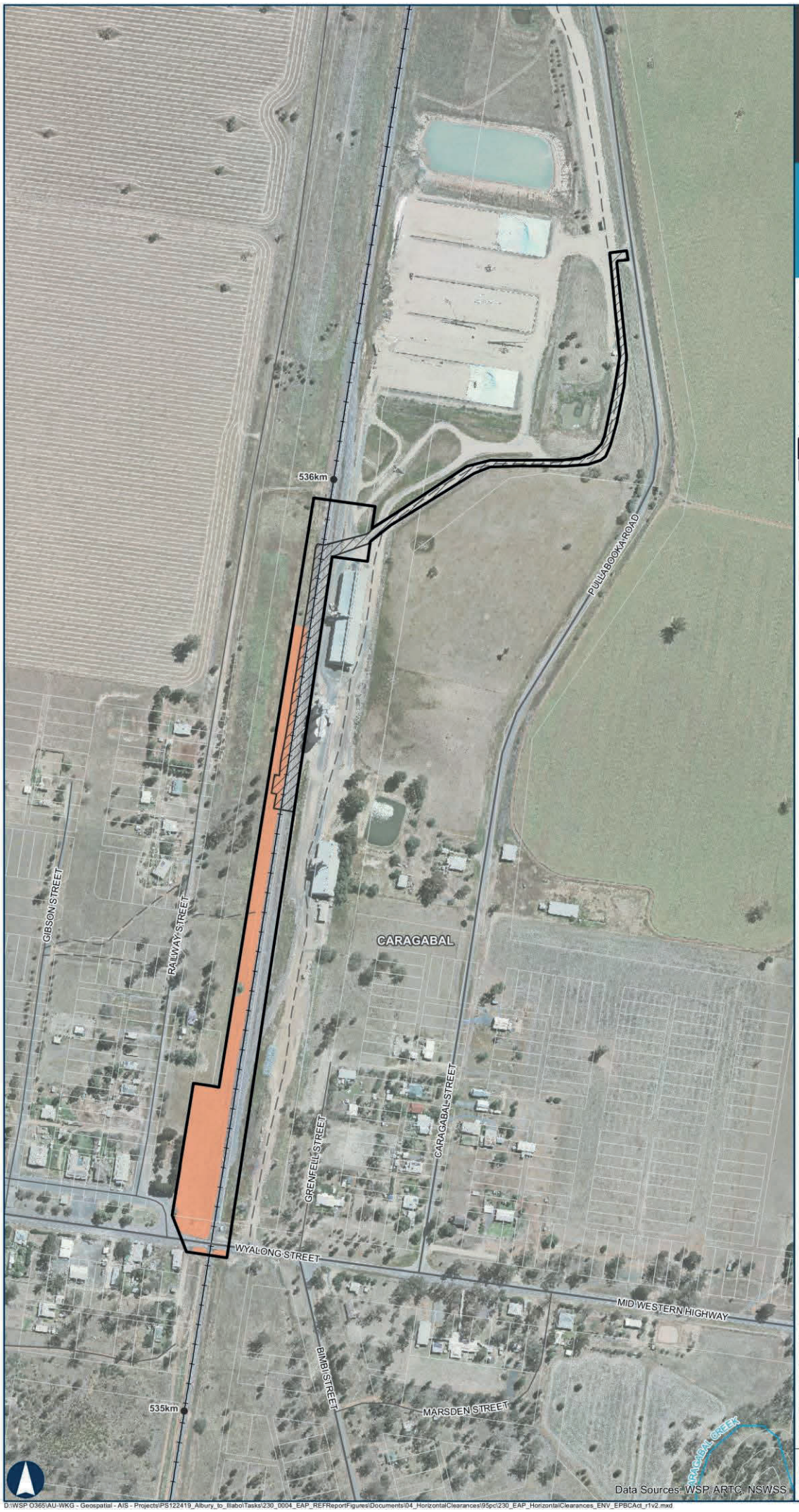

INLAND RAIL

ARTC

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Stockinbingal to Parkes Caragabal yard clearances

Figure 6.2 Threatened Biodiversity Listed under the EPBC Act

MAP 4 OF 6

LEGEND

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

Threatened biodiversity listed under the EPBC Act

- Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia

0 50 100 m

Coordinate System: GDA 1994 MGA Zone 55

Date: 3/08/2021 Paper: A3

Author: WSP Scale: 1:4,000

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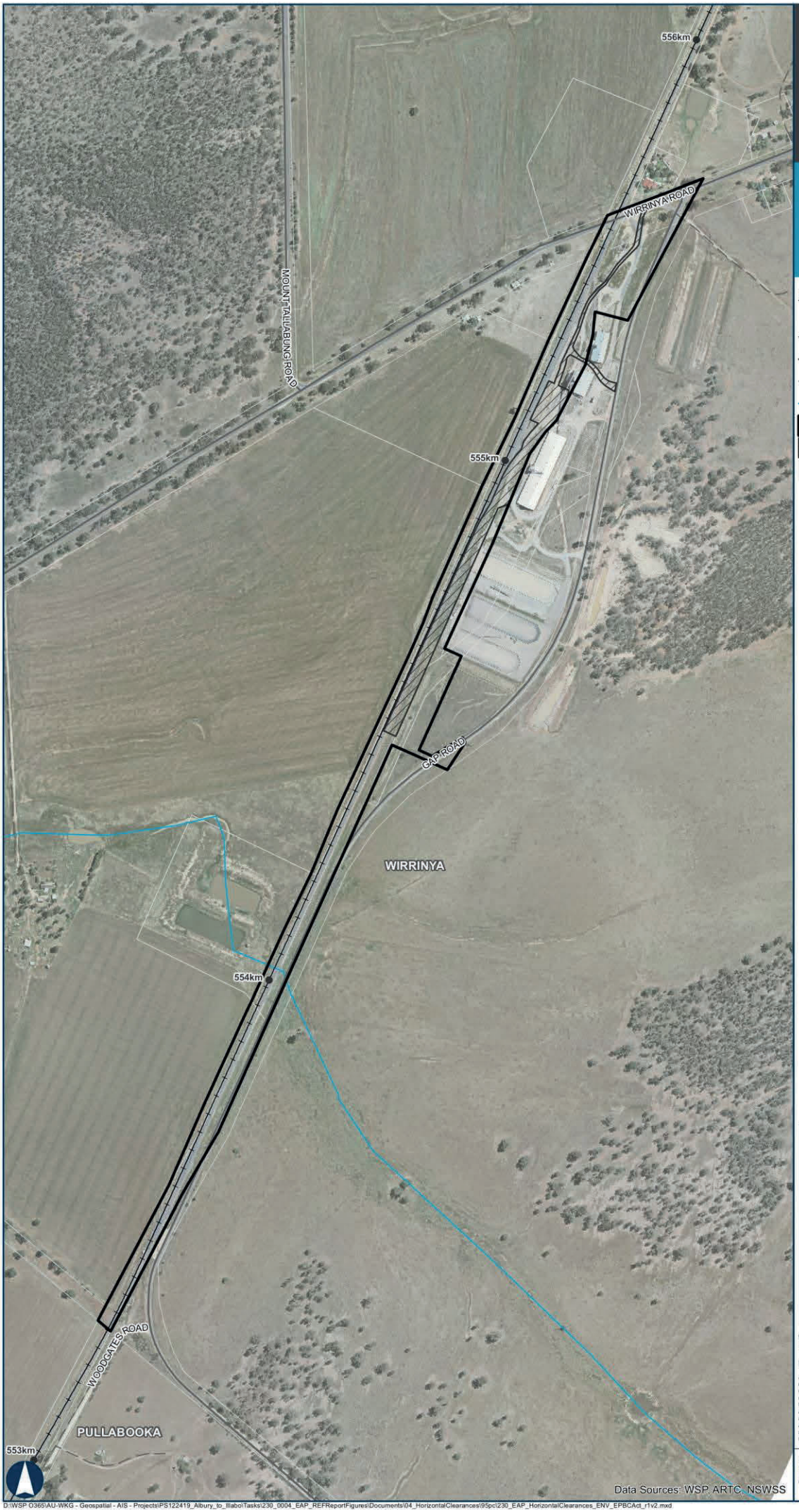

INLAND RAIL

ARTC

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

Stockinbingal to Parkes Wirrinya yard clearances

Figure 6.2 Threatened Biodiversity Listed under the EPBC Act

MAP 5 OF 6

LEGEND

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

0 50 100 m

Coordinate System: GDA 1994 MGA Zone 55

Date: 3/08/2021 Paper: A3

Author: WSP Scale: 1:7,000

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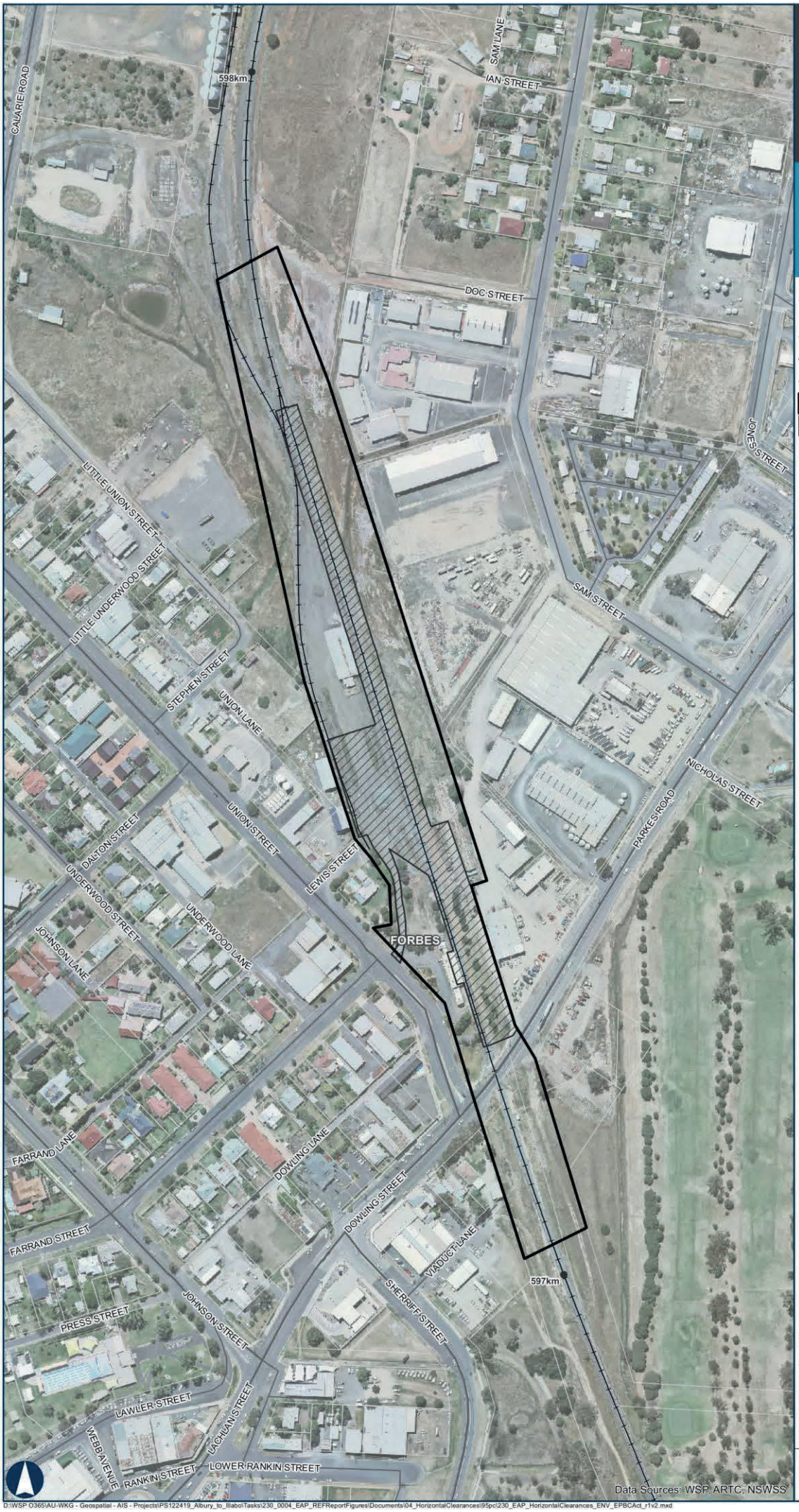


INLAND RAIL

ARTC

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

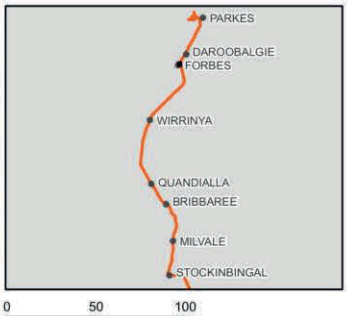
Stockinbingal to Parkes Forbes Station clearances

Figure 6.2 Threatened Biodiversity Listed under the EPBC Act

MAP 6 OF 6

LEGEND

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



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Coordinate System: GDA 1994 MGA Zone 55

Date: 3/08/2021 Paper: A3

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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 off a worst-case scenario from the 100% design impact area. Table 7.1 describes the direct and indirect impacts that may be experienced during different proposal phases. Cumulative impacts are detailed in Section 7.3.

Table 7.1 Summary of potential biodiversity impacts

IMPACT	CONSTRUCTION PHASE	OPERATION PHASE
Direct impacts		
Removal of native vegetation and threatened ecological communities	✓	
Removal of threatened fauna habitat	✓	
Injury and mortality	✓	✓
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	✓	✓

7.1 DIRECT IMPACTS

7.1.1 REMOVAL OF NATIVE VEGETATION AND THREATENED ECOLOGICAL COMMUNITIES

The construction of the proposal will require the removal of approximately 3.3ha of native vegetation, comprising 0.1ha of PCT 26, 2.1ha of PCT 76 and 1.1ha of PCT 80. Approximately 0.8ha of miscellaneous ecosystems will be impacted across the entire proposal area. Impacts to each site for native PCTs is provided in Table 7.2.

PCT 76 and PCT 80 corresponds directly to the BC Act listed Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions TEC and the EPBC listed Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia TEC. As such, the direct impact to this TEC is estimated at approximately 3.2ha.

PCT 26 corresponds directly to the BC Act listed Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions TEC. As such, the direct impact to this TEC is estimated at <0.1ha.

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)
Milvale Yard							
PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Derived native grassland	Grassy Woodlands	Floodplain Transition Woodlands	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	0.7	No impact
					Sub-total	**0.7**	**No impact**
Bribbaree Yard							
PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Poor	Grassy Woodlands	Floodplain Transition Woodlands	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	0.1	No impact
	Derived native grassland					3.3	1.8
	Derived native grassland (not field verified)					0.3	0.3
					Sub-total	**3.7**	**2.1**
Quandialla Yard							
PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Derived native grassland	Grassy Woodlands	Floodplain Transition Woodlands	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	0.2	No impact
					Sub-total	**0.2**	**No impact**

VEGETATION TYPE	CONDITION	VEGETATION FORMATION	VEGETATION CLASS	NSW TEC LISTING	EPBC TEC LISTING	AREA WITH STUDY AREA (ha)	POTENTIAL IMPACT (ha)
Caragabal Yard							
PCT 26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion	Poor	Semi-arid Woodland (Grassy sub-formation)	Riverine Plain Woodlands	Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	Not listed	0.2	0.1
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	Isolated Trees	Grassy Woodlands	Floodplain Transition Woodlands	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	0.1	No impact
	Derived native grassland					1.4	0.1
					Sub-total	**1.7**	**0.2**
Wirrinya Yard							
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	Isolated Trees	Grassy Woodlands	Floodplain Transition Woodlands	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	0.2	No impact
	Derived native grassland					8.0	1.0
					Sub-total	**8.2**	**1.0**

VEGETATION TYPE	CONDITION	VEGETATION FORMATION	VEGETATION CLASS	NSW TEC LISTING	EPBC TEC LISTING	AREA WITH STUDY AREA (ha)	POTENTIAL IMPACT (ha)
Forbes Station Yard							
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	Forested Wetlands	Inland Riverine Forests	Not listed	Not listed	0.1	No impact
	Derived native grassland					0.5	No impact
					Sub-total	**0.6**	**No impact**
					Total	**15.1**	**3.3**

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 3.2ha of derived native grassland associated with PCT 76 and PCT 80, and 0.1ha of poor condition PCT 26. Hollow-bearing trees were not associated with the proposal impact area and such resources are not expected to be impacted by the proposal. Table 7.3 details the potential impact to threatened entities and their associated habitats.

Based on the construction impact area, potential habitat for the following threatened fauna species will not be impacted by the proposal:

- Dusky Woodswallow
- Superb Parrot
- Little Lorikeet
- Swift Parrot
- Koala.

These species were identified to have a moderate or higher likelihood of occurrence based on PCT 76 (poor condition), PCT 80 (isolated trees) and PCT 11 (isolated trees) and the canopy trees (*Eucalyptus microcarpa, Eucalyptus camaldulensis* and *Acacia pendula*) that occurred therein.

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 (1)					
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V	–	PCT 26 (poor)	<0.1
Birds of prey (3)					
Circus assimilis	Spotted Harrier	V	–	PCT 76 (derived native grassland), PCT 26 (poor), PCT 80 (derived native grassland)	3.3
Falco subniger	Black Falcon	V	–		
Hieraaetus morphnoides	Little Eagle	V	–		

(1) Vulnerable (V), Endangered (E1), Critically Endangered (CE) as listed on the BC Act.

(2) Vulnerable (V), Endangered (E), Critically Endangered (CE) 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 clearing would occur. The extent of this impact would be proportionate to the extent of vegetation that is cleared. Less mobile species (e.g. ground dwelling reptiles), 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.

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 within open 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, poor condition and isolated tree forms of PCT 76, PCT 80, PCT 11 and PCT 26. 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. Accordingly, vehicle strike and injury and mortality during construction works is not likely to be significant. Likewise, wildlife train strike during operation is not likely to increase considerably and the impacts are not likely to be significant.

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. The habitats within the study area are fragments that have formed since the initial habitat clearing that has occurred. The current rail line and roads divide the 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. The proposal may however result in an increase in isolation of habitats as the current habitat patches would potentially be made smaller which would increase the physical distance between habitat fragments. The isolation that may be caused by the proposal is not likely to have an appreciable impact on nomadic or migratory species such as birds. The proposal is unlikely to be significant or limit the dispersal of species of frogs and reptiles, effects of small area of impact would only be marginally greater than that which is already experienced.

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

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, adjacent roads and agricultural land tenures. The 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 and a significant impact is not expected. 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 proposal 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 and a significant impact is not expected.

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

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.

7.3 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 cumulative 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)	OVERAL PROPORTIONAL IMPACT
	Horizontal Clearances	Lachlan River Bridge	Wyndham Ave Bridge	Daroobalgie			
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 tress				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.

(1) 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.

(2) PCT 26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion. Commensurate with a TEC under the BC Act.

(3) 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.

(4) 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 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 MEASURE
Detailed design/pre-construction		
BD1	Avoiding impacts on biodiversity	Detailed design and 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: — locations and requirements for pre-clearing surveys, including terrestrial habitats and breeding habitats (including burrows, trees, logs, existing culverts and structures) — 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 *Biosecurity Act 2015* — erosion and sediment control measures.
BD4		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.

REFERENCE	ISSUE / IMPACT	MITIGATION MEASURES – CONSTRUCTION
BD5	Rehabilitation of vegetation subject to temporary disturbance	A Rehabilitation Sub Plan will be developed for the proposal, as a component of the CEMP. This sub-plan will be based on the Inland Rail Landscape and Rehabilitation Strategy, the Inland Rail Landscape and Rehabilitation Framework and property-specific reinstatement commitments. As a minimum it will establish the following: — objectives for rehabilitation, reinstatement and/or stabilisation. Objectives will differ for within the rail corridor and outside of the rail corridor — timeframes for rehabilitation and/or reinstatement/stabilisation works to be achieved — details of the actions and responsibilities to progressively rehabilitate, regenerate, and/or revegetate areas, consistent with the agreed objectives — rehabilitation requirements such as: — milling and removal of bitumen pavement — removal of any decommissioned culverts — application of soil ameliorants — topsoiling and/or compost blanket — stabilisation and rehabilitation (e.g. planting and or seeding) — consideration for maintenance or performance issues of rehabilitation e.g. vegetation that does not grow and obscure signals or impact the longevity of rail infrastructure — procedures, timeframes, measurable performance objectives and responsibilities for monitoring the success of rehabilitation and/or reinstatement/stabilisation areas.

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, 2013).

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 and their potential habitats are being impacted by the proposal (Appendix E). Assessments of significance have been conducted for each threatened species that is assumed to occur based on the presence of potentially suitable habitat. Combined assessments of significance have been completed for groups of species that have similar life history and habitat requirements (e.g. birds of prey).

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).

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]	OUTCOME OF ASSESSMENT	
				BC Act	EPBC Act
Threatened ecological communities					
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions		E	–	Not significant	N/A
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia		–	E	N/A	Not significant
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions		E	–	Not significant	N/A
Woodland birds					
Pomatostomus temporalis temporalis	Grey-Crowned Babbler (Eastern subspecies)	V	–	Not significant	N/A
Birds of prey					
Circus assimilis	Spotted Harrier	V	–	Not significant	N/A
Falco subniger	Black Falcon	V	–	Not significant	N/A
Hieraaetus morphnoides	Little Eagle	V	–	Not significant	N/A

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

(2) Vulnerable (V), Endangered (E), as listed on the EPBC Act.

10 CONCLUSION

The proposal incorporated several discrete study areas that encompassed a heavily disturbed rail corridor, whereby most of the original vegetation had been cleared. A total of 15.1ha of native vegetation and 4.4ha of non-native vegetation was recorded in the study areas and included 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):
  - 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
  - isolated trees characteristic of PCT 11.
- PCT 26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion:
  - poor condition: a small patch that contained some *Acacia pendula* trees and native groundcovers that correspond to PCT 26.
- PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions:
  - poor condition: Patches of PCT 76 that are structurally and floristically characteristic of the PCT but are highly disturbed
  - 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 76.
- 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:
  - isolated trees characteristic of PCT 80
  - 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 80.
- Miscellaneous ecosystems:
  - highly disturbed areas with no or limited native vegetation
  - planted trees.

Two TEC's listed under the BC Act were recorded within the study areas, including:

- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions. This is composed of PCT 76 and PCT 80, including areas of derived native grassland, isolated trees and poor condition classes. There are approximately 14.3ha of this TEC within the study area.
- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions. The Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (PCT 26) forms part of this TEC. There was approximately 0.2ha of this TEC within the study area.

The study area contained vegetation corresponding to the EPBC Act listed Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia TEC. Within the study area, PCT 76 and PCT 80 in derived native grassland, isolated trees and poor condition classes form part of this TEC. Although PCT 26 (Weeping Myall open woodland) was recorded in the study area, it did not meet the condition criteria for the EPBC Act listed Weeping Myall Woodland TEC.

Construction of the proposal will impact approximately 3.3ha of native vegetation and TECs. Approximately 0.8ha of miscellaneous ecosystems will also be impacted by the proposal.

No threatened flora species listed under the EPBC Act or BC Act were identified as having a moderate or higher likelihood or occurrence in the study area.

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, some very small areas of woodland and isolated *Eucalyptus microcarpa* trees occurred therein. Whilst no threatened fauna species were recorded during the site inspection, four threatened species were considered with a moderate likelihood of occurrence in the proposal construction impact area, including Grey-crowned Babbler, Spotted Harrier, Black Falcon and Little Eagle.

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 Species Impact Statement 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 D

Horizontal Clearances

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
Androcalva procumbens (syn. *Commersonia procumbens*)	–	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 *Eucalyptus dealbata* and *Eucalyptus sideroxylon* communities, *Melaleuca uncinata* scrub, under mallee eucalypts with a *Calytrix tetragona* understorey, and in a recently burnt Ironbark and Callitris area. Also, in *Eucalyptus fibrosa* subsp. *nubila, Eucalyptus dealbata, Eucalyptus albens* and *Callitris glaucophylla* woodlands north of Dubbo. Other associated species include *Acacia triptera, Callitris endlicheri, Eucalyptus melliodora, Allocasuarina diminuta, Philotheca salsolifolia, Xanthorrhoea species, Exocarpos cupressiformis, Leptospermum parvifolium* and *Kunzea parvifolia*. 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 the PCTs that are present. As such, this species is considered to have a low likelihood of occurrence in the study area.
Austrostipa metatoris	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 *Eucalyptus populnea, Eucalyptus intertexta, Callitris glaucophylla, Casuarina cristata, Santalum acuminatum* and *Dodonaea viscosa*. Flowers in response to rain.	PMST	Low. This species has not been recorded in the locality. The study area is to the east of the known distribution. A targeted survey undertaken during the flowering period did not record this species.

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Austrostipa wakoolica	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 *Callitris glaucophylla, Eucalyptus microcarpa, E. populnea, Austrostipa eremophila, A. drummondii, Austrodanthonia eriantha* and *Einadia nutans*. 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, Bionet	Low. This species is also known to occur within PCT 76, PCT 80 and PCT 26. Records of this species are present near Caragabal. Several *Austrostipa* species were recorded in the study area during the survey. Although potential habitat was present, a targeted survey undertaken during the flowering period did not record this species.
Caladenia arenaria	Sand-hill Spider-orchid	E	E	*Caladenia arenaria* is found mostly on the south west plains and western south west slopes. The original description is of a plant from Nangus, west of Gundagai (1865) and there is a report of the species from Adelong near Tumut. A record near Cootamundra needs verifying. The Sand-hill Spider Orchid is currently only known to occur in the Riverina between Urana and Narranderra. Occurs in woodlands with sandy soil, especially dominated by White Cypress Pine.	PMST	Low. *Caladenia arenaria* is known to be associated with PCT 76 and PCT 80 but the study areas are outside of the range of this restricted species.

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Caladenia concolor	Crimson/Maroon Spider-orchid	E	V	The current NSW Scientific Committee listing incorporates two populations which have each been described as separate species by D.L. Jones. One of these populations comprises a few hundred plants on private property near Bethungra and the other of about 100 plants occurs in Burrinjuck Nature reserve. The other occurrences of the Crimson Spider Orchid in NSW are from the Nail Can Hill Crown Reserve near Albury. The species also occurs at two localities in Victoria near Beechworth and Chiltern. Habitat is regrowth woodland on granite ridge country that has retained a high diversity of plant species, including other orchids. The dominant trees are Blakely's Red Gum (Eucalyptus blakelyi), Red Stringybark (E. macrorhyncha), Red Box (E. polyanthemos) and White Box (E. albens). This species is deciduous, producing a leaf during autumn or winter and after flowering in spring survives the dry summer and early autumn as a dormant tuber.	PMST	Low. *Caladenia concolor* is not known to be associated with the PCTs from within the study areas as this species is found in granite ridge country further south of the study area. As such, based on known habitat associations, this species is considered to have a low likelihood of occurrence in the study area.
Diuris tricolor	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 Callitris pine forests.	Bionet, Plantnet	Low. *Diuris tricolor* is known to occur in PCT 76 and PCT 80 and will grow in disturbed areas/ grassland. There is also a record of this species from the Forbes area. Although potential habitat was present, a targeted survey undertaken during the flowering period did not record this species.

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Eleocharis obicis	Striate Spike-sedge	V	V	Found near Condobolin and Hay, as well as being known from an old collection from the Barrier Range near Broken Hill. The later collection was made on the Lachlan River floodplain at Micabil, near Condobolin. Grows in ephemerally wet situations such as roadside mitre drains and depressions, usually in low-lying grasslands. Sites include depressions with heavy clay soils on the Lachlan River floodplain, with *Eragrostis australasica, Atriplex vesicaria* and *A. nummularia* shrublands, low-lying claypans near an irrigation channel, and a shallow open ditch on a low ridge with *Eucalyptus populnea* in red sandy soil over clay. Recorded as flowering in November. Found to be locally frequent to abundant in western NSW populations.	PMST	Low. *Eleocharis obicis* has been recorded along the Lachlan River floodplain to the west of Condobolin and is known to be associated with PCT 76. The study area is far to the east of the know distribution of this species and as the habitat in the study area is marginal, it is considered to have a low likelihood of occurrence.
Genoplesium plumosum	Tallong Midge Orchid	CE	E	The Tallong Midge Orchid was originally collected at Kurnell in 1947; presumably it also occurred south of there, but it is now only known from two areas – the village of Tallong and its immediate environs, and a site in Morton National Park 8.5km south-east of the town of Wingello. At Tallong the largest population of flowering plants that has been recorded (in 2001) is less than 300 plants. The Morton National Park site was discovered in 2001 and there were only 10 flowering plants at that time. Surveys have failed to locate any plants there since then. Occurs exclusively in heathland, generally dominated by Violet Kunzea (Kunzea parvifolia), Common Fringe-myrtle (Calytrix tetragona) and parrot-peas (Dillwynia spp.). Grows on very shallow soils, often with lichens and mosses on sandstone conglomerate rock shelves. Plants exists only as a dormant tuber for much of the year, with leaves or fruiting stems dying back in late winter. Flowering stems emerge from late February to March, depending on the seasonal conditions, and they develop to flowering stage within about four weeks. Plants do not flower every year and often produce only a leaf. Leaves usually emerge a few weeks later than the stems that will produce flowers.	Plantnet	Low. *Genoplesium plumosum* is only known to occur in two areas, Tallong region and Morton National Park. This species grows often with lichens and mosses on sandstone conglomerate rock shelves. 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
Lepidium aschersonii	Spiny Pepper-cress	V	V	Not widespread, occurring in the marginal central-western slopes and north-western plains regions of NSW (and potentially the south western plains). In the north of the State recent surveys have recorded a number of new sites including Brigalow Nature Reserve, Brigalow State Conservation Area, Leard State Conservation Area and Bobbiwaa State Conservation Area. Also known from the West Wyalong in the south of the State. Records from Barmedman and Temora areas are likely to be no longer present. Approximately 50% of the total *Lepidium aschersonii* recorded for Australia occurs in NSW. Found on ridges of gilgai clays dominated by Brigalow (*Acacia harpophylla*), Belah (Casuarina cristata), Buloke (*Allocasuarina luehmanii*) and Grey Box (*Eucalyptus microcarpa*). In the south has been recorded growing in Bull Mallee (*Eucalyptus behriana*). Often the understorey is dominated by introduced plants. The species grows as a component of the ground flora, in grey loamy clays. Vegetation structure varies from open to dense, with sparse grassy understorey and occasional heavy litter. Populations have been known to immediately disappear following inundation by flooding, reappearing several seasons later. An apparent increase in numbers during drought conditions has also been observed. The species is reported to be salt tolerant and also grows well under dry conditions.	PMST	Low. *Lepidium aschersonii* is known to be associated with PCT 76. However, this species was not identified during the field survey despite survey in the correct season. Only exotic *Lepidium* species were located during the survey. Therefore, it is considered to have a low likelihood of occurrence.

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Prasophyllum sp. *Wybong* syn. *Prasophyllum petilum*	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 Poa labillardieri, Black Gum Eucalyptus aggregata and tea-trees Leptospermum 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 the PCTs within the study areas. The study area is outside of the known distribution of this species, so it is considered to have a low likelihood of occurrence.
Pultenaea setulosa	Stony Bush-Pea	–	V	For the purposes of the EPBC Act, Pultenaea setulosa is treated in the narrow sense and is restricted to Broad Sound to the Marlborough area in Queensland.	Plantnet	Low. The study area is outside of the known distribution of this species, so it is considered to have a low likelihood of occurrence.
Swainsona murrayana	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 Maireana species.	PMST	Low. This species is known to be associated with PCT 76, PCT 80 and PCT 26 and there are many records of this species to the southwest of Forbes. Although potential habitat was present, a targeted survey undertaken during the flowering period did not record this species.

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Swainsona recta	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 *Eucalyptus blakelyi*, Yellow Box *E. melliodora*, Candlebark Gum *E. rubida* and Long-leaf Box *E. goniocalyx*. Grows in association with understorey dominants that include Kangaroo Grass *Themeda australis*, poa tussocks *Poa* spp. and spear-grasses *Austrostipa* 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. This species is known to be associated with PCT 76 and there are many records of this species to the east and north-east of Forbes. Although potential was present, a targeted survey undertaken during the flowering period did not record this species.
Tylophora linearis	–	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 *Eucalyptus fibrosa*, *Eucalyptus sideroxylon*, *Eucalyptus albens*, *Callitris endlicheri*, *Callitris glaucophylla* and *Allocasuarina luehmannii*. Also grows in association with *Acacia hakeoides*, *Acacia lineata*, *Melaleuca uncinata*, Myoporum species and Casuarina 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 the PCTs in the study areas so it is considered to have a low likelihood of occurrence.

APPENDIX

D

Horizontal Clearances

Biodiversity Assessment Report

Appendix B Threatened fauna likelihood of occurrence assessment

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

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Birds (44)						
Actitis hypoleucos	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
Anseranas semipalmata	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 ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Anthochaera phrygia	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	Low – limited available habitat within the study area. Rare occurrences of individuals in the study area may occur during seasonal movements.
Apus pacificus	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 ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Artamus cyanopterus cyanopterus	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 ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland.	Bionet	**Moderate** – potential habitat in the study area in the form of open woodland
Botaurus poiciloptilus	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 (Typha spp.) and spikerushes (Eleocharis spp.). Breeding occurs in summer from October to January; nests are built in secluded places in densely-vegetated wetlands on a platform of reeds.	Bionet, PMST	Low – no available habitat within the study area. Preferred habitat not in study area.
Calidris acuminata	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 ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Calidris ferruginea	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.
Calidris melanotos	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 ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Chthonicola sagittata	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	Low – limited habitat within the study area. Known to occur within the greater locality.
Circus assimilis	Spotted Harrier	V		Grassy open woodland, inland riparian woodland, grassland and shrub steppe. Most commonly found in native grassland but also in agricultural areas.	Bionet	**Moderate** – potential foraging habitat within the study area in the form of native grasslands, open woodland and agricultural land.

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Climacteris picumnus victoriae	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 (*Eucalyptus camaldulensis*) 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	Low – limited habitat within the study area. Known to occur within the greater locality.
Daphoenositta chrysoptera	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	Low – limited habitat within the study area. Known to occur within the greater locality.

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Epthianura albifrons	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.
Falco hypoleucos	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 500mm 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.
Falco subniger	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.

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Gallinago hardwickii	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.
Gelochelidon nilotica	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.
Grantiella picta	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 (*Acacia pendula*), Brigalow (*A. harpophylla*) and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema. Nest from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping eucalypts, she-oak, paperbark or mistletoe branches.	PMST	Low – limited available habitat within the study area. Low abundance of preferred foraging resources (mistletoes) recorded.
Glossopsitta pusilla	Little Lorikeet	V		Forages in flowering eucalypts and *Melaleuca* sp. Riparian habitats are particularly used, due to higher soil fertility and greater productivity. Nests in tree hollows.	Bionet	**Moderate** – potential habitat within the study area in the form of open woodland. Known to occur within the greater locality.

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Haliaeetus leucogaster	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	Low – marginal habitat within the study area. Intermittent occurrences whilst foraging in greater locality may occur.
Hieraaetus morphnoides	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, open woodland and agricultural land.

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Hirundapus caudacutus	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	Low – Occupies wide ranging habitats thus may occur intermittently in aerial habitats over the study area on a seasonal basis. However, due to being an aerial species unlikely to rely on habitat within the study area.
Hydroprogne caspia	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 ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Lathamus discolor	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 *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. Commonly used lerp infested trees include Inland Grey Box *E. microcarpa*, Grey Box *E. moluccana* and Blackbutt *E. pilularis*.	PMST	**Moderate** – limited available habitat within the study area. Occurrences of individuals in the study area may occur during seasonal movements
Leipoa ocellata	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 ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Melanodryas cucullata cucullata	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 cucullata) 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 picata. 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 habitat within the study area, lacks preferred habitat of structurally diverse habitats. Known to occur within the greater locality.
Motacilla flava	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 ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Myiagra cyanoleuca	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.
Neophema pulchella	Turquoise Parrot	V		Range extends from southern Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland.	Bionet	Low – marginal available habitat within the study area. Known to occur within the greater locality.
Numenius madagascariensis	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 ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Oxyura australis	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 – no available habitat in study area.
Pachycephala inornata	Gilbert's Whistler	V		The Gilbert's Whistler occurs in ranges, plains and foothills in arid and semi-arid timbered habitats. In NSW it occurs mostly in mallee shrubland, but also in box-ironbark woodlands, Cypress Pine and Belah woodlands and River Red Gum forests. Within the mallee the species is often found in association with an understorey of spinifex and low shrubs including acacias, hakeas, sennas and grevilleas. In woodland habitats, the understorey comprises dense patches of shrubs.	Bionet	Low – marginal habitat within the study area. Rare occurrences in locality may occur.
Pandion cristatus (syn. P. haliaetus)	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 ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Pezoporus occidentalis	Night Parrot	EX	E	The distribution of the Night Parrot has not been well documented, but it is known to be restricted to arid and semi-arid Australia. Is known to occur within Spinifex grasslands in stony or sandy areas and samphire and chenopod associations on floodplains, salt lakes and clay pans. Suitable habitat is characterized by the presence of large and dense clumps of Spinifex, and it may prefer mature spinifex that is long and unburnt. The Night Parrot is a nocturnal bird that forages on the ground, becoming active during dusk and, generally flies to water to drink prior to foraging. During the day it rests within clumps of spinifex. Appears to be highly nomadic, moving in response to availability of food and water. After periods of heavy rain with abundant seeding of spinifex, the species was often locally common.	Bionet	Low – marginal habitat within the study area. Presumed extinct in NSW
Polytelis swainsonii	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	**Moderate** – potential habitat within the study area. Presence of remnant open woodland. May occur in study area and utilise surrounding.

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Pomatostomus temporalis temporalis	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	**Moderate –** potential habitat in study area.
Rhipidura rufifrons	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 ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Rostratula australis (syn. R. benghalensis)	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.
Stagonopleura guttata	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	Low – marginal habitat within the study area. Known to occur within the greater locality.

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Stictonetta naevosa	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 in study area.
Tringa nebularia	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.
Tringa stagnatilis	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.	PMST	Low – no available habitat within the study area.

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Fish (3)						
Maccullochella macquariensis	Trout Cod	E1	E	Trout Cod occur in the cooler upper reaches of the Murray river, specifically between Yarrawonga 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	Low – no available habitat in study area.
Maccullochella peelii	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	Low – no available habitat in study area.
Macquaria australasica	Macquarie Perch		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	Low – no available habitat in study area.

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Mammals (6)						
Chalinolobus dwyeri	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 (*Petrochelidon ariel*), 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).
Dasyurus maculatus maculatus	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.

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Nyctophilus corbeni	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, bulloke (*Allocasuarina leuhmanni*) 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.
Petaurus norfolcensis	Squirrel Glider	V		Inhabits mature or old growth box, box-ironbark woodlands and river red gum forest west of the Great Dividing Range. Prefers mixed species stands with a shrub or Acacia midstorey. Uses tree hollows as den sites.	Bionet	Low - marginal habitat within the study area. Rare occurrences in locality may occur.
Phascolarctos cinereus	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, Bionet	**Moderate –** potential habitat available in the study area in the form of isolated trees and poor condition classes of PCT 76, PCT 80 and PCT 11 where remnant Western Grey Box trees occur.

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Pteropus poliocephalus	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 <20 km. Feed on the nectar and pollen of native trees, in particular Eucalyptus, Melaleuca and Banksia, and fruits of rainforest trees and vines.	PMST	Low – marginal available habitat within the study area. Irregular occurrences of individuals during seasonal movements may occur.
Reptiles (2)						
Aprasia parapulchella	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 *Callitris enlicheri* woodland and *Eucalyptus macrorhyncha* 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)

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	HABITAT	DATA SOURCE	LIKELIHOOD OF OCCURRENCE
Delmar impar	Striped legless Lizard, Striped Snake Lizard	V	V	The Striped Legless Lizard occurs in the Southern Tablelands, the South West Slopes, the Upper Hunter and possibly on the Riverina. Populations are known in the Goulburn, Yass, Queanbeyan, Cooma, Muswellbrook and Tumut areas. Also occurs in the ACT, Victoria and south-eastern South Australia. Found mainly in Natural Temperate Grassland and grasslands that have a high exotic component. Preferred habitat is dominated by perennial, tussock-forming grasses such as *Themeda australis*, spear-grasses and poa spp. tussocks with significant areas of rocks which provides sheltering habitat. This species is also known to utilise dried cowpats for sheltering.	PMST	Low – No preferred habitat available in the study area. May occur in greater locality.

APPENDIX

D

Horizontal Clearances

Biodiversity Assessment Report

Appendix C BAM plot floristic data

STOCKINBINGAL TO PARKES REVIEW OF ENVIRONMENTAL FACTORS

			Covers	**Native**	Trees	Shrubs	Grass	Forb	Fern	Other	**Exotic**	HighThreat
Plot name: WGBox 1			**# spp**	**Count**	Count	Count	Count	Count	Count	Count	**Count**	Count
Date: 28/01/2021			**19**	**10**	1	0	5	4	0	0	**9**	0
Species	**Cover**	**Abundance**	**Sum cover**	**Cover**	Sum	Sum	Sum	Sum	Sum	Sum	**Sum**	Sum
			84	**82.8**	10	0	72.3	0.5	0	0	**1.2**	0
Eucalyptus microcarpa	10	6	TG		10							
Panicum effusum	70	2000	GG				70					
Echinochloa colona	1	100	GG				1					
Heliotropium europaeum	0.2	10	EX								0.2	
Echium plantagineum	0.1	1	EX								0.1	
Polygonum aviculare	0.2	10	EX								0.2	
Amaranthus albus	0.1	1	EX								0.1	
Tribulus micrococcus	0.1	1	FG					0.1				
Eragrostis cilianensis	0.2	20	EX								0.2	
Enteropogon acicularis	0.2	10	GG				0.2					
Lythrum hyssopifolia	0.2	20	FG					0.2				
Dactyloctenium radulans	1	20	GG				1					
Opuntia stricta	0.1	1	EX								0.1	
Hirschfeldia incana	0.1	10	EX								0.1	
Lactuca serriola	0.1	1	EX								0.1	
Sida corrugata	0.1	2	FG					0.1				
Eragrostis sp.	0.1	10	GG				0.1					
Einadia nutans	0.1	1	FG					0.1				
Lepidium africanum	0.1	1	EX								0.1	

			Covers	**Native**	Trees	Shrubs	Grass	Forb	Fern	Other	**Exotic**	HighThreat
Plot name: WMyall 1			**# spp**	**Count**	Count	Count	Count	Count	Count	Count	**Count**	Count
Date: 29/01/2021			**27**	**17**	1	2	7	7	0	0	**10**	1
Species	**Cover**	**Abundance**	**Sum cover**	**Cover**	Sum	Sum	Sum	Sum	Sum	Sum	**Sum**	Sum
			67	**65.2**	2	1	61.2	1	0	0	**1.8**	0.1
Acacia pendula	2	4	TG		2							
Panicum effusum	40	1000	GG				40					
Sclerolaena birchii	0.5	10	SG			0.5						
Maireana aphylla	0.5	10	SG			0.5						
Paspalidium constrictum	0.3	30	GG				0.3					
Solanum esuriale	0.2	20	FG					0.2				
Einadia hastata	0.1	1	FG					0.1				
Salvia verbenaca	0.1	1	EX								0.1	
Hirschfeldia incana	0.3	20	EX								0.3	
Zaleya galericulata	0.3	10	FG					0.3				
Lactuca serriola	0.1	10	EX								0.1	
Cucumis myriocarpus subsp. myriocarpus	0.2	20	EX								0.2	
Dactyloctenium radulans	0.2	20	GG				0.2					
Heliotropium europaeum	0.3	50	EX								0.3	
Eragrostis sp.	20	200	GG				20					
Echinochloa colona	0.1	2	GG				0.1					
Boerhavia dominii	0.1	20	FG					0.1				
Amaranthus albus	0.2	20	EX								0.2	
Euphorbia drummondii	0.1	2	FG					0.1				
Enteropogon acicularis	0.3	30	GG				0.3					
Lythrum hyssopifolia	0.1	5	FG					0.1				
Xanthium spinosum	0.1	1	HT									0.1
Cynodon dactylon	0.3	10	GG				0.3					
Erodium crinitum	0.1	1	FG					0.1				
Datura sp.	0.1	1	EX								0.1	
Argemone ochroleuca subsp. ochroleuca	0.1	1	EX								0.1	
Eragrostis cilianensis	0.3	10	EX								0.3	

			Covers	**Native**	Trees	Shrubs	Grass	Forb	Fern	Other	**Exotic**	HighThreat
Plot name: Grass 6			**# spp**	**Count**	Count	Count	Count	Count	Count	Count	**Count**	Count
Date: 31/01/2021			**39**	**24**	0	3	12	8	0	1	**15**	3
Species	**Cover**	**Abundance**	**Sum cover**	**Cover**	Sum	Sum	Sum	Sum	Sum	Sum	**Sum**	Sum
			115.3	**110.8**	0	0.9	107.8	2	0	0.1	**4.5**	1.3
Dichanthium sericeum	20	200	GG				20					
Panicum effusum	10	200	GG				10					
Euphorbia drummondii	1	20	FG					1				
Eragrostis cilianensis	2	50	EX								2	
Eriochloa pseudoacrotricha	60	1000	GG				60					
Chloris gayana	1	100	HT									1
Senna barclayana	0.2	10	FG					0.2				
Sclerolaena birchii	0.2	1	SG			0.2						
Centaurea solstitialis	0.1	1	EX								0.1	
Avena sp.	0.1	5	EX								0.1	
Alternanthera pungens	0.2	10	HT									0.2
Lepidium africanum	0.1	10	EX								0.1	
Atriplex semibaccata	0.5	2	SG			0.5						
Polygonum aviculare	0.2	10	EX								0.2	
Enteropogon acicularis	0.5	30	GG				0.5					
Heliotropium europaeum	0.1	5	EX								0.1	
Cyperus bifax	0.5	100	GG				0.5					
Solanum esuriale	0.2	20	FG					0.2				
Dactyloctenium radulans	0.2	20	GG				0.2					
Eragrostis sp.	0.1	10	GG				0.1					
Schkuhria pinnata	0.1	20	EX								0.1	
Cynodon dactylon	15	500	GG				15					
Paspalidium constrictum	1	100	GG				1					
Echinochloa colona	0.3	10	GG				0.3					

Leiocarpa websteri	0.1	1	FG					0.1				
Erodium crinitum	0.1	10	FG					0.1				
Austrostipa aristiglumis	0.1	5	GG				0.1					
Lactuca serriola	0.1	5	EX								0.1	
Modiola caroliniana	0.1	1	EX								0.1	
Tribulus micrococcus	0.1	2	FG					0.1				
Convolvulus erubescens	0.1	5	OG							0.1		
Maireana decalvans	0.2	2	SG			0.2						
Juncus sp.	0.1	1	GG				0.1					
Echium plantagineum	0.1	1	EX								0.1	
Paspalum dilatatum	0.1	1	HT									0.1
Rumex crispus	0.1	1	EX								0.1	
Calotis lappulacea	0.1	2	FG					0.1				
Conyza sp.	0.1	1	EX								0.1	
Zaleya galericulata	0.2	5	FG					0.2				

			Covers	**Native**	Trees	Shrubs	Grass	Forb	Fern	Other	**Exotic**	HighThreat
Plot name: Grass 7			**# spp**	**Count**	Count	Count	Count	Count	Count	Count	**Count**	Count
Date: 31/01/2021			**22**	**18**	1	4	9	3	0	1	**4**	0
Species	**Cover**	**Abundance**	**Sum cover**	**Cover**	Sum	Sum	Sum	Sum	Sum	Sum	**Sum**	Sum
			143.4	**132.2**	0.1	0.8	120.9	10.3	0	0.1	**11.2**	0
Austrostipa aristiglumis	25	800	GG				25					
Vittadinia pterochaeta	10	2000	FG					10				
Scabiosa atropurpurea	10	2000	EX								10	
Atriplex semibaccata	0.2	5	SG			0.2						
Avena sp.	1	100	EX								1	
Rytidosperma sp.	10	1000	GG				10					
Enteropogon acicularis	60	2000	GG				60					
Austrostipa sp.	25	500	GG				25					
Euphorbia drummondii	0.2	20	FG					0.2				
Maireana decalvans	0.3	5	SG			0.3						
Centaurea solstitialis	0.1	5	EX								0.1	
Anthosachne scabra	0.5	50	GG				0.5					
Chloris ventricosa	0.1	1	GG				0.1					
Callitris glaucophylla	0.1	1	TG		0.1							
Salsola australis	0.2	5	SG			0.2						
Sida corrugata	0.1	1	FG					0.1				
Sclerolaena birchii	0.1	1	SG			0.1						
Dichanthium sericeum	0.1	10	GG				0.1					
Convolvulus erubescens	0.1	10	OG							0.1		
Austrostipa sp.	0.1	1	GG				0.1					
Panicum effusum	0.1	1	GG				0.1					
Carduus pycnocephalus	0.1	5	EX								0.1	

APPENDIX D

Horizontal Clearances

Biodiversity Assessment Report

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)	LOCATION NAME
Birds			
Acanthiza nana	Yellow Thornbill	N	Forbes Station
Anthus novaeseelandiae	Australasian Pipit	N	Wirrinya
Cacatua galerita	Sulphur-crested Cockatoo	N	Bribbaree, Caragabal
Cacatua sanguinea	Little Corella	N	Caragabal
Cincloramphus cruralis	Brown Songlark	N	Wirrinya
Columba livia	Rock Dove	I	Milvale, Bribbaree, Quandialla, Caragabal, Wirrinya, Forbes Station
Corcorax melanorhamphos	White-winged Chough	N	Milvale, Caragabal
Corvus coronoides	Australian Raven	N	Caragabal
Corvus mellori	Little Raven	N	Milvale, Bribbaree, Quandialla, Caragabal, Wirrinya, Forbes Station
Coturnix ypsilophora	Brown Quail	N	Wirrinya
Cracticus nigrogularis	Pied Butcherbird	N	Bribbaree, Milvale
Egretta novaehollandiae	White-faced Heron	N	Wirrinya
Elanus axillaris	Black-shouldered Kite	N	Milvale
Entomyzon cyanotis	Blue-faced Honeyeater	N	Caragabal
Eolophus roseicapillus	Galah	N	Milvale, Bribbaree, Quandialla, Caragabal, Wirrinya, Forbes Station
Falco cenchroides	Nankeen Kestrel	N	Bribbaree
Grallina cyanoleuca	Magpie-lark	N	Milvale, Bribbaree, Quandialla, Caragabal, Wirrinya, Forbes Station
Gymnorhina tibicen	Australian Magpie	N	Milvale, Bribbaree, Quandialla, Caragabal, Wirrinya, Forbes Station
Hirundo neoxena	Welcome Swallow	N	Milvale, Bribbaree, Quandialla, Caragabal, Wirrinya, Forbes Station
Manorina melanocephala	Noisy Miner	N	Bribbaree, Caragabal, Quandialla
Ocyphaps lophotes	Crested Pigeon	N	Milvale, Bribbaree, Quandialla, Caragabal, Wirrinya, Forbes Station
Passer domesticus	House Sparrow	N	Milvale, Bribbaree, Forbes Station
Petrochelidon ariel	Fairy Martin	N	Quandialla
Platycercus eximius	Eastern Rosella	N	Bribbaree, Caragabal, Milvale
Psephotus haematonotus	Red-rumped Parrot	N	Quandialla

SCIENTIFIC NAME	COMMON NAME	NATIVE (N) / INTRODUCED (I)	LOCATION NAME
Rhipidura leucophrys	Willie Wagtail	N	Milvale, Quandialla
Struthidea cinerea	Apostlebird	N	Milvale, Bribbaree, Caragabal
Sturnus tristis	Common Myna	I	Caragabal, Quandialla
Sturnus vulgaris	Common Starling	I	Wirrinya
Taeniopygia bichenovii	Double-barred Finch	N	Forbes Station
Turdus merula	Common Blackbird	I	Caragabal, Forbes Station
Mammals			
Lepus europaeus	European Hare	I	Bribbaree

APPENDIX D

Horizontal Clearances

Biodiversity Assessment Report

Appendix E Assessments of significance

E1 BC ACT ASSESSMENTS 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, which outlines the 'test of significance'. Assessments of significance have been completed for the following TEC as listed under the BC Act:

- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions (corresponds directly to PCT 76).
- Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions.

Assessments of significance have been completed for the following threatened species listed under the BC Act:

- Grey-crowned Babbler
- Birds of prey (Spotted Harrier, Black Falcon, Little Eagle).

E1.1 INLAND GREY BOX WOODLAND IN THE RIVERINA, NSW SOUTH WESTERN SLOPES, COBAR PENEPLAIN, NANDEWAR AND BRIGALOW BELT SOUTH BIOREGIONS

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

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

Not applicable.

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

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

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

The local occurrence of the Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions TEC is outlined below in Table E.1. The local occurrence of the TEC was estimated from broad scale vegetation mapping, 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).

The estimates provided below in Table E.1 provide an indication of the extent of the local occurrence of woodland patches. In all cases, the actual local occurrence is larger than estimated as not all patches of vegetation are mapped accurately.

Of importance to this assessment is that Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions TEC to be impacted consists of derived native grassland (impact of 3.2 ha). No remnant or treed area consistent with the moderate and isolated tree condition states will be impacted. As such, the local occurrence of high quality intact or relatively intact Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions TEC will largely not be affected. The local occurrence of derived native grassland is considerable as there are extensive areas of paddock containing derived native grasslands in the locality. Many of the grassland areas mapped as ‘Not Native’ in 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) will be derived native grasslands (based on observation of paddocks when driving through the locality). As such, the proposal is considered unlikely 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.

As can be seen from Table E.1, the proposal would not have an adverse effect on the extent of Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions TEC, or derived native grasslands as a whole, such that the local occurrence of the TEC is likely to be placed at risk of extinction. The proportional impacts to the local occurrence of the TEC is very low and the proposal would not result in the local extinction of the TEC.

Impacts have been estimated based on a worst-case scenario from the Draft 70% design impact area.

Table E.1 Estimation of the local occurrence of the TEC and proportional impact

THREATENED ECOLOGICAL COMMUNITY	POTENTIAL IMPACT (HA)	LOCAL OCCURRENCE (WITHIN 10KM OF STUDY AREA)	PROPORTIONAL IMPACT
Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	PCT 76 – Derived native grassland – 2.1ha	PCT 76: Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions 11,482ha mapped in the locality.	<0.02% of the local occurrence of mapped PCT 76
	PCT 80 – Derived native grassland – 1.1ha	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 2,656ha mapped in the locality	<0.04% of the local occurrence of mapped derived native grassland

The proposal is considered unlikely to substantially and adversely modify the composition of the Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions TEC such that its local occurrences are placed at risk of extinction. The example of this TEC to be impacted has already been substantially and adversely modified by past land use practices as it is currently present as derived native grassland. The TEC already has an altered composition caused by a very large reduction in ecological function, as indicated by:

- altered community structure (i.e. missing structural layers – no canopy)
- altered species composition (i.e. lack of tree species)
- disruption of ecological processes (i.e. lack of natural tree regeneration)
- invasion and establishment of exotic species
- degradation of habitat
- local small-scale fragmentation.

The proposal would remove part of an already substantially modified version of the Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions TEC. This impact will not cause the local occurrence to be placed at risk of extinction. The composition of the TEC within the locality is predicted to remain as is after the implementation of the proposal.

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

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

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

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

The extent of predicted impacts to each TEC is shown in Table E.1. Impacts have been estimated based on a worst-case scenario from the design impact area. The proportional impact to the TEC is very small when the extent of the TEC mapped within the locality is taken into account.

The TEC within the study area is already fragmented at a local scale by the rail line, adjacent roads, and agricultural development. 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 examples of the TEC. 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.

Due to the conservation significance of this TEC, the remaining patches of this TEC within NSW are likely to be important for its survival. However, the patches within the study area is considerably modified derived native grassland with a small area of regrowth shrubs and are not unique. Derived native grasslands are extensive in the locality (based on observation of paddocks when driving through the locality). Furthermore, no patches of vegetation in the study area have been recognised as priority conservation land or as part of core habitats or regional corridors by the OEH. As such, the TEC patches within the study area can be considered less important than larger high-quality examples of this TECs in the locality that retain higher levels of ecological integrity and function.

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

The proposal will not impact on any declared area of outstanding biodiversity value.

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

A Key Threatening Process (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. Of the 38 listed KTPs under the BC Act, eight are applicable to the TECs subject to this assessment (Table E.2). However, hygiene and weed control measures would reduce or avoid the impact of most KTPs with the exception of clearing of native vegetation.

Table E.2 Key threatening processes relevant to the proposal

KEY THREATENING PROCESS	RELEVANCE TO THE PROPOSAL
Clearing of native vegetation	**Yes**. The proposal would result in clearing of native vegetation.
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	**Yes**. The proposal may result in the introduction or spread of amphibian chytrid. However, hygiene measures would be followed to prevent spread of this fungus.
Infection of native plants by *Phytophthora cinnamomi*	**Yes**. The proposal may result in the introduction or spread of *Phytophthora cinnamomi*. However, hygiene measures would be followed to prevent spread of *Phytophthora cinnamomi*.
Introduction and Establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae	**Yes**. The proposal may result in the introduction or spread of Exotic Rust Fungi. However, hygiene measures would be followed to prevent spread of Exotic Rust Fungi.
Invasion and establishment of exotic vines and scramblers	**Yes**. The proposal may result in the invasion and establishment of exotic vines and scramblers. However, weed control measures would be followed to prevent invasion and establishment of exotic vines and scramblers.
Invasion of native plant communities by African Olive *Olea europaea* L. subsp. *cuspidata*	**Yes**. The proposal may result in the invasion and establishment of African Olive *Olea europaea* L. subsp. *cuspidata*. However, weed control measures would be followed to prevent invasion and establishment of African Olive *Olea europaea* L. subsp. *Cuspidata.*

KEY THREATENING PROCESS	RELEVANCE TO THE PROPOSAL
Invasion, establishment and spread of *Lantana camara*	**Yes**. The proposal may result in the invasion and establishment of *Lantana camara*. However, weed control measures would be followed to prevent invasion and establishment of *Lantana camara.*
Invasion of native plant communities by exotic perennial grasses	**Yes**. The proposal may result in the invasion and establishment of exotic perennial grasses. However, weed control measures would be followed to prevent invasion and establishment of exotic perennial grasses.

Conclusion

In summary, the proposal is considered unlikely to have an adverse effect on the extent of the TEC such that the local occurrence is likely to be placed at further risk of extinction. The proportional impact is small when considered in the context of the actual impact in hectares and the extent of the TEC within the broader locality. Given that the TEC to be impacted is derived native grassland and that this vegetation type is extensive in the locality, the magnitude of the impact is low. The proposal is considered unlikely to substantially and adversely modify the composition of the TEC as the current composition of the TECs is highly modified. There is unlikely to be any further increase in fragmentation from the proposal. The TEC within the study area is not recognised as important to the long-term survival of the TEC in the locality. Considering the context of the TEC and intensity of the potential impacts to the TEC from the proposal, an overall conclusion has been made that the proposal is unlikely to result in a significant effect to the TEC.

E1.2 MYALL WOODLAND IN THE DARLING RIVERINE PLAINS, BRIGALOW BELT SOUTH, COBAR PENEPLAIN, MURRAY-DARLING DEPRESSION, RIVERINA AND NSW SOUTH WESTERN SLOPES BIOREGIONS

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

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

Not applicable.

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

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

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

The local occurrence of the Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions TEC is outlined below in Table E.3. The local occurrence of the TEC was estimated from broad scale vegetation mapping, 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).

The estimates provided below in Table E.3 provide an indication of the extent of the local occurrence of Myall woodland patches. In all cases, the actual local occurrence is larger than estimated as not all patches of vegetation are mapped accurately.

Of importance to this assessment is that a small area (impact of <0.1ha) of Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions TEC to be impacted consists of canopy cover of 2% with only four *Acacia pendula* (Weeping Myall) trees and only two layers of regeneration of Weeping Myall present. No remnant area consistent with the moderate or high condition states will be impacted. As such, the local occurrence of high quality intact or relatively intact Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions TEC will not be affected. As such, the proposal is considered unlikely 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.

As can be seen from Table E.3, the proposal would not have an adverse effect on the extent of Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions TEC as a whole, such that the local occurrence of the TEC is likely to be placed at risk of extinction. The proportional impacts to the local occurrence of the TEC is very low and the proposal would not result in the local extinction of the TEC.

Impacts have been estimated based on a worst-case scenario from the Draft 70% design impact area.

Table E.3 Estimation of the local occurrence of the TEC and proportional impact

THREATENED ECOLOGICAL COMMUNITY	POTENTIAL IMPACT (HA)	LOCAL OCCURRENCE (WITHIN 10KM OF STUDY AREA)	PROPORTIONAL IMPACT
Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions	PCT 26 – poor condition – <0.1ha	PCT 26: Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion 187ha mapped in the locality.	0.05% of the local occurrence of mapped PCT 26

The proposal is considered unlikely to substantially and adversely modify the composition of the Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions TEC such that its local occurrences are placed at risk of extinction. The TEC to be impacted has already been substantially and adversely modified by past land use practices as it is currently present as poor condition patch. The TEC already has an altered composition caused by a very large reduction in ecological function, as indicated by:

- altered community structure (i.e. missing structural layers – only 2 layers)
- disruption of ecological processes (i.e. lack of natural tree regeneration)
- invasion and establishment of exotic species
- degradation of habitat
- local small-scale fragmentation.

The proposal would remove part of an already substantially modified version of the Myall Woodland in the Darling Riverine Plains, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western Slopes bioregions TEC. This impact will not cause the local occurrence to be placed at risk of extinction. The composition of the TEC within the locality is predicted to remain as is after the implementation of the proposal.

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

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

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

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

The extent of predicted impacts to each TEC is shown in Table E.3. Impacts have been estimated based on a worst-case scenario from the design impact area.

The TEC within the study area is already fragmented at a local scale by the rail line, adjacent roads, and agricultural development. 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 examples of the TEC. No further habitat fragmentation on a landscape scale would occur because of the proposal.

Due to the conservation significance of this TEC, the remaining patches of this TEC within NSW are likely to be important for its survival. However, the patches within the study area is considerably modified and are not unique. The TEC patches within the study area can be considered less important than larger high-quality examples of this TECs in the locality that retain higher levels of ecological integrity and function.

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

The proposal will not impact on any declared area of outstanding biodiversity value.

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

A Key Threatening Process (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. Of the 38 listed KTPs under the BC Act, eight are applicable to the TECs subject to this assessment (Table E.4). However, hygiene and weed control measures would reduce or avoid the impact of most KTPs with the exception of clearing of native vegetation.

Table E.4 Key threatening processes relevant to the proposal

KEY THREATENING PROCESS	RELEVANCE TO THE PROPOSAL
Clearing of native vegetation	**Yes**. The proposal would result in clearing of native vegetation.
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis	**Yes**. The proposal may result in the introduction or spread of amphibian chytrid. However, hygiene measures would be followed to prevent spread of this fungus.
Infection of native plants by *Phytophthora cinnamomi*	**Yes**. The proposal may result in the introduction or spread of *Phytophthora cinnamomi*. However, hygiene measures would be followed to prevent spread of *Phytophthora cinnamomi*.
Introduction and Establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae	**Yes**. The proposal may result in the introduction or spread of Exotic Rust Fungi. However, hygiene measures would be followed to prevent spread of Exotic Rust Fungi.
Invasion and establishment of exotic vines and scramblers	**Yes**. The proposal may result in the invasion and establishment of exotic vines and scramblers. However, weed control measures would be followed to prevent invasion and establishment of exotic vines and scramblers.
Invasion of native plant communities by African Olive *Olea europaea* L. subsp. *cuspidata*	**Yes**. The proposal may result in the invasion and establishment of African Olive *Olea europaea* L. subsp. *cuspidata*. However, weed control measures would be followed to prevent invasion and establishment of African Olive *Olea europaea* L. subsp. *Cuspidata.*
Invasion, establishment and spread of *Lantana camara*	**Yes**. The proposal may result in the invasion and establishment of *Lantana camara*. However, weed control measures would be followed to prevent invasion and establishment of *Lantana camara.*
Invasion of native plant communities by exotic perennial grasses	**Yes**. The proposal may result in the invasion and establishment of exotic perennial grasses. However, weed control measures would be followed to prevent invasion and establishment of exotic perennial grasses.

Conclusion

In summary, the proposal is considered unlikely to have an adverse effect on the extent of the TEC such that the local occurrence is likely to be placed at further risk of extinction. The proportional impact is small when considered in the context of the actual impact in hectares and the extent of the TEC within the broader locality. Given that the TEC to be impacted is poor condition, the magnitude of the impact is low. The proposal is considered unlikely to substantially and adversely modify the composition of the TEC as the current composition of the TECs is highly modified. There is unlikely to be any further increase in fragmentation from the proposal. The TEC within the study area are not recognised as important to the long-term survival of the TEC in the locality. Considering the context of the TEC and intensity of the potential impacts to the TEC from the proposal, an overall conclusion has been made that the proposal is unlikely to result in a significant effect to the TEC.

E1.3 GREY-CROWNED BABBLER

The Grey-Crowned Babbler (Eastern subspecies) (*Pomatostomus temporalis temporalis*) is listed as Vulnerable under the BC Act and is has been previous recorded in the locality of the study area of the Proposal. A very small area of potential habitat associated with PCT 26 (poor condition) was recorded in the study area and will impact <0.1ha.

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.

E1.3.1 BC ACT SIGNIFICANCE ASSESSMENT

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

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

Grey-crowned Babbler are currently known to occur in the locality of the study area. As the site investigation was relatively short in nature the Grey-crowned Babbler was not recorded, this assessment is therefore based on the presence of potentially suitable habitat for the species. The proposal would impact on less than 0.1ha of potential habitat in the form of PCT 26 (poor condition), which equates to less than 1% of a typically defended home range of approximately 10ha. Any Grey-crowned Babbler 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 larger patches of potentially suitable habitat in the locality. The proportional impact to this potential habitat is very small and considered negligible. Due to the narrow linear impact expected within an existing highly disturbed rail corridor, it is considered unlikely that local population of Grey-crowned Babbler 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.

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

- **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**

Not applicable

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

Not applicable.

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

- **the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and**
- **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**
- **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 less than 0.1ha of potential habitat for Grey-crowned Babbler in the form of PCT 26 (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.

Any individuals of Grey-crowned Babbler that occur in the study area would fall within 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 approximately 0.03ha 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 birds.

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

The proposal will not impact on any declared area of outstanding biodiversity value.

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

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 Grey-crowned Babbler, 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 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 Grey-crowned Babbler. Less than 0.1ha of potential habitat would be affected by the proposal, which equates to less than 1% of a typically defended home range of approximately 10ha. Any individuals that may utilise 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 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 Grey-crowned Babbler are unlikely to be significant.

E1.4 BIRDS OF PREY

Threatened raptors 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 raptors for the impact assessment are:

- Spotted Harrier (*Circus assimilis*)
- Black Falcon (*Falco subniger*)
- Little Eagle (*Hieraaetus morphnoides)*.

E1.4.1 BC ACT SIGNIFICANCE ASSESSMENT

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

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

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 3.3ha of potential habitat in the form of PCT 76 (derived native grassland condition), PCT 26 (poor condition) & PCT 80 (derived native grassland condition). Due to the mobility and large home range of these species (up to 10 square kilometres for the Little Eagle) 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 (~14,325ha) of potentially suitable habitat in the form of PCT 26, PCT 76 and PCT 80 mapped as occurring in the locality. The proportional impact to this potential habitat is very small and considered negligible in comparison to the available habitat in the greater locality. 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.

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

- **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**

Not applicable

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

Not applicable.

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

- **the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and**
- **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**
- **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 3.3ha of potential habitat for threatened birds of prey in the form of PCT 76 (derived native grassland condition), PCT 26 (poor condition) & PCT 80 (derived native grassland condition). 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 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. 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 3.3ha 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 threatened birds of prey.

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

The proposal will not impact on any declared area of outstanding biodiversity value.

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

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 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 threatened birds of prey. Approximately 3.3ha 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.

E2 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). A significance assessment has been prepared for the community: Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia.

E2.1 GREY BOX (*EUCALYPTUS MICROCARPA*) GRASSY WOODLANDS AND DERIVED NATIVE GRASSLANDS OF SOUTH-EASTERN AUSTRALIA

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).

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

1 reduce the extent of an ecological community

Based on the estimated impact area, the proposal would result in the direct clearing of about 3.2ha of the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia TEC. This represents approximately <0.02% of the local occurrence of mapped PCT 76 and PCT 80 in the proposal locality. The proportional impacts to the local occurrence of this TEC are likely to be low magnitude.

2 fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines

Habitat fragmentation *per se* relates to the physical dividing up of once continuous habitats into separate smaller fragments. The habitats within the study area are fragments that have formed since the initial habitat clearing that has occurred. The proposal would not break apart continuous areas of the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia TEC into separate smaller fragments. Habitat connectivity is expected to remain in a similar state after completion of the proposal and there is unlikely to be an alteration to existing community composition, altered species interactions, or altered ecosystem functioning in the locality due to the action. Habitat fragmentation is not considered an important impact of the action with regard to its context and intensity.

3 adversely affect habitat critical to the survival of an ecological community

Existing habitat, where this community occurs, would be cleared for construction and operation of the proposal. This would result in the direct removal of about 3.2ha of habitat. No very large or high quality patches would be impacted so the proposal is considered unlikely to adversely affect habitat critical to the survival of the ecological community.

4 modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns

Where the TEC would be removed by the action, all abiotic factors (i.e. water, nutrients and soil) would be permanently modified and/or destroyed through vegetation removal.

5 cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting

The composition of the TEC may be modified as a result of the action through weed invasion and removal of vegetation. The patch of the TEC to be impacted is in a derived grassland state and has already experienced a reduction in ecological function. Alteration of species composition in the patch is considered unlikely to occur as it is already altered by past disturbance. Functionally important species (i.e. trees) have already been lost from the patch and the proposal is not considered likely to cause any further substantial change in species composition.

6 cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:

a assisting invasive species, that are harmful to the listed ecological community, to become established

b causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community

Weed introduction and spread and the infection of native plants by *Phytophthora cinnamomi* have been identified as being spread by construction machinery. *Phytophthora* infects the roots of plants and has the potential to cause dieback. Machinery associated with vegetation clearance and subsequent construction for the project has the potential to introduce and transmit weed propagules and *Phytophthora*. This is a potential indirect impact through the spread and transmission of weeds and pathogens into retained habitat near the road. This can be mitigated through the development and implementation of suitable control measures for vehicle and plant hygiene but an impact, particularly from weeds, is likely. It is the intention to use current best practice hygiene and weed control protocols.

There will not be regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the TEC outside of the impact area.

7 interfere with the recovery of an ecological community.

There is no adopted or made Recovery Plan for this TEC.

The proposal will not interfere with any of the identified recovery actions outlined in the *Approved Conservation Advice for the Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-east Australia* (Department of the Environment, Water, Heritage and the Arts, 2010).

Conclusion

After consideration of the factors above, an overall conclusion has been made that the action is unlikely to result in a significant impact to the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-Eastern Australia TEC. The predicted impacts to this TEC are likely to be minor given that it exists in the study area predominately as derived native grassland with some small areas of isolated trees and poor condition vegetation classes and the mapped extent of the PCTs in the locality are likely to be part of the TEC.