Technical and Approvals Consultancy Services: Illabo to Stockinbingal

Box Gum Woodland

Gum Flat Rehabilitation Opportunity

June 2024

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Prepared for

Australian Rail Track Corporation

Prepared by

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Table of Contents

Contents (Continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF PHOTOGRAPHS

LIST OF APPENDICES

Glossary

ARTC	Australian Rail Track Corporation
BC Act	The NSW *Biodiversity Conservation Act 2016*
BCS	Biodiversity, Conservation and Science Group of the NSW Department of Climate Change, Energy, the Environment and Water (DCCEEW)
Box Gum Woodland	White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions listed as Critically Endangered under the BC Act.
CEEC	Critically Endangered Ecological Community
EEC	Endangered Ecological Community
Grey Box Woodland	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions listed as Endangered under the BC Act
I2S	Illabo to Stockinbingal
IRDJV	Inland Rail Design Joint Venture (WSP|MM JV legal entity)
SAII	Serious and Irreversible Impacts
WSP|MM	WSP Australia | Mott MacDonald Joint Venture trading as IRDJV

1 Introduction

1.1 Project background

The Inland Rail program proposes development of the Illabo to Stockingbingal Project (I2S) to connect the Main South Line near Bethungra with the Stockinbingal to Parkes line at Stockinbingal. The I2S project has been declared to be a Critical State Significant Infrastructure Project under the *Environmental Planning and Assessment Act 1979* (EP&A Act).

The proposal passes through agricultural and rural properties in the Riverina region of NSW and generally follows the existing cadastre.

The proposed I2S railway requires the establishment of a greenfield railway corridor of approximately 39 km in length, passing through the largely cleared agricultural and rural properties. The route crosses the Bethungra Range and traverses the Dudauman Creek valley to the north and the Ironbong Creek valley to the south. Remnant vegetation extends from the range along ridgelines and watercourses, with other patches remaining present in the landscape.

Alignment of the railway corridor has sought to avoid and minimise impacts, with an overall impact of approximately 77.17 hectares on native vegetation. Of this, approximately 39.08 hectares are to vegetation communities that have been identified as the Box Gum Woodland Threatened Ecological Community (TEC).

A Biodiversity Development Assessment Report (BDAR) has been prepared in accordance with the NSW Biodiversity Assessment Method 2020 (BAM) established under the *Biodiversity Conservation Act 2016* (BC Act) and includes offset credit requirements for the project impacts. The BDAR is a technical report in accompaniment to the project's environmental impact statement.

In addition to the credit offsets for the project as requirement under the BAM, the Department of Planning, Housing and Infrastructure (DPHI) and the BCS (Biodiversity, Conservation and Science Group of the NSW Department of Climate Change, Energy, the Environment and Water) are seeking additional measures to compensate for impacts to White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland Threatened Ecological Community which is listed as a Serious and Irreversible Impact entity.

1.2 Box Gum Woodland CEEC

The proposal will have a direct impact on White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland in the NSW North Coast, New England Tableland, Nandewar, Brigalow Belt South, Sydney Basin, South Eastern Highlands, NSW South Western Slopes, South East Corner and Riverina Bioregions, listed as Critically Endangered under the BC Act and as a Serious and Irreversible Impact (SAII) entity.

This critically endangered ecological community includes a range of Plant Community Types (PCTs), including the following that would be impacted by the project:

- PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion
- PCT 276 Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion
- PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion
- PCT 347 White Box – Blakely's Red Gum shrub/grass woodland on metamorphic hillslopes in the mid-southern part of the upper slopes sub-region of the NSW South Western Slopes Bioregion.

A summary of direct impacts on this threatened ecological community and SAII entity, associated PCT and VZ is summarised in Table 1.1.

Table 1.1 Direct impact on White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland

Plant Community Type	Condition (vegetation zone)	Direct impacts (ha)
PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	Moderate condition (VZ7)	2.88
PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	Poor condition (VZ8)	4.77
PCT 266 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion	Low condition (VZ9)	6.55
PCT 276 Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion	Moderate condition (VZ10)	0.87
PCT 276 Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion	Poor condition (VZ11)	0.62
PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Moderate condition (VZ12)	11.7
PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Poor condition (VZ13)	2.23
PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Low condition (VZ14)	6.23
PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	Planted native vegetation (VZ20)	2.8
PCT 347 White Box – Blakely's Red Gum shrub/grass woodland on metamorphic hillslopes in the mid-southern part of the upper slopes sub-region of the NSW South Western Slopes Bioregion	Moderate condition (VZ16)	0.14
PCT 347 White Box – Blakely's Red Gum shrub/grass woodland on metamorphic hillslopes in the mid-southern part of the upper slopes sub-region of the NSW South Western Slopes Bioregion	Poor condition (VZ17)	0.29
TOTAL		**39.08**

1.3 Site

A portion of Lot 3 DP591854 (960 Ironbong Road, Bethungra, known as 'Gum Flat'), was identified as a potential rehabilitation site for Box Gum Woodland to compensate for project impacts in consultation with BCS. This rehabilitation site was identified based on:

- its proximity to the project
- the identification of Box Gum Woodland on site in NSW State Vegetation Mapping and ecology surveys for the project. This included areas of derived grassland which would benefit from management to increase canopy cover
- the potential to increase patch size of existing remnant vegetation within the site
- the potential to improve connectivity for the ecological community including threatened fauna recorded within the property and surrounding area including Superb Parrot (*Polytelis swainsonii*) and Squirrel Glider (*Petaurus norfolcensis*).

1.4 Purpose of this report

This report analyses the opportunity to undertake strategic rehabilitation on part of a property known as 'Gum Flat'. This rehabilitation work is proposed as "additional and appropriate measures" to mitigate project impacts to the Box Gum Woodland Critically Endangered Ecological Community. Subject to approval of the I2S Project, a Biodiversity Stewardship Agreement (BSA) would be established for the rehabilitation area.

For clarity, in this report, the Gum Flat property is referred to as the "site", with the proposed BSA is referred to as the "rehabilitation area".

2 Methods

2.1 Personnel

The contributors to the preparation of this paper, their qualifications and roles are listed in Table 2.1.

Table 2.1 Personnel

Name	Qualifications	Role	Years of experience
Alex Cockerill	Bachelor of Science (Hons), accredited BAM assessor BAAS17020	Principal Ecologist – technical review	22
Toby Lambert	Bachelor of Science (Hons), accredited BAM assessor BAAS17046	Principal Ecologist – technical review	25
Selga Harrington	Bachelor of Science (Hons), accredited BAM assessor BAAS17079	Principal Ecologist – ecology survey and report preparation	23
Tasman Carr	Bachelor of Science, Certificate 3 in Conservation and Land Management	Ecologist – field survey and report preparation	5

2.2 Nomenclature

Names of vegetation communities used in this report are based on the PCT used in the NSW BioNet Vegetation Classification Database (NSW DCCEEW 2024).

These PCT names are cross-referenced for equivalency with those used for threatened ecological communities listed under the BC Act and/or the EPBC Act. They are also cross-referenced with previous vegetation mapping (Office of Environment & Heritage 2016) using dominant species and structure of the community.

2.3 Stratification – desktop analysis of vegetation

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 (e.g. vehicle tracks, dams and cropping), vegetation structure and likely native versus exotic species composition. This provided an initial definition and mapping of native vegetation zones.

2.4 Field survey

2.4.1 Field verification of vegetation mapping and PCT allocation

Field validation (ground-truthing) of the existing vegetation classifications was completed based on random meander surveys and BAM vegetation integrity plots. Field verification was undertaken to confirm the vegetation structure, dominant and characteristic species of each stratum, landscape position, native diversity, condition, presence of threatened ecological communities and other diagnostic features. Field data was compared and analysed against the regional vegetation mapping key diagnostic species to confirm each vegetation type. Where a vegetation type did not strictly meet all characteristics of a single PCT the PCT which best fit the vegetation on site was allocated. Field verification of the vegetation type, class and formation was used to identify vegetation zones and conditions in accordance with the BAM and NSW BioNet Vegetation Classification Database (NSW Government 2021). Vegetation (PCT) mapping including the location of vegetation integrity plots are shown in Appendix A.

The regional broadscale mapping used to assist in the field verification of PCT types, condition categories and extents included:

- State Vegetation Type Map: Central West/Lachlan Region Version 1.4. VIS_ID 4468 (Department of Planning and Environment 2023)
- NSW State Vegetation Type Map Release C2.0M2.0 (NSW DCCEEW 2023) .

2.4.2 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 recording dominant and key plant species (e.g. threatened species, noxious 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. This survey technique was used to verify vegetation boundaries and stratification from the desktop analysis.

2.4.3 Mapping of native vegetation zones

Vegetation was firstly assigned to a PCT and then aligned to a vegetation zone which is defined in the BAM as *'an area of native vegetation…. that is the same PCT and has a similar broad condition state'*. A broad condition state infers that the vegetation has a similar tree cover, shrub cover, ground cover, weediness or combinations of these attributes which determine vegetation condition.

The vegetation broad condition states which were applied to vegetation are summarised in Table 2.2. These factors were defined by using factors such as levels of disturbance, weed invasion and resilience.

Table 2.2 Vegetation broad condition categories

Condition category	Description
Good	Vegetation still retains the species complement and structural characteristics. The vegetation displays resilience to weed invasion due to intact groundcover, shrub and canopy layers. Native species diversity is relatively high. Weeds may exist in this vegetation type but exhibit <5% foliage cover.
Moderate	Vegetation has retained a native canopy, but the understorey and groundcover layers are generally co-dominated by exotic species that exhibit between 5–45% foliage cover. The mid and low stratums may have been structurally modified because of disturbances such as previous clearing or agricultural practices such as grazing of livestock.
Poor (canopy only)	Vegetation has retained a native canopy, or the canopy cover is showing signs of regeneration. The understorey and groundcover layers are generally dominated or co-dominated by exotic species that exhibit between 46–70% foliage cover. Native species diversity is generally relatively low, and the mid and low stratums have been structurally modified due to weed incursions, clearing, agricultural practises such as cropping or direct seeding.
Derived native grassland	Native vegetation generally lacking a native over-storey and mid stratum. For this proposal it includes PCTs that have changed to an alternative stable state as a consequence of land management practices since European settlement. Over-storey structural components of derived communities have either entirely been removed or are severely reduced (i.e. derived native grasslands). Derived grassland was assigned to patches of vegetation where native perennial cover was greater than 50%.

2.4.4 Vegetation integrity plots

2.4.4.1 Vegetation integrity plot – survey effort

A total of 23 vegetation integrity plots have been undertaken within the site. Table 2.3 outlines the co-ordinates, orientations and field verified plant community type for each plot completed. The location of each vegetation integrity plot is shown in Appendix A. Full vegetation integrity plot data is presented in Appendix A.

Table 2.3 Location and orientation of BAM vegetation integrity plots

Plot ID	Plant Community Type (Condition)	Vegetation zone	Easting	Northing	Orientation (degrees)	Survey date
R1	PCT 346 White Box – Blakely's Red Gum White Cypress Pine shrubby woodland on metamorphic hills in the Wagga Wagga-Cootamundra region of the NSW South Western Slopes Bioregion (Derived native grassland)	346_dng	576670	6160019	54	12/3/24
R2	PCT 346 White Box – Blakely's Red Gum White Cypress Pine shrubby woodland on metamorphic hills in the Wagga Wagga-Cootamundra region of the NSW South Western Slopes Bioregion (Moderate Condition)	346_moderate	576736	6160182	148	12/3/24
R3	PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (Moderate condition)	277_moderate	576850	6160537	300	12/3/24
R4	PCT 76 Western Grey Box Tall Grassy Woodland on Alluvial Loam and Clay Soils in the NSW South Western Slopes and Riverina Bioregions (Moderate condition)	76_moderate	576213	6160458	297	12/3/24
R5	PCT 76 Western Grey Box Tall Grassy Woodland on Alluvial Loam and Clay Soils in the NSW South Western Slopes and Riverina Bioregions (Moderate condition)	76_moderate	576149	6160613	78	12/3/24
R6	PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (Derived native grassland)	277_dng	575748	6160694	73	13/3/24
R7	PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (Derived native grassland)	277_dng	575737	6160859	77	13/3/24
R9	PCT 346 White Box – Blakely's Red Gum White Cypress Pine shrubby woodland on metamorphic hills in the Wagga Wagga-Cootamundra region of the NSW South Western Slopes Bioregion (Derived native grassland)	346_dng	576470	6159366	100	13/3/24
R10	PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (Derived native grassland)	277_dng	576308	6159797	135	13/3/24
R11	PCT 76 Western Grey Box Tall Grassy Woodland on Alluvial Loam and Clay Soils in the NSW South Western Slopes and Riverina Bioregions (Moderate condition)	76_moderate	576196	6160021	235	13/3/24
R12	PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (Derived native grassland)	277_dng	576567	6160385	65	14/3/24
R13	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)	76_dng	576621	6160572	290	14/3/24

Plot ID	Plant Community Type (Condition)	Vegetation zone	Easting	Northing	Orientation (degrees)	Survey date
R14	PCT 76 Western Grey Box Tall Grassy Woodland on Alluvial Loam and Clay Soils in the NSW South Western Slopes and Riverina Bioregions (Low - DNG)	76_dng	576412	6160193	256	14/3/24
R15	PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (Moderate condition)	277_moderate	576165	6160541	254	14/3/24
Q11	PCT 79 River Red Gum shrub/grass riparian tall woodland or open forest wetland mainly in the upper slopes sub-region of the NSW South Western Slopes Bioregion and western South Eastern Highlands Bioregion (Moderate condition)	79_moderate	576289	6160764	210	4/12/18
Q12	PCT 79 River Red Gum shrub/grass riparian tall woodland or open forest wetland mainly in the upper slopes sub-region of the NSW South Western Slopes Bioregion and western South Eastern Highlands Bioregion (Moderate condition)	79_moderate	576137	6160789	210	4/12/18
Q13	PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (Moderate condition)	277_moderate	576713	6160628	180	4/12/18
Q14	PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (Derived native grassland)	277_dng	576623	6160426	270	4/12/18
Q15	PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (Derived native grassland)	277_dng	576546	6160227	200	4/12/18
Q16	PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (Derived native grassland)	277_ dng	576098	6160021	90	4/12/18
Q51	PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (Moderate condition)	277_moderate	576777	6160538	345	4/12/18
N24	PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (Derived native grassland)	277_ dng	576388	6160450	288	19/10/23
N26	PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion (Derived native grassland)	277_ dng	576134	6160114	208	19/10/23
N27	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)	76_dng	575664	6159589	154	19/10/23

2.4.4.2 Vegetation integrity plot – method

Vegetation integrity plots were completed in accordance with BAM. A schematic diagram illustrating the layout of each vegetation integrity plot is provided in Figure 2.1.

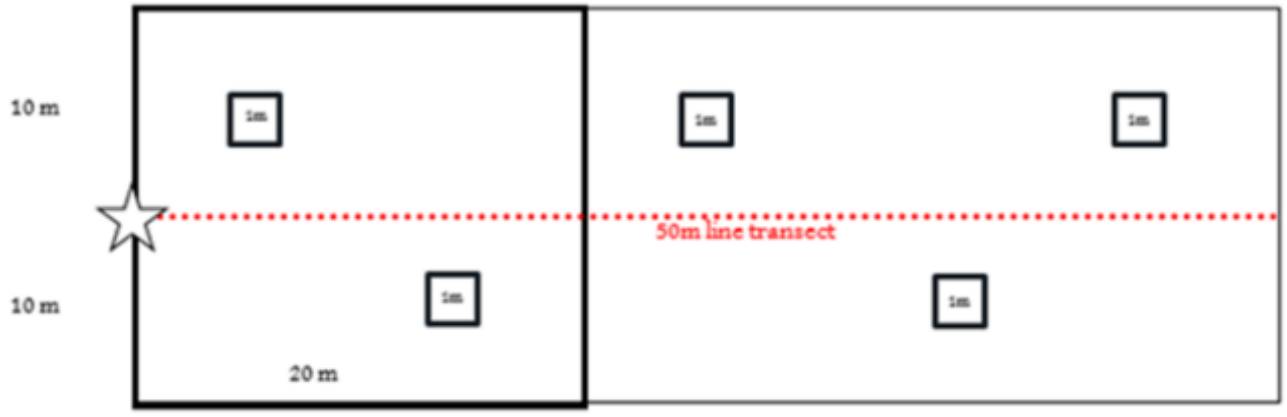


Figure 2.1 Schematic diagram illustrating the layout of the nested 20 x 50m, 20 x 20m and 1 x 1m sub-quadrants used for the assessment of condition attributes at each site

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

- **Location:** (easting – northing grid type MGA 94, Zone 56).
- **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 400m squared quadrat): This consisted of recording all species by systematically walking through each 20m x 20m 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 50m x 20m 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** (1000m 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 50m x 20m 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** (1000m squared quadrat): This was the cumulative total of logs within each 50m x 20m plot with a diameter of at least 10cm and a length of at least 0.5m.
- **Litter cover:** This comprised estimating the average percentage groundcover of litter (i.e. leaves, seeds, twigs, branchlets and branches with a diameter less than 10cm which is detached from a living plant) from within five 1m x 1m sub-plots spaced evenly either side of the 50m 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 5cm).

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

2.4.5 Field survey limitations

Habitat has been highly modified from historic and ongoing agricultural activities. Given this, survey effort has been modified for certain species due to lack of quality habitat (e.g. partially or full removed mid and ground stratum native vegetation for mammal and ground dwelling species).

No sampling technique can totally eliminate the possibility that a species is present. 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 during surveys. The discovery of unknown populations of threatened species, even well outside their known range, is always possible. This applies particularly to cryptic species of plants and animals and plant species which can easily go undetected despite intensive survey.

The conclusions in this report are based upon data acquired during desktop review, field surveys and the known distribution and habitat preferences of species. The conclusions are, therefore, indicative of the likely biodiversity values, based on information available at the time of preparing the report, including the presence or otherwise of species.

3 Site analysis

3.1 Landscape features and landform

The site lies within the eastern part of the Lachlan Fold Belt which consists of a complex series of north to north-westerly trending folded bodies of Cambrian to Early Carboniferous sedimentary and volcanic rocks. Frampton Volcanics which consist of, rhyolite, rhyodacite, dacite, quartz, sandstone, siltstone and conglomerate.

The site is in an undulating valley (300-390m elevation) consisting of low rises, footslopes and flats with steep rocky hill rising in the east and peaking at 390 m in the south east of the site. The steep footslope of another hill (350m elevation) occurs in the northwestern corner of the site.

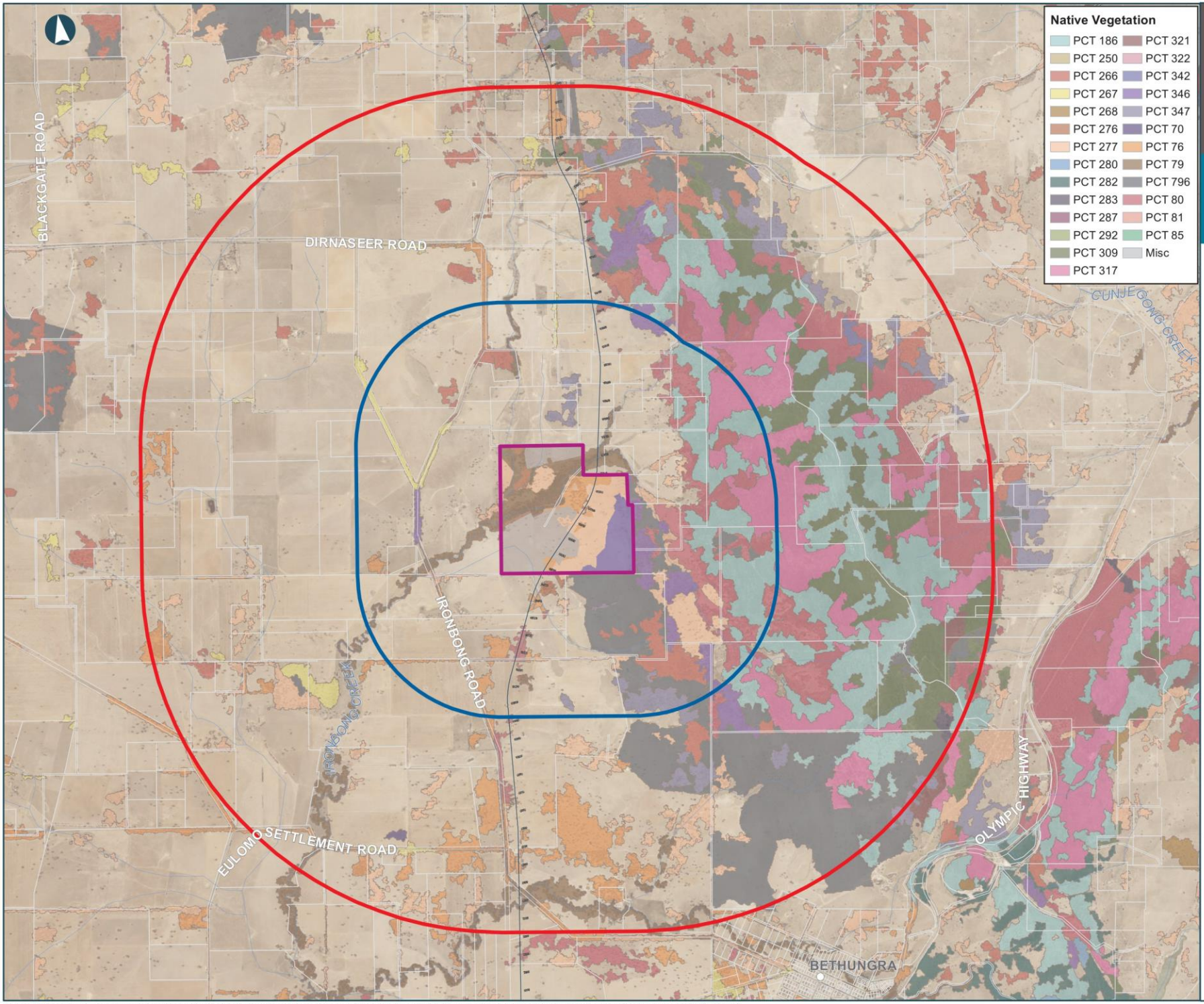
Run Boundary Creek runs southwest through the site from the north eastern corner.

The proposal is located within the Murrumbidgee River catchment, which is a sub-catchment within the Murray-Darling Basin.

An overview of landscape features is provided in Table 3.1 and Figure 3.1.

Table 3.1 Summary of landscape features

Landscape feature	
IBRA bioregions and subregions	NSW South Western Slopes Inland Slopes IBRA subregion
NSW landscape regions (Mitchell landscapes)	Frampton Hills Murrumbidgee – Tarcutta Channels and Floodplains (to west, following Ironbark Creek)
Local Government Area (LGA)	Junee Shire Council
Rivers and streams	Run Boundary Creek – 3rd order stream
Important and local wetlands	Bethungra Dam Reserve- approximately 15 km to southeast
Connectivity features	Overall the landscape has been heavily fragmented due to agricultural practices. The existing connectivity is limited but includes riparian corridors associated with watercourses (Billabong Creek, Ulandra Creek, Ironbong Creek, Run Boundary Creek) and road reserves of Old Sydney Road, Ironbong Road and Dirnaseer Road. These connectivity features link with the largest intact patch of remnant vegetation occurring to the east in association with the nearby Bethungra and Ulandra Mountain range. Creeklines and associated riparian vegetation with the rivers and streams predominantly run from east to west and provide the remaining link to movement between Bethungra and Ulandra Mountain range to the east and areas to the west.
Areas of geological significance and soil hazard features	The site does not contain any areas of geological significance or soil hazard feature in relation to biodiversity.
Areas of outstanding biodiversity value	No declared areas of outstanding biodiversity value occur in or near the site.



Native Vegetation

PCT 186	PCT 321
PCT 250	PCT 322
PCT 266	PCT 342
PCT 267	PCT 346
PCT 268	PCT 347
PCT 276	PCT 70
PCT 277	PCT 76
PCT 280	PCT 79
PCT 282	PCT 796
PCT 283	PCT 80
PCT 287	PCT 81
PCT 292	PCT 85
PCT 309	Misc
PCT 317	

INLAND RAIL ARTC

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

ILLABO TO STOCKINBINGAL

Figure 3.1
Landscape Overview
MAP 1 OF 1

LEGEND

- Major Watercourse
- Minor Watercourse
- Track alignment
- Cadastre
- Property Boundary
- Property Boundary 5km buffer
- Property Boundary 2km buffer

0 1 2 Km

Coordinate System: GDA 1994 MGA Zone 55

Date: 2/05/2024
Author: IRDJV
Data Sources: IRDJV, ARTC, LPI

Paper: A3
Scale: 1:50,000

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3.2 Plant community types

Pre-clearing NSW state vegetation mapping does not provide mapping of the cleared or grassland areas within the site. The plant community types for the derived grassland areas were largely determined based on landform and topography and nearby scattered tree species as the grassland species composition did not vary significantly.

Broadly, *Eucalyptus melliodora* was recorded in the western and southern low lying areas of the site and this area would likely have supported PCT 276. To the east of Run Boundary Creek, *Eucalyptus microcarpa* was recorded on the lower slopes (PCT 76) with Blakely's Red Gum recorded mid slope (PCT 277) and PCT 346 on upper slope and steep hillsides. The dominant grass on rocky upper slopes was *Bothriochloa macra*, while *Austrostipa, Rytidosperma* and *Eragrostis* species dominated the lower slopes and flats.

This following plant community types have been identified within the site:

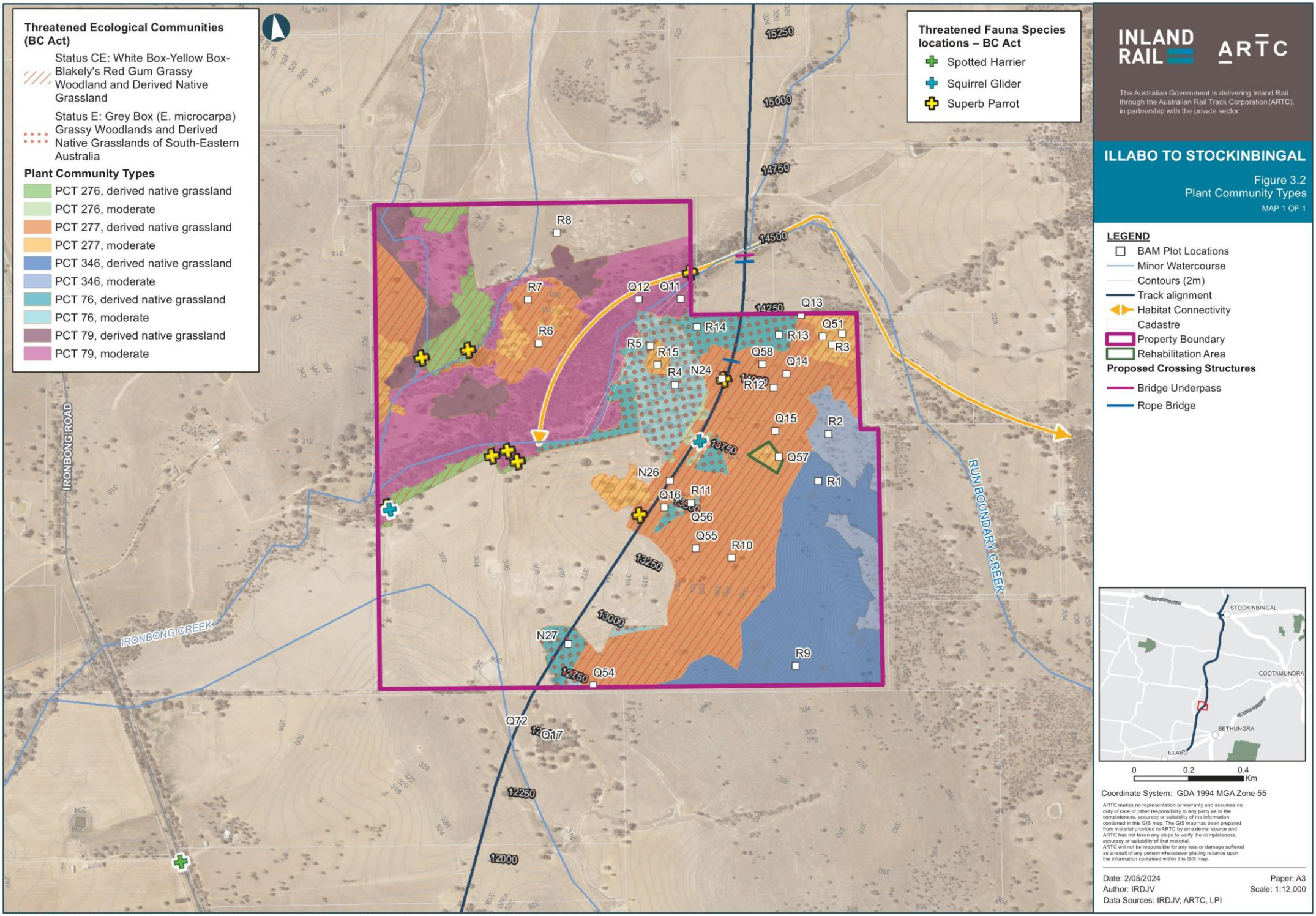
- PCT 79 River Red Gum shrub/grass riparian tall woodland or open forest wetland mainly in the upper slopes sub-region of the NSW South Western Slopes Bioregion and western South Eastern Highlands Bioregion.
- PCT 76 Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions.
- PCT 276 Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion.
- PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion.
- PCT 346 White Box – Blakely's Red Gum White Cypress Pine shrubby woodland on metamorphic hills in the Wagga Wagga- Cootamundra region of the NSW South Western Slopes Bioregion.

These plant community types are described below. Location of Vegetation Integrity (BAM) plots used to define each PCT is illustrated in Figure 3.2.

Table 3.2 Overview of native vegetation types and zones identified

Vegetation type	Threatened Ecological Community (BC Act)	Formation	Class	PCT % cleared	Condition	Plots	Extent (ha)
PCT 76 Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Grassy Woodlands	Floodplain Transition Woodlands	92%	Moderate	R4 R5 R11	10.8
					Derived native grassland	R13 R14	9.9
PCT 79 River Red Gum shrub/grass riparian tall woodland or open forest wetland mainly in the upper slopes sub-region of the NSW South Western Slopes Bioregion and western South Eastern Highlands Bioregion.	Not listed	Forested Wetlands	Inland Riverine Forests	66%	Moderate	Q11 Q12	46.6
					Derived native grassland	N/A	10.2

Vegetation type	Threatened Ecological Community (BC Act)	Formation	Class	PCT % cleared	Condition	Plots	Extent (ha)
PCT 276 Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	Grassy Woodlands	Western Slopes Grassy Woodlands	94%	Moderate	Q25 Q26 N25 N26	0
					Derived native grassland	Q27 N27	7.5
PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	Grassy Woodlands	Western Slopes Grassy Woodlands	15%	Moderate	R3 R15 Q13 Q51 N50 N51	10.8
					Derived Native Grassland	R6 R7 R10 R12 Q14 Q15 Q16 Q24 N24	58.5
PCT 346 White Box – Blakely's Red Gum White Cypress Pine shrubby woodland on metamorphic hills in the Wagga Wagga-Cootamundra region of the NSW South Western Slopes Bioregion.	Not listed	Grassy Woodlands	Western Slopes Grassy Woodlands	63%	Moderate	R2	9.5
					Derived Native Grassland	R1 R9	32.50



INLAND RAIL ARTC

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

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Figure 3.2
Plant Community Types
MAP 1 OF 1

LEGEND

- BAM Plot Locations
- Minor Watercourse
- Contours (2m)
- Track alignment
- Habitat Connectivity
- Cadastre
- Property Boundary
- Rehabilitation Area

Proposed Crossing Structures

- Bridge Underpass
- Rope Bridge

0 0.2 0.4 Km

Coordinate System: GDA 1994 MGA Zone 55

Date: 2/05/2024
Author: IRDJV
Data Sources: IRDJV, ARTC, LPI

Paper: A3
Scale: 1:12,000

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3.2.1 PCT 76 – Western Grey Box Tall Grassy Woodland on Alluvial Loam and Clay Soils in the NSW South Western Slopes and Riverina Bioregions

A profile of PCT 76 Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions is provided in Table 3.3.

Table 3.3 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

PCT 76 – Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	
PCT Justification	The community occurred as a tall open woodland in areas previously mapped by SVTM as PCT 76 or PCT 2760. PCT 76 was assigned to patches of native vegetation dominated by *Eucalyptus microcarpa* (Western Grey Box) that exhibited a sparse shrub middle stratum and predominately grassy ground stratum. This vegetation type was predominately associated with floodplain areas, alluvial foot slopes and undulating lower to mid slopes of local hills associated with clay loam soils. PCT 76 grades into PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion where mature *Eucalyptus blakelyi* become co-dominate in the upper stratum.
Vegetation formation	KF_CH3 Grassy Woodlands
Vegetation class	Floodplain Transition Woodlands
Conservation status	Forms part of Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions (Endangered – BC Act/ EPBC Act)
SAII entity	No
Per cent cleared	92 per cent
Landscape position	Occurs on alluvial foot slopes and undulating lower to mid slopes of local hills associated with clay loam soils.
Species upper stratum	*Eucalyptus microcarpa* (Western Grey Box), *Eucalyptus blakelyi* (Blakely's Red Gum)
Species middle stratum	*Enchylaena tomentosa, Maireana microphylla* (Small-leaved Bluebush), *Salsola australis, Sclerolaena muricata* (Black Rolypoly) and *Solanum cinereum* (Narrawa Burr).
Species ground stratum	*Austrostipa scabra* subsp. *scabra* (Speargrass), *Aristida jerichoensis, Atriplex suberecta*, *Bothriochloa macra* (Red Grass), *Carex appressa, Carex inversa, Chloris truncata, Chloris ventricosa, Cynodon dactylon, Dichondra repens, Dichelachne crinita, Dysphania pumilio, Einadia nutans* subsp. *nutans* (Climbing Saltbush), *Eragrostis brownii, Eragrostis leptostachya, Eragrostis parviflora, Erodium crinitum, Enteropogon acicularis* (Windmill Grass), *Euphorbia drummondii*, *Juncus subsecundus, Lomandra filiformis* subsp. *filiformis* (Wattle Mat-rush), *Maireana enchylaenoides* (Wingless Bluebush), *Panicum decompositum* (Native Millet), *Panicum effusum*, *Paspalidium constrictum* (Knottybutt Grass), *Sida corrugata* (Corrugated sida), *Solanum esuriale* (Quena), *Rytidosperma caespitosum* (Ringed Wallaby Grass), *Rytidosperma erianthum, Rytidosperma setaceum, Vittadinia cuneata*.
Vegetation condition	Moderate condition: exhibits large trees, fallen timber and leaf litter. The middle stratum in generally absent. The ground stratum is mostly comprised of native grasses and is relatively low in native species richness and cover in forb, fern and other natives. Low condition: this vegetation type occurs as derived native grasses and lacks any woodland structure with the upper and middle stratums historically removed. Due to historic and ongoing grazing the ground stratum is relatively low in native species richness and cover in forb, fern and other natives.

Photo 3.1 PCT 76 – moderate condition (Plot R5)

Photo 3.2 PCT 76 –derived native grassland (Plot R14)

3.2.2 PCT 79 – River Red Gum shrub/grass riparian tall woodland or open forest wetland mainly in the upper slopes sub-region of the NSW South Western Slopes Bioregion and western South Eastern Highlands Bioregion

A profile of PCT 79 River Red Gum shrub/grass riparian tall woodland or open forest wetland mainly in the upper slopes sub-region of the NSW South Western Slopes Bioregion and western South Eastern Highlands Bioregion is provided in Table 3.4.

Table 3.4 Summary of PCT 79 River Red Gum shrub/grass riparian tall woodland or open forest wetland mainly in the upper slopes sub-region of the NSW South Western Slopes Bioregion and western South Eastern Highlands Bioregion

PCT 79 River Red Gum shrub/grass riparian tall woodland or open forest wetland mainly in the upper slopes sub-region of the NSW South Western Slopes Bioregion and western South Eastern Highlands Bioregion	
PCT Justification	The community occurred as a tall riparian woodland along watercourses which had been previously mapped by SVTM as PCT 79. The vegetation type was assigned to PCT 79 based on the dominance of tall stands of *Eucalyptus camaldulensis* (River Red Gum) in the upper stratum, the herbaceous/grassy structure and composition of the ground stratum, floristic composition of each stratum, occurrence on alluvial loam soils and its biogeographical location. PCT 2 and PCT 5 were also considered as candidates for this vegetation type although were dismissed based on the lack of sedge diversity, dominance of herbaceous-grassy cover in the ground stratum and it not being located along the Murrumbidgee River or Murray River systems. These characteristics are consistent with the BioNet profile for PCT 79.
Vegetation formation	Forested Wetlands
Vegetation class	Inland Riverine Forests
Conservation status	Not listed under BC Act or EPBC Act
SAII entity	No
Per cent cleared	66 per cent
Landscape position	This vegetation type was recorded along ephemeral drainage lines and Run Boundary Creek.
Species upper stratum	*Eucalyptus camaldulensis* (River Red Gum), *Eucalyptus microcarpa* (Western Grey Box)
Species middle stratum	Mostly absent
Species ground stratum	*Alternanthera denticulata, Aristida behriana, Carex appressa* (Tall sedge), *Chloris truncata, Cynodon dactylon* (Common Couch), *Dichondra repens, Enteropogon acicularis, Juncus usitatus, Microlaena stipoides* var. *stipoides* (Weeping Rice Grass), *Oxalis perennans, Rumex brownii* (Swamp Dock) and *Rytidosperma caespitosum* (Ringed Wallaby Grass)
Vegetation condition	Moderate condition: areas were generally dominated by native species although subject to ongoing grazing pressure that has reduced the ground stratum native species richness and cover. Exotic weed cover was generally low at <5% although it is considered that seasonal occurrences of dense exotic annual weed cover would occur. Low condition (DNG): occurred adjacent to moderate condition areas and lacked canopy with low species richness in the ground stratum.

Photo 3.3 PCT 79 – moderate condition (Plot Q11)

Photo 3.4 PCT 79 – moderate condition (Plot Q12)

3.2.3 PCT 276 – Yellow Box Grassy Tall Woodland on Alluvium or Parna Loams and Clays on Flats in NSW South Western Slopes Bioregion

A profile of PCT 276 Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion is provided in Table 3.5.

Table 3.5 Summary of PCT 276 Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion

PCT 276 Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion	
PCT Justification	The community occurred as a tall open grassy woodland dominated by *Eucalyptus melliodora* (Yellow Box) largely in areas previously mapped by the SVTM as PCT 276 or PCT 76. PCT 276 was assigned to this vegetation type based on the dominance of *Eucalyptus melliodora* (Yellow Box) in the upper stratum often occurring with *Eucalyptus microcarpa* (Western Grey Box). Further, the community occurred on flats and alluvial floodplains associated with alluvial soils. These characteristics are consistent with the BioNet profile for PCT 276.
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodlands
Conservation status	PCT 276 is broadly consistent with White Box Yellow Box Blakely's Red Gum Woodland listed as Endangered under BC Act and White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed as Critically Endangered under the EPBC Act.
SAII entity	Yes
Per cent cleared	90 per cent
Landscape position	Occurs on lower slopes and alluvial floodplain flats.
Species upper stratum	*Eucalyptus melliodora* (Yellow Box), *Eucalyptus microcarpa* (Western Grey Box)
Species middle stratum	Absent
Species ground stratum	*Anthosachne scabra* (Wheat Grass), *Aristida behriana* (Bunch Wiregrass), *Aristida jerichoensis* var. *jerichoensis* (Jericho Wiregrass), *Austrostipa scabra* subsp. *scabra* (Speargrass), *Austrostipa setacea* (Corkscrew Grass), *Bothriochloa macra* (Red Grass), *Chloris truncata* (Windmill Grass) *Enteropogon acicularis* (A Windmill Grass), *Lomandra multiflora* subsp. *multiflora* (Many-flowered Mat-rush), *Sida corrugata* (Corrugated sida), *Rytidosperma auriculatum* (Lobed Wallaby Grass).
Vegetation condition	Moderate condition (vegetation integrity score 70.9): exhibited a sparse canopy dominated by *Eucalyptus melliodora* (Yellow Box) with the middle stratum absent due to historic clearing for agriculture and continued ongoing sheep grazing. The ground stratum is modified due to grazing with exotic weed cover recorded to about 25 per cent. Poor condition: occurred generally as canopy only with low species richness and cover in the ground stratum. Evidence of heavy grazing and high exotic weed cover (74 per cent) including cropping.

Photo 3.5 PCT 276 – moderate condition (plot Q17)

3.2.4 PCT 277 – Blakely's Red Gum – Yellow Box Grassy Tall Woodland of the NSW South Western Slopes Bioregion

A profile of PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion is provided in Table 3.6.

Table 3.6 Summary of PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	
PCT Justification	The community occurred as a tall open grassy woodland dominated by *Eucalyptus blakelyi* (Blakely's Red Gum) and *Eucalyptus melliodora* (Yellow Box) largely in areas previously mapped by the SVTM as PCT 277. PCT 277 was assigned to this vegetation type based on the dominance of *Eucalyptus blakelyi* (Blakely's Red Gum)). The community was largely associated with footslopes and undulating hills slopes on clay loam soils commonly integrading with PCT 374 and PCT 76. These characteristics are consistent with the BioNet profile for PCT 277.
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodlands
Conservation status	PCT 277 broadly consistent with White Box Yellow Box Blakely's Red Gum Woodland listed as Endangered under BC Act and White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland listed as Critically Endangered under the EPBC Act.
SAII entity	Yes
Per cent cleared	94 per cent
Landscape position	Occurs on lower slopes and gently undulating areas.
Species upper stratum	*Eucalyptus blakelyi* (Blakely's Red Gum), *Eucalyptus dwyeri* (Dwyer's Red Gum), *Eucalyptus melliodora* (Yellow Box), *Eucalyptus albens* (White Box), *Eucalyptus macrorhyncha* (Red Stringybark), *Brachychiton populneus* subsp. *populneus* (Kurrajong).
Species middle stratum	*Daviesia genistifolia, Salsola australis, Solanum cinereum*
Species ground stratum	*Alternanthera nana, Anthosachne scabra* (Wheat Grass), *Aristida behriana* (Bunch Wiregrass), *Aristida jerichoensis* var. *jerichoensis* (Jericho Wiregrass), *Austrostipa scabra* subsp. *scabra* (Speargrass), *Austrostipa setacea* (Corkscrew Grass), *Boerhavia domini*, *Bothriochloa macra* (Red Grass), *Cheilanthes sieberi subsp. sieberi*, *Chloris truncata* (Windmill Grass), *Chloris venticosa, Cynodon dactylon, Dichelachne crinite, Dichondra repens, Dysphania pumilio, Elymus scaber, Enteropogon acicularis* (A Windmill Grass), *Epilobium billardierianum, Eragrostis brownii, Eragrostis leptostachya, Erodium crinitum, Euphorbia drummondii, Gonocarpus elatus, Goodenia hederacea, Juncus remotiflorus, Juncus usitatus, Lomandra filiformis*, *Lomandra multiflora* subsp. *multiflora* (Many-flowered Mat-rush), *Oxalis perennans, Panicum effusum, Rumex brownii*, *Rytidosperma auriculatum* (Lobed Wallaby Grass), *Rytidosperma erianthum, Rytidosperma pallidum, Rytidosperma setaceum, Schoenus latelaminatus, Sida corrugata* (Corrugated sida), *Tricoryne elatior*, *Vittadinia cuneata*, *Vittadinia gracilis*.
Vegetation condition	Moderate condition: exhibited a sparse canopy dominated by *Eucalyptus blakelyi* (Blakely's Red Gum) with the middle stratum absent due to historic clearing for agriculture and continued ongoing sheep grazing. The ground stratum is predominately native with exotic cover <5 per cent. Low condition: this vegetation type occurs as derived native grasses and lacks any woodland structure with the upper and middle stratums historically removed. Due to historic and ongoing grazing the ground stratum is relatively low in native species richness and cover in forb, fern and other natives.

Photo 3.6 PCT 277 – moderate condition (Plot R3)

Photo 3.7 PCT 277 – derived native grassland (Plot R10)

3.2.5 PCT 346 – White Box – Blakely's Red Gum White Cypress Pine shrubby woodland on metamorphic hills in the Wagga Wagga- Cootamundra region of the NSW South Western Slopes Bioregion

A profile PCT 346 White Box – Blakely's Red Gum White Cypress Pine shrubby woodland on metamorphic hills in the Wagga Wagga- Cootamundra region of the NSW South Western Slopes Bioregion is provided in Table 3.7.

Table 3.7 Summary of PCT 346 White Box – Blakely's Red Gum White Cypress Pine shrubby woodland on metamorphic hills in the Wagga Wagga- Cootamundra region of the NSW South Western Slopes Bioregion

PCT 346 White Box – Blakely's Red Gum White Cypress Pine shrubby woodland on metamorphic hills in the Wagga Wagga- Cootamundra region of the NSW South Western Slopes Bioregion	
PCT Justification	PCT 346 occurred as a medium high open grassy woodland dominated by *Eucalyptus blakelyi* (Blakely's Red Gum) and *Callitris glaucophylla* (White Cypress Pine) in areas previously mapped or nearby areas mapped by the SVTM as PCT 346. This PCT was assigned to this vegetation type based on the dominance of *Eucalyptus blakelyi* (Blakely's Red Gum) and *Callitris glaucophylla* (White Cypress Pine) in the upper stratum occurring on hillslopes and undulating terrain associated with clay loam soils. These characteristics are consistent with the BioNet profile for PCT 346.
Vegetation formation	Grassy Woodlands
Vegetation class	Western Slopes Grassy Woodlands
Conservation status	Not listed under BC Act or EPBC Act
SAII entity	No
Per cent cleared	60 per cent
Landscape position	Occurs on hillslopes and undulating terrain associated with the foot slopes and outcropping rocky slopes of the Bethungra Range.
Species upper stratum	*Eucalyptus blakelyi* (Blakely's Red Gum) with scattered occurrences of *Callitris glaucophylla* and *Brachychiton populneus* subsp*. populneus* (Kurrajong).
Species middle stratum	*Acacia decora, Dodonaea viscosa, Solanum cinereum*
Species ground stratum	*Anthosachne scabra* (Wheat Grass), *Austrostipa setacea*, *Austrostipa scabra* subsp. *scabra* (Speargrass), *Bothriochloa biloba*, *Bothriochloa macra* (Red Grass), *Cheilanthes sieberi*, *Chloris truncata* (Windmill Grass), *Chloris ventricosa, Cynodon dactylon*, *Dichondra repens* (Kidney Weed), *Dysphania pumilio* (Small Crumbweed), *Einadia nutans* subsp. *nutans* (Climbing Saltbush), *Elymus scaber, Enneapogon gracilis, Eragrostis leptostachya, Euphorbia drummondii, Lomandra filiformis subsp. coriace*, *Lomandra multiflora* subsp. *multiflora* (Many-flowered Mat-rush), *Oxalis perennans*, *Panicum effusum* (Hairy Panicum), *Rytidosperma caespitosum* (Ringed Wallaby Grass), *Rytidosperma erianthum*, *Rytidosperma racemosum*, *Rytidosperma setaceum* (Smallflower Wallaby Grass), *Sida corrugata* (Corrugated sida).
Vegetation condition	Moderate condition: exhibited a relatively intact upper stratum dominated by *Eucalyptus blakelyi* (Blakely's Red Gum). The middle stratum was mostly absent due to historic clearing for agriculture and continued ongoing sheep grazing. The ground stratum is predominately native with exotic cover <5 per cent. Low condition: this vegetation type occurs as derived native grasses and lacks any woodland structure with the upper and middle stratums historically removed. Due to historic and ongoing grazing the ground stratum is relatively low in native species richness and cover in forb, fern and other natives.

Photo 3.8 PCT 346 – moderate condition (Plot R2)

Photo 3.9 PCT 346 – derived native grassland (Plot R9)

3.3 Threatened species

Two threatened species have been previously recorded within the site and adjacent areas (Table 3.8 and Figure 3.2).

Table 3.8 Threatened species

Scientific name	Common name	BC Act1	EPBC Act2	Recorded/assumed	Credit type
Petaurus norfolcensis	Squirrel Glider	V	–	Recorded	Species credit species
Polytelis swainsonii	Superb Parrot	V	V	Recorded	Species credit species (breeding)/Ecosystem

3.4 Quality and condition

The vegetation integrity (VI) scores for the revegetation area are outlined in Table 3.9, below.

Table 3.9 VI scores for revegetation area

PCT	Condition	Composition condition score	Structure condition score	Function condition score	Current VI score
76 - Western Grey Box Tall Grassy Woodland on Alluvial Loam and Clay Soils in the NSW South Western Slopes and Riverina Bioregions	Moderate	46.2	48.9	75.9	55.6
	DNG	24.7	37.8	4.4	16.1
79 - River Red Gum shrub/grass riparian tall woodland or open forest wetland mainly in the upper slopes sub-region of the NSW South Western Slopes Bioregion and western South Eastern Highlands Bioregion	Moderate	57.1	81.1	100	77.4
277 - Blakely's Red Gum – Yellow Box Grassy Tall Woodland of the NSW South Western Slopes Bioregion	Moderate	32.9	84.3	25.4	41.3
	DNG	27.2	55.2	0	11.4
346 - White Box – Blakely's Red Gum White Cypress Pine shrubby woodland on metamorphic hills in the Wagga Wagga- Cootamundra region of the NSW South Western Slopes Bioregion	Moderate	59.3	24.4	65.4	45.6
	DNG	23.8	20.7	0	7.9

3.4.1 Natural regeneration

Despite ongoing grazing, natural regeneration of *Eucalyptus* species was observed within woodland patches and scattered trees. This natural regeneration was only observed in the northern portion of the site. Other regeneration recorded included groundcover seedlings of *Carex appressa, Maireana enchylaenoides, Enchylaena tomentosa.* Current grazing activities are potentially inhibiting the natural regeneration of some species in these areas.

3.4.2 Weeds and pests

A variety of weed species were recorded within the site (Table 3.10), however, weed cover was generally relatively low and ongoing management of weeds was evident. Although five high threat weeds were recorded within the site, these were in low abundance:

- *Lycium ferocissimum* (African Boxthorn)
- *Xanthium spinosum* (Bathurst Burr)
- *Hypericum perforatum* (St John's Wort)
- *Bromus diandrus* (Giant Brome)
- *Nassella neesiana* (Chilean Needle Grass).

Pests recorded in the vicinity of the site and likely to occur include Rabbit (*Oryctolagus cuniculus*) and Fox (*Vulpes vulpes).*

Table 3.10 Weeds recorded within the site

Species	Common name	Status
Aira spp.	Hair Grass	EX
Arctotheca calendula	Capeweed	EX
*Avena barbata**	-	EX
Avena fatua	-	EX
Brassica spp.	-	EX
*Bromus diandrus**	Great Brome	HT
Bromus hordeaceus	Soft Brome	EX
*Bromus molliformis**	Soft/hairy Brome	EX
Chloris virgata	-	EX
Chondrilla juncea	Skeleton Weed	EX
*Cirsium vulgare**	Spear Thistle	EX
Cucumis myriocarpus	Paddy Melon	EX
Echium plantagineum	Patersons curse	EX
Eleusine tristachya	-	EX
*Eragrostis cilianensis**	Stink	EX
*Erodium brachycarpum**	Heronsbill	EX
Euphorbia serpens	-	EX
Festuca rubra	Red Fescue	EX
Hordeum leporinum	Barley Grass	EX
Hordeum marinum	-	EX
Hordeum vulgare	-	EX
*Hypochaeris radicata**	Cat's Ear	EX
Lactuca serriola	Prickly Lettuce	EX
Lepidium africanum	Lepidium africanum	EX

Species	Common name	Status
Lolium perenne	Perennial Rye-grass	EX
*Lycium ferocissimum**	African Box Thorn	HT
Malva neglecta	-	EX
*Malva parviflora**	Small Flowered Mallow	EX
*Medicago polymorpha**	Burr Medic	EX
Medicago sativa	-	EX
Modiola caroliniana	-	EX
Moraea setifolia	Thread Iris	EX
Nassella neesiana	Chilean Needlegrass	HT
Polygonum aviculare	-	EX
Rumex crispus	-	EX
Solanum nigrum	-	EX
Sonchus oleraceus	Sow Thistle	EX
Taraxacum officinale	-	EX
Tribulus terrestris	-	EX
Trifolium angustifolium	-	EX
Trifolium arvense	Hare's Foot Clover	EX
Trifolium glomeratum	-	EX
Trifolium repens	White clover	EX
Trifolium subterraneum	-	EX
Vulpia bromoides	Squirrel Tail Fescue	EX
Vulpia myuros	Rat's tail fescue	EX
Xanthium spinosum	Bathurst Burr	HT

Note: EX= exotic species; HT= High Threat species

3.4.3 Important habitat features

The site includes important habitat features including:

- Riparian areas – Run Boundary Creek runs southwest through the northern portion of the site. The creek is surrounded by extensive area of River Red Gum Woodland (PCT 79). Dams and pools are also present within the site and in the northern portion of the site these have good cover of riparian and aquatic vegetation.
- Hollow bearing trees – hollow bearing trees were largely limited to scattered trees within cropping land and within PCT 79. There were also a number of nest boxes within PCT 79 and adjacent vegetation.
- Fallen timber- fallen timber is present within the woodland areas providing habitat for fauna.
- Rocky outcropping – providing habitat for fauna particularly reptiles, as well as microhabitats for flora.

Photo 3.10 Dam within site

Photo 3.11 Woodland with fallen timber

3.4.4 Soil surface condition

The soil condition varied within the site. The flat areas and low rises, particularly in the north of the site in proximity to Run Boundary Creek and cropped area, were characterised by deeper soils with organic matter. On the hilltops and steep slopes in the east and south of the site, soils were very shallow, hardsetting, and gravelly with rocky outcropping.

The soil landscapes within the site are prone to gully, sheet and rill erosion in disturbed areas. Minor gully erosion occurred along concentrated drainage flowlines. The rehabilitation enclosure in the centre of the site surrounded an area of gully erosion.

No evidence of soil salinity or salting along drainage lines was recorded.

3.4.5 Comparison of revegetation area to project impacts

The subject land for the I2S proposal includes the EIS study corridor (i.e., the land subject to the development). The subject land is shown in Figure 1.1 of the BDAR. The subject land passes through the site and will ultimately establish the railway corridor.

A total of 93.83ha of Box Gum Woodland was recorded within the 250m corridor applied to the subject land of the assessment. After design refinements, a total direct impact of 39.08ha was determined. Of this direct impact land:

- 17.48ha has been recorded as moderate condition
- 6.02ha is poor condition (canopy with exotic understorey)
- 12.78ha occurs as derived native grasslands
- 2.8ha consists of native plantings

The removal of 39.08ha equates to a 0.4% reduction of this community within the locality (10km radius from subject land). It is estimated that 439ha of the community would be retained within 500m buffer of the subject land.

The proposed areas for management and rehabilitation of Box Gum Woodland TEC total 45.7 ha and are comprised of:

- 8.8ha of woodland
- 36.9 ha of derived native grasslands.

Strategic revegetation will be undertaken to the derived grassland to improve its condition. This will see derived native grassland strategically revegetated and rehabilitated resulting in Box Gum Woodland of no less than an equivalent area/condition being protected compared to the project impacts and managed to improve condition, supported by other habitat areas present on the rehabilitation area.

The project will involve the removal of vegetation along a linear development. This impact is on small isolated patches and patches with limited connectivity subject to grazing and high edge effects from cropping. The scale, floristic composition and existing level of disturbance of these patches are such that the areas to be removed are not considered to be habitat that would be important for the long-term survival of Box Gum Woodland.

To address the impact of fragmentation, the strategic revegetation prioritises reconnecting existing fragments of woodland within the site to improve connectivity and overall patch sizes. While the project impacts 56 patches (ranging in size from 0.02 ha to 6.86 ha), this is across varied patch conditions and reflects the current distribution of the TEC through the landscape, as presented in Table 3.11. In contrast, the proposed revegetation will conserve a connected vegetation of over 100 ha (including a minimum of 39 ha of Box Gum Woodland). Although the proposed railway would traverse this area, the corridor would be less than 100 m wide (58-99 m) and would still be considered a single patch under BAM. Fauna connectivity structures would be provided as part of the development to ensure continued connectivity for arboreal mammals within the patch. This large consolidated area of vegetation with low perimeter to area ratio will minimise edge effects and allow for higher quality vegetation ultimately to be maintained.

Although the proposed railway would traverse this area, the corridor would be less than 100 m wide (58-99 m) and would still be considered a single patch under BAM. Fauna connectivity structures would be provided as part of the development to ensure continued connectivity for arboreal mammals within the patch. This large consolidated area of vegetation with low perimeter to area ratio will minimise edge effects and allow for higher quality vegetation ultimately to be maintained.

Table 3.11 Impacted patches of Box Gum Woodland

PCT number	Number of patches (Box Gum Woodland)*	Total area of patches (ha)
266	11	14.20
276	5	1.52
277	39	23.01
347	2	0.43

*patch size defined under the BAM as an ‘area of native vegetation that occurs on the subject land and includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or ≤ 30 m for non-woody ecosystems) (Department of Planning Industry and Environment 2020).

4 Site capability

4.1 Rehabilitation opportunity

The site contains areas of cropping, remnant vegetation as well as areas of derived native grassland. Areas of cropping have limited potential for rehabilitation due to soil disturbance and loss of seed bank as well as high exotic cover. Areas being prioritised for rehabilitation have existing patches of Box Gum Woodland CEEC that will aim to be reconnected from a mix of rehabilitation methods recommended in Table 4.3. The outcome of this should improve connectivity, increase overall woodland patch size and improve natural rehabilitation of derived native grassland to woodland for the Box Gum Woodland CEEC within the site. These actions may go on to improve the broader landscape surrounding the site through supporting greater biodiversity that may expand out overtime (e.g. seed and pollen dispersal).

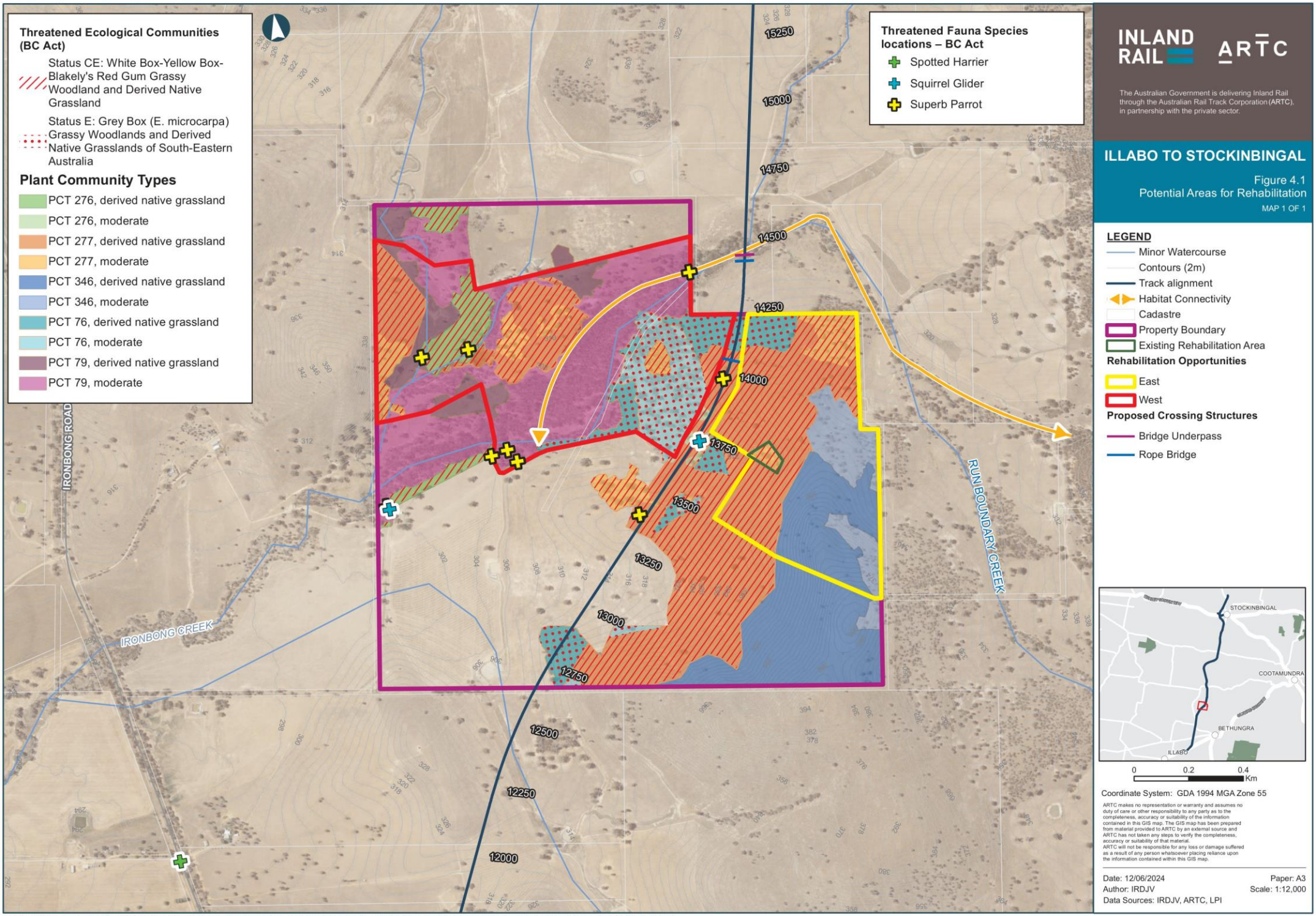
The northern portion of the site is considered to have higher rehabilitation potential than the southern portion based on:

- evidence of natural regeneration, despite ongoing grazing, with regeneration of eucalypt saplings surrounding remnant trees in remnant vegetation and derived native grassland
- higher existing diversity of native species including a range of native forb species
- lower cover of exotic species
- better soil condition with deeper A horizon soil profile including organic matter.

In comparison, the southern portion of the site is considered to have a lower rehabilitation potential than the northern portion based on:

- shallow soil profile with sloped rocky terrain
- a harder more compacted soil profile likely due to greater grazing activity by livestock
- less scattered trees
- the western half of this portion is currently tilled farmland with little to no potential for natural rehabilitation.

The best rehabilitation opportunities are in the north and east of the site (Figure 4.1).



INLAND RAIL ARTC

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

ILLABO TO STOCKINBINGAL

Figure 4.1
Potential Areas for Rehabilitation
MAP 1 OF 1

LEGEND

- Minor Watercourse
- Contours (2m)
- Track alignment
- Habitat Connectivity
- Cadastre
- Property Boundary
- Existing Rehabilitation Area

Rehabilitation Opportunities

- East
- West

Proposed Crossing Structures

- Bridge Underpass
- Rope Bridge

Coordinate System: GDA 1994 MGA Zone 55

Date: 12/06/2024
Author: IRDJV
Data Sources: IRDJV, ARTC, LPI

Paper: A3
Scale: 1:12,000

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4.2 Ecosystem rehabilitation potential

An overview of native vegetation types identified is presented in Table 4.1. The best rehabilitation opportunities are in the north and east of the site and would provide rehabilitation opportunities for the ecosystems as outlined in Table 4.1 and Figure 4.1.

Table 4.1 Overview of native plant community types in proposed rehabilitation area

Vegetation type	Threatened Ecological Community (BC Act)	Habitat for Threatened species known to occur in site	Condition	Extent (ha)
PCT 76 Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Superb Parrot Squirrel Glider	Woodland	10.8
			Derived native grassland	9.9
PCT 79 River Red Gum shrub/grass riparian tall woodland or open forest wetland mainly in the upper slopes sub-region of the NSW South Western Slopes Bioregion and western South Eastern Highlands Bioregion.	Not listed	Superb Parrot Squirrel Glider	Moderate	46.6
			Derived native grassland	10.2
PCT 276 Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	Superb Parrot Squirrel Glider	Derived native grassland	7.5
PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	White Box Yellow Box Blakely's Red Gum Woodland	Superb Parrot Squirrel Glider	Moderate	10.8
			Derived native grassland	58.5
PCT 346 White Box – Blakely's Red Gum White Cypress Pine shrubby woodland on metamorphic hills in the Wagga Wagga-Cootamundra region of the NSW South Western Slopes Bioregion	Not listed	Superb Parrot Squirrel Glider	Moderate	9.5
			Derived native grassland	32.5
TOTAL				**196.3**

4.3 Proposed management

4.3.1 Management zones

Management zones within the proposed conservation area have been mapped according to the existing condition and management actions required to manage the native vegetation in perpetuity. A summary of the proposed management zones is provided in Table 4.2.

Table 4.2 Management zones TEC and PCT summary

Management zone	TECs and other PCTs	Western rehabilitation area (ha)	Eastern rehabilitation area (ha)	TOTAL (ha)
MZ 1 – Woodland	Box Gum Woodland CEEC (PCT 276 and 277)	5.0	3.8	8.8
	Grey Box Woodland EEC (PCT 76)	9.5	0	9.5
	River Red Gum Woodland (PCT 79)	33.7	0	33.7
	White Box – Blakely's Red Gum White Cypress Pine shrubby woodland (PCT 346)	0	8.6	8.6
	Total	**48.2**	**12.4**	**60.6**
MZ 2 – Derived Natural Grassland	Box Gum Woodland CEEC (PCT 276 and 277)	16.9	20.0	36.9
	Grey Box Woodland EEC (PCT 76)	4.9	2.3	7.2
	River Red Gum Woodland (PCT 79)	6.6	0	6.6
	White Box – Blakely's Red Gum White Cypress Pine shrubby woodland (PCT 346)	0	11.8	11.8
	Total	28.4	34.1	62.5
GRAND TOTAL		**76.6**	**46.5**	**123.1**
TOTAL Box Gum Woodland CEEC (PCT 276 and 277)				**45.7**
TOTAL Grey Box Woodland EEC (PCT 76)				**16.7**
GRAND TOTAL TEC				**62.4**

4.3.2 Recommended management actions

BAM outlines required management actions which can create beneficial biodiversity outcomes through increasing vegetation integrity (gain) and/or threatened species habitat. A brief summary of management actions and recommended activities to achieve this increase is provided in Table 4.3. These management actions will be undertaken in accordance with the latest and best practice BCT guidance and requirements.

Table 4.3 Required management actions for improving vegetation integrity

Management action	Activities recommended	Location
Grazing management	Grazing is to be excluded. This will need to be negotiated with the relevant parties in relation to a timeframe for when this needs to occur. If this needs to occur over time across different areas, then the western rehabilitation area should be prioritized due to it having a greater potential for rehabilitation as mentioned in Section 4.1. Fencing would be required around the rehabilitation area to exclude grazing and control access. Removal of some fencing may be recommended to improve wildlife connectivity. Fencing should be in accordance with the BCT Essential Conservation Fencing Guide (2020).	All management zones

Management action	Activities recommended	Location
Native vegetation management	Within grassland areas: • Planting of canopy species that are representative of the identified PCT and have low likelihoods of regenerating naturally in the short-term. Pioneer species such as *Callitris glaucophylla* will not be included in these lists since they are expected to germinate from existing seed banks once grazing management is taken into effect. – PCT 76 (EEC): *E.microcarpa* – PCT 79: *E.camaldulensis, E.blakelyi, E.melliodora* – PCT 276 (CEEC): *E.albens, E.blakelyi, E.melliodora* – PCT 277 (CEEC): *E.albens, E.blakelyi, E.melliodora* – PCT 346: *E.albens, E.blakelyi, E.microcarpa* • To address management actions for Box Gum Woodland CEEC, priority planting should be focused in derived native grassland areas of PCT 277 to reconnect remaining patches of the CEEC. • Plantings should be avoided in areas where the soil is too heavily compacted by grazing animals. Consider using techniques such as deep-ripping to improve planting conditions in these areas. • Revegetation works should be planned outside of the summer period to avoid heat stress when establishing. • Planting densities should be determined by assessing the natural tree density in the PCT profile and the expected survival rates within the planned revegetation. • Monitoring of planted canopy should ensure survival is above a certain percentage by years 3/5 after initial planting. Supplementary plantings of canopy species will be considered if this threshold isn't reached. • Monitoring of ground cover vegetation and adaptive management to consider additional planting of native forbs. • The initial goal for the revegetation is to improve connectivity between patches of Box-Gum Woodland TEC. These corridors should be a minimum of 30m wide to account for any edge effect.	Derived Native Grassland areas
	Woodland areas: • Native vegetation management is proposed to be based on principals of natural regeneration. Native regeneration is considered likely following exclusion of grazing. • Monitoring of ground cover vegetation and adaptive management to consider additional planting of native forbs	Woodland areas
Integrated pest animal control	Undertake feral pest management including control of, but not exclusive of foxes and rabbits.	All management zones
Integrated weed management and control of high threat weeds	Maintenance control of weeds and High Threat weeds in accordance with relevant guidelines including DPI New South Wales Weed Control Handbook, Seventh Edition (nsw.gov.au). Maintenance control of weeds including High Threat weeds through spot spraying and slashing. High threat and other weeds recorded in the site are listed in Table 3.10.	All management zones
Fire management	Patch burns may be considered for management of weeds, regeneration and management of fire risk and frequency.	All management zones
Management of human disturbance	Installation of boundary fencing to meet BCT guidelines. Installation of conservation signs to meet BCT guidelines.	All management zones
Monitoring	Biodiversity monitoring will follow the BCT guidelines and will include: • Establishing monitoring plots in each vegetation zone • Threatened species monitoring • Monitoring management effectiveness (revegetation, weed management, etc.)	All management zones

4.3.3 Restoration targets

Preliminary restoration targets have been identified to ensure that rehabilitated areas has the best opportunity to reach their associated PCT benchmarks. The benchmarks and mean species composition, structure and function (per 400 sq m vegetation integrity plot) are summarised in Table 4.6, Table 4.7 and Table 4.8 respectively.

Strategic revegetation will be the main restoration method used to reach these benchmarks for tree cover and abundance. Table 4.4 outlines minimum targets for each PCT within the rehabilitation areas.

For example, PCT 277 (Box Gum Woodland CEEC) has a benchmark composition of 3 and structure of 19 for its tree species. In the sites current condition, PCT 277 has areas of DNG with mean composition score of 0.1 and structure score of 0.4. To ensure the benchmark is reached to transition DNG to Woodland, revegetation should ensure that the planted canopy has a minimum 3 tree species (composition benchmark) and more than 19% cover (structure benchmark) of these species once established.

Species for planting would be consistent with specific PCT and be consistent with PCT description in NSW Vegetation Database. Seed source for selected species will be established from site collection on the target property and from associated communities within the vicinity of the site.

Planting mix for canopy species, and a notional proportion for these for each PCT is provided in Table 4.4 and Table 4.5. In detailed planning for planting outcomes, consideration will also be given the species mixes of PCTs 266 and 347, depending on the landform and soil characteristics of the rehabilitation areas, particularly those across the eastern area.

Supplementary plantings of shrubs, forbs, etc may be required if monitoring indicates that these revegetated areas are not reaching the PCT benchmarks. Indicative species for planting for each PCT, including shrub layer and groundcover is provided in Appendix B.

Table 4.4 Canopy Revegetation Targets

PCT	Canopy Benchmark Composition (no. species)	Canopy Benchmark Structure (% cover)	Derived Native Grassland area for revegetation (ha)	Minimum planted canopy required to meet Structure Benchmark (trees/ha)*	Minimum trees required for revegetation *
PCT 76	3	31	8.1	207	1677
PCT 79	2	55	1.8	367	661
PCT 276	3	19	1.5	127	190
PCT 277	3	19	25.6	127	3251
PCT 346	5	60	9.6	400	3840
Total					**9619**

Notes: * assumes 100% survival. Planting density should be increased to account for mortality, depending on seasonal conditions as well as taking into consideration natural regeneration within the site.

Table 4.5 Canopy Revegetation Species Mixture for Box Gum Woodland TEC

Representative PCTs	Scientific Name	Common Name	Minimum planted canopy species required to meet Structure Benchmark (trees/ha)* (indicative quantities by species)
PCT 76	*Eucalyptus microcarpa*	Grey Box	187
	Casuarina glaucophylla	White Cypress Pine	10
	Allocasuarina luehmannii	Bull Oak	10
PCT 79	*Eucalyptus camaldulensis*	River Red Gum	300
	Casuarina cunninghamiana	River Oak	40
	Eucalyptus blakelyi	Blakely's Red Gum	20
	Eucalyptus melliodora	Yellow Box	7
PCT 276	*Eucalyptus melliodora*	Yellow Box	107
	Eucalyptus blakelyi	Blakely's Red Gum	10
	Eucalyptus bridgesiana	Apple Box	10
PCT 277	*Eucalyptus blakelyi*	Blakely's Red Gum	57
	Eucalyptus melliodora	Yellow Box	57
	Eucalyptus bridgesiana	Apple Box	5
	Eucalyptus microcarpa	Grey Box	3
	Eucalyptus goniocalyx	Long-leaved Box	5
PCT 346	*Eucalyptus albens*	White Box	120
	Eucalyptus blakelyi	Blakely's Red Gum	120
	Callitris glaucophylla	White Cypress Pine	120
	Eucalyptus microcarpa	Grey Box	13
	Eucalyptus dwyeri	Dwyer's Red Gum	13
	Callitris endlicheri	Black Cypress Pine	13

Notes: * assumes 100% survival. Planting density should be increased to account for mortality, depending on seasonal conditions as well as taking into consideration natural regeneration within the site.

Composition, structure and function benchmark targets and current condition are outlined in Table 4.6, Table 4.7 and Table 4.8 respectively.

Table 4.6 Composition Condition Benchmarks and Current Plot Means

Item	Tree	Shrub	Grass	Forb	Fern	Other
76 Benchmark	**3**	**4**	**6**	**10**	**1**	**1**
76 DNG	0.3	0	6	0.7	0	0
76 Woodland	1	1.3	8	4.3	0	0
79 Benchmark	**2**	**2**	**6**	**8**	**1**	**1**
79 Woodland	1.5	0	7	4	0	0
276 Benchmark	**3**	**3**	**8**	**10**	**1**	**1**
277 Benchmark	**3**	**3**	**8**	**10**	**1**	**1**
277 DNG	0.1	0.3	6.2	3.1	0.2	0
277 Woodland	0.8	0.5	7.5	3.5	0.3	0
346 Benchmark	**5**	**9**	**6**	**8**	**1**	**1**
346 DNG	0	0	7	1.5	0.5	0
346 Woodland	3	3	12	5	1	0

Table 4.7 Structure Condition Benchmarks and Current Plot Means

Item	Tree	Shrub	Grass	Forb	Fern	Other
76 Benchmark	**31**	**2**	**23**	**5**	**0**	**0**
76 DNG	1.3	0	58.5	0.1	0	0
76 Woodland	8.3	0.4	48.9	1.6	0	0
79 Benchmark	**55**	**0**	**36**	**6**	**0**	**0**
79 Woodland	39.5	0	66.3	2.8	0	0
276 Benchmark	**19**	**1**	**32**	**6**	**0**	**0**
277 Benchmark	**19**	**1**	**32**	**6**	**0**	**0**
277 DNG	0.4	0	45.8	1.8	0	0
277 Woodland	10.1	0.2	39.4	0.6	0	0
346 Benchmark	**60**	**10**	**15**	**4**	**0**	**0**
346 DNG	0	0	58.4	0.3	0.1	0
346 Woodland	12	0.8	32.3	1.1	0.1	0

Table 4.8 Function Condition Benchmarks and Current Plot Means

Item	No. of large trees	Litter Cover	Length of fallen logs	Stem size class	Tree regeneration (<5cm diameter)	High threat weed cover
76 Benchmark	**3**	**65**	**49**	**4**	**Present**	**0**
76 DNG	0	22	0.5	0.3	Absent	0
76 Woodland	2	29	34.7	2.7	Present	0.3
79 Benchmark	**4**	**44**	**62**	**4**	**Present**	**0**
79 Woodland	4.5	56	101	4	Present	2.8
276 Benchmark	**4**	**55**	**41**	**4**	**Present**	**0**
277 Benchmark	**4**	**55**	**41**	**4**	**Present**	**0**
277 DNG	0.1	12.5	3.9	0	Absent	0
277 Woodland	0.5	18.3	11.8	1.8	Present	0
346 Benchmark	**1**	**66**	**67**	**4**	**Present**	**0**
346 DNG	0	0	0	0	Absent	0.1
346 Woodland	1	6.2	5	3	Present	0

5 Conclusion

The site provides an opportunity to improve connectivity, enhance existing vegetation and habitats and expand area and patch size for threatened woodland communities. The inclusion of rehabilitation in the agreed areas will provide benefits to Box Gum Woodland CEEC quality and quantity on this property and in the broader landscape including:

- Increased connectivity – enhancing and conserving in perpetuity an existing corridor along Run Boundary Creek between extensive vegetation of Bethungra Range and vegetation to the west.
- Increased extent of vegetation protected and managed for conservation, including:
  - Protection of existing vegetation including an extensive area of River Red Gum Woodland around Run Boundary Creek as well as remnant patches of Box Gum Woodland and Grey Box Woodland threatened ecological communities.
  - Increasing the extent of Box Gum Woodland CEEC and Grey Box Woodland within the site and region
- Improvement of condition, including diversity, structure and function – Improving vegetation integrity of native vegetation within the site including through the addition of canopy to areas of derived grassland and increased cover and diversity of groundcover vegetation through the removal of grazing.
- Increased patch size resulting in decreased edge effects
- Improved habitat condition for fauna- Providing larger and more resilient habitat patches for flora and fauna including threatened species known to occur within the site (Superb Parrot and Squirrel Glider).

Providing long-term conservation of these important features on an agricultural property in an over cleared landscape. It is recommended that BAM calculations are undertaken on the vegetation to assess the current vegetation integrity score and to quantify the increase that would be gained through a Biodiversity Stewardship Agreement (BSA) set up for the site.

In addition to the credit offsets for the project outlined in the BDAR, the conservation area would provide additional biodiversity benefits beyond BAM-C requirements for:

- White Box Yellow Box Blakely's Red Gum Woodland and Derived Native Grassland Threatened Ecological Community (Box Gum Woodland CEEC) which is listed as a Serious and Irreversible Impact entity.
- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions (Grey Box Woodland).
- Squirrel Glider (*Petaurus norfolcensis*).
- Superb Parrot (*Polytelis swainsonii*).

5.1 Improved connectivity

Rehabilitation and protection of the northern portion of the site would increase connectivity in the landscape along and from Run Boundary Creek and link into more extensive vegetation of the Bethungra Range. This would include:

- Protection of existing River Red Gum Woodland (PCT 79) adjacent to Run Boundary Creek.
- Provision of wider corridor connection than currently present along Run Boundary Creek and to the vegetation to the east of the site. Corridor width would increase from 30m at its current narrowest point to over 500m.
- Increasing connectivity between patches of threatened ecological communities. For example, the western rehabilitation area will potentially link smaller patches of moderate condition PCT 277 (Box Gum Woodland CEEC) to each other, in addition to the larger patch that occurs on Run Boundary Creek.

- Increasing connectivity for flora and fauna including threatened species known to occur within the site (Superb Parrot and Squirrel Glider).

The establishment of canopy led revegetation will see a future potential for reestablishing connectivity from the riparian corridor to neighbouring areas of established vegetation.

Canopy plantings in the west rehabilitation area will assist in linking up remnant patches of moderate condition PCT 277 (Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion)

A key management action for Box Gum Woodland CEEC is habitat rehabilitation/restoration and/or regeneration. This action sets out to ensure that remnants remain connected or linked to each other; in cases where remnants have lost connective links, re-establish them by revegetating sites to act as stepping stones for fauna, and flora (pollen and seed dispersal).

The revegetation will eventually allow for greater access to old growth trees for threatened species, such as the Squirrel Glider (*Petaurus norfolcensis*).

5.2 Increased extent with long-term conservation

The proposed revegetation area would be subject to a Biodiversity Stewardship Agreement ensuring conservation of Box Gum Woodland. The area in conservation would be no less than equivalent to the project impacts on Box Gum Woodland and derived grassland, taking into consideration current and future condition. Without a conservation agreement, this vegetation is at risk of degradation or loss as a result of agriculture. The integrity and scale of the rehabilitated Box Gum Woodland areas will provide considerably greater long-term conservation outcomes than the fragmented pattern impacted by the I2S project.

5.3 Improved condition

Restoration targets have been established to ensure that rehabilitated areas will reach their associated PCT benchmarks. This includes planting of canopy species within the Derived Native Grassland areas resulting in improved structure and function including connectivity.

Groundcover and understorey diversity and structure will improve as a result of removal of ongoing threat of grazing. Adaptive restoration and planting will be undertaken where benchmark targets are not met. Function will improve also including increased leaf litter and fallen timber.

5.4 Increased patch size

The large patch size of the remnant riparian corridor will be widened as a result of the proposed rehabilitation areas.

An added benefit of having the revegetation near such large patches is the potential for improved exchange of endemic species from the larger patch to the revegetation patches. This will potentially improve the species richness beneath the planted canopy, reducing the need for future understory revegetation.

6 References

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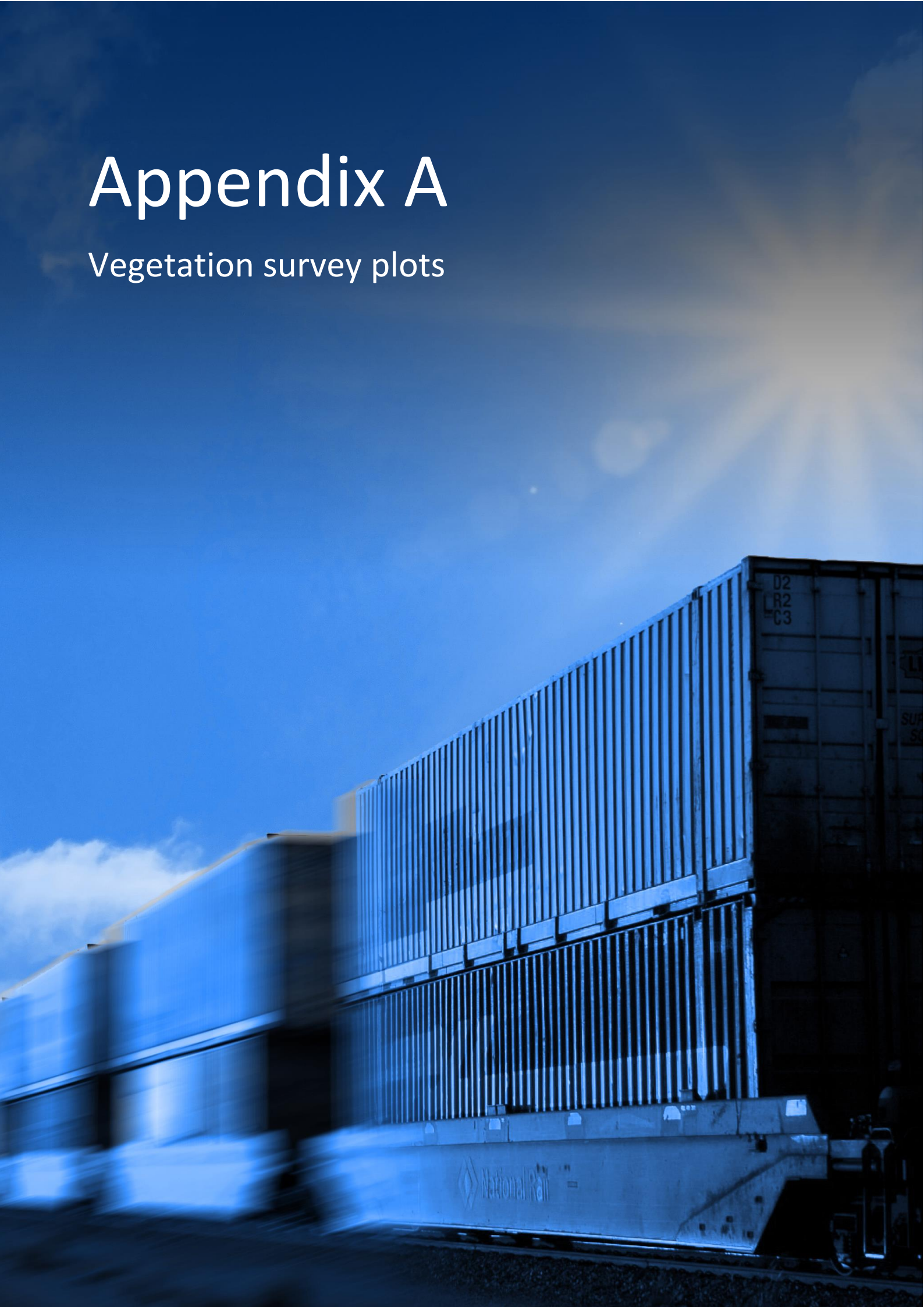
Appendix A

Vegetation survey plots



Date	12/03/2024		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat	55
Plot Name	R1		# spp	Count	Count	Count	Count	Count	Count	Count	Count	Count	
PCT	346 - DNG		37	23	0	0	7	2	1	0	2	1	
Species	Cover	Abundance	Sum cover	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	
			71.9	71.6	0	0	71.2	0.3	0.1	0	0.2	0.1	
Bothriochloa macra	65	1000	GG				65						
Enneapogon gracilis	5	100	GG				5						
Echium plantagineum	0.1	5	EX								0.1		
Sida corrugata	0.2	30	FG					0.2					
Chloris ventricosa	0.2	2	GG				0.2						
Oxalis perennans	0.1	1	FG					0.1					
Rumex crispus	0.1	3	EX								0.1		
Panicum effusum	0.5	20	GG				0.5						
Cheilanthes sieberi	0.1	1	EG						0.1				
Eragrostis spp.	0.2	20	GG				0.2						
Cynodon dactylon	0.1	1	GG				0.1						
Rytidosperma setaceum	0.2	8	GG				0.2						
Hypericum perforatum	0.1	1	HT									0.1	

Easting	576670
Northing	6160019
Orientation	54
Plot size	20x20x50
BAM Attributes 20x50m plot	
Stem classes	
80+	0
50-79	0
30-49	No
20-29	No
10-19	No
5-9	No
<5	No
Hollows	0
Length logs (m)	0
BAM Attributes 1x1 plot (%)	**0**
Litter (%)	0

Date	12/03/2024		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat	55
Plot Name	R2		# spp	Count	Count	Count	Count	Count	Count	Count	Count	Count	
PCT	346 - Mod		30	24	3	3	12	5	1	0	6	0	
Species	Cover	Abundance	Sum cover	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	
			47.5	46.3	12	0.8	32.3	1.1	0.1	0	1.2	0	
Callitris glaucophylla	2	1	TG		2								
Chloris ventricosa	2	100	GG				2.0						
Panicum effusum	2	50	GG				2.0						
Elymus scaber	1	50	GG				1.0						
Lomandra multiflora	0.2	1	GG				0.2						
Eragrostis leptostachya	1	30	GG				1.0						
Rytidosperma setaceum	15	300	GG				15.0						
Acacia decora	0.5	20	SG			0.5							
Cheilanthes sieberi	0.1	1	EG						0.1				
Echium plantagineum	0.3	30	EX								0.3		
Sida corrugata	0.2	30	FG					0.2					
Cucumis myriocarpus	0.1	1	EX								0.1		
Euphorbia drummondii	0.2	30	FG					0.2					
Austrostipa setacea	2	50	GG				2.0						
Bothriochloa macra	1	30	GG				1.0						
Vulpia myuros	0.5	40	EX								0.5		
Lomandra filiformis subsp. coriacea	2	100	GG				2.0						
Austrostipa scabra	2	200	GG				2.0						
Eucalyptus blakelyi	5	2	TG		5								
Dichondra repens	0.5	100	FG					0.5					
Eragrostis elongata	0.1	1	GG				0.1						
Dysphania spp.	0.1	5	FG					0.1					
Lepidium africanum	0.1	2	EX								0.1		
Dodonaea viscosa	0.2	4	SG			0.2							
Sonchus oleraceus	0.1	2	EX								0.1		
Rytidosperma erianthum	4	200	GG				4.0						
Rumex crispus	0.1	2	EX								0.1		
Eucalyptus albens	5	1	TG		5								
Oxalis perennans	0.1	1	FG					0.1					
Solanum cinereum	0.1	1	SG			0.1							

Easting	576736
Northing	6160182
Orientation	148
Plot size	20x20x50
BAM Attributes 20x50m plot	
Stem classes	
80+	0
50-79	1
30-49	Yes
20-29	Yes
10-19	Yes
5-9	No
<5	Yes
Hollows	0
Length logs (m)	4.5
BAM Attributes 1x1 plot (%)	**7**
Litter (%)	0
	5
	10
	15
	5

Date	12/03/2024		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat	55
Plot Name	**R3**		**# spp**	**Count**	Count	Count	Count	Count	Count	Count	**Count**	Count	
PCT	**277 - Mod**		**21**	**15**	2	1	7	4	1	0	**5**	1	
Species	**Cover**	**Abundance**	**Sum cover**	**Sum**	Sum	Sum	Sum	Sum	Sum	Sum	**Sum**	Sum	
			55.8	**55.2**	3	0.5	51	0.6	0.1	0	**0.6**	0.1	
Aristida jerichoensis var. jerichoensis	15	200	GG				15						
Panicum effusum	5	50	GG				5						
Hypericum perforatum	0.1	1	HT									0.1	
Chondrilla juncea	0.1	1	EX								0.1		
Medicago polymorpha	0.1	5	EX								0.1		
Lomandra multiflora	1	4	GG				1						
Rytidosperma setaceum	5	50	GG				5						
Lepidium africanum	0.1	1	EX								0.1		
Vittadinia cuneata	0.1	1	FG					0.1					
Epilobium billardierianum	0.1	1	FG					0.1					
Daviesia genistifolia	0.5	1	SG			0.5							
Rumex crispus	0.1	1	EX								0.1		
Austrostipa scabra	5	50	GG				5						
Bothriochloa macra	5	50	GG				5						
Cheilanthes sieberi	0.1	3	EG						0.1				
Dichelachne crinita	15	200	GG				15						
Euphorbia drummondii	0.3	30	FG					0.3					
Goodenia hederacea	0.1	1	FG					0.1					
Sonchus oleraceus	0.1	1	EX								0.1		
Eucalyptus microcarpa	2	1	TG		2								
Eucalyptus dwyeri	1	1	TG		1								

Easting	576850
Northing	6160537
Orientation	300
Plot size	20x20x50
BAM Attributes 20x50m plot	
Stem classes	
80+	0
50-79	1
30-49	Yes
20-29	No
10-19	No
5-9	No
<5	Yes
Hollows	0
Length logs (m)	8
BAM Attributes 1x1 plot (%)	**13**
Litter (%)	5
	15
	10
	15
	20

Date	12/03/2024		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat	55
Plot Name	R4		# spp	Count	Count	Count	Count	Count	Count	Count	Count	Count	
PCT	76 - Mod		21	16	1	2	6	7	0	0	5	1	
Species	Cover	Abundance	Sum cover	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	
			52.7	51.2	10	1	36	4.2	0	0	1.5	0.5	
Panicum effusum	10	100	GG				10						
Lycium ferocissimum	0.5	3	HT									0.5	
Euphorbia drummondii	0.5	30	FG					0.5					
Chloris ventricosa	5	20	GG				5						
Lepidium africanum	0.2	5	EX								0.2		
Eucalyptus microcarpa	10	4	TG		10								
Rytidosperma setaceum	5	100	GG				5						
Dysphania pumilio	2	30	FG					2					
Einadia nutans	1	20	FG					1					
Salsola australis	0.5	2	SG			0.5							
Erodium crinitum	0.2	5	FG					0.2					
Sonchus oleraceus	0.1	2	EX								0.1		
Atriplex suberecta	0.2	5	FG					0.2					
Rytidosperma erianthum	5	80	GG				5						
Echium plantagineum	0.5	30	EX								0.5		
Enchylaena tomentosa	0.5	20	SG			0.5							
Cynodon dactylon	1	10	GG				1						
Dichondra repens	0.2	10	FG					0.2					
Austrostipa scabra	10	100	GG				10						
Malva neglecta	0.2	2	EX								0.2		
Maireana enchylaenoides	0.1	2	FG					0.1					

Easting	576213
Northing	6160458
Orientation	297
Plot size	20x20x50
BAM Attributes 20x50m plot	
Stem classes	
80+	0
50-79	2
30-49	Yes
20-29	Yes
10-19	No
5-9	No
<5	No
Hollows	0
Length logs (m)	17
BAM Attributes 1x1 plot (%)	35
Litter (%)	35
	45
	20
	50
	25

Date	12/03/2024		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat	55
Plot Name	R5		# spp	Count	Count	Count	Count	Count	Count	Count	Count	Count	
PCT	76 - Mod		11	10	1	1	6	2	0	0	0	1	
Species	Cover	Abundance	Sum cover	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	
			77.9	77.7	10	0.1	67.3	0.3	0	0	0	0.2	
Eucalyptus microcarpa	10	8	TG		10								
Panicum effusum	2	100	GG				2						
Austrostipa scabra	20	300	GG				20						
Lycium ferocissimum	0.2	2	HT									0.2	
Chloris ventricosa	20	300	GG				20						
Einadia nutans	0.1	2	FG					0.1					
Enchylaena tomentosa	0.1	5	SG			0.1							
Dichelachne crinita	15	200	GG				15						
Rytidosperma spp.	10	100	GG				10						
Lomandra filiformis	0.3	1	GG				0.3						
Dysphania spp.	0.2	10	FG					0.2					

Easting	576149
Northing	6160613
Orientation	78
Plot size	20x20x50
BAM Attributes 20x50m plot	
Stem classes	
80+	1
50-79	3
30-49	Yes
20-29	Yes
10-19	Yes
5-9	No
<5	No
Hollows	0
Length logs (m)	43
BAM Attributes 1x1 plot (%)	48
Litter (%)	35
	40
	55
	65
	45

Date	13/03/2024		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat	55
Plot Name	R6		# spp	Count	Count	Count	Count	Count	Count	Count	Count	Count	
PCT	277 - DNG		22	9	0	1	6	2	0	0	13	1	
Species	Cover	Abundance	Sum cover	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	
			95.5	91.9	0	0.1	91.5	0.3	0	0	3.6	0.1	
Cynodon dactylon	75	1000	GG				75						
Juncus usitatus	3	10	GG				3						
Eragrostis leptostachya	10	100	GG				10						
Dysphania spp.	0.1	1	FG					0.1					
Echium plantagineum	0.2	20	EX								0.2		
Solanum cinereum	0.1	1	SG			0.1							
Trifolium spp.	0.5	10	EX								0.5		
Sonchus oleraceus	0.1	2	EX								0.1		
Trifolium subterraneum	0.2	5	EX								0.2		
Xanthium spinosum	0.1	2	HT									0.1	
Euphorbia drummondii	0.2	10	FG					0.2					
Austrostipa setacea	2	20	GG				2						
Eleusine tristachya	1	20	EX								1		
Panicum effusum	0.5	50	GG				0.5						
Chloris virgata	0.5	20	EX								0.5		
Hypochaeris radicata	0.1	3	EX								0.1		
Trifolium repens	0.5	10	EX								0.5		
Modiola caroliniana	0.1	2	EX								0.1		
Cirsium vulgare	0.1	1	EX								0.1		
Eragrostis brownii	1	15	GG				1						
Brassica spp.	0.1	1	EX								0.1		
Malva parviflora	0.1	1	EX								0.1		

Easting	575748
Northing	6160694
Orientation	73
Plot size	20x20
BAM Attributes 20x50m plot	
Stem classes	
80+	0
50-79	0
30-49	No
20-29	No
10-19	No
5-9	No
<5	No
Hollows	0
Length logs (m)	0
BAM Attributes 1x1 plot (%)	**0**

Date	13/03/2024		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat	55
Plot Name	R7		# spp	Count	Count	Count	Count	Count	Count	Count	Count	Count	0
PCT	277 - DNG		21	10	0	2	7	1	0	0	10	1	
Species	Cover	Abundance	Sum cover	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	
			88.5	80.5	0	0.2	80.1	0.2	0	0	7.9	0.1	
Cynodon dactylon	70	200	GG				70						
Juncus usitatus	2	20	GG				2						
Echium plantagineum	0.2	50	EX								0.2		
Solanum cinereum	0.1	1	SG			0.1							
Trifolium spp.	2	200	EX								2.0		
Sonchus oleraceus	0.1	2	EX								0.1		
Xanthium spinosum	0.1	2	HT									0.1	
Austrostipa setacea	2	50	GG				2						
Eleusine tristachya	1	50	EX								1.0		
Panicum effusum	0.5	50	GG				0.5						
Chloris virgata	4	300	EX								4.0		
Modiola caroliniana	0.1	1	EX								0.1		
Cirsium vulgare	0.1	1	EX								0.1		
Eragrostis brownii	5	100	GG				5						
Brassica spp.	0.2	20	EX								0.2		
Euphorbia serpens	0.1	1	EX								0.1		
Rytidosperma setaceum	0.5	30	GG				0.5						
Sida corrugata	0.2	20	FG					0.2					
Solanum cinereum	0.1	2	SG			0.1							
Bothriochloa macra	0.1	2	GG				0.1						
Solanum nigrum	0.1	2	EX								0.1		

Easting	575737
Northing	6160859
Orientation	77
Plot size	20x20
BAM Attributes 20x50m plot	
Stem classes	
80+	0
50-79	0
30-49	No
20-29	No
10-19	No
5-9	No
<5	No
Hollows	0
Length logs (m)	0
BAM Attributes 1x1 plot (%)	0
Litter (%)	

Date	13/03/2024		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat
Plot Name	R9		# spp	Count	Count	Count	Count	Count	Count	Count	Count	Count
PCT	346 - DNG		13	8	0	0	7	1	0	0	5	0
Species	Cover	Abundance	Sum cover	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum
			61	45.7	0	0	45.5	0.2	0	0	15.3	0
Sida corrugata	0.2	20	FG					0.2				
Rytidosperma erianthum	10	50	GG				10					
Panicum effusum	5	30	GG				5					
Echium plantagineum	5	200	EX								5	
Chondrilla juncea	0.1	1	EX								0.1	
Avena fatua	10	200	EX								10	
Bothriochloa biloba	5	200	GG				5					
Austrostipa scabra	15	300	GG				15					
Chloris truncata	5	50	GG				5					
Cynodon dactylon	5	10	GG				5					
Hypochaeris radicata	0.1	1	EX								0.1	
Eragrostis leptostachya	0.5	40	GG				0.5					
Tribulus terrestris	0.1	2	EX								0.1	

55

Easting	576470
Northing	6159366
Orientation	100
Plot size	20x20
BAM Attributes 20x50m plot	
Stem classes	
80+	0
50-79	0
30-49	No
20-29	No
10-19	No
5-9	No
<5	No
Hollows	0
Length logs (m)	0
BAM Attributes 1x1 plot (%)	0
Litter (%)	0

Date	13/03/2024		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat	55
Plot Name	**R10**		**# spp**	**Count**	Count	Count	Count	Count	Count	Count	**Count**	Count	
PCT	**277 - DNG**		**17**	**11**	0	0	10	1	0	0	**6**	0	
Species	**Cover**	**Abundance**	**Sum cover**	**Sum**	Sum	Sum	Sum	Sum	Sum	Sum	**Sum**	Sum	
			93.5	**78.2**	0	0	78.1	0.1	0	0	**15.3**	0	
Echium plantagineum	5	50	EX								5		
Lepidium africanum	0.1	2	EX								0.1		
Panicum effusum	5	50	GG				5						
Avena fatua	5	50	EX								5		
Chloris ventricosa	20	150	GG				20						
Eragrostis leptostachya	4	40	GG				4						
Rytidosperma setaceum	1	30	GG				1						
Trifolium spp.	5	40	EX								5		
Rytidosperma erianthum	5	80	GG				5						
Cynodon dactylon	25	100	GG				25						
Sonchus oleraceus	0.1	1	EX								0.1		
Dichondra repens	0.1	5	FG					0.1					
Juncus spp.	3	20	GG				3						
Austrostipa setacea	5	50	GG				5						
Bothriochloa macra	10	100	GG				10						
Lomandra filiformis	0.1	1	GG				0.1						
Malva neglecta	0.1	1	EX								0.1		

Easting	576308
Northing	6159797
Orientation	135
Plot size	20x20
BAM Attributes 20x50m plot	
Stem classes	
80+	0
50-79	0
30-49	No
20-29	No
10-19	No
5-9	No
<5	No
Hollows	0
Length logs (m)	0
BAM Attributes 1x1 plot (%)	**0**
Litter (%)	0

Date	13/03/2024		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat
Plot Name	R11		# spp	Count	Count	Count	Count	Count	Count	Count	Count	Count
PCT	76 - Mod		25	18	1	1	12	4	0	0	7	0
Species	Cover	Abundance	Sum cover	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum
			56.8	49	5	0.1	43.5	0.4	0	0	7.8	0
Eucalyptus blakelyi	5	3	TG		5							
Rytidosperma erianthum	15	200	GG				15					
Chloris ventricosa	10	100	GG				10					
Echium plantagineum	5	200	EX								5	
Dysphania pumilio	0.1	10	FG					0.1				
Cynodon dactylon	5	30	GG				5					
Aristida jerichoensis	5	10	GG				5					
Chondrilla juncea	0.1	2	EX								0.1	
Trifolium spp.	2	50	EX								2	
Lomandra filiformis	0.2	2	GG				0.2					
Sida corrugata	0.1	2	FG					0.1				
Solanum cinereum	0.1	1	SG			0.1						
Cucumis myriocarpus	0.1	1	EX								0.1	
Sonchus oleraceus	0.1	2	EX								0.1	
Bothriochloa macra	1	20	GG				1					
Panicum effusum	2	50	GG				2					
Rumex crispus	0.1	2	EX								0.1	
Austrostipa scabra	4	20	GG				4					
Avena fatua	0.4	10	EX								0.4	
Dichelachne crinita	0.5	10	GG				0.5					
Dichondra repens	0.1	10	FG					0.1				
Vittadinia cuneata	0.1	1	FG					0.1				
Eragrostis leptostachya	0.5	5	GG				0.5					
Juncus subsecundus	0.2	1	GG				0.2					
Eragrostis parviflora	0.1	1	GG				0.1					

55

Easting	576196
Northing	6160021
Orientation	235
Plot size	20x20x50
BAM Attributes 20x50m plot	
Stem classes	
80+	0
50-79	0
30-49	Yes
20-29	Yes
10-19	Yes
5-9	No
<5	Yes
Hollows	0
Length logs (m)	44
BAM Attributes 1x1 plot (%)	**39**
Litter (%)	20
	40
	55
	35
	45

Date	14/03/2024		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat	55	Easting	576567
Plot Name	R12		# spp	Count	Count	Count	Count	Count	Count	Count	Count	Count		Northing	6160385
PCT	277 - DNG		15	9	0	0	7	2	0	0	6	1		Orientation	65
Species	Cover	Abundance	Sum cover	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum		Plot size	20x20x50
			74.4	68.1	0	0	67.5	0.6	0	0	6.3	0.1		BAM Attributes 20x50m plot	
Bothriochloa macra	40	400	GG				40							Stem classes	
Avena fatua	1	20	EX								1			80+	0
Echium plantagineum	3	60	EX								3			50-79	0
Sida corrugata	0.1	4	FG					0.1						30-49	0
Chloris ventricosa	5	100	GG				5							20-29	0
Rytidosperma setaceum	5	100	GG				5							10-19	0
Panicum effusum	5	100	GG				5							5-9	0
Trifolium spp.	2	50	EX								2			<5	0
Lomandra filiformis	0.5	3	GG				0.5							Hollows	0
Austrostipa setacea	10	200	GG				10							Length logs (m)	0
Rumex brownii	0.5	3	FG					0.5							
Elymus scaber	2	50	GG				2							BAM Attributes 1x1 plot (%)	0
Chondrilla juncea	0.1	1	EX								0.1			Litter (%)	0
Xanthium spinosum	0.1	1	HT									0.1			0
Medicago polymorpha	0.1	1	EX								0.1				0
															0
															0

Date	14/03/2024		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat	55
Plot Name	R13		# spp	Count	Count	Count	Count	Count	Count	Count	Count	Count	
PCT	76 - DNG		13	9	0	0	8	1	0	0	4	0	
Species	Cover	Abundance	Sum cover	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	
			91.6	70.4	0	0	70.3	0.1	0	0	21.2	0	
Bothriochloa macra	10	200	GG				10						
Avena fatua	1	20	EX								1		
Sida corrugata	0.1	3	FG					0.1					
Juncus subsecundus	0.2	1	GG				0.2						
Rytidosperma erianthum	10	100	GG				10						
Chloris virgata	20	100	EX								20		
Panicum effusum	20	200	GG				20						
Medicago polymorpha	0.1	3	EX								0.1		
Echium plantagineum	0.1	5	EX								0.1		
Austrostipa scabra	20	200	GG				20						
Eragrostis parviflora	5	100	GG				5						
Cynodon dactylon	5	50	GG				5						
Carex appressa	0.1	2	GG				0.1						

Easting	576621
Northing	6160572
Orientation	138
Plot size	20x20x50
BAM Attributes 20x50m plot	
Stem classes	
80+	0
50-79	0
30-49	0
20-29	0
10-19	0
5-9	0
<5	0
Hollows	0
Length logs (m)	0
BAM Attributes 1x1 plot (%)	0
Litter (%)	0
	0
	0
	0
	0

Date	14/03/2024		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat
Plot Name	R14		# spp	Count	Count	Count	Count	Count	Count	Count	Count	Count
PCT	76 - DNG		11	8	0	0	8	0	0	0	3	0
Species	Cover	Abundance	Sum cover	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum
			95.8	95.1	0	0	95.1	0	0	0	0.7	0
Juncus subsecundus	30	50	GG				30					
Panicum effusum	10	100	GG				10					
Cynodon dactylon	15	50	GG				15					
Eragrostis parviflora	10	100	GG				10					
Rytidosperma erianthum	10	200	GG				10					
Sonchus oleraceus	0.1	2	EX								0.1	
Echium plantagineum	0.5	20	EX								0.5	
Chloris truncata	15	100	GG				15					
Eragrostis brownii	5	50	GG				5					
Avena fatua	0.1	5	EX								0.1	
Carex appressa	0.1	2	GG				0.1					

55

Easting	576412
Northing	6160193
Orientation	256
Plot size	20x20x50
BAM Attributes 20x50m plot	
Stem classes	
80+	0
50-79	0
30-49	0
20-29	0
10-19	0
5-9	0
<5	0
Hollows	0
Length logs (m)	0
BAM Attributes 1x1 plot (%)	0
Litter (%)	0
	0
	0
	0
	0

Date	14/03/2024		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat	55	Easting	576165
Plot Name	R15		# spp	Count	Count	Count	Count	Count	Count	Count	Count	Count		Northing	6160541
PCT	277 - Mod		14	10	1	1	6	2	0	0	4	0		Orientation	254
Species	Cover	Abundance	Sum cover	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum		Plot size	20x20x50
			58.2	57.8	15	0.1	42.1	0.6	0	0	0.4	0		BAM Attributes 20x50m plot	
Eucalyptus blakelyi	15	10	TG		15									Stem classes	
Panicum effusum	5	50	GG				5							80+	0
Dysphania pumilio	0.5	50	FG					0.5						50-79	0
Austrostipa scabra	10	100	GG				10							30-49	Y
Chloris truncata	5	100	GG				5							20-29	Y
Rytidosperma setaceum	20	200	GG				20							10-19	Y
Hypochaeris radicata	0.1	2	EX								0.1			5-9	Y
Sonchus oleraceus	0.1	2	EX								0.1			<5	Y
Dichondra repens	0.1	2	FG					0.1						Hollows	0
Medicago polymorpha	0.1	5	EX								0.1			Length logs (m)	39
Lomandra filiformis	0.1	1	GG				0.1								
Rytidosperma pallidum	2	20	GG				2							BAM Attributes 1x1 plot (%)	38
Salsola australis	0.1	2	SG			0.1								Litter (%)	20
Echium plantagineum	0.1	2	EX								0.1				50
															40
															15
															65

Date:	4/12/2018		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat	55
Plot Name	**Q11**		**# spp**	**Count**	Count	Count	Count	Count	Count	Count	**Count**	Count	
PCT	**79 - Mod**		**18**	**13**	2	0	7	4	0	0	**5**	2	
Species	**Cover**	**Abundance**	**Sum cover**	**Sum**	Sum	Sum	Sum	Sum	Sum	Sum	**Sum**	Sum	
			122.3	**112**	34	0	73.4	4.6	0	0	**10.3**	2.1	
Alternanthera denticulata	0.1	2	FG					0.1					
Aristida behriana	0.1	1	GG				0.1						
*Bromus diandrus**	2	20	HT									2	
Carex appressa	55	60	GG				55						
Chloris truncata	3	40	GG				3						
*Cirsium vulgare**	0.2	2	EX								0.2		
Cynodon dactylon	4	40	GG				4						
Dichondra repens	4	200	FG					4					
Enteropogon acicularis	1	10	GG				1						
Eucalyptus camaldulensis	30	5	TG		30								
Eucalyptus microcarpa	4	2	TG		4								
*Hordeum vulgare**	5	100	EX								5		
Juncus spp. (grazed)	0.3	1	GG				0.3						
*Lolium perenne**	3	60	EX								3		
*Lycium ferocissimum**	0.1	1	HT									0.1	
Microlaena stipoides var. stipoides	10	100	GG				10						
Oxalis perennans	0.3	20	FG					0.3					
Rumex brownii	0.2	2	FG					0.2					

Easting	576289
Northing	6160764
Orientation	210
Plot size	20x20x50
BAM Attributes 20x50m plot	
Stem classes	
80+	1
50-79	1
30-49	Yes
20-29	Yes
10-19	Yes
5-9	Yes
<5	Yes
Hollows	0
Length logs (m)	48
BAM Attributes 1x1 plot (%)	
Litter (%)	34
Bare Ground (%)	40
Vegetation (%)	26
Rock (%)	0

Date:	4/12/2018		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat	55
Plot Name	**Q12**		**# spp**	**Count**	Count	Count	Count	Count	Count	Count	**Count**	Count	
PCT	**79 - Mod**		**19**	**12**	1	0	7	4	0	0	**7**	2	
Species	**Cover**	**Abundance**	**Sum cover**	**Sum**	Sum	Sum	Sum	Sum	Sum	Sum	**Sum**	Sum	
			118.6	**105.2**	45	0	59.2	1	0	0	**13.4**	3.5	
Alternanthera denticulata	0.1	1	FG					0.1					
*Bromus diandrus**	3	50	HT									3	
Carex appressa	45	100	GG				45						
Chloris truncata	5	60	GG				5						
*Cirsium vulgare**	0.3	7	EX								0.3		
Cynodon dactylon	3	40	GG				3						
Dichondra repens	0.4	20	FG					0.4					
Enteropogon acicularis	3	40	GG				3						
Eucalyptus camaldulensis	45	6	TG		45								
*Hordeum vulgare**	4	80	EX								4		
Juncus usitatus	0.1	2	GG				0.1						
*Lactuca serriola**	0.3	10	EX								0.3		
*Lolium perenne**	5	100	EX								5		
*Lycium ferocissimum**	0.5	2	HT									0.5	
Microlaena stipoides var. stipoides	3	50	GG				3						
Oxalis perennans	0.2	3	FG					0.2					
Rumex brownii	0.3	10	FG					0.3					
Rytidosperma caespitosum	0.1	2	GG				0.1						
*Sonchus oleraceus**	0.3	3	EX								0.3		

Easting	576137
Northing	6160789
Orientation	210
Plot size	20x20
BAM Attributes 20x50m plot	
Stem classes	
80+	4
50-79	3
30-49	Yes
20-29	Yes
10-19	Yes
5-9	Yes
<5	Yes
Hollows	2
Length logs (m)	154
BAM Attributes 1x1 plot (%)	
Litter (%)	78
Bare Ground (%)	5
Vegetation (%)	17
Rock (%)	0

Date:	4/12/2018		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat
Plot Name	**Q13**		**# spp**	**Count**	Count	Count	Count	Count	Count	Count	**Count**	Count
PCT	**277 - Mod**		**24**	**15**	1	0	10	4	0	0	**9**	0
Species	**Cover**	**Abundance**	**Sum cover**	**Sum**	Sum	Sum	Sum	Sum	Sum	Sum	**Sum**	Sum
			49.4	**44.4**	0.3	0	43.4	0.7	0	0	**5**	0
Anthosachne scabra	1	20	GG				1					
Aristida behriana	3	60	GG				3					
Austrostipa scabra subsp. scabra	0.2	5	GG				0.2					
Austrostipa setacea	6	100	GG				6					
*Avena barbata**	2	60	EX								2	
Bothriochloa macra	3	100	GG				3					
*Bromus molliformis**	1	20	EX								1	
Chloris truncata	6	200	GG				6					
*Echium plantagineum**	0.4	40	EX								0.4	
Enteropogon acicularis	4	100	GG				4					
*Erodium brachycarpum**	0.1	2	EX								0.1	
Erodium crinitum	0.1	2	FG					0.1				
Eucalyptus dwyeri	0.3	1	TG		0.3							
Euphorbia drummondii	0.2	15	FG					0.2				
*Hypochaeris radicata**	0.1	2	EX								0.1	
Juncus usitatus	0.2	2	GG				0.2					
Lomandra multiflora subsp. multiflora	5	100	GG				5					
*Polygonum aviculare**	0.1	1	EX								0.1	
Rumex brownii	0.2	4	FG					0.2				
Rytidosperma auriculatum	15	500	GG				15					
Sida corrugata	0.2	20	FG					0.2				
*Trifolium angustifolium**	0.1	1	EX								0.1	
*Trifolium spp.**	0.2	10	EX								0.2	
*Vulpia myuros**	1	20	EX								1	

Easting	576713
Northing	6160608
Orientation	180
Plot size	20x20x50
Attributes 20x50m plot	
Stem classes	
80+	0
50-79	0
30-49	No
20-29	Yes
10-19	No
5-9	No
<5	No
Hollows	0
Length logs (m)	0
Attributes 1x1 plot (%)	
Litter (%)	2
Bare Ground (%)	80
Vegetation (%)	16
Rock (%)	2

Date:	4/12/2018		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat
Plot Name	**Q14**		**# spp**	**Count**	Count	Count	Count	Count	Count	Count	**Count**	Count
PCT	**277 - DNG**		**23**	**16**	0	0	9	7	0	0	**7**	0
Species	**Cover**	**Abundance**	**Sum cover**	**Sum**	Sum	Sum	Sum	Sum	Sum	Sum	**Sum**	Sum
			56.4	**40.4**	0	0	38.7	1.7	0	0	**16**	0
Alternanthera nana	0.1	2	FG					0.1				
Anthosachne scabra	0.2	10	GG				0.2					
Aristida behriana	0.1	3	GG				0.1					
Austrostipa scabra subsp. scabra	35	500	GG				35					
Austrostipa setacea	0.2	6	GG				0.2					
*Avena barbata**	15	200	EX								15	
Bothriochloa macra	0.7	20	GG				0.7					
*Bromus molliformis**	0.2	6	EX								0.2	
Chloris truncata	1	35	GG				1					
*Cucumis myriocarpus subsp. leptodermis**	0.1	1	EX								0.1	
Dysphania pumilio	0.1	3	FG					0.1				
*Echium plantagineum**	0.2	10	EX								0.2	
Enteropogon acicularis	0.1	2	GG				0.1					
*Erodium brachycarpum**	0.1	1	EX								0.1	
Erodium crinitum	0.2	30	FG					0.2				
Euphorbia drummondii	0.5	20	FG					0.5				
*Hypochaeris radicata**	0.3	15	EX								0.3	
Lomandra multiflora subsp. multiflora	0.4	15	GG				0.4					
*Polygonum aviculare**	0.1	2	EX								0.1	
Rumex brownii	0.4	8	FG					0.4				
Rytidosperma auriculatum	1	100	GG				1					
Sida corrugata	0.3	15	FG					0.3				
Vittadinia gracilis	0.1	2	FG					0.1				

Easting	576623
Northing	6160426
Orientation	270
Plot size	20x20x50
Attributes 20x50m plot	
Stem classes	
80+	0
50-79	0
30-49	No
20-29	No
10-19	No
5-9	No
<5	No
Hollows	0
Length logs (m)	0
Attributes 1x1 plot (%)	
Litter (%)	2
Bare Ground (%)	81
Vegetation (%)	17
Rock (%)	0

Date:	4/12/2018		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat
Plot Name	**Q15**		**# spp**	**Count**	Count	Count	Count	Count	Count	Count	**Count**	Count
PCT	**277 - DNG**		**21**	**16**	0	0	8	7	1	0	**5**	0
Species	**Cover**	**Abundance**	**Sum cover**	**Sum**	Sum	Sum	Sum	Sum	Sum	Sum	**Sum**	Sum
			46.8	**21.3**	0	0	8.9	12.1	0.3	0	**25.5**	0
Aira spp.	20	150	EX								20	
Aristida behriana	0.5	20	GG				0.5					
Austrostipa scabra subsp. scabra	1	30	GG				1					
Austrostipa setacea	0.4	15	GG				0.4					
*Avena barbata**	5	200	EX								5	
Bothriochloa macra	1	30	GG				1					
Cheilanthes sieberi subsp. sieberi	0.3	10	EG						0.3			
Chloris truncata	5	70	GG				5					
Dichondra repens	0.2	3	FG					0.2				
*Echium plantagineum**	0.3	6	EX								0.3	
Enteropogon acicularis	0.6	20	GG				0.6					
Erodium crinitum	0.2	15	FG					0.2				
Euphorbia drummondii	0.3	10	FG					0.3				
Gonocarpus elatus	10	80	FG					10				
*Hypochaeris radicata**	0.1	1	EX								0.1	
Lomandra multiflora subsp. multiflora	0.1	2	GG				0.1					
Oxalis perennans	1	50	FG					1				
Rytidosperma auriculatum	0.3	10	GG				0.3					
Sida corrugata	0.2	10	FG					0.2				
Tricoryne elatior	0.2	10	FG					0.2				
*Vulpia myuros**	0.1	1	EX								0.1	

Easting	576546
Northing	6160227
Orientation	200
Plot size	20x20x50
Attributes 20x50m plot	
Stem classes	
80+	0
50-79	0
30-49	No
20-29	No
10-19	No
5-9	No
<5	No
Hollows	0
Length logs (m)	0
Attributes 1x1 plot (%)	
Litter (%)	0
Bare Ground (%)	72
Vegetation (%)	21
Rock (%)	7

Date:	4/12/2018		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat	55
Plot Name	**Q15**		**# spp**	**Count**	Count	Count	Count	Count	Count	Count	**Count**	Count	
PCT	**76 - DNG**		**15**	**11**	0	0	5	5	1	0	**4**	0	
Species	**Cover**	**Abundance**	**Sum cover**	**Sum**	Sum	Sum	Sum	Sum	Sum	Sum	**Sum**	Sum	
			44.5	**42.8**	0	0	41.6	1.1	0.1	0	**1.7**	0	
Austrostipa scabra subsp. scabra	0.2	4	GG				0.2						
Bothriochloa macra	0.4	10	GG				0.4						
*Bromus molliformis**	0.4	20	EX								0.4		
Cheilanthes sieberi subsp. sieberi	0.1	1	EG						0.1				
Chloris truncata	1	80	GG				1						
Dichondra repens	0.1	5	FG					0.1					
*Echium plantagineum**	0.1	1	EX								0.1		
Enteropogon acicularis	20	200	GG				20						
Erodium crinitum	0.2	10	FG					0.2					
Euphorbia drummondii	0.5	40	FG					0.5					
*Lolium perenne**	0.9	20	EX								0.9		
Rumex brownii	0.1	1	FG					0.1					
Rytidosperma auriculatum	20	200	GG				20						
Sida corrugata	0.2	8	FG					0.2					
*Vulpia myuros**	0.3	10	EX								0.3		

Easting	576098
Northing	6160021
Orientation	90
Plot size	20x20x50
BAM Attributes 20x50m plot	
Stem classes	
80+	0
50-79	0
30-49	No
20-29	No
10-19	No
5-9	No
<5	No
Hollows	0
Length logs (m)	0
BAM Attributes 1x1 plot (%)	
Litter (%)	11
Bare Ground (%)	58
Vegetation (%)	31
Rock (%)	0

Date:	4/12/2018		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat
Plot Name	Q51		**# spp**	**Count**	Count	Count	Count	Count	Count	Count	**Count**	Count
PCT	**277 - Mod**		**15**	**12**	1	0	7	4	0	0	**3**	0
Species	**Cover**	**Abundance**	**Sum cover**	**Sum**	Sum	Sum	Sum	Sum	Sum	Sum	**Sum**	Sum
			49.6	**46.5**	25	0	21	0.5	0	0	**3.1**	0
Alternanthera nana	0.1	1	FG					0.1				
Aristida jerichoensis var. jerichoensis	1	20	GG				1					
Austrostipa scabra subsp. scabra	5	100	GG				5					
Austrostipa setacea	5	100	GG				5					
*Avena barbata**	1	20	EX								1	
Chloris truncata	2	40	GG				2					
Enteropogon acicularis	2	50	GG				2					
*Erodium brachycarpum**	0.1	2	EX								0.1	
Erodium crinitum	0.2	4	FG					0.2				
Eucalyptus dwyeri	25	2	TG		25							
Euphorbia drummondii	0.1	2	FG					0.1				
*Lolium perenne**	2	80	EX								2	
Lomandra multiflora subsp. multiflora	3	40	GG				3					
Rytidosperma auriculatum	3	100	GG				3					
Sida corrugata	0.1	1	FG					0.1				

Easting	576777
Northing	6160338
Orientation	345
Plot size	20 x 20
Attributes 20x50m plot	
Stem classes	
80+	0
50-79	1
30-49	No
20-29	Yes
10-19	Yes
5-9	No
<5	No
Hollows	0
Length logs (m)	0
Attributes 1x1 plot (%)	
Litter (%)	20
Bare Ground (%)	64
Vegetation (%)	14
Rock (%)	2

Date:	19.10.2023		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat	55	Easting	576388
Plot ID:	N24		# spp	Count	Count	Count	Count	Count	Count	Count	Count	Count		Northing	6160450
PCT	**277 - DNG**		19	5	1	0	3	1	0	0	8	0		Orientatio	288
Species	**Cover**	**Abundance**	Sum cover	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum		Plot size	20 x 50m
			143.7	9.3	4	0	5.2	0.1	0	0	134.4	0		ributes 20x50m plot	
Eucalyptus dwyeri	4		TG		4									Stem classes	
Avena fatua	49	N/A	EX								49			80+	1
Vulpia bromoides	60	N/A	EX								60			50-79	0
Lolium perenne	22	N/A	EX								22			30-49	No
Echium plantagineum	3		EX								3			20-29	No
Austrostipa scabra	5		GG				5							10-19	No
Vittadinia cuneata	0.1	2	FG					0.1						5-9	No
Rytidosperma erianthum	0.1	3	GG				0.1							<5	No
Taraxacum officinale	0.1	3	EX								0.1			Hollows	0
Arctotheca calendula	0.1	2	EX								0.1			ngth logs (	0
Moraea setifolia	0.1	2	EX								0.1				
Chloris truncata	0.1	2	GG				0.1							ributes 1x	20.8
Bromus hordeaceus	0.1	2	EX								0.1			Litter (%)	23
															64
															12
															1
															4

Date:	19.10.2023		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat	55	Easting	575110
Plot ID:	N25		# spp	Count	Count	Count	Count	Count	Count	Count	Count	Count		Northing	6157370
PCT	**266 - Mod**		20	7	1	1	2	3	0	0	5	0		Orientatio	61
Species	**Cover**	**Abundance**	Sum cover	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum		Plot size	20 x 50m
			164.6	79.4	56	0.1	23	0.3	0	0	85.2	0		ibutes 20x50m plot	
Eucalyptus microcarpa	56	N/A	TG		56									Stem classes	
Austrostipa scabra	6	N/A	GG				6							80+	3
Lolium perenne	33	N/A	EX								33			50-79	1
Hordeum leporinum	50	N/A	EX								50			30-49	No
Echium plantagineum	2		EX								2			20-29	No
Sida corrugata	0.1	2	FG					0.1						10-19	No
Rytidosperma erianthum	17	N/A	GG				17							5-9	No
Polygonum aviculare	0.1	2	EX								0.1			<5	No
Dichondra repens	0.1	1	FG					0.1						Hollows	0
Lepidium africanum	0.1	2	EX								0.1			ngth logs (	4
Sclerolaena muricata var. semiglabra	0.1	2	SG			0.1									
Einadia nutans subsp. linifolia	0.1	1	FG					0.1						ributes 1x1	44.8
														Litter (%)	7
															79
															4
															81
															53

Date:	19.10.2023		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat	55	Easting	576134
Plot ID:	N26		# spp	Count	Count	Count	Count	Count	Count	Count	Count	Count		Northing	6160114
PCT	**266 - Mod**		18	3	0	0	1	2	0	0	7	0		Orientatio	208
Species	**Cover**	**Abundance**	Sum cover	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum		Plot size	20 x 50m
			124.4	1.2	0	0	1	0.2	0	0	123.2	0		ributes 20x50m plot	
Juncus subsecundus	1		GG				1							Stem classes	
Festuca rubra	2		EX								2			80+	0
Moraea setifolia	0.1	2	EX								0.1			50-79	0
Lolium perenne	70	N/A	EX								70			30-49	No
Echium plantagineum	0.1	3	EX								0.1			20-29	No
Trifolium subterraneum	40	N/A	EX								40			10-19	No
Hordeum marinum	1		EX								1			5-9	No
Bromus hordeaceus	10	N/A	EX								10			<5	No
Dichondra repens	0.1	1	FG					0.1						Hollows	0
Sida corrugata	0.1	3	FG					0.1						ngth logs (	35
														ributes 1x1	79
														Litter (%)	96
															94
															73
															44
															88

Date:	19.10.2023		Covers	Native	Trees	Shrubs	Grass	Forb	Fern	Other	Exotic	HighThreat	55	Easting	575664
Plot ID:	N27		# spp	Count	Count	Count	Count	Count	Count	Count	Count	Count		Northing	6159589
PCT	**76 - DNG**		18	4	1	0	2	1	0	0	6	0		Orientation	154
Species	**Cover**	**Abundance**	Sum cover	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum	Sum		Plot size	20 x 50m
			112.3	14.1	4	0	10	0.1	0	0	98.2	0		BAM Attributes 20x50m plot	
Eucalyptus dwyeri	4		TG		4									Stem classes	
Lolium perenne	41	N/A	EX								41			80+	0
Echium plantagineum	32	N/A	EX								32			50-79	0
Avena fatua	22	N/A	EX								22			30-49	No
Sida corrugata	0.1	2	FG					0.1						20-29	Yes
Bromus hordeaceus	3		EX								3			10-19	No
Rytidosperma erianthum	9	N/A	GG				9							5-9	No
Lomandra filiformis	1		GG				1							<5	No
Trifolium subterraneum	0.1	1	EX								0.1			Hollows	0
Moraea setifolia	0.1	2	EX								0.1			Length logs (m)	1.5
														BAM Attributes 1x1 plot (%)	66
														Litter (%)	52
															84
															96
															67
															31

Appendix B

Indicative species for planting for each PCT

Table B.1 Indicative species for planting for each PCT

PCTID	PCT Name	Upper Stratum Species List	Mid Stratum Species List	Ground Stratum Species List
76	Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions	*Eucalyptus microcarpa* *Callitris glaucophylla* *Allocasuarina luehmannii*	*Dodonaea viscosa subsp. cuneata* *Acacia buxifolia subsp. buxifolia* *Bursaria spinosa subsp. spinosa* *Acaciaoswaldii* *Acacia pycnantha* *Acacia hakeoides* *Acacia brachybotrya* *Santalum acuminatum* *Acacia homalophylla* *Templetonia stenophylla* *Exocarpos aphyllus*	*Austrodanthonia caespitosa* *Chloris truncata* *Sida corrugata* *Austrostipa scabra subsp. falcata* *Wahlenbergia gracilis* *Einadia nutans subsp. nutans* *Paspalidium constrictum* *Themeda australis* *Austrostipa aristiglumis* *Aristida behriana* *Elymus scaber var. scaber* *Austrodanthonia setacea* *Carex inversa* *Poa sieberiana* *Vittadinia gracilis* *Dianella porracea* *Salsola tragus subsp. tragus* *Oxalis perennans* *Atriplex semibaccata* *Chamaesyce drummondii* *Lomandra filiformissubsp. coriacea* *Asperula conferta* *Convolvulus erubescens* *Rhodanthe corymbiflora* *Austrostipa bigeniculata* *Enchylaenatomentosa* *Leiocarpa panaetioides* *Podolepis jaceoides* *Atriplex semibaccat*
79	River Red Gum shrub/grass riparian tall woodland or open forest wetland mainly in the upper slopes sub-region of the NSW South Western Slopes Bioregion and western South Eastern Highlands Bioregion	*Eucalyptus camaldulensis* *Casuarina cunninghamiana* *Eucalyptus blakelyi Eucalyptus melliodora;*	*Callistemon sieberi* *Acacia dealbata* *Acacia implexa* *Bursaria spinosa subsp. lasiophylla* *Acacia vestita* *Acacia melanoxylon* *Acacia buxifolia subsp. buxifolia* *Leptospermum continentale* *Leptospermum obovatum*	*Carex appressa* *Microlaena stipoides var. stipoides* *Rumex brownii* *Elymus scaber var. scaber* *Bothriochloa macra* *Austrodanthonia auriculata* *Austrodanthonia racemosa* *Austrodanthonia fulva* *Lythrum hyssopifolia*

PCTID	PCT Name	Upper Stratum Species List	Mid Stratum Species List	Ground Stratum Species List
			Leptospermum brevipes *Kunzea ericoides* *Typha domingensis* *Melicytus dentatus* *Lomatia myricoides* *Dodonaea viscosa subsp. spatulata* *Exocarpos cupressiformis* *Acacia verniciflua* *Chondrilla juncea* *Pomaderris phylicifolia subsp. phylicifolia*	*Eleocharis acuta* *Eleocharis pusilla* *Carex inversa* *Cyperus eragrostis* *Pratia pedunculata* *Gratiola peruviana* *Arthropodium* *minus* *Hypericum gramineum* *Wahlenbergia stricta subsp. stricta* *Acaena echinata* *Euchiton involucratus* *Scutellaria humilis* *Senecio bathurstianus* *Persicaria hydropiper* *Einadia nutans subsp. nutans* *Haloragis heterophylla* *Opercularia aspera* *Themeda australis* *Bothriochloa macra* *Cynodon dactylon* *Lachnagrostis filiformis* *Echinopogon ovatus* *Dichelachne crinita* *Austrostipa blackii* *Austrostipa bigeniculata* *Aristida ramosa* *Austrostipa scabra subsp. scabra* *Eragrostis lacunaria* *Panicum simile* *Juncus usitatus* *Juncus amabilis* *Juncus aridicola* *Juncus psammophilus* *Juncus psammophilus* *Desmodium varians*

PCTID	PCT Name	Upper Stratum Species List	Mid Stratum Species List	Ground Stratum Species List
276	Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion	*Eucalyptus melliodora* *Eucalyptus blakelyi* *Eucalyptus bridgesiana*	*Acacia decora* *Maireana microphylla* *Acacia deanei subsp. deanei* *Acacia implexa* *Acacia montana* *Acacia pycnantha* *Acacia paradoxa*	*Bothriochloa macra* *Austrostipa bigeniculata* *Vittadinia cuneata* *Elymus scaber var. scaber* *Chloris truncata* *Convolvulus graminetinus* *Sida corrugata* *Goodenia pinnatifida* *Austrodanthonia auriculata* *Austrodanthonia setacea* *Austrostipa scabra subsp. falcata* *Calotis cuneata var. cuneata* *Carex inversa* *Oxalis exilis* *Rumex brownii*
277	Blakely's Red Gum - Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion	*Eucalyptus blakelyi* *Eucalyptus melliodora* *Eucalyptus bridgesiana* *Eucalyptus microcarpa* *Eucalyptus goniocalyx*	*Acacia dealbata* *Hibbertia obtusifolia*	*Themeda australis* *Poa sieberiana* *Bothriochloa macra* *Aristida ramosa* *Panicum effusum* *Austrostipa verticillata* *Austrostipa scabra subsp. scabra* *Austrostipa bigeniculata* *Austrodanthonia auriculata* *Austrodanthonia setacea* *Cymbopogon refractus* *Elymus scaber var. scaber* *Juncus usitatus* *Lomandra filiformis subsp. coriacea* *Alternanthera nana* *Geranium solanderi var. solanderi* *Chrysocephalum apiculatum* *Sida corrugata* *Carex inversa* *Wahlenbergia luteola* *Chloris truncata* *Cheilanthes sieberi subsp. sieberi* *Vittadinia cuneata* *Lomandra filiformis subsp. coriacea*

PCTID	PCT Name	Upper Stratum Species List	Mid Stratum Species List	Ground Stratum Species List
				Enteropogon acicularis *Convolvulus graminetinus* *Bulbine bulbosa* *Dianella revoluta var. revoluta* *Calotis scabiosifolia var. scabiosifolia*
346	White Box - Blakely's Red Gum - White Cypress Pine shrubby woodland on metamorphic hills in the Wagga Wagga - Cootamundra region of the NSW South Western Slopes Bioregion	*Eucalyptus albens* *Eucalyptus blakelyi* *Callitris glaucophylla* *Eucalyptus microcarpa* *Eucalyptus dwyeri* *Callitris endlicheri*	*Dillwynia sericea* *Acacia decora* *Acacia pycnantha* *Acacia verniciflua* *Acacia paradoxa* *Brachyloma daphnoides subsp. daphnoides* *Melichrus urceolatus* *Acacia implexa* *Allocasuarina verticillata* *Pultenaea foliolosa*	*Gonocarpus elatus* *Xerochrysum viscosum* *Cheilanthes sieberi subsp. sieberi* *Austrostipa densiflora* *Hypericum gramineum* *Stypandra glauca* *Chrysocephalum semipapposum* *Gonocarpus tetragynus* *Dianella revoluta var. revoluta* *Dianella longifolia* *Austrodanthonia eriantha* *Digitaria divaricatissima* *Elymus scaber var. scaber* *Einadia nutans subsp. nutans* *Erodium crinitum* *Hydrocotyle laxiflora* *Lomandra filiformis subsp. coriacea* *Oxalis perennans* *Panicum effusum* *Poa sieberiana* *Austrostipa scabra subsp. scabra* *Wahlenbergia stricta subsp. stricta* *Wahlenbergia communis*