

Safety Improvement Work between Wagga Wagga and Buronga on Sturt Highway (HW14)

Biodiversity Assessment Report

Transport for NSW | June 2022



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Prepared by EnviroKey Pty. Ltd

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Approval and authorisation

Title	Safety Improvement Work between Wagga Wagga and Buronga on Sturt Highway (HW14) Biodiversity assessment report
Accepted on behalf of Transport by:	Jesse Baaner Project Engineer
Signed:	
Dated:	

Executive summary

Transport for NSW (Transport) propose to carry out safety improvement work on the Sturt Highway (HW14) between Wagga Wagga and Buronga. The project objective is to reduce road trauma and aligns with the governments 'Towards Zero' commitment under the NSW Road Safety Plan 2021. The NSW Road Safety Plan has a priority target to reduce road fatalities by at least 30 per cent from 2008–2010 levels by 2021. It aims to continue a downward trend in road trauma to ultimately achieve zero fatal and serious injuries on NSW roads by 2056.

The Route Safety Review (RSR) has identified the primary crash types contributing to road trauma on the Sturt Highway HW14. The RSR identified key roadside infrastructure and line marking safety improvements along this 550-kilometre section of the Sturt Highway that would improve the safety of the road and reduce the likelihood and severity of run off road type incidents.

EnviroKey were engaged by Transport to prepare a Biodiversity Assessment Report (BAR) that would form part of a Project Review of Environmental Factors (REF) to be assessed under Division 5.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act).

The key impact from the proposal is the direct removal of up to 89.21 hectares of native vegetation and up to 343 hollow-bearing trees. Temporary impacts are also likely to about 9.02 hectares of native vegetation, cleared land and highly disturbed portions of the road reserve.

Given the length of the proposal, the study area is highly variable and traverses three bioregions, and dozens of Mitchell landscapes. Combined with portions of the proposal occurring within highly modified agricultural landscapes, the plant community types (PCT) are also extensive.

Twenty-nine PCT were identified during field surveys as well as native tree plantings and areas of existing formation/highly disturbed/cleared land dominated by exotic flora. The 29 PCT are summarised in Table 1-1.

Table 1-1: Plant community types occurring within the road reserve along the length of the proposal

PCT ID	Plant community name	Fauna habitat	Condition	Area (ha)
2	River Red Gum - sedge dominated very tall open forest	Woodland	Low	1.9
2	River Red Gum - sedge dominated very tall open forest	Woodland	Mod-good	73.3
11	River Red Gum - Lignum very tall open forest or woodland wetland	Woodland	Mod-good	5.0
13	Black Box - Lignum woodland wetland	Woodland	Low	8.4
13	Black Box - Lignum woodland wetland	Woodland	Mod-good	205.8
15	Black Box open woodland wetland	Woodland	Low	3.7
15	Black Box open woodland wetland	Woodland	Mod-good	62.4
19	Cypress Pine woodland of source-bordering dunes	Woodland	Mod-good	6.9
23	Yarran tall open shrubland	Shrubland	Mod-good	31.7
23	Yarran tall open shrubland	Shrubland	Low	2.7
26	Weeping Myall open woodland	Woodland	Low	20.1

PCT ID	Plant community name	Fauna habitat	Condition	Area (ha)
26	Weeping Myall open woodland	Woodland	Mod-good	97.5
28	White Cypress Pine open woodland	Woodland	Low	1.2
28	White Cypress Pine open woodland	Woodland	Mod-good	15.2
45	Plains Grass Grassland	Native Grassland	Mod-good	147.6
45	Plains Grass Grassland	Native Grassland	Low	1.8
46	Curly Windmill Grass - speargrass - wallaby grass grassland	Native Grassland	Low	13.9
46	Curly Windmill Grass - speargrass - wallaby grass grassland	Native Grassland	Mod-good	361.4
58	Black Oak - Western Rosewood open woodland	Woodland	Low	3.2
58	Black Oak - Western Rosewood open woodland	Woodland	Mod-good	35.3
74	Yellow Box - River Red Gum tall grassy riverine woodland	Woodland	Low	0.3
74	Yellow Box - River Red Gum tall grassy riverine woodland	Woodland	Mod-good	59.4
75	Yellow Box - White Cypress Pine grassy woodland	Woodland	Mod-good	9.0
76	Western Grey Box tall grassy woodland	Woodland	Mod-good	46.9
76	Western Grey Box tall grassy woodland	Woodland	Low	1.4
80	Western Grey Box - White Cypress Pine tall woodland	Woodland	Mod-good	88.3
80	Western Grey Box - White Cypress Pine tall woodland	Woodland	Low	0.5
139	Prickly Wattle tall open shrubland	Shrubland	Low	0.9
139	Prickly Wattle tall open shrubland	Shrubland	Mod-good	8.5
153	Black Bluebush low open shrubland	Shrubland	Low	7.2
153	Black Bluebush low open shrubland	Shrubland	Mod-good	45.2
157	Bladder Saltbush shrubland	Shrubland	Mod-good	48.5
159	Old Man Saltbush shrubland	Shrubland	Mod-good	34.6
160	Nitre Goosefoot shrubland wetland	Shrubland	Mod-good	201.0
163	Dillon Bush shrubland	Shrubland	Mod-good	80.9
164	Cotton Bush open shrubland	Shrubland	Mod-good	131.1

PCT ID	Plant community name	Fauna habitat	Condition	Area (ha)
170	Chenopod sandplain mallee woodland/shrubland	Woodland	Low	48.3
170	Chenopod sandplain mallee woodland/shrubland	Woodland	Mod-good	425.3
171	Spinifex linear dune mallee	Woodland	Low	3.5
171	Spinifex linear dune mallee	Woodland	Mod-good	86.7
216	Black Roly Poly low open shrubland	Shrubland	Mod-good	45.8
236	Derived Giant Redburr low shrubland	Shrubland	Low	9.7
237	Riverine Western Grey Box grassy woodland	Woodland	Mod-good	38.6
237	Riverine Western Grey Box grassy woodland	Woodland	Low	4.5
267	White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland	Woodland	Mod-good	8.6
277	Blakely's Red Gum - Yellow Box grassy tall woodland	Woodland	Mod-good	15.7
0	Cleared Land	Cleared Land		669.3
0	Native Tree Planting	Native Tree Planting		45.7
Total				3,264.4

Five threatened ecological communities (TEC) were recorded. These being:

- Sandhill Pine Woodland (BC Act)
- Acacia melvillei Shrubland (BC Act)
- Myall Woodland (BC Act & EPBC Act)
- Box-gum Woodland (BC Act & EPBC Act)
- Inland Grey Box Woodland (BC Act & EPBC Act)

During the field surveys, 12 threatened species and one migratory species were recorded. These being:

- Superb Parrot (listed as vulnerable under the BC Act and EPBC Act)
- Square-tailed Kite (listed as vulnerable under the BC Act)
- Turquoise Parrot ((listed as vulnerable under the BC Act)
- Little Eagle (listed as vulnerable under the BC Act)
- Grey-crowned Babbler (listed as vulnerable under the BC Act)
- Koala (listed as vulnerable under the BC Act and EPBC Act)
- Regent Parrot (listed as endangered under the BC Act and vulnerable under the EPBC Act)
- Rufous Fieldwren (listed as vulnerable under the BC Act)
- Varied Sitella (listed as vulnerable under the BC Act)
- White-fronted Chat (listed as vulnerable under the BC Act)
- Bitter Quandong (listed as endangered under the BC Act)
- Pine Donkey Orchid (listed as vulnerable under the BC Act)
- Eastern Great Egret (listed as migratory under the EPBC Act)

For those threatened and migratory biota that had potential to occur within the proposal area but went undetected during the field survey, further analysis by detailed habitat assessment was conducted. This found that 69 threatened and 5 migratory biota have a moderate to high potential to occur within the study area. The fauna species detected during field surveys are typical of those occurring in similar habitats across the locality.

Targeted surveys for two threatened orchid species within the Sandhill Pine Woodland TEC confirmed the presence of Pine Donkey orchid (listed as vulnerable under the BC Act) in areas of PCT 19 west of Narrandera. The field survey identified a population of three plants within the proposed work area. Without modification of the proposal, it was *'likely'* to have a significant impact. However, the proposal was modified by Transport to exclude any proposed work within this population. Given this, this assessment has concluded that the proposal is *'unlikely'* to have a significant effect on remaining listed threatened flora and fauna species, communities, and their habitats in accordance with the BC Act. Additional assessment has also determined that the proposal is *'unlikely'* to have a significant effect on any *Environment Protection and Biodiversity Conservation Act* listed threatened and migratory biota and their habitats or other matters of national environmental significance. Therefore, a species impact statement is not required.

A series of mitigation measures are proposed that have been developed with specific regard to the proposal and the nationally threatened Superb Parrot and other hollow-dependant fauna, and the population of Pine Donkey Orchid using the Transport *Biodiversity Guidelines: Protecting and Managing Biodiversity on Transport projects* and site-specific safeguards to minimise potential impact to biodiversity.

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Glossary of terms

Definitions	
Biodiversity offsets	Management actions that are undertaken to achieve a gain in biodiversity values on areas of land in order to compensate for losses to biodiversity values from the impacts of proposal (OEH 2017).
Construction footprint	The area to be directly impacted by the proposal during construction activities. Analogous with subject land (see definition for subject land).
Cumulative impact	The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Refer to Clause 228(2) of the EP&A Regulation 2000 for cumulative impact assessment requirements.
Direct impact	Direct impacts on biodiversity values include those related to clearing native vegetation and threatened species habitat, and impacts on biodiversity values prescribed by the Biodiversity Conservation Regulation 2017 (the BC Regulation)(BAM 2017)
Habitat	An area or areas occupied, or periodically or occasionally occupied, by a species, population or ecological community, including any biotic or abiotic component.
Indirect impact	Indirect impacts include but not limited to: (a) indirect impacts on adjacent vegetation and habitat during construction (b) indirect impacts on adjacent vegetation and habitat during operation I impacts on adjacent vegetation and habitat arising from a change in land-use patterns (BAM 2017)
Local population	The population that occurs in the study area. In cases where multiple populations occur in the study area or a population occupies part of the study area, impacts on each subpopulation must be assessed separately (OEH 2017).
MNES	A matter of national environmental significance (MNES) protected by a provision of Part 3 of the EPBC Act
Mitchell landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000 (OEH 2014).
Mitigation	Action to reduce the severity of an impact (OEH 2014).
Mitigation measure	Any measure that facilitates the safe movement of wildlife and/or prevents wildlife mortality or injury.
Native vegetation	(a) trees (including any sapling or shrub or any scrub), (b) understorey <i>plants</i> , I groundcover (being any type of herbaceous vegetation), (d) <i>plants</i> occurring in a wetland. A <i>plant</i> is native to New South Wales if it was established in New South Wales before European settlement (BC Act).

Definitions	
OEH BAM Credit Calculator (BCC)	An online application of the Biodiversity Assessment Method (BAM). The calculator uses the rules and calculations outlined in the BAM, and allows the user to apply the BAM at a site and observe the results of the assessment.
Operational footprint	The area that will be subject to ongoing operational impacts from the proposal. This includes the road, surrounding safety verges and infrastructure, fauna connectivity structures and maintenance access tracks and compounds.
Population	A group of organisms, all of the same species, occupying a particular area (BAM 2017).
Proposal footprint	The area of land that is directly impacted on by the proposal that is being assessed under the EP&A Act, including access roads, and areas used to store construction materials (OEH 2014). It includes the construction and operational areas for the proposal.
Study area	The area directly affected by the proposal and any additional areas likely to be affected by the proposal, either directly or indirectly (OEH 2014).
Target species	A species has been identified within the study area or is considered to have a moderate to high likelihood of occurrence and may be impacted by the proposal.

Abbreviations	
BAM	Biodiversity Assessment Method (OEH 2018)
BC Act	Biodiversity Conservation Act 2017
BOS	Biodiversity Offset Scheme under the BC Act
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
DoEE	Department of Environment and Energy
DP&E	Department of Planning and Environment
DPI	Department of Primary Industries
EEC	Endangered ecological community
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999 (Commonwealth).
FM Act	Fisheries Management Act 1994 (NSW)
GDE	Groundwater dependent ecosystems
IBRA	Interim Biogeographically Regionalisation of Australia
MNES	Matters of National Environmental Significance
OEH	Office of Environment and Heritage
PCT	Plant Community Type
REF	Review of Environmental Factors

Abbreviations	
SEPP	State Environmental Planning Policy
TECs	Threatened Ecological Communities
TBDC	Threatened Biodiversity Data Collection
VEC	Vulnerable Ecological Community
VIS	Vegetation information system

1. Introduction

1.1 Proposal background

Transport for NSW (Transport) propose to carry out safety improvement work on the Sturt Highway (HW14) between Wagga Wagga and Buronga. The project objective is to reduce road trauma and aligns with the governments 'Towards Zero' commitment under the NSW Road Safety Plan 2021. The NSW Road Safety Plan has a priority target to reduce road fatalities by at least 30 per cent from 2008–2010 levels by 2021 and aims to continue a downward trend in road trauma to ultimately achieve zero fatal and serious injuries on NSW roads by 2056.

The Route Safety Review (RSR) has identified the primary crash types contributing to road trauma on the Sturt Highway HW14. Key roadside infrastructure and line marking safety improvements along this 550-kilometre section of the Sturt Highway that would improve the safety of the road and reduce the likelihood and severity of run off road type incidents.

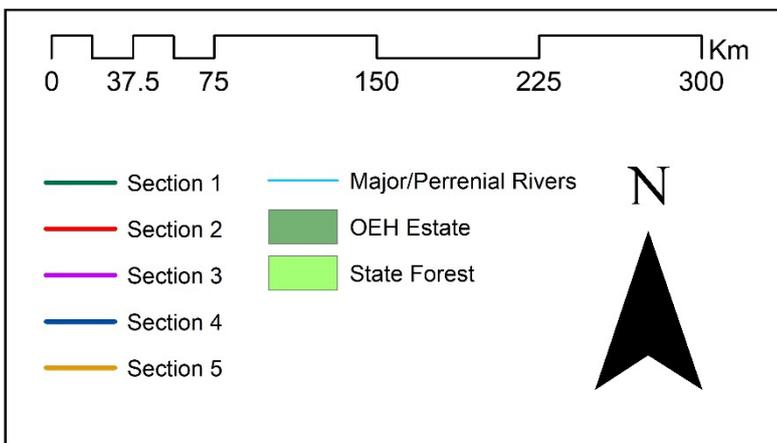
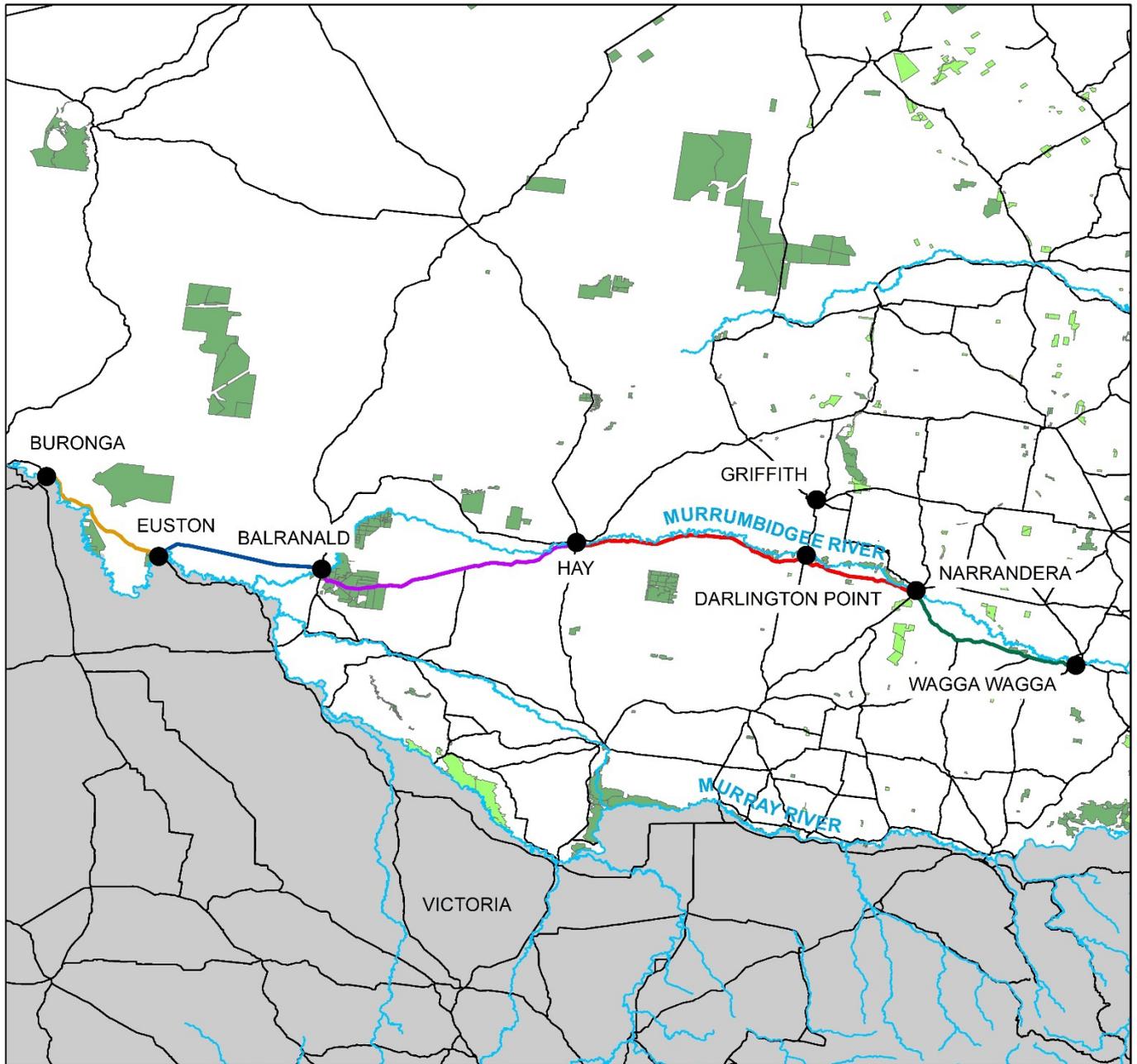
EnviroKey were engaged by Transport to prepare a Biodiversity Assessment Report (BAR) that would form part of a Project Review of Environmental Factors (REF) to be assessed under Division 5.1 of the NSW *Environmental Planning and Assessment Act 1979* (EP&A Act). For this proposal, Transport would be the proponent and determining authority. Accordingly, the proposed work and associated environmental impact would be assessed in the context of clause 171 of the NSW *Environmental Planning and Assessment Regulation 2021*, the NSW *Biodiversity Conservation Act 2016* (BC Act) and the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). In accordance with the requirements of the EP&A Act, a REF allows Transport to examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of a proposed activity.

1.2 The proposal

The proposal would result in an improved condition and safety of this section of the Sturt Highway by carrying out road edge repairs, road widening, line marking, audio-tactile line marking, installation of safety barriers, intersection upgrades and other minor works. The Project REF provides a full description of the proposed work.

The study area is located within the NSW South West Slopes Bioregion, Riverina Bioregion and Murray-Darling Depression Bioregion (NPWS, 2003a, Thackway and Creswell, 1995) and in the Wagga Wagga City, Narrandera, Leeton, Murrumbidgee, Hay, Balranald and Wentworth local government areas (LGA). Given the proposal length is long, it traverses 17 Mitchell landscapes (Brookong Plains, Cocoparra Ranges and Foothills, Coffin Rock Granite Hills, Lockhart Hills and Foothills, Mallee Cliffs Linear Dunes, Mallee Cliffs Sandplains, Murray Channels and Floodplains, Murray Lakes, Swamps and Lunettes, Murrumbidgee – Tarcutta Channels and Floodplains, Murrumbidgee – Tarcutta Sourcing-bordering Dunes, Murrumbidgee Channels and Floodplains, Murrumbidgee Depression Plains, Murrumbidgee Lakes, Swamps and Lunettes, Murrumbidgee Scaled Plains, Murrumbidgee Source-bordering Dunes and Wonga Hills and Ranges Mitchell landscapes) (Mitchell, 2002). The regional location of the proposal is provided in Figure 2-1.

Transport have provided an GIS shapefile (Objective ID A43067779 220427-HW14_S1_Impact-MGA55; Objective ID A43067781 220427-HW14_S2_Impact-MGA55; Objective ID A43067784 220427-HW14_S3_Impact-MGA55; Objective ID A43067780 220427-HW14_S4_Impact-MGA55 and Objective ID A43067785 220427-HW14_S5_Impact-MGA55) of the final footprint, allowing the calculation of impacts as a result of the proposal. A modified proposal excludes an area of the final footprint for the purpose of excluding any proposed work around a population of Pine Donkey Orchid listed as vulnerable under the NSW *Biodiversity Conservation Act 2016*. For this BAR, the road corridor has been applied as the study area.



Mapping Date: March 2021
 Map Datum: GDA 1994
 Data Sources:
 OEH Estate: OEH
 State Forest: Forests NSW
 Sections:
 Roads and Rivers: Geoscience Australia


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Figure 1-1: Proposal context

1.3 Legislative context

A Review of Environmental Factors (REF) is prepared to satisfy Transport duties under Division 5.1 of the EP&A Act to “examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity” and section 5.5 in making decisions on the likely significance of any environmental impacts. This biodiversity impact assessment forms part of the REF being prepared for the proposal, and assesses the biodiversity impacts of the proposal to meet the requirements of the EP&A Act.

Part 7 of the BC Act and Part 7A of the FM Act require that the significance of the impact on threatened species, and endangered ecological communities is assessed using a five-part test. Where a significant impact is likely to occur, a species impact statement (SIS) must be prepared in accordance with the Director-General’s requirements or a Biodiversity Proposal Assessment Report (BDAR) must be prepared by an accredited assessor in accordance with the Biodiversity Assessment Method (BAM).

In September 2015, a “strategic assessment” approval was granted by the Federal Minister in accordance with the EPBC Act. The approval applies to Transport activities being assessed under Division 5.1 (formerly Part 5) of the EP&A Act with respect to potential impacts on nationally listed threatened species, ecological communities and migratory species.

As a result, Transport proposals assessed via an REF:

- must address and consider potential impacts on nationally listed threatened species, populations, ecological communities and migratory species, including application of the “avoid, minimise, mitigate and offset” hierarchy
- do not require referral to the Federal Department of the Environment for these matters, even if the activity is likely to have a significant impact.

To assist with this, assessments are required in accordance with the *Matters of National Environmental Significance: Significant impact guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999* (DoE 2013).

2. Methods

2.1 Personnel

The personnel involved in this assessment and an overview of their qualifications is included in Table 2-1.

Table 2-1 Qualifications and experience of personnel

Name and Qualifications	Experience
<p>Steve Sass B.App.Sci (Env.Sci) (Hons), GradCert.CaptVertMngt (CSU) Director / Principal Ecologist</p> <p>Certified Environmental Practitioner, EIANZ</p> <p>OEH Biodiversity Accredited Assessor (BAAS17047)</p> <p>Member, Ecological Consultants Association of NSW</p>	<p>Steve is a highly experienced Ecologist having undertaken hundreds of terrestrial and aquatic ecological surveys and assessments across Australia since 1992. He has an in-depth working knowledge of environmental and biodiversity legislation across all states and territories which allows him to provide detailed and accurate assessments and formulate practical solutions to clients and specific projects on a case-by-case basis.</p> <p>Steve is a past and current Councillor of the Ecological Consultants Association of NSW. Steve was recently given “Expert” status for a number of threatened species listed under the NSW <i>Biodiversity Conservation Act 2016</i> and is on a panel reporting directly to the Minister for a review of matters relating to wildlife under the BC Act.</p> <p>Previous and current research holds Steve in high regard within both the scientific and ecological consultants’ community. To date, Steve has published, submitted or has in preparation, thirty-seven manuscripts within peer-reviewed scientific journals, many of which are relate to threatened species survey, monitoring or management.</p> <p>Steve has extensive experience in NSW. Over the past 15 years, he has completed or provided specialist biodiversity advice for more than 1,200 environmental assessments for projects such as residential and industrial developments, highway upgrades and telecommunications, water, sewerage, energy, mining and electricity network infrastructure projects.</p> <p>Steve is the Principal Ecologist of EnviroKey. For the BA, he managed the project, led the field surveys and prepared this report.</p>
<p>Linda Sass Ass.Deg. Gn.St (Science), B.A, Dip. Ed (Sec)</p> <p>Director / Senior Ecologist Member, Ecological Consultants Association of NSW (ECA)</p>	<p>Linda is an experienced ecologist having conducted flora and fauna surveys across NSW over the past 12 years.</p> <p>Linda has extensive experience with the flora and fauna of southern and western NSW. In recent years, she has completed biodiversity surveys for a number of projects along HW14, MR279, MR284, and MR677.</p> <p>For this project, Linda assisted with the field surveys and conducted an internal review of the BA.</p>

Name and Qualifications	Experience
<p>Alexandra Metcalfe B.Env.Sci (on-going), Cert III. Captive Animal Management Ecology Field Assistant</p>	<p>Alex has worked as a field assistant with the NSW National Parks and Wildlife Service in Kosciuszko National Park for the past three years. Here, she was mainly involved with weed monitoring and threatened species surveys. In her short time at EnviroKey, Alex works under the direct supervision of the Principal Ecologist and Senior Ecologist, and provides valuable field assistance to the ecology team. Her most recent projects include the Downies Bridge MWREF, Batemans Bay Bridge Marine Offset Project and a BDAR for the Howlong Sand and Gravel Quarry Expansion. She is due to commence her studies in Environmental Science in 2021. For this project, Alexandra assisted with the field surveys.</p>
<p>Zoe Sass B.Sci/B.A (GIS) Project Officer (GIS)</p>	<p>Zoe has worked as an ecology field assistant on a casual basis with EnviroKey over a number of years including during their university studies. They recently joined EnviroKey as a permanent member of the team as a Project Officer (GIS) given that they are conversant in the ArcGIS software by ESRI. Zoe has been responsible for GIS mapping and statistical analysis for a number of environmental assessments including REFs and prepared the portions of the mapping for this report.</p>
<p>Mark Harris B.App.Sci (Nat.Res.Mgt) Senior Botanist / GIS Analyst</p>	<p>Mark has extensive botanical experience in southern NSW including the southern highlands and snowy mountains regions having undertaken hundreds of botanical assessments for projects over the last 15 years. He also has wide experience in GIS, having produced map sets for more than 1,000 environmental assessments.</p> <p>For this project, Mark produced the vegetation mapping and spatial statistics for this BA.</p>
<p>Holly Hennessy Cert III. Captive Animal Management Ecology data management</p>	<p>Holly has worked in project management and assisted with ecology surveys with EnviroKey for the past 5 years. For this project, Holly assisted with HBT mapping and data management.</p>

2.2 Background research

Background research is required to collect and review information on the presence or likelihood of occurrence of:

- Threatened and protected terrestrial and aquatic flora and fauna species and their habitat
- Threatened ecological communities
- Important habitat for migratory species
- Critical habitats.

The database searches carried out for this BA are included in Table 2-2.

Table 2-2 Database searches

Database	Search For	Search Area	Timing
BioNET Atlas	Threatened species, migratory species, JAMBA, CAMBA, ROKAMBA	10 kilometre radius	10/03/2021
OEH Threatened species profile search	Threatened flora, fauna and ecological communities	Study area	10/03/2021
EPBC Act Protected Matters Search	Threatened flora and fauna, endangered populations, ecological communities and migratory species	10 kilometre radius	02/03/2021
OEH vegetation information system (VIS)	Vegetation communities and descriptions	Study area	18/03/2021
OEH Vegetation Types Database	Vegetation communities	Study area	18/03/2021
Department of Environment's directory of important wetlands	Important wetlands	Along the length of the proposal	09/11/2020
Priority weeds database	Declared priority weeds	Riverina and Western DPI search areas	03/05/2021

Additionally, a literature review for any relevant local information was conducted on 10 March 2021 using the following key words: Sturt Highway, biodiversity, weed, vegetation, management plan. The search also extended to previous environmental assessments in proximity to the proposal. The literature review identified the following:

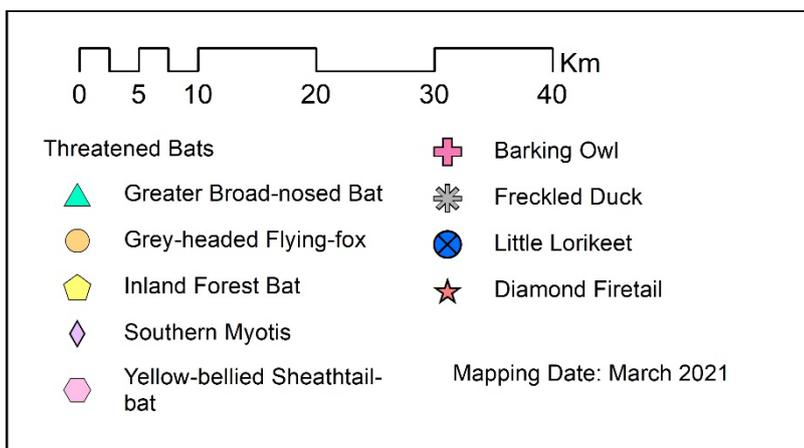
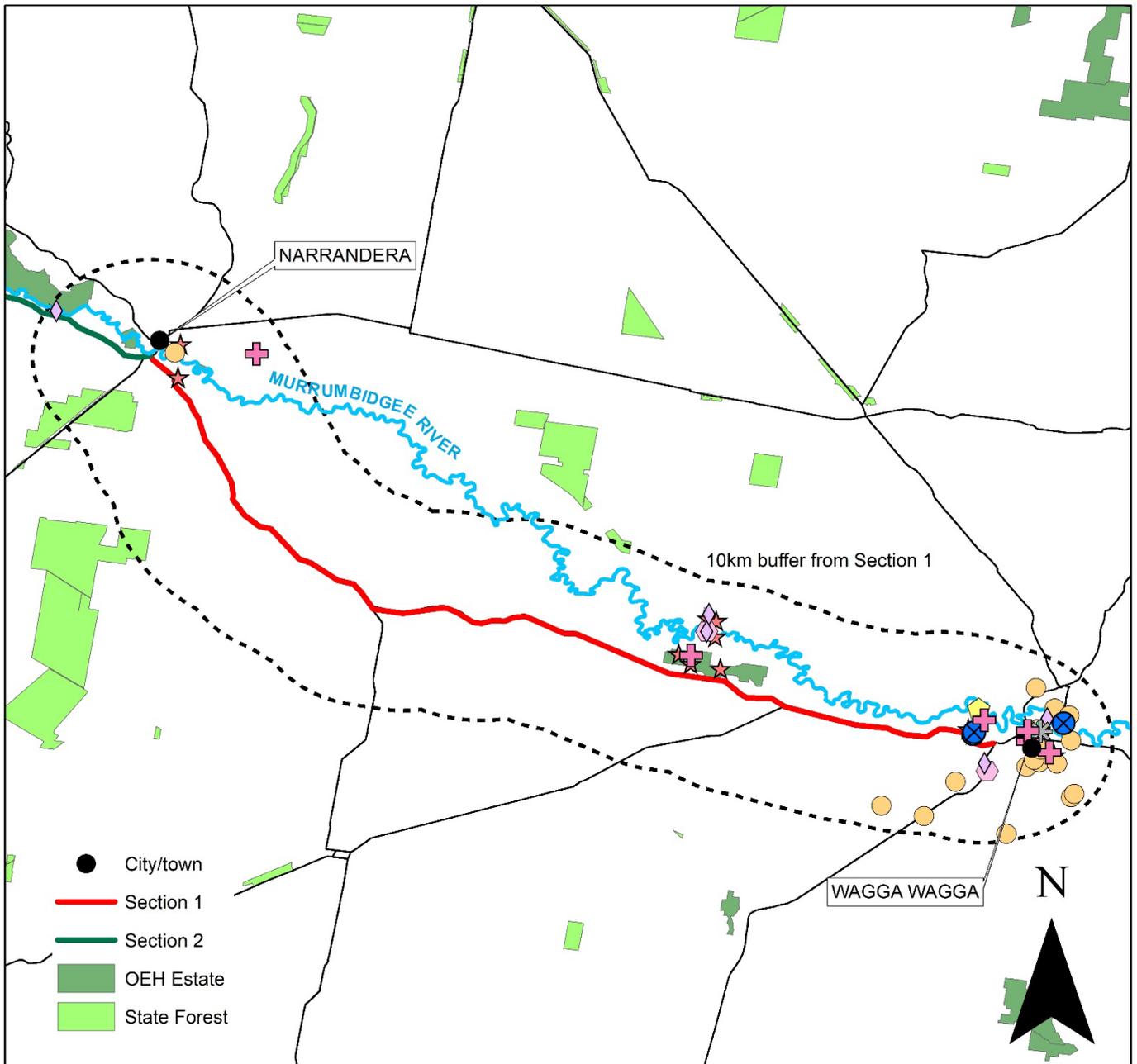
- Riverina Regional Strategic Weed Management Plan 2017-2022 (LLS, 2017)
- Minor Works REF: Sturt Highway (HW14) Route Safety Review Safety Improvements Hume Highway to Wagga Wagga (EnviroKey, 2020)
- Wagga Wagga Roadside Vegetation Management Plan (CTE, 2019)
- Minor Works REF: Sturt Highway (HW14) Safety Improvement Work east of Mundarlo Road (GHD, 2014)
- Project REF: Sturt Highway (HW14) Bolton Park Reconstruction (RMS, 2018)
- Project REF: Newell and Sturt Highway Western intersection upgrade at Gillenbah (GHD, 2021)
- Project REF: Sturt Highway (HW14) Yarragundry upgrade work (GHD, 2019)
- Minor Works REF: Sturt Highway (HW14) Safety Improvements at Borambola (NGH, 2018).

These documents were considered in this BA where appropriate.

2.3 Habitat assessment

The desktop analysis, database searches and literature review found that threatened and migratory biota are regularly recorded in the locality. Figure 2-1 to Figure 2-31 provides the spatial locations of records of these biota within the locality of the proposal (10 kilometre radius).

A habitat assessment for the threatened and migratory species with potential to occur within the vicinity of the proposal is provided in Annexure C. This revealed that a total of 70 threatened or migratory biota were known to, or had a moderate to high potential to occur in the vicinity of the proposal.



Map Datum: GDA 1994

Data Sources:

- OEH Estate: OEH
- State Forest: Forests NSW
- Sections: Transport for NSW
- Roads and Rivers: Geoscience Australia

Threatened Species:

DPIE BioNET Atlas Database

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Figure 2-1: Previous records for threatened species in Section 1

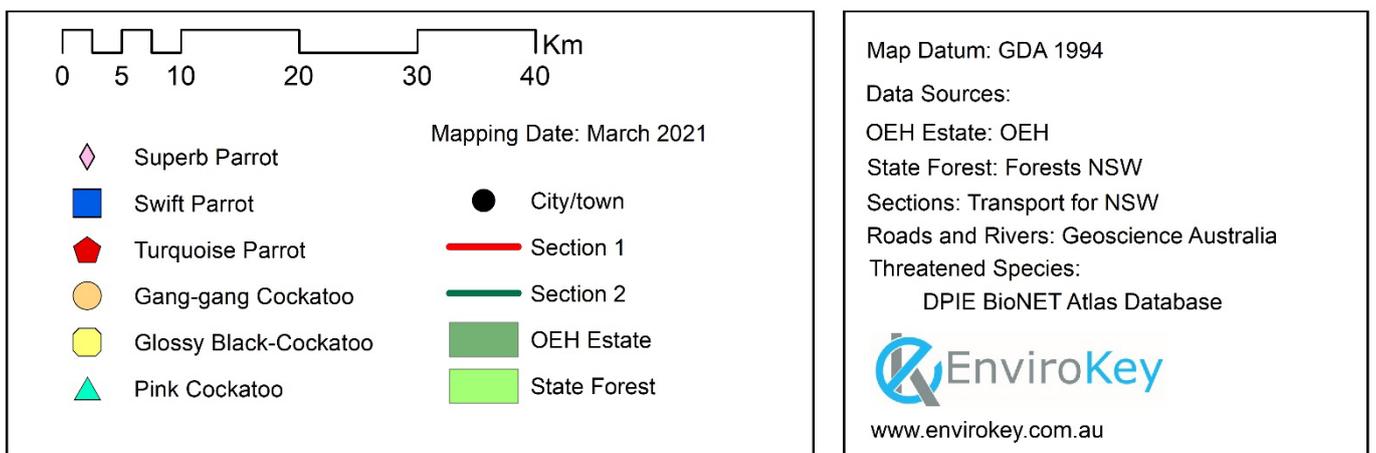
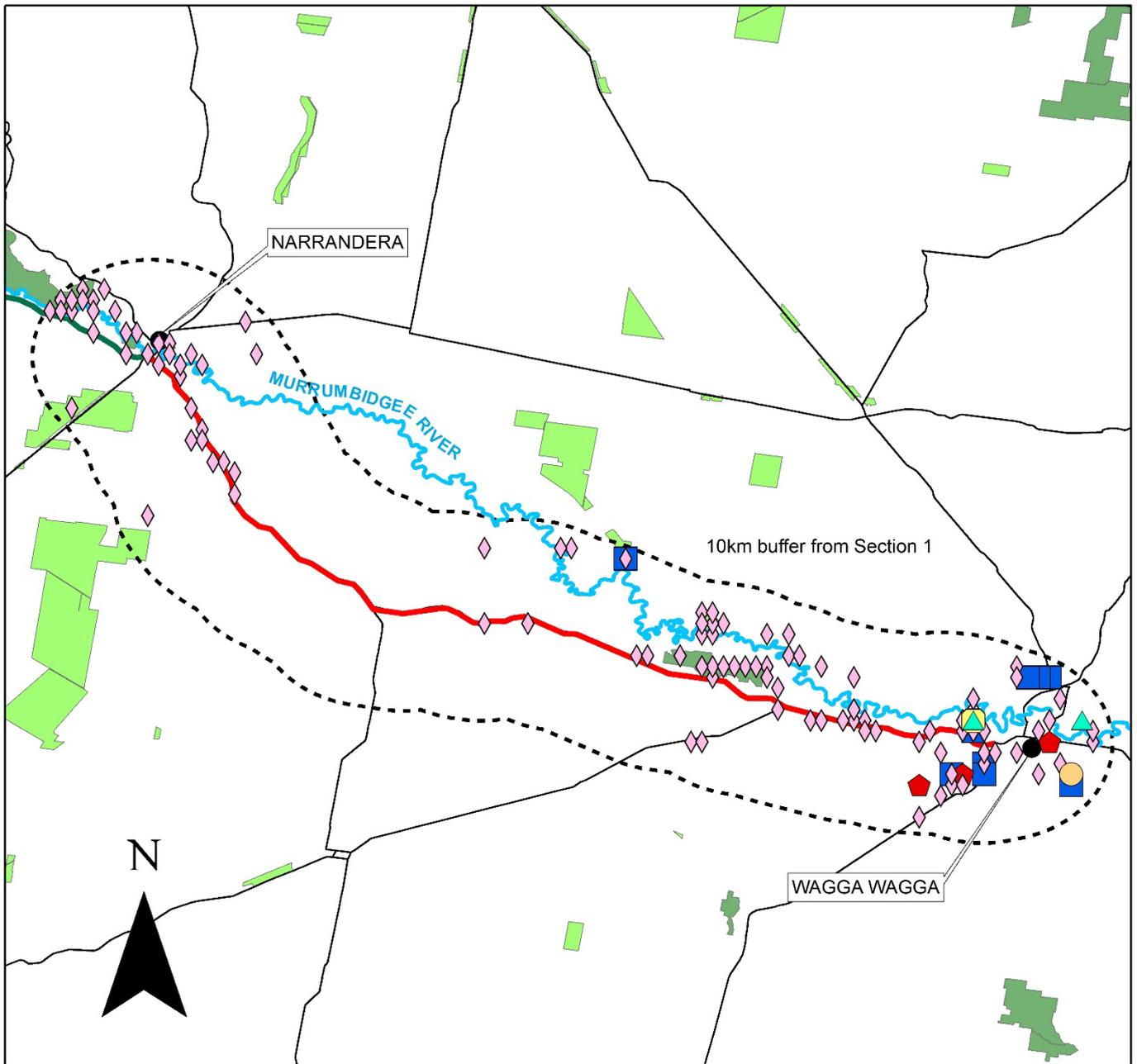
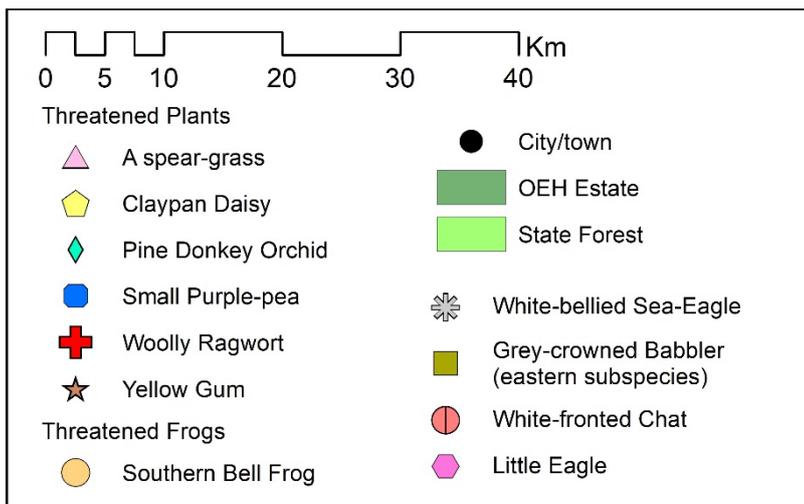
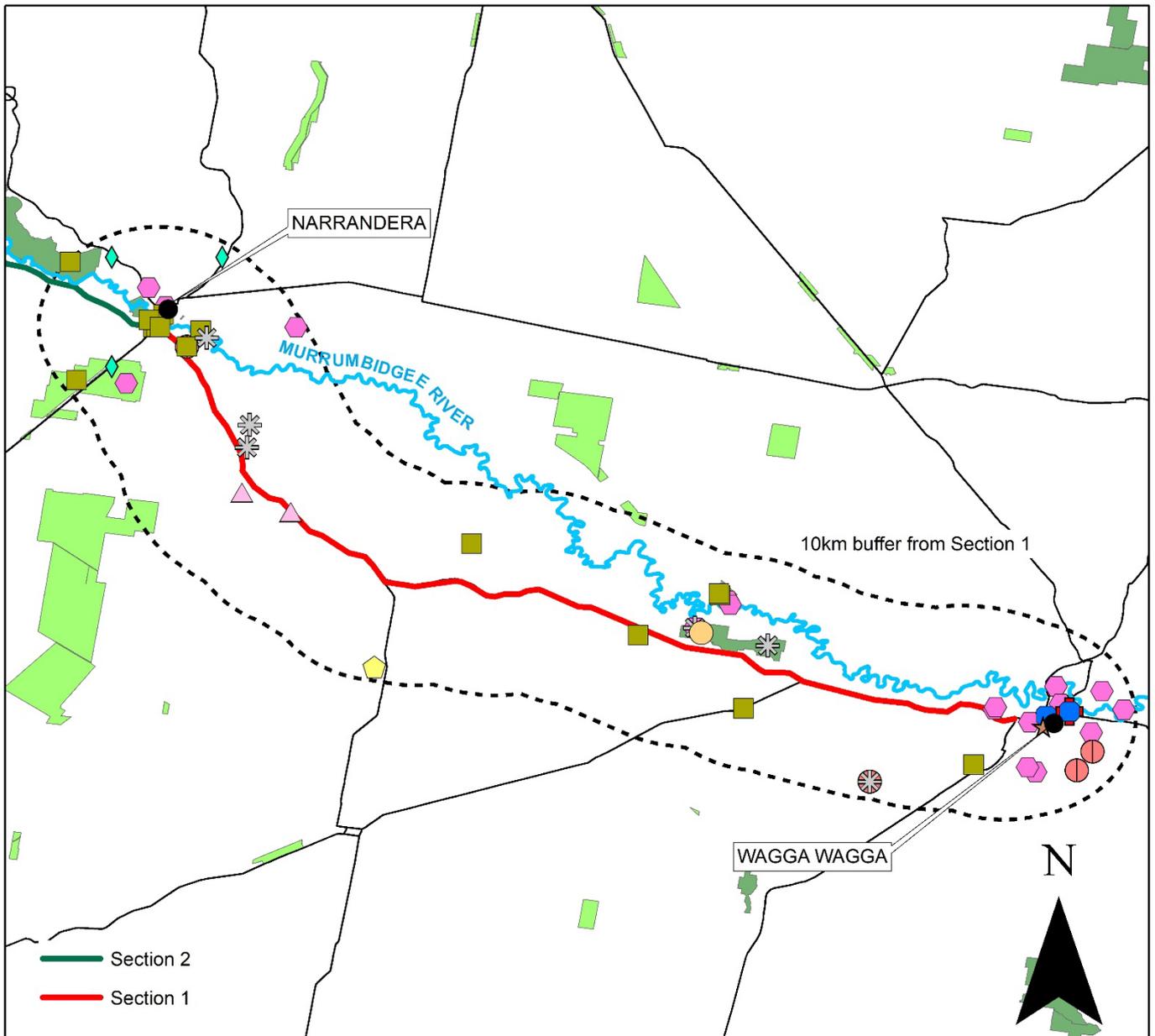


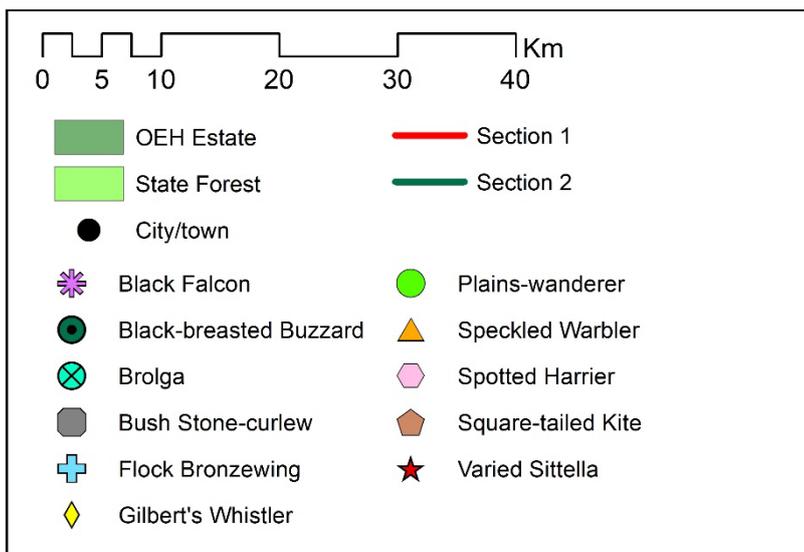
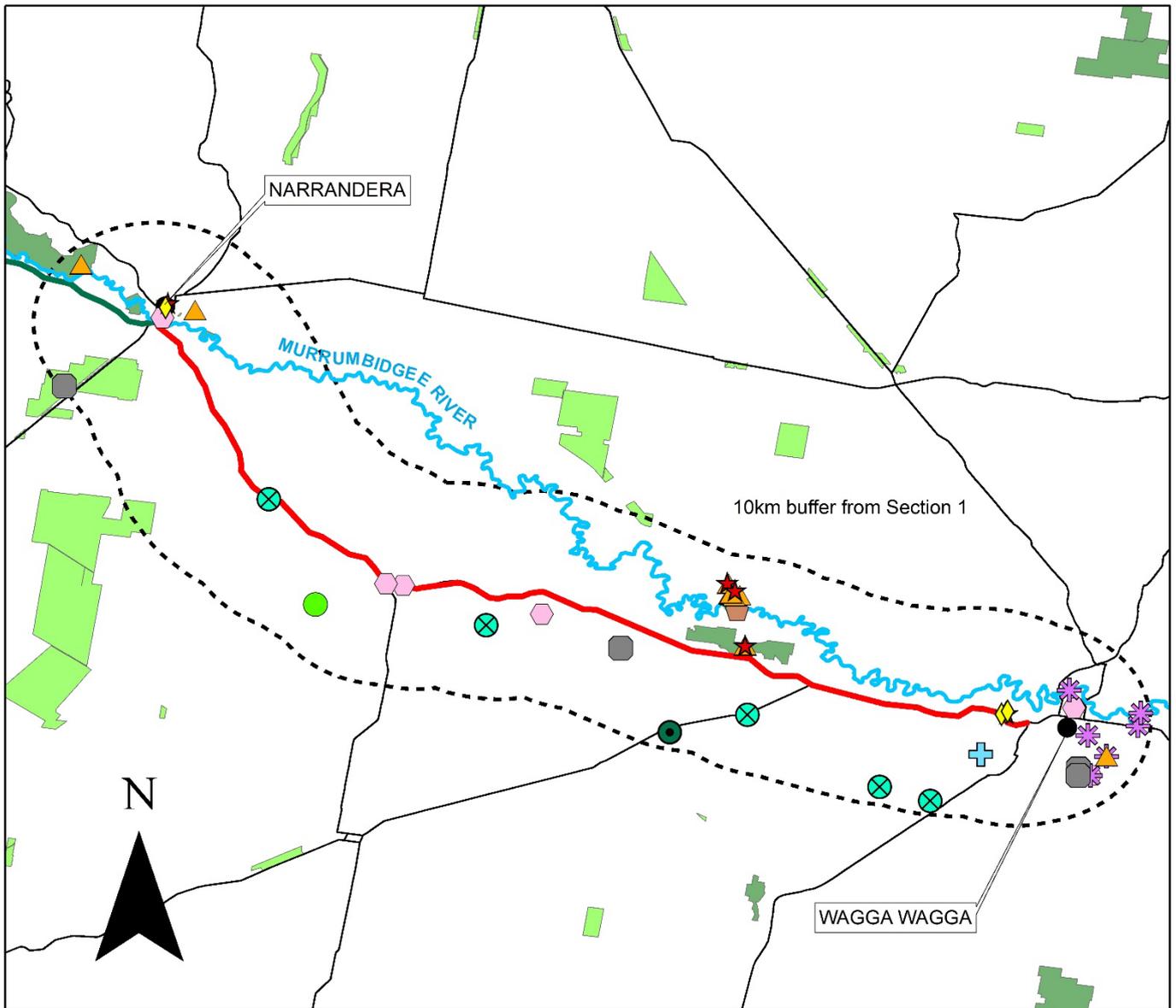
Figure 2-2: Previous records for threatened species in section 1



Mapping Date: March 2021
 Map Datum: GDA 1994
 Data Sources:
 OEH Estate: OEH
 State Forest: Forests NSW
 Sections: Transport for NSW
 Roads and Rivers: Geoscience Australia
 Threatened Species:
 DPIE BioNET Atlas Database


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Figure 2-3: Previous records for threatened species in section 1



Mapping Date: March 2021
 Map Datum: GDA 1994

Data Sources:
 OEH Estate: OEH
 State Forest: Forests NSW
 Sections: Transport for NSW
 Roads and Rivers: Geoscience Australia
 Threatened Species:
 DPIE BioNET Atlas Database

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Figure 2-4: Previous records for threatened species in section 1

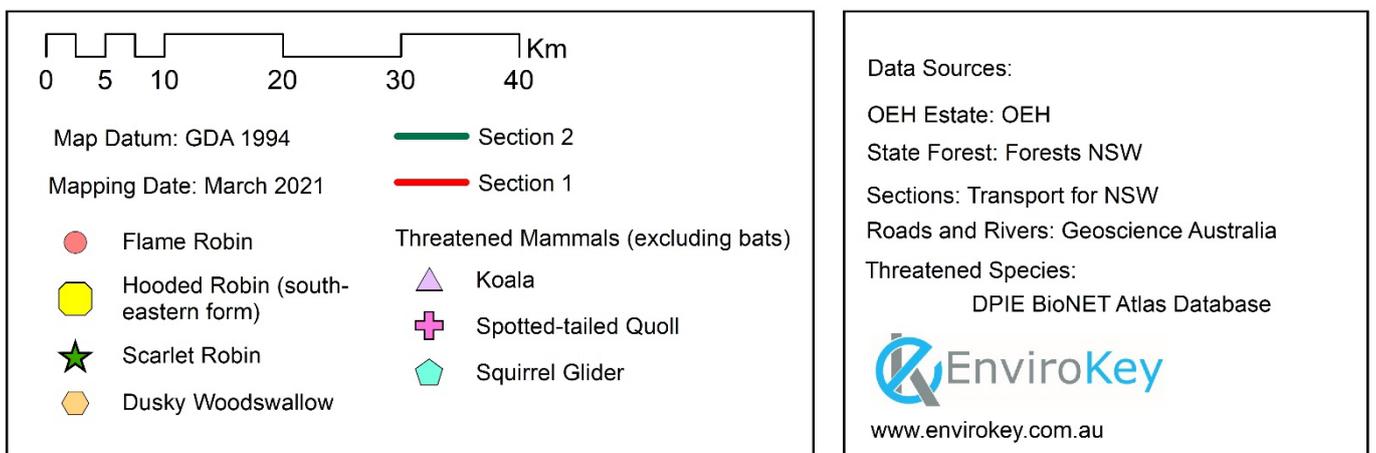
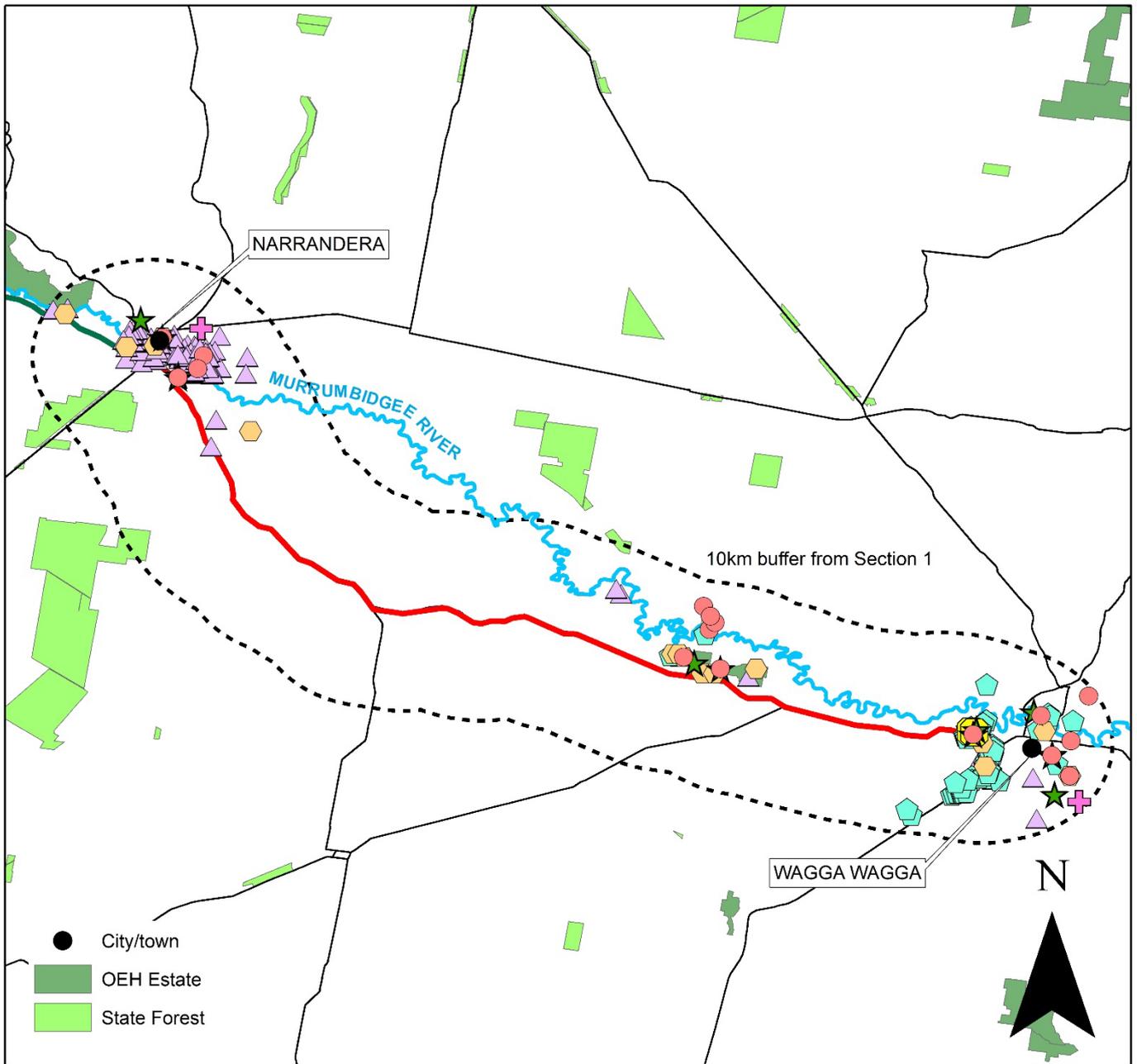


Figure 2-5: Previous records for threatened species in section 1

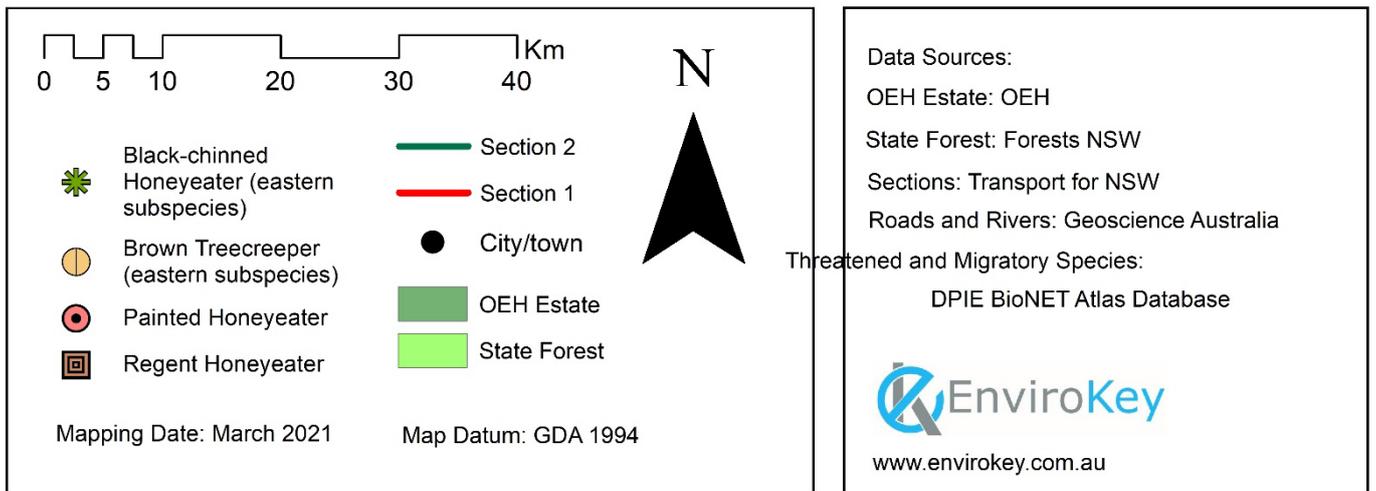
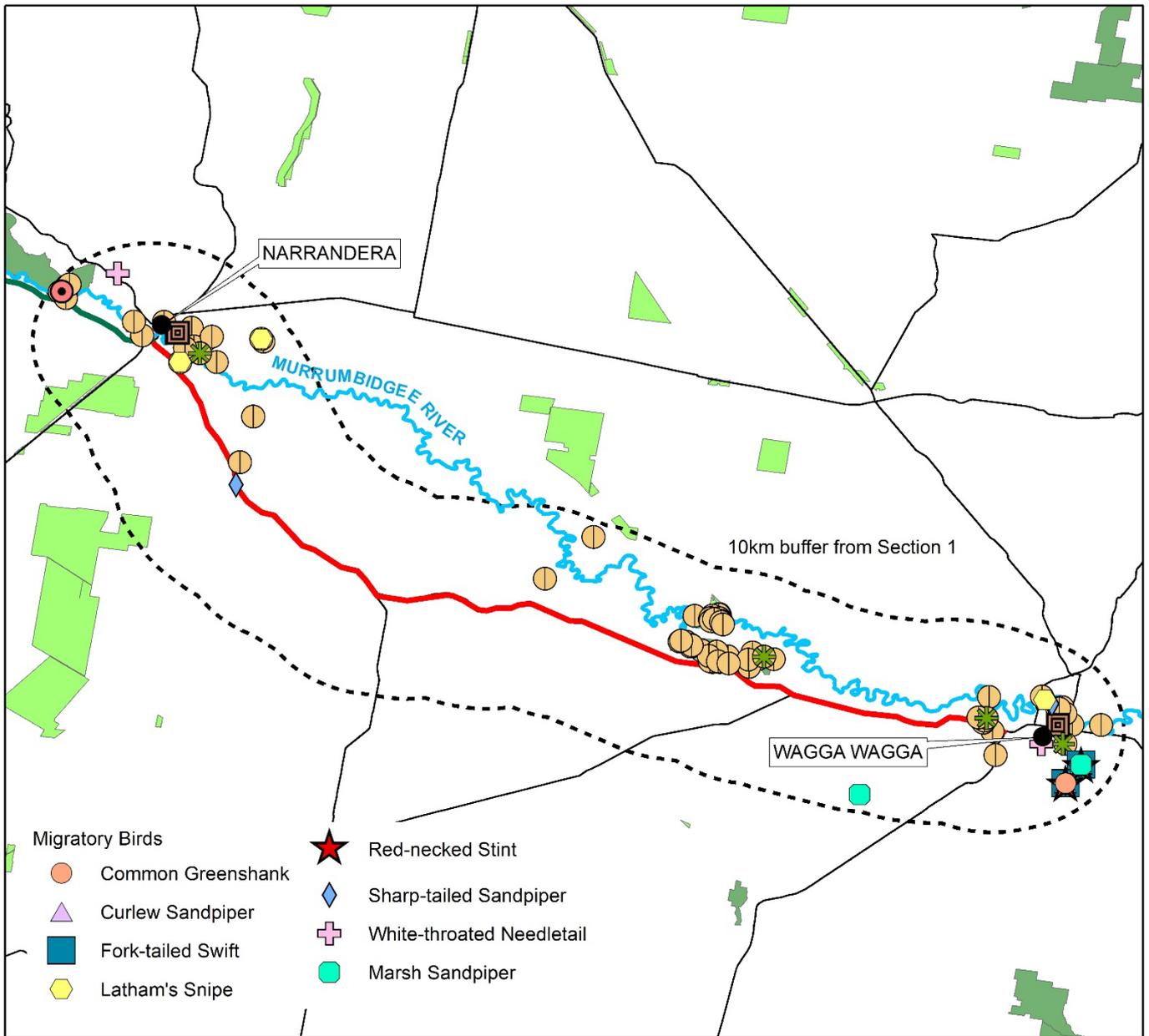


Figure 2-6: Previous records for migratory species and threatened species in section 1

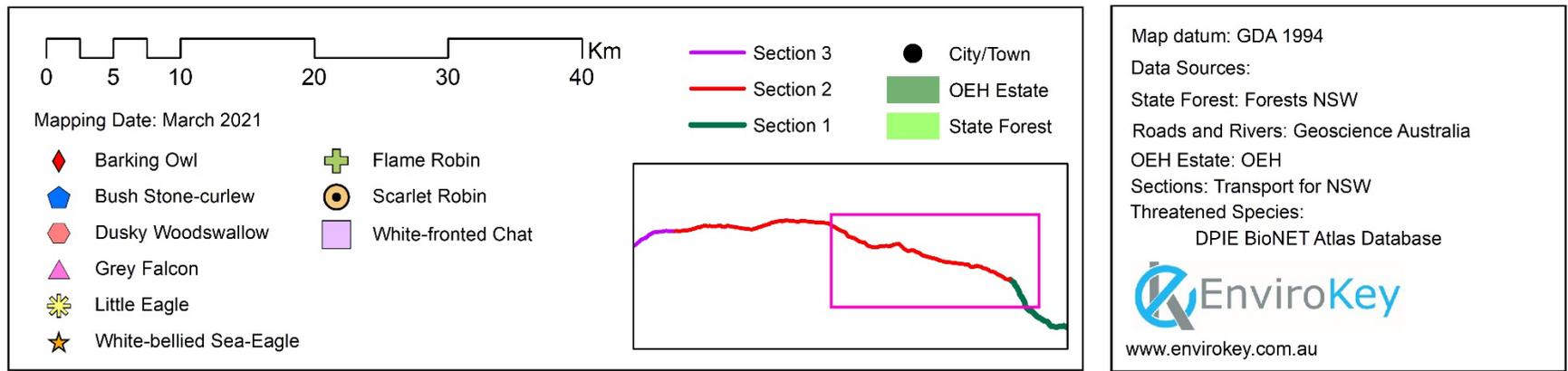
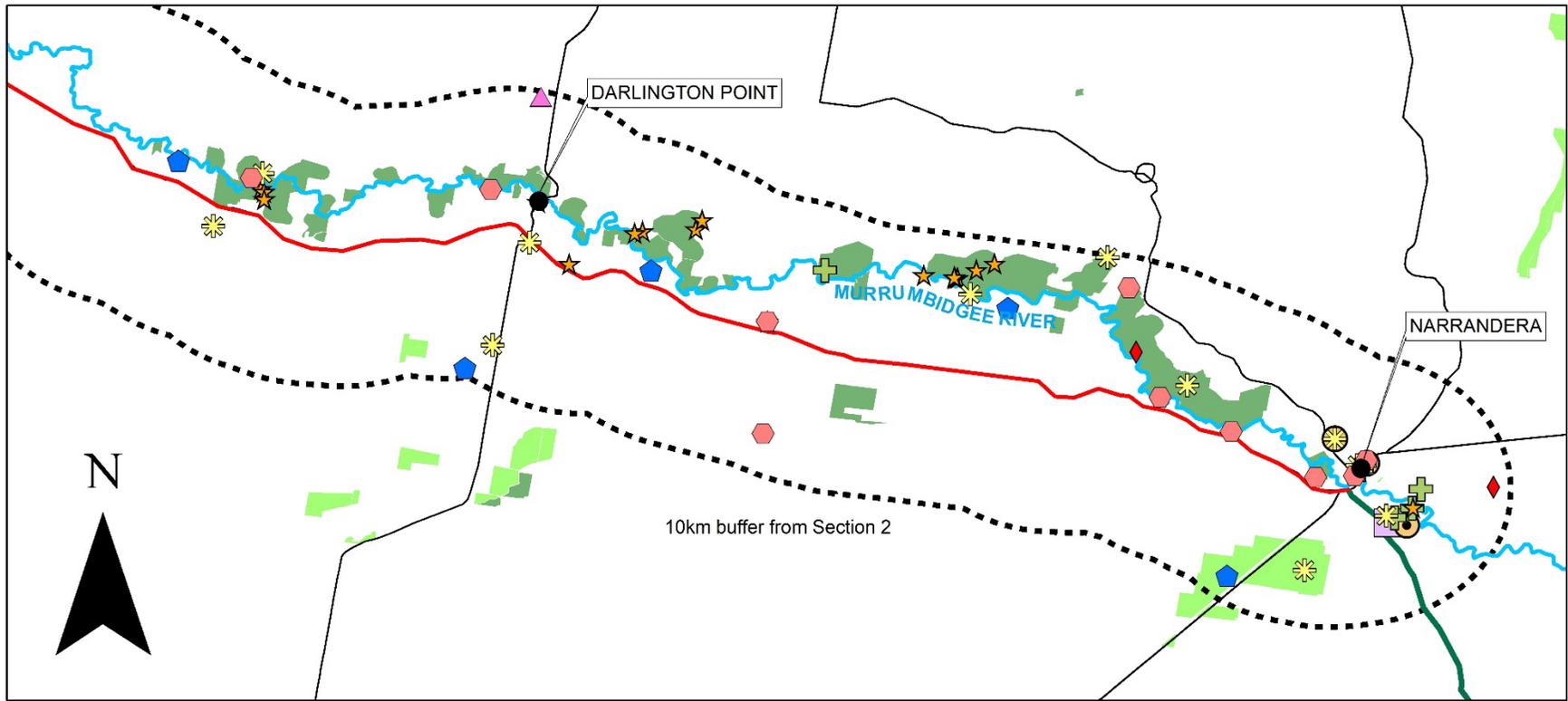
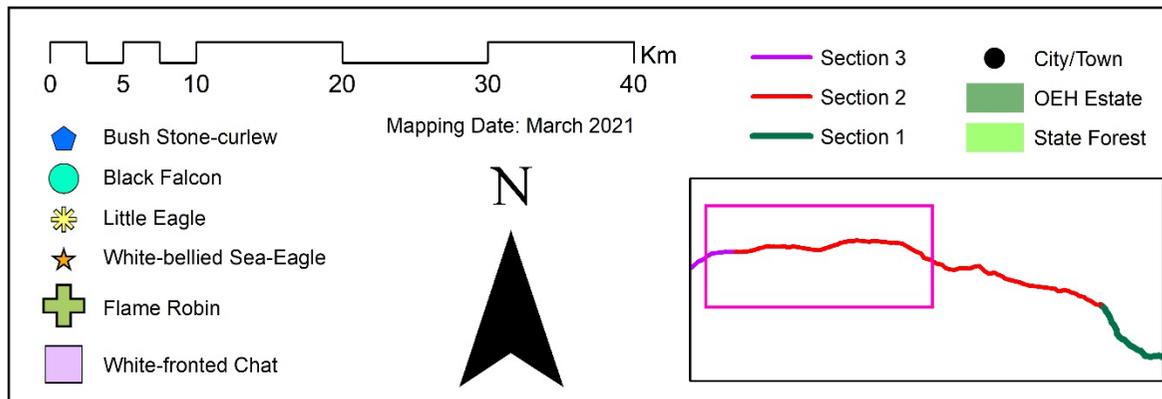


Figure 2-7: Previous records for threatened species in section 2



Map datum: GDA 1994
 Data Sources:
 State Forest: Forests NSW
 Roads and Rivers: Geoscience Australia
 OEH Estate: OEH
 Sections: Transport for NSW
 Threatened Species:
 DPIE BioNET Atlas Database


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Figure 2-8: Previous records for threatened species in section 2

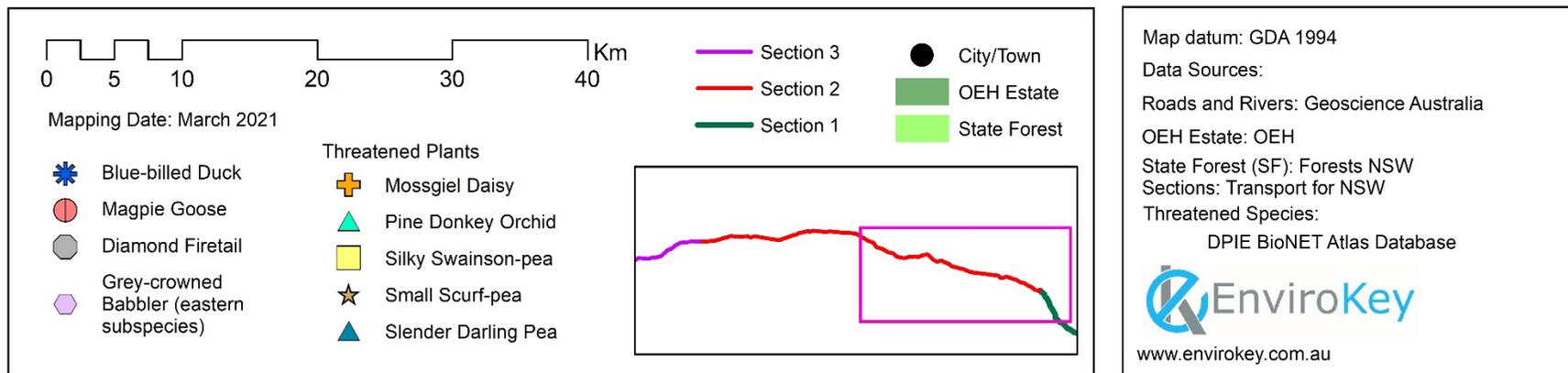
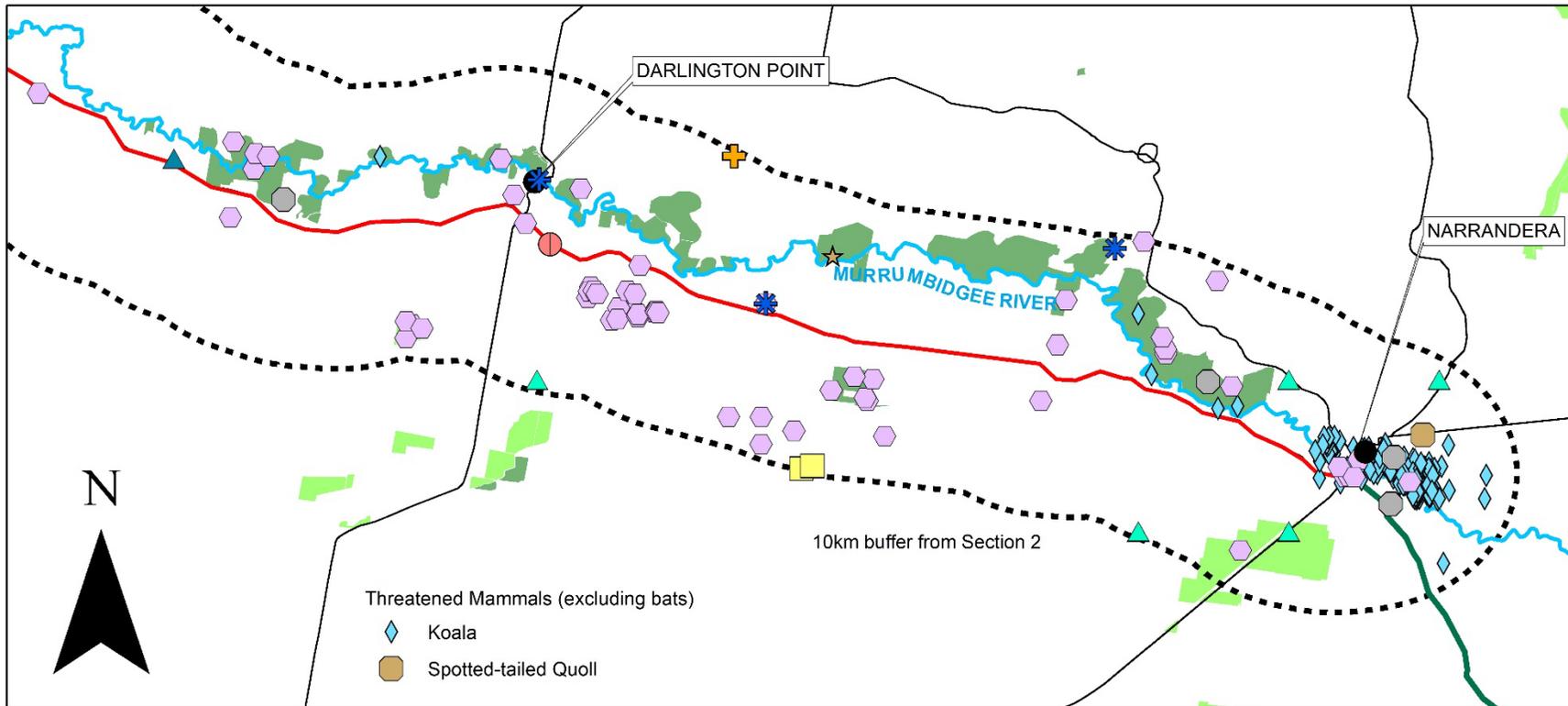


Figure 2-9: Previous records for threatened species in section 2

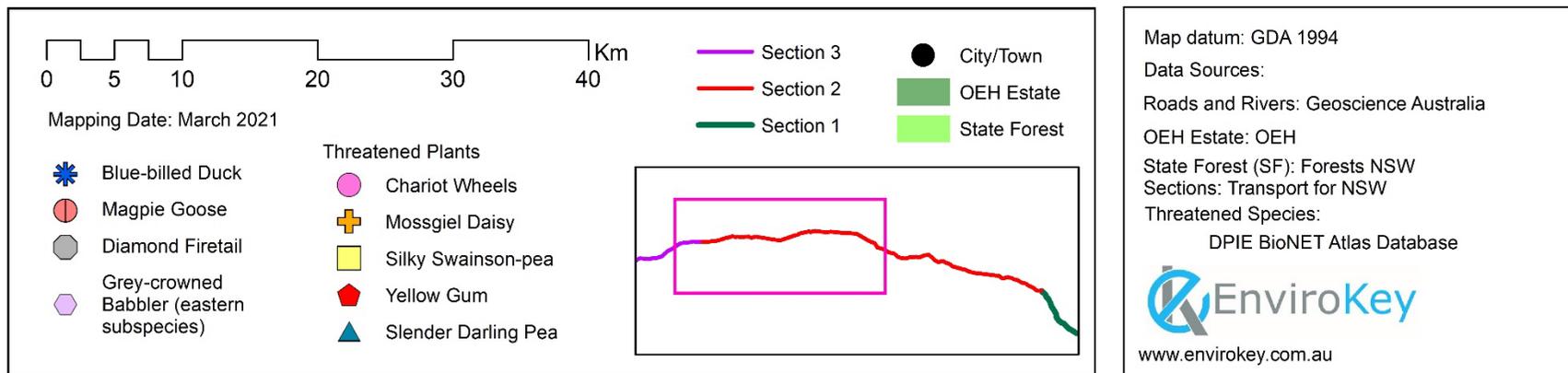
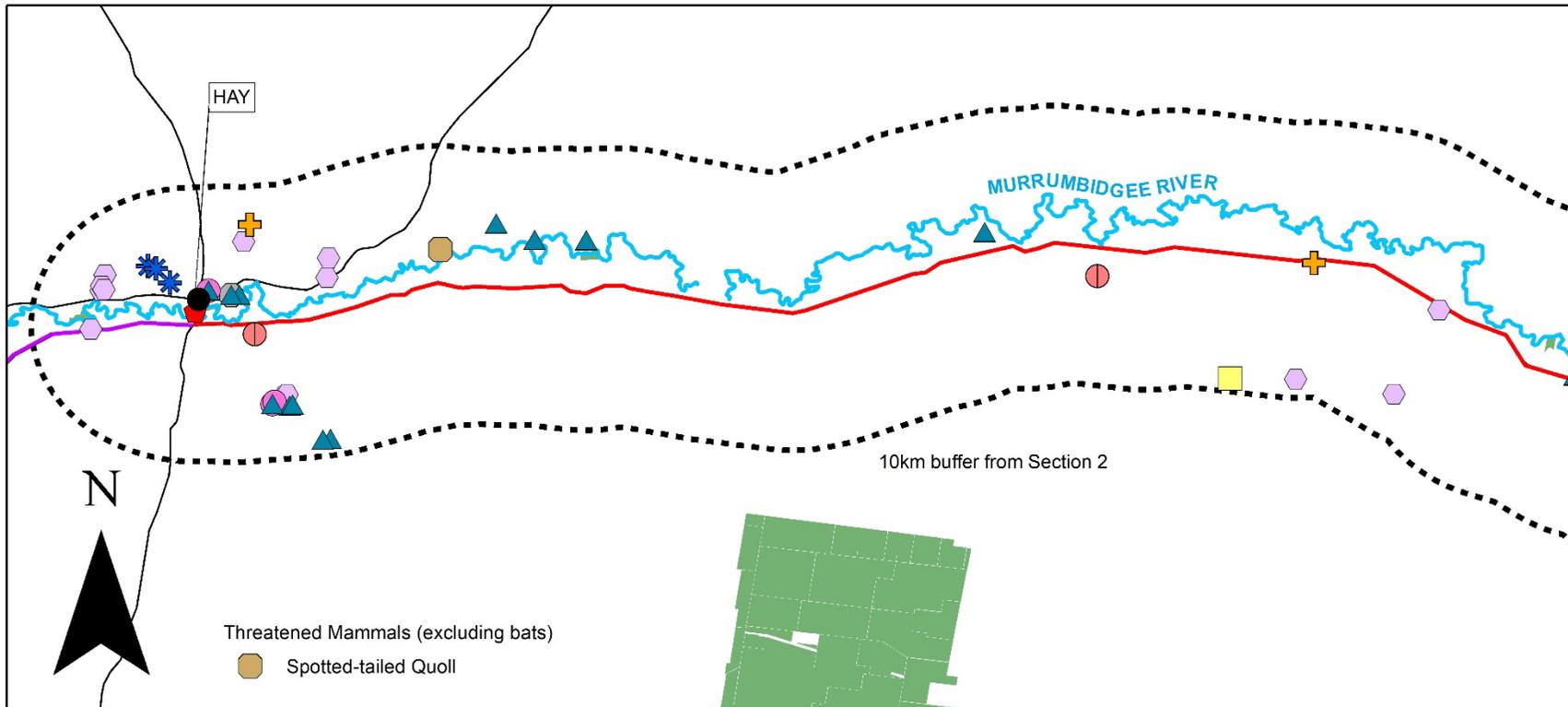


Figure 2-10: Previous records for threatened species in section 2

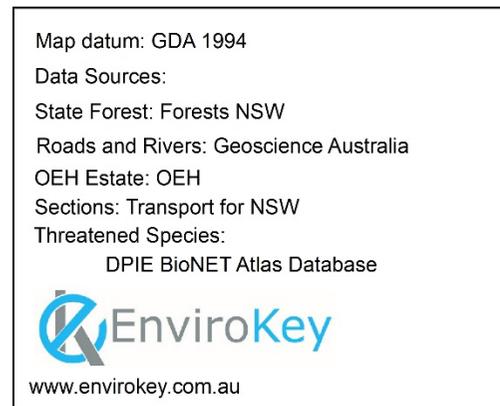
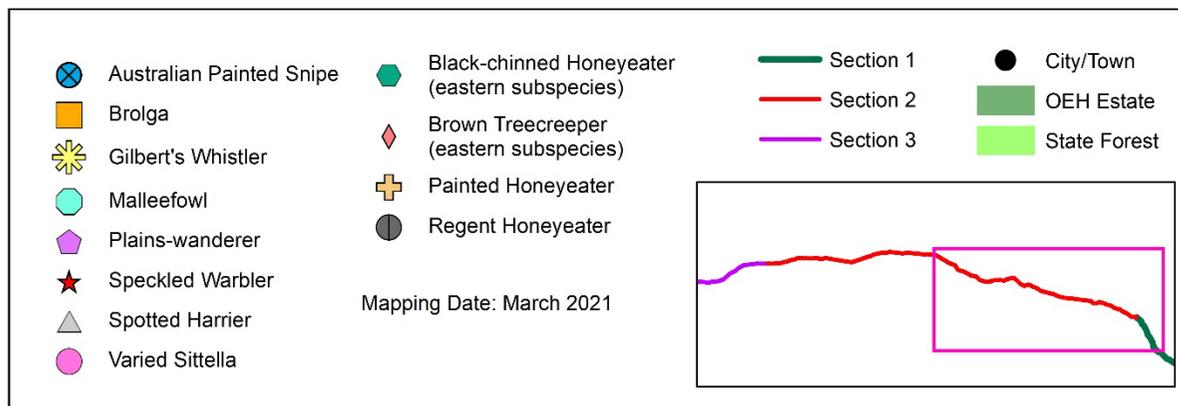
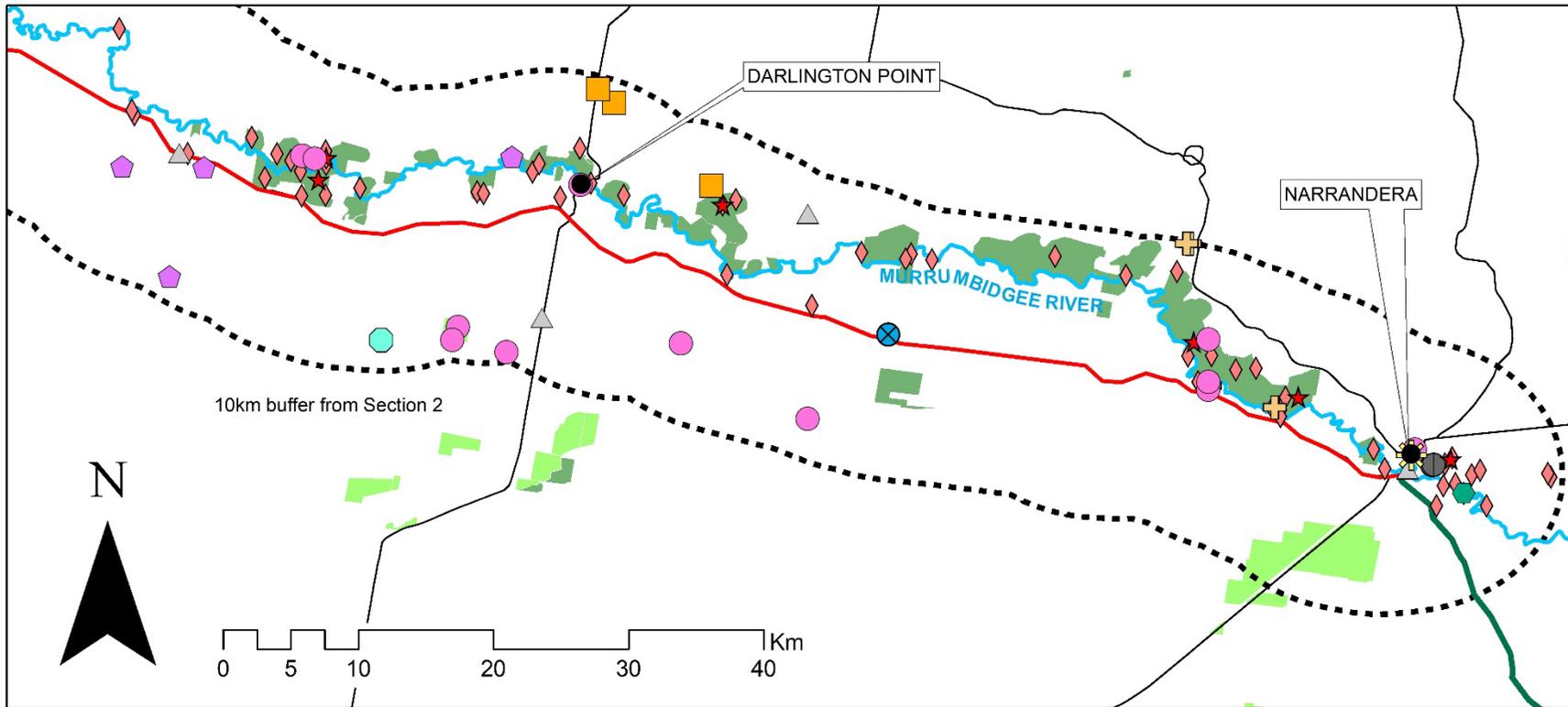


Figure 2-11: Previous records for threatened species in section 2

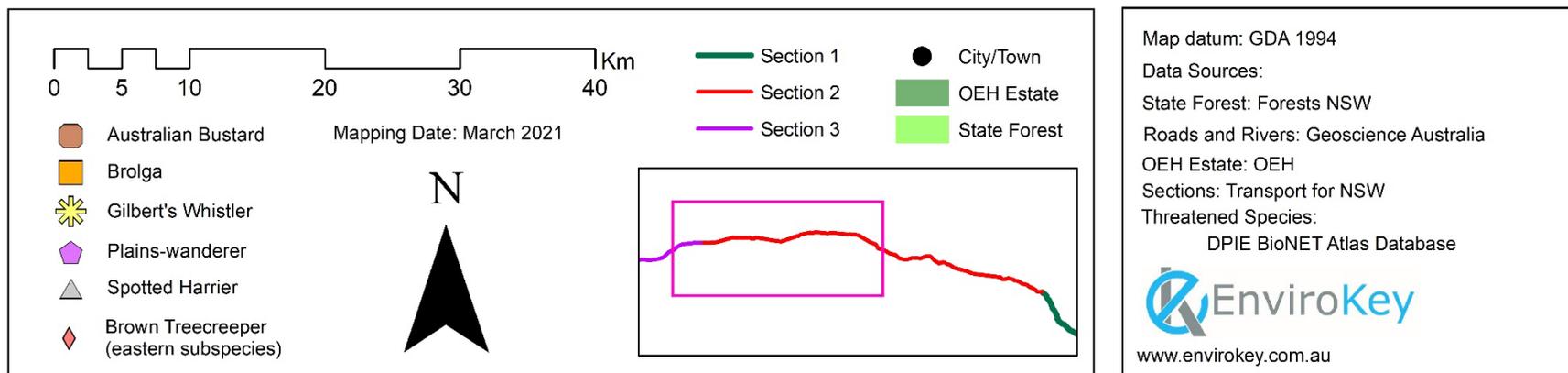


Figure 2-12: Previous records for threatened species in section 2

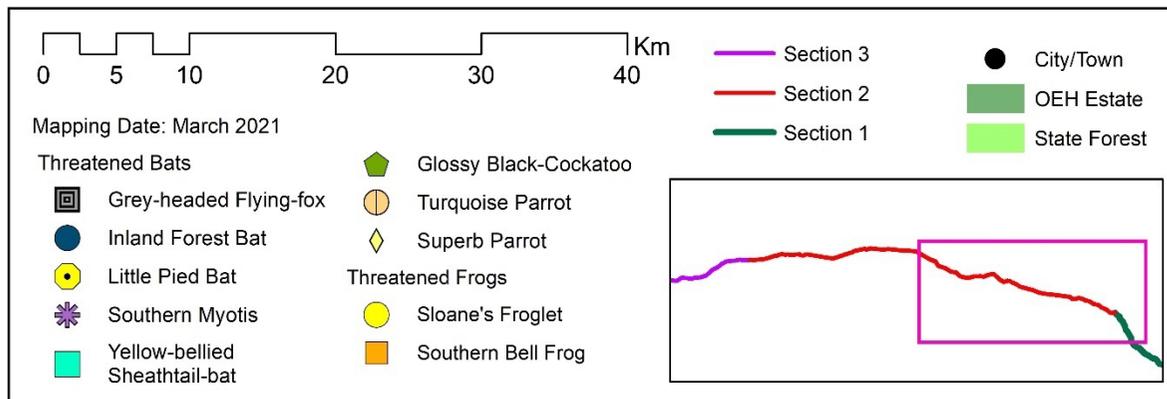
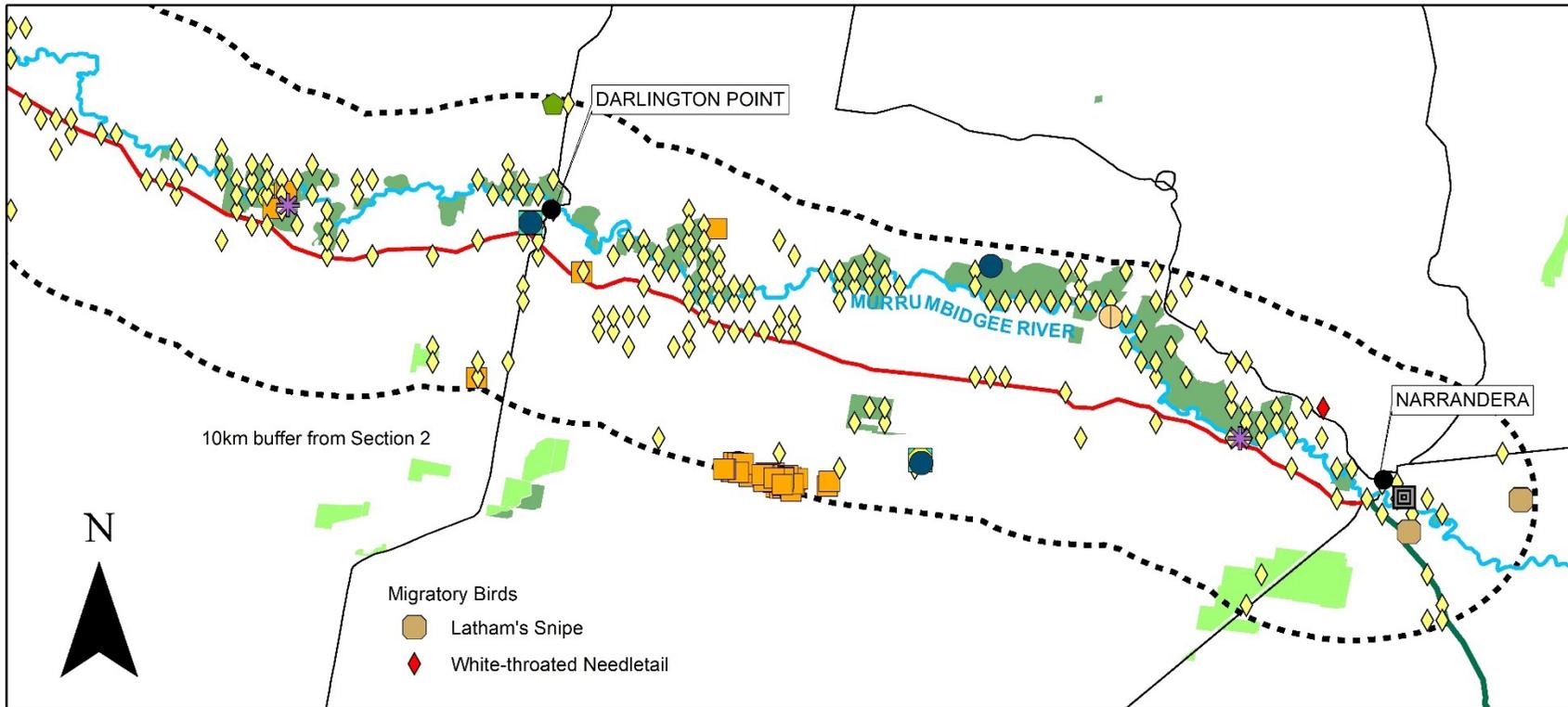


Figure 2-13: Previous records for migratory and threatened species in section 2

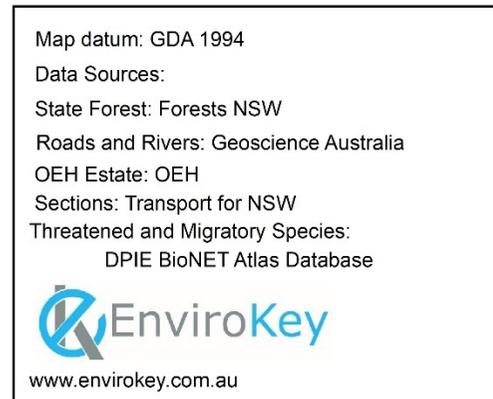
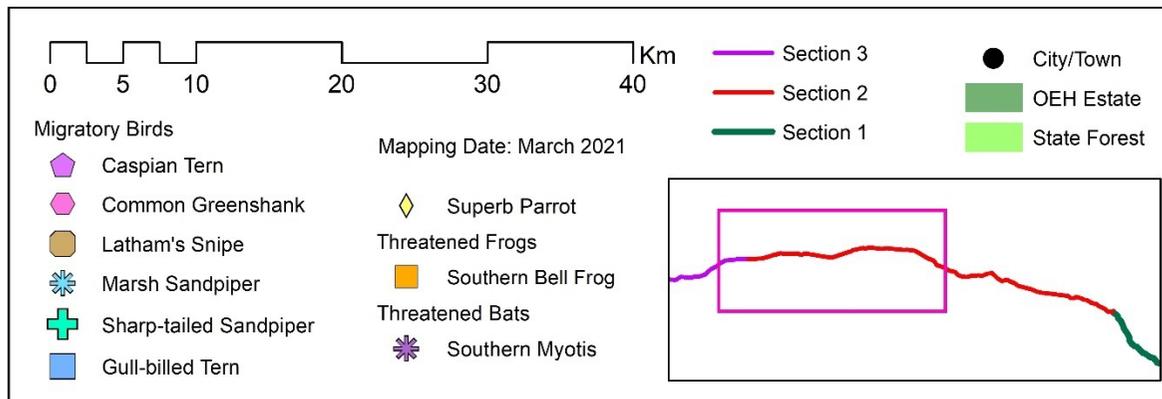


Figure 2-14: Previous records for migratory and threatened species in section 2

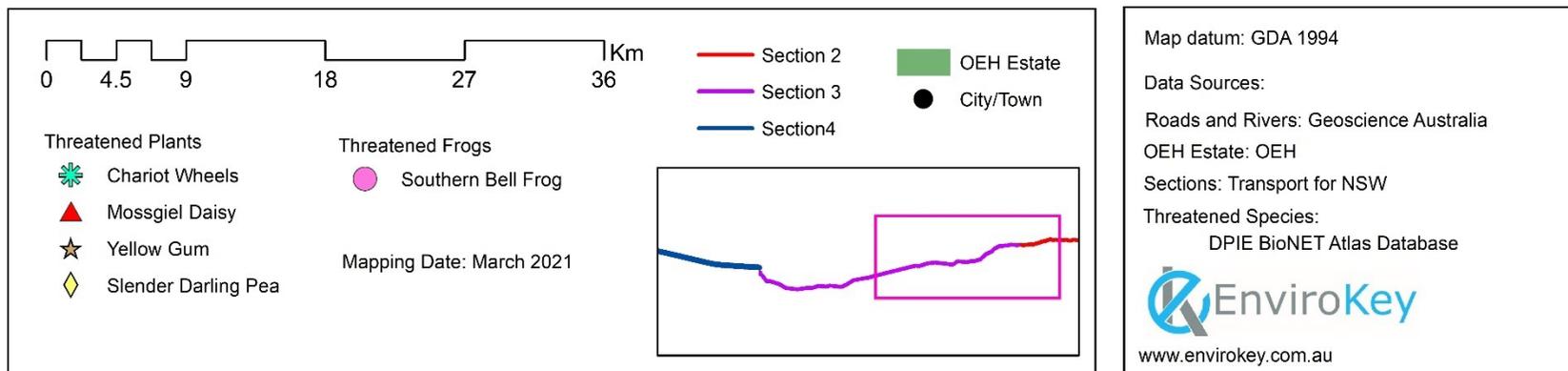


Figure 2-15: Previous records for threatened species in section 3

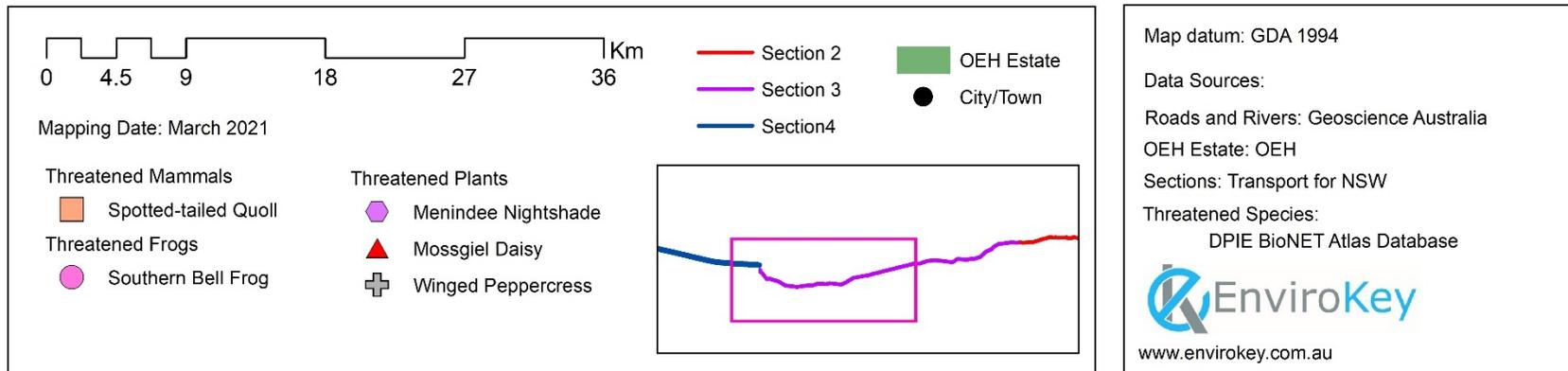
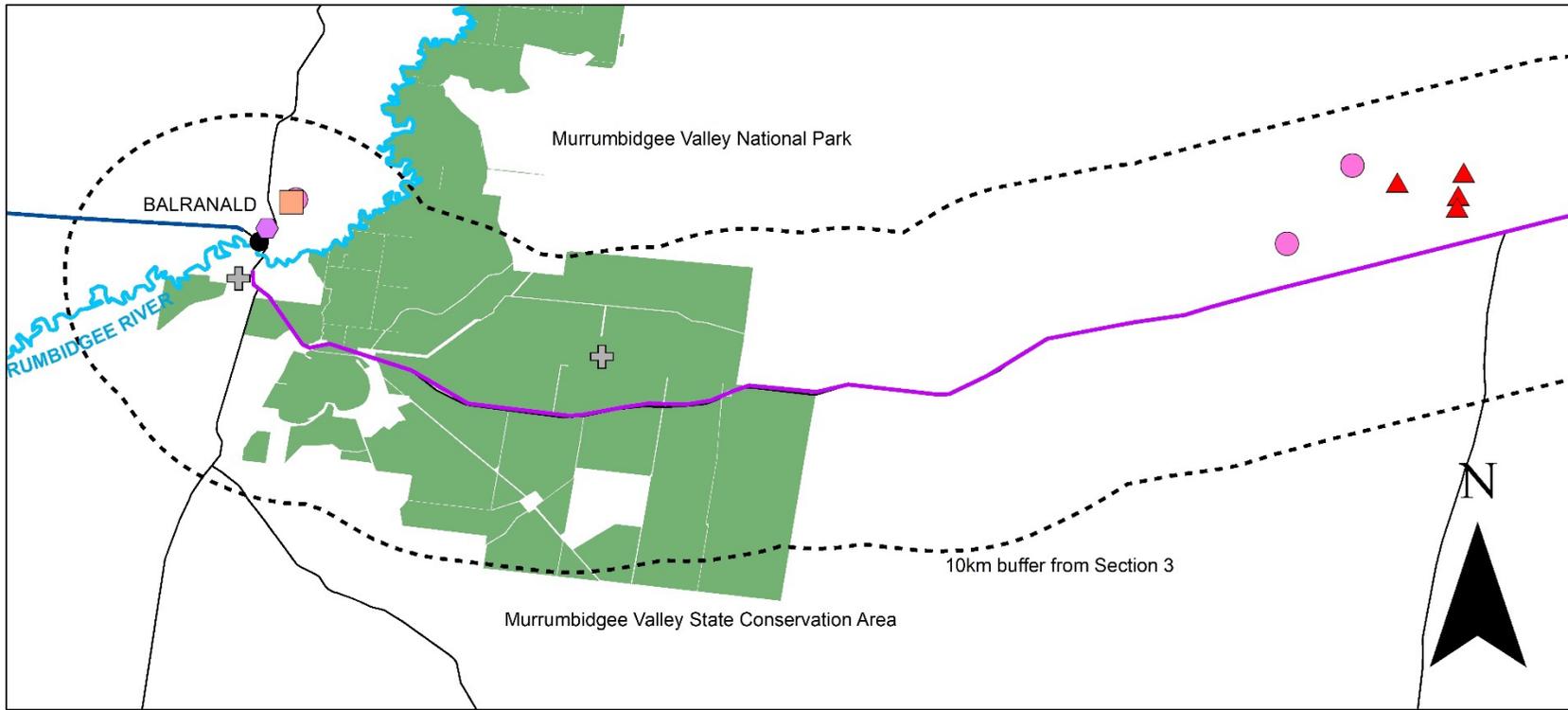


Figure 2-16: Previous records for threatened species in section 3

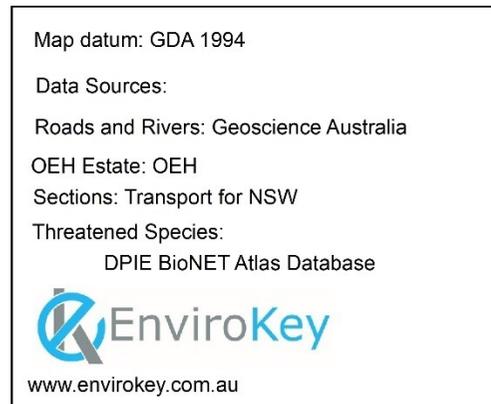
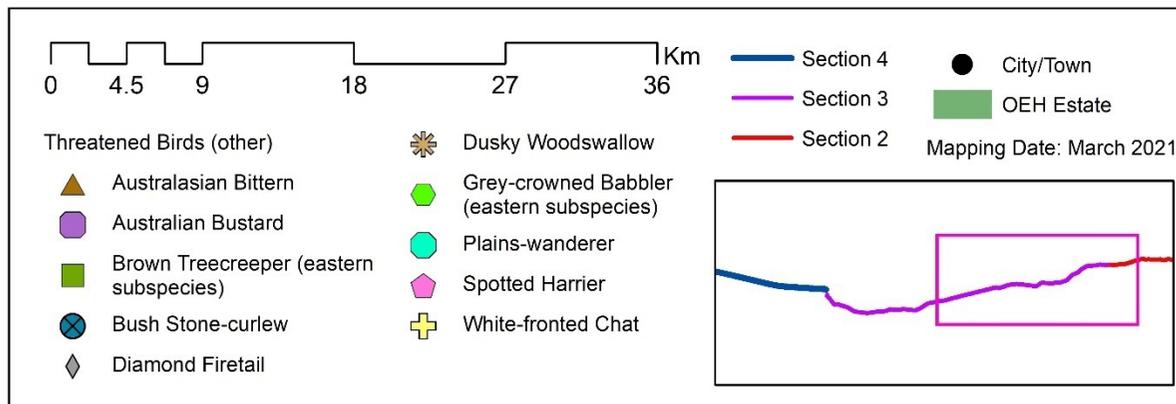
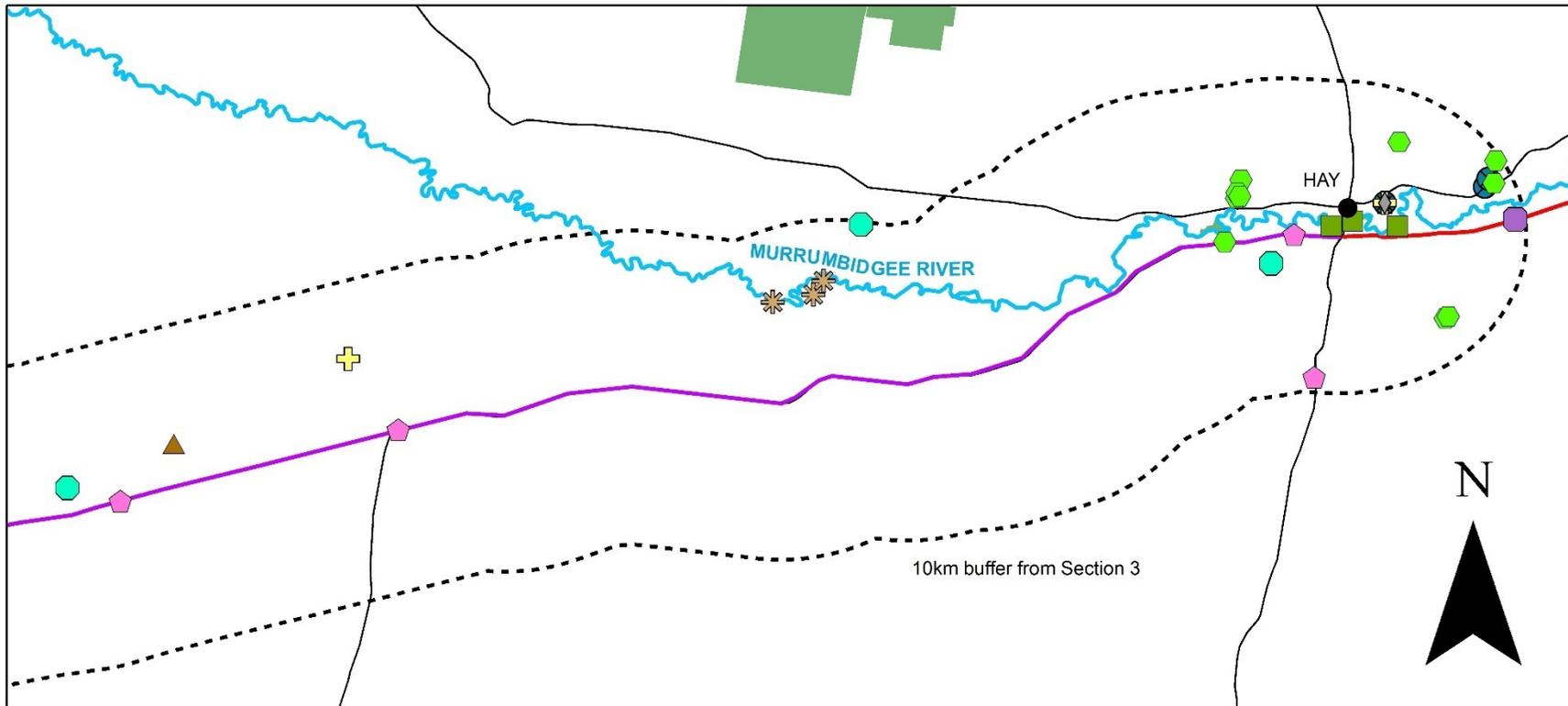


Figure 2-17: Previous records for threatened species in section 3

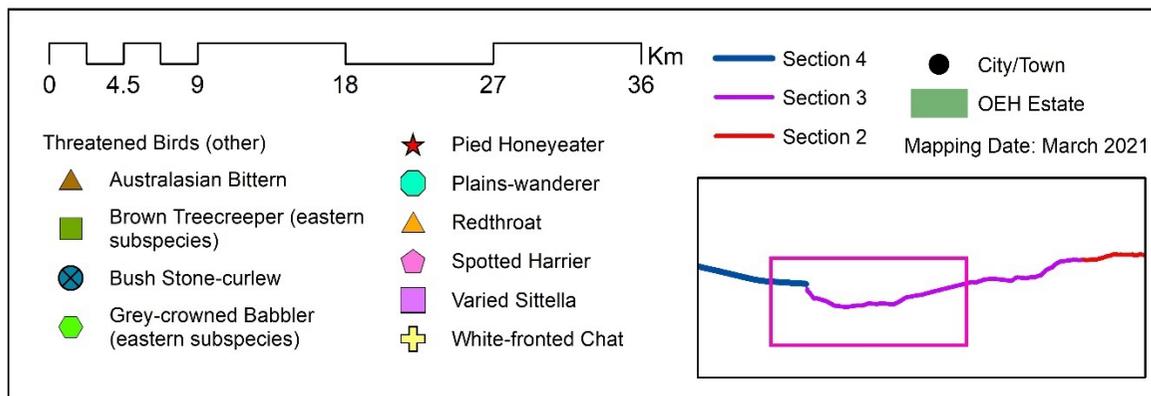
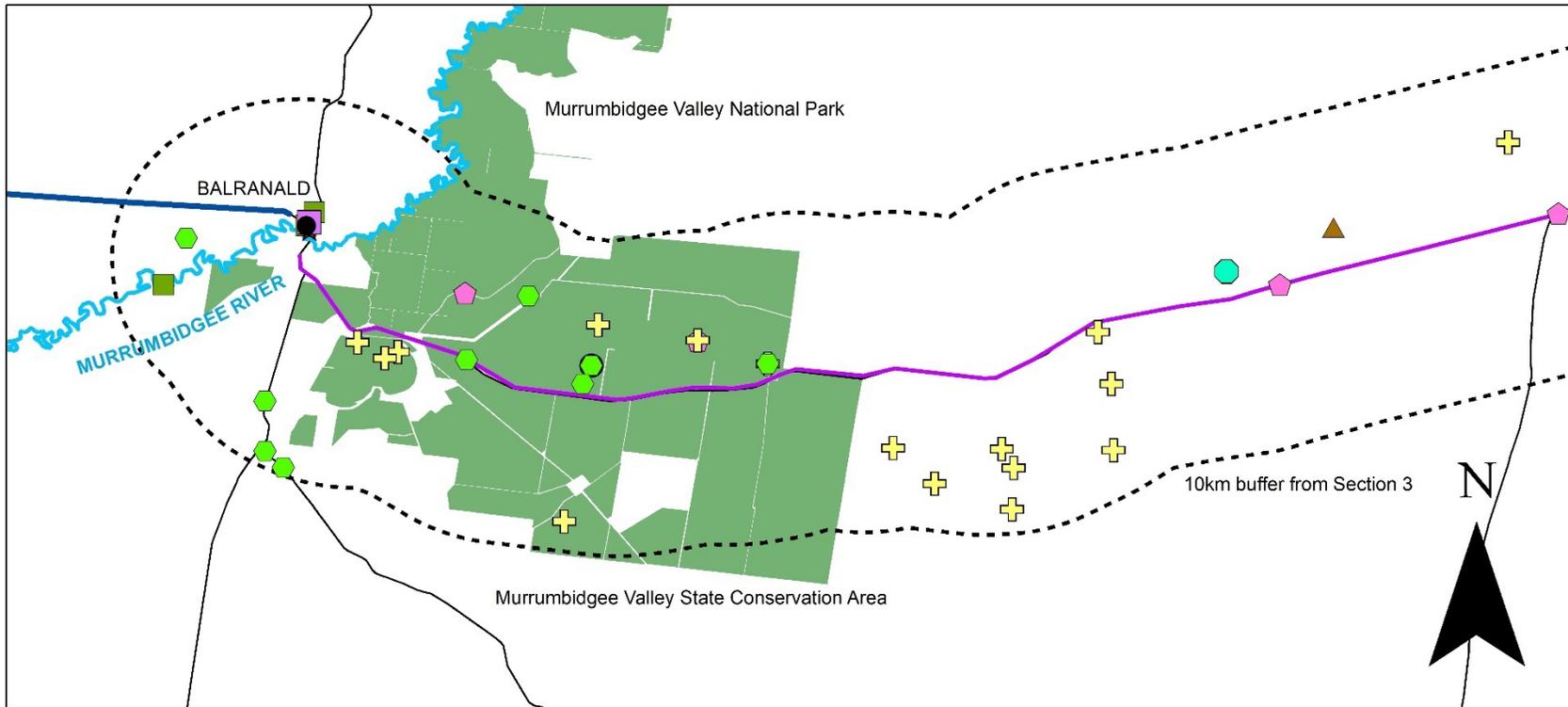


Figure 2-18: Previous records for threatened species in section 3

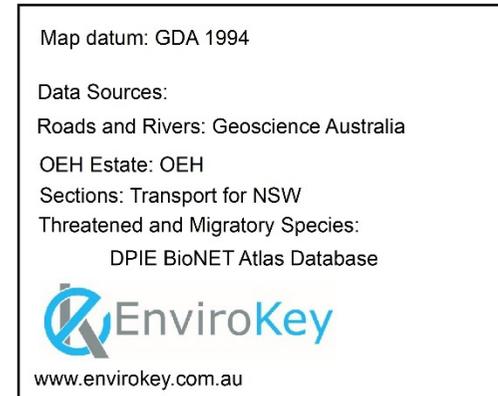
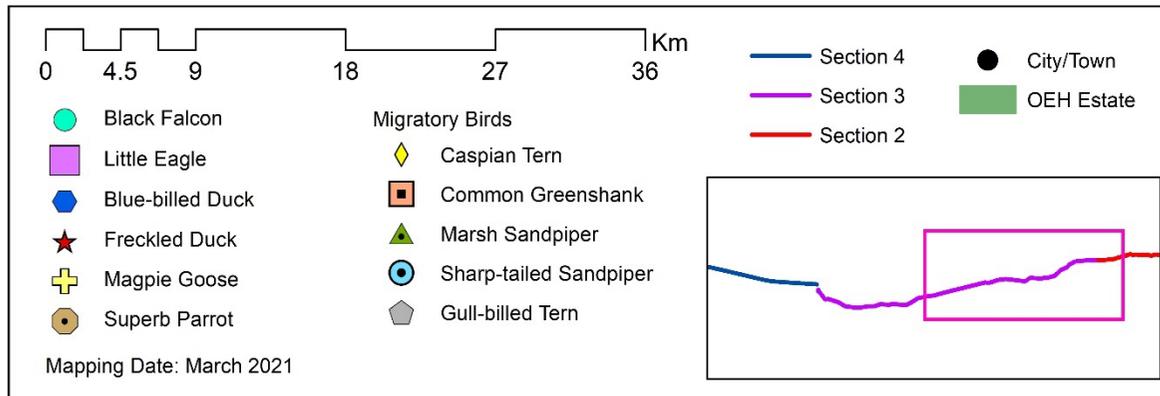
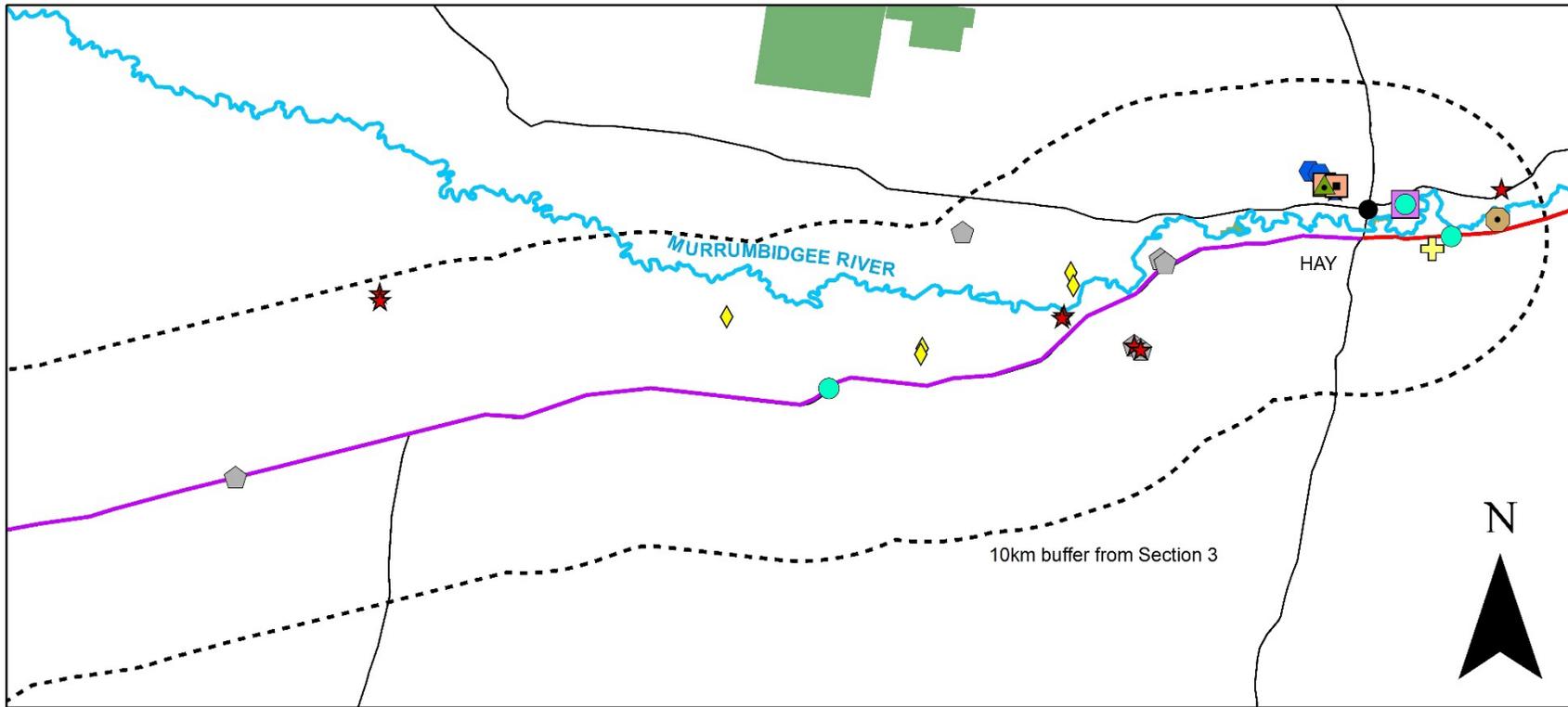
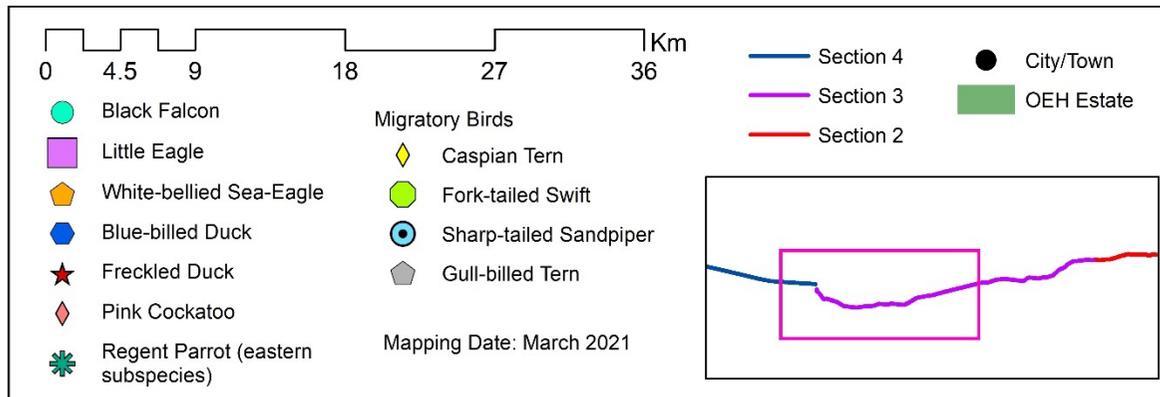
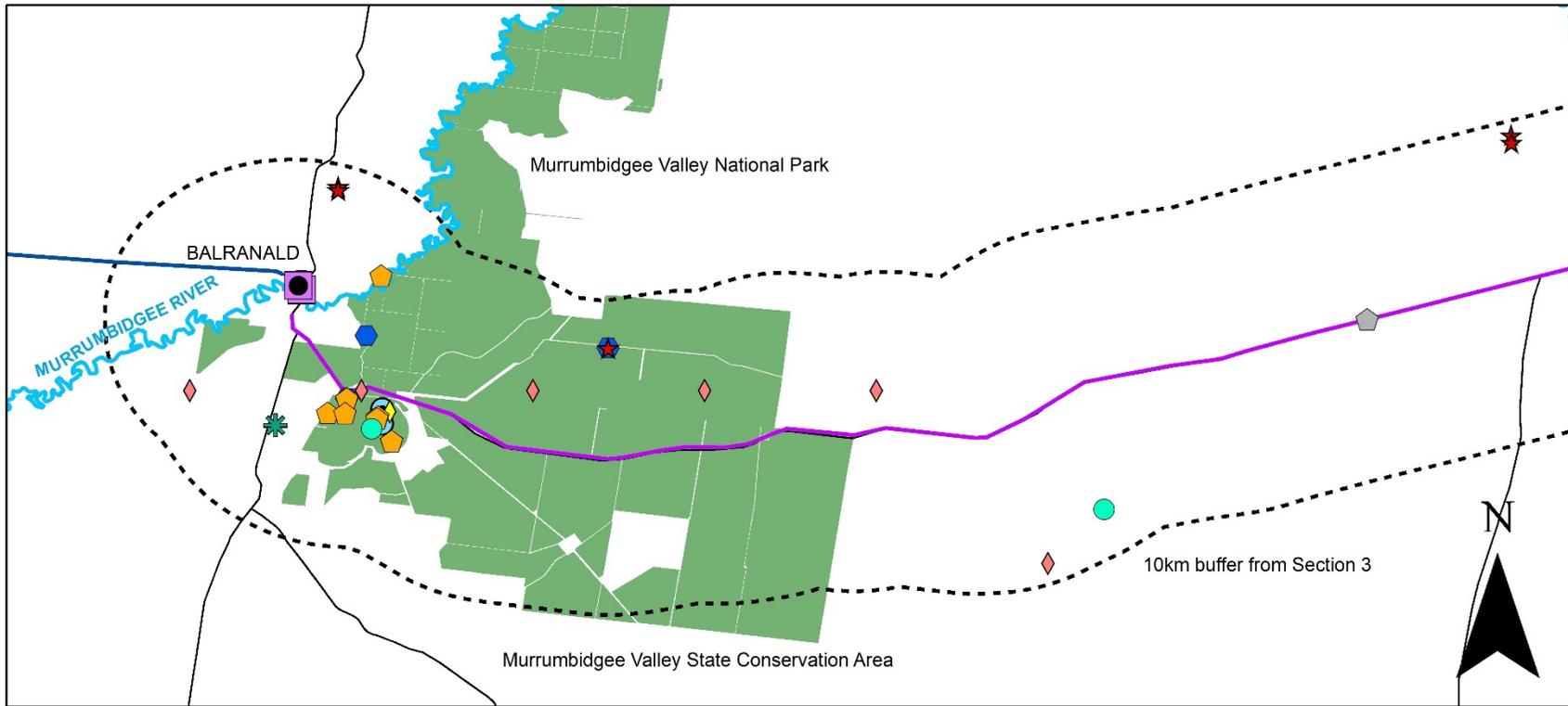


Figure 2-19: Previous records for migratory and threatened species in section 3

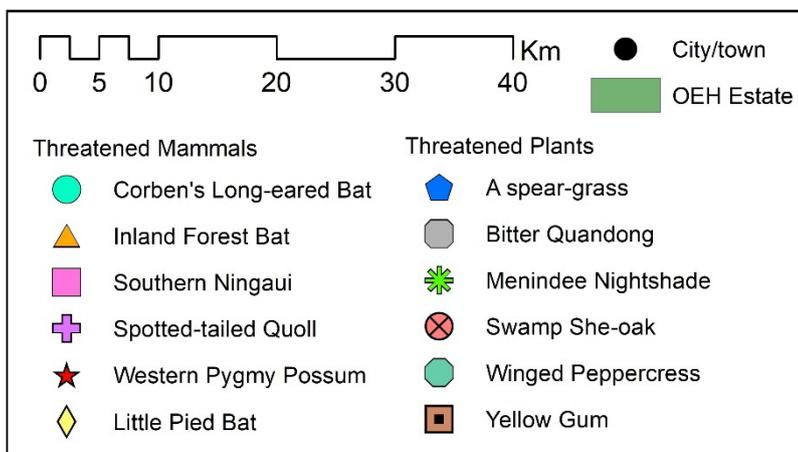
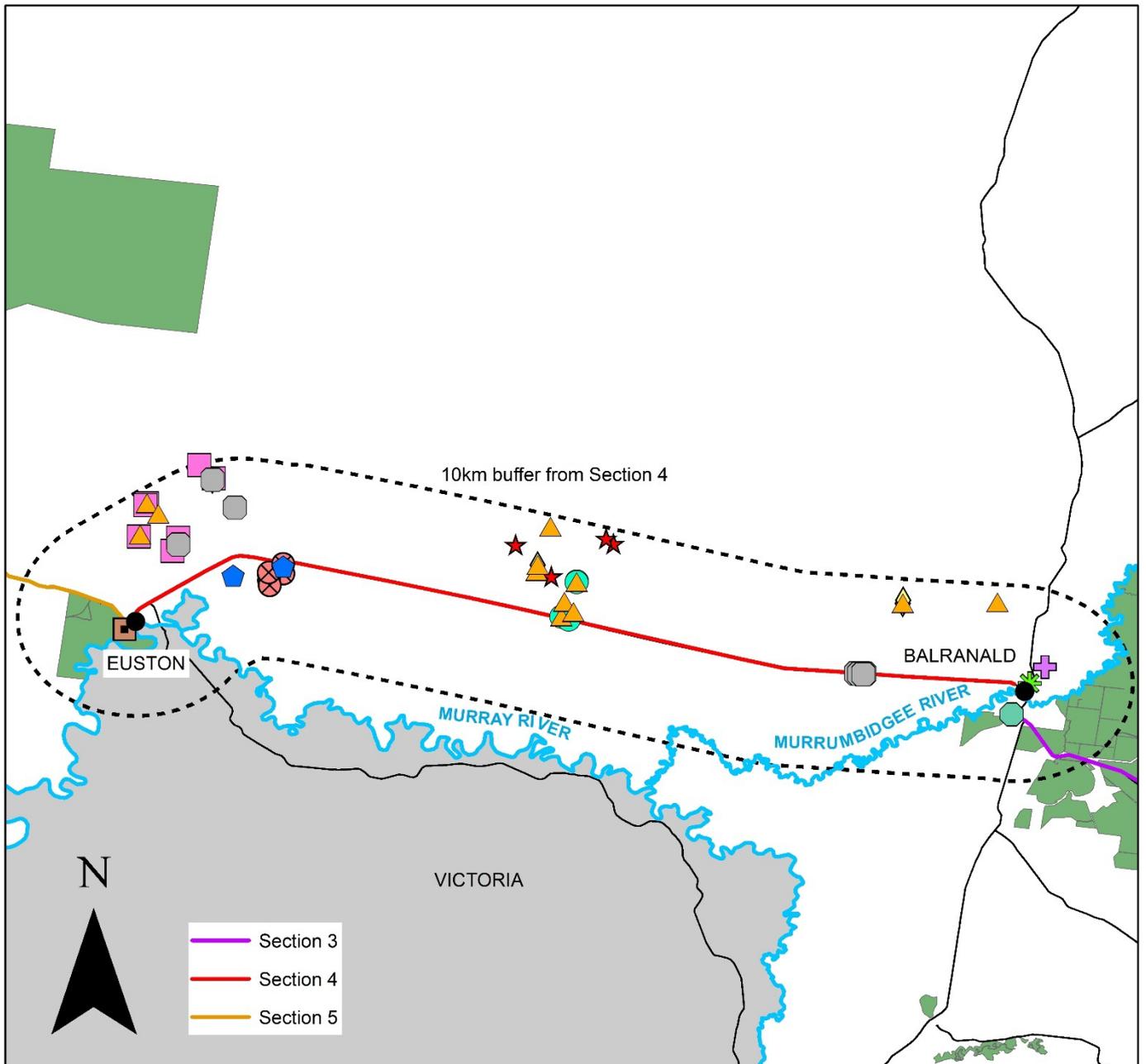


Map datum: GDA 1994

Data Sources:
 Roads and Rivers: Geoscience Australia
 OEH Estate: OEH
 Sections: Transport for NSW
 Threatened and Migratory Species:
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Figure 2-20: Previous records for migratory and threatened species in section 3



Mapping Date: March 2021

Map Datum: GDA 1994

Data Sources:

OEH Estate: OEH

Sections: Transport for NSW

Roads and Rivers: Geoscience Australia

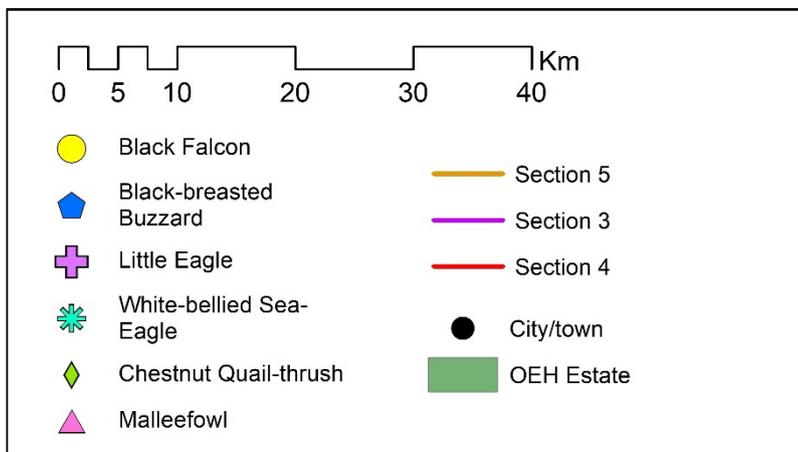
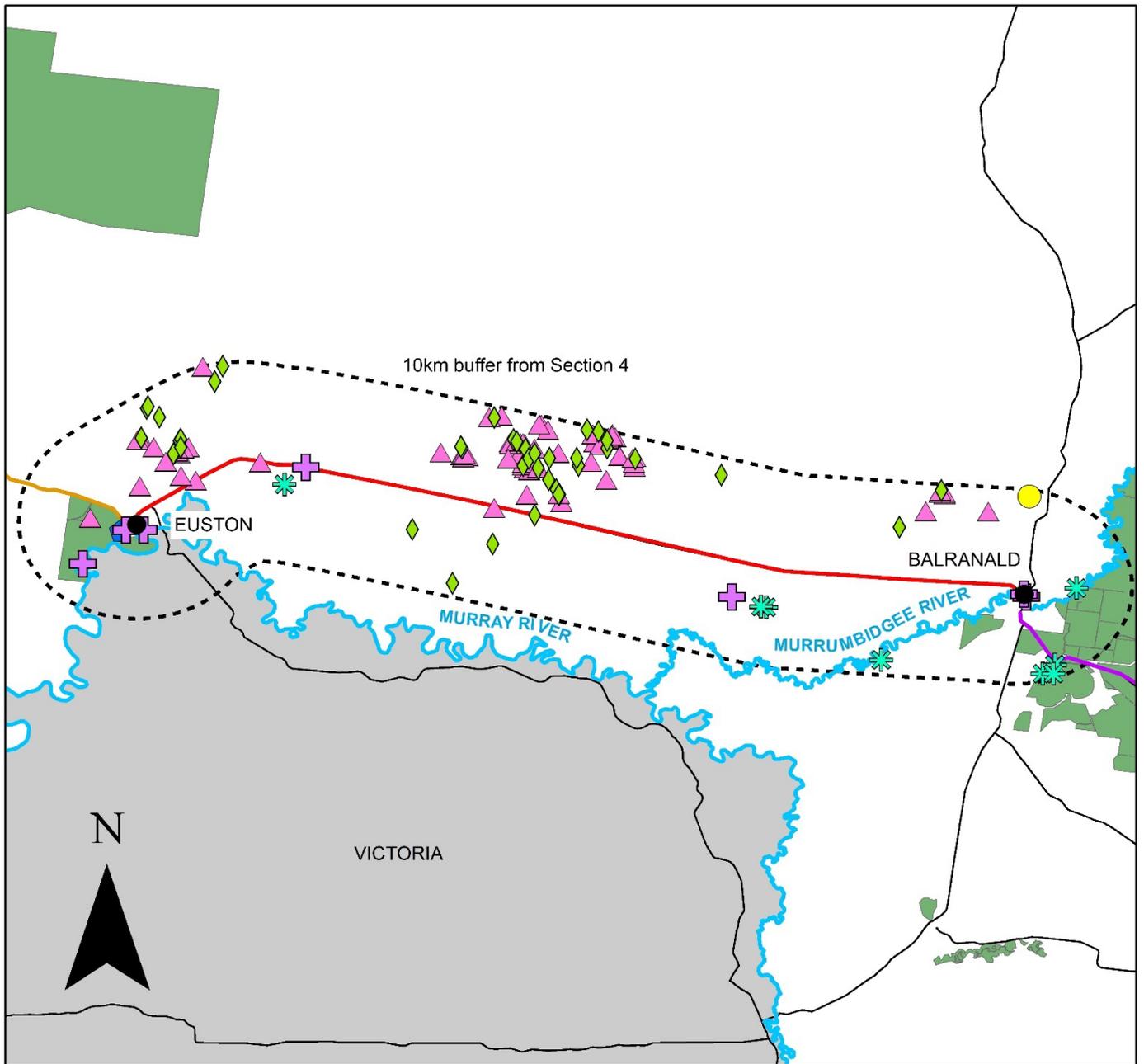
Threatened Species:

DPIE BioNET Atlas Database



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Figure 2-21: Previous records for threatened species in section 4



Mapping Date: March 2021
 Map Datum: GDA 1994

Data Sources:
 OEH Estate: OEH
 Sections: Transport for NSW
 Roads and Rivers: Geoscience Australia
 Threatened Species:
 DPIE BioNET Atlas Database

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Figure 2-22: Previous records for threatened species in section 4

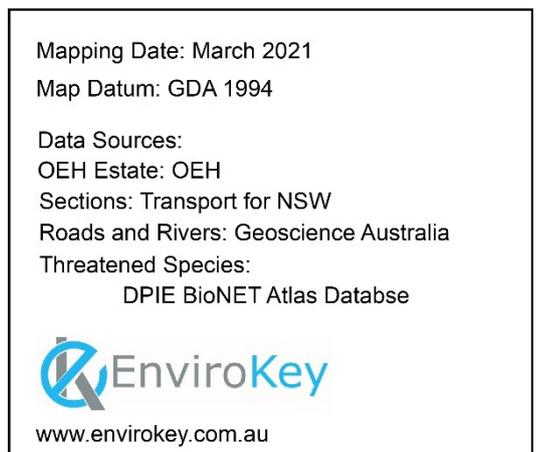
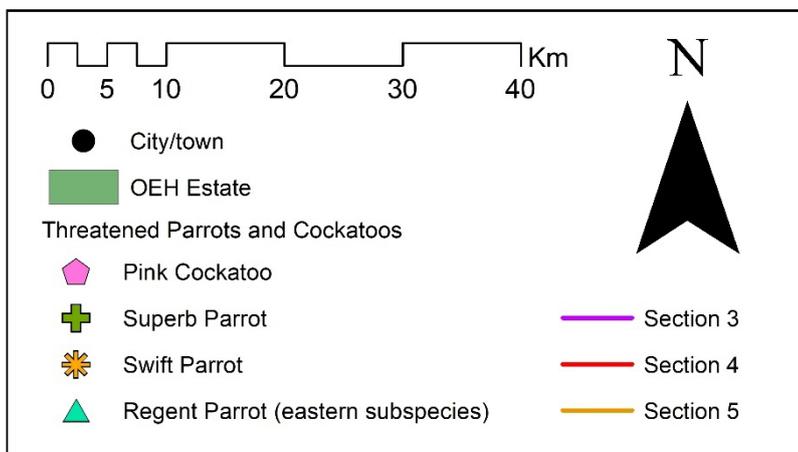
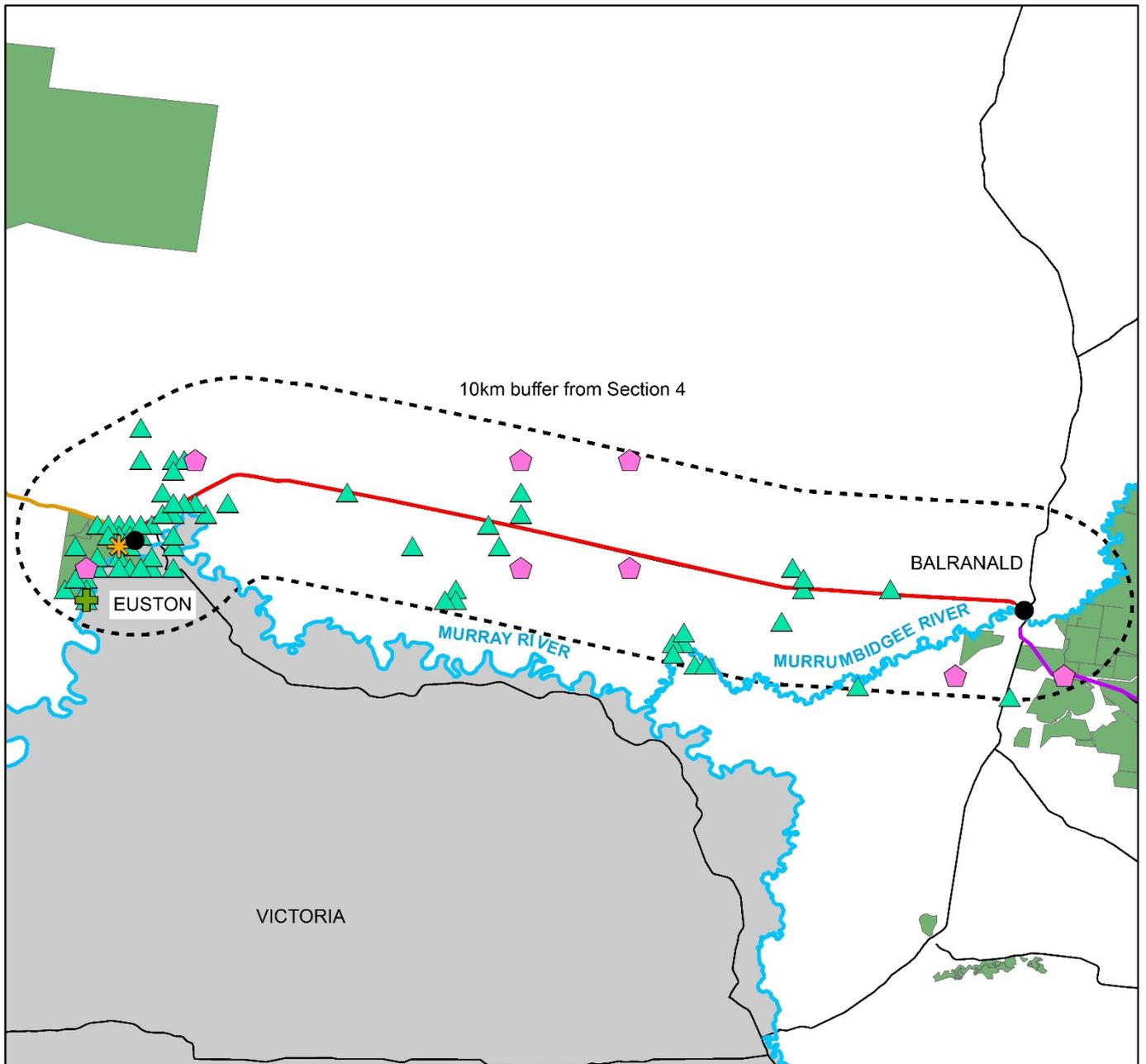
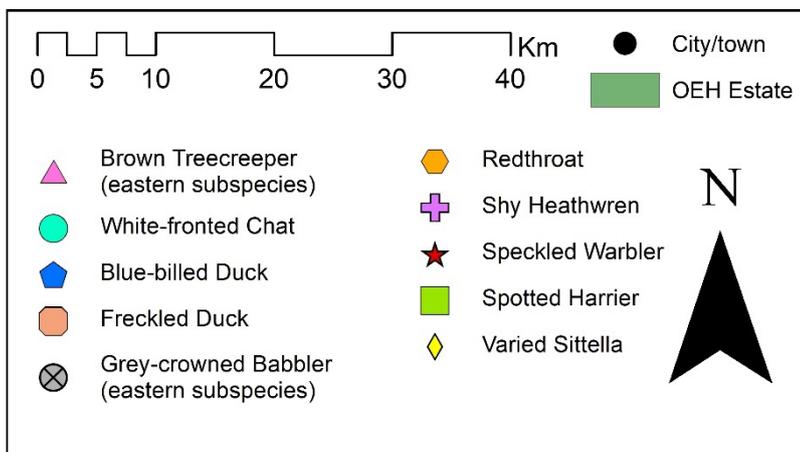
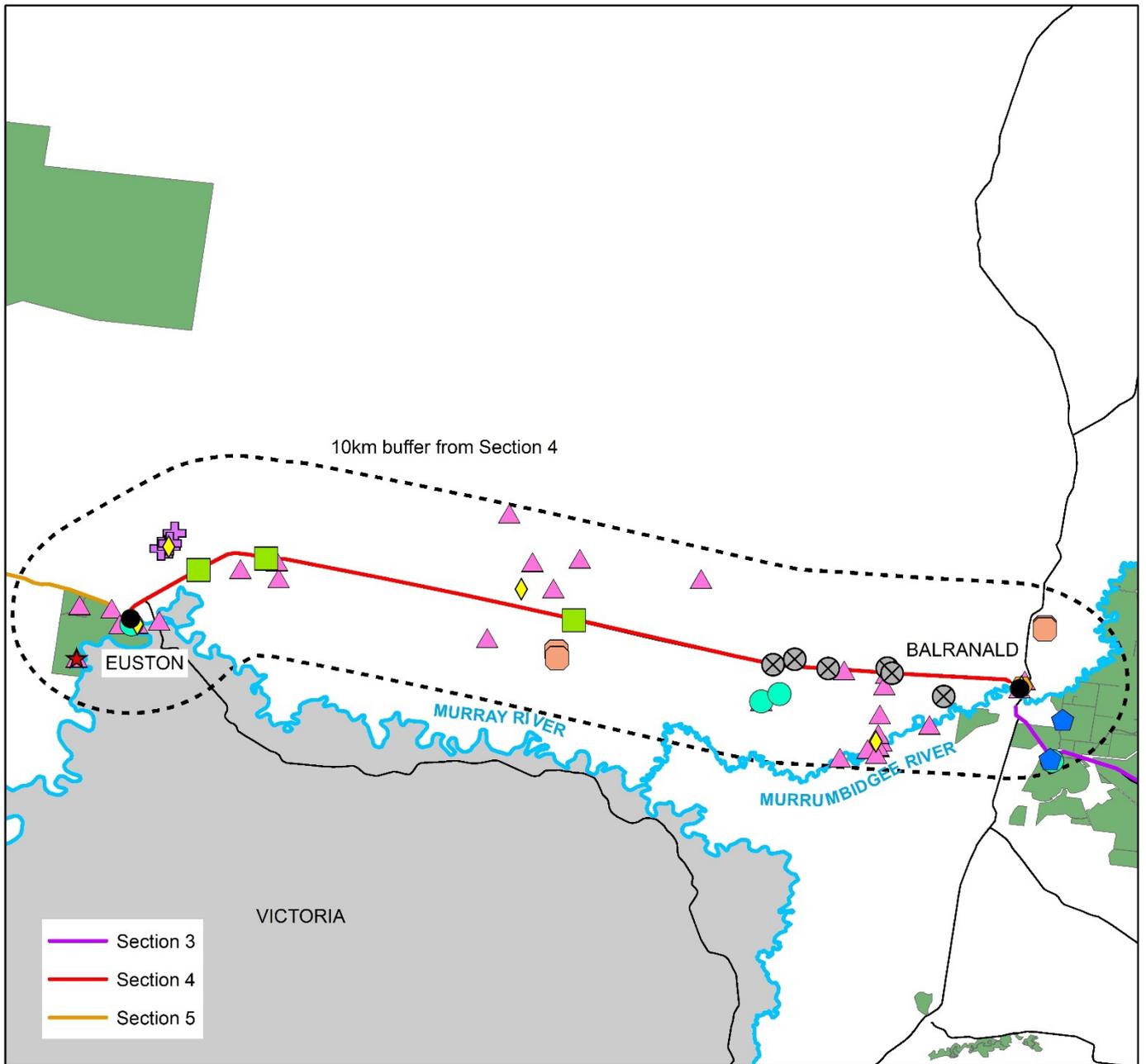


Figure 2-23: Previous records for threatened species in section 4



Mapping Date: March 2021
 Map Datum: GDA 1994

Data Sources:
 OEH Estate: OEH
 Sections: Transport for NSW
 Roads and Rivers: Geoscience Australia
 Threatened Species:
 DPIE BioNET Atlas Database


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Figure 2-24: Previous records for threatened species in section 4

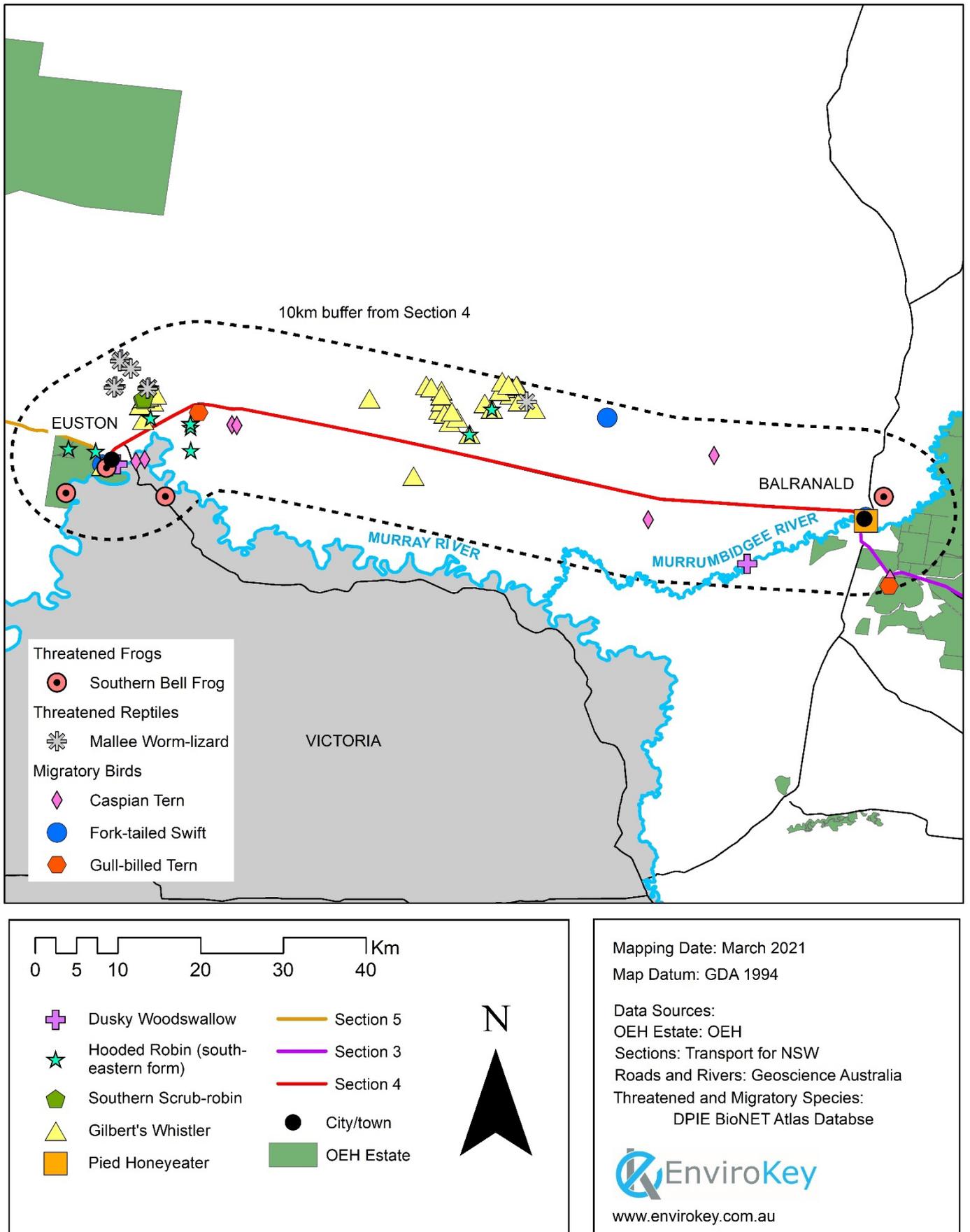
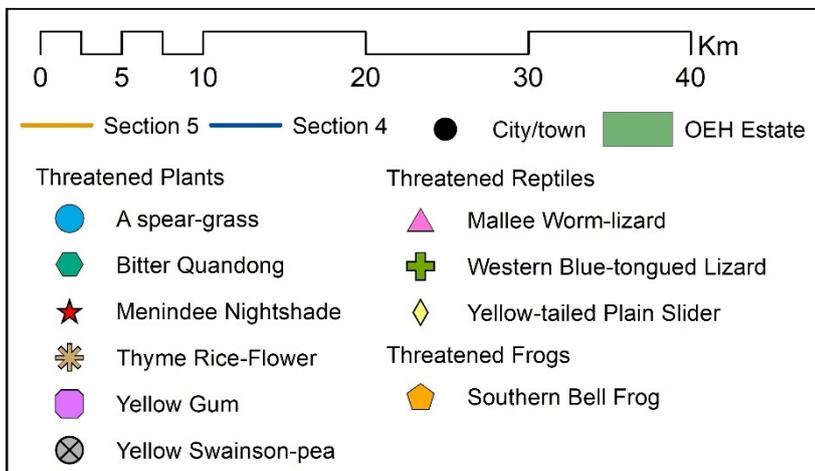
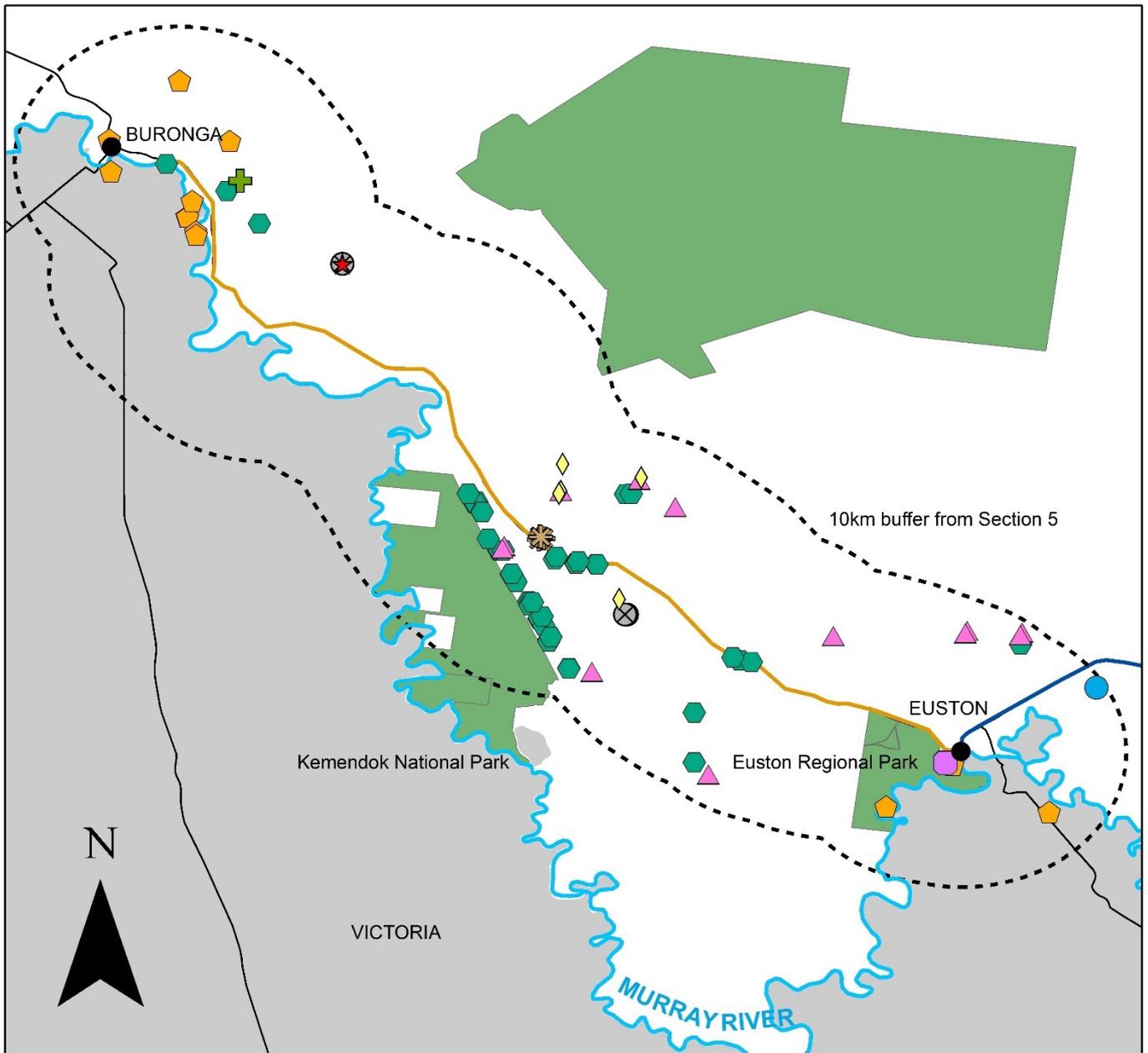


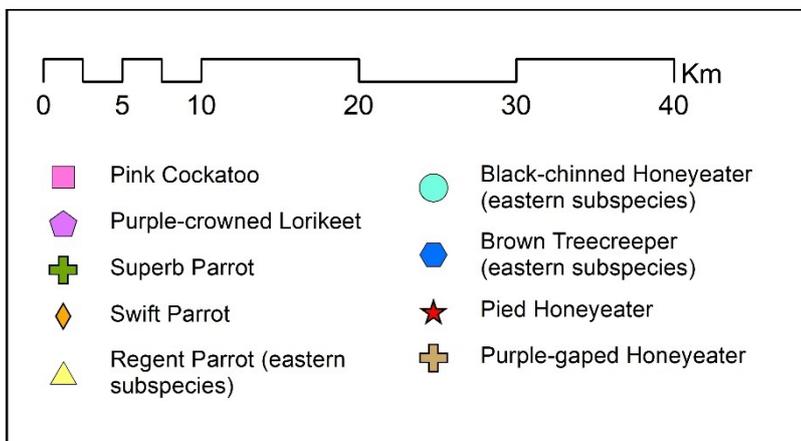
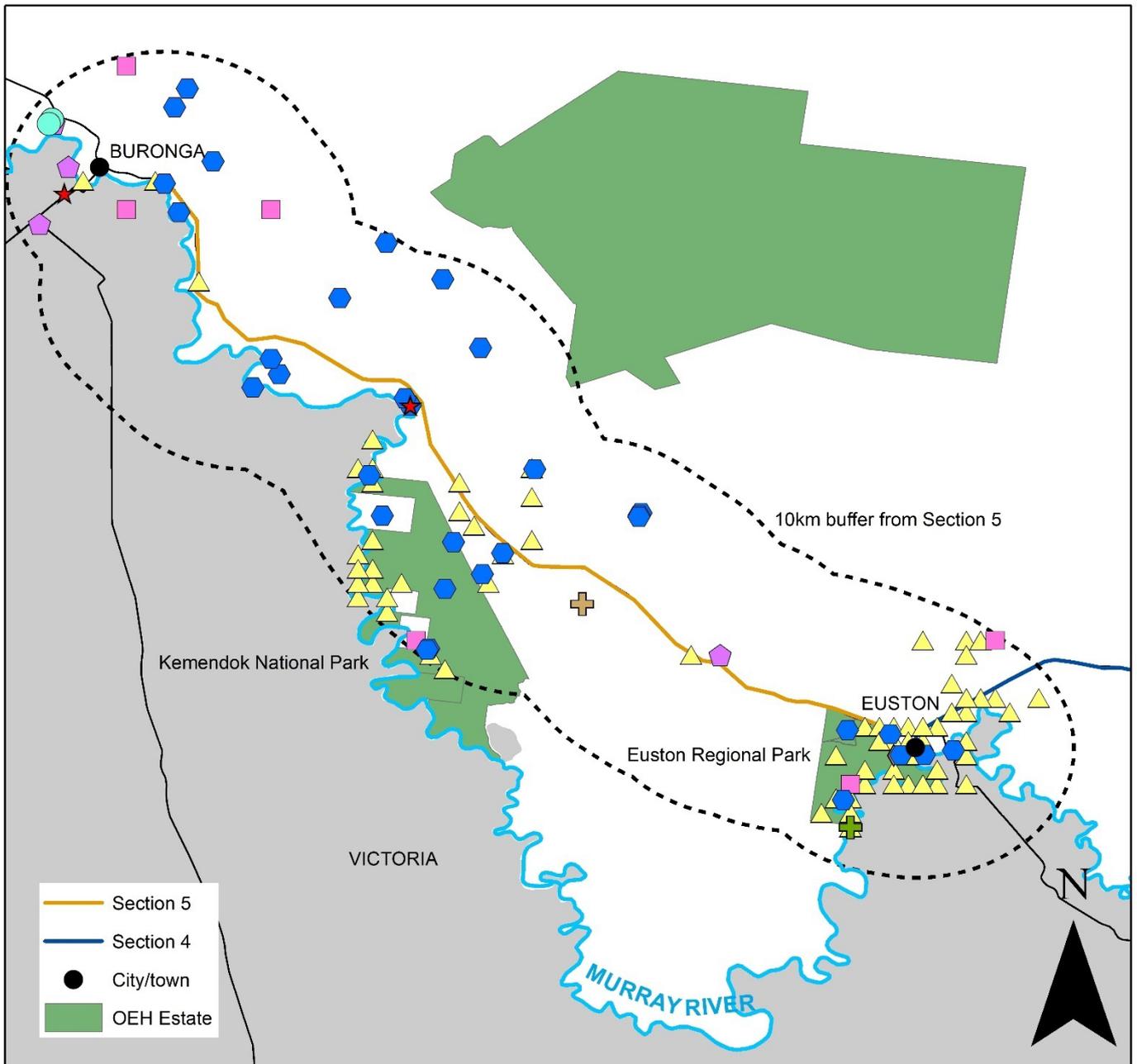
Figure 2-25: Previous records for threatened species in section 4



Mapping Date: March 2021
 Map Datum: GDA 1994
 Data Sources:
 OEH Estate: OEH
 Sections: Transport for NSW
 Roads and Rivers: Geoscience Australia
 Threatened Species:
 DPIE BioNET Atlas Database


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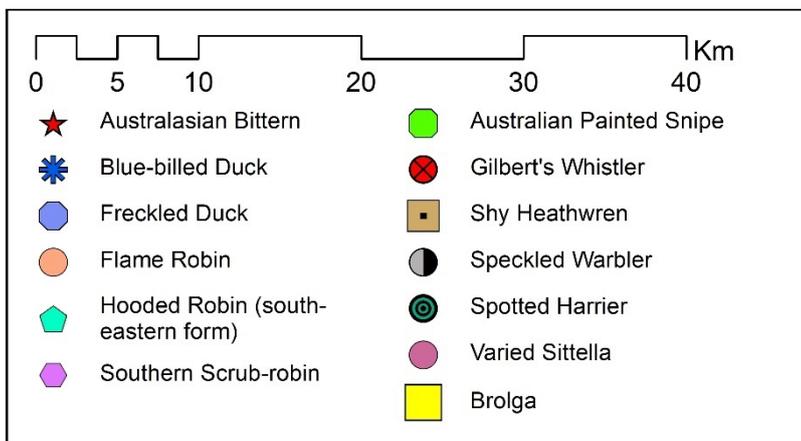
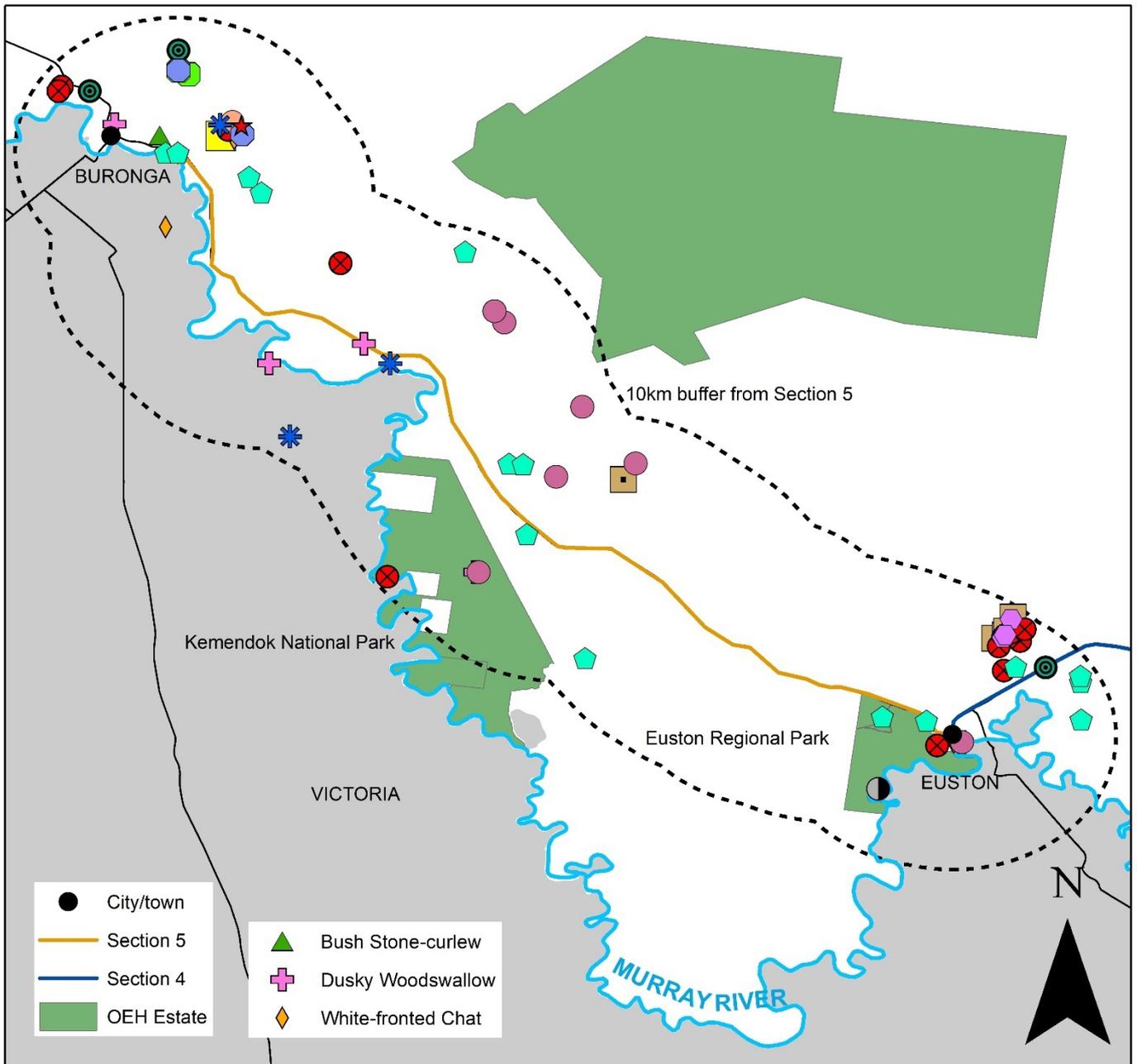
Figure 2-26: Previous records for threatened species in section 5



Mapping Date: March 2021
 Map Datum: GDA 1994
 Data Sources:
 OEH Estate: OEH
 Sections: Transport for NSW
 Roads and Rivers: Geoscience Australia
 Threatened Species:
 DPIE BioNET Atlas Database

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Figure 2-27: Previous records for threatened species in section 5



Mapping Date: March 2021
 Map Datum: GDA 1994
 Data Sources:
 OEH Estate: OEH
 Sections: Transport for NSW
 Roads and Rivers: Geoscience Australia
 Threatened Species:
 DPIE BioNET Atlas Database

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Figure 2-28: Previous records for threatened species in section 5

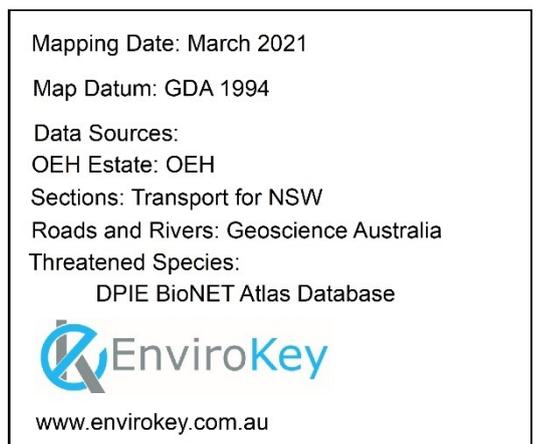
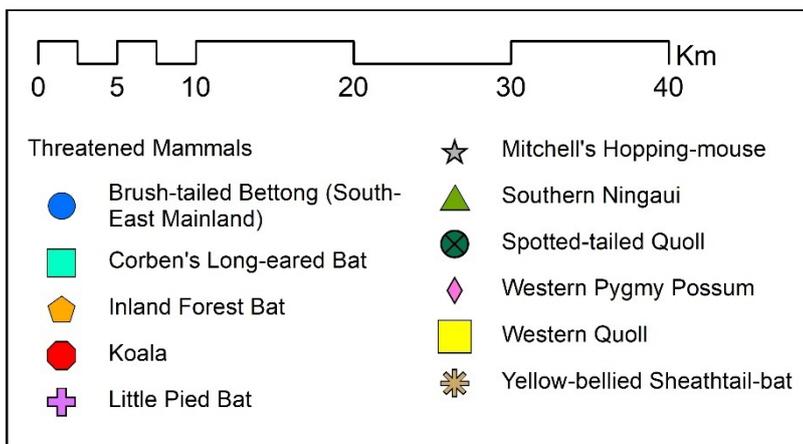
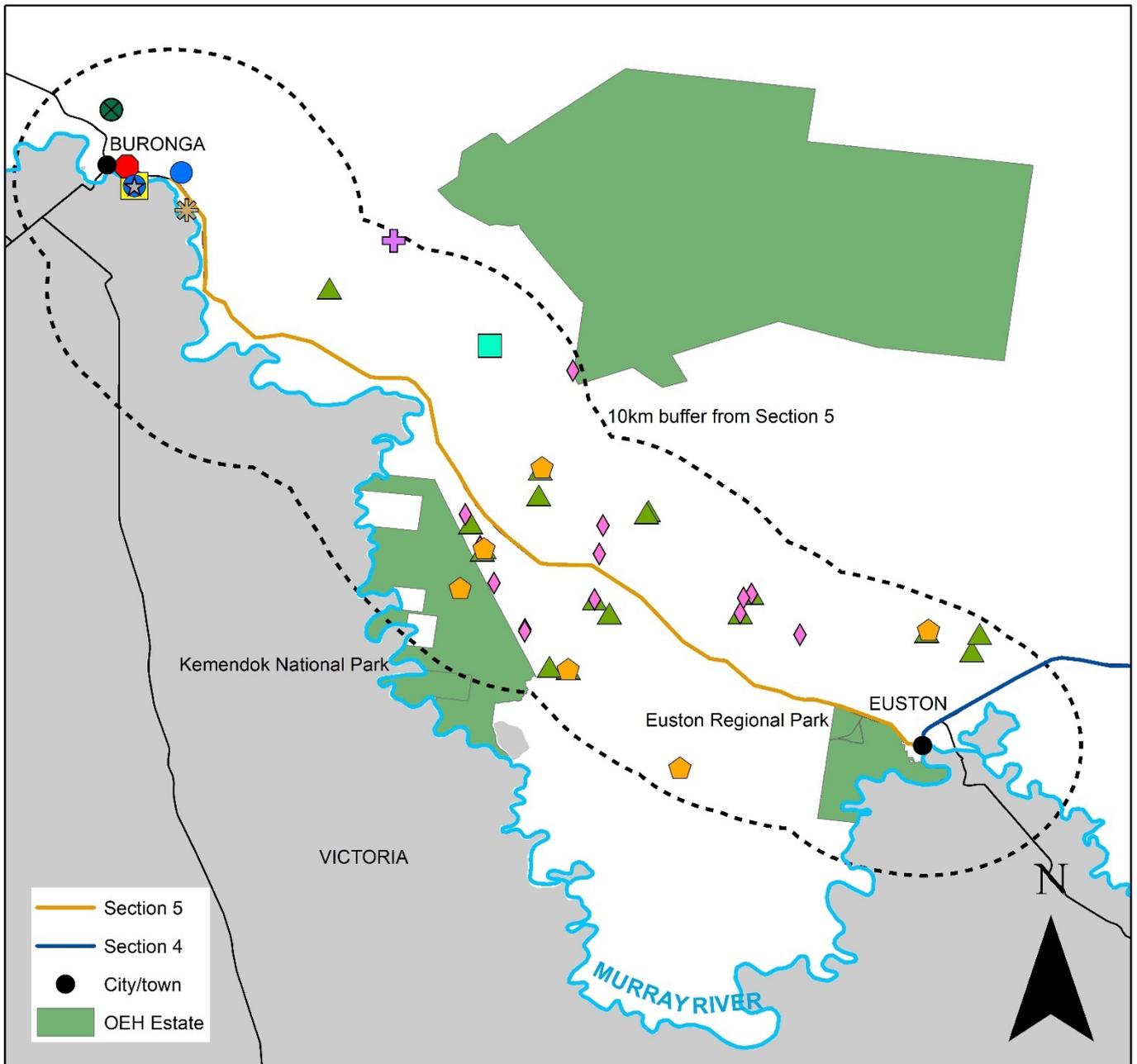


Figure 2-29: Previous records for threatened species in section 5

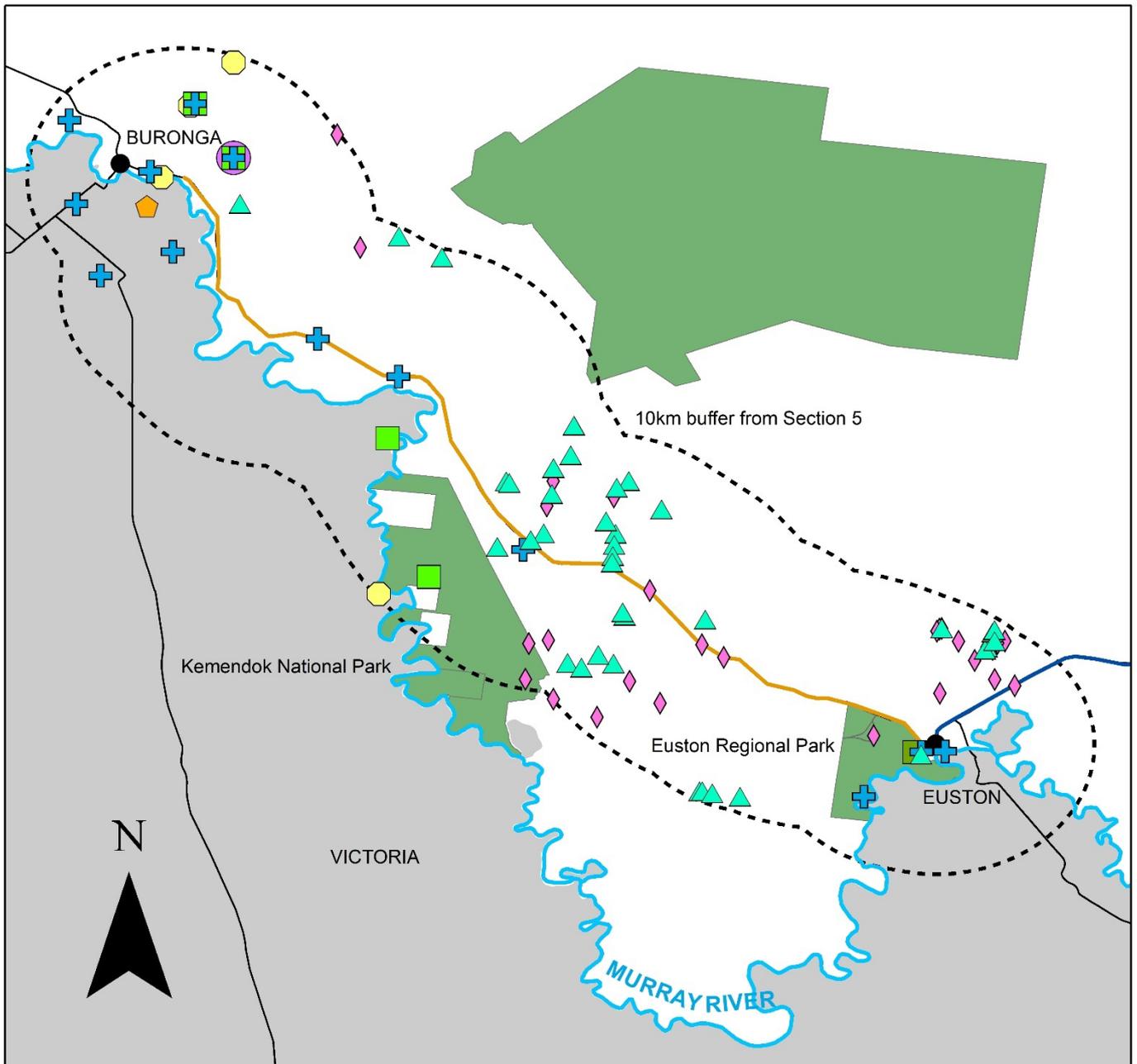
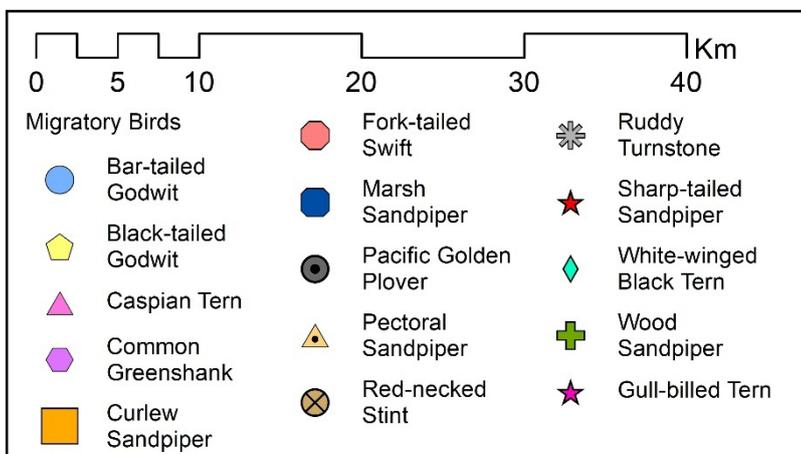
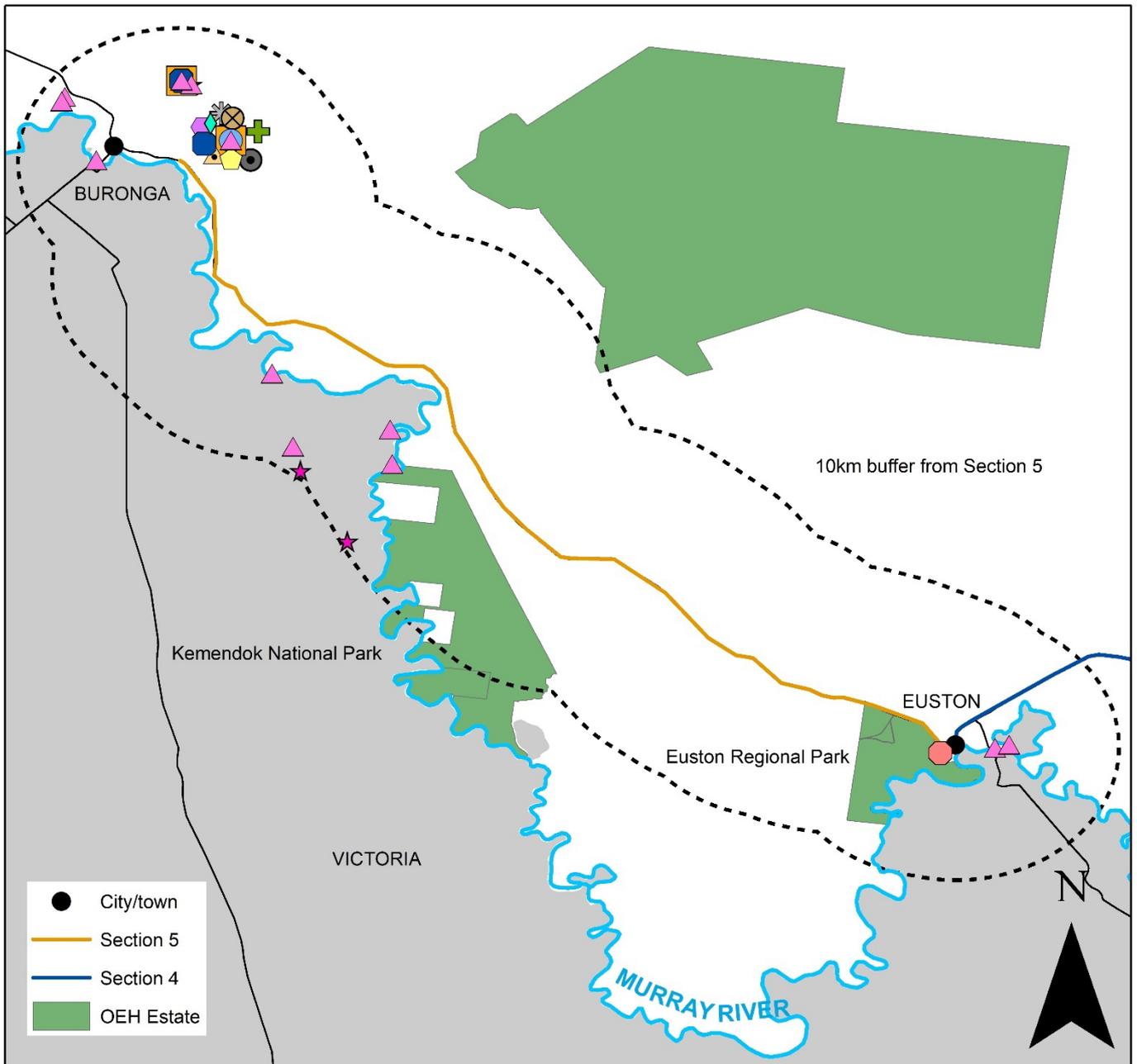


Figure 2-30: Previous records for threatened species in section 5



Mapping Date: March 2021
 Map Datum: GDA 1994
 Data Sources:
 OEH Estate: OEH
 Sections: Transport for NSW
 Roads and Rivers: Geoscience Australia
 Migratory Birds:
 DPIE BioNET Atlas Database


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Figure 2-31: Previous records for migratory species in section 5

2.4 Field survey

2.4.1 Vegetation surveys

Threatened species searches and general vegetation surveys were carried out between 21 March – 3 April 2021. A total of 13 field surveys days by two persons were completed (26-person days).

The aims of the flora surveys were to:

- Determine all vegetation communities present within the study area, their condition and extent, with reference to the OEH plant community type (PCT) classification
- Identify potential Threatened Ecological Communities (TECs) within the study area and determine their condition and extent
- Identify whether threatened flora species are present within the study area, and whether it is likely that any have the potential to occur within the habitats present
- Identify areas of high weed infestation.

Species and vegetation communities identified from the background searches as potentially occurring in the study area were targeted during the surveys

Flora survey methods were based on the *Threatened Species Survey and Assessment: Guidelines for developments and activities* (DEC, 2004) using the random meander method. All habitat variations were covered across the study area. A BAM plot/transects in accordance with the Biodiversity Assessment Method (BAM) was also completed in each PCT.

Native vegetation communities/types were classified in accordance with the NSW Vegetation Information System (OEH, 2021b). Threatened ecological communities (if present) were classified in accordance with relevant State and Federal threatened ecological community descriptions (OEH, 2021c, SPRAT, 2017).

Exotic species were checked for priority weed status on the Department of Primary Industries websites (DPI, 2021).

2.4.2 Random meander surveys

The study area was surveyed using a random meander method (informal transects) (Cropper, 1993). This was carried out by random walking through the proposed impact areas within each PCT. This was generally within a 50-metre radius of the BAM plot. All observed vascular plant species were identified to species level or otherwise as accurately as possible. The random meander method provides comprehensiveness in terms of the number of species recorded and variation within vegetation types. It is used to maximise the coverage of threatened species habitat and the encounter rate of different species (SoQ, 2014). During the random meander dominant tree species, physical structure of the vegetation, and species composition were also recorded and used to identify vegetation types. A comprehensive species list is provided in Annexure A.

2.4.3 Threatened orchid surveys

Surveys for the threatened flora species Pine Donkey Orchid (*Diuris tricolor*) were triggered after the field survey identified potentially suitable habitat within sandhill pine woodland areas. The survey timing was not appropriate for species detection so target surveys were carried out in October 2021 in line with known flowering of other Pine Donkey Orchid populations that occur south of Narrandera. The location of orchid transects are shown in Figure 3-55 and 3-56.

2.4.4 Targeted fauna surveys

Targeted fauna surveys were carried out between 21 March – 3 April 2021. A total of 13 field surveys days by one person was completed (13-person days). At each 'Fauna Survey' location mapped on Figure 3-1 to Figure 3-54., the following surveys were carried out at each site.

Diurnal Bird Survey

Diurnal bird surveys were conducted using the widely accepted 'standardised method' (Watson, 2003). Any species of bird observed or identified from call recognition, were recorded during the field survey period. Surveys were completed across a range of environmental variables to encompass the range of avifaunal assemblages and their periods of activity.

Systematic Reptile Search

Reptile hand searches were completed at each Fauna survey location. These were carried out by an experienced ecologist well known for their reptile expertise, by actively seeking basking animals and searching through leaf litter, roadside rubbish, and under fallen timber for inactive reptiles.

Systematic Amphibian Search

Where habitat was present, an experienced ecologist search for active frogs, and through leaf litter, roadside rubbish and under fallen timber.

2.4.5 Habitat assessment

EnviroKey completed out a general Habitat Assessment along the proposal length. This was completed during the BAM plots (one BAM plot within each PCT). Hollow-bearing trees (HBT) were also assessed. All hollow-bearing trees within 10 metres of the existing edge line were mapped. Outside of the 10 metre buffer, HBT clusters were mapped by a single point which then identified the number of HBT within the road reserve (but outside of the proposed impact area) within 50 metres. All HBT and HBT clusters are mapped on Figure 3-1 to Figure 3-54.

2.4.6 Summary of survey effort and limitations

Table 2-3: Targeted species survey details

Species	Minimum survey requirements ¹	Survey completed
All flora species	1 plot per <2 hectares of a vegetation zone	29 BAM plots plus random meander surveys
All bird species	No specific minimum	29 x 20-minute bird surveys along the proposal
All species via Habitat assessment	No specific minimum	The full length of the study area
Reptile and frog surveys	No specific minimum	29 hand search surveys

A common limitation of many biodiversity studies is the short period of time in which they are conducted. When combined with a lack of seasonal sampling this can lead to either low detection rates or false

absences being reported. This is also particularly relevant to highly mobile species that may not have been in the study area at the time of the survey or in the very dry conditions during and prior to the field surveys. Given this, further analysis was conducted to evaluate which threatened and migratory biota were likely to occur within the vicinity of the proposal based on the presence of habitat. This is detailed within Annexure C.

The floristic survey carried out recorded as many species as possible and provides a comprehensive but likely not definitive species list. More species would probably be recorded during a longer survey of more sites over various seasons. Nevertheless, the techniques used in this investigation are considered adequate to gather the data necessary to assess the impacts of the proposal on the flora species and vegetation communities found in the study area.

2.5 Impact assessment calculation

The area of impact has been calculated using a geographic information system (GIS) shapefile of the proposed impact areas provided by Transport which was then overlain onto the vegetation mapping, hollow-bearing tree mapping, and threatened species recorded prepared from the field surveys.

Where the impact area provided was a square or rectangle polygon, this was taken as the area of direct impact and all vegetation would be removed. It was agreed early in the planning process between representatives of Transport and Envirokey that these areas would not require an additional buffer.

For circle polygons (ie individual tree removal), this was taken as the area of direct impact. An additional area was calculated around the individual tree for temporary impacts during tree removal. An allowance of 3 metres by 3 metres was calculated for each individual tree as a temporary impact. Where circle polygons existed within square or rectangular polygons, they are omitted from the GIS calculations, so that “double-ups” are not included.

3. Existing environment

3.1 Plant community types

Given the length of the proposal, the study area is highly variable and traverses three bioregions, and dozens of Mitchell landscapes. Combined with portions of the proposal occurring within highly modified agricultural landscapes, the plant community types (PCT) are also extensive.

To better understand the extent of native vegetation within the general vicinity of the proposal an assessment using the Biodiversity Assessment Methodology (BAM) was carried out on the existing vegetation community datasets that occur within the study area. These being State Vegetation Type (SVT) Map: Riverina and SVT: Western (OEH, 2018a). These existing datasets identify 60 plant community types (PCT) within a 550-metre radius of the proposal (Table 3-1 to Table 3-5). The SVT mapping datasets are produced through a combination of previous map sets, GIS modelling, but with limited ground validation, so they often have widespread inaccuracies, including not mapping existing vegetation with a PCT unit. However, the SVT does provide an indicative analysis of the potential PCT that may occur in the vicinity of the proposal, and we have used these to guide our field surveys and our understanding of vegetation types and extent beyond the boundaries of the proposal.

Table 3-1: Existing vegetation mapping (Riverina State Vegetation Type Map) within a 550-metre buffer of section 1

Plant community type (PCT)	Area (ha)	Threatened ecological community?
Non-native vegetation	8,102.7	No
River Red Gum herbaceous-grassy very tall open forest (5)	670.9	No
River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region (9)	180.0	No
Shallow freshwater wetland sedgeland in depressions on floodplains on inland alluvial plains and floodplains (53)	13.5	No
White Cypress Pine woodland on sandy loams in central NSW wheatbelt (70)	20.5	No
Yellow Box – River Red Gum tall grassy riverine woodland (74)	304.7	Yes, BC Act and EPBC Act
Yellow Box – White Cypress Pine grassy woodland on deep sandy-loam alluvial soils (75)	22.3	Yes, BC Act and EPBC Act
Western Grey Box tall grassy woodland on alluvial loam and clay soils (76)	251.2	Yes, BC Act and EPBC Act
Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains (80)	262.6	Yes, BC Act and EPBC Act
Western Grey Box – Cypress Pine shrubby woodland on stony footslopes (110)	9.3	Yes, BC Act and EPBC Act

Plant community type (PCT)	Area (ha)	Threatened ecological community?
Riverine Western Grey Box grassy woodland of the semi-arid (warm) climate zone (237)	125.4	Yes, BC Act and EPBC Act
Derived tussock grassland of the central western plains and lower slopes (250)	220.4	No
White Box – White Cypress Pine – Western Grey Box shrub/grass/forb woodland (267)	22.6	Yes, BC Act and EPBC Act
Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in the NSW South Western Slopes Bioregion (276)	19.0	Yes, BC Act and EPBC Act
Blakely's Red Gum – Yellow Box tall grassy woodland (277)	72.9	Yes, BC Act and EPBC Act
White Box – Blakelys Red Gum – White Cypress Pine shrubby woodland on metamorphic hills in the Wagga Wagga – Cootamundra region (346)	67.3	Yes, BC Act and EPBC Act
Derived grassland of the NSW South Western Slopes (796)	29.8	No
Total	10,395.1 (incl 8,102.7ha non-native)	

Table 3-2: Existing vegetation mapping (Riverina State Vegetation Type Map) within a 550-metre buffer of section 2

Plant community type (PCT)	Area (ha)	Threatened ecological community (yes/no)
Non-native vegetation	8131.8	No
River Red Gum-sedge dominated very tall open forest in frequently flooded forest wetland along major rivers and floodplains in south-western NSW (2)	361.9	No
River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion (5)	572.3	No
River Red Gum – Warrego Grass – herbaceous riparian tall open forest wetland mainly in the Riverina Bioregion (7)	272.4	No
River Red Gum – Warrego Grass – Couch Grass riparian tall woodland wetland of the semi-arid (warm) climate zone (Riverina Bioregion and Murray Darling Depression Bioregion) (8)	0.6	No

Plant community type (PCT)	Area (ha)	Threatened ecological community (yes/no)
River Red Gum – wallaby grass tall woodland wetland on the outer River Red Gum zone mainly in the Riverina Bioregion (9)	4.7	No
River Red Gum – Black Box woodland wetland of the semi-arid (warm) climatic zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (10)	499.8	No
River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (11)	6.0	No
Shallow marsh wetland of regularly flooded depressions on floodplains mainly in the semi-arid (warm) climatic zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (12)	0.2	No
Black Box – Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (13)	804.5	No
Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (15)	47.6	No
Black Box grassy open woodland wetland of rarely flooded depressions in south western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (16)	362.5	No
Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (17)	115.1	No
Cypress Pine woodland of source-bordering dunes mainly on the Murray and Murrumbidgee River floodplains (19)	287.1	Yes, BC Act only
Buloke – Moonah – Black Box open woodland on sandy rises of semi arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (20)	10.6	Yes, BC Act only

Plant community type (PCT)	Area (ha)	Threatened ecological community (yes/no)
Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones (23)	91.5	Yes, BC Act only
Canegrass swamp tall grassland wetland of drainage depressions: lakes and pans of the inland plains (24)	0.6	No
Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion (26)	1028.5	Yes, BC Act and EPBC Act
White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone (28)	389.0	Yes, BC Act only
Forb-rich Speargrass – Windmill Grass – White Top grassland of the Riverina Bioregion (44)	1902.5	No
Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion (45)	409.7	No
Curly Windmill Grass – speargrass – wallaby grass grassland on alluvial clay and loam on the Hay Plain: Riverina Bioregion (46)	2322.3	No
Swamp grassland wetland of the Riverine Plain (47)	2.9	No
Shallow freshwater wetland sedgeland in depressions on floodplains on inland alluvial plains and floodplains (53)	14.9	No
White Cypress Pine woodland on sandy loams in central NSW wheatbelt (70)	7.6	No
Yellow Box – River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion (74)	253.1	Yes, BC Act and EPBC Act
Yellow Box – White Cypress Pine grassy woodland on deep sandy-loam alluvial soils of the eastern Riverina Bioregion and western NSW South Western Slopes Bioregion (75)	130.7	Yes, BC Act and EPBC Act
Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions (76)	1.1	Yes, BC Act and EPBC Act

Plant community type (PCT)	Area (ha)	Threatened ecological community (yes/no)
Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion (80)	18.4	Yes, BC Act and EPBC Act
Nitre Goosefoot shrubland wetland on clays of the inland floodplains (160)	52.4	No
Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones (163)	651.4	No
Cotton Bush open shrubland of the semi-arid (warm) zone (164)	887.9	No
Derived corkscrew grass grassland/forbland on sandplains and plains in the semi-arid (warm) climate zone (165)	20.9	No
Black Roly Poly low open shrubland of the Riverina Bioregion and Murray Darling Depression Bioregion (216)	11.1	No
Riverine Western Grey Box grassy woodland of the semi-arid (warm) climate zone (237)	26.1	Yes, BC Act and EPBC Act
Total	19,699.7 (incl. 8131.8ha non-native)	

Table 3-3: Existing vegetation mapping (State Vegetation Type Maps: Riverina and Western) within a 550-metre buffer of section 3

Plant community type (PCT)	Area (ha)	Threatened ecological community (yes/no)
Non-native vegetation	2862.0	No
River Red Gum-sedge dominated very tall open forest in frequently flooded forest wetland along major rivers and floodplains in south-western NSW (2)	24.3	No
River Red Gum herbaceous-grassy very tall open forest wetland on inner floodplains in the lower slopes sub-region of the NSW South Western Slopes Bioregion and the eastern Riverina Bioregion (5)	4.4	No
River Red Gum – Warrego Grass – herbaceous riparian tall open forest wetland mainly in the Riverina Bioregion (7)	143.3	No

Plant community type (PCT)	Area (ha)	Threatened ecological community (yes/no)
River Red Gum – Black Box woodland wetland of the semi-arid (warm) climatic zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (10)	13.4	No
River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (11)	41.1	No
Black Box – Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (13)	316.2	No
Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (15)	568.6	No
Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (17)	113.2	No
Canegrass swamp tall grassland wetland of drainage depressions: lakes and pans of the inland plains (24)	7.1	No
White Cypress Pine open woodland of sand plains: prior streams and dunes mainly of the semi-arid (warm) climate zone (28)	201.1	Yes, BC Act only
Forb-rich Speargrass – Windmill Grass – White Top grassland of the Riverina Bioregion (44)	1.9	No
Curly Windmill Grass – speargrass – wallaby grass grassland on alluvial clay and loam on the Hay Plain: Riverina Bioregion (46)	2323.3	No
Belah/Black Oak – Western Rosewood – Wilga woodland of central NSW including the Cobar Penepplain Bioregion (57)	259.3	No
Western Grey Box – Poplar Box – White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Penepplain Bioregion (82)	6.6	Yes, BC Act and EPBC Act

Plant community type (PCT)	Area (ha)	Threatened ecological community (yes/no)
Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones (153)	255.8	No
Bladder Saltbush shrubland on alluvial plains in the semi-arid (warm) zone including Riverina Bioregion (157)	1474.3	No
Old Man Saltbush shrubland mainly of the semi-arid (warm) climate zone (south western NSW) (159)	216.6	No
Nitre Goosefoot shrubland wetland on clays of the inland floodplains (160)	612.8	No
Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones (163)	1142.4	No
Cotton Bush open shrubland of the semi-arid (warm) zone (164)	3935.7	No
Derived corkscrew grass grassland/forbland on sandplains and plains in the semi-arid (warm) climate zone (165)	13.5	No
Disturbed annual saltbush forbland on clay plains and inundation zones mainly of south-western NSW (166)	5.1	No
Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones (170)	258.6	No
Cumbungi rushland wetland of shallow semi-permanent water bodies and inland watercourses (182)	0.1	No
Black Roly Poly low open shrubland of the Riverina Bioregion and Murray Darling Depression Bioregion (216)	27.5	No
Derived Giant Redburr low shrubland on alluvial plains of the semi-arid (warm) climate zone (236)	52.1	No
Permanent and semi-permanent freshwater lakes wetland of the inland slopes and plains (238)	0.5	No
Total	14,880.8 (incl 2,862 ha non-native)	

Table 3-4: Existing vegetation mapping (State Vegetation Type Maps: Riverina and Western) within a 550-metre buffer of section 4

Plant community type (PCT)	Area (ha)	Threatened ecological community (yes/no)
Not native vegetation	3867.5	
River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (11)	87.4	No
Black Box – Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (13)	448.7	No
Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (15)	10.7	No
Lignum shrubland wetland of the semi-arid (warm) plains (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (17)	3.4	No
Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones (23)	16.9	Yes, BC Act only
Canegrass swamp tall grassland wetland of drainage depressions, lakes and pans of the inland plains (24)	56.7	No
White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone (28)	4.1	Yes, BC Act only
Belah/Black Oak – Western Rosewood – Wilga woodland of central NSW including the Cobar Peneplain Bioregion (57)	264.6	No
Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion (58)	648.3	No
Prickly Wattle tall open shrubland of dunes and sandplains of semi-arid and arid regions (139)	2.5	No
Lunette chenopod shrubland mainly of the Murray Darling Depression Bioregion (152)	2.8	No

Plant community type (PCT)	Area (ha)	Threatened ecological community (yes/no)
Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones (153)	231.8	No
Pearl Bluebush low open shrubland of the arid and semi-arid plains (154)	2.5	No
Bladder Saltbush shrubland on alluvial plains in the semi-arid (warm) zone including Riverina Bioregion (157)	1.2	No
Old Man Saltbush – mixed chenopod shrubland of the semi-arid hot (persistently dry) and arid climate zones (north-western NSW) (158)	0.4	No
Old Man Saltbush shrubland mainly of the semi-arid (warm) climate zone (south western NSW) (159)	54.7	No
Nitre Goosefoot shrubland wetland on clays of the inland floodplains (160)	26.1	No
Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones (163)	37.0	No
Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones (170)	3207.0	No
Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion (171)	133.4	No
Permanent and semi-permanent freshwater lakes wetland of the inland slopes and plains (238)	8.4	No
Total	9,116.2 (incl 3,867.5 in non-native)	

Table 3-5: Existing vegetation mapping (State Vegetation Type Maps: Riverina and Western) within a 550-metre buffer of section 5

Plant community type	Area (ha)	Threatened ecological community (yes/no)
Non-native vegetation	1786.7	No

Plant community type	Area (ha)	Threatened ecological community (yes/no)
River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (11)	243.8	No
Black Box – Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (13)	1269.8	No
Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion) (15)	36.5	No
White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone (28)	173.9	Yes, BC Act only
Belah/Black Oak – Western Rosewood – Wilga woodland of central NSW including the Cobar Peneplain Bioregion (57)	28.1	No
Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion (58)	474.7	No
Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones (153)	0.7	No
Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones (163)	0.1	No
Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones (170)	2827.8	No
Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion (171)	1443.7	No
Deep sand mallee of irregular dunefields of the semi-arid (warm) zone (172)	3.1	No

Plant community type	Area (ha)	Threatened ecological community (yes/no)
Total	8,288.8 (incl 1,786.7 ha in non-native)	

Field surveys identified fewer PCT than mapped within the 550-metre buffer of the proposal. This result is likely due to the field survey ground-truthing the vegetation present within the road reserve, as well as the smaller area of the road reserve.

In accordance with the BioNET Vegetation Information System (VIS) (OEH, 2021b), our field surveys revealed the presence of 29 PCT as listed in Table 3-6, and mapped in Figure 3-1 to Figure 3-54.

The highly disturbed areas that form the existing road formation, adjacent verge and cleared land are not discussed further given they are dominated by hard packed road base and or introduced (non-native) flora. The field survey also revealed the presence of native tree plantings. While not consistent with a PCT, a small section of this BA provides further information.

Table 3-6: Plant community types occurring within the road reserve along the length of the proposal

PCT ID	Plant community name	Fauna habitat	Condition	Area (ha)
2	River Red Gum – sedge dominated very tall open forest	Woodland	Low	1.9
2	River Red Gum – sedge dominated very tall open forest	Woodland	Mod-good	73.3
11	River Red Gum – Lignum very tall open forest or woodland wetland	Woodland	Mod-good	5.0
13	Black Box – Lignum woodland wetland	Woodland	Low	8.4
13	Black Box – Lignum woodland wetland	Woodland	Mod-good	205.8
15	Black Box open woodland wetland	Woodland	Low	3.7
15	Black Box open woodland wetland	Woodland	Mod-good	62.4
19	Cypress Pine woodland of source-bordering dunes	Woodland	Mod-good	6.9
23	Yarran tall open shrubland	Shrubland	Mod-good	31.7
23	Yarran tall open shrubland	Shrubland	Low	2.7
26	Weeping Myall open woodland	Woodland	Low	20.1
26	Weeping Myall open woodland	Woodland	Mod-good	97.5
28	White Cypress Pine open woodland	Woodland	Low	1.2
28	White Cypress Pine open woodland	Woodland	Mod-good	15.2
45	Plains Grass Grassland	Native Grassland	Mod-good	147.6

PCT ID	Plant community name	Fauna habitat	Condition	Area (ha)
45	Plains Grass Grassland	Native Grassland	Low	1.8
46	Curly Windmill Grass – speargrass – wallaby grass grassland	Native Grassland	Low	13.9
46	Curly Windmill Grass – speargrass – wallaby grass grassland	Native Grassland	Mod-good	361.4
58	Black Oak – Western Rosewood open woodland	Woodland	Low	3.2
58	Black Oak – Western Rosewood open woodland	Woodland	Mod-good	35.3
74	Yellow Box – River Red Gum tall grassy riverine woodland	Woodland	Low	0.3
74	Yellow Box – River Red Gum tall grassy riverine woodland	Woodland	Mod-good	59.4
75	Yellow Box – White Cypress Pine grassy woodland	Woodland	Mod-good	9.0
76	Western Grey Box tall grassy woodland	Woodland	Mod-good	46.9
76	Western Grey Box tall grassy woodland	Woodland	Low	1.4
80	Western Grey Box – White Cypress Pine tall woodland	Woodland	Mod-good	88.3
80	Western Grey Box – White Cypress Pine tall woodland	Woodland	Low	0.5
139	Prickly Wattle tall open shrubland	Shrubland	Low	0.9
139	Prickly Wattle tall open shrubland	Shrubland	Mod-good	8.5
153	Black Bluebush low open shrubland	Shrubland	Low	7.2
153	Black Bluebush low open shrubland	Shrubland	Mod-good	45.2
157	Bladder Saltbush shrubland	Shrubland	Mod-good	48.5
159	Old Man Saltbush shrubland	Shrubland	Mod-good	34.6
160	Nitre Goosefoot shrubland wetland	Shrubland	Mod-good	201.0
163	Dillon Bush shrubland	Shrubland	Mod-good	80.9
164	Cotton Bush open shrubland	Shrubland	Mod-good	131.1
170	Chenopod sandplain mallee woodland/shrubland	Woodland	Low	48.3
170	Chenopod sandplain mallee woodland/shrubland	Woodland	Mod-good	425.3
171	Spinifex linear dune mallee	Woodland	Low	3.5
171	Spinifex linear dune mallee	Woodland	Mod-good	86.7

PCT ID	Plant community name	Fauna habitat	Condition	Area (ha)
216	Black Roly Poly low open shrubland	Shrubland	Mod-good	45.8
236	Derived Giant Redburr low shrubland	Shrubland	Low	9.7
237	Riverine Western Grey Box grassy woodland	Woodland	Mod-good	38.6
237	Riverine Western Grey Box grassy woodland	Woodland	Low	4.5
267	White Box – White Cypress Pine – Western Grey Box shrub/grass/forb woodland	Woodland	Mod-good	8.6
277	Blakely's Red Gum – Yellow Box grassy tall woodland	Woodland	Mod-good	15.7
0	Cleared Land	Cleared Land		669.3
0	Native Tree Planting	Native Tree Planting		45.7
Total				3,264.4

River Red Gum-sedge dominated very tall open forest in frequently flooded forest wetland along major rivers and floodplains in south-western NSW

Vegetation formation: *Forested Wetland*

Vegetation class: *Inland Riverine Forests*

PCT: 2

Conservation status: *n/a*

Estimate of percent cleared: 14%

Condition: *Low* *1.9 hectares*

Mod-good *73.3 hectares*

Extent in the study area: *75.2 hectares*

Extent in footprint: *Low* *0.19 hectares*

Mod-good *7.54 hectares (Sec 1: 1.3 / Sec 2: 6.24)*

Typical composition of this PCT

Growth form	Typical species
Upper stratum	<i>Eucalyptus camaldulensis</i> subsp. <i>Camaldulensis</i>
Middle stratum	<i>Acacia stenophylla</i> , <i>Amyema miquelii</i>
Ground stratum	<i>Centipeda cunninghamii</i> , <i>Carex inversa</i> , <i>Juncus</i> sp, <i>Paspalidium jubiflorum</i> , <i>Senecio quadridentatus</i> , <i>Triglochin procerum</i> , <i>Oxalis perennans</i>



Photograph 3-1: Examples of PCT 2 within the study area

River Red Gum – Lignum very tall open forest or woodland wetland on floodplains of semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)

Vegetation formation: *Forested Wetland*

Vegetation class: *Inland Riverine Forests*

PCT: 11

Conservation status: *n/a*

Estimate of percent cleared: *42%*

Condition: *Mod-good*

Extent in the study area: *5.0 hectares*

Extent in the proposal footprint: *1.63 hectares (sec 1)*

Typical composition of this PCT

Growth form	Typical species
Upper stratum	<i>Eucalyptus camaldulensis</i>
Middle stratum	<i>Muehlenbeckia florulenta</i> , <i>Acacia stenophylla</i> , <i>Enchylaena tomentosa</i>
Ground stratum	<i>Wahlenbergia fluminalis</i> , <i>Chenopodium pumilio</i> , <i>Sonchus hydrophilus</i> , <i>Rumex tenax</i> , <i>Ranunculus undosus</i> , <i>Vittadinia cuneata</i>



Photograph 3-2: An example of PCT 11 within the study area

Black Box – Lignum woodland wetland of the inner floodplains in the semi-arid (warm) climate zone (mainly Riverina Bioregion and Murray Darling Depression Bioregion)

Vegetation formation: *Semi-arid Woodlands (Grassy sub-formation)*

Vegetation class: *Inland Floodplain Woodlands*

PCT: 13

Conservation status: *n/a*

Estimate of percent cleared: 57%

Condition: *Low* *8.4 hectares*

Mod-good *205.8 hectares*

Extent in the study area: *214.2 hectares*

Extent in the proposal footprint: *Low* *0.27 hectares (sec 1: 0.05 / sec 5:0.22)*

Mod-good *13.48 hectares (sec 2: 4.48 / sec 3:1.98 / sec 5:6.02)*

Typical composition of this PCT

Growth form	Typical species
Upper stratum	<i>Eucalyptus largiflorens, Eucalyptus camaldulensis</i>
Middle stratum	<i>Muehlenbeckia florulenta, Rhagodia spinescens, Myoporum montanum</i>
Ground stratum	<i>Sclerolaena muricata, Paspalidium jubiflorum, Austrodanthonia caespitosa, Atriplex eardleyae, Austrodanthonia setacea, Wahlenbergia fluminalis</i>



Photograph 3-3: Examples of PCT 13 within the study area

Black Box open woodland wetland with chenopod understorey mainly on the outer floodplains in south-western NSW (mainly Riverina Bioregion and Murray Darling Depression Bioregion)

Vegetation formation: *Semi-arid Woodlands (Grassy sub-formation)*

Vegetation class: *Inland Floodplain Woodlands*

PCT: 15

Conservation status: *n/a*

Estimate of percent cleared: 50%

Condition: *Low* *3.7 hectares*

Mod-good *62.4 hectares*

Extent in the study area: *66.1 hectares*

Extent in the proposal footprint: *Low* *0.08 hectares (sec 2: 0.04 / sec 5: 0.04)*

Mod-good *6.35 hectares (sec 2: 3.83 / sec 3: 2.52)*

Typical composition of this PCT

Growth form	Typical species
Upper stratum	<i>Eucalyptus largiflorens</i>
Middle stratum	<i>Maireana pyramidata, Atriplex vesicaria, Maireana decalvans, Maireana Rhagodia spinescens, Sclerolaena muricata</i>
Ground stratum	<i>Einadia nutans, Sclerolaena tricuspis, Enchylaena tomentosa, Zygodophyllum aurantiacum, Chamaesyce drummondii, Sida corrugata</i>



Photograph 3-4: Examples of PCT 15 within the study area

Cypress Pine woodland of source-bordering dunes mainly on the Murray and Murrumbidgee River floodplains

Vegetation formation: *Semi-arid Woodlands (Shrubby sub-formation)*

Vegetation class: *Riverine Sandhill Woodlands*

PCT: 19

Conservation status: *BC Act*

Estimate of percent cleared: 70%

Condition: *Mod-good*

Extent in the study area: 6.9 hectares

Extent in the proposal footprint: 0.86 hectares (sec 2: 0.77 / sec 3: 0.09)

Typical composition of this PCT

Growth form	Typical species
Upper stratum	<i>Callitris glaucophylla</i> , <i>Allocasuarina luehmannii</i>
Middle stratum	<i>Calytrix tetragona</i>
Ground stratum	<i>Austrodanthonia caespitosa</i> , <i>Austrostipa scabra</i> , <i>Einadia nutans</i> , <i>Oxalis perennans</i> , <i>Senecio quadridentatus</i> , <i>Crassula colorata</i>



Photograph 3-5: An example of PCT 19 within the study area

Yarran tall open shrubland of the sandplains and plains of the semi-arid (warm) and arid climate zones

Vegetation formation: *Semi-arid Woodlands (Shrubby sub-formation)*

Vegetation class: *Riverine Sandhill Woodlands*

PCT: 23

Conservation status: *BC Act*

Estimate of percent cleared: 71%

Condition: *Low* *2.7 hectares*

Mod-good *31.7 hectares*

Extent in the study area: *34.4 hectares*

Extent in the proposal footprint: *Low* *0.06 hectares (sec 4)*

Mod-good *0.79 hectares (sec 2: 0.01 / sec 4: 0.78)*

Typical composition of this PCT

Growth form	Typical species
Upper stratum	-
Middle stratum	<i>Acacia melvillei, Rhagodia spinescens, Eremophila sturtii, Enchylaena tomentosa, Maireana decalvans, Nitraria billardierei, Sclerolaena diacantha</i>
Ground stratum	<i>Austrostipa nodosa, Goodenia fascicularis, Austrostipa nitida, Atriplex stipitate, Austrostipa scabra</i>



Photograph 3-6: An example of PCT 23 within the study area

Weeping Myall open woodland of the Riverina Bioregion and NSW South Western Slopes Bioregion

Vegetation formation: *Semi-arid Woodlands (Grassy sub-formation)*

Vegetation class: *Riverine Plain Woodlands*

PCT: 26

Conservation status: *BC Act and EPBC Act*

Estimate of percent cleared: 90%

Condition: *Low* *20.1 hectares*

Mod-good *97.5 hectares*

Extent in the study area: *117.6 hectares*

Extent in the proposal footprint: *Low* *0.19 hectares (sec 2)*

Mod-good *17.98 hectares (sec 1: 0.05 / sec 2: 17.93)*

Typical composition of this PCT

Growth form	Typical species
Upper stratum	<i>Acacia pendula</i>
Middle stratum	<i>Rhagodia spinescens, Maireana decalvans, Maireana aphylla, Acacia salicina, Hakea leucoptera</i>
Ground stratum	<i>Austrodanthonia caespitosa, Atriplex semibaccata, Einadia nutans, Atriplex leptocarpa, Sporobolus caroli, Centipeda cunninghamii</i>



Photograph 3-7: Examples of PCT 26 within the study area

White Cypress Pine open woodland of sand plains, prior streams and dunes mainly of the semi-arid (warm) climate zone

Vegetation formation: *Semi-arid Woodlands (Shrubby sub-formation)*

Vegetation class: *Riverine Sandhill Woodlands*

PCT: 28

Conservation status: BC Act

Estimate of percent cleared: 73%

Condition: *Low* *1.2 hectares*

Mod-good *15.2 hectares*

Extent in the study area: *16.4 hectares*

Extent in the proposal footprint: *Low* *0 hectares*

Mod-good *0.15 hectares (sec 4: 0.06 / sec 5: 0.09)*

Typical composition of this PCT

Growth form	Typical species
Upper stratum	<i>Callitris glaucophylla, Myoporum platycarpum, Allocasuarina luehmannii</i>
Middle stratum	<i>Hakea leucoptera, Pittosporum angustifolium, Maireana pyramidata, Geijera parviflora, Eremophila longifolia, Exocarpos aphyllus, Acacia hakeoides</i>
Ground stratum	<i>Enchylaena tomentosa, Dissocarpus paradoxus, Sclerolaena obliquicuspis, Calotis hispidula, Enneapogon nigricans, Austrodanthonia caespitosa, Crassula colorata, Sida corrugata</i>



Photograph 3-8: Examples of PCT 28 within the study area

Plains Grass grassland on alluvial mainly clay soils in the Riverina Bioregion and NSW South Western Slopes Bioregion

Vegetation formation: Grasslands

Vegetation class: Riverine Plain Grasslands

PCT: 45

Conservation status: n/a

Estimate of percent cleared: 60%

Condition: Low 1.8 hectares

Mod-good 147.6 hectares

Extent in the study area: 149.4 hectares

Extent in the proposal footprint: Low 0.02 hectares (sec 2)

Mod-good 1.85 hectares (sec 1: 0.59 / sec 2: 1.26)

Typical composition of this PCT

Growth form	Typical species
Upper stratum	-
Middle stratum	<i>Muehlenbeckia florulenta</i> , <i>Sclerolaena muricata</i>
Ground stratum	<i>Austrostipa aristiglumis</i> , <i>Sporobolus caroli</i> , <i>Maireana pentagona</i> , <i>Rumex dumosus</i> , <i>Arthropodium minus</i> , <i>Crassula decumbens</i> , <i>Oxalis perennans</i>



Photograph 3-9: An example of PCT 45 within the study area

Curly Windmill Grass – speargrass – wallaby grass grassland on alluvial clay and loam on the Hay Plain, Riverina Bioregion

Vegetation formation: Grasslands

Vegetation class: Riverine Plain Grasslands

PCT: 46

Conservation status: n/a

Estimate of percent cleared: 20%

Condition: *Low* *13.9 hectares*

Mod-good *361.4 hectares*

Extent in the study area: *375.3 hectares*

Extent in the proposal footprint: *Low* *0.01 hectares (sec 2)*

Mod-good *2.46 hectares (sec 2: 1.32 / sec 3: 1.14)*

Typical composition of this PCT

Growth form	Typical species
Middle stratum	<i>Maireana 71acrocar</i> , <i>Maireana aphylla</i> , <i>Maireana pentagona</i>
Ground stratum	<i>Enteropogon ramosus</i> , <i>Austrostipa nodosa</i> , <i>Austrodanthonia eriantha</i> , <i>Austrodanthonia caespitosa</i> , <i>Atriplex leptocarpa</i> , <i>Crassula colorata</i> , <i>Goodenia pusilliflora</i> , <i>Calocephalus sonderi</i>



Photograph 3-10: Examples of PCT 46 within the study area

Black Oak – Western Rosewood open woodland on deep sandy loams mainly in the Murray Darling Depression Bioregion

Vegetation formation: *Semi-arid Woodlands (Shrubby sub-formation)*

Vegetation class: *Semi-arid Sand Plain Woodlands*

PCT: 58

Conservation status: *n/a*

Estimate of percent cleared: 50%

Condition: *Low* *3.2 hectares*

Mod-good *35.3 hectares*

Extent in the study area: *38.5 hectares*

Extent in the proposal footprint: *Low* *0 hectares*

Mod-good *0.96 hectares (sec 3: 0.15 / sec 4: 0.78 / sec 5: 0.03)*

Typical composition of this PCT

Growth form	Typical species
Upper stratum	<i>Casuarina pauper, Myoporum platycarpum, Pittosporum angustifolium</i>
Middle stratum	<i>Geijera parviflora, Senna sp, Exocarpos aphyllus, Maireana pyramidata, Chenopodium nitrariaceum, Eremophila deserti, Zygophyllum aurantiacum</i>
Ground stratum	<i>Sclerolaena diacantha, Austrostipa nitida, Zygophyllum apiculatum, Tetragonia moorei, Chloris 73acrocar, Atriplex 73acrocarp, Vittadinia dissecta</i>



Photograph 3-11: An example of PCT 58 within the study area

Yellow Box – River Red Gum tall grassy riverine woodland of NSW South Western Slopes Bioregion and Riverina Bioregion

Vegetation formation: *Grassy Woodlands*

Vegetation class: *Floodplain Transition Woodlands*

PCT: 74

Conservation status: *BC Act & EPBC Act*

Estimate of percent cleared: 73%

Condition: *Low* *0.3 hectares*

Mod-good *59.4 hectares*

Extent in the study area: *59.7 hectares*

Extent in the proposal footprint: *Low* *0.02 hectares (sec 2)*

Mod-good *3.09 hectares (sec 1: 1.46 / sec 2: 1.63)*

Typical composition of this PCT

Growth form	Typical species
Upper stratum	<i>Eucalyptus melliodora, Eucalyptus camaldulensis, Eucalyptus 75acrocarpa, Callitris glaucophylla</i>
Middle stratum	<i>Acacia deanei, Acacia stenophylla, Muehlenbeckia florulenta</i>
Ground stratum	<i>Monachather paradoxus, Panicum effusum, Austrostipa scabra,</i>



Photograph 3-12: Examples of PCT 74 within the study area

Yellow Box – White Cypress Pine grassy woodland on deep sandy-loam alluvial soils of the eastern Riverina Bioregion and western NSW South Western Slopes Bioregion

Vegetation formation: *Semi-arid Woodlands (Shrubby sub-formation)*

Vegetation class: *Riverine Sandhill Woodlands*

PCT: 75

Conservation status: *BC Act & EPBC Act*

Estimate of percent cleared: 92%

Condition: *Mod-good*

Extent in the study area: 9.0 hectares

Extent in the proposal footprint: 1.19 hectares (sec 2)

Typical composition of this PCT

Growth form	Typical species
Upper stratum	<i>Eucalyptus melliodora</i> , <i>Callitris glaucophylla</i> , <i>Brachychiton populneus</i>
Middle stratum	<i>Acacia deanei</i> , <i>Eremophila longifolia</i> , <i>Pittosporum angustifolium</i> , <i>Dodonaea viscosa</i> , <i>Acacia decora</i> , <i>Senna form taxon 'filifolia'</i> , <i>Maireana decalvans</i>
Ground stratum	<i>Enchylaena tomentosa</i> , <i>Sida 77acroparp</i> , <i>Chloris 77acropar</i> , <i>Dichopogon fimbriatus</i> , <i>Calostemma purpureum</i> , <i>Wahlenbergia luteola</i>



Photograph 3-13: An example of PCT 75 within the study area

Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions

Vegetation formation: *Grassy Woodlands*

Vegetation class: *Floodplain Transition Woodlands*

PCT: 76

Conservation status: *BC Act & EPBC Act*

Estimate of percent cleared: 92%

Condition: *Low* *1.4 hectares*

Mod-good *46.9 hectares*

Extent in the study area: *48.3 hectares*

Extent in the proposal footprint: *Mod-good* *6.46 hectares (sec 1)*

Typical composition of this PCT

Growth form	Typical species
Upper stratum	<i>Eucalyptus macrocarpa, Callitris glaucophylla, Allocasuarina luehmannii</i>
Middle stratum	<i>Dodonaea viscosa, Acacia buxifolia, Exocarpos aphyllus</i>
Ground stratum	<i>Austrodanthonia caespitosa, Chloris 78acrocar, Sida 78acrocarp, Einadia nutans, Themeda australis, Enchylaena tomentosa</i>



Photograph 3-14: An example of PCT 76 within the study area

Western Grey Box – White Cypress Pine tall woodland on loam soil on alluvial plains of NSW South Western Slopes Bioregion and Riverina Bioregion

Vegetation formation: *Grassy Woodlands*

Vegetation class: *Floodplain Transition Woodlands*

PCT: 80

Conservation status: *BC Act & EPBC Act*

Estimate of percent cleared: 83%

Condition: *Low* *0.5 hectares*

Mod-good *88.3 hectares*

Extent in the study area: *88.8 hectares*

Extent in the proposal footprint: *Low* *0.04 hectares (sec 1)*

Mod-good *3.6 hectares (sec 1:3.42 / sec 2:0.18)*

Typical composition of this PCT

Growth form	Typical species
Upper stratum	<i>Eucalyptus macrocarpa, Callitris glaucophylla, Eucalyptus melliodora, Allocasuarina luehmannii, Brachychiton populneus</i>
Middle stratum	<i>Maireana microphylla, Acacia deanei, Acacia hakeoides, Eremophila deserti, Hakea leucoptera subsp. leucoptera, Geijera parviflora, Exocarpos aphyllus</i>
Ground stratum	<i>Austrostipa scabra, Austrodanthonia setacea, Sida 79acrop, Maireana enchylaenoides, Austrodanthonia caespitosa, Chrysocephalum apiculatum</i>



Photograph 3-15: Examples of PCT 80 within the study area

Prickly Wattle tall open shrubland of dunes and sandplains of semi-arid and arid regions

Vegetation formation: *Arid Shrublands (Acacia sub-formation)*

Vegetation class: *Sand Plain Mulga Shrublands*

PCT: 139

Conservation status: *n/a*

Estimate of percent cleared: 50%

Condition: *Low* *0.9 hectares*

Mod-good *8.5 hectares*

Extent in the study area: *9.4 hectares*

Extent in the proposal footprint: *Low* *0.04 hectares (sec 4: 0.02 / sec 5: 0.02)*

Typical composition of this PCT

Growth form	Typical species
Upper stratum	<i>Callitris glaucophylla</i>
Middle stratum	<i>Acacia victoriae</i> , <i>Maireana pyramidata</i> , <i>Dodonaea viscosa</i> , <i>Enchylaena tomentosa</i> , <i>Sclerolaena diacantha</i> , <i>Myoporum platycarpum</i> , <i>Hakea leucoptera</i> , <i>Dissocarpus paradoxus</i>
Ground stratum	<i>Einadia nutans</i> , <i>Austrostipa nitida</i> , <i>Rhodanthe corymbiflora</i> , <i>Plantago turrifera</i> , <i>Brachyscome lineariloba</i> , <i>Sida intricata</i>



Photograph 3-16: An example of PCT 139 within the study area

Black Bluebush low open shrubland of the alluvial plains and sandplains of the arid and semi-arid zones

Vegetation formation: *Arid Shrublands (Chenopod sub-formation)*

Vegetation class: *Aeolian Chenopod Shrublands*

PCT: 153

Conservation status: *n/a*

Estimate of percent cleared: 40%

Condition: *Low* *7.2 hectares*

Mod-good *45.2 hectares*

Extent in the study area: *52.4 hectares*

Extent in the proposal footprint: *Low* *0.04 hectares (sec 3)*

Mod-good *0.38 hectares (sec 3: 0.17 / sec 4: 0.21)*

Typical composition of this PCT

Growth form	Typical species
Upper stratum	<i>Casuarina pauper</i>
Middle stratum	<i>Maireana pyramidata, Rhagodia spinescens, Atriplex vesicaria, Maireana georgei, Maireana sedifolia, Maireana appressa, Nitraria billardierei, Eremophila sturtii</i>
Ground stratum	<i>Sclerolaena brachyptera, Austrostipa scabra, Calotis hispidula, Austrostipa nodosa, Atriplex lindleyi, Zygophyllum glaucum, Sclerolaena tricuspis, Zygophyllum confluens, Austrodanthonia caespitosa</i>



Photograph 3-17: Examples of PCT 153 within the study area

Bladder Saltbush shrubland on alluvial plains in the semi-arid (warm) zone including Riverina Bioregion

Vegetation formation: *Arid Shrublands (Chenopod sub-formation)*

Vegetation class: *Riverine Chenopod Woodlands*

PCT: 157

Conservation status: *n/a*

Estimate of percent cleared: 60%

Condition: *Mod-good*

Extent in the study area: 48.5 hectares

Extent in the proposal footprint: 0.01 hectares (sec 3)

Typical composition of this PCT

Growth form	Typical species
Upper stratum	-
Middle stratum	<i>Atriplex vesicaria</i> , <i>Sclerostegia tenuis</i> , <i>Maireana pyramidata</i> , <i>Maireana sedifolia</i> , <i>Maireana decalvans</i> , <i>Nitraria billardierei</i> , <i>Eragrostis australasica</i>
Ground stratum	<i>Sclerolaena tricuspis</i> , <i>Sclerolaena 84acroparp</i> , <i>Chloris truncata</i>



Photograph 3-18: An example of PCT 157 within the study area

Old Man Saltbush shrubland mainly of the semi-arid (warm) climate zone (south western NSW)

Vegetation formation: *Arid Shrublands (Chenopod sub-formation)*

Vegetation class: *Riverine Chenopod Shrublands*

PCT: 159

Conservation status: *n/a*

Estimate of percent cleared: 92%

Condition: *Mod-good*

Extent in the study area: 34.6 hectares

Extent in the proposal footprint: 0.2 hectares (sec 3)

Typical composition of this PCT

Growth form	Typical species
Upper stratum	-
Middle stratum	<i>Atriplex nummularia</i> , <i>Rhagodia spinescens</i> , <i>Maireana pyramidata</i> , <i>Maireana appressa</i> , <i>Atriplex vesicaria</i> , <i>Chenopodium curvispicatum</i> , <i>Eragrostis australasica</i>
Ground stratum	<i>Einadia nutans</i> , <i>Atriplex lindleyi</i> , <i>Sclerolaena diacantha</i> , <i>Austrodanthonia caespitosa</i>



Photograph 3-19: An example of PCT 159 within the study area

Nitre Goosefoot shrubland wetland on clays of the inland floodplains

Vegetation formation: *Freshwater Wetlands*

Vegetation class: *Inland Floodplain Shrublands*

PCT: 160

Conservation status: *n/a*

Estimate of percent cleared: 28%

Condition: *Mod-good*

Extent in the study area: 201.0 hectares

Extent in the proposal footprint: 0.28 hectares (sec 2: 0.05 / sec 3: 0.23)

Typical composition of this PCT

Growth form	Typical species
Upper stratum	<i>Eucalyptus largiflorens</i>
Middle stratum	<i>Chenopodium nitrariaceum</i> , <i>Muehlenbeckia florulenta</i> , <i>Atriplex nummularia</i>
Ground stratum	<i>Sclerolaena muricata</i> , <i>Oxalis perennans</i>



Photograph 3-20: Examples of PCT 160 within the study area

Dillon Bush (Nitre Bush) shrubland of the semi-arid and arid zones

Vegetation formation: *Arid Shrublands (Chenopod sub-formation)*

Vegetation class: *Riverine Chenopod Shrublands*

PCT: 163

Conservation status: *n/a*

Estimate of percent cleared: 26%

Condition: *Mod-good*

Extent in the study area: 80.9 hectares

Extent in the proposal footprint: 0.03 hectares (sec 3: 0.02 / sec 4: 0.01)

Typical composition of this PCT

Growth form	Typical species
Middle stratum	<i>Nitraria billardierei</i> , <i>Rhagodia spinescens</i> , <i>Maireana aphylla</i> , <i>Maireana pyramidata</i> , <i>Maireana turbinata</i>
Ground stratum	<i>Sclerolaena tricuspis</i> , <i>Austrodanthonia setacea</i> , <i>Atriplex lindleyi</i> , <i>Enchylaena tomentosa</i> , <i>Sclerolaena obliquicuspis</i> , <i>Zygophyllum ammophilum</i>



Photograph 3-21: An example of PCT 163 within the study area

Cotton Bush open shrubland of the semi-arid (warm) zone

Vegetation formation: *Arid Shrublands (Chenopod sub-formation)*

Vegetation class: *Riverine Chenopod Shrublands*

PCT: 164

Conservation status: *n/a*

Estimate of percent cleared: 8%

Condition: *Mod-good*

Extent in the study area: 131.1 hectares

Extent in the proposal footprint: 0.28 hectares (sec 2: 0.2 / sec 3: 0.08)

Typical composition of this PCT

Growth form	Typical species
Upper stratum	-
Middle stratum	<i>Maireana aphylla</i> , <i>Nitraria billardierei</i> , <i>Sclerolaena muricata</i> , <i>Maireana 89acarp</i> , <i>Chenopodium nitrariaceum</i>
Ground stratum	<i>Sclerolaena tricuspis</i> , <i>Austrodanthonia caespitosa</i> , <i>Goodenia fascicularis</i> , <i>Minuria cunninghamii</i> , <i>Daucus glochidiatus</i>



Photograph 3-22: An example of PCT 164 within the study area

Chenopod sandplain mallee woodland/shrubland of the arid and semi-arid (warm) zones

Vegetation formation: *Semi-arid Woodlands (Shrubby sub-formation)*

Vegetation class: *Sand Plain Mallee Woodlands*

PCT: 170

Conservation status: *n/a*

Estimate of percent cleared: 41%

Condition: *Low* **48.3 hectares**

Mod-good **425.3 hectares**

Extent in the study area: **473.6 hectares**

Extent in the proposal footprint: *Low* **0.96 hectares (sec 3: 0.02 / sec 4: 0.3 / sec 5: 0.64)**

Mod-good **12.75 hectares (sec 3: 0.01 / sec 4: 6.29 / sec 5: 6.45)**

Typical composition of this PCT

Growth form	Typical species
Upper stratum	<i>Eucalyptus sp, Eucalyptus oleosa, Eucalyptus gracilis, Eucalyptus socialis, Eucalyptus leptophylla, Alectryon oleifolius, Allocasuarina luehmannii, Casuarina pauper</i>
Middle stratum	<i>Chenopodium curvispicatum, Maireana sedifolia, Maireana pyramidata, Myoporum platycarpum, Acacia 90acrocarpa, Rhagodia spinescens</i>
Ground stratum	<i>Enchylaena tomentosa, Zygophyllum apiculatum, Chenopodium desertorum, Sclerolaena obliquicuspis, Sclerolaena patenticuspis, Vittadinia cuneata</i>



Photograph 3-23: Examples of PCT 170 within the study area

Spinifex linear dune mallee mainly of the Murray Darling Depression Bioregion

Vegetation formation: *Semi-arid Woodlands (Shrubby sub-formation)*

Vegetation class: *Dune Mallee Woodlands*

PCT: 171

Conservation status: *n/a*

Estimate of percent cleared: 19%

Condition: *Low* *3.5 hectares*

Mod-good *86.7 hectares*

Extent in the study area: *90.2 hectares*

Extent in the proposal footprint: *Mod-good* *0.77 hectares (sec 4: 0.16 / sec 5: 0.61)*

Typical composition of this PCT

Growth form	Typical species
Upper stratum	<i>Eucalyptus socialis, Eucalyptus sp, Eucalyptus gracilis, Eucalyptus costata, Eucalyptus leptophylla, Eucalyptus oleosa</i>
Middle stratum	<i>Acacia colletioides, Dodonaea viscosa, Eremophila glabra, Maireana pentatropis, Chenopodium curvispicatum</i>
Ground stratum	<i>Triodia scariosa, Vittadinia cuneata, Austrostipa nitida, Enchylaena tomentosa, Lomandra leucocephala</i>



Photograph 3-24: Examples of PCT 171 within the study area

Black Roly Poly low open shrubland of the Riverina Bioregion and Murray Darling Depression Bioregion

Vegetation formation: *Arid Shrublands (Chenopod sub-formation)*

Vegetation class: *Riverine Chenopod Shrublands*

PCT: 216

Conservation status: *n/a*

Estimate of percent cleared: *0%*

Condition: *Mod-good*

Extent in the study area: *45.8 hectares*

Extent in the proposal footprint: *0.02 hectares (sec 2: 0.01 / sec 3: 0.01)*

Typical composition of this PCT

Growth form	Typical species
Upper stratum	-
Middle stratum	<i>Sclerolaena muricata, Sclerolaena diacantha, Maireana microphylla, Leiocarpa panaetioides, Teucrium racemosum</i>
Ground stratum	<i>Atriplex semibaccata, Vittadinia cuneata, Austrostipa scabra, Austrodanthonia caespitosa, Vittadinia pterochaeta, Sida trichopoda, Einadia nutans</i>



Photograph 3-25: An example of PCT 216 within the study area

Derived Giant Redburr low shrubland on alluvial plains of the semi-arid (warm) climate zone

Vegetation formation: *Arid Shrublands (Chenopod sub-formation)*

Vegetation class: *Riverine Chenopod Shrublands*

PCT: 236

Conservation status: *n/a*

Estimate of percent cleared: *0%*

Condition: *Low*

Extent in the study area: *9.7 hectares*

Extent in the proposal footprint: *0.05 hectares (sec 3)*

Typical composition of this PCT

Growth form	Typical species
Upper stratum	-
Middle stratum	<i>Sclerolaena tricuspidis</i> , <i>Sclerolaena muricata</i> , <i>Eragrostis australasica</i> , <i>Rhagodia spinescens</i> , <i>Maireana 95acrocarpa</i>
Ground stratum	<i>Atriplex lindleyi</i> , <i>Dissocarpus paradoxus</i> , <i>Atriplex pseudocampanulata</i> , <i>Einadia nutans subsp. nutans</i>



Photograph 3-26: An example of PCT 236 within the study area

Riverine Western Grey Box grassy woodland of the semi-arid (warm) climate zone

Vegetation formation: *Grassy Woodlands*

Vegetation class: *Floodplain Transition Woodlands*

PCT: 237

Conservation status: *BC Act & EPBC Act*

Estimate of percent cleared: 73%

Condition: *Low* *4.5 hectares*

Mod-good *38.6 hectares*

Extent in the study area: *43.1 hectares*

Extent in the proposal footprint: *Low* *0 hectares*

Mod-good *3.00 hectares (sec 1: 2.99 / sec 2: 0.01)*

Typical composition of this PCT

Growth form	Typical species
Upper stratum	<i>Eucalyptus macrocarpa, Eucalyptus camaldulensis, Eucalyptus largiflorens</i>
Middle stratum	<i>Acacia dealbata, Maireana enchylaenoides, Sclerolaena muricata</i>
Ground stratum	<i>Paspalidium jubiflorum, Austrodanthonia caespitosa, Juncus flavidus, Atriplex semibaccata, Einadia nutans, Chloris 96acrocar, Carex appressa</i>



Photograph 3-27: An example of PCT 237 within the study area

White Box – White Cypress Pine – Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion

Vegetation formation: *Grassy Woodlands*

Vegetation class: *Western Slopes Grassy Woodlands*

PCT: 267

Conservation status: *BC Act & EPBC Act*

Estimate of percent cleared: 89%

Condition: *Mod-good*

Extent in the study area: 8.6 hectares

Extent in the proposal footprint: 1.4 hectares (sec 1)

Typical composition of this PCT

Growth form	Typical species
Upper stratum	<i>Eucalyptus albens</i> , <i>Callitris glaucophylla</i> , <i>Eucalyptus macrocarpa</i> , <i>Eucalyptus melliodora</i>
Middle stratum	<i>Acacia decora</i> , <i>Dodonaea viscosa</i> , <i>Maireana microphylla</i> , <i>Pittosporum angustifolium</i> , <i>Acacia implexa</i>
Ground stratum	<i>Austrostipa densiflora</i> , <i>Austrodanthonia caespitosa</i> , <i>Lomandra filiformis</i> , <i>Dianella revoluta</i> , <i>Lomandra multiflora</i> , <i>Hydrocotyle laxiflora</i> , <i>Chenopodium desertorum</i> , <i>Wahlenbergia communis</i>



Photograph 3-28: An example of PCT 267 within the study area

Blakely's Red Gum – Yellow Box grassy tall woodland of the NSW South Western Slopes Bioregion

Vegetation formation: *Grassy Woodlands*

Vegetation class: *Western Slopes Grassy Woodlands*

PCT: 277

Conservation status: *BC Act & EPBC Act*

Estimate of percent cleared: 94%

Condition: *Mod-good*

Extent in the study area: 15.7 hectares

Extent in the proposal footprint: 0.63 hectares (sec 1)

Typical composition of this PCT

Growth form	Typical species
Upper stratum	<i>Eucalyptus blakelyi</i> , <i>Eucalyptus melliodora</i> , <i>Eucalyptus bridgesiana</i> , <i>Eucalyptus albens</i> , <i>Eucalyptus conica</i> , <i>Callitris glaucophylla</i>
Middle stratum	<i>Acacia dealbata</i> , <i>Hibbertia obtusifolia</i>
Ground stratum	<i>Themeda australis</i> , <i>Poa sieberiana</i> , <i>Bothriochloa macra</i> , <i>Aristida</i> , <i>Austrostipa</i> , <i>Cymbopogon refractus</i> , <i>Alternanthera nana</i> , <i>Sida</i> , <i>Wahlenbergia luteola</i> , <i>Cheilanthes sieberi</i> , <i>Enteropogon acicularis</i>



Photograph 3-29: An example of PCT 277 within the study area

3.1.1 Native tree plantings

The field survey revealed the presence of a number of tree plantings comprising native species, some local to the locality, others such as WA eucalypts, not local.

In total, 45.71 hectares of native tree plantings were mapped within the road corridor, with some of these being of significant age. This included near Yarragundry which are likely to have been in excess of 50 years of age, and very diverse tree plantings near Trentham Cliffs. Trees were considered part of a tree planting when they were in lineal arrangements and evenly spaced.

The proposal footprint would result in the removal of up to 2.79 hectares of native tree plantings (sec 1: 2.59 / sec 2: 0.01 / sec 3: 0.05 / sec 5: 0.14).



Native tree planting east of Collingullie (section 1)



Native tree planting near Trentham Cliffs (section 5)



Native tree planting east of Quilters road (section 1)



Native tree planting near Gol Gol (section 5)

Photograph 3-30: Examples of native tree plantings within the study area

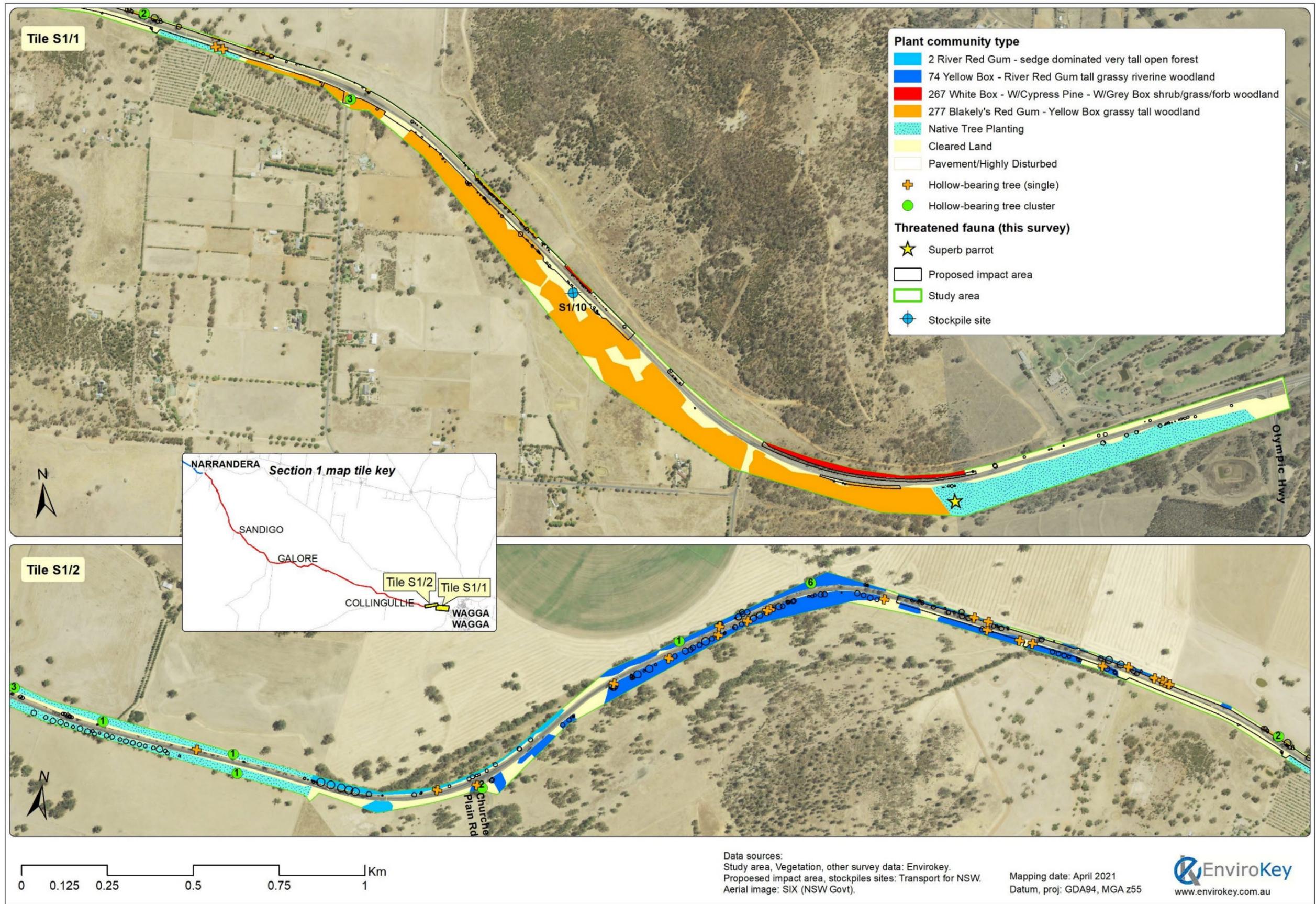


Figure 3-1: Plant community types and other points of interest within the study area (section 1)

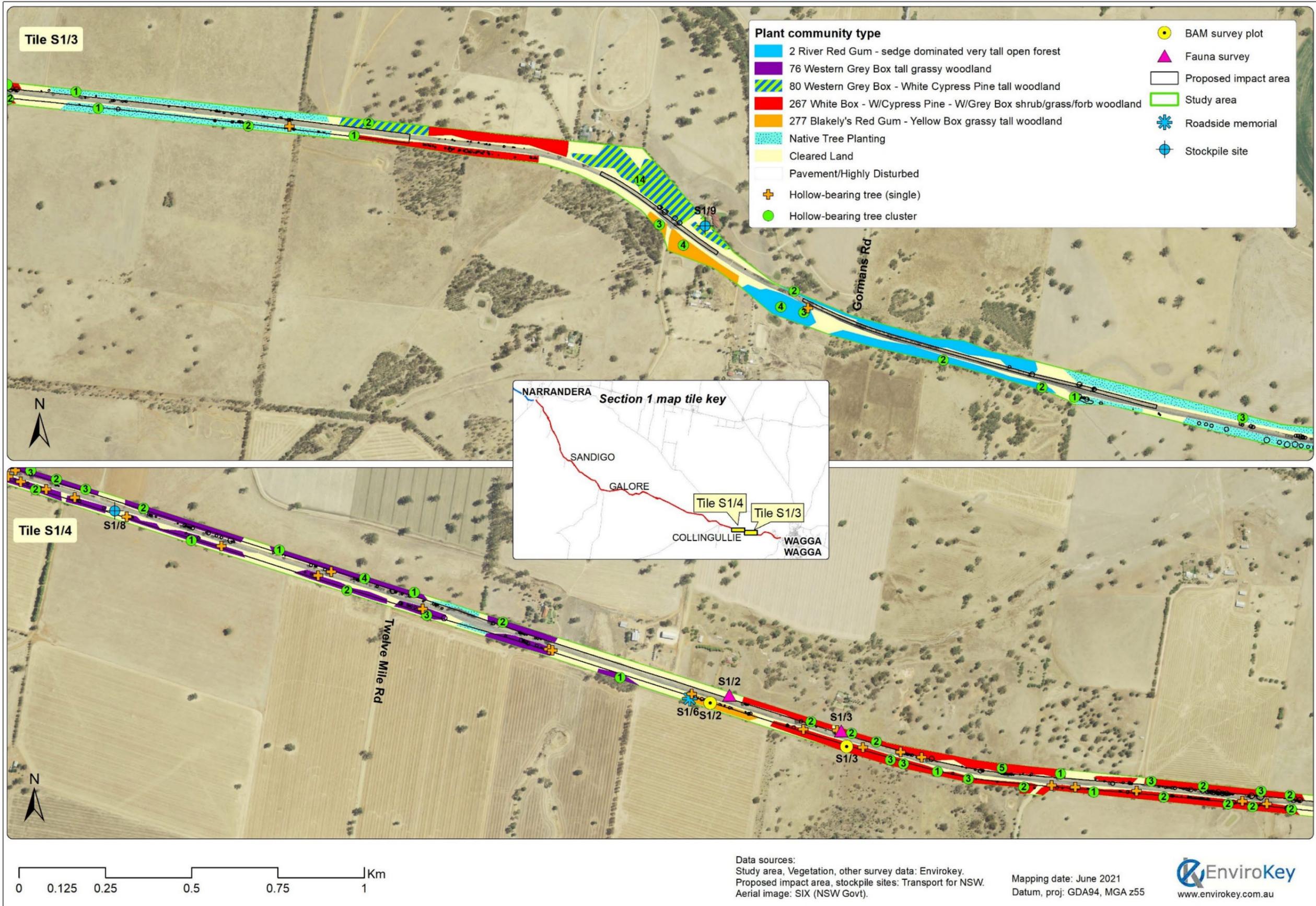
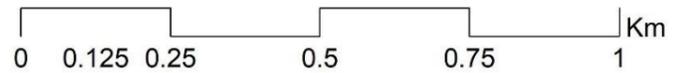
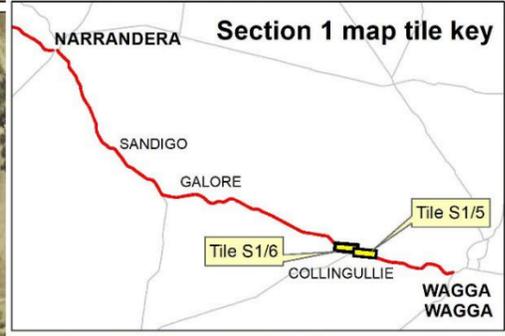


Figure 3-2: Plant community types and other points of interest within the study area (section 1)



Data Sources:
 Study Area, Vegetation, other survey data: Envirokey
 Proposed impact area, stockpile sites: Transport
 Aerial Image: SIX (NSW Govt).

Mapping Date: May 2022
 Datum, Projection: GDA94, MGA z55



Figure 3-3: Plant community types and other points of interest within the study area (section 1)

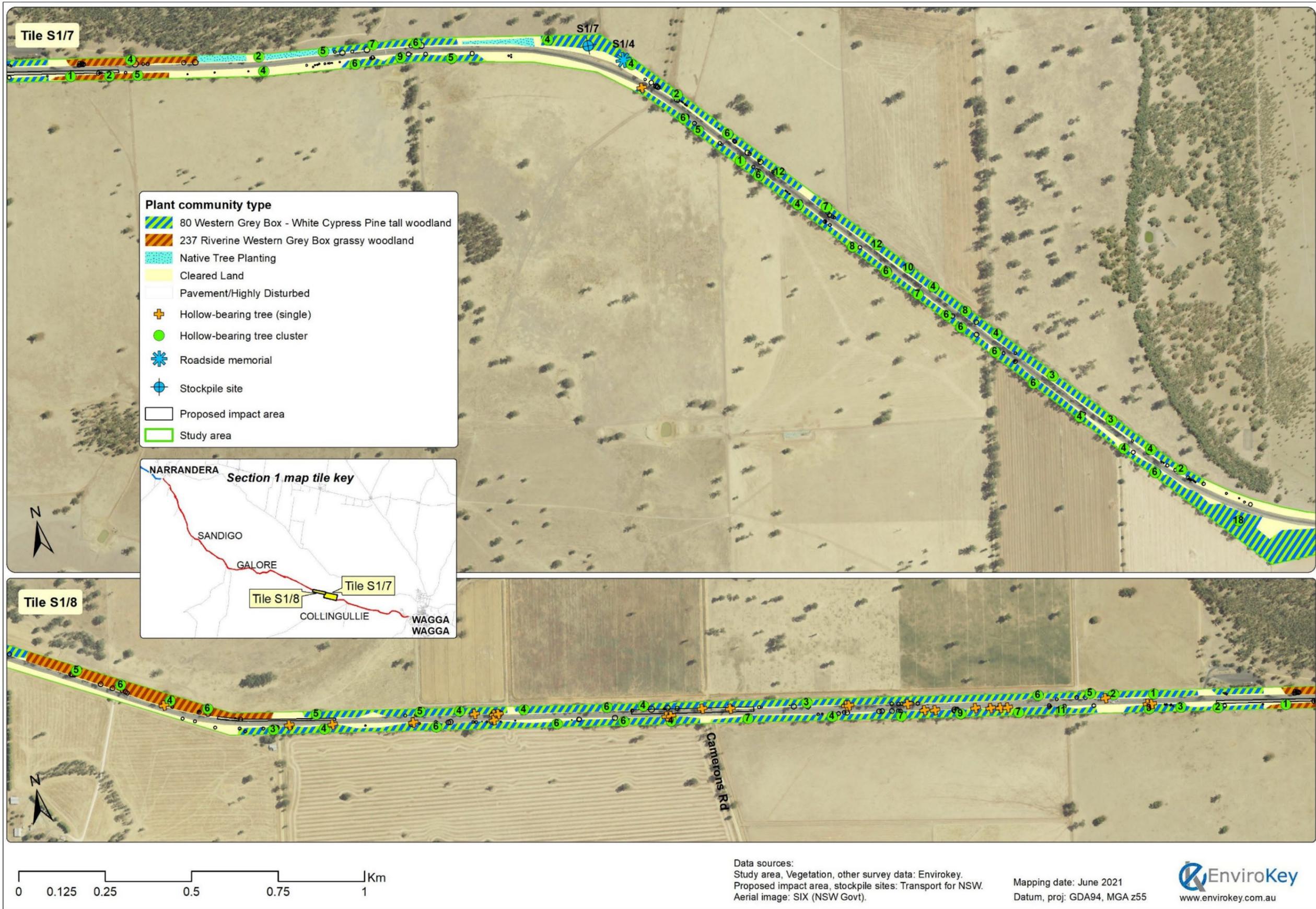


Figure 3-4: Plant community types and other points of interest within the study area (section 1)

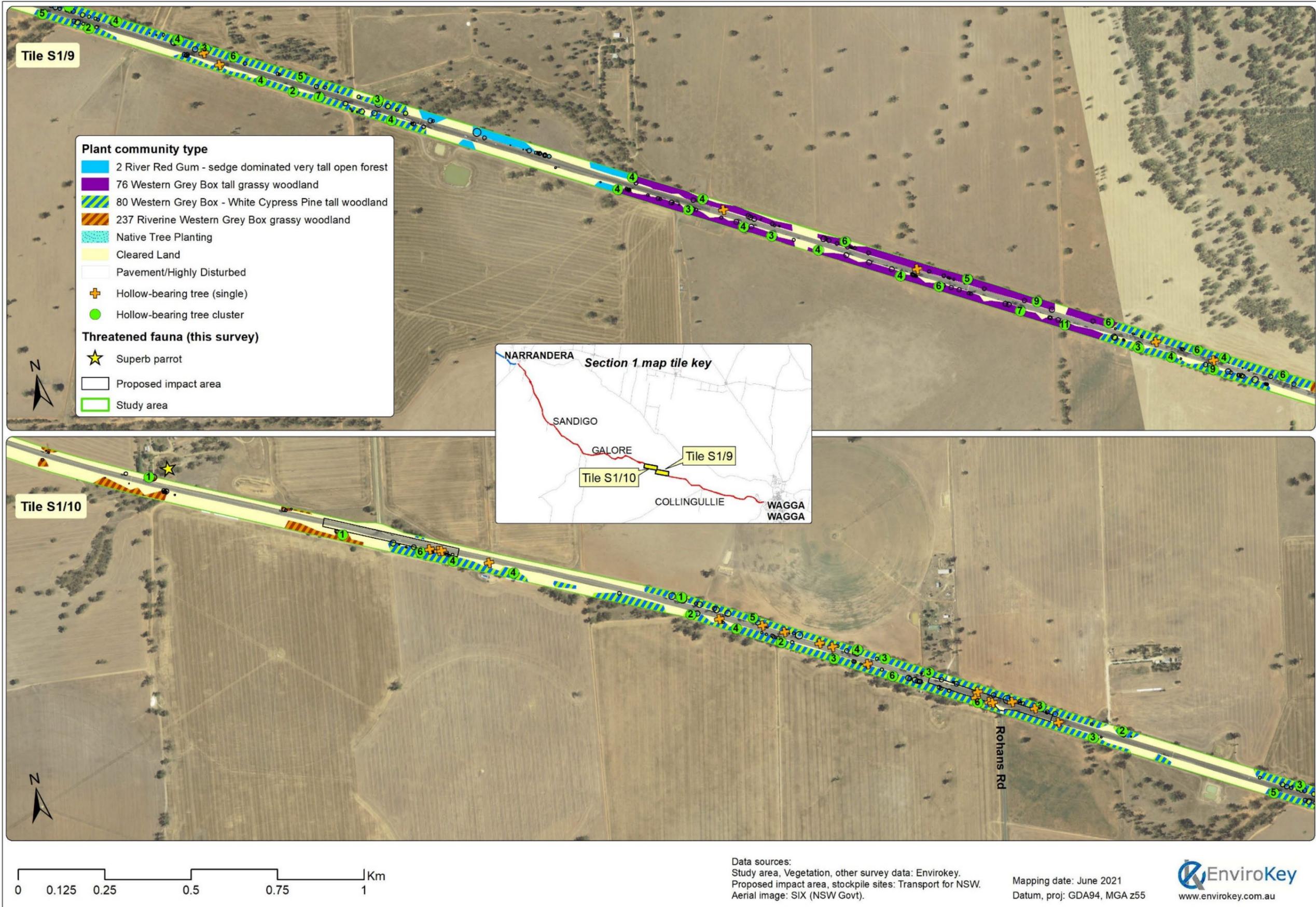


Figure 3-5: Plant community types and other points of interest within the study area (section 1)

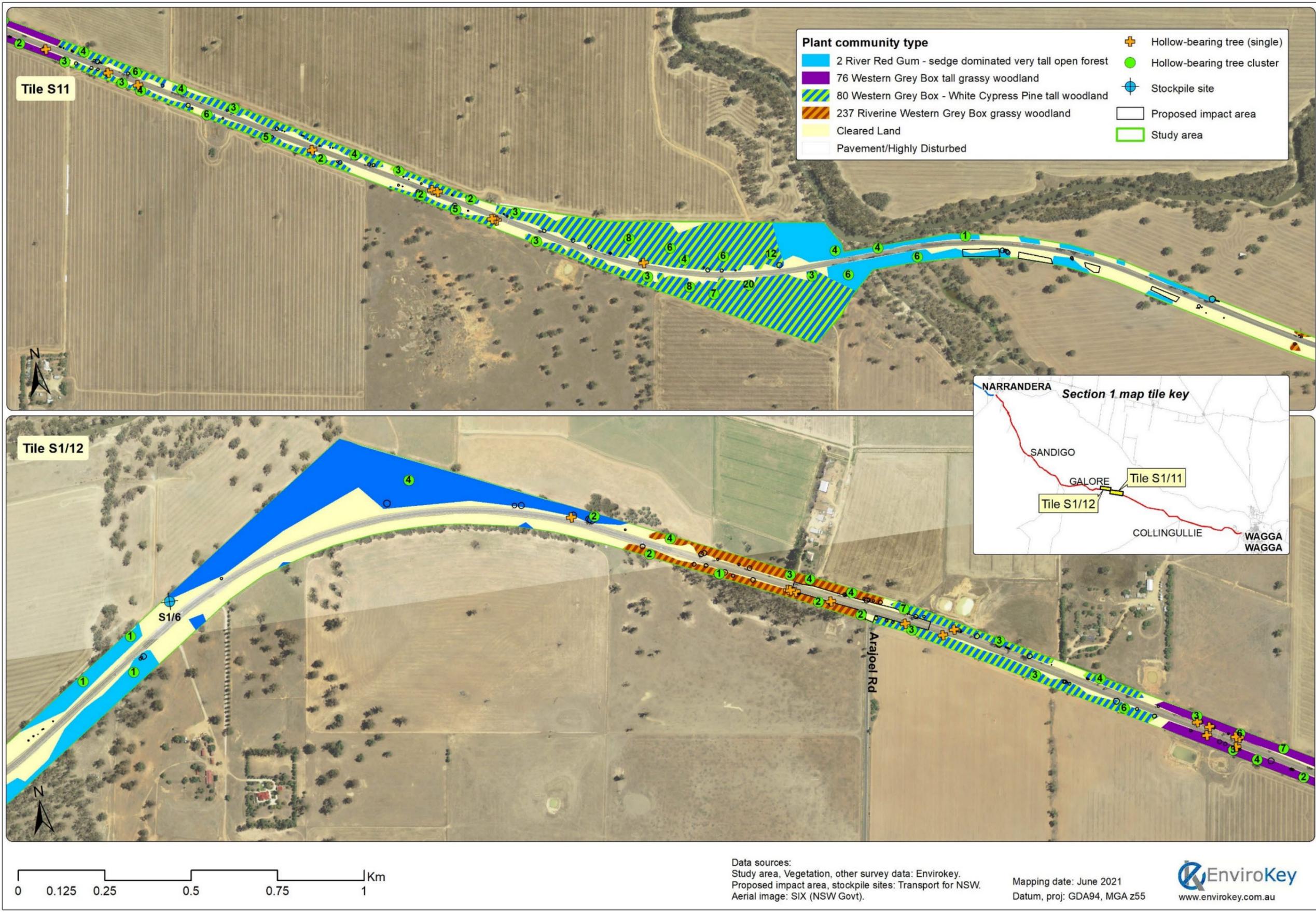


Figure 3-6: Plant community types and other points of interest within the study area (section 1)

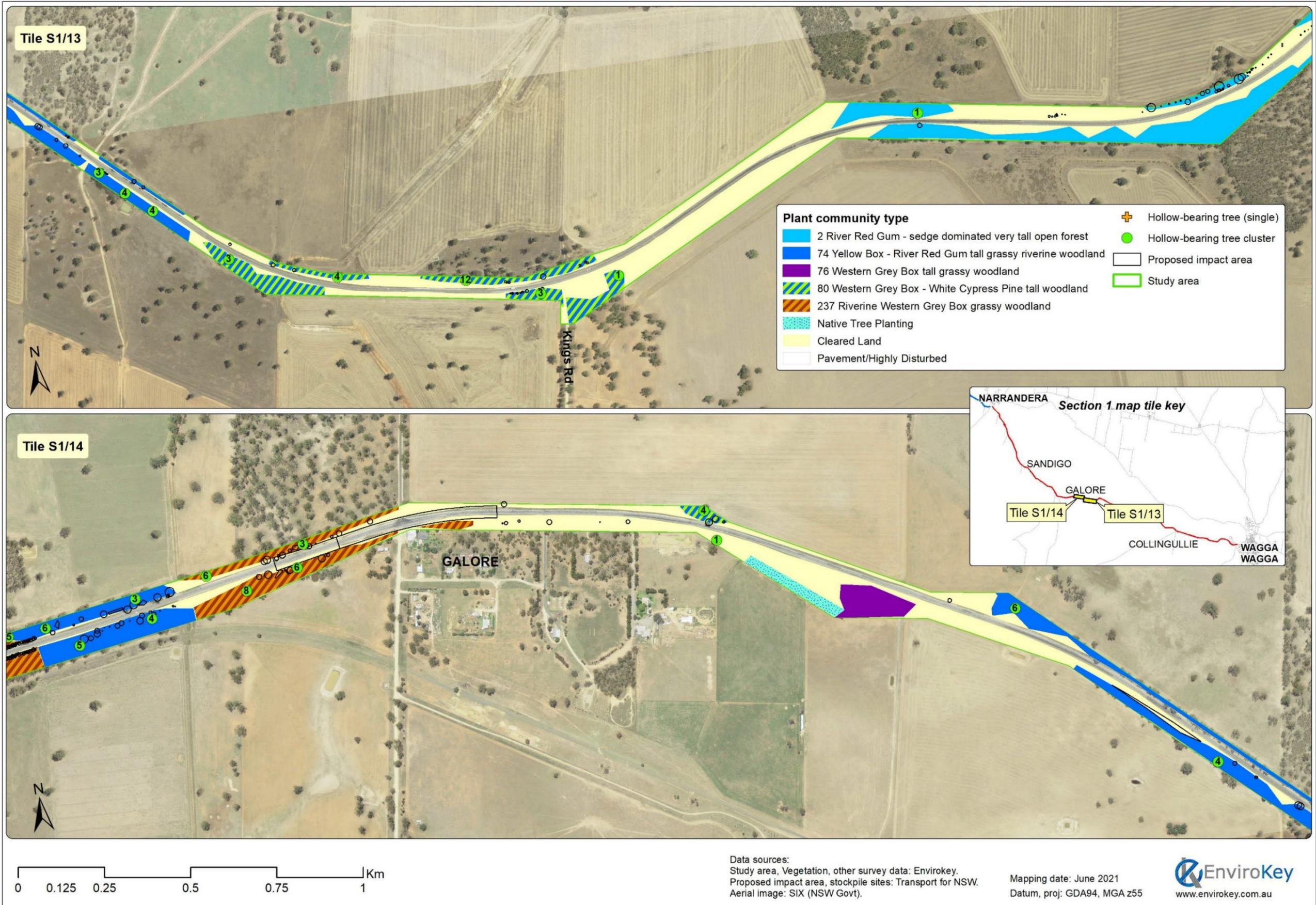


Figure 3-7: Plant community types and other points of interest within the study area (section 1)

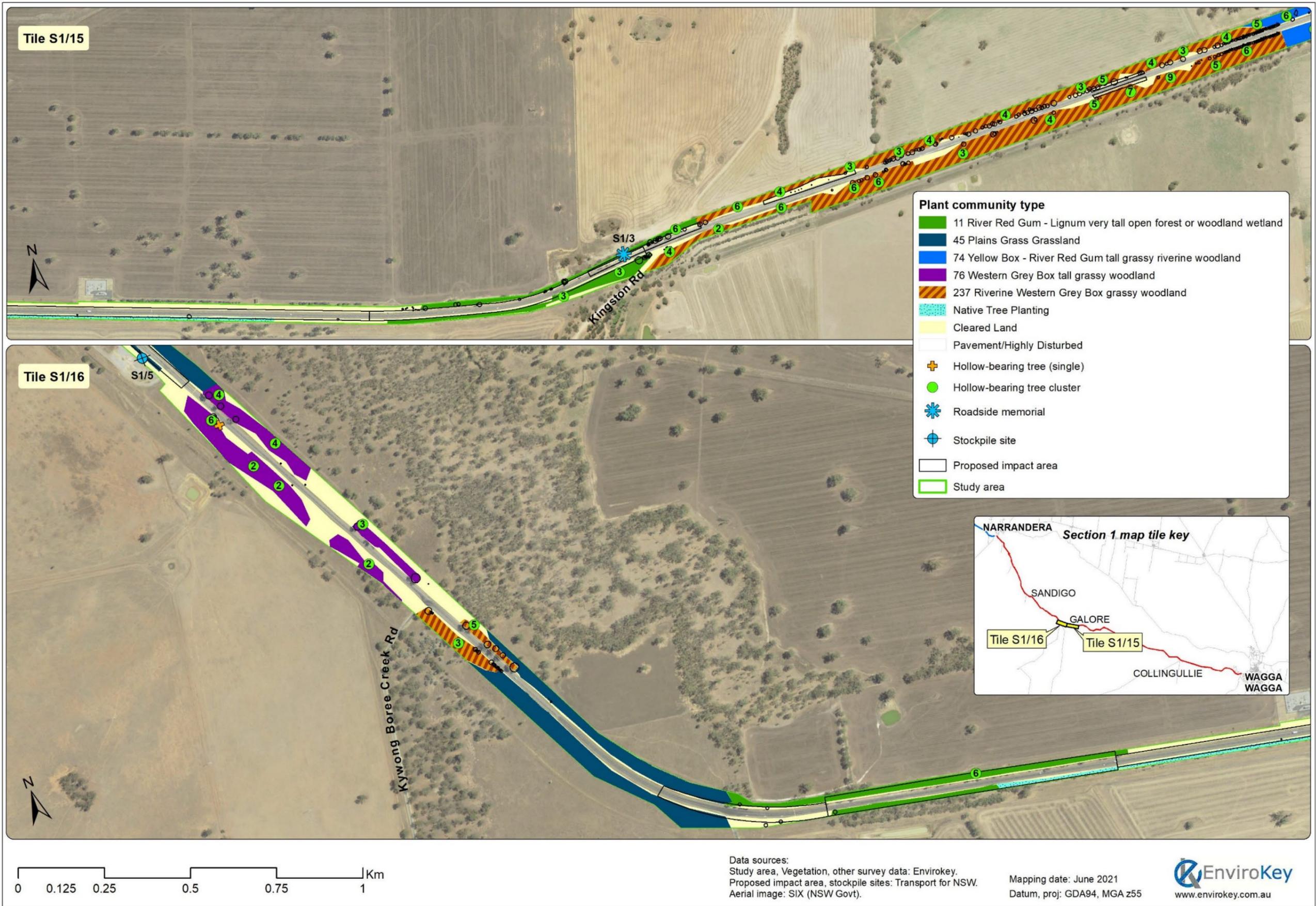


Figure 3-8: Plant community types and other points of interest within the study area (section 1)

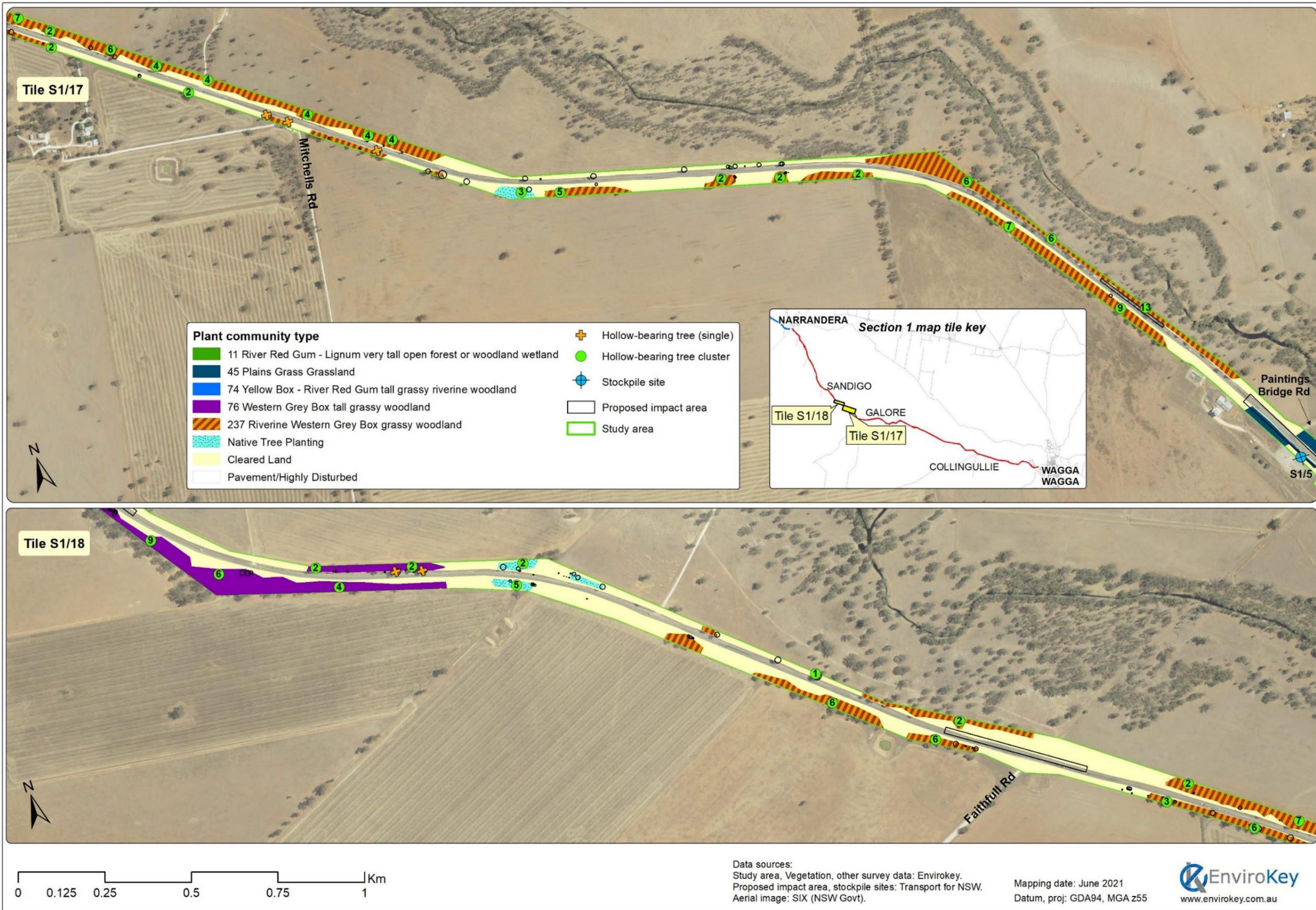


Figure 3-9: Plant community types and other points of interest within the study area (section 1)

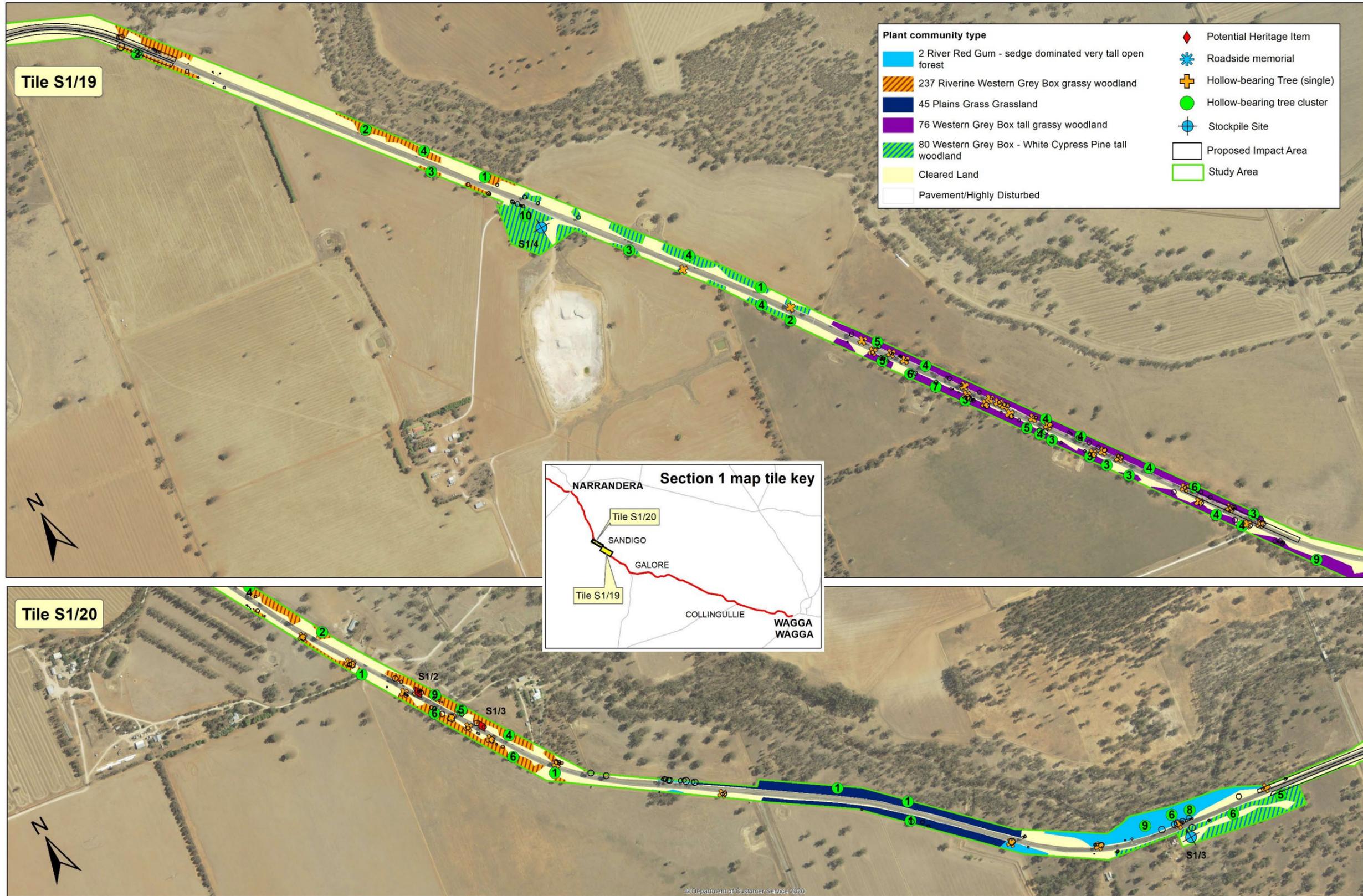


Figure 3-10: Plant community types and other points of interest within the study area (section 1)

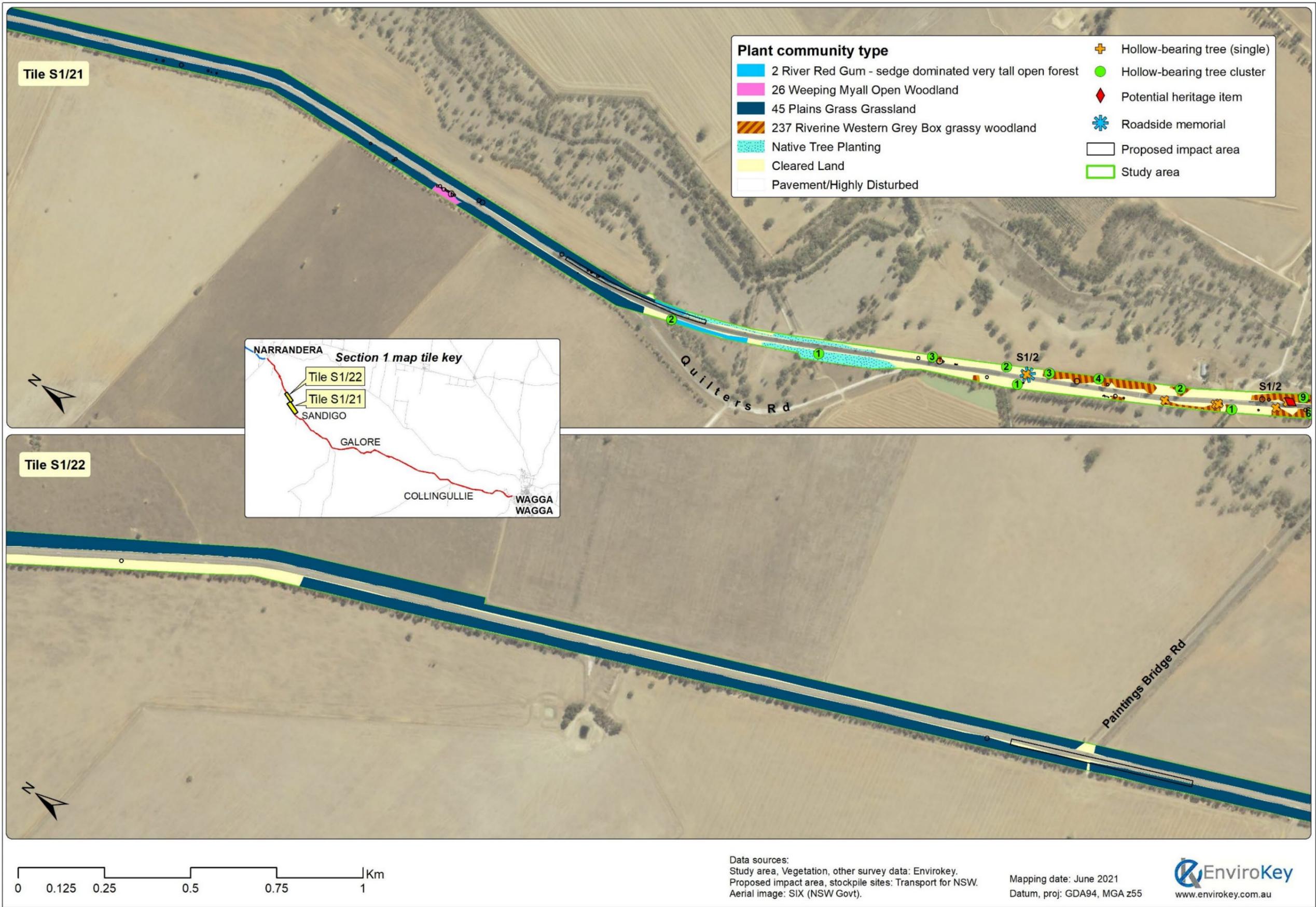


Figure 3-11: Plant community types and other points of interest within the study area (section 1)

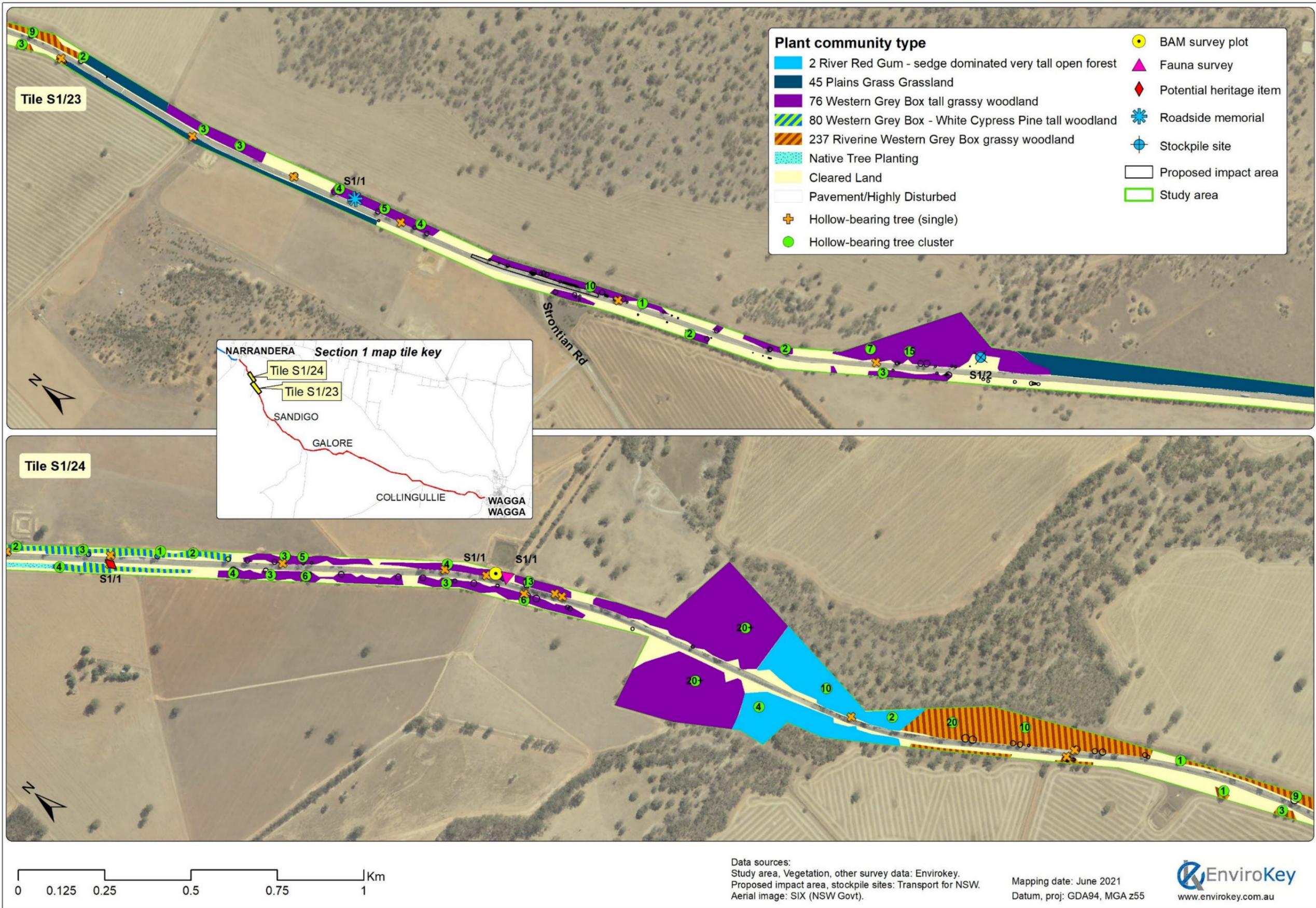


Figure 3-12: Plant community types and other points of interest within the study area (section 1)

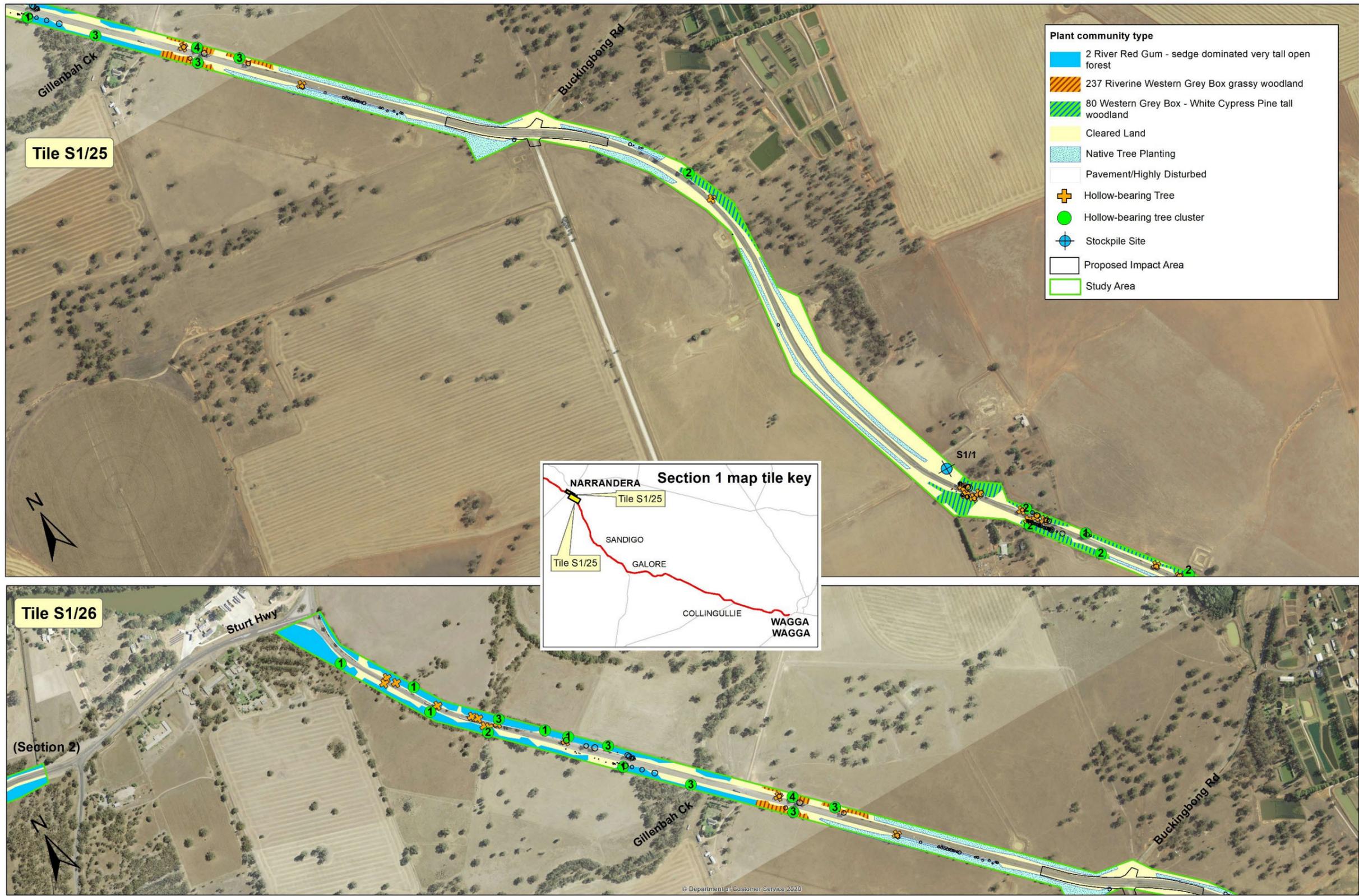
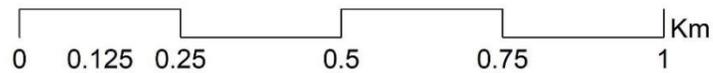
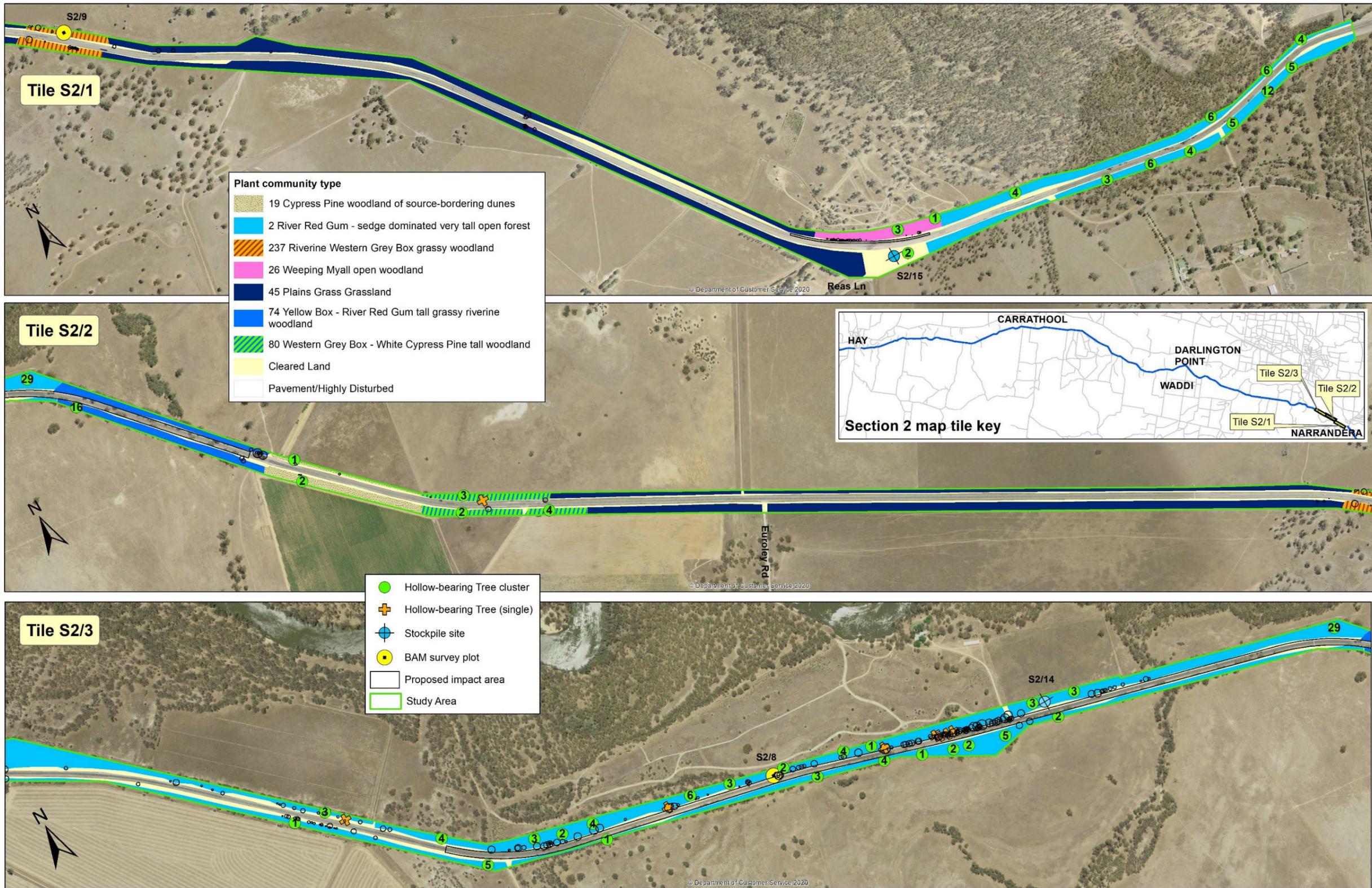


Figure 3-13: Plant community types and other points of interest within the study area (section 1)



Data Sources:
 Study Area, Vegetation, other survey data: Envirokey
 Proposed impact area, stockpile sites: Transport
 Aerial Image: SIX (NSW Govt).

Mapping Date: May 2022

Datum, Projection: GDA94, MGA z55



Figure 3-14: Plant community types and other points of interest within the study area (section 2)

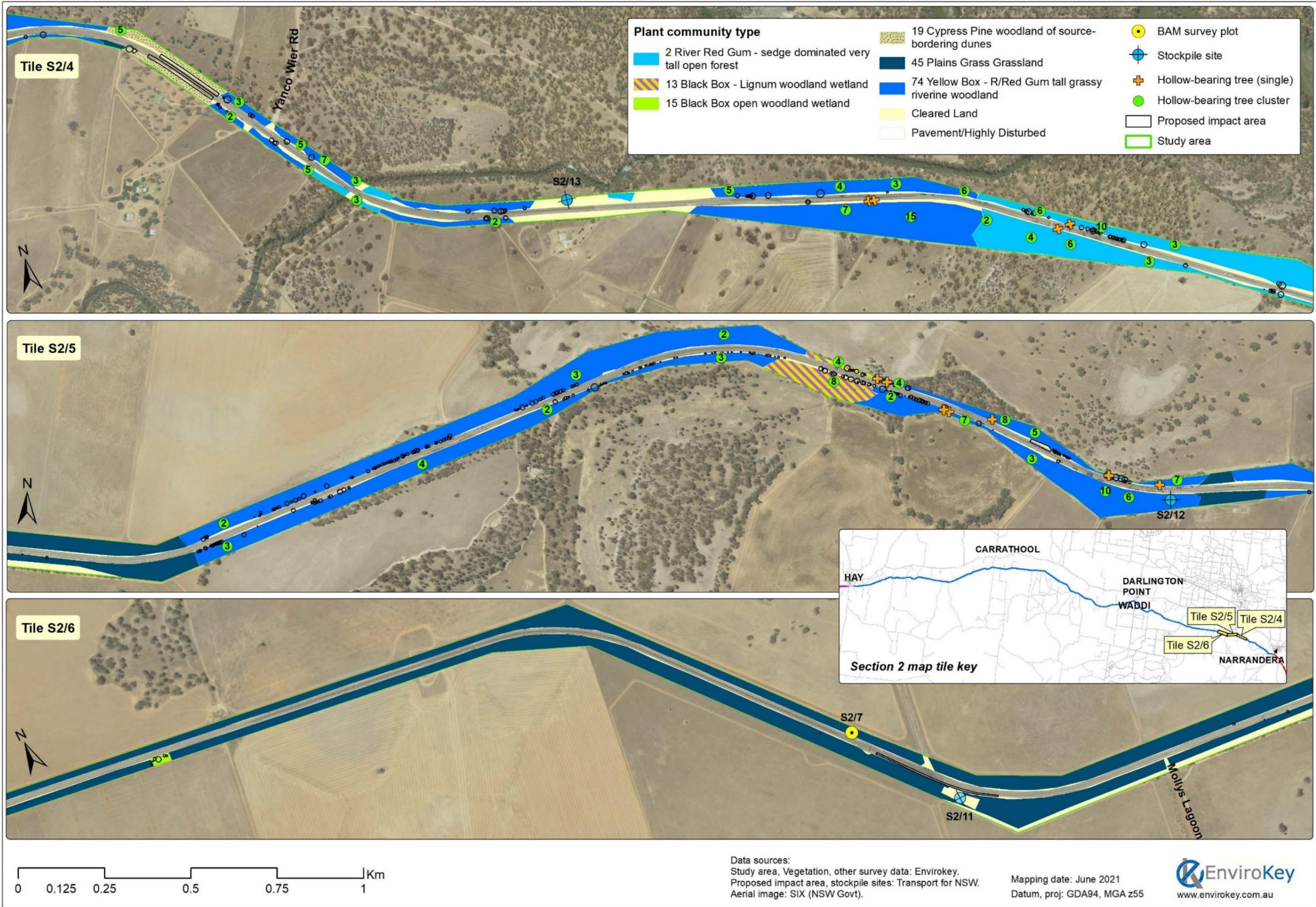
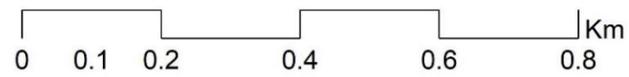
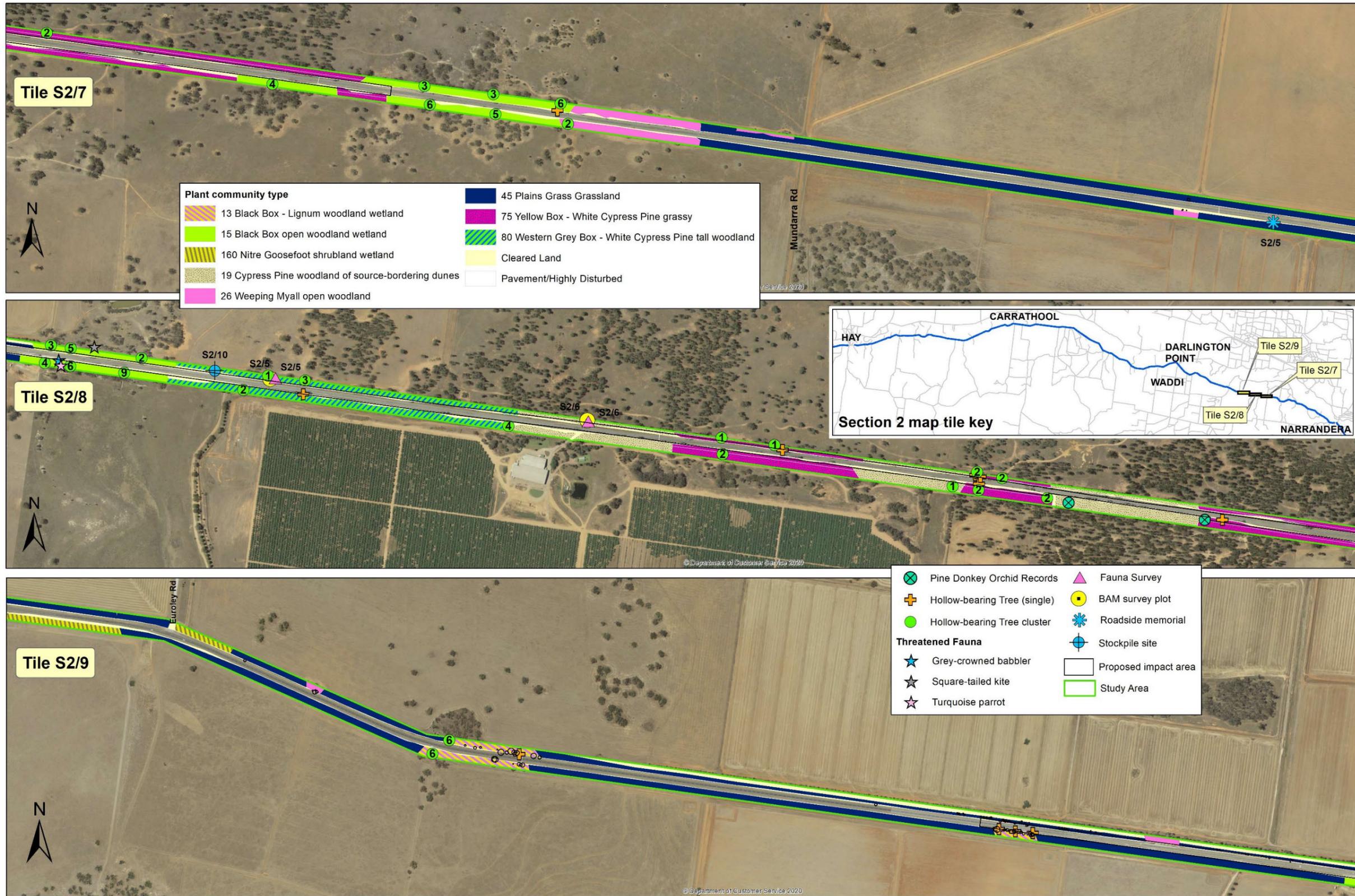


Figure 3-15: Plant community types and other points of interest within the study area (section 2)



Data Sources:
 Study Area, Vegetation, other survey data: Envirokey
 Proposed impact area, stockpile sites: Transport
 Aerial Image: SIX (NSW Govt).

Mapping Date: May 2022

Datum, Projection: GDA94, MGA z55



Figure 3-16: Plant community types and other points of interest within the study area (section 2)

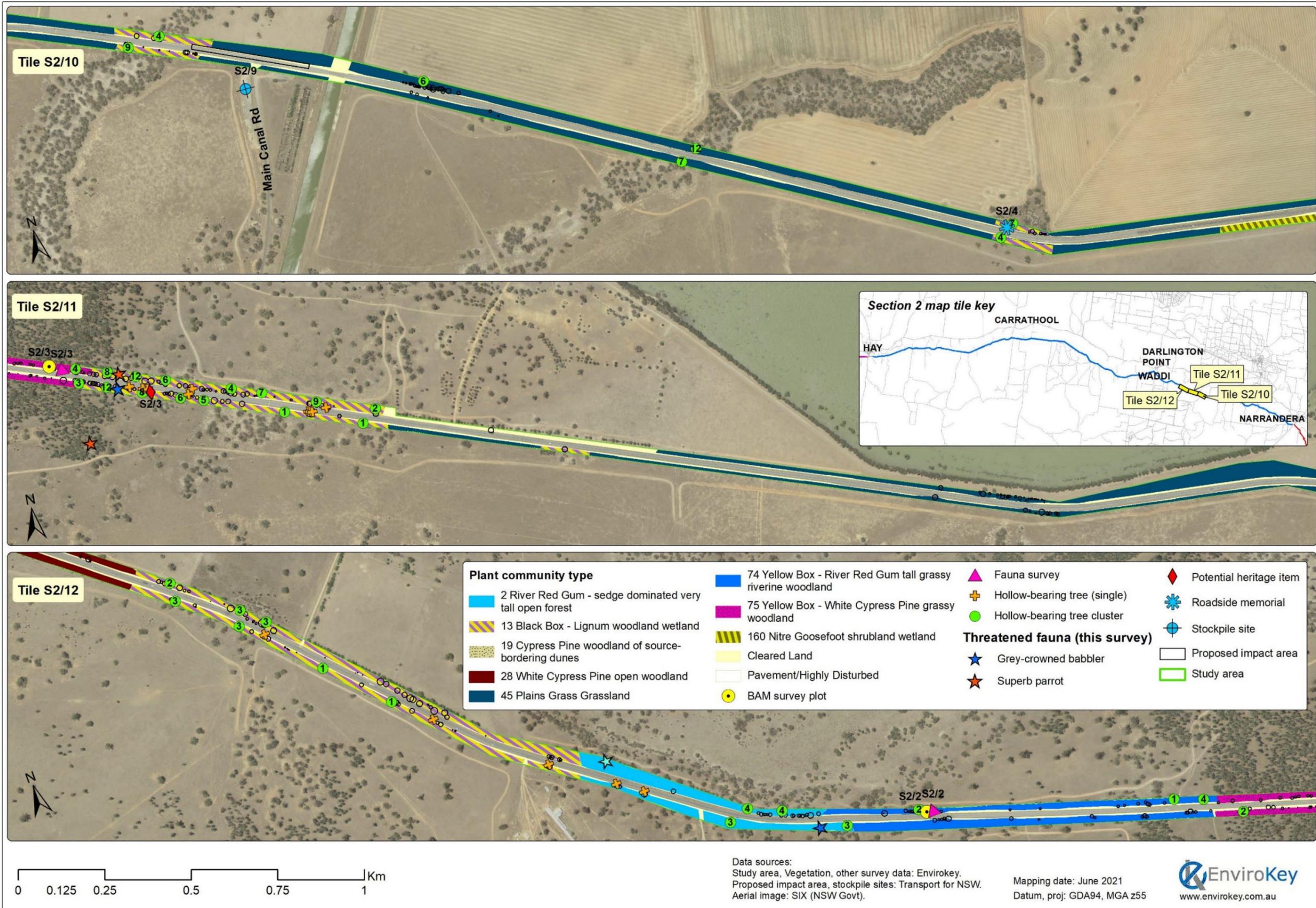


Figure 3-17: Plant community types and other points of interest within the study area (section 2)

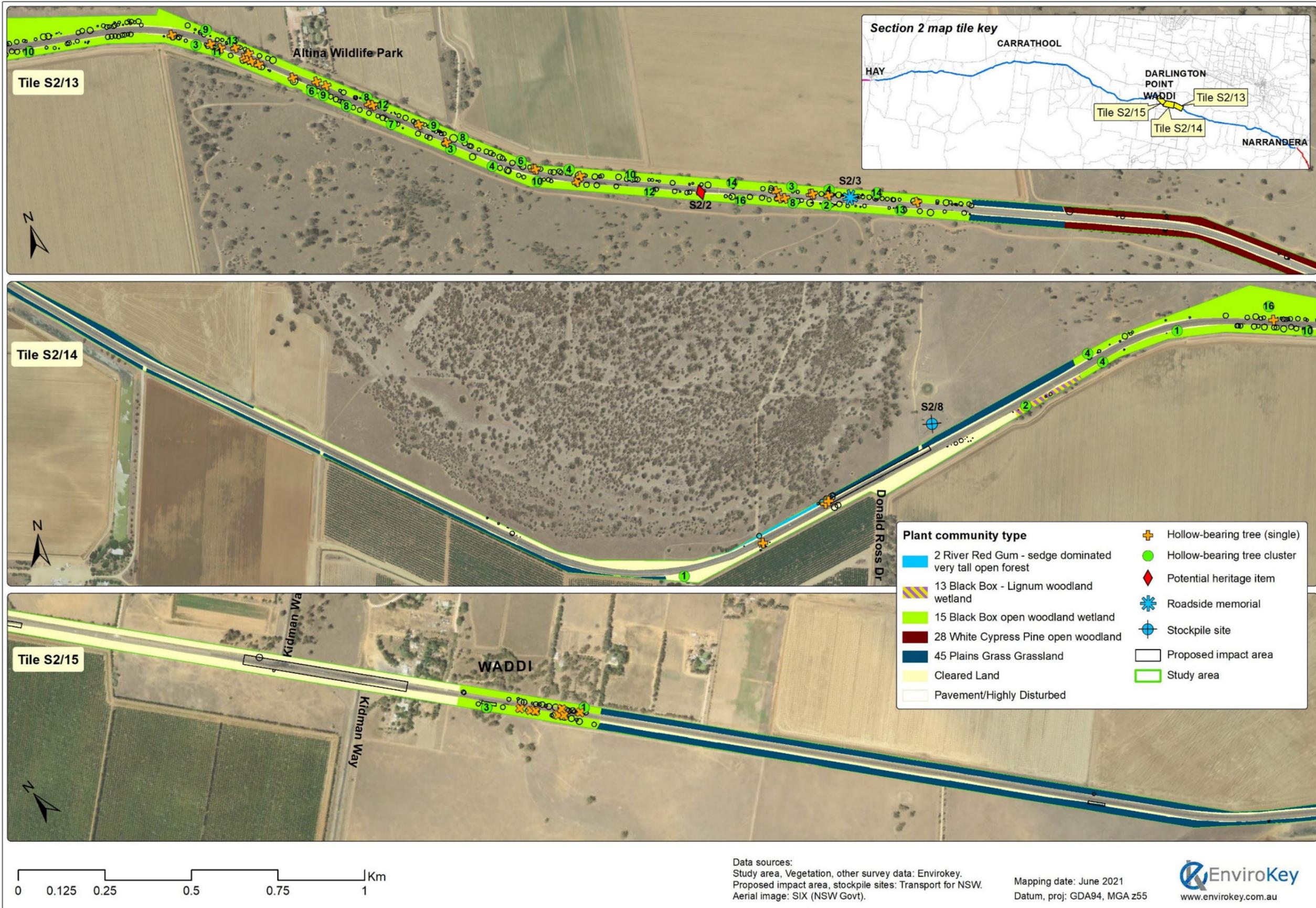


Figure 3-18: Plant community types and other points of interest within the study area (section 2)

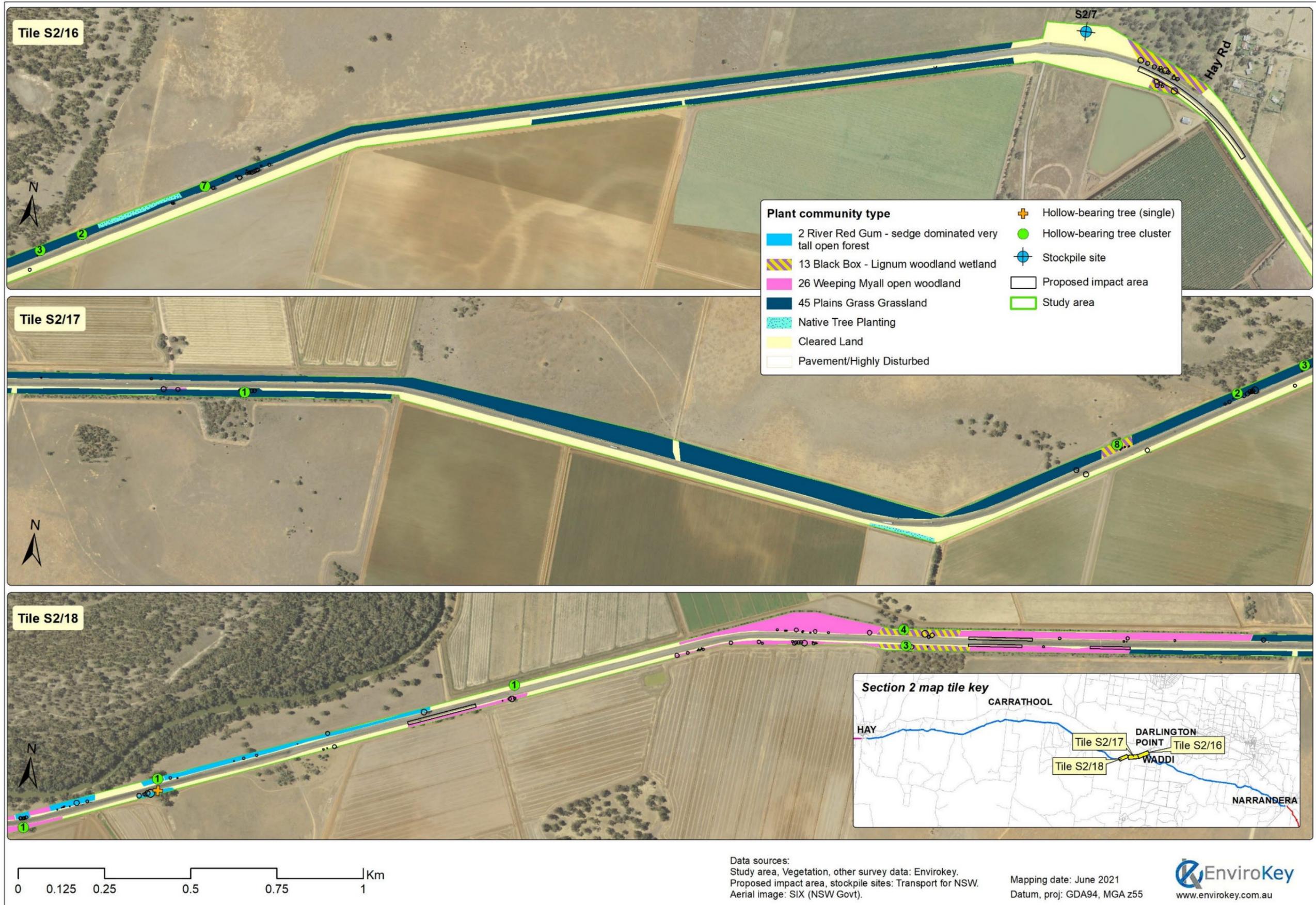


Figure 3-19: Plant community types and other points of interest within the study area (section 2)

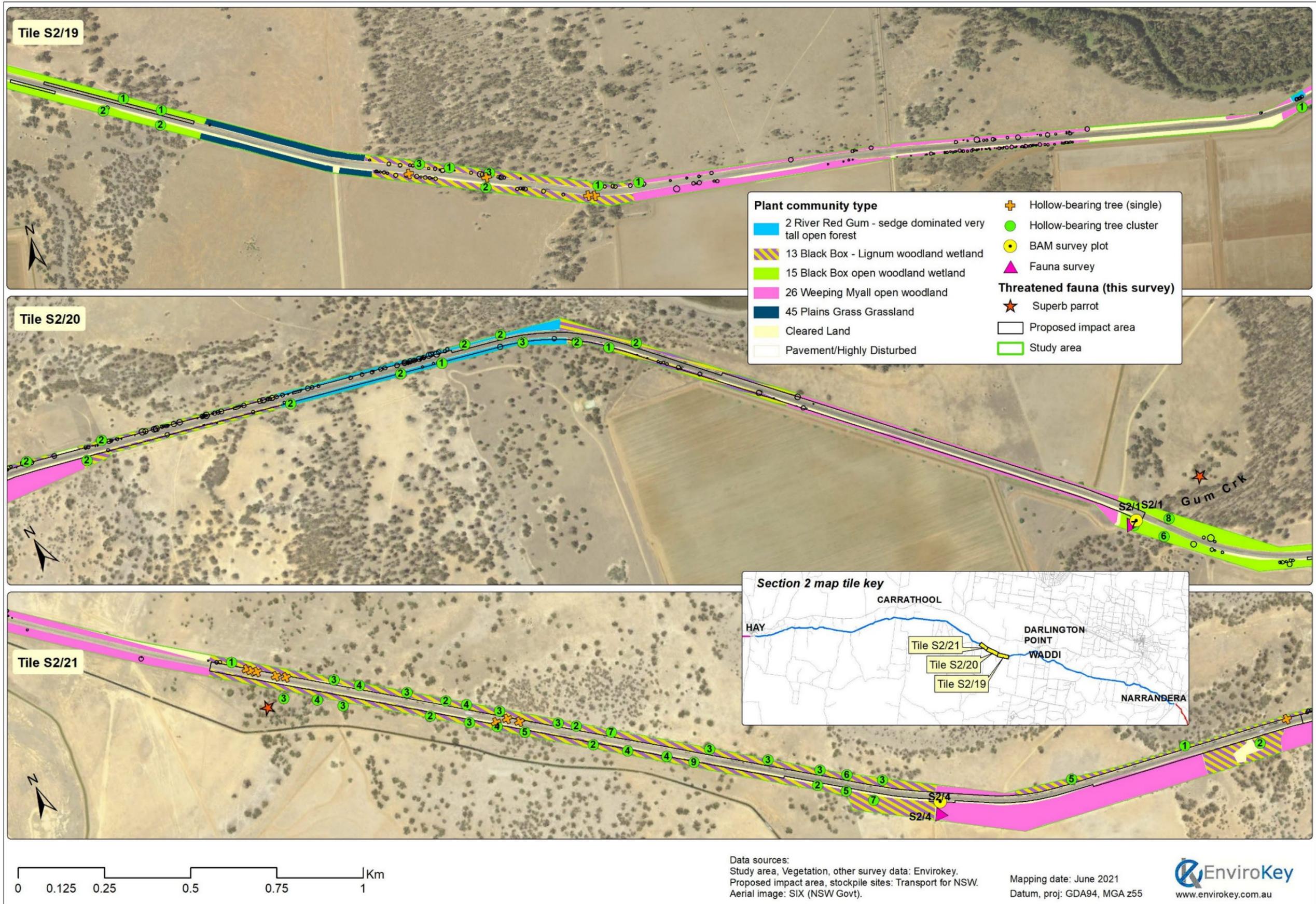


Figure 3-20: Plant community types and other points of interest within the study area (section 2)

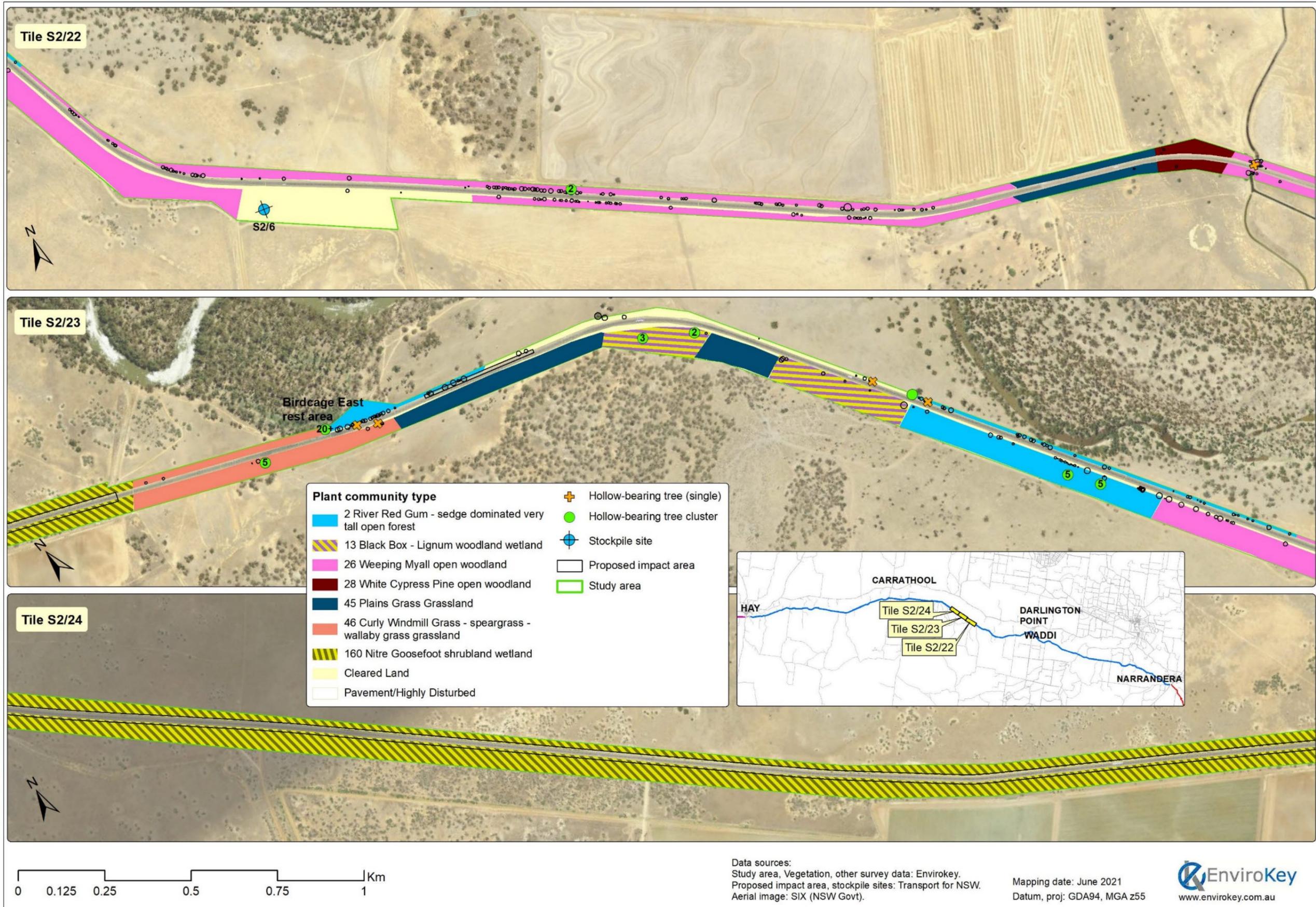


Figure 3-21: Plant community types and other points of interest within the study area (section 2)

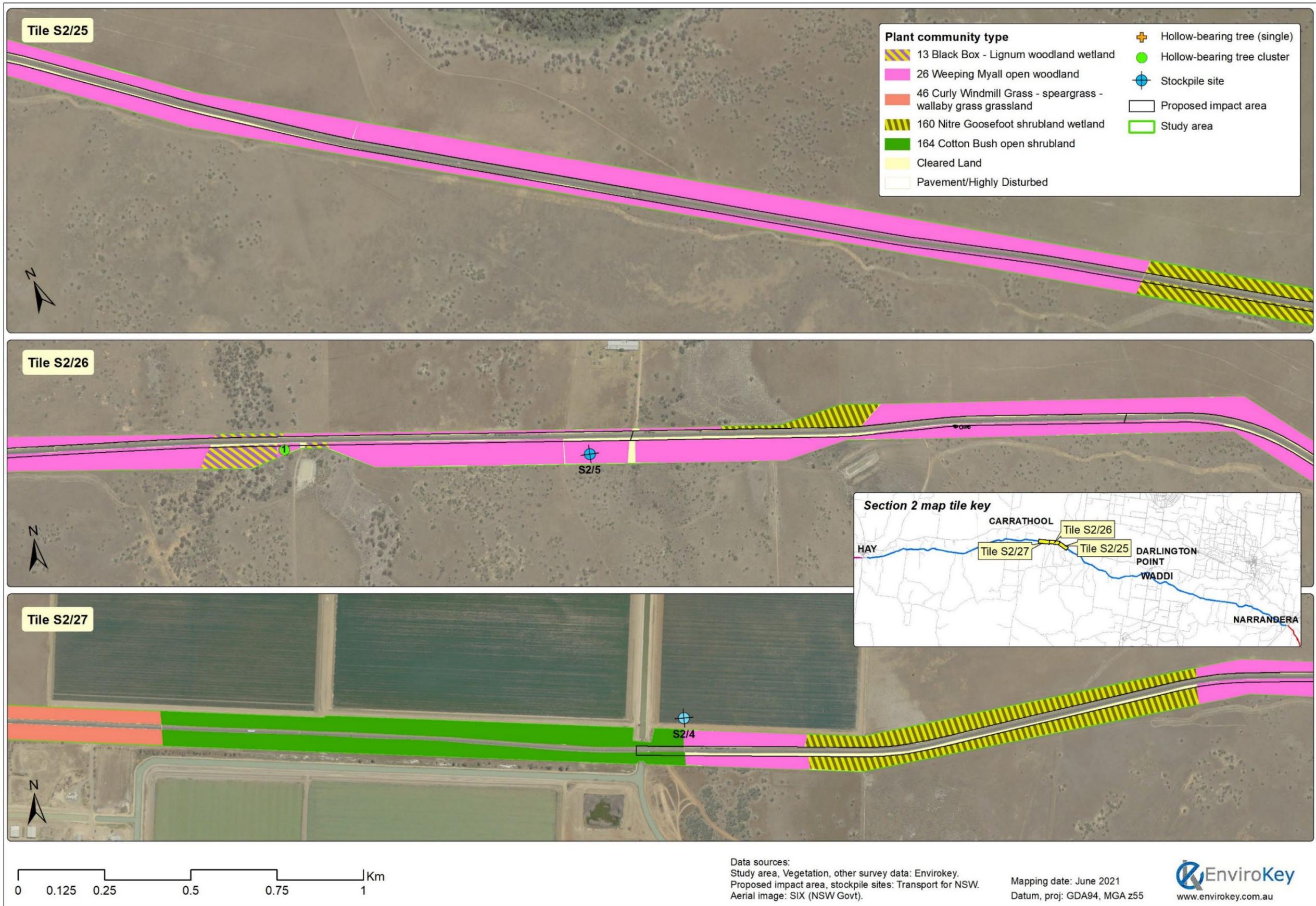


Figure 3-22: Plant community types and other points of interest within the study area (section 2)

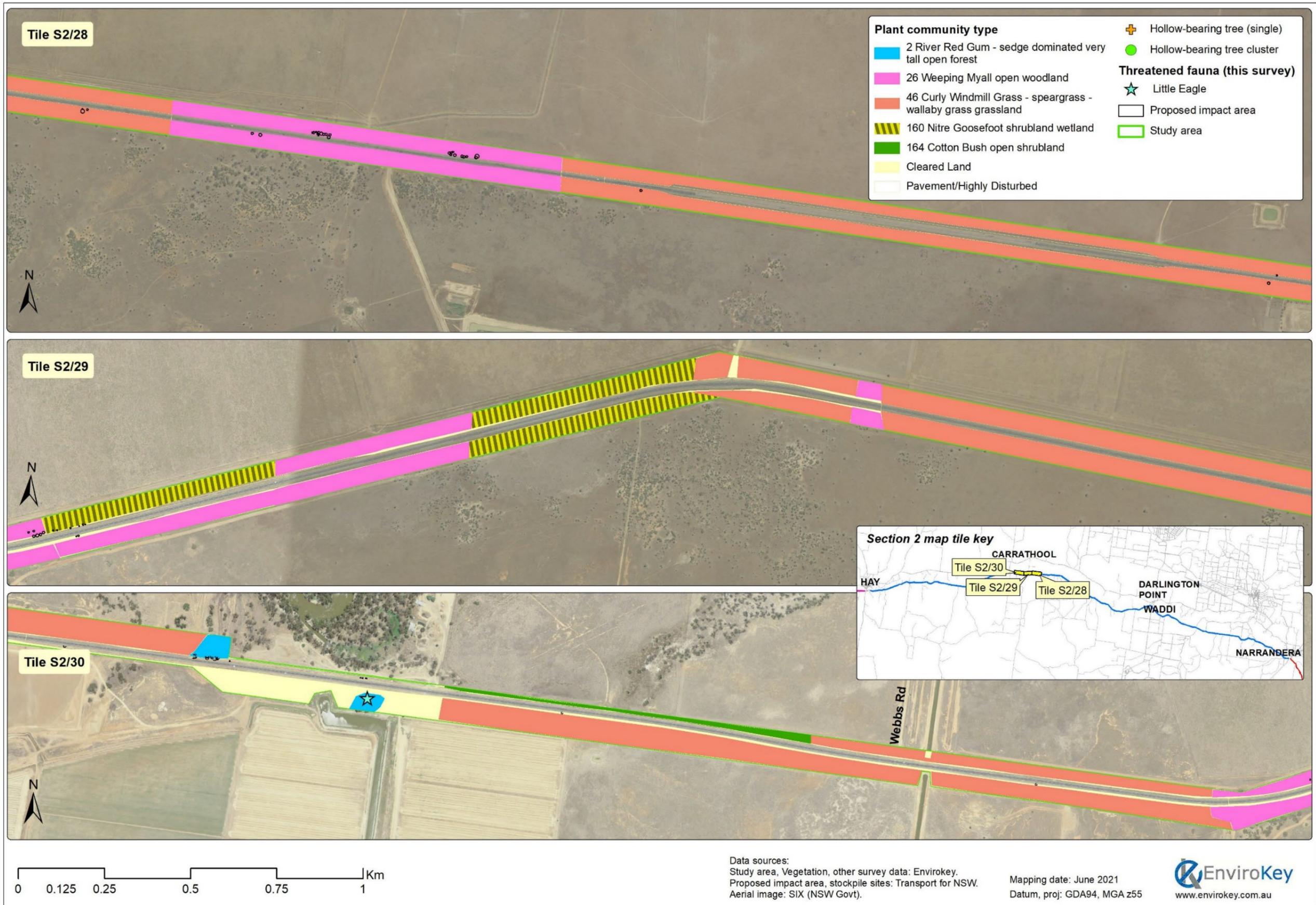


Figure 3-23: Plant community types and other points of interest within the study area (section 2)

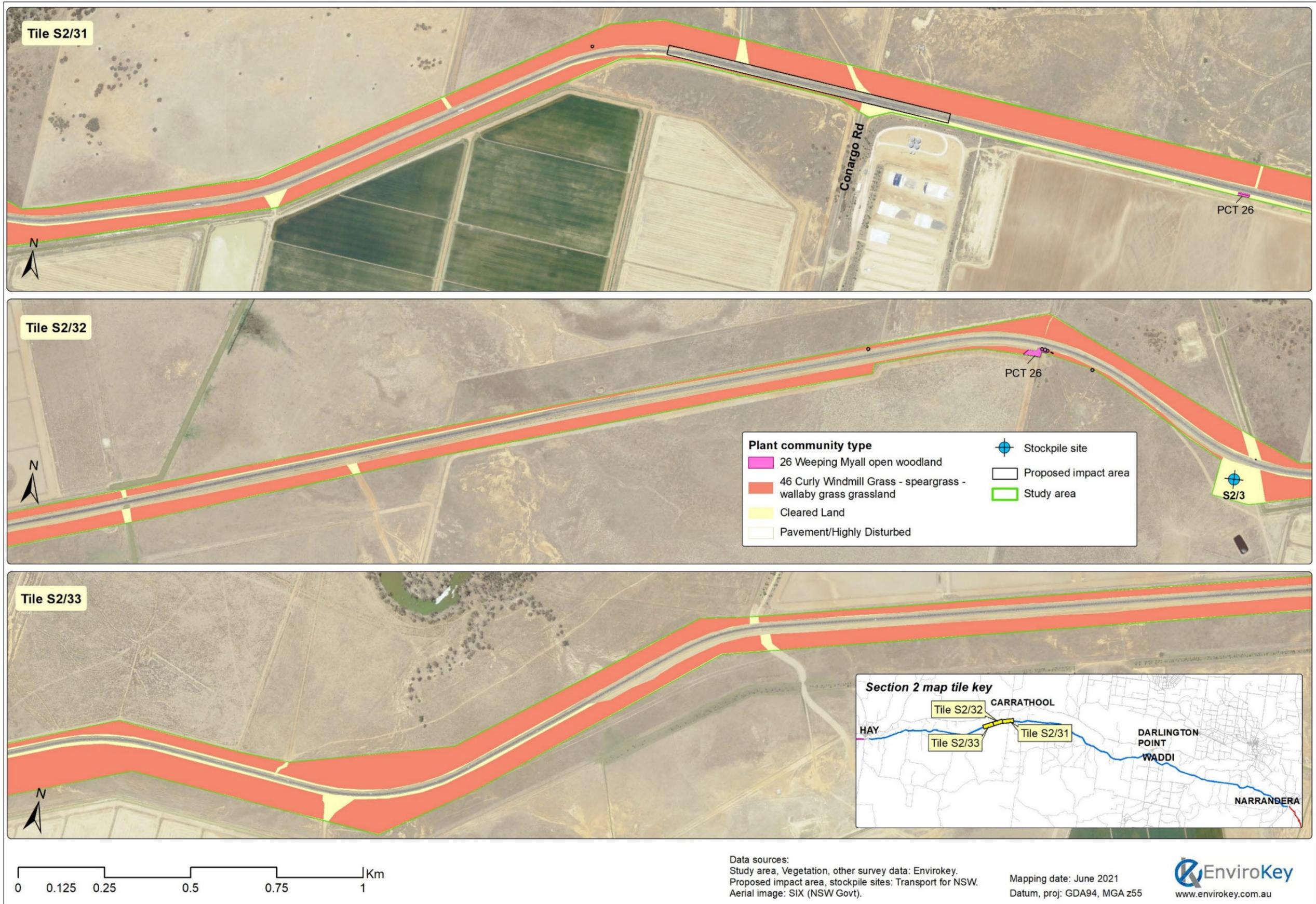


Figure 3-24: Plant community types and other points of interest within the study area (section 2)

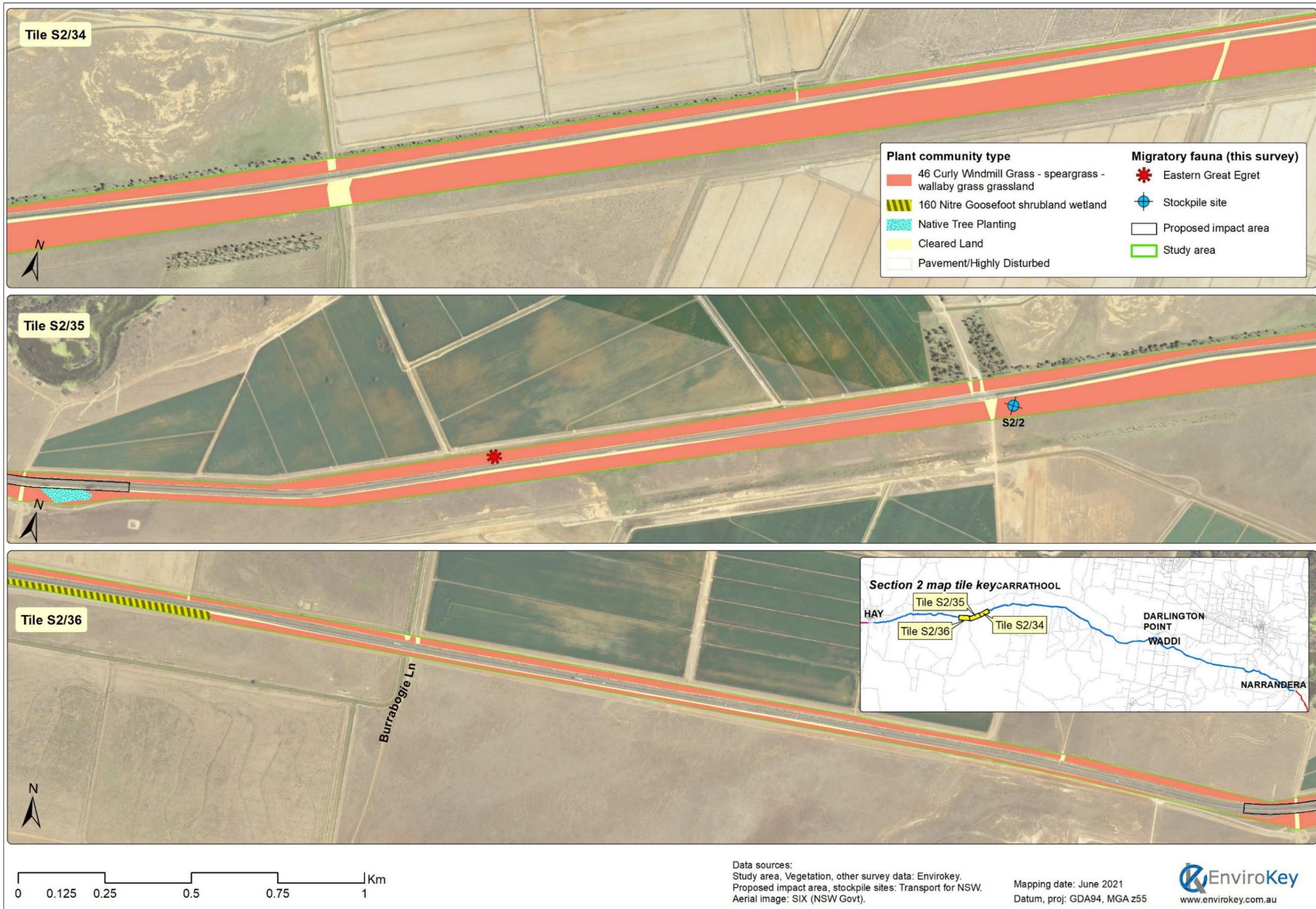


Figure 3-25: Plant community types and other points of interest within the study area (section 2)

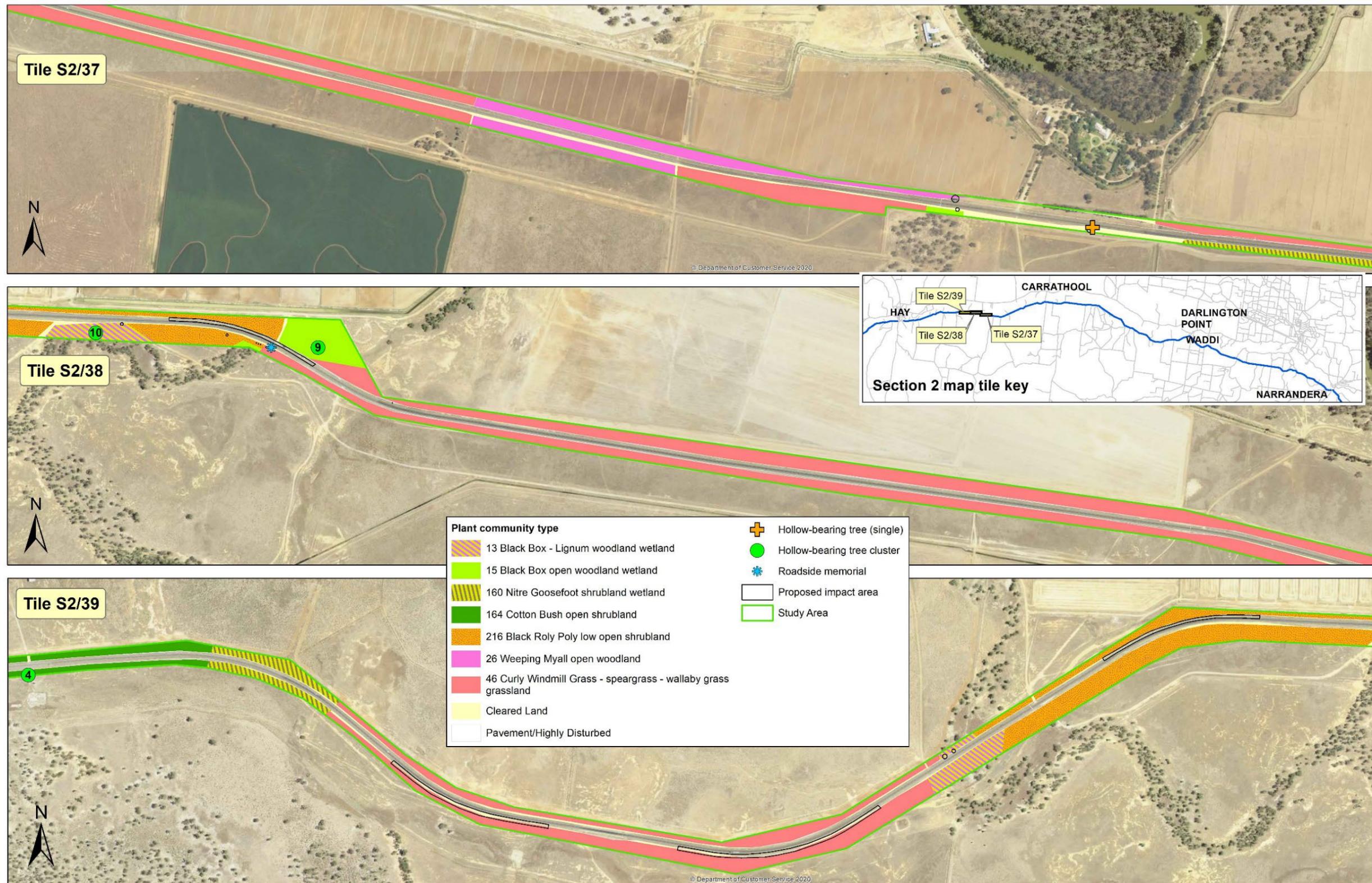


Figure 3-26: Plant community types and other points of interest within the study area (section 2)

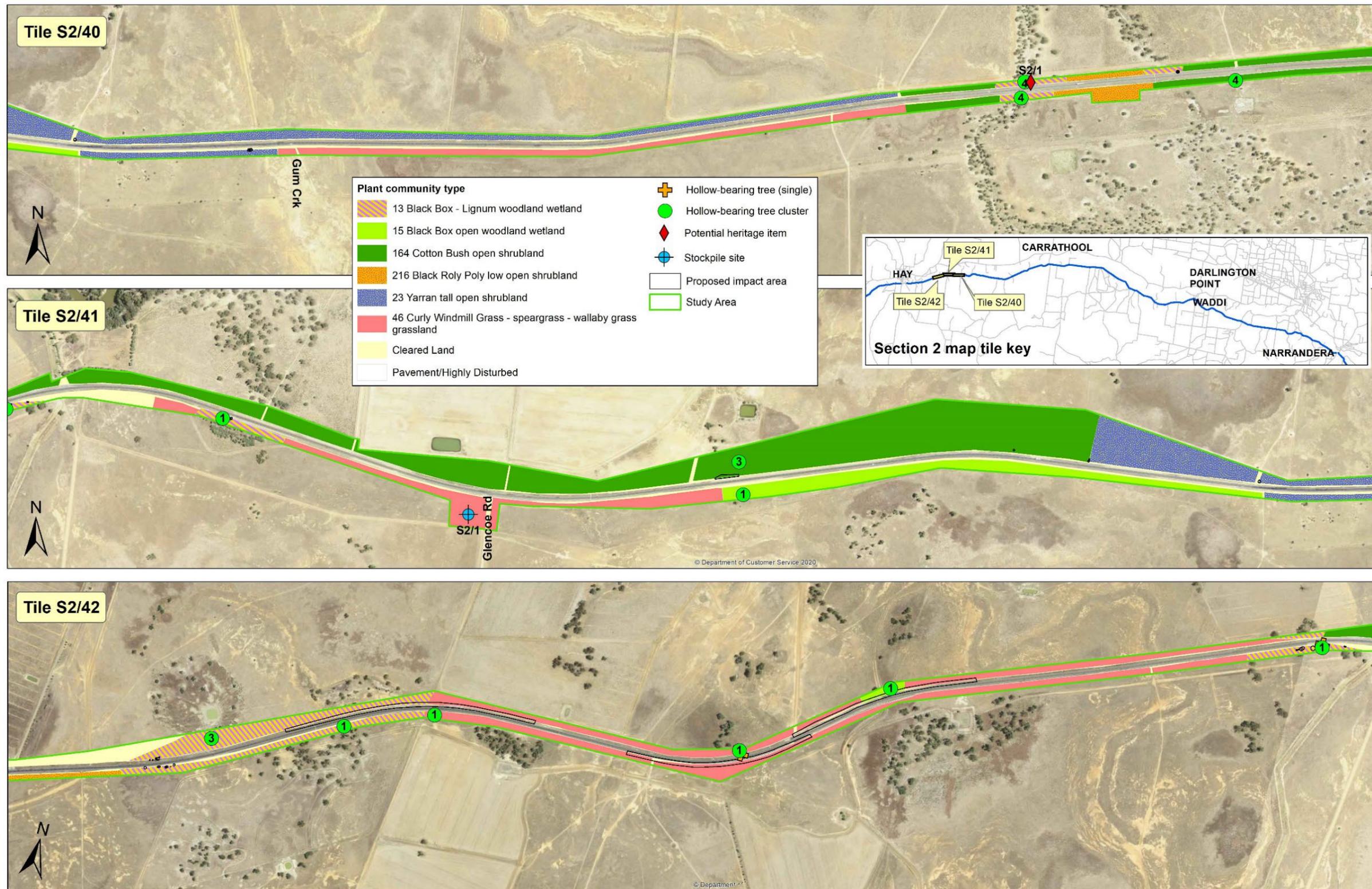


Figure 3-27: Plant community types and other points of interest within the study area (section 2)

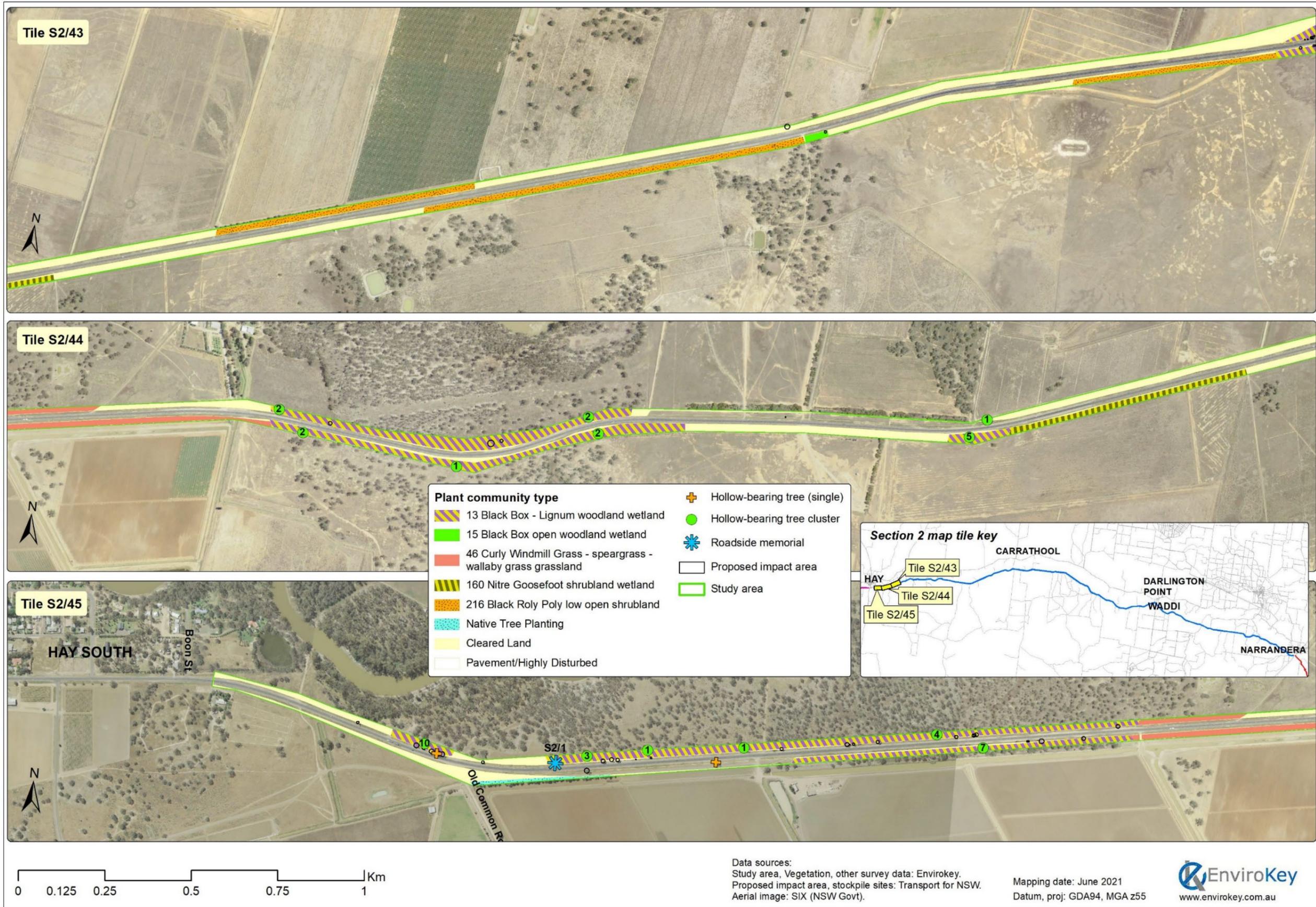


Figure 3-28: Plant community types and other points of interest within the study area (section 2)

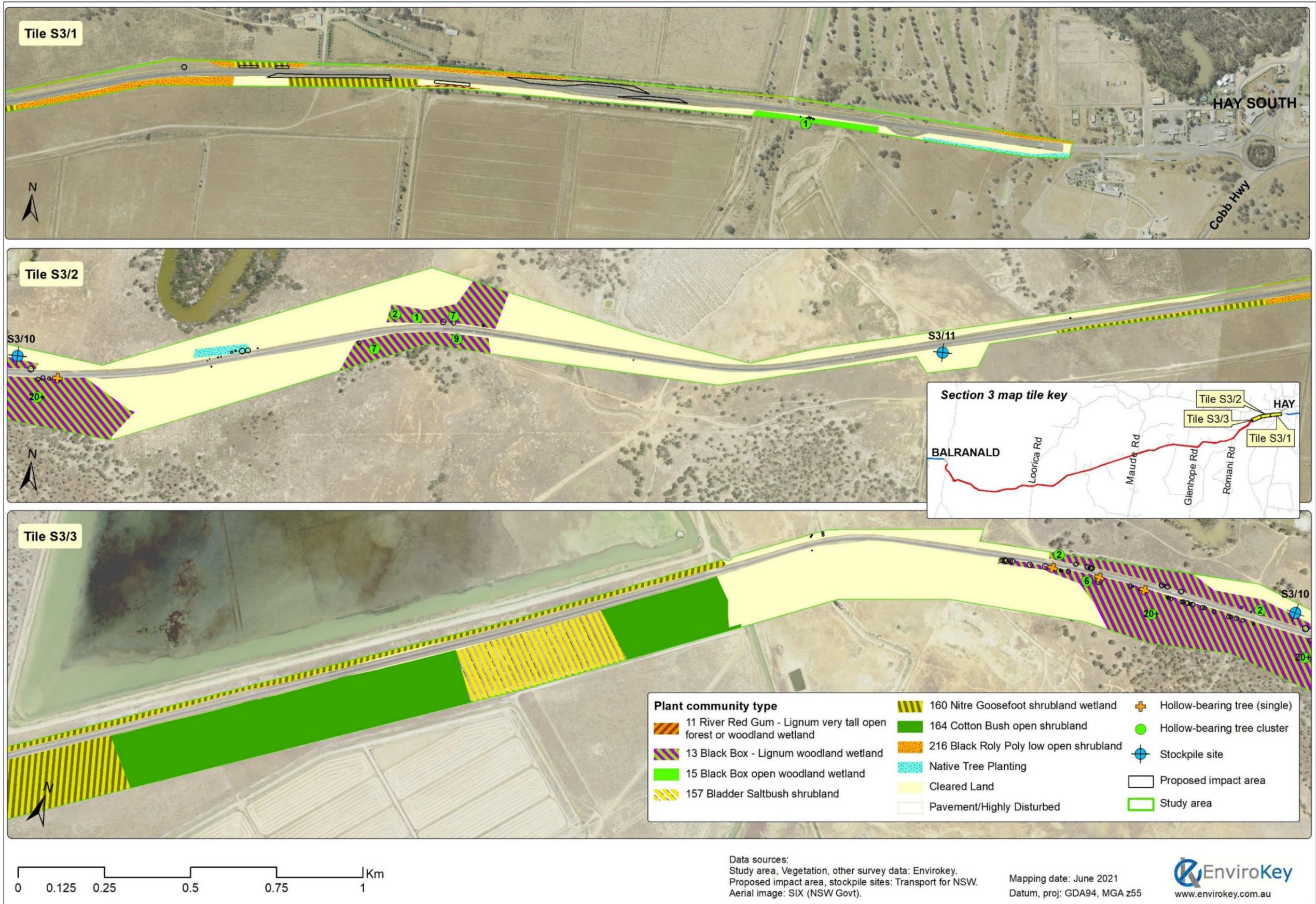


Figure 3-29: Plant community types and other points of interest within the study area (section 3)

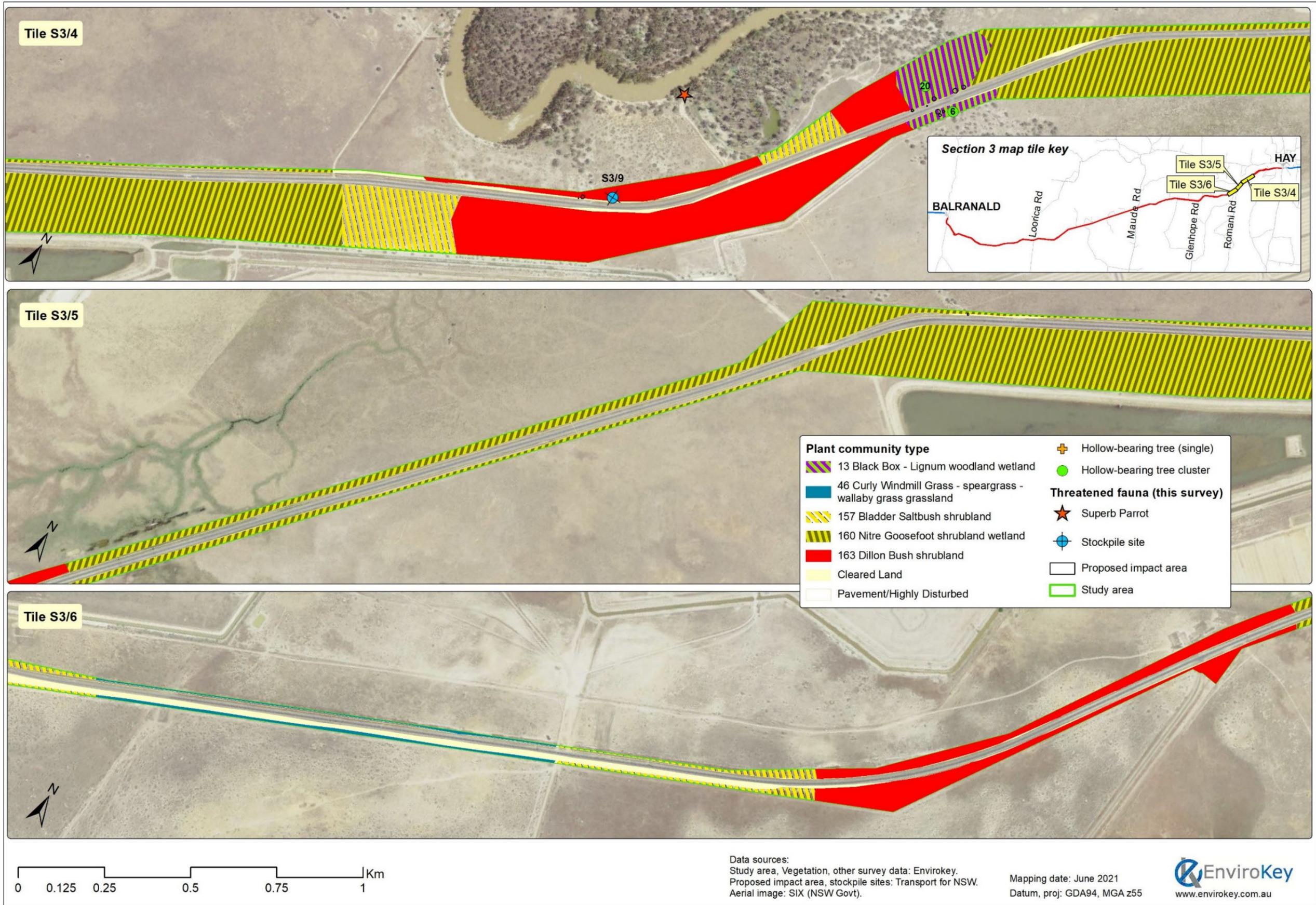


Figure 3-30: Plant community types and other points of interest within the study area (section 3)

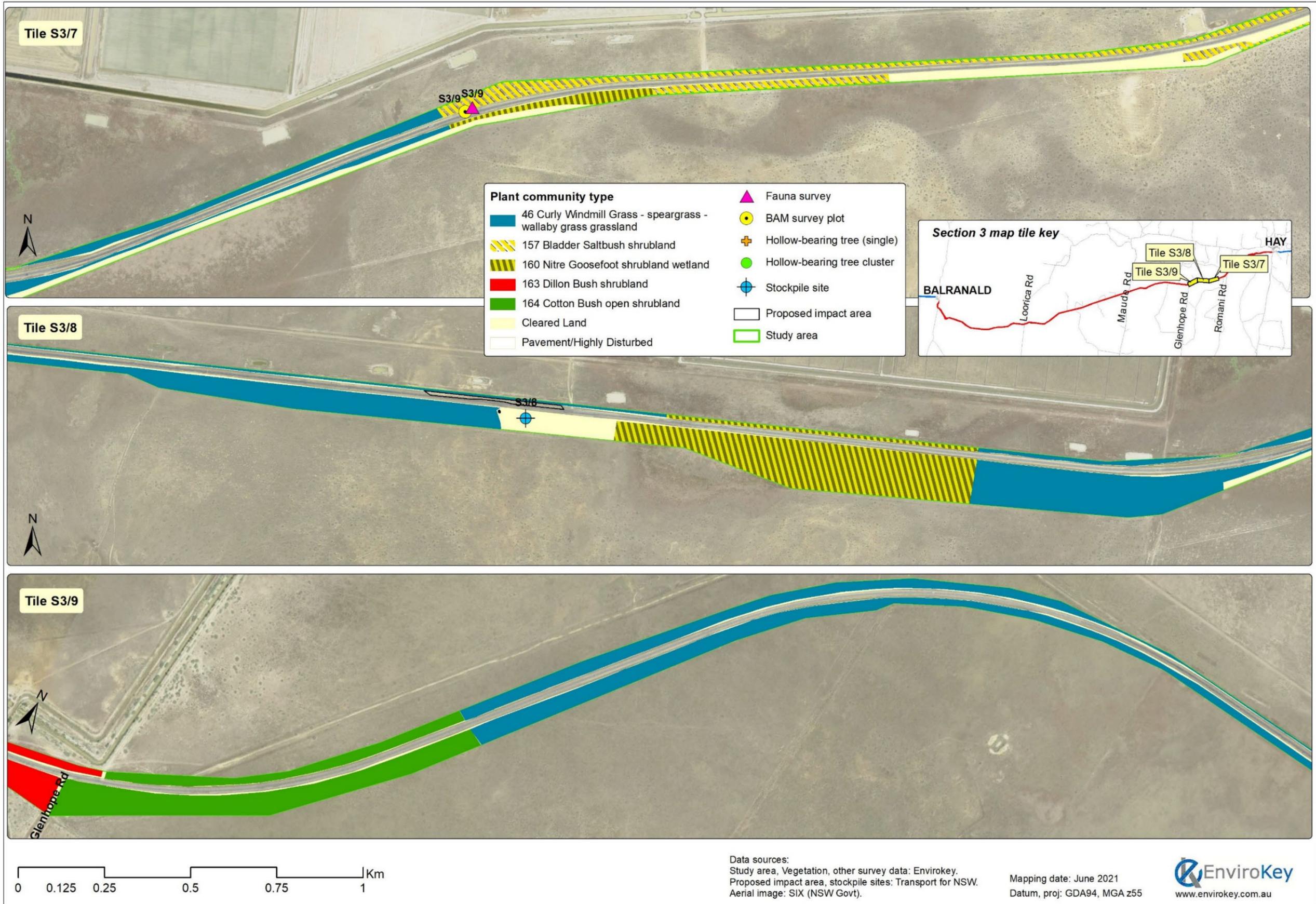


Figure 3-31: Plant community types and other points of interest within the study area (section 3)

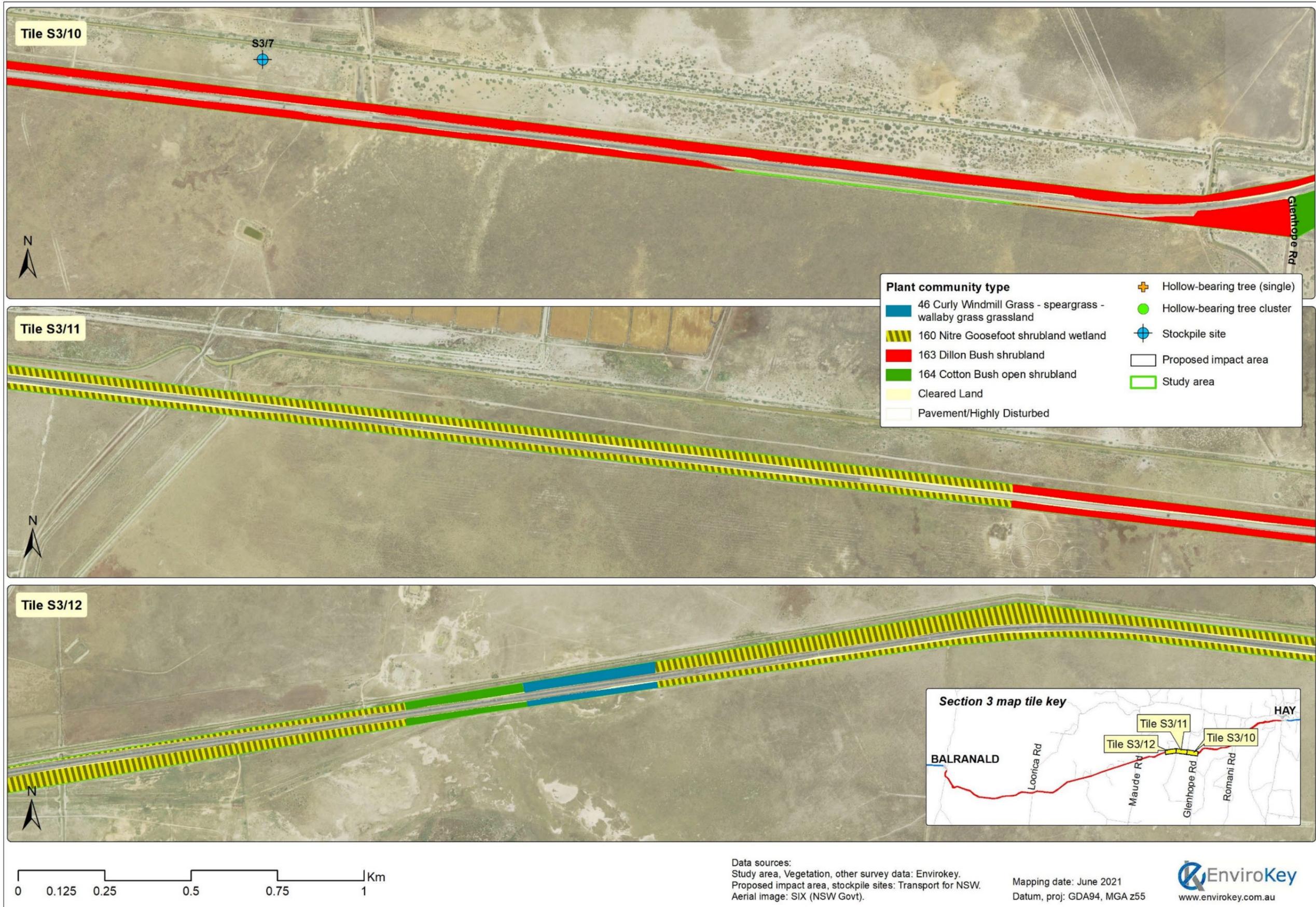


Figure 3-32: Plant community types and other points of interest within the study area (section 3)

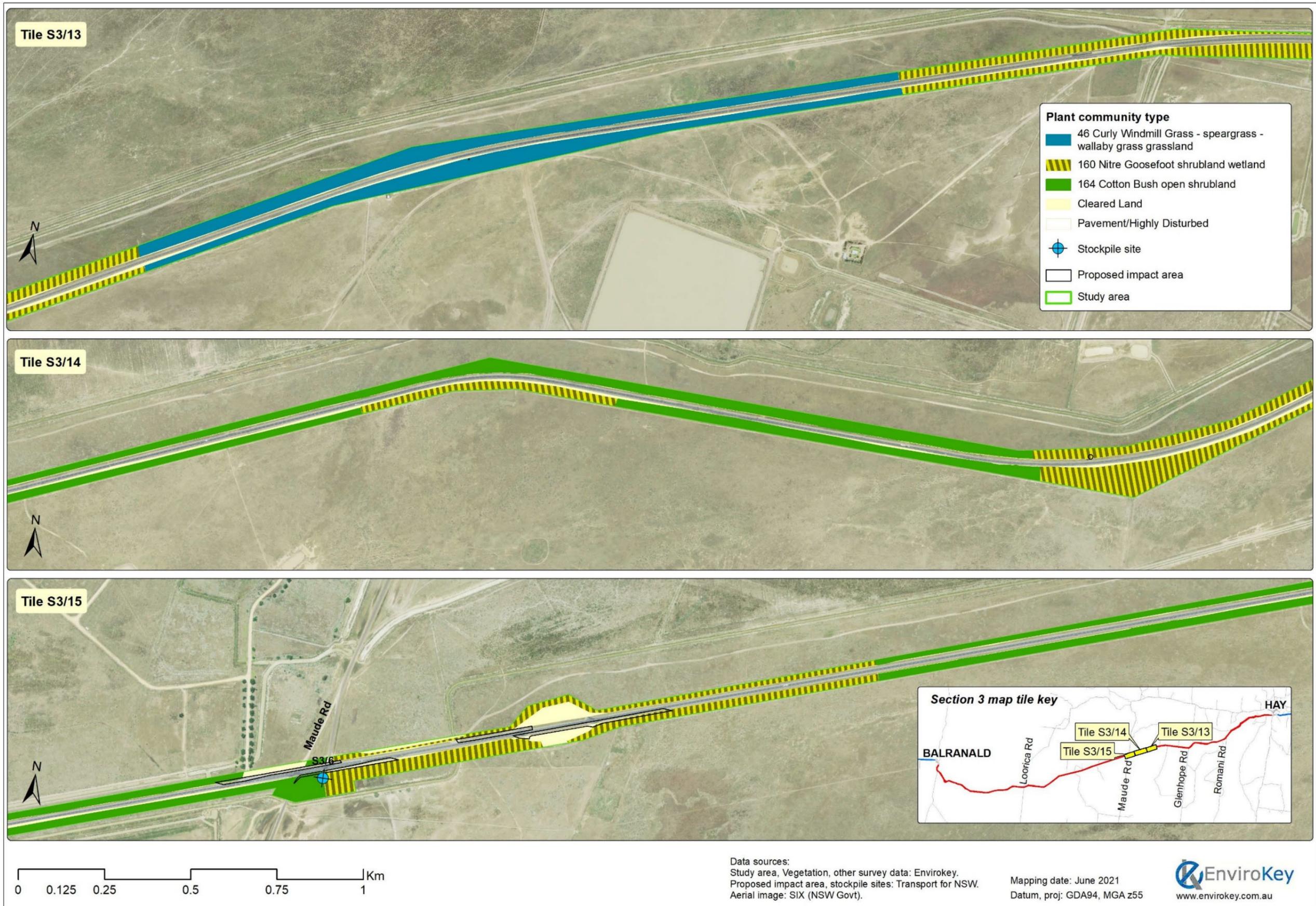


Figure 3-33: Plant community types and other points of interest within the study area (section 3)

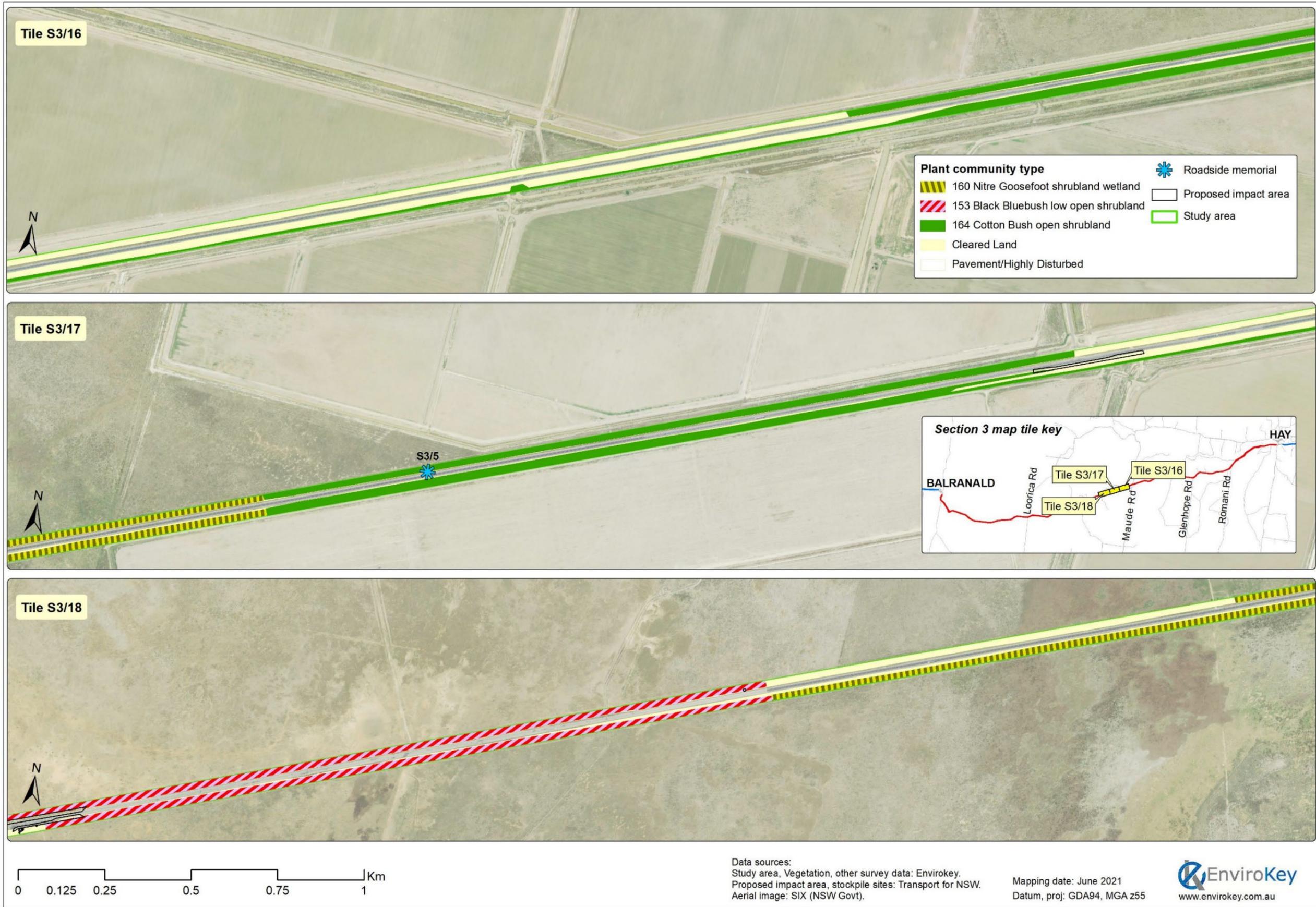


Figure 3-34: Plant community types and other points of interest within the study area (section 3)

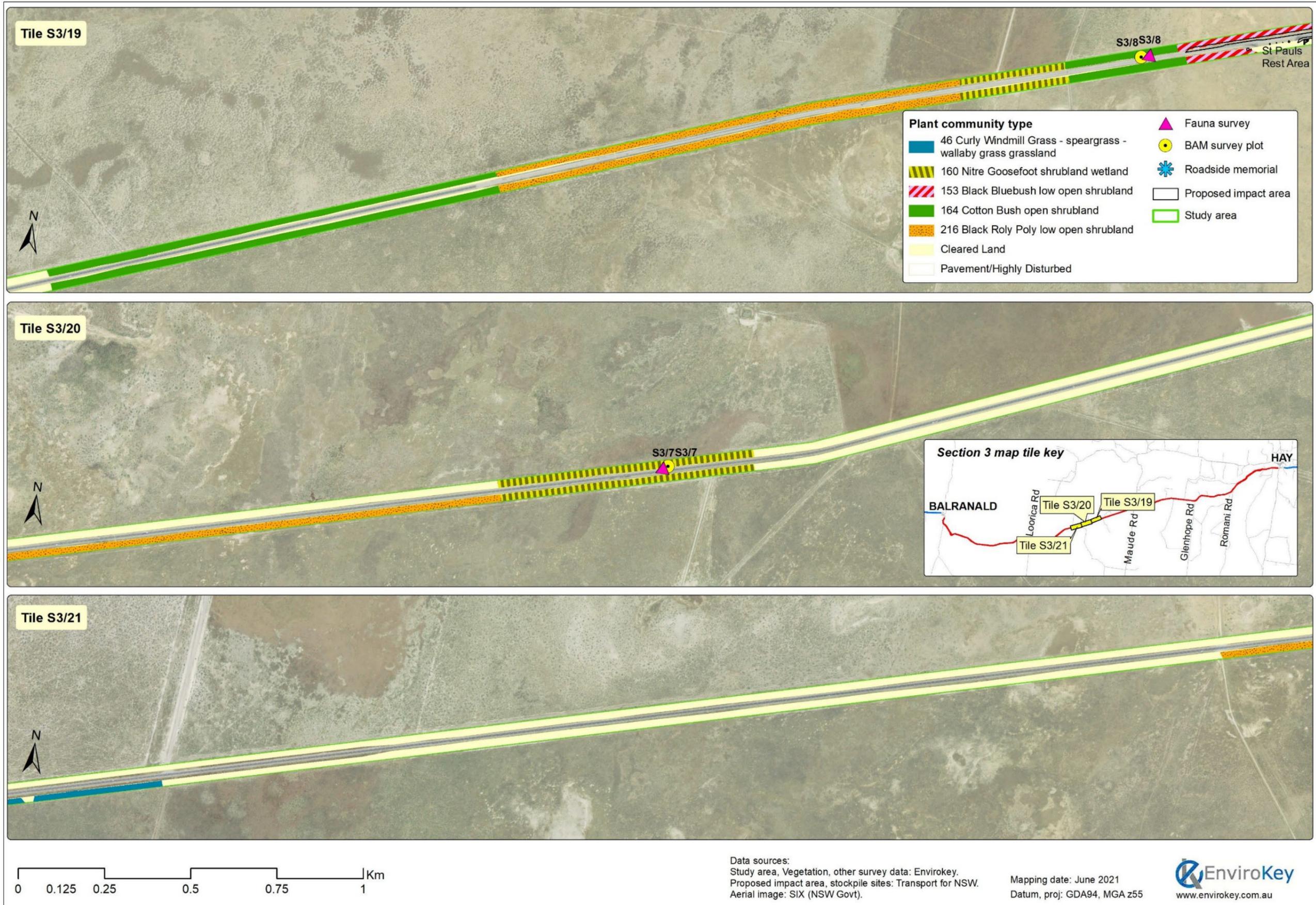


Figure 3-35: Plant community types and other points of interest within the study area (section 3)

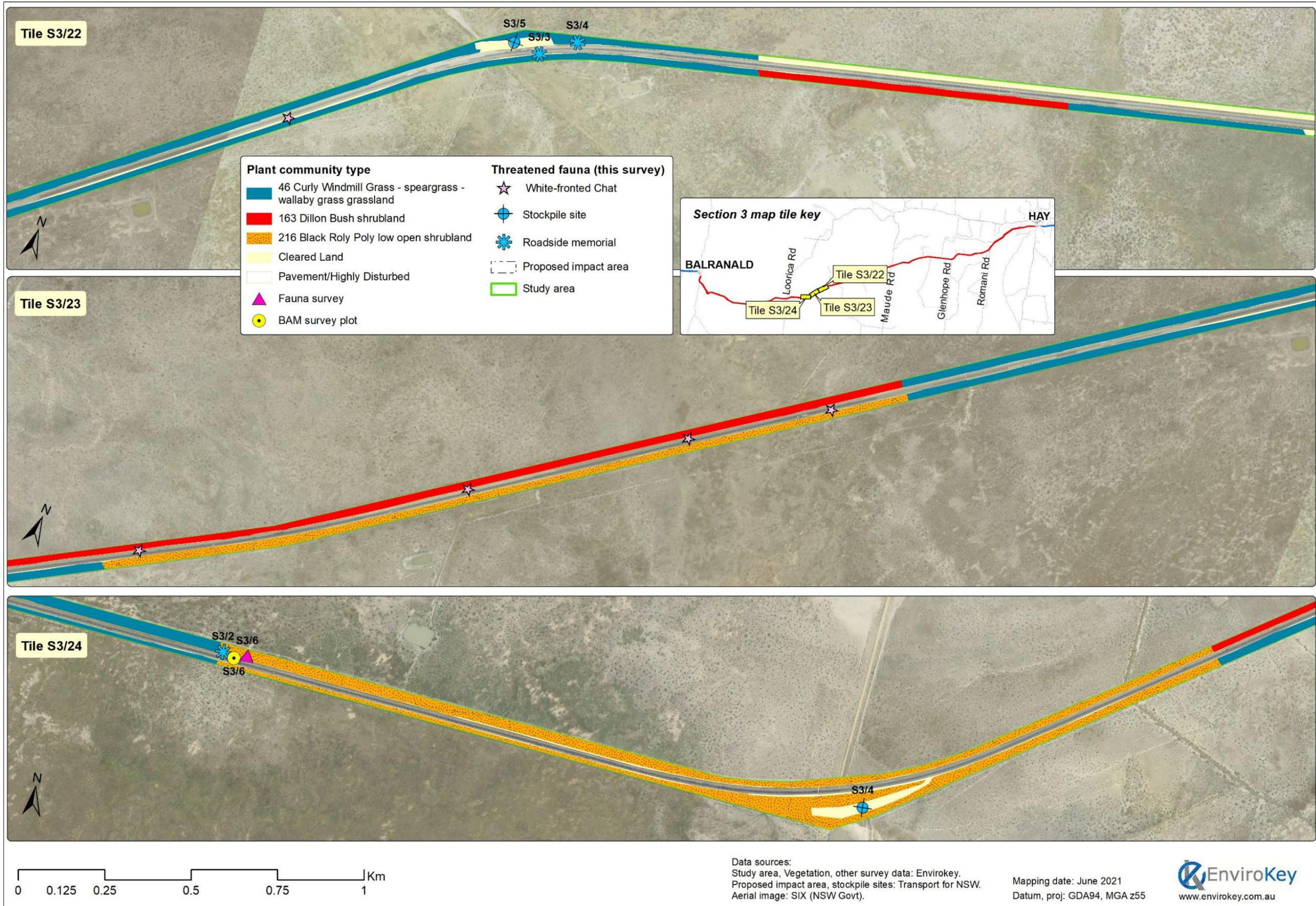


Figure 3-36: Plant community types and other points of interest within the study area (section 3)

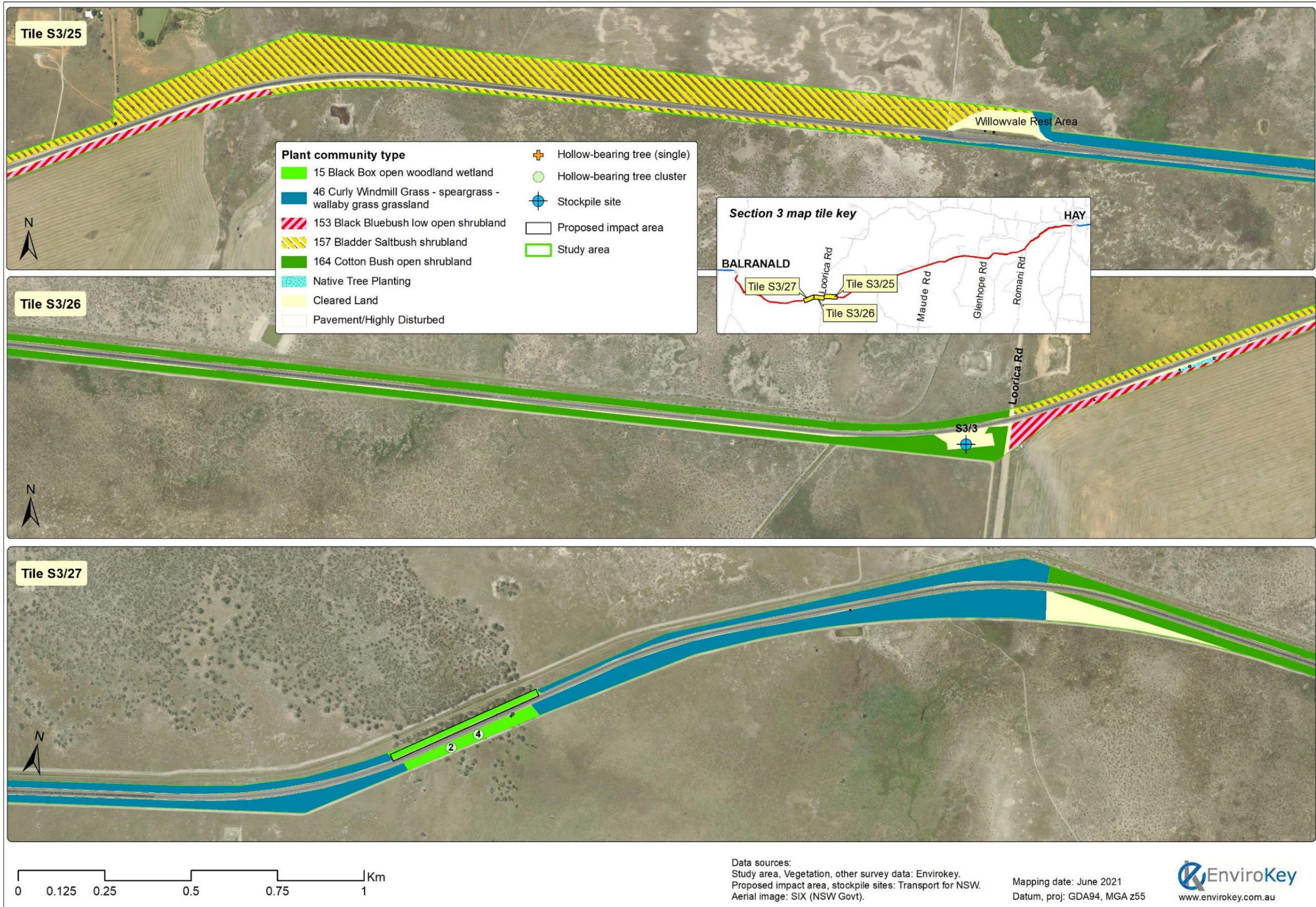


Figure 3-37: Plant community types and other points of interest within the study area (section 3)

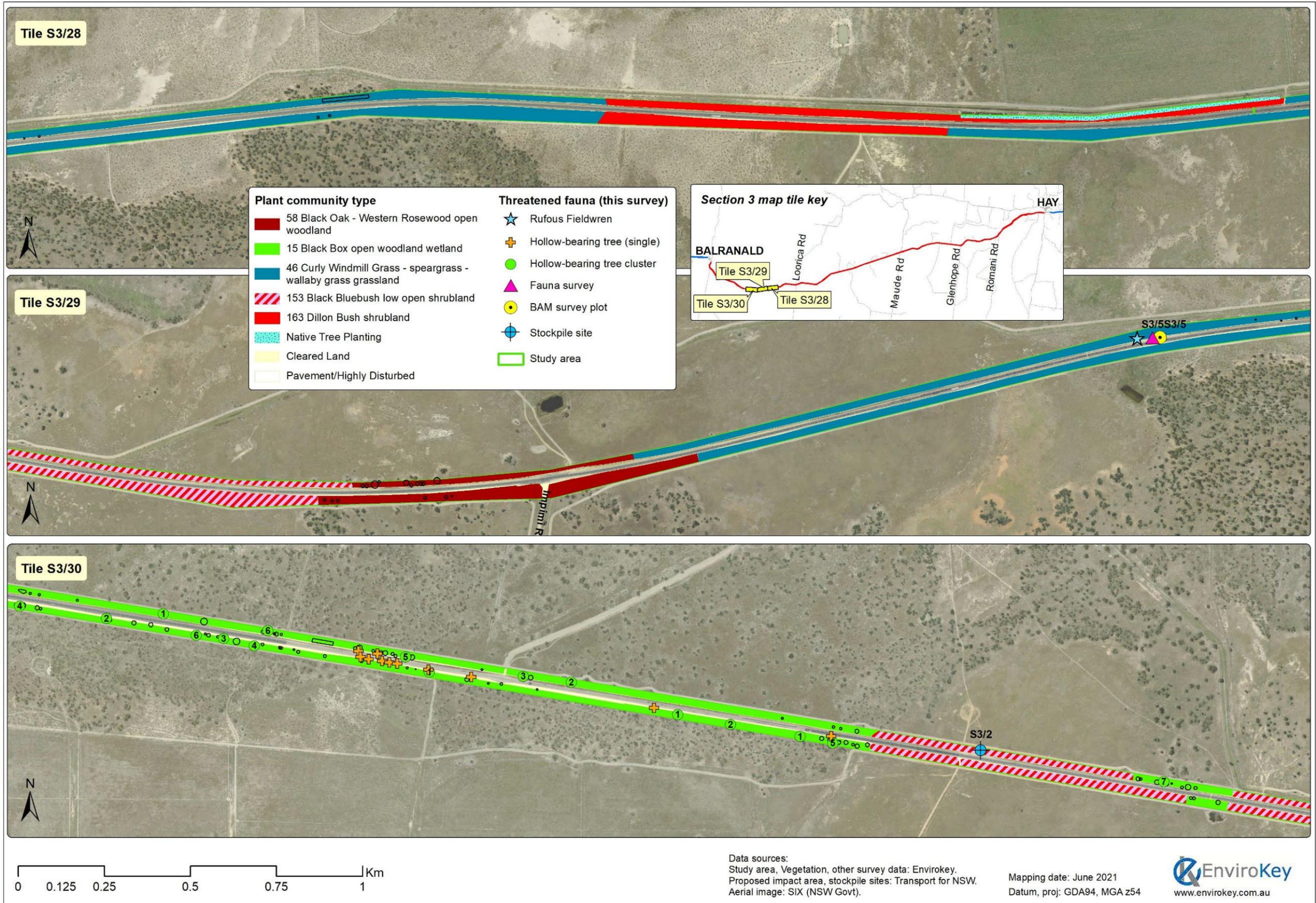


Figure 3-38: Plant community types and other points of interest within the study area (section 3)

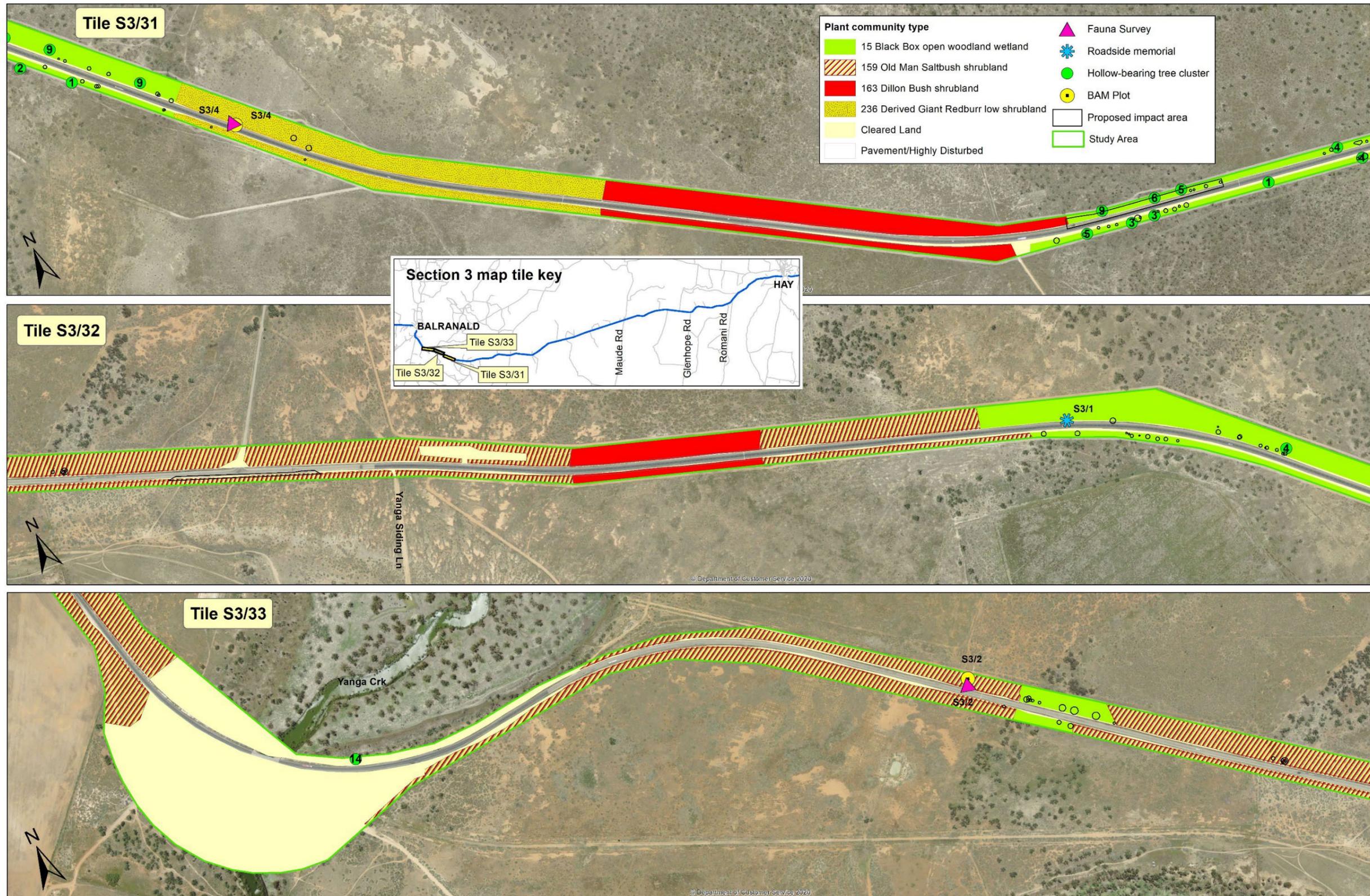


Figure 3-39: Plant community types and other points of interest within the study area (section 3)

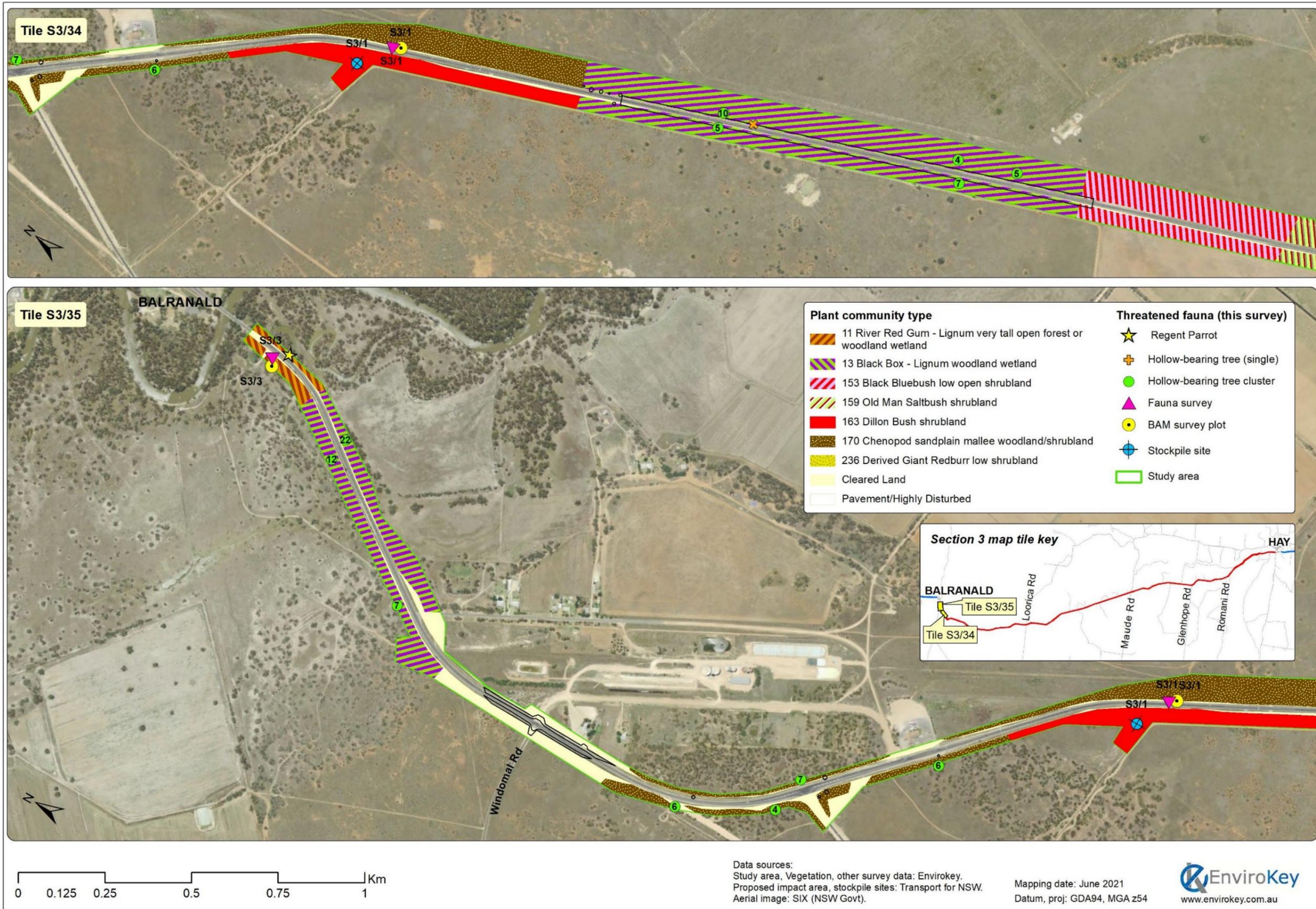


Figure 3-40: Plant community types and other points of interest within the study area (section 3)

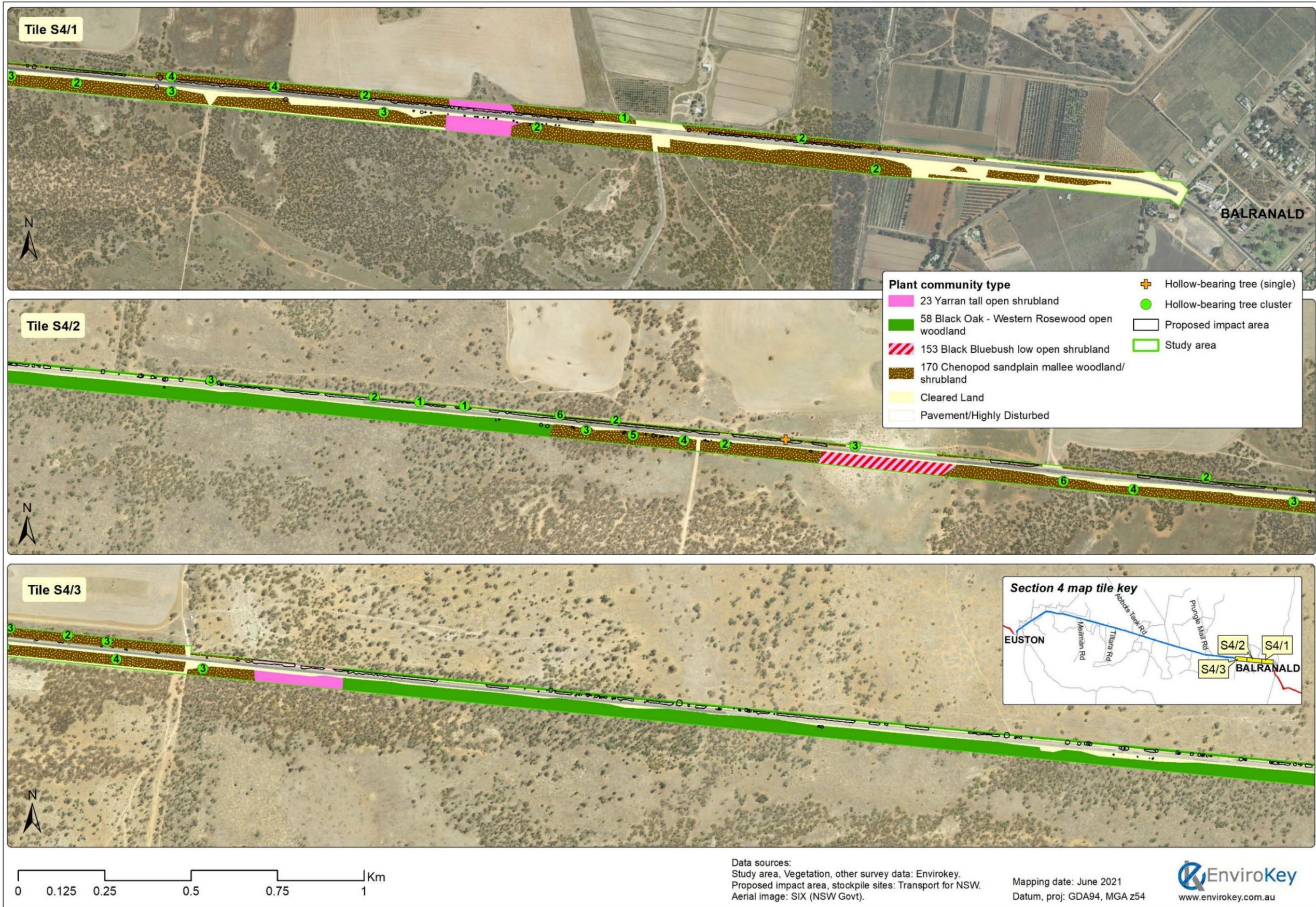


Figure 3-41: Plant community types and other points of interest within the study area (section 4)

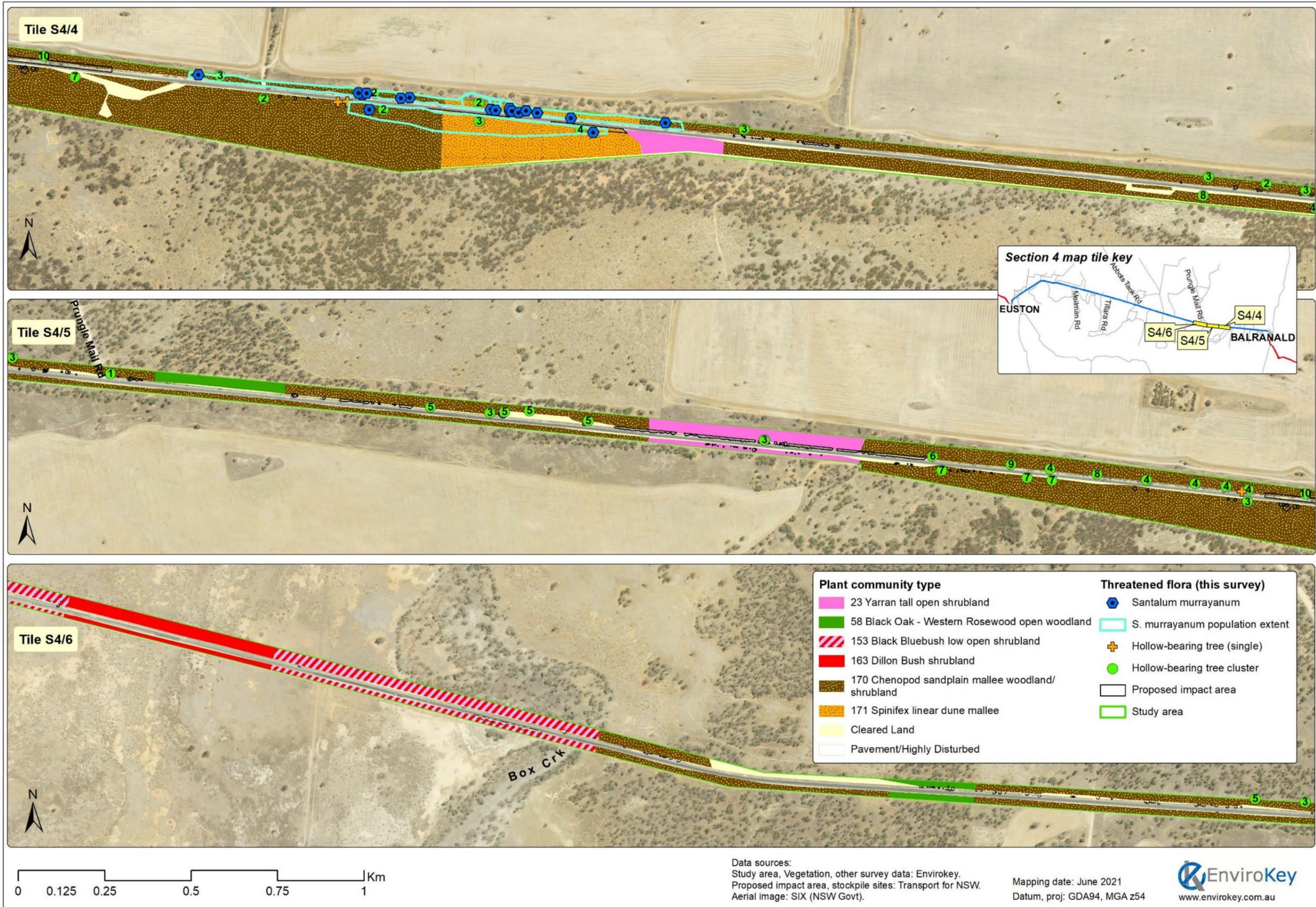


Figure 3-42: Plant community types and other points of interest within the study area (section 4)

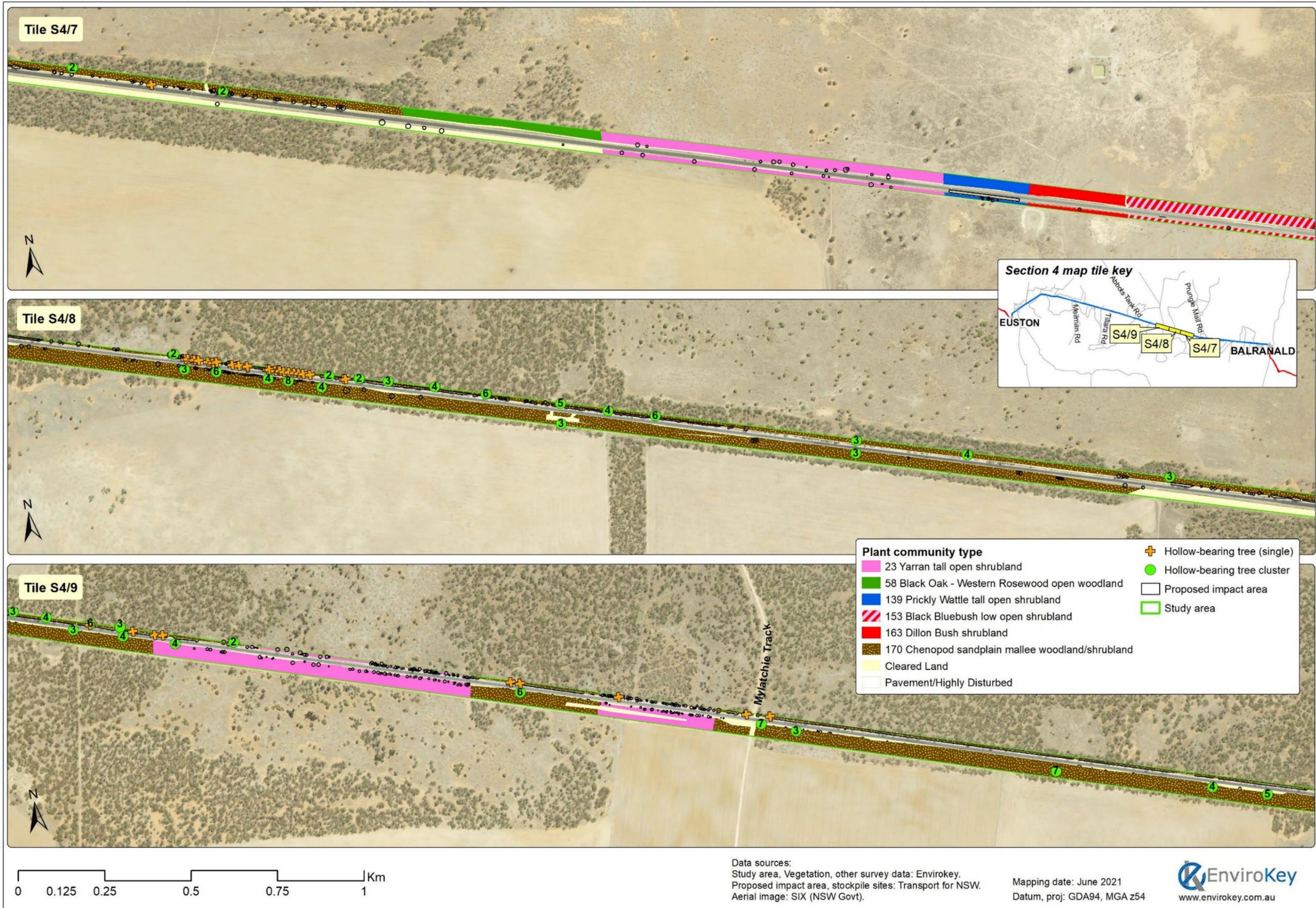


Figure 3-43: Plant community types and other points of interest within the study area (section 4)

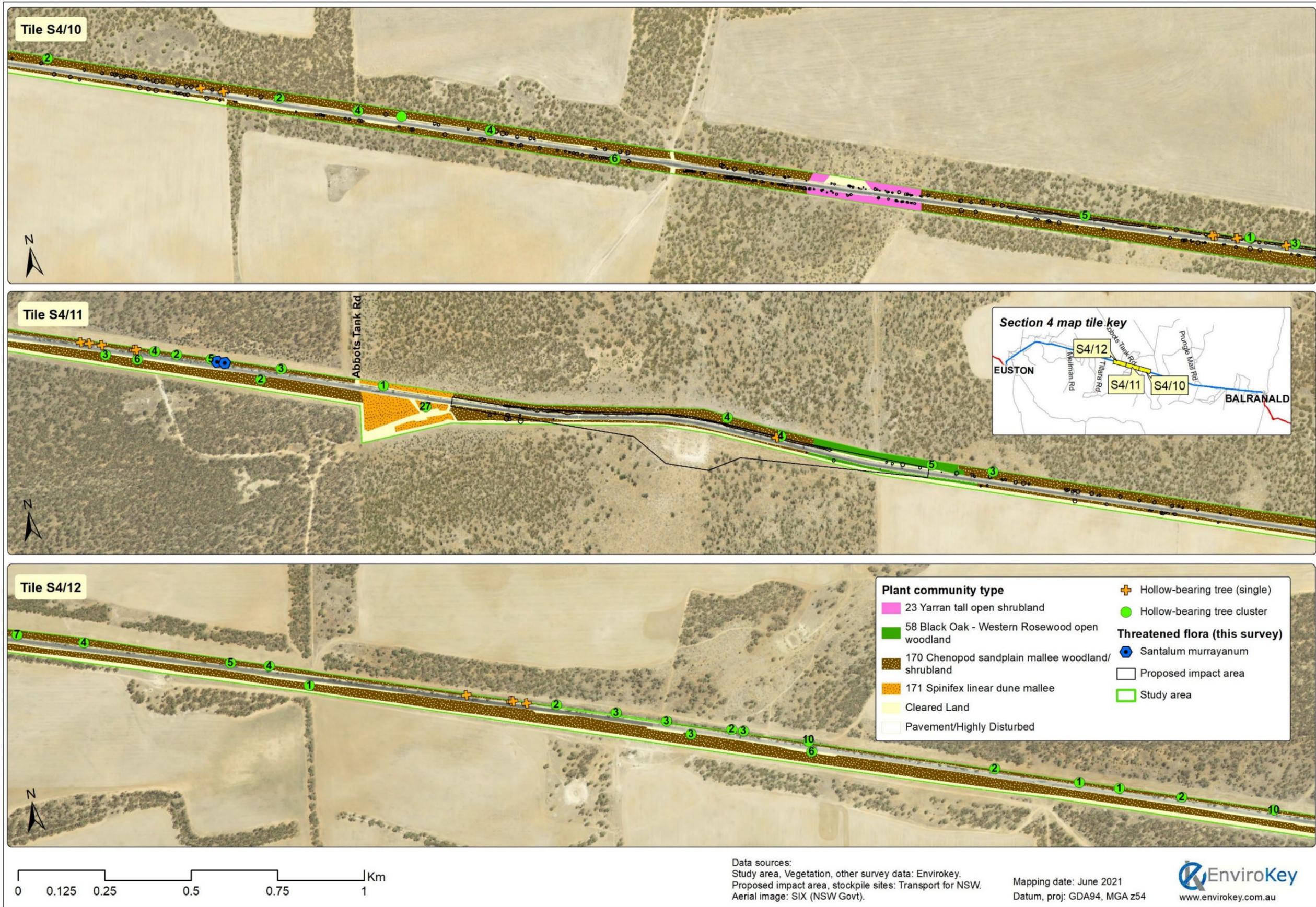


Figure 3-44: Plant community types and other points of interest within the study area (section 4)

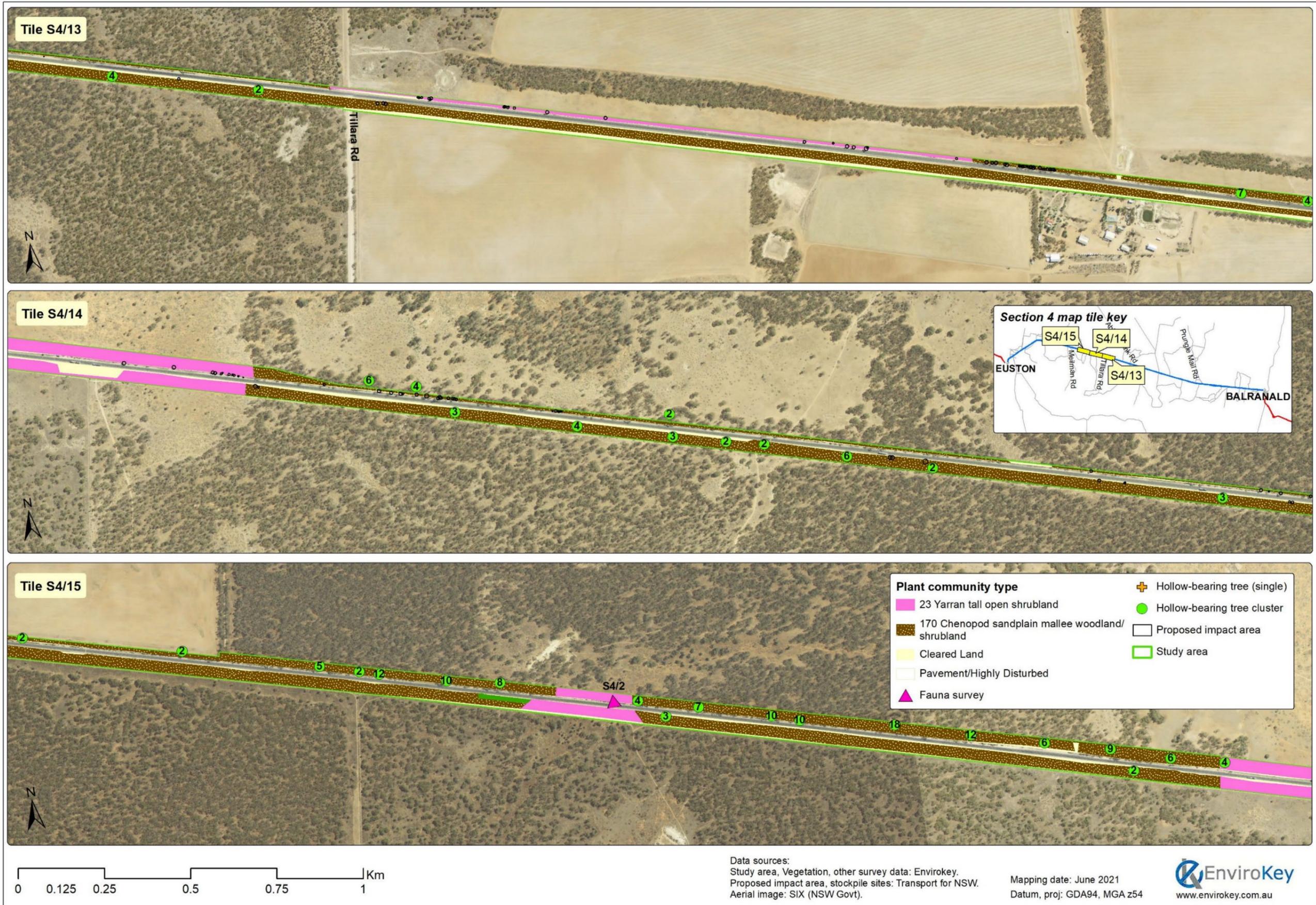


Figure 3-45: Plant community types and other points of interest within the study area (section 4)

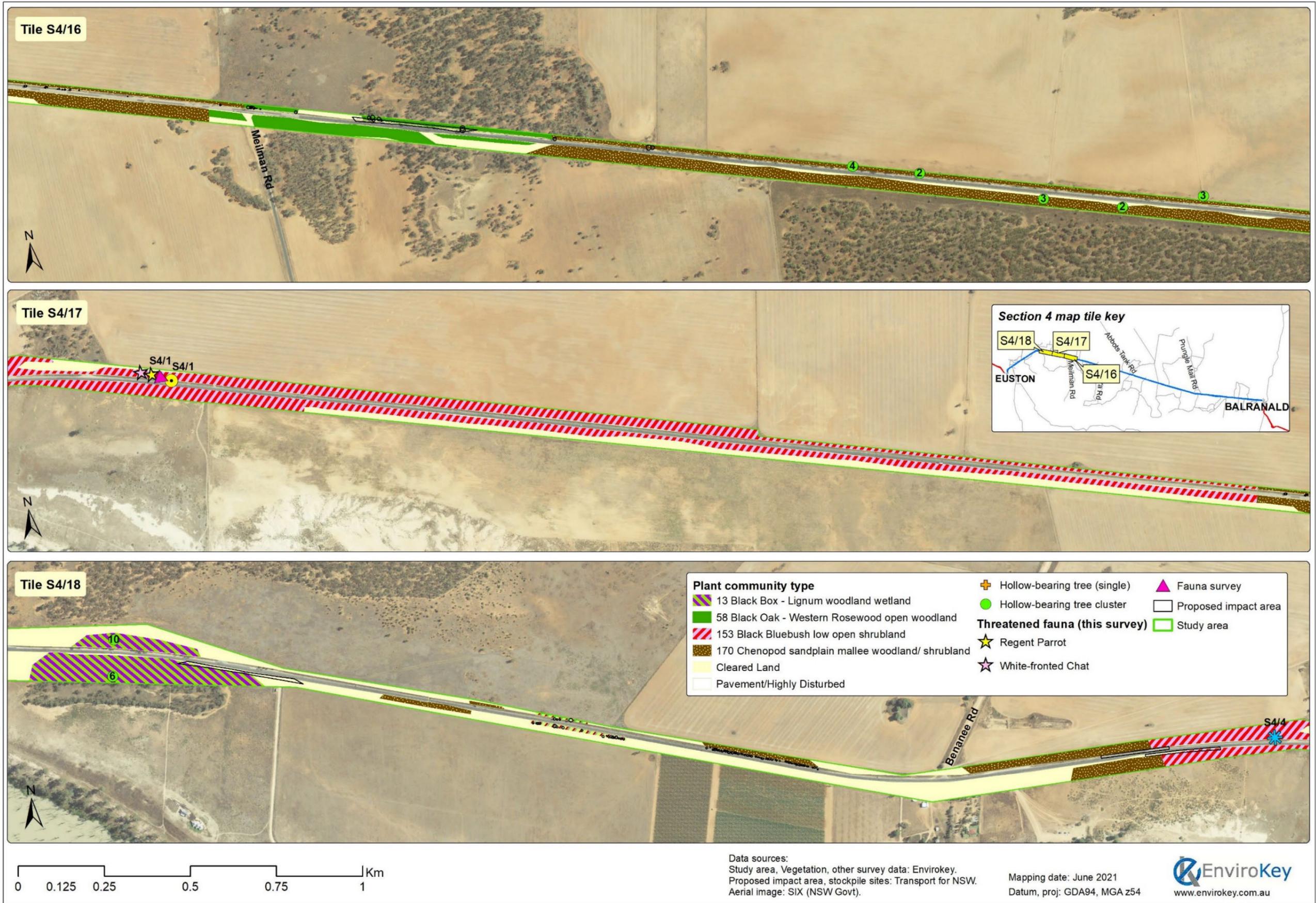


Figure 3-46: Plant community types and other points of interest within the study area (section 4)

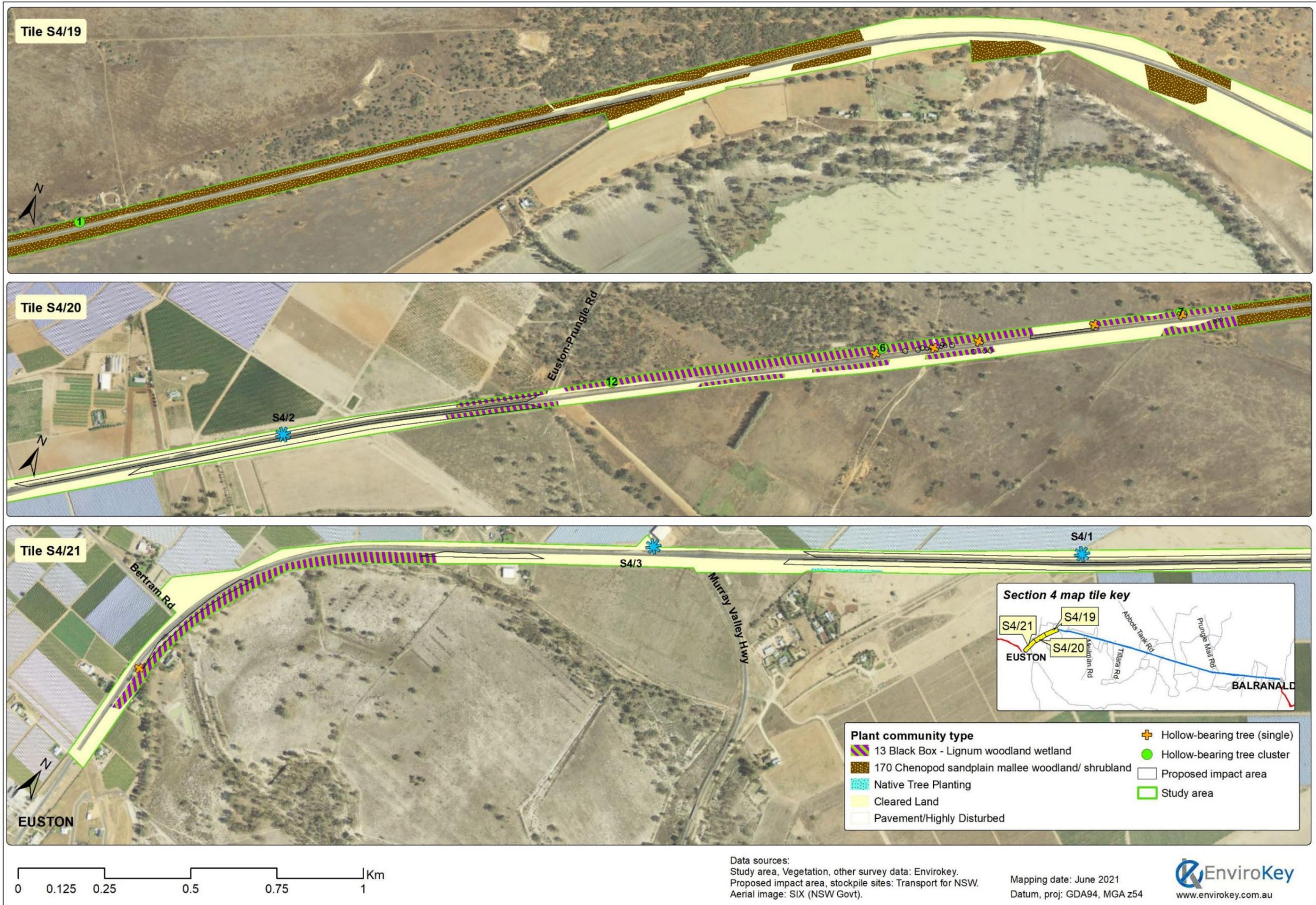


Figure 3-47: Plant community types and other points of interest within the study area (section 4)

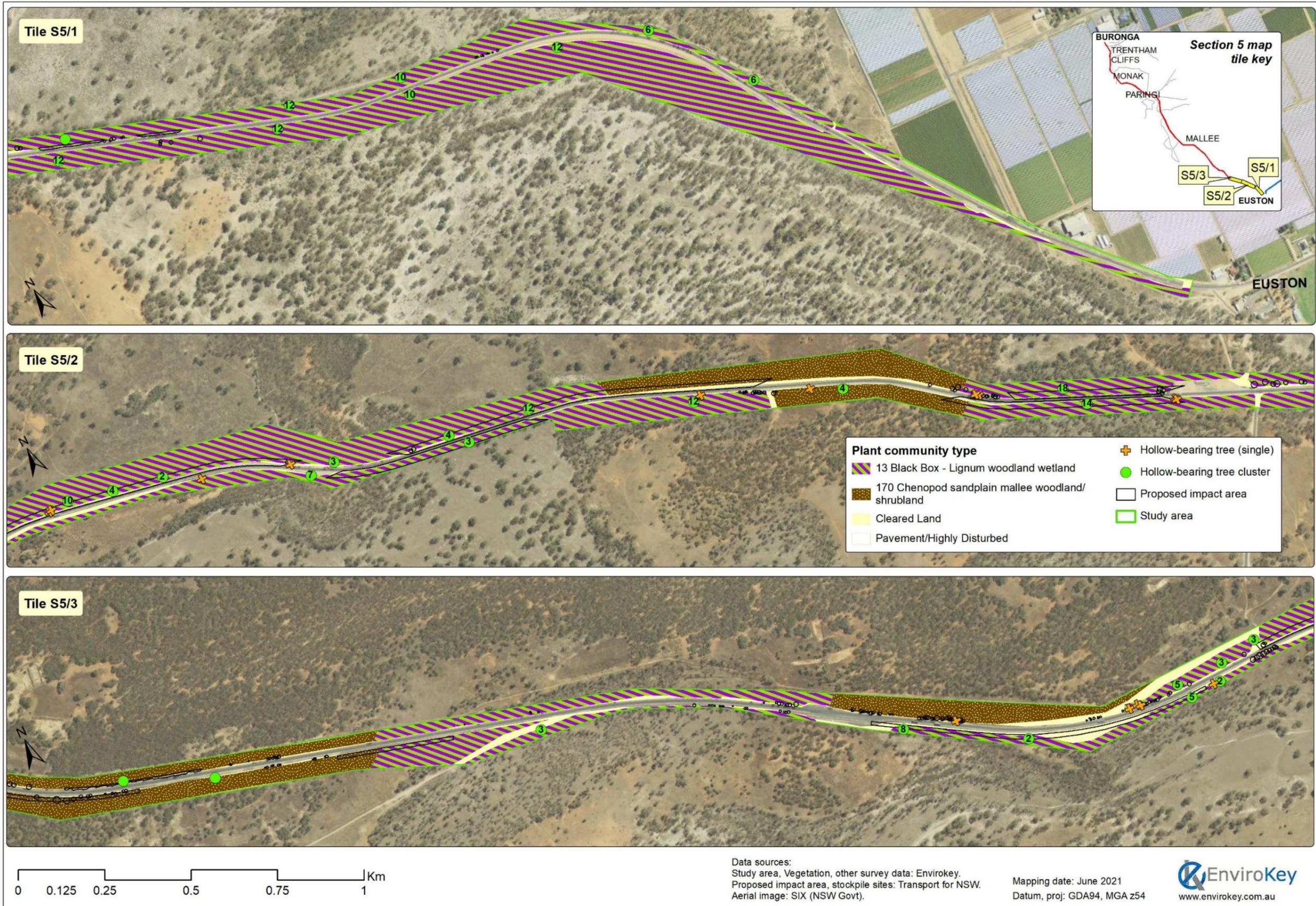


Figure 3-48: Plant community types and other points of interest within the study area (section 5)

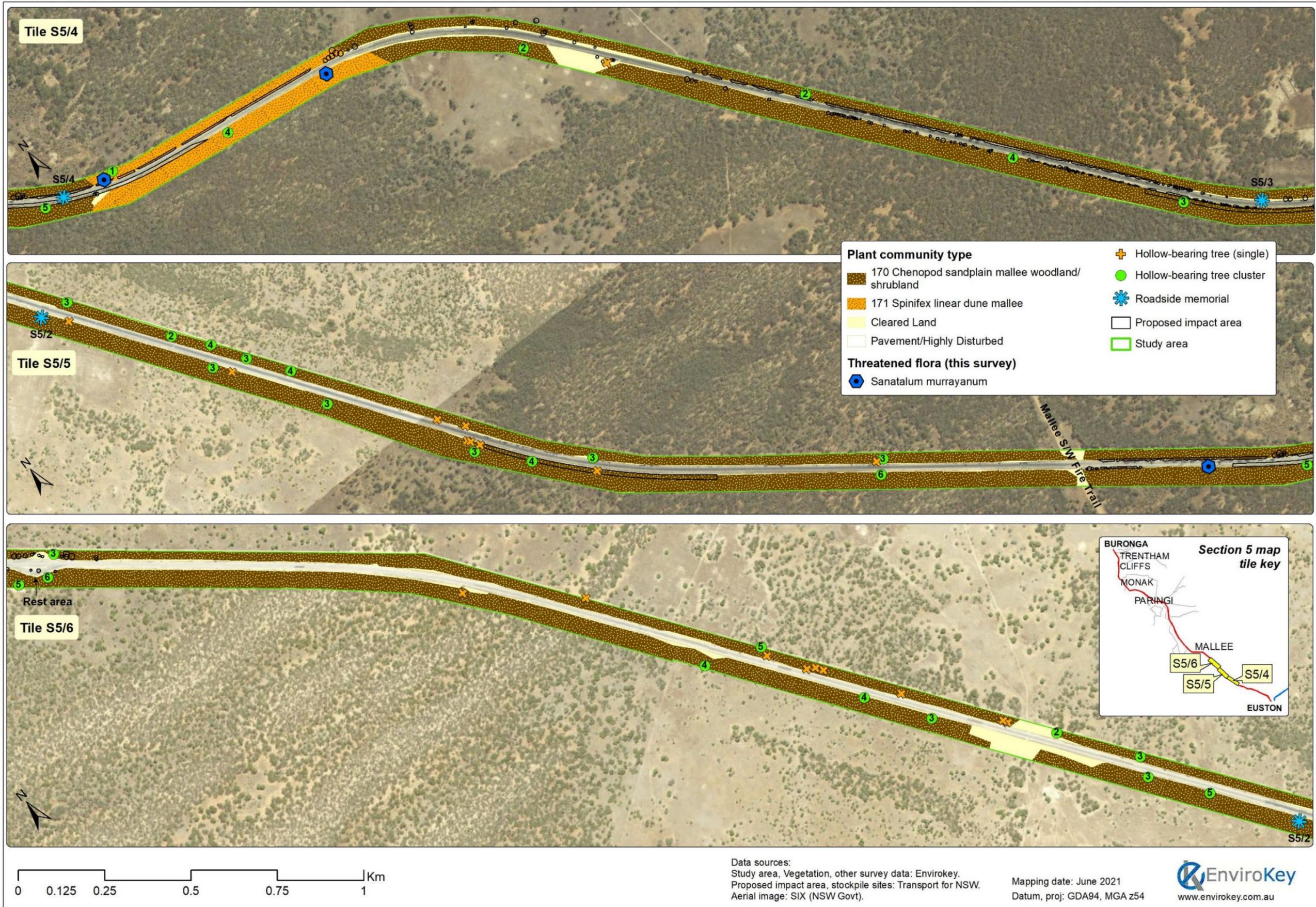


Figure 3-49: Plant community types and other points of interest within the study area (section 5)

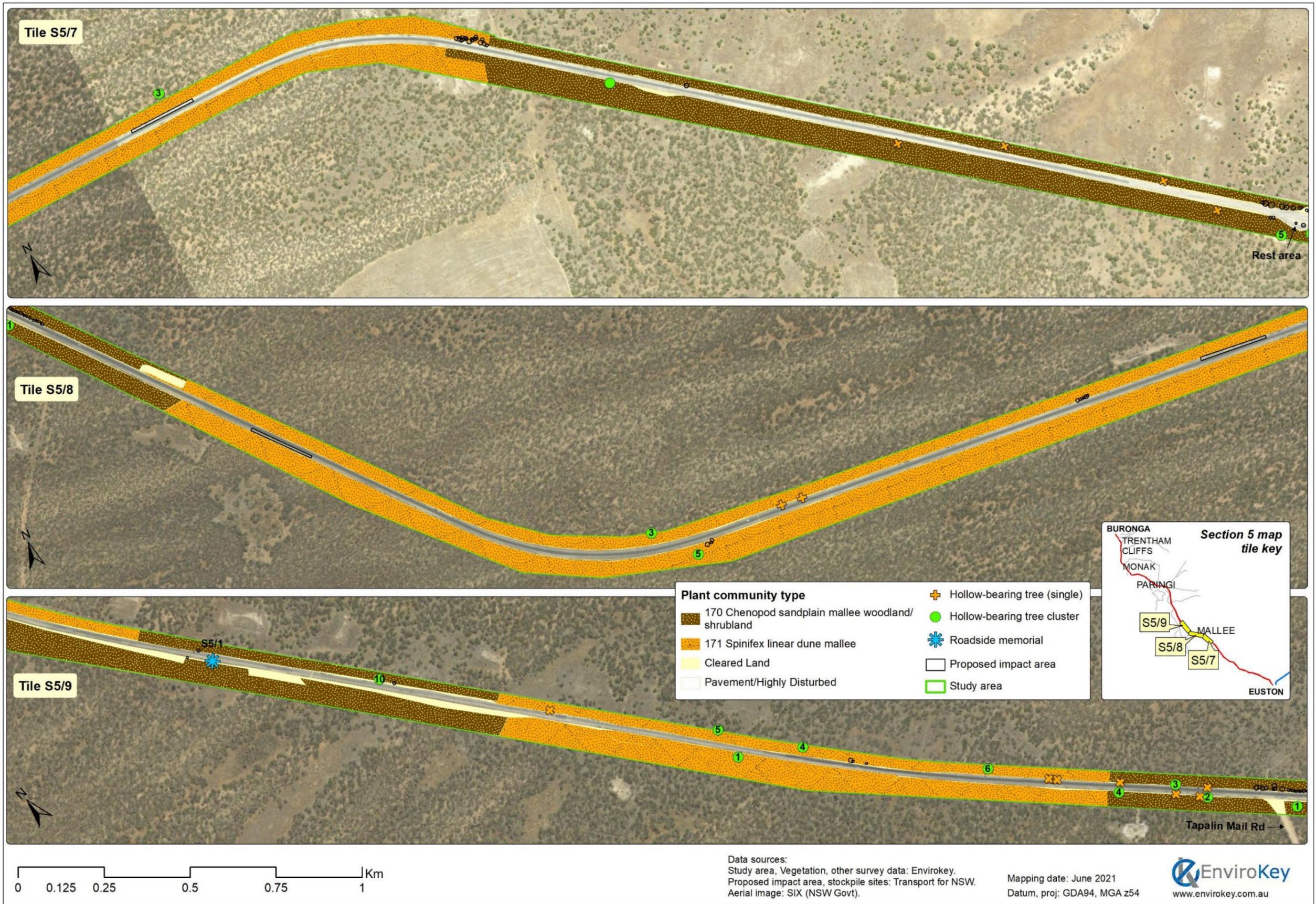


Figure 3-50: Plant community types and other points of interest within the study area (section 5)

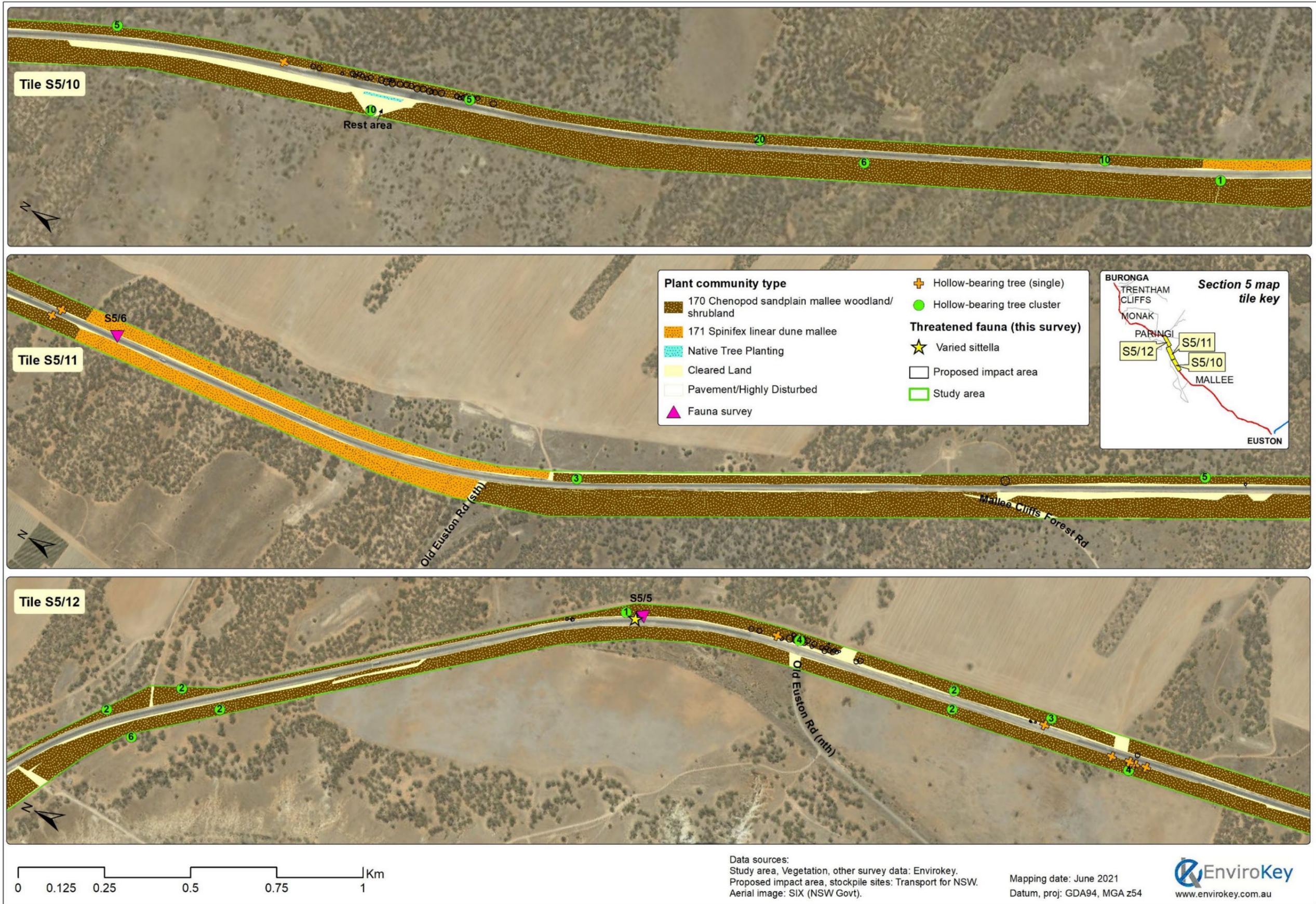


Figure 3-51: Plant community types and other points of interest within the study area (section 5)

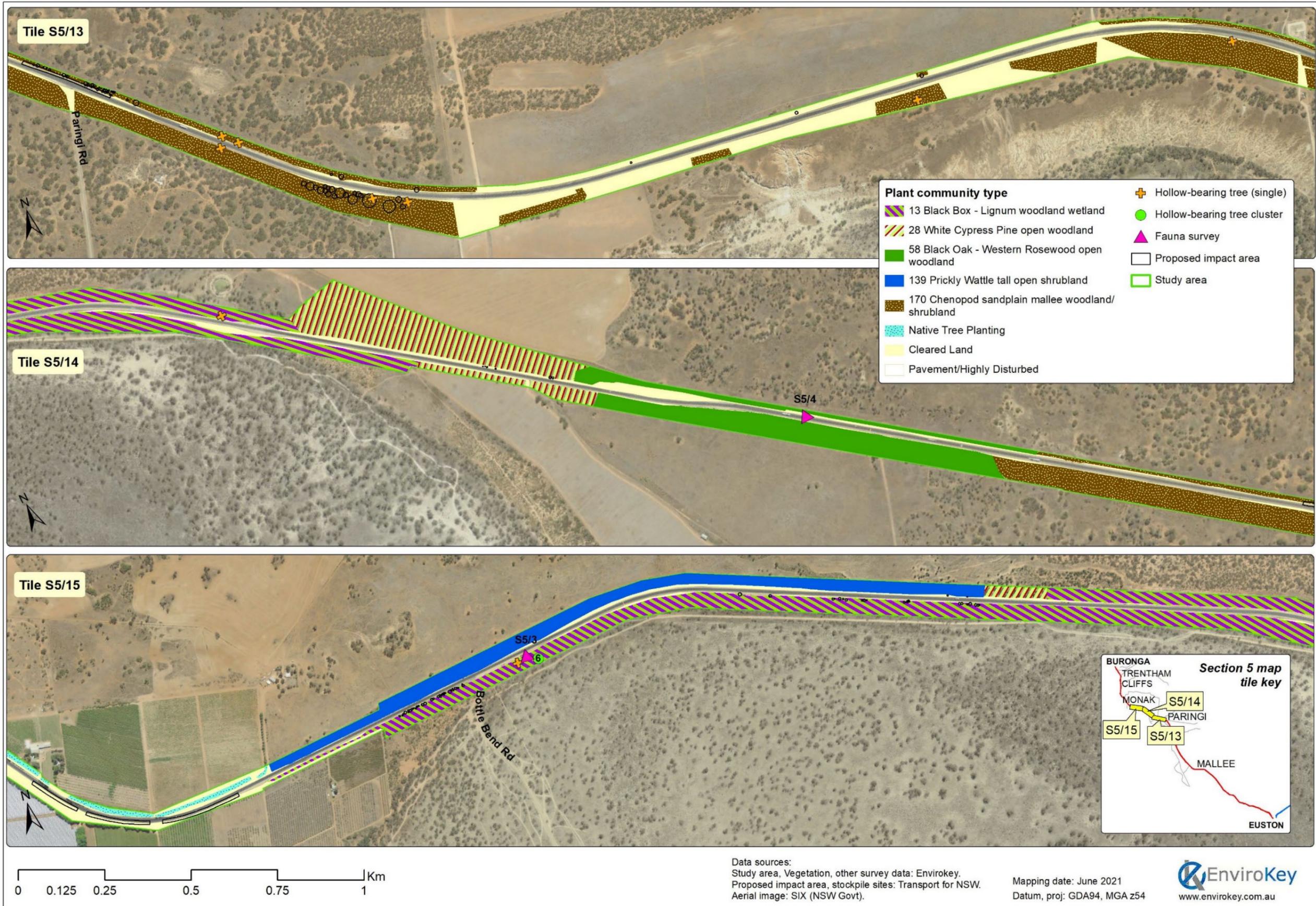


Figure 3-52: Plant community types and other points of interest within the study area (section 5)

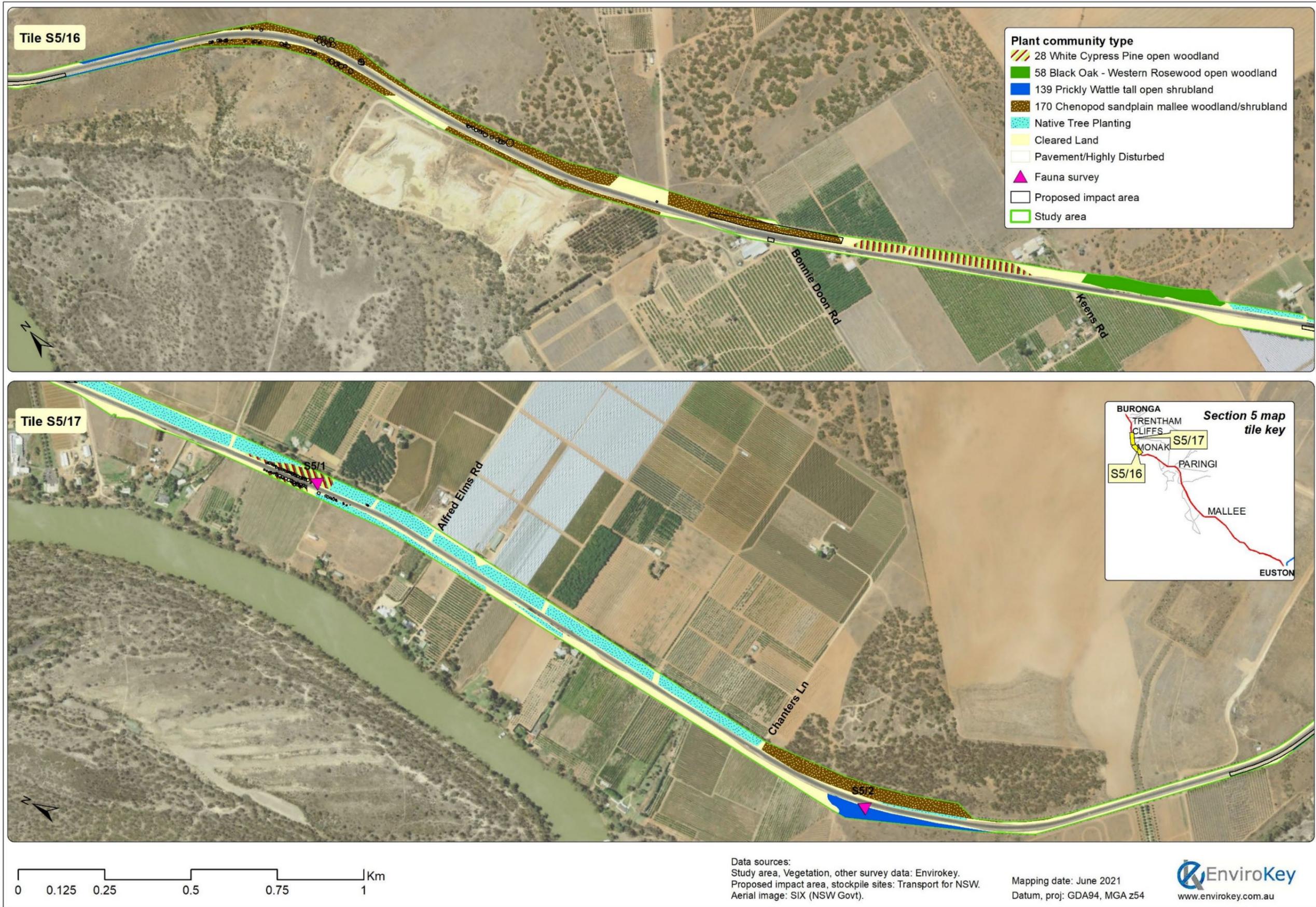


Figure 3-53: Plant community types and other points of interest within the study area (section 5)

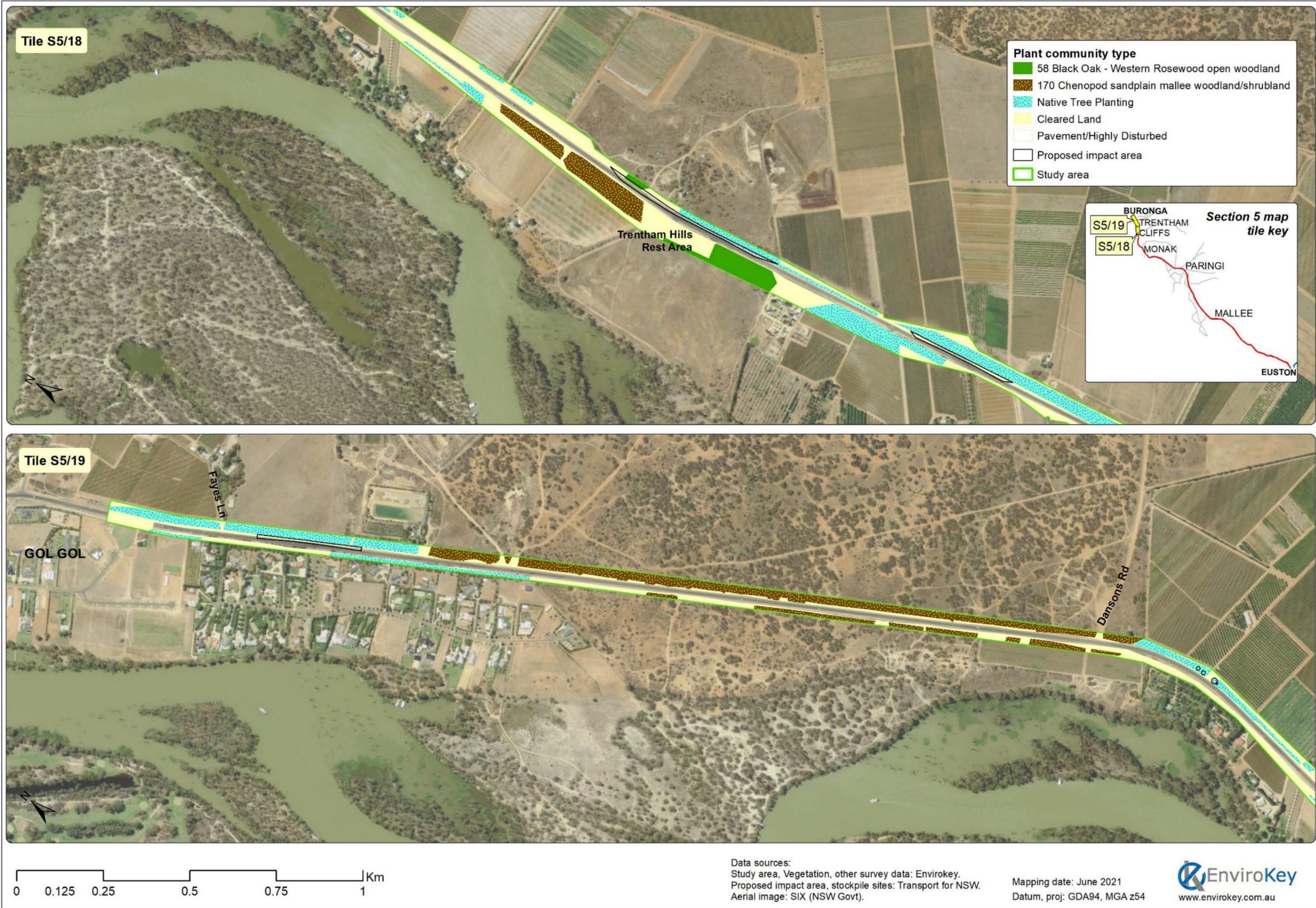
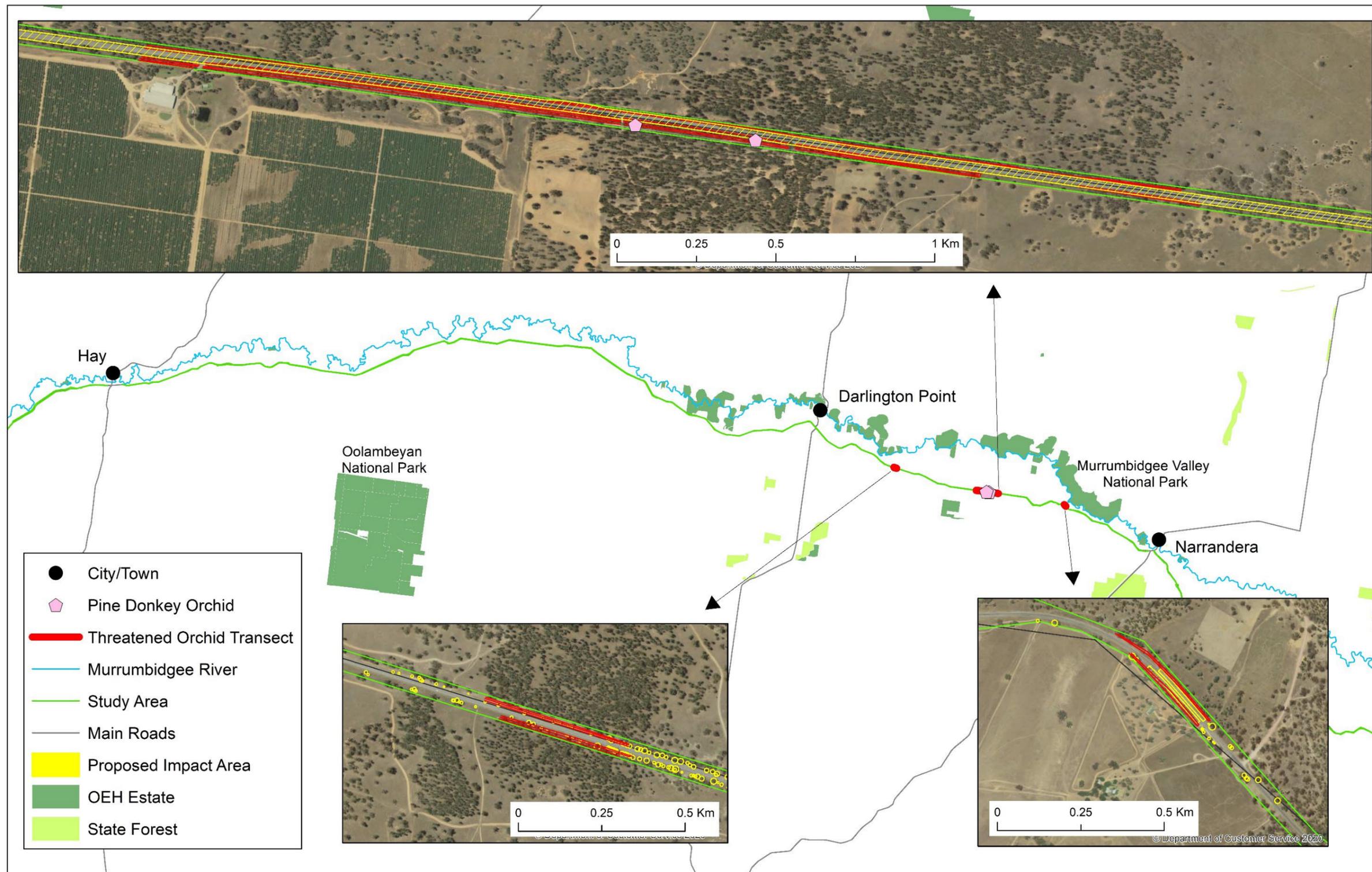


Figure 3-54: Plant community types and other points of interest within the study area (section 5)



Mapping Date: October 2021

Datum, Projection: GDA 1994, MGA Zone 55

Data Sources:
 Study Area, Proposed Impact Area: TfNSW
 Threatened Orchid Transect and Threatened Orchid: Envirokey

Aerial Imagery: SIX Maps (NSW Govt)
 OEH Estate: OEH
 State Forest: Forests NSW




 www.envirokey.com.au

Figure 3-55: Threatened orchid survey locations and records of Pine Donkey Orchid from the target spring survey

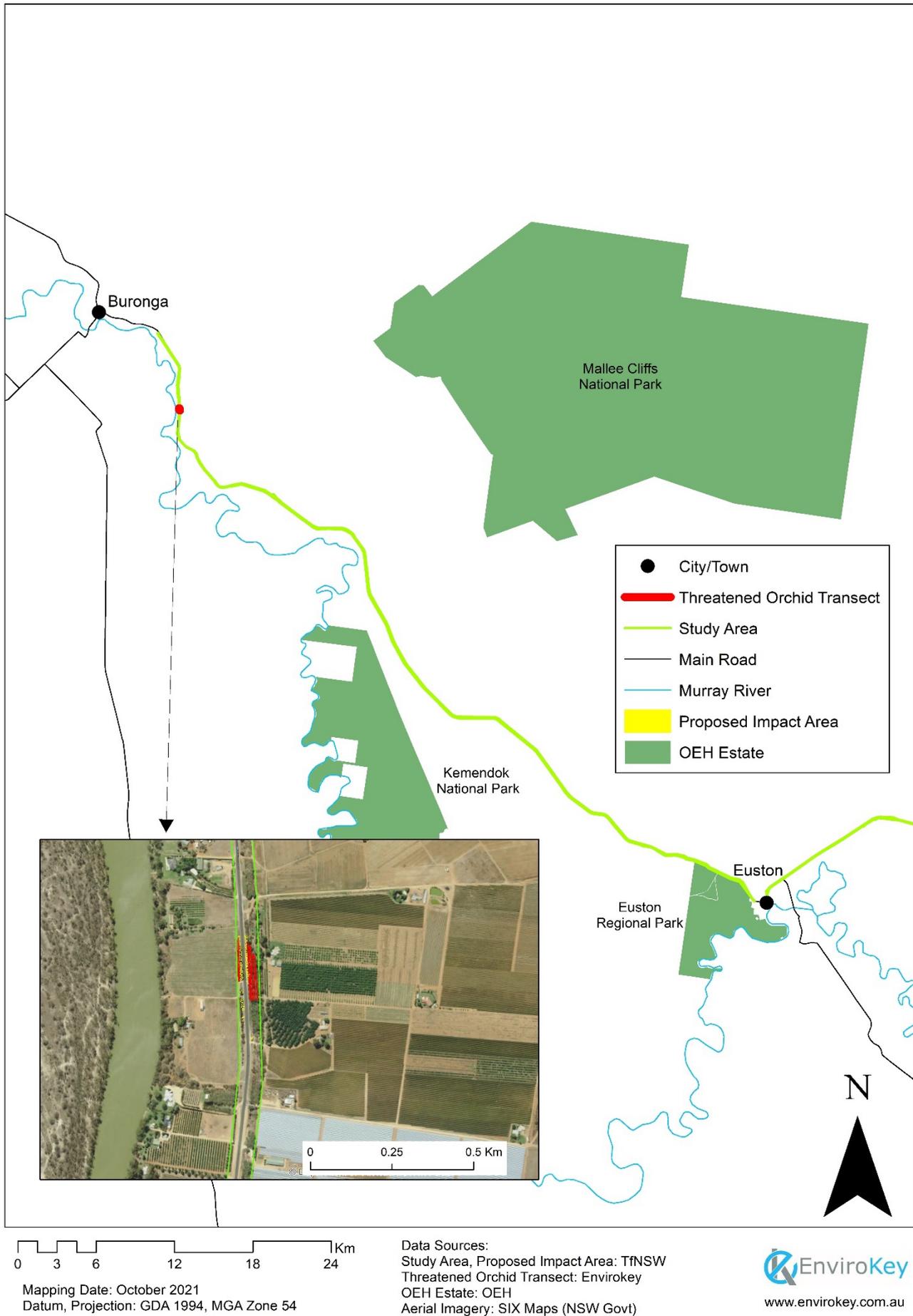


Figure 3-56: Threatened orchid survey locations near Buronga

3.2 Threatened ecological communities

A number of threatened ecological communities (TEC) were recorded during the field survey. These being:

- Sandhill Pine Woodland (BC Act)
- *Acacia melvillei* Shrubland (BC Act)
- Myall Woodland (BC Act & BC Act/EPBC Act)
- Box-gum Woodland (BC Act & BC Act/EPBC Act)
- Inland Grey Box Woodland (BC Act & BC Act/EPBC Act)

Sandhill Pine Woodland TEC occurs as the following PCT within the study area:

- PCT 19 and PCT 28

Acacia melvillei Shrubland TEC occurs as the following PCT within the study area:

- PCT 23

Myall Woodland TEC occurs as the following PCT within the study area:

- PCT 26

Box-gum Woodland occurs as the following PCT within the study area:

- PCT 74, PCT 75, PCT 267 and PCT 277

Inland Grey Box Woodland TEC occurs as the following PCT within the study area:

- PCT 76, PCT 80 and PCT 237

Myall Woodland, Box-gum Woodland and Inland Grey Box Woodland TECs can also be listed under the EPBC Act based on specific criteria listed by decision flowcharts (DEH, 2006, DEWHA, 2009b, DSEWP&C, 2012). The decision flowcharts have been used to assigned legal status to portions of the study area containing PCT that are consistent with the TEC. Generally, those TEC listed under the EPBC Act have an understorey dominated by native flora species, regeneration present, and are a minimum area (depending on the TEC) (Figure 3-65 to 3-67).



A very small patch of PCT 28 near Euston



PCT 19 east of Gillenbah

Photograph 3-31: Examples of Sandhill Pine Woodland TEC



PCT 23, 19.3kms east of Hay



PCT 23, 49kms east of Euston

Photograph 3-32: Examples of *Acacia melvillei* Shrubland TEC



PCT 26, 31.1kms east of Waddi



PCT 26, 60.1kms east of Hay

Photograph 3-33: Examples of Myall Woodland TEC



PCT 277 in section 1



PCT 74 in section 2

Photograph 3-34: Examples of Box-gum Woodland TEC



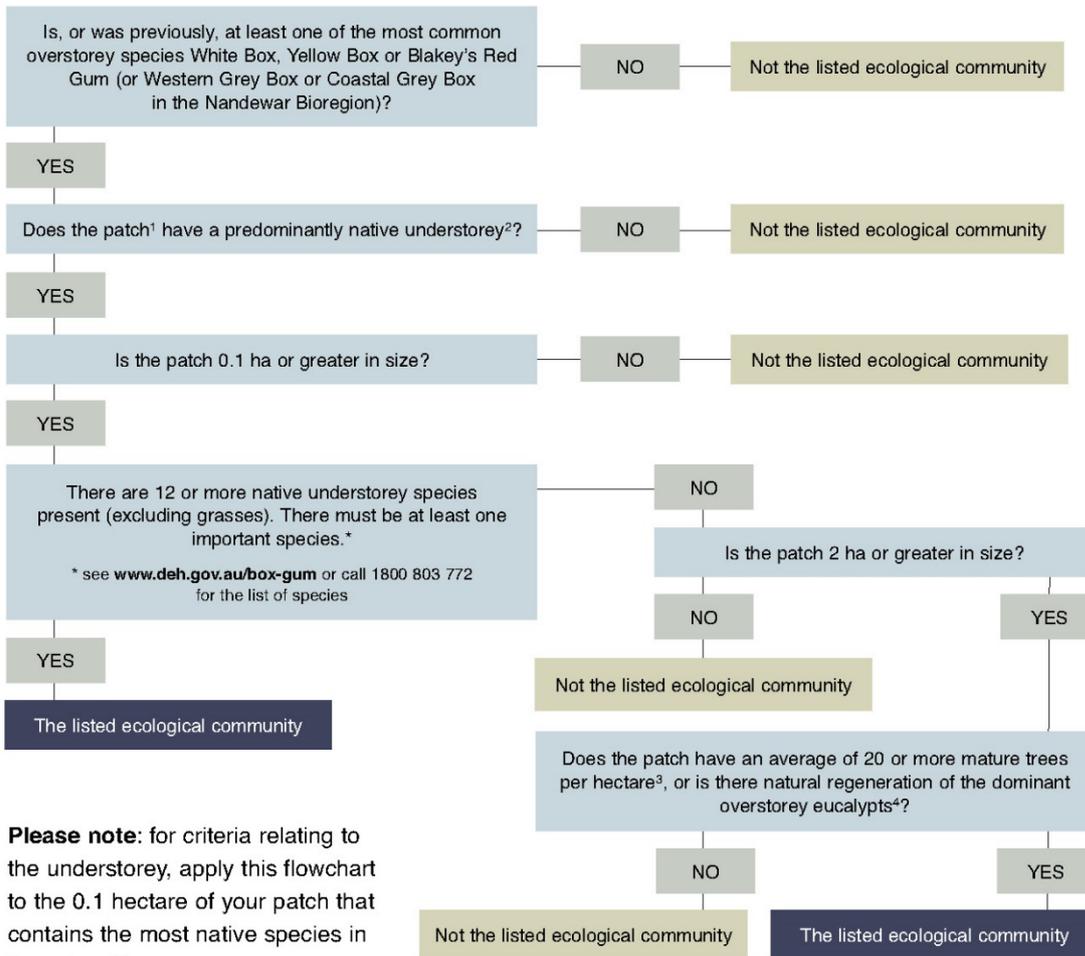
Photograph 3-35: Examples of Inland Grey Box Woodland TEC

Table 3-7: Threatened ecological communities and their condition, legal status and their extent within the study area

Threatened ecological community	Condition	Legal Status	Area (ha)
Sandhill Pine Woodland	Low	BC Act	1.2
Sandhill Pine Woodland	Mod-good	BC Act	22.1
<i>Acacia melvillei</i> Shrubland	Low	BC Act	2.7
<i>Acacia melvillei</i> Shrubland	Mod-good	BC Act	31.7
Myall Woodland	Low	BC Act	18.9
Myall Woodland	Mod-good	BC Act	24.6
Myall Woodland	Low	BC Act	1.2
Myall Woodland	Mod-good	BC Act & EPBC Act	72.9
Box-gum Woodland	Low	BC Act	0.3
Box-gum Woodland	Mod-good	BC Act	4.8
Box-gum Woodland	Mod-good	BC Act & EPBC Act	88.0
Inland Grey Box Woodland	Mod-good	BC Act	6.4
Inland Grey Box Woodland	Mod-good	BC Act & EPBC Act	173.9
	Total		448.7

The flowchart below represents the lowest condition at which patches are included in the listed ecological community. This is not the ideal state of the ecological community. Large patches, those that link remnants in the landscape, those that occur in highly cleared areas, those that contain rare, declining or threatened species, and those that represent the entire range of the ecological community, are important for the long-term future of the ecological community.

Determining if your land has an area of the listed ecological community



- ¹ Patch – a patch is a continuous area containing the ecological community (areas of other ecological communities such as woodlands dominated by other species are not included in a patch). In determining patch size it is important to know what is, and is not, included within any individual patch. The patch is the larger of:
 - an area that contains five or more trees in which no tree is greater than 75 m from another tree, or
 - the area over which the understorey is predominantly native.
 Patches must be assessed at a scale of 0.1 ha (1000m²) or greater.
- ² A predominantly native ground layer is one where at least 50 per cent of the perennial vegetation cover in the ground layer is made up of native species. The best time of the year to determine this is late autumn when the annual species have died back and have not yet started to regrow. (At other times of the year, you can determine whether something is perennial or not if it is difficult to pull out of the soil. Annual species pull out very easily.)
- ³ Mature trees are trees with a circumference of at least 125 cm at 130 cm above the ground.
- ⁴ Natural regeneration of the dominant overstorey eucalypts when there are mature trees plus regenerating trees of at least 15 cm circumference at 130 cm above the ground.

Figure 3-57: Decision flowchart from the EPBC Act Policy Statement for Box-gum Woodlands

Flowchart 1: Could a nationally threatened grassland or grassy woodland community be present?

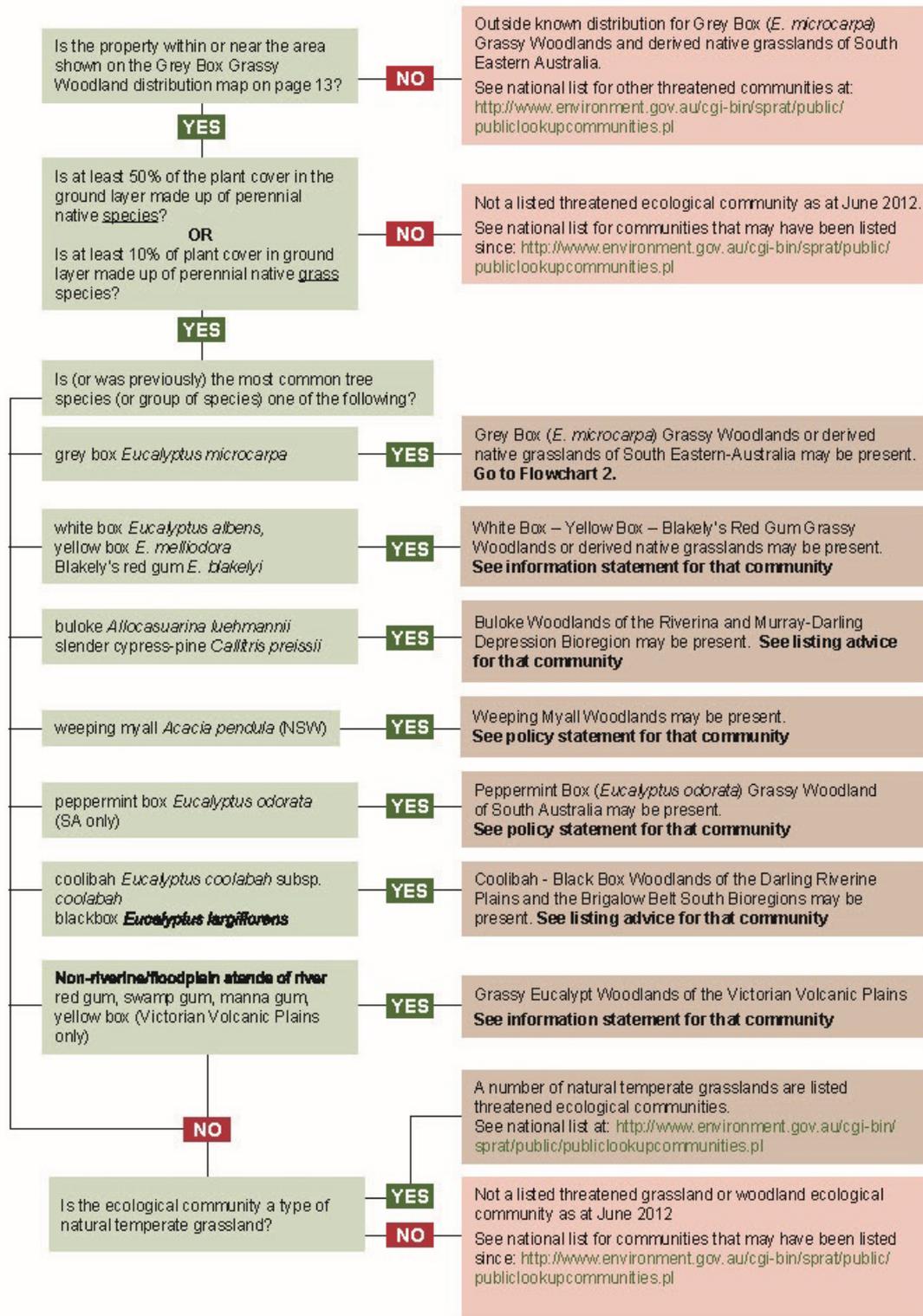
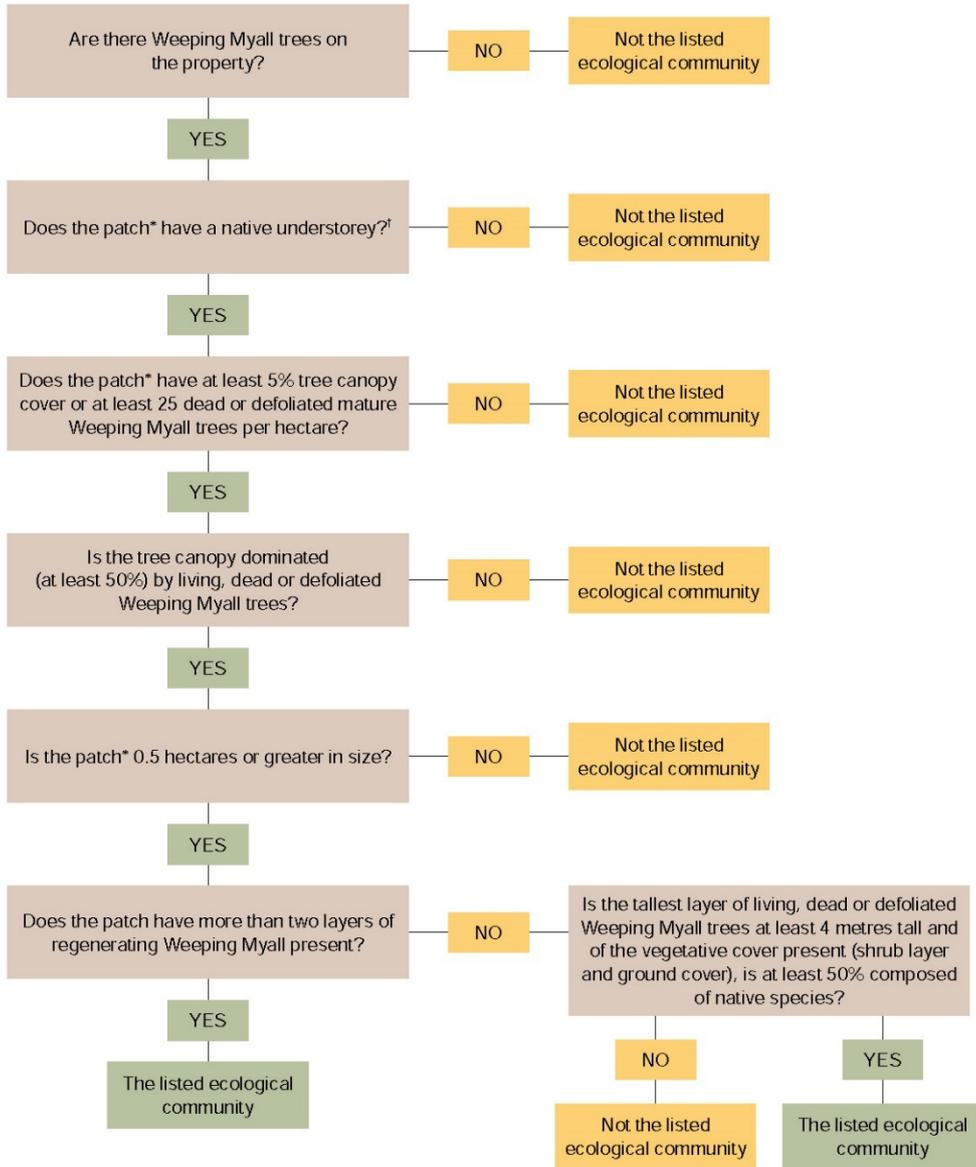


Figure 3-58: Decision flowchart from the EPBC Act Policy Statement for Inland Grey Box Woodlands



Weeping Myall Woodlands – Decision Flowchart



Definitions

* A patch is defined as a continuous area that entirely consists of an ecological community. Substantial areas of other ecological communities such as woodlands dominated by other species are not included in a patch. The patch extends over the area up to 10 m beyond the drip line (the edge of the foliage canopy) of the outermost trees where the understorey criteria are satisfied. Assessment of a patch should be done wherever possible when 10 per cent or more of the area is covered with either native or exotic vegetation, whether dead or alive,

(this accounts for situations such as drought). Assessment timing must also consider the flowering of the understorey species to aid identification. For example; in areas where winter rainfall is more likely, such as the southern extent of the community, sampling should be performed following these rainfall events. However, in areas where summer rainfall is more likely, such as the northern extent of the community, sampling should be planned for late summer.

† Areas of leaf litter cryptogams and biological soil crusts may be evident and acceptable as part of the native understorey of this ecological community.

Figure 3-59: Decision flowchart from the EPBC Act Policy Statement for Myall Woodlands

3.3 Fauna habitat

Field surveys revealed the presence of three general terrestrial fauna habitats (Table 3-6). These being Native Grassland, Woodland and Shrubland and their corresponding PCT is identified on Table 3-6. Mapping of all PCT is provided on Figure 3-1 to Figure 3-54. Hollow-bearing trees (HBT) were identified in many PCT, as well as within cleared land and in more mature Native tree plantings. Examples of HBT within the study area are provided (Photograph 3-13).

A total of 513 HBT were identified to occur within 10 metres of the existing edge line (Table 3-8). Many of these occurred within a single PCT (PCT 170 Chenopod sandplain mallee woodland/shrubland) with 101 HBT present. Within mallee trees, hollows are generally small in size (less than 10cm diameter). Interestingly, there were 75 and 71 HBT mapped within Cleared land and Highly-disturbed land respectively. Many of the HBT within these areas occurred as isolated trees and/or dead trees (stags) and their scattered extent meant that they were not assigned to a PCT given the scale of the mapping applied to such a long, lineal proposal.

Table 3-8: Number of hollow-bearing trees within 10 metres of the existing edge line

Plant community type	Number of HBT
13 Black Box – Lignum woodland wetland	37
15 Black Box open woodland wetland	40
170 Chenopod sandplain mallee woodland/shrubland	101
171 Spinifex linear dune mallee	5
2 River Red Gum – sedge dominated very tall open forest	21
23 Yarran tall open shrubland	1
237 Riverine Western Grey Box grassy woodland	15
26 Weeping Myall open woodland	1
267 White Box – White Cypress Pine – Western Grey Box shrub/grass/forb woodland	9
277 Blakely's Red Gum – Yellow Box grassy tall woodland	1
46 Curly Windmill Grass – speargrass – wallaby grass grassland	2
74 Yellow Box – River Red Gum tall grassy riverine woodland	25
75 Yellow Box – White Cypress Pine grassy woodland	4
76 Western Grey Box tall grassy woodland	59
80 Western Grey Box – White Cypress Pine tall woodland	39

Plant community type	Number of HBT
Cleared Land	75
Native Tree Planting	7
Pavement/Highly Disturbed	71
Total	513

Within the study area (ie, the road reserve) but outside of the 10 metre buffer applied to the edge line, HBT were mapped in clusters. A single point was mapped and from this point, the number of HBT within 50 metres in this portion of the study area were assigned to that point, creating a HBT cluster. Using this method, 4,885 HBT were detected outside of the 10 metre buffer (Table 3-9). Some of these HBT were mapped outside of the study area (road reserve), however, these are likely to be spatial errors from the GPS, as they were considered to be within the road reserve at the time of the field survey. These HBT are termed (ghosts) in Table 3-9. They have been retained for the purpose of this BA as they provided relevant information with regard to HBT as fauna habitat.

In addition to HBT, a number of nesting boxes were observed in the study area (Photograph 3-14). The majority of these were in the Gillenbah area. Nesting boxes were not mapped during the field survey.

Table 3-9: Total number of hollow-bearing trees within each plant community type mapped as clusters

Plant community types	Total HBT in clusters
Ghosts	183
2 River Red Gum – sedge dominated very tall open forest	316
11 River Red Gum – Lignum very tall open forest or woodland wetland	18
13 Black Box – Lignum woodland wetland	796
15 Black Box open woodland wetland	482
19 Cypress Pine woodland of source-bordering dunes	9
23 Yarran tall open shrubland	11
26 Weeping Myall open woodland	11
45 Plains Grass Grassland	22
46 Curly Windmill Grass – speargrass – wallaby grass grassland	22
58 Black Oak – Western Rosewood open woodland	5
74 Yellow Box – River Red Gum tall grassy riverine woodland	220

Plant community types	Total HBT in clusters
75 Yellow Box – White Cypress Pine grassy woodland	16
76 Western Grey Box tall grassy woodland	455
80 Western Grey Box – White Cypress Pine tall woodland	910
164 Cotton Bush open shrubland	7
170 Chenopod sandplain mallee woodland/shrubland	734
171 Spinifex linear dune mallee	64
237 Riverine Western Grey Box grassy woodland	423
267 White Box – White Cypress Pine – Western Grey Box shrub/grass/forb woodland	44
277 Blakely's Red Gum – Yellow Box grassy tall woodland	7
Cleared Land	101
Native Tree Planting	29
TOTAL	4885

A number of named waterways occur within the study area. HW14 intersects the Murrumbidgee River (at Balranald) and comes within 100 metres of the Murray River near Buronga and Gol Gol. The Sturt Highway traverses numerous creeks and is directly adjacent to numerous waterways along the length including Bullenbong, Old Man, Sandy, Poison Waterholes (Section 1), Gillenbah, Yanco, Euroley, Uri, Gum (Section 2), Washpen, Yanga (Section 3), and Box Creek (Section 4) (Photograph 3-14). With consideration of the DPI document *Policy and guidelines for fish habitat conservation and management*, Poison Waterholes (Section 1), Gillenbah, Uri, Gum (Section 2), Washpen, Yanga (Section 3), and Box Creek are best considered to be Class 2 Moderate key fish habitat, as they are named waterways with intermittent flow and sporadic refuge, breeding or feeding areas with semi-permanent pools forming within the waterway after rain events and contain freshwater aquatic vegetation. Bullenbong, Old Man, Sandy, (Section 1), Yanco, Uri, and Gum Creeks (Section 2), and the Murrumbidgee and Murray Rivers would be considered Class 1 Major key fish habitat given the permanent nature of these waterways and their potential to contain threatened or protected fish species.

All waterways have some level of degradation given the largely agricultural nature of the landscape that these waterways occur within and the widespread clearing that has occurred across their catchments resulting in increased water velocity overland and subsequently bank erosion and sediment load into each waterway. Despite all of this, water quality appeared relatively good in all waterways, although no specific water quality testing was carried out.



Examples of HBT within PCT 170 east of Euston



Examples of HBT at Gillenbah

Photograph 3-36: Examples of hollow-bearing trees in the study area



Photograph 3-37: Examples of nesting boxes in the study area



Confluence of Bullenbung and Old Man Creek (section 1)



Yanco Creek (section 2)

Photograph 3-38: Examples of waterways in the study area

3.4 Threatened and migratory species

During the field surveys, 12 threatened species and one migratory species were recorded (Table 3-10). These being:

- Superb Parrot (listed as vulnerable under the BC Act and EPBC Act)
- Square-tailed Kite (listed as vulnerable under the BC Act)
- Turquoise Parrot (listed as vulnerable under the BC Act)
- Little Eagle (listed as vulnerable under the BC Act)
- Grey-crowned Babbler (listed as vulnerable under the BC Act)
- Koala (listed as vulnerable under the BC Act and EPBC Act)
- Regent Parrot (listed as endangered under the BC Act and vulnerable under the EPBC Act)
- Rufous Fieldwren (listed as vulnerable under the BC Act)
- Varied Sittella (listed as vulnerable under the BC Act)
- White-fronted Chat (listed as vulnerable under the BC Act)
- Bitter Quandong (listed as endangered under the BC Act)
- Pine Donkey Orchid (listed as vulnerable under the BC Act)
- Eastern Great Egret (listed as migratory under the EPBC Act)

The locations of each species and the section they were recorded in is provided (Figure 3-1 to Figure 3-54).

Table 3-10: Threatened and migratory species recorded during the field survey

Scientific name	Common Name	BC Act/FM Act status	EPBC Act status	Section recorded within/number of individuals
<i>Ardea alba</i>	Great Egret	-	M	2/2
	Grey-crowned Babbler	V	-	2/20 (3 family groups)
<i>Daphoenositta chrysoptera</i>	Varied Sittella	V	-	5/4
<i>Epthianura albifrons</i>	White-fronted Chat	V	-	3/26 4/2
<i>Calamanthus campestris</i>	Rufous Fieldwren	V	-	3/1
<i>Hieraaetus morphnoides</i>	Little Eagle	V	-	2/4
<i>Lophoictinia isura</i>	Square-tailed Kite	V	-	2/1
<i>Neophema pulchella</i>	Turquoise Parrot	V	-	2/4
<i>Polytelis swainsonii</i>	Superb Parrot	V	V	1/6 2/50 3/1
<i>Polytelis anthopeplus</i>	Regent Parrot	V	-	3/6 4/28
<i>Phascolarctos cinereus</i>	Koala	V	V	2/4
<i>Santalum murrayanum</i>	Bitter Quandong	E	-	4/152 5/3

Scientific name	Common Name	BC Act/FM Act status	EPBC Act status	Section recorded within/number of individuals
<i>Diuris tricolour</i>	Pine Donkey Orchid	V	-	2/3

Table 3-11 summarises the results of the habitat assessments completed in Annexure C for those threatened and migratory species assessed to have a moderate or high likelihood of occurrence within the study area.

Table 3-11: Habitat assessment results

Common Name (Scientific Name)	BC Act	EPBC Act	Likelihood of occurrence
Southern Bell Frog <i>Litoria raniformis</i>	E	V	Moderate
Corben's Long-eared Bat <i>Nyctophilus corbeni</i>	V	V	Moderate
Greater Broad-nosed Bat <i>Scoteanax rueppellii</i>	V	-	Moderate
Inland Forest Bat <i>Vespadelus baverstocki</i>	V	-	High
Little Pied Bat <i>Chalinolobus picatus</i>	V	-	High
Southern Myotis <i>Myotis Macropus</i>	V	-	Moderate
Yellow-bellied Sheath-tail-bat <i>Saccolaimus flaviventris</i>	V	-	Moderate
Barking Owl <i>Ninox connivens</i>	V	-	Moderate
Black-breasted Buzzard <i>Maioratra melanosternon</i>	V	-	Moderate
Black-chinned Honeyeater <i>Melithreptus gularis gularis</i>	V	-	Moderate
Black Falcon <i>Falco subniger</i>	V	-	Moderate
Brolga <i>Grus rubicunda</i>	V	-	Moderate
Brown Treecreeper (eastern subspecies) <i>Climacteris picumnus victoriae</i>	V	-	High
Bush Stone-curlew <i>Burhinus grallarius</i>	E	-	Moderate
Chestnut Quail-thrush <i>Cinlosoma castanotum</i>	V	-	High (section 4 & 5 only)
Diamond Firetail <i>Stagonopleura guttata</i>	V	-	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Likelihood of occurrence
Dusky Woodswallow <i>Artamus cyanopterus cyanopterus</i>	V	-	Moderate
Flame Robin <i>Petroica pheonica</i>	V	-	Moderate
Fork-tailed Swift <i>Apus pacificus</i>	-	M	Moderate
Gilbert's Whistler <i>Pachycephala inornata</i>	V	-	Moderate
Grey-crowned Babbler <i>Pomatostomus temporalis temporalis</i>	V	-	Recorded
Hooded Robin <i>Melanodryas cucullata</i>	V	-	Moderate
Little Eagle <i>Hieraaetus morphnoides</i>	V	-	Recorded
Little Lorikeet <i>Glossopsitta pusilla</i>	V	-	Moderate
Malleefowl <i>Leipoa ocellata</i>	E	V	High
Painted Honeyeater <i>Grantiella picta</i>	V	V	Moderate
Pied Honeyeater <i>Certhionyx variegatus</i>	V	-	Moderate
Pink Cockatoo <i>Lophochroa leadbeateri</i>	V	-	Moderate
Plains-wanderer <i>Pedionomus torquatus</i>	E	CE	Moderate
Purple-crowned Lorikeet <i>Glossopsitta porphyrocephala</i>	V	-	Moderate
Purple-gaped Honeyeater <i>Lichenostomus cratitius</i>	V	-	Moderate
Redthroat <i>Pyrrholaemus brunneus</i>	V	-	Moderate
Rufous Fieldwren <i>Calamanthus campestris</i>	V	-	Recorded
Regent Parrot <i>Polytelis anthopeplus monarchoides</i>	E	V	Recorded
Scarlet Robin <i>Petrocia boodang</i>	V	-	Moderate
Shy Heathwren <i>Hylacola cautus</i>	V	-	Moderate
Southern Scrub-robin <i>Drymodes brunneopygia</i>	V	-	Moderate
Speckled Warbler <i>Chthonicola sagittate</i>	V	-	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Likelihood of occurrence
Spotted Harrier <i>Circus assimilis</i>	V	-	Moderate
Square-tailed Kite <i>Lophoictinia isura</i>	V	-	Recorded
Superb Parrot <i>Polytelis swainsonii</i>	V	V	Recorded
Turquoise Parrot <i>Neophema pulchella</i>	V	-	Recorded
Varied Sittella <i>Daphoenositta chrysoptera</i>	V	-	Recorded
White-bellied Sea-eagle <i>Haliaeetus leucogaster</i>	V	M	Moderate
White-fronted Chat <i>Epthianura albifrons</i>	V	-	Recorded
White-throated Needletail <i>Hirundapus caudacutus</i>	-	M	Moderate
Murray Cod <i>Maccullochella peelii</i>	-	V	Moderate
Silver Perch <i>Bidyanus bidyanus</i>	V	CE	Moderate
Koala <i>Phascolarctos cinereus</i>	V	V	Recorded
Southern Ningau <i>Ningau yvonnae</i>	V	-	High
Squirrel Glider <i>Petaurus norfolcensis</i>	V	-	High
Western Pygmy Possum <i>Cercartetus concinnus</i>	E	-	High
Mallee Worm-lizard <i>Aprasia inaurita</i>	E	-	High
Western Blue-tongued Lizard <i>Tiliqua occipitalis</i>	V	-	Moderate
Yellow-tailed Plain Slider <i>Lerista xanthura</i>	V	-	Moderate
Bitter Quandong <i>Santalum murrayanum</i>	E	-	Recorded
Menindee Nightshade <i>Solanum karsense</i>	V	V	Moderate
Mossgiel Daisy <i>Brachyscome papillosa</i>	V	V	Moderate
Pine Donkey Orchid <i>Diuris tricolor</i>	V	-	Recorded
Sand-hill Spider-orchid <i>Caladenia arenaria</i>	E	E	Moderate
Silky Swainson-pea <i>Swainsona sericea</i>	V	-	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Likelihood of occurrence
Slender Darling Pea <i>Swainsona murrayana</i>	V	V	Moderate
Small Purple-pea <i>Swainsona recta</i>	E	E	Moderate
Thyme Rice-Flower <i>Pimelea serpyllifolia</i>	E	-	Moderate
Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions	EEC	-	Recorded
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	EEC	EEC	Recorded
Myall Woodland in the Darling Riverine, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western slopes bioregions	EEC	EEC	Recorded
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	EEC	-	Recorded
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	EEC	CEEC	Recorded

Superb Parrot

Superb Parrots are known to nest in box-gum woodland, riparian woodland and isolated paddock trees, where they may travel as far as 10 kilometre to suitable foraging habitat (OEH, 2021c, CSU, 2006b). In the south-west slopes, their core breeding habitat has been identified as roughly bordered by the towns of Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west making the study area in core breeding habitat. Other known breeding sites are located within the corridors of the Murrumbidgee, Murray and Edward Rivers. Migration of these populations occurs at the end of the breeding season, when birds move north toward the Upper Namoi and Gwydir River regions. Superb Parrot were regularly recorded during the field surveys (57 individuals with the majority within section 2) and were frequently recorded feeding on flowering eucalypts.

Square-tailed Kite

This species’ preferred habitat is open eucalypt forest and woodland where it is a predator primarily of small birds and their nestlings, foraging in the tree tops of the forest (DECCW, 2009, Morcombe, 2004, NPWS, 1999b). It is sparsely distributed with resident pairs having territories of greater than 100 km², and is also believed to be nomadic (NPWS, 1999b, Garnett and Crowley, 2000). Habitat requirements essential for the lifecycle of these species are areas of intact forest that provide forage habitat and nest sites (OEH, 2021c). It has been suggested however, that the Square-Tailed Kite prefers a landscape that is structurally diverse and that the mixed landscape created by partial clearing may favour it. The comprehensive field

survey identified a single bird in section 2. No past or current nest sites were identified. However, the study area could form part of this large territory and essentially, a potential foraging resource.

Considering the large territories that this species occupies, potential foraging resources are not regarded as limited within the locality given the extent of the woodlands, shrublands and grasslands in the locality.

Little Eagle

The Little Eagle is found across mainland Australia except in densely forested areas. They nest in tall, living trees, where a large stick nest is built in winter. The species lays two or three eggs during spring, and young fledge in early summer. The field survey at least one pair of Little Eagle in section 2. A second pair was also observed in the same section, however, it cannot be stated with any level of certainty that was the same pair or two different pairs. Given the relatively large range of this species, it is more than likely to be a single pair detected on two separate occasions.

Grey-crowned Babbler

The Grey-crowned Babbler is found on the western slopes of the Great Dividing Range as well as some locations in the Hunter Valley where it inhabits woodlands in family groups of up to fifteen individuals (Reid, 1999, OEH, 2021c, Garnett and Crowley, 2000). These family groups maintain territories that can range from one to fifty hectares which are defended all year round, where disputes with neighbouring groups are frequent (OEH, 2021c). The species is listed as Vulnerable under the BC Act.

The Babbler inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. The species forages for invertebrates on tree trunks and branches of eucalypts, and other woodland trees or on the ground, digging and probing amongst leaf litter and tussock grasses.

Breeding occurs between July and February, where a dome-shaped stick nest is used for roosting each night. Nests are usually located in shrubs, cypress pines or sapling eucalypts, although they may be built in the outermost leaves of low branches of large eucalypts. Nests are maintained year round, with old nests they are often dismantled to build new ones.

Three family troupes totalling 20 birds were identified in section 2 of the study area (eastern portion) confirming their presence in high quality woodland habitats.

Koala

The Koala is an arboreal marsupial, weighing 6-12kg for males and 5-8kg for females. Koala's fur ranges from grey to brown with white on the belly, with large ears and no tail. The species spends most of its time within the tree, using its long sharp claws, adapted for climbing.

The Koala occurs in fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. The marsupial is found in eucalypt forest and woodland (OEH, 2021c, DECC, 2008, Matthews et al., 2007, McAlpine et al., 2006). Feeding on foliage of more than 70 eucalypt species and 30 non-eucalypt species, the Koala will select preferred browse species. The species is inactive for most of the day, feeding and moving mostly at night.

Habitat suitability is largely dependent on tree species and maturity, nutrients in the soil, the area of habitat and its disturbance history (DECC, 2008). Koalas change trees frequently, with swamp mahogany (*Eucalyptus robusta*) the preferred tree, particularly at night and by breeding females (Matthews et al., 2007). Koalas show a preference to large tree diameter of >30cm and use significantly taller trees in summer (Matthews et al., 2007).

Habitat connectivity is considered critical to persistence of Koalas in any given area (McAlpine et al., 2006) given that they are less able to traverse between habitats due to their low energy diet. Habitat loss is recognised as the key problem for long-term survival of the Koala (R. Kav)

Koala were recorded during the field survey, and all within the vicinity of the known population of Koala at Gillenbah – Narrandera.

Regent Parrot

Regent Parrot is well known from the Euston – Robinvale locality where it was recorded during the field surveys. The population is estimated to be no more than 1,500 adult breeding pairs in the region (Baker-Gabb and Hurley, 2011). The species is generally considered colony breeders, with these ranging from two to 60 pairs, but generally up to 10 pairs with breeding occurring between August and December.

A total of 34 Regent Parrots were recorded in sections 3 and 4. Given that the species is known to breed within riparian vegetation communities, it is likely that the study area forms foraging habitat only.

Rufous Fieldwren

The Rufous Fieldwren is a small wren-like bird of inland shrublands and is known to occur in saltbush and bluebush communities and around inland saline lakes (OEH, 2021c). Breeding is known to occur between July and December but this may be in response to rain events. The species usually nests on the ground which is likely to exacerbate the effects of predation by foxes and cats

During the field survey, one Rufous Fieldwren responded to call playback within chenopod shrublands in section 3. The individual called for a number of minutes on top of a chenopod shrub allowing a good visual and audible identification.

Turquoise Parrot

The Turquoise Parrot occurs from southern Queensland through to northern Victoria where it is known from woodland and riparian habitats particularly those with a grassy or shrubby understorey (OEH, 2021c). The species is often seen at the ecotone between woodland and open farmland, along timbered ridges and watercourses. A flock of four Turquoise Parrot were recorded in Black box woodland in the eastern portion of section 2.

Varied Sittella

The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands, with a nearly continuous distribution in NSW from the coast to the far west (Morcombe, 2004, OEH, 2021c, OEH, 2021a). It inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland. The Varied Sittella feeds on arthropods gleaned from crevices in rough or decorticating bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy. It builds a cup-shaped nest of plant fibres and cobweb in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years. Varied Sittella was recorded in section 5 during the field survey, but it is also likely to occur in other sections of the proposal.

White-fronted Chat

The White-fronted Chat is found across the southern half of Australia, from southernmost Queensland to southern Tasmania, and across to Western Australia as far north as Carnarvon (Higgins et al., 2001, OEH, 2021c). Found mostly in temperate to arid climates and very rarely sub-tropical areas, it occupies foothills and lowlands up to 1000 m above sea level. In NSW, it occurs mostly in the southern half of the state, in damp open habitats but also in open grasslands. White-fronted Chat was recorded in large numbers in section 3 (26 individuals recorded) in chenopod shrublands, and in section 4, two individuals were recorded.

Bitter Quandong

The Bitter Quandong occurs between inland southern Western Australia, through South Australia, east to north-western Victoria and south-western New South Wales. Many of the NSW records occur within the vicinity of the Sturt Highway (between Dareton and Balranald), but recently more plants have been found over a much wider distribution, including between Kyalite and Moulamein in the east, west of Lake Victoria in the west and in mallee to the south east of Menindee in the north. Only one plant is known from formal conservation reserves in NSW (Mallee Cliffs NP), though another is known from the Travelling Stock Route within northern Mungo NP and a number are known from various conservation initiatives on leasehold land.

The species usually grows in mallee communities and generally grows in gravelly and sandy loam soils on dunes, in open woodland and tall shrubland. NSW populations are generally found in mallee habitats on soft linear dune-crests, with deep and well-drained calcareous earths or red and brown sands, loamy sands or clay-loams. Associated species include *Eucalyptus socialis* and *Pimelea microcephalya* with associated species including *Eucalyptus costata*, *E. leptophylla*, and *Triodia scariosa*.

Santalum species are root-parasitic shrubs or small trees. This species is sometimes found as an isolated tree, but is also regularly found in small to large groups scattered over a relatively small area. Many plants appear to be senescent, though juvenile plants are also present in some populations.

Section 4 was found to have a large population (at least 142 plants) of this species within the road reserve (mapped on Figure 3-42) in a single location and in section 5, three individuals were identified.



Photograph 3-16: Examples of the endangered Bitter Quandong within the Sturt Highway road reserve

Eastern Great Egret

This species prefers shallow water, particularly when flowing, but may be seen on any watered area including cleared, open farmland. Two individuals were recorded during the field survey in section 2, and were associated within irrigation pastures.

Southern Bell Frog

In NSW the species was once distributed along the Murray and Murrumbidgee Rivers and their tributaries, the southern slopes of the Monaro district and the central southern tablelands as far north as Tarana, near Bathurst. Currently, the species is known to exist only in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain, the Murray and Murrumbidgee Irrigation Area and around Lake Victoria. The species is also found in Victoria, Tasmania and South Australia, where it has also become endangered.

They are known from in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains. They are also found in irrigated rice crops, particularly where there is no available natural habitat.

Corbens Long-eared Bat/Greater Broad-nosed Bat/Inland Forest Bat/ Yellow-bellied Sheathtail Bat/Southern Myotis

Corbens Long-eared Bat, Greater Broad-nosed Bat, Inland Forest Bat and Yellow-bellied Sheathtail Bat are hollow-dependant species with Southern Myotis, while a cave dweller, is also known to roost in culverts, old buildings, bridges and mine shafts and tree hollows (Churchill, 2008). All have been previously recorded in the locality and in the case of Southern Myotis, along major rivers and creeks. Microbats are generally regarded as highly mobile fauna extending their foraging ranges over tens of kilometres from their roosting sites (Pavey, 1998, Barclay et al., 2000, Pavey and Burwell, 2004, Pennay and Freeman, 2005). In the context of their ecology, the study area could form habitat of some importance given the presence of hollow-bearing trees.

Barking Owl

The Barking Owl is widely distributed around Australia but sparsely in NSW (OEH, 2021c, NPWS, 2003b). They can be found in a range of coastal habitats, but in northern Australia and semi-arid areas, riparian areas dominated by red gum and *Melaleuca* species seem preferred.

The moderately large owl is often seen along timbered watercourses, especially in dense vegetation where they will roost. The species roost in shaded portions of tree canopies, including tall mid-story trees with dense foliage such as *Acacia* and *Casuarina* species. Nesting occurs during mid-winter and spring within large old hollows, where nests are usually repeated.

The species opportunistically hunts for terrestrial, arboreal and aerial prey between dusk and dawn and occasionally in daylight (Kavanagh, 2002). Home ranges are thought to be between 200 and 6000 ha (NPWS, 2003b).

Black-breasted Buzzard

The Black-breasted Buzzard is found sparsely in areas of less than 500mm rainfall, from north-western NSW and north-eastern South Australia to the east coast at about Rockhampton, then across northern Australia south almost to Perth, avoiding only the Western Australian deserts.

It occurs in a range of inland habitats, especially along timbered watercourses which is the preferred breeding habitat. The species is also known to hunt over grasslands and sparsely timbered woodlands where it will prey on small reptiles, small mammals, birds, including nestlings and sometimes feed on carrion. It is also an egg specialist, feeding on large eggs such as Emu which it cracks on rocks.

Black-chinned Honeyeater

The Black-chinned Honeyeater is found in dry open forests and woodlands dominated by box or ironbark eucalypts (OEH, 2021c). The species is often seen in pairs but also in small groups as many as a dozen or

more individuals. Foraging ranges are generally at least five hectares making this species locally nomadic to exploit food resources. No Black-chinned Honeyeater were recorded during the field survey.

Brolga

The Brolga occurs within the northern tropics, but becomes very sparse across the southern parts of Australia. The species often feeds in dry grassland, ploughed paddocks, desert claypans, wetlands especially hallow swamps where they will forage with their head entirely submerged.

Brolga nests comprises of a platform of grasses and sticks, augmented with mud, on an island or in the water. Where two eggs are laid within the winter to autumn period. No Brolga were recorded during the field survey.

Brown Treecreeper

The Brown Treecreeper occurs in sub-coastal environments and the slopes of the Great Dividing Range through central NSW (Wagga Wagga, Temora, Forbes, Dubbo, Inverell) (Morcombe, 2004). Whilst it has a large range the species has greatly reduced in density over most of that range (Reid, 1999). They are found in eucalypt woodlands dominated by stringybarks or other roughbark eucalypt, usually with an open grassy understory (including Box-gum Woodland) and dry open forest occurs in eucalypt forests and woodland of inland plains and slopes of the Great Dividing Range (OEH, 2021c). Four individuals were recorded during the field survey in section 5.

The Brown Treecreeper has also declined or disappeared from most remaining remnants that are smaller than 300 hectares, at least partly because females disperse from these areas or die preferentially and are not replaced (Cooper et al., 2002, Cooper and Walters, 2002). Once lost from a remnant, recolonisation is unlikely without assistance. Extensive field surveys in the vicinity of the proposal, did not reveal any Brown Treecreeper which was very surprising.

Bush Stone Curlew

The current distribution of Bush Stone Curlew in NSW is patchy with the area bounded by Albury, Wagga Wagga, Hay and Wentworth considered the stronghold (DEC, 2006). However, scattered populations are also known around the Forbes-Caragabal, Gulargambone-Collie and Mungindi districts

The species occurs in open forests, woodlands and shrublands with a sparse grassy groundcover (DEC, 2006). The species is considered largely nocturnal in nature, especially active on moonlight nights, where they forage for invertebrates and small frogs, snakes and lizards (OEH, 2021c). They build their nests on the ground in a scrape or small bare patch, laying two eggs in spring and early summer. While no Bush Stone Curlew were recorded, it is likely that woodland and shrubland vegetation in section 3,4 and 5 are the most likely areas of potential habitat.

Cattle Egret

Cattle Egret can be found in grasslands, woodlands and wetlands, and is not common in arid areas. It also uses pastures and croplands, especially where drainage is poor. It will also forage at garbage dumps, and is often seen with cattle and other stock. No Cattle Egret were recorded during the field surveys.

Chestnut Quail-thrush

The Chestnut Quail-thrush is considered a mallee specialist in NSW where the two main populations are in the mallee around Nymagee, Yathong and Round Hill, and then in the mallee to the west and east of the Darling River, north of Wentworth (OEH, 2021c). Throughout its NSW range, it seems to almost exclusively occur in Mallee/Spinifex habitat, however its presence where structurally diverse shrub layers replace Spinifex is also known.

The Chestnut Quail-thrush forages on the ground, often among spinifex clumps, on a wide range invertebrates, seeds of both native and introduced species and fruit. They are known to nest in a depression on the ground which is lined with strips of bark or grass usually adjacent to a mallee tree, amongst fallen timber or underneath a shrub layer.

None were recorded during the field survey, but it is highly probable to occur in the quality mallee remnants in section 4 and section 5.

Diamond Firetail

Diamond Firetail is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South-western Slopes and the North-west Plains and Riverina (OEH, 2021c, Morcombe, 2004). Although they are not commonly found in coastal districts, there are records from near Sydney, the Hunter Valley and the Bega Valley (OEH, 2021c). They are considered relatively sedentary; however, many populations are known to disperse, especially during drought periods. They are known to build bottle-shaped nests in trees and bushes and preferentially choose mistletoe as a nest site (Cooney and Watson, 2005). It has declined in numbers in many areas and has disappeared from parts of its former range with Reid (1999) identifying it as a 'decliner' in a review of bird species' status in the NSW sheep-wheatbelt (Reid, 1999). No Diamond Firetail were recorded during the field survey.

Dusky Woodswallow

The Dusky Woodswallow is often reported in woodlands and dry open sclerophyll forests, usually dominated by eucalypts, including mallee associations. It has also been recorded in shrublands and heathlands and various modified habitats, including regenerating forests; very occasionally in moist forests or rainforests (Higgins et al., 2006). They are also seen in areas of non-native vegetation. No Dusky Woodswallow were recorded, however, they are highly likely to occur in the study area.

Flame Robin

Flame Robin breeds in upland, moist eucalypt forests and woodlands spending winter in more open lowland habitats such as grassland with scattered trees and open woodland on the inland slopes and plains (OEH, 2021c). Given this, there is some probability that they could use the proposal area and any area of open farmland with scattered trees in the locality. No Flame Robin were recorded within the study area.

Fork-tailed Swift

This species mostly occurs over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. None were recorded during the field survey.

Gang-gang Cockatoo

The Gang-gang Cockatoo is distributed from southern Victoria through south and central-eastern New South Wales (Morcombe, 2004). In New South Wales they have been recorded from the south-east coast to the Hunter region, and inland to the Central Tablelands and South-west slopes (OEH, 2021c). In summer, this species is generally found in tall mountain forests, showing a preference for more mature wet sclerophyll forests. This species is reliant on the presence of nest sites – medium sized hollows high in trees, suitable foraging habitat and it is known to favour old growth attributes for nesting and roosting. No Gang-gang Cockatoo were recorded during the field survey but they are known from the locality.

Gilberts Whistler

Gilbert's Whistler occurs across a range of habitats in NSW. The commonality between these habitats is a dense shrub layer where it has been recorded in mallee, pine woodlands and river red gum forests (OEH, 2021c). The north western distributional limits are poorly known, with records from as far west as Cobar and recent records from Quanda NR, though records further west may be due to confusion with the Golden Whistler.

The species forages on or near the ground in shrub thickets and generally breeds between August and November in their own cup shaped nest or the disused nests of babblers. Breeding occurs between August and November, with nests usually built above ground level in the fork of dense foliage of plants such as wattles or cypress pines.

Hooded Robin

The Hooded Robin is found across many parts of Australia in woodlands, acacia scrub and mallee (OEH, 2021c, Sass, 2009, Reid, 1999, Watson et al., 2001). First recognised as a declining woodland bird (Reid, 1999), the Hooded Robin is now listed as Vulnerable under the TSC Act. It is generally considered that the Hooded Robin requires a structurally diverse habitat including microhabitat such as native grasses, shrubs and fallen timber across a breeding territory of around 10 hectares (OEH, 2021c). However, it is believed that the species generally exhibits demanding requirements for both habitat complexity and area (>100ha) (Watson et al., 2001) confirming that the some portions of the study area provides both of these attributes. These are particularly evident in the extensive areas of mallee in section 4 and 5, as well as the highly quality woodlands in the eastern end of section 2.

Little Lorikeet

The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia (OEH, 2021c). NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability, although some areas retain residents for much of the year and 'locally nomadic' movements are suspected of breeding pairs.

Little Lorikeets are gregarious, usually foraging in small flocks, often with other species of lorikeet. They feed primarily on nectar and pollen in the tree canopy, particularly on profusely-flowering eucalypts, but also on a variety of other species including paperbarks and mistletoes. Little Lorikeets nest in hollow-bearing trees typically of smooth-barked eucalypts but they also nest in proximity to feeding areas if possible. Typically selecting hollows in the limb or trunk of smooth-barked Eucalypts in riparian trees species such as *Allocasuarina* sp. No Little Lorikeet were recorded during the field survey.

Malleefowl

Malleefowl is a large, ground dwelling bird that primarily occurs in mallee across southern Australia but is also known to inhabit eucalypt woodlands and acacia shrublands that provide some refuge in the form of dense shrubby understory (Benshemesh, 2000, NPWS, 1999a, OEH, 2021c). Malleefowl vary in the size of their home range which is likely influenced by the level of resource available for them to exploit. These range between 50 and 500 ha in area. Malleefowl incubate eggs in large mounds that are comprised of large volumes of sandy soil and leaf litter. Males continually add leaf litter to these mounds as the decomposition provides moisture and heat required for successful egg incubation.

Mallee within section 5 is known habitat for this species, and it is likely to occur in some mallee areas in section 4.

Painted Honeyeater

The Painted Honeyeater is a highly nomadic species that lives in Boree, Brigalow, Box-Gum Woodlands and Box-Ironbark Woodlands at low densities throughout its range (OEH, 2021c). Its primary food is the fruit of mistletoes though it will also take some nectar and insects (Oliver et al., 2003, Oliver et al., 1998). Its distribution is dictated by distribution of mistletoes, which are largely restricted to older trees, and the seasonality of their fruiting. No Painted Honeyeater was recorded during the comprehensive field surveys.

Pied Honeyeater

The Pied Honeyeater is a widespread species found throughout a variety of vegetation communities across arid and semi-arid regions of NSW (OEH, 2021c). Pied Honeyeater are considered highly nomadic and follow the erratic flowering of shrubs where they feed on nectar but also eating saltbush fruits, berries, seeds and insects (OEH, 2021c). As with other semi-arid honeyeaters (Oliver et al., 2003, Watson, 1997, Yan, 1993), Pied Honeyeaters also rely heavily on mistletoe.

Pink Cockatoo

The Pink Cockatoo is found in arid and semi-arid zone woodlands dominated by mulga, mallee and box eucalypts, cypress pine or Belah where it feeds primarily on seeds, roots and fruits (OEH, 2021c,

Morcombe, 2004). Breeding pairs occupy nests at least 1 km apart with densities of about one pair per 30 km² recorded (OEH, 2021c). No Pink Cockatoo were recorded during the field surveys, however, they are highly likely to occur within the vicinity of the proposal, particularly section 4 and section 5, as well as the western end of section 3.

Plains Wanderer

The Plains-wanderer is a ground-dwelling grassland bird, which is cryptic and very difficult to observe during the day. Graziers have seen Plains-wanderers during the day when mustering sheep. The species can only be properly surveyed at night using spotlighting.

The vast majority (>99%) of records of Plains-wanderers in NSW over the past 30 years come from an area of the western Riverina bounded by Hay and Narrandera on the Murrumbidgee River in the north, the Cobb Highway in the west, the Billabong Creek in the south, and Urana in the east. Even within its western Riverina stronghold, the Plains-wanderer has a very patchy distribution. Surveys in the 1990s across 5,000km² of the western Riverina covering 37 properties found only 5% of the total area comprised suitable habitat. The amount of high-quality habitat in the Riverina drops to 1-2% during very wet or dry years when grasslands become too dense or are grazed too bare for Plains-wanderers.

Habitat structure appears to play a more important role than plant species composition. Preferred habitat of the Plains-wanderer typically comprises 50% bare ground, 10% fallen litter, and 40% herbs, forbs and grasses. Most of the grassland habitat of the species is <5 cm high, but some vegetation up to a maximum of 30 cm is important for concealment, as long as grass tussocks are spaced 10-20 cm apart.

During prolonged drought, the denudation of preferred habitats may force birds into marginal denser and taller grassland habitats that become temporarily suitable.

The average home range of a single bird is about 12 hectares. Breeding pairs have overlapping home ranges that total approximately 18 hectares.

Purple-crowned Lorikeet

Purple-crowned Lorikeet occurs in the southern areas of Australia, ranging from Victoria to south-west Western Australia. They are uncommon in NSW and most records are associated with flowering events. This species is nomadic and found in open forest and woodlands, particularly where large flowering eucalypts are present. This species utilises hollow branches or holes in trees for breeding. Feeding and breeding areas can be separated by several kilometres (OEH, 2021c).

Purple-gaped Honeyeater

Purple-gaped Honeyeaters occurs in disjunct populations across southern Australia east from southern Western Australia, with the eastern population largely occurring south of the Murray River. NSW forms the extreme north-east of its range, with occasional sightings in the far south west in shrubby mallee habitats. The mallee in section 5 is likely to have some potential for habitat for this species.

Redthroat

The Redthroat is a small, nondescript bird of inland shrublands in western NSW as well as other Australian states and the NT (OEH, 2021c). In NSW the species has been recorded mainly in chenopod shrublands including Old Man Saltbush, Black Bluebush and Dillon Bush shrublands. Around Broken Hill it appears to be associated with the denser vegetation, particularly Acacias, found in drainage lines that run from the rocky hills. In other locations it is known from Canegrass and Lignum swamps and depressions, particularly on floodplains.

Scarlet Robin

In NSW, the Scarlet Robin occurs in open forests and woodlands from the coast to the inland slopes and in winter, dispersing birds are known to appear in the east of the inland plains (OEH 2012b). The Scarlet Robin is considered sensitive to habitat fragmentation and the reductions of structural complexity of habitat

and native ground covers. (Barrett *et al.* 2007; Watson *et al.* 2001). No Scarlet Robin have been detected during the field survey.

Shy Heathwren

Shy Heathwren can be found across southern Australia extending from the wheatbelt in southern Western Australia east to central NSW, including Kangaroo Island. Within the vicinity of the proposal, they are known from the extensive mallee areas in Section 5 between Balranald and Trentham Cliffs (including Mallee Cliffs National Park). The species appears to occur in all age classes of vegetation, though it is believed to prefer either one to five years following fire when the resprouting eucalypts provide dense vegetation cover or in long unburnt (greater than 40 years) areas which have a well developed shrub layer.

Southern Scrub-robin

Southern Scrub-robin is restricted to mallees and shrublands across southern Australia and in NSW is confined to two main areas. The first is in central NSW and is centred on Round Hill and Nombinnie Nature Reserves, though suitable habitat probably exists on adjoining leasehold lands. This population once extended south and east to near Griffith and West Wyalong, but clearing appears to have led to its local extinction in most of this region. The final record from The Charcoal Tank NR was in 1993, while in Pulletop NR it has not been observed since 1982. The other population occurs in the far south west of NSW, mainly within the Scotia mallee centred on Tarawi NR and Scotia Sanctuary. Records east of the Darling River are more scattered, with recent confirmation in Mallee Cliffs NP, and a new population recently detected on leasehold land to the north of Euston. Other populations may still occur in other areas of mallee, particularly those with a well developed shrub layer in the south west corner of the state. Fire history has an influence on habitat occupancy, and it occupies vegetation with a post fire age of 4-80 years, but is most abundant in areas with a post fire age of 26-40 years as it is dependent on a well-developed shrub layer.

Speckled Warbler

The Speckled Warbler has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the Grampians. The species is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast. There has been a decline in population density throughout its range, with the decline exceeding 40% where no vegetation remnants larger than 100ha survive.

The Speckled Warbler lives in a wide range of *Eucalyptus* dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat includes scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area. Pairs are sedentary and occupy a breeding territory of about ten hectares, with a slightly larger home-range when not breeding.

Spotted Harrier

The Spotted Harrier occurs in open woodland and grassland habitats across mainland Australia. It builds a stick nest in a live tree and breeds in Spring, occasionally Autumn (DECCW, 2010). Field surveys failed to reveal the presence of this species, nor were any nest sites located. Potential habitat is more likely in the grassy groundcover areas adjacent to creeklines as these attributes aid foraging techniques for the species.

Swift Parrot

Swift Parrot is a winter (March-September) visitor to southern and eastern New South Wales, where it inhabits eucalypt forests and woodlands (OEH, 2021c, Brereton *et al.*, 2004, Mac Nally and Horrocks, 2000). It feeds mostly on the flowers of eucalypts (particularly prolifically flowering species), but also eats psyllids and exotic fruits (Brereton *et al.*, 2004, Mac Nally and Horrocks, 2000). This species is highly nomadic and relatively large numbers can arrive at and vacate areas depending on local and regional flowering of favoured species (Mac Nally and Horrocks, 2000). No Swift Parrot were recorded during the

field surveys, but they are known to occur within the Wagga Wagga district including the Mates Gully Travelling Stock Reserve. Swift Parrot does not breed on the Australian mainland.

White-bellied Sea-eagle

The White-bellied Sea-eagle is distributed around the Australian coastline, including Tasmania, and well inland along rivers and wetlands of the Murray Darling Basin. They inhabit large areas of open water including larger rivers, swamps, lakes, and the sea. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees. This species feeds mainly on fish and freshwater turtles, but also waterbirds, reptiles, mammals, and carrion (OEH, 2021b).

White-throated Needletail

White-throated Needletail are found across Australia and indeed, globally. For a time it was commonly believed that they did not land while in Australia. It has now been observed that birds will roost in trees, and radio-tracking has since confirmed that this is a regular activity. They can be found in almost any habitat. None were recorded during the field survey.

Rainbow Bee-eater

Most often found in open forests, woodlands and shrublands, and cleared areas, usually near water. It will be found on farmland with remnant vegetation and in orchards and vineyards. It will use disturbed sites such as quarries, cuttings and mines to build its nesting tunnels. Rainbow Bee-eater was not recorded during the field survey. However, the absence was not due to lack of habitat given that the species is well documented as occurring in southern Australia during summer. Given the timing of the field survey, it was more likely that the apparent absence was due to birds beginning migration further north.

Aquatic species (Trout Cod, Murray Cod, Silver Perch and Murray Crayfish)

Murray Crayfish, Trout Cod and Murray Cod are all known from NSW Fisheries surveys in the wider locality. While field surveys did not specifically target these species through instream sampling, the habitat assessment confirms that the named creeks and rivers within or adjacent to the study area provides potential habitat for these species.

Southern Ningai

Southern Ningai are known from scattered locations across southern Western Australia, South Australia, north western Victoria and south western New South Wales. Within this area it appears to be patchily distributed, but can be locally common (as is the case in some locations in NSW). In NSW most records are from the far south west, including the Scotia mallee (Tarawi Nature Reserve, Scotia Sanctuary and surrounding properties) and east of the Darling River (Mungo and Mallee Cliffs National Parks and many surrounding properties). They are known to shelter within spinifex clumps, beneath logs and in dense vegetation. In NSW, there distribution is mostly known within mallee with spinifex.

Squirrel Glider

Squirrel Glider is known to occur in mature Box-Gum/Box Ironbark woodlands and River Red Gum forests west of the Great Dividing Range and in Blackbutt/Bloodwood forests with a heathy understory in coastal areas (OEH 2020c) where they utilise hollow-bearing trees for denning purposes. Our field survey did not detect this species, but this is likely an artefact of survey effort and methods, rather than non-presence. Given this, and given the presence of box-gum woodland and river red-gum woodlands in section 1 and 2, we have considered Squirrel Glider to be present in the road reserves.

Western Pygmy Possum

The Western Pygmy Possum occurs in temperate to arid woodlands across southern Australia, extending from the south west corner of Western Australia, through South Australia and western Victoria, with the eastern limit in south-western NSW. In NSW, has been found in mallee shrubland either dominated by

spinifex (*Triodia* spp.) or with an understorey of tea-tree (*Leptospermum* spp.) and also in Belah (*Casuarina pauper*) in a mixed woodland with a well developed understorey of saltbush.

Within the study area, these habitat requirements and their known distribution aligns with the woodland communities of section 4 and section 5.

Mallee Worm-lizard

Mallee Worm-lizard occurs across southern Australia and in NSW, most records are from the south west corner of the state, and are from the mallee between Balranald and Gol Gol centred on Mallee Cliffs NP. On this basis, the mallee vegetation communities (PCT 170/171) in section 4 and 5 are likely to contain habitat for Mallee Worm-lizard.

Western Blue-tongue Lizard

The Western Blue Tongue Lizard is a robust pale brown skink with a series of broad brown transverse bands on the body and tail. The species is known to occur across a variety of habitats including plains, swales and ranges vegetated by woodlands and shrublands with a definite preference for mixed Mallee/Spinifex communities (OEH, 2021c, Swan et al., 2004, Wilson and Swan, 2013, Sass, 2006).

They diurnally forage for insects, snails and native vegetation and are terrestrial in nature and are known to utilise rabbit warrens for shelter. The species inhabits plains, swales, ranges and sometimes dunes of loamy or clayey/sandy soils vegetated by woodlands.

In the study area, they are likely to occur within PCT 170 and 171.

Yellow-tailed Plain Slider

In NSW, this species is known from two disjunct populations. One population occurs between Tarawi Nature Reserve, Ivanhoe and Broken Hill, and the other in the north-west corner of the state. Since the 1970s, it has only been recorded from Kinchega, Sturt and Mutawintji National Parks, Tarawi Nature Reserve, and one record from Broken Hill.

They are known from grassed alluvial sands and sand dunes, including dry open woodlands and spinifex-dominated red sand plains. The species is fossorial and usually found in loose soil or sand beneath stones, logs and other surface debris.

Menindee Nightshade

Menindee Nightshade is restricted to the far south-western plains, extending up the Darling River to the Menindee and Wilcannia districts. Habitats are generally lake beds or floodplains of heavy grey clays with a highly self-mulching surface. Also found on sandy floodplains and ridges and in calcareous soils, red sands, red-brown earths and loamy soils.

Pine Donkey Orchid

The Pine Donkey Orchid is known in pine sandhill woodland areas south and west of Narrandera as well as other areas on the western slopes of NSW and extending into QLD. In the study area, it is highly likely to occur in areas with *Callitris glaucophylla* on sand hills that are grassy and with herbaceous plants such as *Bulbine* species. High quality habitat is located within section 2 and this was confirmed in the target spring surveys with the species confirmed to be present. A total of 3 individuals were identified on the southern side of the Sturt Highway (see section 2 mapping – Tiles 7,8,9).



Photograph 3-17: Examples of the threatened Pine Donkey Orchid within the Sturt Highway road reserve

Sand-hill Pine Orchid

Caladenia arenaria is found mostly on the south west plains and western south west slopes. The Sand-hill Spider Orchid is currently only known to occur in the Riverina between Urana and Narrandera and has moderate potential to occur on the sandhill/pine areas in section 2, west of Narrandera despite not being recorded within an appropriately timed field survey, confirmed by flowering individuals at a reference site south of Narrandera.

Slender Darling Pea

Slender Darling Pea has been recorded in the Jerilderie and Deniliquin areas of the southern riverine plain, the Hay plain as far north as Willandra National Park, near Broken Hill and in various localities between Dubbo and Moree. The species is known to occur within bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with *Maireana* species. Plants

have been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated.

Acacia melvillei Shrubland

Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions is the name given to the ecological community that is dominated by *Acacia melvillei* (Yarran). *Acacia melvillei* Shrubland typically has an open canopy of shrubs or small trees, sometimes with scattered mid-stratum shrubs, and with a sometimes sparse, but highly variable ground layer dominated by grasses, chenopods and herbs. The structure and species composition of the community varies depending on disturbance history and temporal variability in rainfall. The open stratum of large shrubs or small trees may be reduced to isolated individuals or may be absent as a result of past clearing. The shrub/tree layer is dominated by *Acacia melvillei*, either in pure stands or with a range of other less abundant trees or tall shrubs. These may include *Nelia* (*Acacia loderi*), Western Rosewood (*Alectryon oleifolius* subsp. *canescens*), Belah (*Casuarina pauper*) and Sugarwood (*Myoporum platycarpum*).

Inland Grey Box Woodland

Inland Grey Box Woodland are dominated by *Eucalyptus 183acrocarpa* (Inland Grey Box), and are often found in association with *E. populnea* subsp. *bimbil* (Bimble or Poplar Box), *Callitris glaucophylla* (White Cypress Pine), *Brachychiton populneus* (Kurrajong), *Allocasuarina luehmannii* (Bulloak) or *E. melliodora* (Yellow Box).

Myall Woodland

Myall Woodland typically occurs on red-brown earths and heavy textured grey and brown alluvial soils within a climatic belt receiving between 375 and 500 mm mean annual rainfall. The structure of the community varies from low woodland and low open woodland to low sparse woodland or open shrubland, depending on site quality and disturbance history. The tree layer grows up to a height of about 10 metres and invariably includes *Acacia pendula* (Weeping Myall or Boree) as one of the dominant species or the only tree species present. The understorey includes an open layer of chenopod shrubs and other woody plant species and an open to continuous groundcover of grasses and herbs.

Sandhill Pine Woodland

Sandhill Pine Woodland is characterised by an open tree stratum, which may be reduced to isolated individuals or may be absent as a result of past clearing. The tree layer is dominated by *C. glaucophylla*, either in pure stands or with a range of other less abundant trees or tall shrubs.

Box-gum Woodland

Box-gum Woodland is an open woodland community (sometimes occurring as a forest formation), in which the most obvious species are one or more of the following: White Box (*Eucalyptus albens*), Yellow Box (*E. melliodora*) and Blakely's Red Gum (*E. blakelyi*). Intact sites contain a high diversity of plant species including some shrub species, several climbing plant species, many grasses and a very high diversity of herbs (OEH, 2021c). It generally occurs on fertile lower parts of the landscape where resources such as water and nutrients are abundant (OEH 2020b). Sites that retain only a grassy groundlayer, with few or no trees remaining are considered important for rehabilitation and to rebuild connections between sites of better quality (OEH 2020b). Box-gum Woodland occurs in section 1 and 2 of the study area.

3.5 Areas of outstanding biodiversity value

No areas of outstanding biodiversity value as listed on the *Register of Declared Areas of Outstanding Biodiversity Value* in the study area or in the Wagga Wagga City, Narrandera, Leeton, Murrumbidgee, Hay, Balranald and Wentworth LGA.

3.6 Wildlife connectivity corridors

The importance of corridors cannot be overstated within any landscape (Lindenmayer and Nix, 1993, MacDonald, 2003, Johnson et al., 2007). Features such as these are considered important to maintain long-term genetic diversity amongst woodland and grassland flora and fauna and in the Riverina and South-west slopes regions, it is well known (Spooner and Lunt, 2004).

The proposal lies within a highly modified, agricultural landscape. Nonetheless, the riparian corridor of the Murrumbidgee River and its tributaries are well known to provide landscape scale corridors for the threatened Superb Parrot (BakerDabb, 2011, CSU, 2006b) and the long, lineal remnants within the road corridor of the Sturt Highway are also likely to be of high importance, especially where previous clearing outside of the road reserve dominates the landscape.

3.7 Matters of National Environmental Significance

Six Matters of National Environmental Significance (MNES) were recorded during the field surveys. These being Superb Parrot, Koala, Eastern Great Egret, Myall Woodland EEC, Box-gum Woodland EEC and Inland Grey Box Woodland EEC.

The EPBC Act Protected Matters Search identified a number of MNES with potential to occur within the study area (Annexure E).

There are no wetlands of international importance in the vicinity of the proposal. The proposal is located in the same catchment, but between 10 -700 kilometres from each wetland.

Further assessment of matters of MNES relating to threatened ecological communities, threatened species and migratory species is considered further in Annexure D.

4. Avoidance and minimisation

Avoidance and minimisation of impacts to biodiversity have been incorporated at the strategic design stage of planning. This has resulted in avoiding areas of high biodiversity value (where possible), and minimise the areas of impact in these areas (where not possible to avoid).

For this proposal, extensive redesign of the scope of the proposed work occurred once the field survey data was collected and analysed. This included the population of the threatened plant, *Santalum murrayanum* and the Pine Donkey Orchid (*Diuris tricolor*).

This allowed Transport to avoid areas of high biodiversity value where possible, or if not possible, minimise the level of impact to an appropriate level if the objectives of the proposal could still be met.

5. Impact assessment

Road construction, operation and associated maintenance can have a range of potential impacts to biodiversity. The potential impacts resulting from this proposal are summarised below and in the following sections. These include:

- Removal of native vegetation
- Removal of threatened fauna species habitat and habitat features
- Fauna injury and mortality
- Invasion and spread of weeds
- Noise, light and vibration.

5.1 Construction impacts

5.1.1 Removal of native vegetation

Clearing of native vegetation is a key threatening process listed under the BC Act and the EPBC Act.

The proposal would result in the removal of native vegetation. The area of impact has been calculated using a geographic information system (GIS) shapefile of the proposed impact areas which was then overlain onto the vegetation mapping prepared from the field surveys. The methodology for the GIS calculations is provided in section 2.5 of this BA.

The potential extent of clearing expected as a result of the proposal is listed by PCT in Table 5-1.

Table 5-1: Impacts on vegetation

Plant community type (PCT) (condition)	Status		Proposal footprint ¹ (hectares)	Temporary impact ² (hectares)
	BC Act	EPBC Act		
River Red Gum – sedge dominated very tall open forest (2) (low condition)	-	-	0.2	0.44
River Red Gum – sedge dominated very tall open forest (2) (mod-good condition)	-	-	6.63	
River Red Gum – Lignum very tall open forest or woodland wetland (11) (mod-good condition)	-	-	1.63	0.03
Black Box – Lignum woodland wetland (13) (low condition)	-	-	0.27	0.63
Black Box – Lignum woodland wetland (13) (mod-good condition)	-	-	13.48	
Black Box open woodland wetland (15) (low condition)	-	-	0.08	

Plant community type (PCT) (condition)	Status		Proposal footprint ¹ (hectares)	Temporary impact ² (hectares)
	BC Act	EPBC Act		
Black Box open woodland wetland (15) (mod-good condition)	-	-	6.35	0.65
Cypress Pine woodland of source-bordering dunes (19) (mod-good condition)	Yes	-	0.86	0.01
Yarran tall open shrubland (23) (low condition)	Yes	-	0.06	0.24
Yarran tall open shrubland (23) (mod-good condition)	Yes	-	0.79	
Weeping Myall open woodland (26) (low condition)	Yes	-	0.19	0.29
Weeping Myall open woodland (26) (mod-good condition)	Yes	Yes	17.98	
White Cypress Pine open woodland (28) (mod-good condition)	Yes	-	0.15	0.05
Plains Grass Grassland (45) (low condition)	-	-	0.02	0.19
Plains Grass Grassland (45) (mod-good condition)	-	-	1.85	
Curly Windmill Grass – speargrass – wallaby grass grassland (46) (low condition)	-	-	0.01	0.03
Curly Windmill Grass – speargrass – wallaby grass grassland (46) (mod-good condition)	-	-	2.46	
Black Oak – Western Rosewood open woodland (58) (mod-good condition)	-	-	0.96	0.12
Yellow Box – River Red Gum tall grassy riverine woodland (74) (low condition)	Yes	No	0.02	0.35
Yellow Box – River Red Gum tall grassy riverine woodland (74) (mod-good condition)	Yes	Yes	3.09	
Yellow Box – White Cypress Pine grassy woodland (75) (mod-good condition)	Yes	Yes	1.19	0.02
Western Grey Box tall grassy woodland (76) (mod-good condition)	Yes	Yes	6.49	0.51

Plant community type (PCT) (condition)	Status		Proposal footprint ¹ (hectares)	Temporary impact ² (hectares)
	BC Act	EPBC Act		
Western Grey Box – White Cypress Pine tall woodland (80) (low condition)	Yes	No	0.04	0.57
Western Grey Box – White Cypress Pine tall woodland (80) (mod-good condition)	Yes	Yes	3.6	
Prickly Wattle tall open shrubland (139) (low condition)	-	-	0.04	0.07
Black Bluebush low open shrubland (153) (low condition)	-	-	0.04	0.01
Black Bluebush low open shrubland (153) (mod-good condition)	-	-	0.38	
Bladder Saltbush shrubland (157) (mod-good condition)	-	-	0.01	0.01
Old Man Saltbush shrubland (159) (mod-good condition)	-	-	0.2	0.01
Nitre Goosefoot shrubland wetland (160) (mod-good condition)	-	-	0.28	0.01
Dillon Bush shrubland (163) (mod-good condition)	-	-	0.03	0.01
Cotton Bush open shrubland (164) (mod-good condition)	-	-	0.28	0.01
Chenopod sandplain mallee woodland/shrubland (170) (low condition)	-	-	0.96	1.3
Chenopod sandplain mallee woodland/shrubland (170) (mod-good condition)	-	-	12.75	
Spinifex linear dune mallee (171) (mod-good condition)	-	-	0.77	0.04
Black Roly Poly low open shrubland (216) (mod-good condition)	-	-	0.02	0.01
Derived Giant Redburr low shrubland (236) (low condition)	-	-	0.05	0.01
Riverine Western Grey Box grassy woodland (237) (mod-good condition)	Yes	Yes	0.24	0.1

Plant community type (PCT) (condition)	Status		Proposal footprint ¹ (hectares)	Temporary impact ² (hectares)
	BC Act	EPBC Act		
White Box – White Cypress Pine – Western Grey Box shrub/grass/forb woodland (267) (mod-good condition)	Yes	Yes	1.4	0.14
Blakely's Red Gum – Yellow Box grassy tall woodland (277) (mod-good condition)	Yes	Yes	0.63	0.05
Total Plant Community Types			90.35	
Cleared land (no PCT) (low condition)	-	-	45.41	1.5
Native Tree Planting (no PCT) (mod-good condition)	-	-	2.79	0.16
Total impacts proposed			138.55	9.02

¹Area to be cleared based on ground-truthed vegetation mapping within the study area.

²Area to be temporarily disturbed by machinery to remove vegetation in proposal footprint. This is based on a 3m x 3m disturbance area around each individual tree (not polygons of vegetation removal).

5.1.2 Removal of threatened fauna habitat

The removal of native vegetation would result in the removal of fauna habitat.

Potential impacts to the threatened fauna species recorded or with a moderate to high potential to occur in the study area and their habitats are listed in Table 5-2. As noted in Table 5-2, the area of impact differs between species dependant on the outcome of the field survey, the habitat assessment completed within Annexure C, and the known habitat requirements of each species.

A total of 343 hollow-bearing trees (HBT) are also proposed for removal. The majority of these are within section 1 (203 HBT) followed by section 2 (79 HBT). The number of HBT within each section and within each PCT is detailed within Table 5-3.

Table 5-2: Impacts on threatened and migratory fauna and fauna habitat

Species	Potential occurrence (Moderate, High, Recorded)	Section impacted	Impact (ha)
Southern Bell Frog	Moderate	2,3,4	19.95
Corben's Long-eared Bat	Moderate	2,3,4,5	77.66
Greater Broad-nosed Bat	Moderate	1	5.03
Inland Forest Bat	Moderate	2,4,5	77.66
Little Pied Bat	Moderate	2,4,5	83.65
Southern Myotis	Moderate	1,2	58.7
Yellow-bellied Sheath-tail-bat	Moderate	1,2,5	72.78

Species	Potential occurrence (Moderate, High, Recorded)	Section impacted	Impact (ha)
Barking Owl	Moderate	1,2	55.23
Black-breasted Buzzard	Moderate	4,5	23.75
Black-chinned Honeyeater	Moderate	2,5	50.4
Black Falcon	Moderate	2,3,4	55.64
Brolga	Moderate	1,2,5	34.6
Brown Treecreeper	High, Moderate, High	1,2,3	18.85
Bush Stone-curlew	Moderate	1,2,3,5	74.1
Chestnut Quail-thrush	Moderate, High	4,5	14.45
Diamond Firetail	Moderate	1,2,3	65.46
Dusky Woodswallow	Moderate	1,2,3,4,5	137.03
Flame Robin	Moderate	1,2	87.25
Gilbert's Whistler	Moderate	1,2,4,5	38.7
Grey-crowned Babbler	Recorded	1,2,3,4	68.55
Hooded Robin	Moderate	1,4,5	42.4
Little Eagle	Recorded	1,2,3,4,5	83.91
Little Lorikeet	Moderate	1,2	55.23
Malleefowl	High	4,5	14.45
Painted Honeyeater	Moderate	1,2,3	59.86
Pied Honeyeater	Moderate	3,4,5	28.3
Pink Cockatoo	Moderate & High	1,3,4,5	75.5
Plains-wanderer	Moderate	1,2,3	4.34
Purple-crowned Lorikeet	Moderate	5	14.03
Purple-gaped Honeyeater	Moderate	5	21.73
Redthroat	Moderate	3,4	1.05
Rufous Fieldwren	Recorded, Moderate	3,4	1.05
Regent Parrot	Recorded	4,5	21.69
Scarlet Robin	Moderate, High	1,2	55.24
Shy Heathwren	Moderate	4,5	14.45
Southern Scrub-robin	Moderate	4,5	14.45
Speckled Warbler	Moderate	1,2,4,5	78.73
Spotted Harrier	Moderate	1,2,3,4,5	63.56

Species	Potential occurrence (Moderate, High, Recorded)	Section impacted	Impact (ha)
Square-tailed Kite	Moderate, Recorded, Moderate	1,2,5	67.25
Superb Parrot	Recorded, Recorded, Recorded, Moderate, Moderate	1,2,3,4,5	64.26
Swift Parrot	Moderate	1	18.85
Turquoise Parrot	Moderate, Recorded	1,2	37.06
Varied Sittella	Moderate, High, Moderate, Recorded	1,2,4,5	78.73
White-bellied Sea-eagle	Moderate	1,2,3,4,5	3.11
White-fronted Chat	Moderate, Moderate, Recorded, Moderate, Moderate	1,2,3,4,5	50.7 (incl Cleared Land)
Murray Cod	Moderate	1,2	No impacts proposed to aquatic habitat
Silver Perch	Moderate	1,2	No impacts proposed to aquatic habitat
Trout Cod	Moderate	1,2	No impacts proposed to aquatic habitat
Murray Crayfish	Moderate	1,2	No impacts proposed to aquatic habitat
Grey-headed Flying Fox	Moderate	1	18.85
Koala	Moderate, Recorded	1,2	8.46
Southern Ningauai	High, Moderate	4,5	14.45
Squirrel Glider	High	1	18.85
Western Pygmy Possum	High, Moderate	4,5	15.26
Mallee Worm-lizard	High	4,5	14.45
Western Blue-tongued Lizard	Moderate	5	7.7
Yellow-tailed Plain Slider	Moderate	5	7.7
Bitter Quandong	Recorded	4,5	No impacts proposed
Menindee Nightshade	Moderate	3,4,5	11.98
Mossgiel Daisy	Moderate	2,3	0.19
Pine Donkey Orchid	Moderate	1,2	1.96
Sand-hill Spider-orchid	Moderate	1,2	0.77
Slender Darling Pea	Moderate	2,3	16.69
Silky Swainson-pea	Moderate	2	24.54

Species	Potential occurrence (Moderate, High, Recorded)	Section impacted	Impact (ha)
Small Purple-pea	Moderate	2	24.54
Thyme Rice-flower	Moderate	5	7.7
Winged Pepper-cress	Moderate	3	4.54
Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions	Recorded	2,4	0.85
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	Recorded	1,2	13.1
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	Recorded	2,3,4,5	1.01
Myall Woodland in the Darling Riverine, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western slopes bioregions	Recorded	1,2	18.17
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	Recorded	1	2.03

Table 5-3: Number of hollow-bearing trees to be removed within each plant community type by section

Plant Community Types	Sec 1	Sec 2	Sec 3	Sec 4	Sec 5
Highly disturbed area directly adjacent to pavement	50	27	0	2	0
Native tree planting	6	0	0	0	0
Cleared land	37	16	1	6	2
PCT 2	7	7	0	0	0
PCT 11	0	0	0	0	0
PCT 13	0	4	5	0	4

Plant Community Types	Sec 1	Sec 2	Sec 3	Sec 4	Sec 5
PCT 15	0	16	0	0	0
PCT 19	0	0	0	0	0
PCT 23	0	0	0	1	0
PCT 26	0	0	0	0	0
PCT 28	0	0	0	0	0
PCT 45	0	0	0	0	0
PCT 46	0	0	0	0	0
PCT 74	10	4	0	0	0
PCT 75	0	4	0	0	0
PCT 76	46	0	0	0	0
PCT 80	28	1	0	0	0
PCT 160	0	0	0	0	0
PCT 164	0	0	0	0	0
PCT 170	0	0	0	35	5
PCT 171	0	0	0	0	0
PCT 216	0	0	0	0	0
PCT 237	11	0	0	0	0
PCT 267	7	0	0	0	0
PCT 277	1	0	0	0	0
TOTAL HBT TO BE REMOVED	203	79	6	44	11

5.1.3 Removal of threatened flora

Targeted searches were carried out within the study area at an appropriate time of year for all species. Two threatened flora species was recorded in this field survey. These being Bitter Quandong and Pine Donkey orchid (as detailed in section 3.4). For Bitter Quandong, within section 4, a large population (at least 142 plants) of this species was identified within the road reserve (mapped on Figure 3-42) in a single location with many of these within 10 metres of the edge line, and in section 5, three individuals were identified. For

Pine Donkey Orchid, three individuals were recorded, two of which were within the proposed impact footprint. The proposal footprint has been redesigned to avoid all known locations of threatened flora.

For the majority of the road reserve within close proximity to the existing formation, past disturbances within and directly adjacent provides strong evidence that other threatened flora are unlikely to occur. However, where proposed impacts occur well clear from the existing formation (i.e., for overtaking lanes), these are relatively undisturbed areas and would have the potential to impact on threatened flora without adequate safeguards and without targeted surveys during species time periods.

5.1.4 Removal of threatened ecological communities

As well as the clearing of native vegetation, several of the PCT also correspond to threatened ecological communities (TEC) as listed by the BC Act and EPBC. Where a threatened ecological community meets the criteria for both the BC and EPBC Act, they are presented as different impacts. A total of 39.28 hectares comprises a TEC where direct permanent impacts are proposed. A breakdown of each of these impacts is provided in Table 5-4.

Table 5-4: Impacts to threatened ecological communities

Threatened Ecological Community	Status		Proposal footprint (hectares)
	BC Act	EPBC Act	
White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland	EEC	-	0.45
White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland	EEC	CEEC	5.88
Sandhill Pine Woodland	EEC	-	1.01
Inland Grey Box Woodland	EEC	-	0.32
Inland Grey Box Woodland	EEC	EEC	12.6
Myall Woodland	EEC	-	9.98
Myall Woodland	EEC	EEC	8.19
Acacia melvillei Shrubland	EEC	-	0.85
Total TEC to be impacted			39.28

5.1.5 Injury and mortality

Fauna injury or mortality can occur during the clearing phase of construction during the removal of habitat. This is of particular relevance to Superb Parrot that may be nesting during the construction period, and any nocturnal fauna such as Squirrel Glider and microbats that may be roosting/denning during daylight hours.

During construction it is anticipated that some diurnal and mobile fauna species such as birds and larger reptiles may be able to move from the path of construction equipment during any clearing operations. Other

fauna species such as those that are less mobile and nocturnal, are less likely to move away from clearing activity. The implementation of a HBT Removal Procedure is considered a minimum to reduce the potential for injury and mortality to threatened fauna species (BC Act and EPBC Act) that may be nesting or roosting within the 343 HBT to be removed.

During operation, impacts are not expected to increase given that the proposed work is not likely to result in an increase in vehicles using the Sturt Highway.

5.2 Indirect/operational impacts

5.2.1 Wildlife connectivity and habitat fragmentation

The proposal is likely to have no negative affect on the potential wildlife corridors or markedly increase habitat fragmentation particularly in the context of the proposed work and that potentially significant wildlife corridors remain within the road corridor and across the locality.

The proposal would not increase habitat fragmentation above pre-existing levels given the current detailed design.

5.2.2 Invasion and spread of weeds

Weed species are widespread across the study area as a result of the surrounding agricultural areas. The proposed work has some potential to disperse priority and environmental weed plant material into retained areas of native vegetation from incoming construction equipment and incoming fill materials. The most likely cause would be once construction vehicles and machinery first enter the proposal area from elsewhere and when fill is unloaded at the site. No Priority Weeds were identified during the field survey. However, given the length of the proposal and the survey effort, there is some potential that Priority Weeds are present, but went undetected. Any Priority Weed would require appropriate management during construction should the proposal proceed. For the remaining weeds, and the extent of weeds already present within some portions of the study area, the general impact is negligible and of no significance to the long-term viability of the retained vegetation within the study area or the locality given their current presence. However, in other areas of native vegetation, weeds are virtually absent which is a rarity in many landscapes, particularly agricultural dominated ones. Appropriate safeguards relating to machinery and vehicle parking are required to minimise impacts to areas of retained native vegetation.

5.2.3 Noise, light and vibration

Noise, vibration and light impact already pre-exists on the Sturt Highway from vehicular movements and so, potential impacts are restricted to construction impact.

Construction noise and vibration are likely to result from the proposal but would be limited to the construction period and during daylight hours. While it is important to remember that no multi-species study has found all species to be sensitive to noise and vibration, it is generally agreed that for species that vocalise frequently such as birds and amphibians, there is some potential for negative effects over the long-term. In the context of the proposal, the work is expected to be conducted over a relatively short time frame and over a length exceeding 500 kilometres. Potential impact, if any, is therefore considered to be relatively minor and temporary with extensive areas of the existing road reserve and other habitats in the locality remaining unaffected by temporary increases in noise and vibration.

No light impacts are expected due to construction occurring during daylight hours.

5.2.4 Invasion and spread of pathogens and disease

Pathogens like bacteria and viruses can result in disease in flora and fauna and can be found in soils and living in organisms such as fungus. Several pathogens are known from the region and these are listed as KTP. These being:

- Infection of native plants by *Phytophthora* (BC Act and EPBC Act)
- Infection of frogs by amphibian chytrid fungus causing the disease *chytridiomycosis* (BC Act and EPBC Act)
- Infection by Psittacine Beak and Feather Disease affecting endangered psittacine species (BC Act and EPBC Act)
- Introduction and establishment of exotic rust fungi on plants of the Myrtaceae (BC Act)
- Novel biota and their impact on biodiversity (EPBC Act) (covers Myrtle Rust)

Without appropriate mitigation measures, all of these pathogens could be inadvertently transported into the proposal area by construction machinery and vehicles.

5.3 Cumulative impacts

The proposal is part of a broader program of work to carry out safety improvement work along the full length of Sturt Highway. This would result in a significant safety improvement for road users.

5.4 Assessments of significance

Section 7.3 of the BC Act details five factors which are to be considered when determining if a proposed development or activity '*is likely to have a significant effect on the threatened species, ecological communities, or their habitats*'. These five factors must be taken into account by determining authorities when considering an activity. This enables a decision to be made as to whether there is likely to be a significant effect on the species.

The Test of Significance (Annexure D) has determined that the proposed activity is '*unlikely*' to have a '*significant effect*' on species that are known from the study area, or that have been assessed as having a moderate to high potential of occurring in the study area. They include the following biota and their habitats:

- Southern Bell Frog
- Microbats (Corben's Long-eared Bat, Greater Broad-nosed Bat, Inland Forest Bat, Little Pied Bat, Southern Myotis, Yellow-bellied Sheathtail Bat)
- Barking Owl
- Birds of Prey (Black-breasted Buzzard, Black Falcon, Little Eagle, Spotted Harrier, Square-tailed Kite, White-bellied Sea-eagle)
- Woodland/Shrubland Birds (Black-chinned Honeyeater, Brown Treecreeper, Bush Stone-curlew, Diamond Firetail, Grey-crowned Babbler, Hooded Robin, Little Lorikeet, Painted Honeyeater, Pink Cockatoo, Regent Parrot, Scarlet Robin, Speckled Warbler, Superb Parrot, Swift Parrot, Turquoise Parrot, Varied Sittella,
- Habitat generalists (Flame Robin, Dusky Woodswallow, Fork-tailed Swift, Pied Honeyeater)
- Open grassland/cleared land Birds (Flame Robin, Plains Wanderer, White-fronted Chat, Brolga,
- Birds of the mallee (Chestnut Quail-thrush, Gilberts Whistler, Malleefowl, Purple-crowned Lorikeet, Purple-gaped Honeyeater, Shy Heathwren, Southern Scrub-robin,
- Birds of the chenopod shrublands (Redthroat, Rufous Fieldwren)
- Grey-headed Flying-fox
- Koala
- Southern Ningau

- Squirrel Glider
- Western Pygmy-possum
- Reptiles of the Mallee (Mallee Worm-lizard, Western Blue-tongued Lizard, Yellow-tailed Plain Slider)
- Bitter Quandong
- Orchids (Pine Donkey Orchid, Sand-hill Spider Orchid)
- Peas (Slender Darling Pea, Silky Swainson-pea, Small Purple-pea)
- Other flora (Menindee Nightshade, Mossgiel Daisy, Thyme Rice-flower, Winged Peppergrass)
- Acacia Melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions endangered ecological community
- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions endangered ecological community
- Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions endangered ecological community
- Myall Woodland in the Darling Riverine, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western slopes bioregions endangered ecological community
- 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 endangered ecological community

In the FM Act, there are seven factors which are to be considered when determining if a proposed development or activity ‘*is likely to have a significant effect on the threatened species, or ecological communities, or their habitats*’. These seven factors must be taken into account by determining authorities when considering an activity. This enables a decision to be made as to whether there is likely to be a significant effect on the species.

The habitat assessment table in Annexure D found that three threatened biota listed under the FM Act that were known to, or have the potential to occur within the study area based on the evaluation completed. Given this, further assessment by application of the 7-part test is completed on the following biota:

- Trout Cod
- Silver Perch
- Murray Crayfish

With consideration of the assessment completed within Annexure D, the proposed activity is *unlikely* to have a significant effect on threatened or migratory species, populations, communities or their habitats as listed by the EPBC Act.

The proposal itself, with the adoption of mitigation measures outlined within Chapter 6 and further consideration of potential impact, is considered moderate risk. Target survey is required in some locations before a decision on whether referral to the Commonwealth Minister is warranted.

A summary of the results of the BC Act Assessment of Significance and EPBC Act Significance Assessments is provided in Table 5-4.

Table 5-5: Summary of the findings of the BC Act, FM Act and EPBC Act significance assessments.

BC Act & FM Act significance assessments						
Threatened species, or communities	Significance assessment question ¹					Likely significant impact?
	A	b	c	d	e	
Southern Bell Frog	N	X	N	N	N	No
Corben’s Long-eared Bat	N	X	N	N	N	No

BC Act & FM Act significance assessments

Greater Broad-nosed Bat	N	X	N	N	N	No
Inland Forest Bat	N	X	N	N	N	No
Little Pied Bat	N	X	N	N	N	No
Southern Myotis	N	X	N	N	N	No
Yellow-bellied Sheath-tail-bat	N	X	N	N	N	No
Barking Owl	N	X	N	N	N	No
Black-breasted Buzzard	N	X	N	N	N	No
Black-chinned Honeyeater	N	X	N	N	N	No
Black Falcon	N	X	N	N	N	No
Brolga	N	X	N	N	N	No
Brown Treecreeper	N	X	N	N	N	No
Bush Stone-curlew	N	X	N	N	N	No
Chestnut Quail-thrush	N	X	N	N	N	No
Diamond Firetail	N	X	N	N	N	No
Dusky Woodswallow	N	X	N	N	N	No
Flame Robin	N	X	N	N	N	No
Fork-tailed Swift	N	X	N	N	N	No
Gilbert's Whistler	N	X	N	N	N	No
Grey-crowned Babbler	N	X	N	N	N	No
Hooded Robin	N	X	N	N	N	No
Little Eagle	N	X	N	N	N	No
Little Lorikeet	N	X	N	N	N	No
Malleefowl	N	X	N	N	N	No
Painted Honeyeater	N	X	N	N	N	No
Pied Honeyeater	N	X	N	N	N	No
Pink Cockatoo	N	X	N	N	N	No
Plains-wanderer	N	X	N	N	N	No
Purple-crowned Lorikeet	N	X	N	N	N	No
Purple-gaped Honeyeater	N	X	N	N	N	No
Redthroat	N	X	N	N	N	No
Rufous Fieldwren	N	X	N	N	N	No
Regent Parrot	N	X	N	N	N	No
Scarlet Robin	N	X	N	N	N	No

BC Act & FM Act significance assessments

Shy Heathwren	N	X	N	N	N	No
Southern Scrub-robin	N	X	N	N	N	No
Speckled Warbler	N	X	N	N	N	No
Spotted Harrier	N	X	N	N	N	No
Square-tailed Kite	N	X	N	N	N	No
Superb Parrot	N	X	N	N	N	No
Swift Parrot	N	X	N	N	N	No
Turquoise Parrot	N	X	N	N	N	No
Varied Sittella	N	X	N	N	N	No
White-bellied Sea-eagle	N	X	N	N	N	No
White-fronted Chat	N	X	N	N	N	No
Silver Perch	N	X	N	N	N	No
Trout Cod	N	X	N	N	N	No
Murray Crayfish	N	X	N	N	N	No
Grey-headed Flying Fox	N	X	N	N	N	No
Koala	N	X	N	N	N	No
Southern Ningau	N	X	N	N	N	No
Squirrel Glider	N	X	N	N	N	No
Western Pygmy Possum	N	X	N	N	N	No
Mallee Worm-lizard	N	X	N	N	N	No
Western Blue-tongued Lizard	N	X	N	N	N	No
Yellow-tailed Plain Slider	N	X	N	N	N	No
Bitter Quandong	N	X	N	N	N	No
Menindee Nightshade	N	X	N	N	N	No
Mossgiel Daisy	N	X	N	N	N	No
Pine Donkey Orchid	N	X	N	N	N	No
Sand-hill Spider-orchid	N	X	N	N	N	No
Slender Darling Pea	N	X	N	N	N	No
Silky Swainson-pea	N	X	N	N	N	No
Small Purple-pea	N	X	N	N	N	No
Thyme Rice-flower	N	X	N	N	N	No
Winged Pepper-cress	N	X	N	N	N	No

BC Act & FM Act significance assessments						
Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions EEC	X	N	N	N	N	No
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions EEC	X	N	N	N	N	No
Myall Woodland in the Darling Riverine, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western slopes bioregions EEC	X	N	N	N	N	No
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 EEC	X	N	N	N	N	No

EPBC Act Assessments		
Threatened species, or communities	Important population ²	Likely significant impact?
Southern Bell Frog	No	No
Corben's Long-eared Bat	No	No
Fork-tailed Swift	No	No
Malleefowl	Yes	No
Painted Honeyeater	No	No
Plains-wanderer	Yes	No
Regent Parrot (eastern)	No	No
Superb Parrot	No	No
White-bellied Sea-eagle	No	No
White-throated Needletail	No	No
Murray Cod	No	No
Silver Perch	No	No
Koala	Yes	No
Menindee Nightshade	No	No
Mossgiel Daisy	No	No

EPBC Act Assessments		
Sand-hill Spider-orchid	No	No
Slender Darling Pea	No	No
Small Purple-pea	No	No
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penepplain, Nandewar and Brigalow Belt South Bioregions EEC	No	No
Myall Woodland in the Darling Riverine, Brigalow Belt South, Cobar Penepplain, Murray-Darling Depression, Riverina and NSW South Western slopes bioregions EEC	No	No
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 EEC	No	No

Notes: Y= Yes (negative impact), N= No (no or positive impact), X= not applicable, ?= unknown impact.

1. Under Section 7.2 of the BC Act, a proposal or activity is likely to significantly affect threatened species or ecological communities, or their habitats if:
 - a) in the case of a threatened species, whether the proposed proposal or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,
 - b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed proposal or activity:
 - i. is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
 - ii. is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,
 - c) in relation to the habitat of a threatened species or ecological community:
 - i. the extent to which habitat is likely to be removed or modified as a result of the proposed proposal or activity, and
 - ii. whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed proposal or activity, and
 - iii. the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,
 - d) whether the proposed proposal or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),
 - e) whether the proposed proposal or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

2. A 'population of a species' as determined by the EPBC Act is an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to:
 - a) a geographically distinct regional population, or collection of local populations, or
 - b) a population, or collection of local populations, that occurs within a particular bioregion.

Important Population as determined by the EPBC Act is one that for a vulnerable species:

- a) is likely to be key source populations either for breeding or dispersal
- b) is likely to be necessary for maintaining genetic diversity
- c) is at or near the limit of the species range.

6. Biodiversity offsets

A review of the biodiversity offset thresholds identified within Table 1 of the Transport *Guidelines for biodiversity offsets*, identifies that the proposal requires consideration by Transport for biodiversity offsets or supplementary measures.

Biodiversity impacts would be mitigated or offset in accordance the current TfNSW Guidelines for biodiversity offsets or future Offset guidelines. A Biodiversity Offset Strategy will be developed and implemented. It will account for funded aspects of the work and will be staged in line with delivery phases.

7. Mitigation

Measures to minimise impacts on threatened species have been recommended as part of this assessment and are summarised in Table 6-1.

Safeguards and management measures proposed have been developed by referring to the best practice management measures found in the Transport *Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects* (2011) and site-specific mitigation measures have been specifically developed for the proposed work as deemed necessary.

Table 6-1: Mitigation measures

Impact	Mitigation measures	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated
Removal of threatened flora habitat	The limit of works (including compounds and parking areas) must be clearly and physically demarcated with flagging/fencing or similar.	Prior to construction	Effective	None
	Limit of clearing fencing must be placed around any threatened flora locations with an appropriate buffer distance as determined by the Project Environmental Officer or Ecologist	Prior to construction	Effective	None
	No work of any kind would take place in the identified population of Pine Donkey Orchid.	During construction	Effective	None
	All personnel would be made aware of Pine Donkey Orchid and Santalum murrayanum given their known presence within the road corridor. This should be part of tool-box talks to all onsite personnel.	During construction	Effective	None
	The unexpected species find procedure is to be followed under <i>Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (RTA 2011) if threatened ecological communities, not assessed in the biodiversity assessment, are identified in the proposal site	During construction	Effective	None
Removal of native vegetation	Only vegetation assessed within this BA is to be removed. Should any additional clearing be necessary, further onsite assessment is required	During construction	Effective	None
	Parking options should be limited to existing hard stand areas	During construction	Effective	None
	Pre-clearing surveys will be undertaken in accordance with Guide 1: Pre-clearing process of the <i>Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (RTA 2011).	Prior to construction	Effective	None

Impact	Mitigation measures	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated
	Vegetation removal will be undertaken in accordance with <i>Guide 4: Clearing of vegetation and removal of bushrock of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (RTA 2011).	During construction	Effective	None
	All pathogens (e.g. Chytrid, Myrtle Rust and Phytophthora) are to be managed in accordance with the Transport Biodiversity Guidelines – Guide 7 (Pathogen Management) and DECC Statement of Intent 1: Infection of native plants by <i>Phytophthora cinnamomi</i> (for Phytophthora).	During construction	Effective	None
	Pruning of mature trees is to be in accordance with Part 5 of the Australian Standard 4373-2007 Pruning of amenity trees.	During construction	Effective	None
	Biodiversity impacts would be mitigated or offset in accordance the current TfNSW Guidelines for Biodiversity Offsets or future Offset Guidelines for all works	As determined by the biodiversity offset strategy	Effective	None
Removal of fauna habitat	Removal of any HBT would only be carried out in accordance with a HBT Removal Procedure. The Procedure must specifically include actions to minimise potential impacts to Superb Parrot, Squirrel Glider and microbats and must include procedures for supervision, salvage and relocation by a suitable qualified and experienced person.	During construction	Effective	None
	Any Grey-crowned Babbler nests would be the subject of a pre-clearance survey to determine if breeding is occurring. Should breeding be present, works should be temporarily postponed to avoid direct impacts during any breeding event. Should this be unavoidable, any offspring within the nest can be salvaged and directed to a suitably qualified and experienced person for raising.	During construction	Effective	None

Impact	Mitigation measures	Timing and duration	Likely efficacy of mitigation	Residual impacts anticipated
	Fauna will be managed in accordance with <i>Guide 9: Fauna handling of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (RTA 2011)	During construction	Proven	None
	Habitat removal will be undertaken in accordance with Guide 4: Clearing of vegetation and removal of bushrock of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011).	During construction	Effective	None
	The unexpected species find procedure is to be followed under Guide 1: Pre-clearing process of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011) if threatened fauna, not assessed in the biodiversity assessment, are identified in the proposal site.	During construction	Proven	None
	Prior to clearing any vegetation within PCT 2 or PCT 11 within section 1 and section 2, an ecologist must be onsite to confirm that Koala are not present within the proposed impact area. Should any Koala be observed, any proposed work within 50 metres of any individual sighted must cease.	Prior to construction	Effective	None
Waterways and water quality	No work is to be carried out within any of the waterways within the road reserve	During construction	Proven	None
	Aquatic habitat will be protected in accordance with Guide 10: Aquatic habitats and riparian zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects (RTA 2011) and Section 3.3.2 Standard precautions and mitigation measures of the Policy and guidelines for fish habitat conservation and management Update 2013 (DPI (Fisheries NSW) 2013).	During construction	Effective	None
Weeds	Declared priority weeds are to be managed according to requirements under the Biosecurity Act, 2015 and Guide 6 (Weed Management) of the Roads and Maritime Services Biodiversity Guidelines 2011	During construction	Proven	None

8. Conclusion

This assessment has confirmed that the study area is highly variable given that the proposal traverses three bioregions, and dozens of Mitchell landscapes regions. Combined with portions of the proposal occurring within highly modified agricultural landscapes, the plant community types (PCT) are also extensive. Field surveys identified 29 plant community types (PCT) as well as native tree plantings and areas of existing formation/highly disturbed/cleared land dominated by exotic flora. Threatened and migratory fauna species as well as threatened ecological communities are also known to occur within the road reserve.

The proposal was likely to have a significant impact for Pine Donkey Orchid. Modification of the proposal was required in some areas to avoid a significant impact. This section has now been removed from the proposed work scope. For the threatened biota that are known to or have a moderate to high likelihood of occurring within the study area, and therefore, be impacted by the proposal, significance assessments in accordance with the BC Act, FM Act and EPBC Act were completed. These concluded that the proposal is unlikely to have a significant impact on any threatened biota. Therefore, a species impact statement or a referral to the Commonwealth is not required.

Mitigation measures have been recommended to minimise and mitigate impacts from the proposal, particular for the nationally threatened Superb Parrot, *Santalum murrayanum*, Pine Donkey Orchid, Koala and other threatened species. Overall, the measures aim to mitigate impacts to threatened species, threatened fauna species habitat and habitat features, and other potential impacts identified by this BA.

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Annexure A

Species recorded

Recorded flora

Scientific name	Common name
<i>Acacia acinacea</i>	Gold-dust Wattle
<i>Acacia burkittii</i>	Sand Hill Wattle
<i>Acacia buxifolia</i> subsp. <i>buxifolia</i>	Box-leaf Wattle
<i>Acacia colletioides</i>	Wait-a-while
<i>Acacia dealbata</i>	Silver Wattle
<i>Acacia deanei</i>	Deane's Wattle
<i>Acacia decora</i>	Western Silver Wattle
<i>Acacia hakeoides</i>	Hakea Wattle
<i>Acacia homalophylla</i>	Yarran
<i>Acacia implexa</i>	Hickory Wattle
<i>Acacia melvillei</i>	Yarran
<i>Acacia oswaldii</i>	Miljee
<i>Acacia paradoxa</i>	Kangaroo Thorn
<i>Acacia pendula</i>	Weeping Myall
<i>Acacia pycnantha</i>	Golden Wattle
<i>Acacia salicina</i>	Cooba
<i>Acacia stenophylla</i>	River Cooba
<i>Acacia verniciflua</i>	Varnish Wattle
<i>Acacia victoriae</i>	Prickly Wattle
<i>Actinobole uliginosum</i>	Flannel Cudweed
* <i>Agave americana</i>	Century Plant
<i>Ajuga australis</i>	Austral Bugle
<i>Alectryon oleifolius</i>	Western Rosewood
<i>Allocasuarina luehmannii</i>	Bulloak

Scientific name	Common name
<i>Alternanthera denticulata</i>	Lesser Joyweed
<i>Alternanthera nana</i>	Hairy Joyweed
* <i>Amaranthus sp.</i>	pigweed
<i>Amyema linophyllum</i>	A Mistletoe
<i>Amyema miquelii</i>	Box Mistletoe
<i>Amyema miraculosum</i>	Fleshy Mistletoe
<i>Amyema quandang</i>	Grey Mistletoe
<i>Apophyllum anomalum</i>	Warrior bush
<i>Aristida behriana</i>	Bunch Wiregrass
<i>Aristida jerichoensis</i>	Jericho Wiregrass
<i>Aristida ramosa</i>	Purple Wiregrass
<i>Arthropodium minus</i>	Small Vanilla-lily
<i>Asperula conferta</i>	Common Woodruff
<i>Asperula gemella</i>	Twin-leaved Bedstraw
* <i>Asphodelus fistulosus</i>	Onion Weed
<i>Atriplex holocarpa</i>	Pop Saltbush
<i>Atriplex leptocarpa</i>	Slender-fruit Saltbush
<i>Atriplex lindleyi</i>	Eastern Flat-top Saltbush
<i>Atriplex nummularia</i>	Old Man Saltbush
<i>Atriplex semibaccata</i>	Creeping Saltbush
<i>Atriplex spongiosa</i>	Pop Saltbush
<i>Atriplex stipitata</i>	Mallee Saltbush
<i>Atriplex vesicaria</i>	Bladder Saltbush
<i>Austrostipa aristiglumis</i>	Plains Grass
<i>Austrostipa bigeniculata</i>	Kneed Spear-grass

Scientific name	Common name
<i>Austrostipa densiflora</i>	Fox-tail Spear-grass
<i>Austrostipa elegantissima</i>	Feather Speargrass
<i>Austrostipa nitida</i>	Balcarra Grass
<i>Austrostipa nodosa</i>	Knotty Spear-grass
<i>Austrostipa scabra</i>	Speargrass
<i>Austrostipa verticillata</i>	Slender Bamboo Grass
* <i>Avena fatua</i>	Wild oats
<i>Azolla filiculoides</i>	Pacific Azolla
<i>Boerhavia dominii</i>	Tarvine
<i>Bothriochloa macra</i>	Red-leg grass
<i>Brachychiton populneus</i>	Kurrajong
<i>Brachyscome ciliaris</i>	Variable Daisy
<i>Brachyscome multifida</i>	Cut-leaf Daisy
* <i>Brassica fruticulosa</i>	Twiggy Turnip
* <i>Brassica rapa</i>	Wild Turnip
<i>Bulbine bulbosa</i>	Bulbine Lily
<i>Bulbine semibarbata</i>	Wild Onion
<i>Bursaria spinosa</i>	Sweet Busaria
<i>Calandrinia eremaea</i>	Small Purslane
<i>Calandrinia volubilis</i>	Twining Pursane
<i>Callitris glaucophylla</i>	White Cypress Pine
<i>Callitris verrucosa</i>	Mallee Pine
<i>Calocephalus sonderi</i>	Pale Beauty-heads
<i>Calostemma purpureum</i>	Garland Lily
<i>Calotis cuneifolia</i>	Purple Burr-Daisy

Scientific name	Common name
<i>Calotis erinacea</i>	Tangled Burr-daisy
<i>Calotis hispidula</i>	Bogan Flea
<i>Calytrix tetragona</i>	Common Fringe-myrtle
<i>Capparis lasiantha</i>	Nepine
* <i>Capsella bursa-pastoris</i>	Shepherd's Purse
<i>Carex gaudichaudiana</i>	Fen Sedge
<i>Carex inversa</i>	Knob Sedge
<i>Carex tereticaulis</i>	Rush Sedge
* <i>Carrichtera annua</i>	Ward's Weed
* <i>Carthamus lanatus</i>	Saffron thistle
<i>Cassinia aculeata</i>	Dolly Bush
<i>Casuarina cristata</i>	Belah
<i>Casuarina pauper</i>	Black Oak
* <i>Centaureum erythraea</i>	Common Centaury
<i>Centipeda cunninghamii</i>	Common Sneezeweed
<i>Centipeda minima var. minima</i>	Spreading Sneezeweed
<i>Chamaesyce drummondii</i>	Caustic Weed
<i>Cheilanthes austrotenuifolia</i>	Rock Fern
<i>Cheilanthes sieberi subsp. sieberi</i>	Mulga Fern
<i>Chenopodium auricomiforme</i>	
<i>Chenopodium cristatum</i>	Crested Goosfoot
<i>Chenopodium curvispicatum</i>	Cottony Saltbush
<i>Chenopodium desertorum</i>	Desert Goosefoot
<i>Chenopodium nitrariaceum</i>	Nitre Goosefoot
<i>Chenopodium pumilio</i>	Small Crumbweed

Scientific name	Common name
* <i>Chloris gayana</i>	Rhodes Grass
<i>Chloris truncata</i>	Windmill Grass
* <i>Chondrilla juncea</i>	Skeleton weed
<i>Chrysocephalum apiculatum</i>	Common Everlasting
* <i>Citrullus amarus</i>	Camel Melon
<i>Convolvulus erubescens</i>	Blushing Bindweed
<i>Convolvulus graminetinus</i>	A Bindweed
* <i>Conyza bonariensis</i>	Flaxleaf Fleabane
<i>Corymbia citriodora (Planted)</i>	Lemon-scented Gum
<i>Cotula australis</i>	Carrot Weed
<i>Crassula colorata</i>	Dense Crassula
<i>Crassula decumbens var. decumbens</i>	Spreading Crassula
<i>Crassula sieberiana subsp. sieberiana</i>	Australian Stonecrop
<i>Crinum flaccidum</i>	Darling Lily
<i>Cymbopogon refractus</i>	Barbed Wire Grass
<i>Cyperus bifax</i>	Downs Nutgrass
<i>Cyperus exaltatus</i>	Tall Flat-sedge
<i>Cyperus gymnocaulos</i>	Spiny Flatsedge
<i>Damasonium minus</i>	Starfruit
* <i>Datura innoxia</i>	Downy Thornapple
<i>Daucus glochidiatus</i>	Native Carrot
<i>Dianella revoluta</i>	Blue Flax-lily
<i>Dichelachne crinita</i>	Plume grass
<i>Dichondra sp.</i>	
<i>Dichopogon strictus</i>	Chocolate Lily

Scientific name	Common name
<i>Dissocarpus biflorus</i>	Twin-flower Saltbush
<i>Dissocarpus paradoxus</i>	Cannonball Burr
<i>Dodonaea viscosa subsp. angustissima</i>	Narrow-leaf Hop-bush
<i>Dodonaea viscosa subsp. cuneata</i>	Wedge-leaf Hop-bush
* <i>Echium plantagineum</i>	Pattersons curse
<i>Einadia nutans</i>	Climbing Saltbush
<i>Eleocharis acuta</i>	Common Spikerush
<i>Elymus scaber var. scaber</i>	Wheatgrass
<i>Enchylaena tomentosa</i>	Ruby Saltbush
<i>Enneapogon avenaceus</i>	Bottle Washers
<i>Enneapogon gracilis</i>	Slender Nineawn
<i>Enneapogon nigricans</i>	Niggerheads
<i>Enteropogon ramosus</i>	Curly Windmill Grass
<i>Epilobium billardioreanum subsp. cinereum</i>	Willow Herb
<i>Eragrostis australasica</i>	Canegrass
* <i>Eragrostis curvula</i>	African lovegrass
<i>Eragrostis dielsii</i>	Mallee Lovegrass
<i>Eremophila deserti</i>	Turkeybush
<i>Eremophila glabra</i>	Tar Bush
<i>Eremophila longifolia</i>	Emubush
<i>Eremophila sturtii</i>	Turpentine Bush
<i>Erodium crinitum</i>	Blue Crowfoot
<i>Eryngium ovinum</i>	Blue Devil
<i>Eucalyptus albens</i>	White Box

Scientific name	Common name
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum
<i>Eucalyptus camaldulensis</i>	River Red Gum
<i>Eucalyptus conica</i>	Fuzzy Box
<i>Eucalyptus costata</i>	Ridge-fruited Mallee
<i>Eucalyptus dumosa</i>	White Mallee
<i>Eucalyptus gracilis</i>	Yorrell
<i>Eucalyptus largiflorens</i>	Black Box
<i>Eucalyptus leptophylla</i>	Narrow-leaved Red Mallee
<i>Eucalyptus melliodora</i>	Yellow Box
<i>Eucalyptus microcarpa</i>	Grey Box
<i>Eucalyptus oleosa</i>	Red Mallee
<i>Eucalyptus socialis</i>	Red Mallee
<i>Euchiton sphaericus</i>	Star Cudweed
* <i>Euphorbia prostrata</i>	Red Caustic Weed
<i>Exocarpos aphyllus</i>	Leafless Ballart
* <i>Foeniculum vulgare</i>	Fennel
<i>Frankenia connata</i>	Clustered Sea-heath
* <i>Fumaria officinalis</i>	Common fumitory
<i>Geijera parviflora</i>	Wilga
<i>Geranium solanderi</i>	Native Geranium
* <i>Gibasis pellucida</i>	Tahitian Bridal Veil
<i>Glinus lotoides</i>	Hairy Carpet-weed
<i>Glossocardia bidens</i>	Cobbler's Tack
<i>Glycine clandestina</i>	Twining Glycine
<i>Glycine tabacina</i>	Variable Glycine

Scientific name	Common name
<i>Goodenia fascicularis</i>	Mallee Goodenia
<i>Hakea leucoptera</i>	Needlewood
<i>Hakea sp. (Planted)</i>	A Hakea
<i>Hakea tephrosperma</i>	Hooked Needlewood
* <i>Helianthus tuberosus</i>	Jerusalem Artichoke
* <i>Heliotropium europaeum</i>	Potato Weed
* <i>Heliotropium supinum</i>	Prostrate Heliotrope
<i>Hibbertia obtusifolia</i>	Hoary Guinea Flower
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort
* <i>Hypericum perforatum</i>	St. Johns Wort
<i>Imperata cylindrica</i>	Blady grass
* <i>Jacaranda mimosifolia</i>	Jacaranda
<i>Juncus sp.</i>	A Juncus
* <i>Lactuca serriola</i>	Prickly lettuce
<i>Leiocarpa leptolepis</i>	Pale Plover-daisy
<i>Leiocarpa panaetioides</i>	Wooly Buttons
* <i>Lepidium africanum</i>	Common Peppercross
<i>Lepidium pseudohyssopifolium</i>	Peppercross
<i>Lomandra effusa</i>	Scented Mat-rush
<i>Lomandra filiformis subsp. coriacea</i>	Wattle Mat-rush
<i>Lomandra leucocephala subsp. leucocephala</i>	Woolly Mat-rush
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush
<i>Ludwigia peploides subsp. montevidensis</i>	Water Primrose
<i>Lycium australe</i>	Australian Boxthorn

Scientific name	Common name
<i>*Lycium ferocissimum</i>	African boxthorn
<i>Lysiana exocarpis</i>	Harlequin Mistletoe
<i>Maireana aphylla</i>	Cotton Bush
<i>Maireana appressa</i>	Pale-fruit Bluebush
<i>Maireana brevifolia</i>	Small-leaf Bluebush
<i>Maireana decalvans</i>	Black Cotton Bush
<i>Maireana enchylaenoides</i>	Wingless Fissure-weed
<i>Maireana georgei</i>	Slit-wing Bluebush
<i>Maireana integra</i>	Entire-wing Bluebush
<i>Maireana microphylla</i>	Small-leaf Bluebush
<i>Maireana pentagona</i>	Hairy Bluebush
<i>Maireana pentatropis</i>	Erect Mallee Bluebush
<i>Maireana pyramidata</i>	Black Bluebush
<i>Maireana sclerolaenoides</i>	Woolly-fruit Copperburr
<i>Maireana sedifolia</i>	Pearl Bluebush
<i>Maireana triptera</i>	Three-wing Bluebush
<i>Maireana turbinata</i>	Satiny Bluebush
<i>*Malva parviflora</i>	Small-flowered mallow
<i>Marsilea drummondii</i>	Common Nardoo
<i>*Melia azedarach</i>	White Cedar
<i>Mesembryanthemum crystallinum</i>	Common ice Plant
<i>Microlaena stipoides</i>	Weeping Grass
<i>Minuria cunninghamii</i>	Bush Minuria
<i>Muehlenbeckia florulenta</i>	Lignum
<i>Myoporum montanum</i>	Western Boobialla

Scientific name	Common name
<i>Myoporum platycarpum</i>	Sugarwood
<i>Myriocephalus rhizocephalus</i>	Woolly-heads
* <i>Nicotiana glauca</i>	Tree Tobacco
<i>Nitraria billardierei</i>	Dillon Bush
* <i>Opuntia sp.</i>	Prickly pear
<i>Oxalis perennans</i>	Grassland Wood-sorrel
<i>Pachycornia triandra</i>	Desert Glsswort
<i>Pandorea pandorana</i>	Wonga Vine
<i>Panicum decompositum</i>	Native Millet
<i>Panicum effusum</i>	Hairy Panic
<i>Panicum simile</i>	Two-colour Panic
<i>Paspalidium constrictum</i>	Knottybutt Grass
<i>Paspalidium distans</i>	Shotgrass
<i>Paspalidium jubiflorum</i>	Warrego Grass
* <i>Paspalum dilatatum</i>	Paspalum
<i>Persicaria prostrata</i>	Creeping Knotweed
* <i>Phalaris aquatica</i>	Phalaris
* <i>Phalaris paradoxa</i>	Paradoxa Grass
<i>Phlegmatospermum cochlearinum</i>	Oval-podded Cress
* <i>Photinia serratifolia</i>	Chinese photinia
* <i>Phytolacca octandra</i>	Ink weed
<i>Picris squarrosa</i>	Squat Picris
* <i>Pinus sp.</i>	A Pine Tree
<i>Pittosporum angustifolium</i>	Butterbush
* <i>Plantago lanceolata</i>	Ribwort

Scientific name	Common name
<i>Plantago cunninghamii</i>	Sago-weed
<i>Plantago debilis</i>	Shade Plantain
<i>Plantago drummondii</i>	Dark Sago-weed
<i>Plantago varia</i>	Variable Plantain
* <i>Poa annua</i>	Winter Grass
<i>Poa fordeana</i>	Sweet Swamp-grass
<i>Poa sieberiana</i>	Blue Tussock Grass
<i>Podolepis capillaris</i>	Invisible Plant
<i>Ptilotus exaltatus</i> var. <i>exaltatus</i>	Tall Mulla Mulla
<i>Ptilotus obovatus</i>	Smoke Bush
<i>Pycnosorus pleiocephalus</i>	Soft Billy Buttons
<i>Ranunculus inundatus</i>	River Buttercup
<i>Ranunculus undosus</i>	Swamp Buttercup
<i>Rhagodia spinescens</i>	Thorny Saltbush
<i>Rhodanthe floribunda</i>	Common White Sunray
<i>Roepera apiculata</i>	Common Twinleaf
<i>Roepera aurantiaca</i>	Shrubby Twinleaf
<i>Roepera confluens</i>	Scrambling Twinleaf
<i>Roepera glauca</i>	Pale Twinleaf
<i>Roepera iodocarpa</i>	Violet Twinleaf
* <i>Romulea rosea</i>	Onion Grass
<i>Rumex Brownii</i>	Swamp Dock
* <i>Rumex crispus</i>	Curled Dock
<i>Rumex dumosus</i>	Wiry Dock
<i>Rumex tenax</i>	Shiny Dock

Scientific name	Common name
<i>Rytidosperma auriculatum</i>	Lobed Wallaby Grass
<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass
<i>Rytidosperma setaceum</i>	Small-flowered Wallaby-grass
<i>Salsola tragus subsp. tragus</i>	Buckbush
* <i>Salvia verbenaca</i>	Wild sage
<i>Santalum acuminatum</i>	Sweet Quandong
<i>Santalum lanceolatum</i>	Northern Sandlewood
<i>Santalum murrayanum</i>	Bitter Quandong
* <i>Schinus molle</i>	Pepper Tree
<i>Scleroblitum atriplicinum</i>	Purple Goosefoot
<i>Sclerolaena bicornis var. bicornis</i>	Goathead Burr
<i>Sclerolaena brachyptera</i>	Short-winged Copperburr
<i>Sclerolaena diacantha</i>	Grey Cpperburr
<i>Sclerolaena divaricata</i>	Tangled Copperburr
<i>Sclerolaena eriacantha</i>	Silky Copperburr
<i>Sclerolaena intricata</i>	Poverty Bush
<i>Sclerolaena muricata</i>	Black Rolypoly
<i>Sclerolaena parviflora</i>	Small-flower Saltbush
<i>Sclerolaena tricuspis</i>	Giant Redburr
<i>Senecio cunninghamii</i>	Bushy Groundsel
<i>Senecio pinnatifolius</i>	Variable Groundsel
<i>Senecio quadridentatus</i>	Cotton fireweed
<i>Senecio runcinifolius</i>	Tall Groundsel
<i>Senna form taxon 'artemisioides'</i>	Silver Cassia
<i>Senna form taxon 'petiolaris'</i>	Woody Cassia

Scientific name	Common name
<i>Sida corrugata</i>	Corrugated Side
<i>Sida intricata</i>	Twiggy Sida
<i>Sida trichopoda</i>	High Sida
* <i>Silybum marianum</i>	Varigated thistle
* <i>Sisymbrium erysimoides</i>	Smooth Mustard
<i>Solanum esuriale</i>	Quena
<i>Solanum ferocissimum</i>	Spiny Potato Bush
* <i>Solanum nigrum</i>	Black-berry Nightshade
* <i>Sonchus ciliaris</i>	Common Sowthistle
<i>Sporobolus sp.</i>	Fairy Grass
<i>Stellaria angustifolia</i>	Swamp Starwort
<i>Swainsona swainsonioides</i>	Downy Swainson-pea
<i>Tecticornia tenuis</i>	Slender Samphire
<i>Templetonia egena</i>	Desert Broombush
<i>Tetragonia tetragonioides</i>	New Zealand Spinach
<i>Themeda triandra</i>	Kangaroo Grass
<i>Thysanotus tuberosus</i>	Common Fringe-lily
<i>Tragus australianus</i>	Small Burrgrass
* <i>Tribulus terrestris</i>	Cat-head
* <i>Trifolium angustifolium</i>	Narrow-leaved Clover
<i>Triglochin procerum</i>	Water Ribbons
<i>Triodia scariosa subsp. scariosa</i>	Porcupine Grass
* <i>Verbena bonariensis</i>	Purple top
<i>Vittadinia cuneata</i>	Fuzzweed
<i>Vittadinia gracilis</i>	Woolly New Holland Daisy

Scientific name	Common name
<i>Wahlenbergia communis</i>	Tufted Bluebell
<i>Wahlenbergia fluminalis</i>	River Bluebell
<i>Xerochrysum viscosum</i>	Sticky Everlasting
* <i>Yucca sp.</i>	Yucca

Recorded fauna

Taxa/Fauna group	Scientific Name	Common name	Status	
			BC Act	EPBC Act
Aves	<i>Rhipidura leucophrys</i>	Willie Wagtail	-	-
Aves	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill	-	-
Aves	<i>Eolophus roseicapillus</i>	Galah	-	-
Aves	<i>Cacatua galerita</i>	Sulphur-crested Cockatoo	-	-
Aves	<i>Cacatua sanguinea</i>	Little Corella	-	-
Aves	<i>Colluricincla harmonica</i>	Grey-shrike Thrush	-	-
Aves	<i>Malurus cyaneus</i>	Superb Fairy-wren	-	-
Aves	<i>Cracticus tibicen</i>	Australian Magpie	-	-
Aves	<i>Falcon cehcrioides</i>	Nankeen Kestrel	-	-
Aves	<i>Graillina cyanoleuca</i>	Magpie-lark	-	-
Aves	<i>Hirundo neoxena</i>	Welcome Swallow	-	-
Aves	<i>Merops ornatus</i>	Rainbow Bee-eater	-	M
Aves	<i>Microeaca fascinans</i>	Jacky Winter	-	-
Aves	<i>Myiagra inquieta</i>	Restless Flycatcher	-	-
Aves	<i>Pardalotus punctatus</i>	Spotted Pardalote	-	-
Aves	<i>Pardalotus striatus</i>	Striated Pardalote	-	-
Aves	<i>Platycercus elegans</i>	Crimson Rosella (yellow form)	-	-
Aves	<i>Polytelis swainsonii</i>	Superb Parrot	V	V
Aves	<i>Psephotus haematonotus</i>	Red-rumped Parrot	-	-

Taxa/Fauna group	Scientific Name	Common name	Status	
			BC Act	EPBC Act
Aves	<i>Anthochaera carunculata</i>	Red Wattlebird	-	-
Aves	<i>Corvus coronoides</i>	Australian Raven	-	-
Aves	<i>Platycercus eximius</i>	Eastern Rosella	-	-
Aves	<i>Sturnus vulgaris</i>	Common Starling	-	-
Aves	<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater	-	-
Reptilia	<i>Morethia boulengeri</i>	Boulengers Skink	-	-
Reptilia	<i>Christinus marmoratus</i>	Marbled Southern Gecko	-	-
Reptilia	<i>Cryptoblepharus pannosus</i>	Ragged snake-eyed skink	-	-
Reptilia	<i>Pseudonaja textilis</i>	Eastern Brown Snake	-	-
Mammalia	<i>Macropus giganteus</i>	Eastern Grey Kangaroo	-	-
Mammalia	<i>Trichosurus vulpecula</i>	Brushtail Possum	-	-
Mammalia	<i>Austronomus australis</i>	White-striped Freetail Bat	-	-
Mammalia	<i>Chalinolobus gouldii</i>	Goulds Wattled Bat	-	-
Mammalia	<i>Mormopterus ridei</i>	Eastern Freetail Bat	-	-
Mammalia	<i>Vespadelus darlingtoni</i>	Large Forest Bat	-	-
Mammalia	<i>Vespadelus vulturnus</i>	Little Forest Bat	-	-
Mammalia	<i>Vespadelus regulus</i>	Southern Forest Bat	-	-
Amphibia	<i>Litoria peronii</i>	Peron's Tree Frog	-	-
Amphibia	<i>Crinia signifera</i>	Eastern Froglet	-	-
Amphibia	<i>Limnodynastes tasmaniensis</i>	Spotted Marsh Frog	-	-

Annexure B

Hollow-bearing tree data

HBT within 10 metres of the existing edge line (MGA55) (bold is to be removed)

Section no/ HBT no	Section	Easting MGA55	Northing MGA55
s1 1	s1	458298	6152938
s1 2	s1	458279	6152925
s1 3	s1	458312	6152913
s1 4	s1	458380	6152801
s1 5	s1	458448	6152726
s1 6	s1	458461	6152713
s1 7	s1	458463	6152684
s1 8	s1	458472	6152674
s1 9	s1	458501	6152673
s1 10	s1	458640	6152535
s1 11	s1	459076	6152105
s1 12	s1	459307	6151846
s1 13	s1	460142	6151001
s1 14	s1	460345	6149958
s1 15	s1	460350	6149950
s1 16	s1	460341	6149932
s1 17	s1	460357	6149914
s1 18	s1	460377	6149919
s1 19	s1	460455	6149817
s1 20	s1	460456	6149782
s1 21	s1	460480	6149781
s1 22	s1	460496	6149762
s1 23	s1	460703	6149496
s1 24	s1	460746	6149439

Section no/ HBT no	Section	Easting MGA55	Northing MGA55
s1 25	s1	460894	6149249
s1 26	s1	460877	6149239
s1 27	s1	461136	6148932
s1 28	s1	461366	6148635
s1 29	s1	461418	6148553
s1 30	s1	461441	6148459
s1 31	s1	461488	6148404
s1 32	s1	461493	6148387
s1 33	s1	461711	6147696
s1 34	s1	461984	6147249
s1 35	s1	461960	6147254
s1 36	s1	462224	6146676
s1 37	s1	462280	6146238
s1 38	s1	462369	6145935
s1 39	s1	462456	6145610
s1 40	s1	462666	6144976
s1 41	s1	462984	6144277
s1 42	s1	465584	6137748
s1 43	s1	465753	6137376
s1 44	s1	465830	6137250
s1 45	s1	465834	6137243
s1 46	s1	465920	6137100
s1 47	s1	465953	6137083
s1 48	s1	466000	6136974
s1 49	s1	466027	6136928

Section no/ HBT no	Section	Easting MGA55	Northing MGA55
s1 50	s1	466064	6136869
s1 51	s1	466189	6136718
s1 52	s1	466546	6136415
s1 53	s1	467172	6135895
s1 54	s1	467379	6135765
s1 55	s1	467601	6135705
s1 56	s1	467862	6135673
s1 57	s1	469461	6134118
s1 58	s1	469667	6133877
s1 59	s1	469794	6133697
s1 60	s1	469803	6133657
s1 61	s1	469845	6133627
s1 62	s1	469869	6133592
s1 63	s1	469975	6133446
s1 64	s1	469969	6133422
s1 65	s1	470019	6133381
s1 66	s1	470001	6133374
s1 67	s1	470034	6133360
s1 68	s1	470046	6133342
s1 69	s1	470046	6133317
s1 70	s1	470096	6133274
s1 71	s1	470122	6133235
s1 72	s1	470191	6133107
s1 73	s1	470219	6133097
s1 74	s1	470248	6133058

Section no/ HBT no	Section	Easting MGA55	Northing MGA55
s1 75	s1	470364	6132895
s1 76	s1	470380	6132842
s1 77	s1	470446	6132784
s1 78	s1	470497	6132704
s1 79	s1	470465	6132721
s1 80	s1	471097	6132297
s1 81	s1	471156	6132279
s1 82	s1	473500	6130618
s1 83	s1	473553	6130579
s1 84	s1	473773	6130421
s1 85	s1	476152	6128550
s1 86	s1	489627	6126544
s1 87	s1	490101	6126309
s1 88	s1	490117	6126302
s1 89	s1	490106	6126306
s1 90	s1	490195	6126268
s1 91	s1	490359	6126193
s1 92	s1	490441	6126154
s1 93	s1	490468	6126164
s1 94	s1	490996	6125873
s1 95	s1	491023	6125859
s1 96	s1	491014	6125840
s1 97	s1	491077	6125804
s1 98	s1	491087	6125824
s1 99	s1	491080	6125827

Section no/ HBT no	Section	Easting MGA55	Northing MGA55
s1 100	s1	491295	6125685
s1 101	s1	491464	6125593
s1 102	s1	491544	6125546
s1 103	s1	492017	6125289
s1 104	s1	492346	6125127
s1 105	s1	492360	6125119
s1 106	s1	492517	6125014
s1 107	s1	492510	6125019
s1 108	s1	492505	6125020
s1 109	s1	492921	6124833
s1 110	s1	495806	6123871
s1 111	s1	495831	6123861
s1 112	s1	495839	6123859
s1 113	s1	495968	6123800
s1 114	s1	496590	6123513
s1 115	s1	496709	6123471
s1 116	s1	496769	6123440
s1 117	s1	496862	6123389
s1 118	s1	496897	6123371
s1 119	s1	496987	6123303
s1 120	s1	497275	6123149
s1 121	s1	497284	6123163
s1 122	s1	497312	6123128
s1 123	s1	497320	6123124
s1 124	s1	497376	6123116

Section no/ HBT no	Section	Easting MGA55	Northing MGA55
s1 125	s1	497438	6123085
s1 126	s1	497497	6123032
s1 127	s1	498505	6122513
s1 128	s1	498544	6122471
s1 129	s1	499894	6121782
s1 130	s1	500412	6121507
s1 131	s1	501050	6121168
s1 132	s1	501203	6121084
s1 133	s1	501828	6120741
s1 134	s1	502173	6120616
s1 135	s1	502297	6120594
s1 136	s1	502528	6120555
s1 137	s1	502705	6120546
s1 138	s1	502761	6120533
s1 139	s1	502757	6120517
s1 140	s1	502773	6120533
s1 141	s1	503250	6120433
s1 142	s1	503263	6120431
s1 143	s1	503354	6120435
s1 144	s1	503434	6120420
s1 145	s1	503767	6120364
s1 146	s1	503774	6120363
s1 147	s1	503941	6120335
s1 148	s1	504016	6120302
s1 149	s1	503986	6120308

Section no/ HBT no	Section	Easting MGA55	Northing MGA55
s1 150	s1	504132	6120286
s1 151	s1	504175	6120277
s1 152	s1	504202	6120273
s1 153	s1	504224	6120269
s1 154	s1	504506	6120242
s1 155	s1	504624	6120203
s1 156	s1	504635	6120200
s1 157	s1	506631	6119777
s1 158	s1	508994	6118122
s1 159	s1	509961	6118151
s1 160	s1	511191	6117516
s1 162	s1	512203	6116994
s1 163	s1	512190	6117000
s1 164	s1	512224	6117013
s1 165	s1	512227	6116987
s1 166	s1	512312	6116959
s1 167	s1	512301	6116959
s1 168	s1	512345	6116952
s1 169	s1	512450	6116917
s1 170	s1	512462	6116917
s1 171	s1	512502	6116906
s1 172	s1	512588	6116875
s1 173	s1	512691	6116844
s1 174	s1	512864	6116790
s1 175	s1	512968	6116753

Section no/ HBT no	Section	Easting MGA55	Northing MGA55
s1 176	s1	513078	6116716
s1 177	s1	513114	6116733
s1 178	s1	513156	6116689
s1 179	s1	513394	6116617
s1 180	s1	513539	6116569
s1 181	s1	513550	6116592
s1 182	s1	513628	6116539
s1 183	s1	513645	6116561
s1 184	s1	513703	6116518
s1 185	s1	513766	6116499
s1 186	s1	513798	6116512
s1 187	s1	513827	6116479
s1 188	s1	513829	6116501
s1 189	s1	513862	6116491
s1 190	s1	513853	6116468
s1 191	s1	513936	6116468
s1 192	s1	513925	6116447
s1 193	s1	513965	6116438
s1 194	s1	514055	6116406
s1 195	s1	514109	6116389
s1 196	s1	514116	6116387
s1 197	s1	514220	6116379
s1 198	s1	514352	6116311
s1 199	s1	514413	6116297
s1 200	s1	514410	6116287

Section no/ HBT no	Section	Easting MGA55	Northing MGA55
s1 201	s1	514440	6116280
s1 202	s1	514526	6116253
s1 203	s1	514603	6116232
s1 204	s1	514647	6116242
s1 205	s1	514689	6116206
s1 206	s1	514725	6116217
s1 207	s1	514808	6116162
s1 208	s1	514876	6116145
s1 209	s1	514897	6116162
s1 210	s1	514913	6116129
s1 211	s1	514986	6116107
s1 212	s1	515069	6116084
s1 213	s1	515220	6116028
s1 214	s1	515494	6115943
s1 215	s1	515774	6115857
s1 216	s1	515812	6115868
s1 217	s1	516077	6115761
s1 218	s1	516443	6115644
s1 219	s1	516453	6115641
s1 220	s1	516857	6115514
s1 221	s1	517278	6115409
s1 222	s1	517180	6115412
s1 223	s1	517353	6115360
s1 224	s1	517462	6115346
s1 225	s1	517523	6115331

Section no/ HBT no	Section	Easting MGA55	Northing MGA55
s1 226	s1	517899	6115250
s1 227	s1	517968	6115245
s1 228	s1	518146	6115234
s1 229	s1	518452	6115204
s1 230	s1	518523	6115197
s1 231	s1	519410	6115101
s1 232	s1	520913	6114574
s1 233	s1	522728	6114168
s1 234	s1	523438	6114174
s1 235	s1	523549	6114209
s1 236	s1	523892	6114569
s1 237	s1	524036	6114669
s1 238	s1	524166	6114761
s1 239	s1	524165	6114787
s1 240	s1	524243	6114815
s1 241	s1	524301	6114861
s1 242	s1	524294	6114856
s1 243	s1	524624	6114948
s1 244	s1	524891	6114940
s1 245	s1	524935	6114911
s1 246	s1	524933	6114935
s1 247	s1	525072	6114895
s1 248	s1	525033	6114898
s1 249	s1	525284	6114866
s1 250	s1	525358	6114877

Section no/ HBT no	Section	Easting MGA55	Northing MGA55
s1 251	s1	525439	6114858
s1 252	s1	525462	6114854
s1 253	s1	525472	6114851
s1 254	s1	525484	6114848
s1 255	s1	526021	6114640
s1 256	s1	526043	6114632
s2 1	s2	304135	6177999
s2 2	s2	304938	6178042
s2 3	s2	314864	6180537
s2 4	s2	316438	6181291
s2 5	s2	334247	6180064
s2 6	s2	380981	6178926
s2 7	s2	381030	6178886
s2 8	s2	382189	6178038
s2 9	s2	382273	6177890
s2 10	s2	386054	6175355
s2 11	s2	386633	6174911
s2 12	s2	386645	6174902
s2 13	s2	386657	6174893
s2 14	s2	386703	6174860
s2 15	s2	386726	6174843
s2 16	s2	387221	6174464
s2 17	s2	387256	6174463
s2 18	s2	387283	6174444
s2 19	s2	389302	6173506

Section no/ HBT no	Section	Easting MGA55	Northing MGA55
s2 20	s2	393499	6170775
s2 21	s2	393720	6170724
s2 22	s2	394015	6170603
s2 23	s2	393997	6170608
s2 24	s2	396454	6170567
s2 25	s2	407802	6171231
s2 26	s2	407821	6171207
s2 27	s2	407831	6171196
s2 28	s2	407874	6171145
s2 29	s2	407894	6171154
s2 30	s2	407886	6171133
s2 31	s2	407930	6171112
s2 32	s2	411383	6168652
s2 33	s2	411572	6168751
s2 34	s2	411583	6168756
s2 35	s2	412908	6169169
s2 36	s2	413416	6169045
s2 37	s2	413514	6168987
s2 38	s2	413538	6168967
s2 39	s2	413580	6168962
s2 40	s2	413595	6168921
s2 41	s2	413603	6168913
s2 42	s2	413613	6168937
s2 43	s2	413612	6168905
s2 44	s2	413629	6168891

Section no/ HBT no	Section	Easting MGA55	Northing MGA55
s2 45	s2	413712	6168829
s2 46	s2	413774	6168799
s2 47	s2	413798	6168779
s2 48	s2	413906	6168690
s2 49	s2	413900	6168694
s2 50	s2	413911	6168687
s2 51	s2	414024	6168593
s2 52	s2	414081	6168518
s2 53	s2	414299	6168376
s2 54	s2	414304	6168373
s2 55	s2	414410	6168298
s2 56	s2	414427	6168315
s2 57	s2	414747	6168165
s2 58	s2	414953	6168108
s2 59	s2	414956	6168086
s2 60	s2	414972	6168080
s2 61	s2	415046	6168071
s2 62	s2	415051	6168069
s2 63	s2	415093	6168052
s2 64	s2	415153	6168029
s2 65	s2	415332	6167961
s2 66	s2	416711	6167120
s2 67	s2	417085	6166722
s2 68	s2	417355	6166485
s2 69	s2	417520	6166366

Section no/ HBT no	Section	Easting MGA55	Northing MGA55
s2 70	s2	417587	6166318
s2 71	s2	419657	6165536
s2 72	s2	419695	6165523
s2 73	s2	419710	6165519
s2 74	s2	419835	6165498
s2 75	s2	419822	6165485
s2 76	s2	420157	6165371
s2 77	s2	420162	6165370
s2 78	s2	420167	6165367
s2 79	s2	420208	6165379
s2 80	s2	427836	6162788
s2 81	s2	429170	6162580
s2 82	s2	429216	6162574
s2 83	s2	429264	6162569
s2 84	s2	430919	6162337
s2 85	s2	432251	6162182
s2 86	s2	432788	6162112
s2 87	s2	432798	6162088
s2 88	s2	432802	6162108
s2 89	s2	433475	6161988
s2 90	s2	435263	6161756
s2 91	s2	443194	6160508
s2 92	s2	443222	6160499
s2 93	s2	443401	6160412
s2 94	s2	443386	6160418

Section no/ HBT no	Section	Easting MGA55	Northing MGA55
s2 95	s2	443527	6160390
s2 96	s2	443864	6160227
s2 97	s2	444012	6160201
s2 98	s2	446700	6159128
s2 99	s2	446715	6159126
s2 100	s2	447249	6158922
s2 101	s2	447212	6158916
s2 102	s2	448546	6158011
s2 103	s2	449333	6157596
s2 104	s2	449931	6157441
s2 105	s2	450081	6157393
s2 106	s2	450070	6157399
s2 107	s2	450102	6157387
s2 108	s2	450118	6157385
s2 109	s2	452091	6156191
s3 1	s3	186324	6156989
s3 2	s3	198342	6151378
s3 3	s3	198347	6151353
s3 4	s3	198372	6151348
s3 5	s3	198397	6151374
s3 6	s3	198411	6151345
s3 7	s3	198432	6151343
s3 8	s3	198455	6151340
s3 9	s3	198546	6151330
s3 10	s3	198671	6151317

Section no/ HBT no	Section	Easting MGA55	Northing MGA55
s3 11	s3	199207	6151260
s3 12	s3	199722	6151204
s3 13	s3	293915	6177226
s3 14	s3	294053	6177246
s3 15	s3	294188	6177259
s3 16	s3	294747	6177293

Section no/ HBT no	Section	Easting MGA54	Northing MGA54
s4 1	s4	660083	6173410
s4 2	s4	664853	6177082
s4 3	s4	665004	6177176
s4 4	s4	665115	6177246
s4 5	s4	665398	6177432
s4 6	s4	665616	6177566
s4 7	s4	692257	6173535
s4 8	s4	692382	6173498
s4 9	s4	692388	6173496
s4 10	s4	692425	6173485
s4 11	s4	694783	6172751
s4 12	s4	694807	6172744
s4 13	s4	694843	6172732
s4 14	s4	694933	6172704
s4 15	s4	694939	6172704
s4 16	s4	696728	6172164

Section no/ HBT no	Section	Easting MGA54	Northing MGA54
s4 17	s4	698711	6171509
s4 18	s4	698773	6171489
s4 19	s4	701539	6170629
s4 20	s4	701532	6170631
s4 21	s4	701599	6170613
s4 22	s4	701602	6170612
s4 23	s4	701739	6170569
s4 24	s4	702099	6170460
s4 25	s4	702159	6170442
s4 26	s4	702183	6170435
s4 27	s4	703155	6170145
s4 28	s4	703181	6170137
s4 29	s4	703457	6170053
s4 30	s4	703814	6169945
s4 31	s4	703881	6169929
s4 32	s4	705790	6169360
s4 33	s4	705797	6169358
s4 34	s4	705809	6169355
s4 35	s4	705819	6169352
s4 36	s4	705815	6169353
s4 37	s4	705826	6169350
s4 38	s4	705852	6169341
s4 39	s4	705864	6169338
s4 40	s4	705876	6169336
s4 41	s4	705920	6169321

Section no/ HBT no	Section	Easting MGA54	Northing MGA54
s4 42	s4	705938	6169316
s4 43	s4	705962	6169309
s4 44	s4	705962	6169311
s4 45	s4	706019	6169293
s4 46	s4	706024	6169291
s4 47	s4	706039	6169286
s4 48	s4	706050	6169285
s4 49	s4	706053	6169283
s4 50	s4	706064	6169278
s4 51	s4	706079	6169275
s4 52	s4	706094	6169271
s4 53	s4	706106	6169268
s4 54	s4	706118	6169264
s4 55	s4	706137	6169258
s4 56	s4	706232	6169232
s4 57	s4	706237	6169230
s4 58	s4	709277	6168348
s4 59	s4	719699	6166315
s4 60	s4	720733	6166177
s4 61	s4	720760	6166177
s4 62	s4	729144	6165353
s4 63	s4	701979	6170499
s5 1	s5	616308	6207474
s5 2	s5	616500	6206891
s5 3	s5	619423	6204987

Section no/ HBT no	Section	Easting MGA54	Northing MGA54
s5 4	s5	621928	6204338
s5 5	s5	624965	6202067
s5 6	s5	624953	6202038
s5 7	s5	625008	6202039
s5 8	s5	625336	6201777
s5 9	s5	625430	6201739
s5 10	s5	626929	6201617
s5 11	s5	627851	6201529
s5 12	s5	629268	6199581
s5 13	s5	629347	6198767
s5 14	s5	629342	6198552
s5 15	s5	629352	6198481
s5 16	s5	629345	6198492
s5 17	s5	629350	6198498
s5 18	s5	629355	6198448
s5 19	s5	629411	6197936
s5 20	s5	629440	6197921
s5 21	s5	631094	6193892
s5 22	s5	633336	6190012
s5 23	s5	634286	6188891
s5 24	s5	634297	6188880
s5 25	s5	634299	6188876
s5 26	s5	634283	6188895
s5 27	s5	634428	6188747
s5 28	s5	634525	6188612

Section no/ HBT no	Section	Easting MGA54	Northing MGA54
s5 29	s5	634573	6188561
s5 30	s5	634607	6188568
s5 31	s5	636698	6187091
s5 32	s5	636761	6187090
s5 33	s5	640584	6185988
s5 34	s5	640855	6185835
s5 35	s5	641217	6185529
s5 36	s5	641314	6185380
s5 37	s5	642428	6184402
s5 38	s5	642670	6184154
s5 39	s5	642999	6183706
s5 40	s5	643063	6183603
s5 41	s5	643087	6183591
s5 42	s5	643094	6183560
s5 43	s5	643233	6183377
s5 44	s5	643411	6183114
s5 45	s5	643412	6183131
s5 46	s5	643951	6182306
s5 47	s5	644235	6181901
s5 48	s5	644622	6181426
s5 49	s5	644671	6181361
s5 50	s5	644647	6181324
s5 51	s5	644654	6181317
s5 52	s5	644670	6181292
s5 53	s5	644891	6181024

Section no/ HBT no	Section	Easting MGA54	Northing MGA54
s5 54	s5	645544	6180544
s5 55	s5	648070	6179131
s5 56	s5	651961	6176640
s5 57	s5	652431	6176460
s5 58	s5	652453	6176460
s5 59	s5	652467	6176456
s5 60	s5	652681	6176425
s5 61	s5	653091	6176455
s5 62	s5	653099	6176457
s5 63	s5	653525	6176333
s5 64	s5	653774	6176253
s5 65	s5	654914	6175869
s5 66	s5	655203	6175736
s5 67	s5	655627	6175494
s5 68	s5	655619	6175500
s5 69	s5	656123	6175216
s5 70	s5	656126	6175211

HBT More than 10 metres from the existing edge line but within the road reserve (MGA55)

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s1 1	1	s1	458205	6153036
s1 2	1	s1	458348	6152878
s1 3	1	s1	458354	6152794
s1 4	2	s1	458464	6152664
s1 5	3	s1	458509	6152682
s1 6	1	s1	458605	6152590

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s1 7	1	s1	458652	6152542
s1 8	3	s1	458735	6152464
s1 9	1	s1	458743	6152393
s1 10	3	s1	458881	6152255
s1 11	4	s1	459110	6152084
s1 12	3	s1	459091	6152047
s1 13	3	s1	459197	6152000
s1 14	2	s1	460122	6151096
s1 15	2	s1	460468	6149816
s1 16	2	s1	460454	6149767
s1 17	1	s1	460577	6149672
s1 18	2	s1	460586	6149602
s1 19	2	s1	460769	6149430
s1 20	4	s1	460797	6149323
s1 21	3	s1	460862	6149306
s1 22	1	s1	460975	6149167
s1 23	2	s1	461020	6149106
s1 24	4	s1	461044	6149005
s1 25	3	s1	461097	6148936
s1 26	3	s1	461152	6148939
s1 27	5	s1	461177	6148906
s1 28	6	s1	461148	6148872
s1 29	3	s1	461344	6148612
s1 30	4	s1	461379	6148639
s1 31	13	s1	461470	6148468
s1 32	6	s1	461430	6148449
s1 33	20	s1	461542	6148025
s1 34	20	s1	461710	6148015

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s1 35	4	s1	461590	6147873
s1 36	10	s1	461724	6147781
s1 37	2	s1	461770	6147622
s1 38	20	s1	461850	6147507
s1 39	10	s1	461951	6147371
s1 40	1	s1	462123	6147046
s1 41	1	s1	462133	6146925
s1 42	3	s1	462186	6146791
s1 43	9	s1	462232	6146787
s1 44	2	s1	462267	6146628
s1 45	3	s1	462316	6146225
s1 46	3	s1	462343	6146112
s1 47	4	s1	462422	6145809
s1 48	5	s1	462458	6145670
s1 49	4	s1	462486	6145561
s1 50	10	s1	462647	6145063
s1 51	1	s1	462702	6144914
s1 52	2	s1	462716	6144751
s1 53	2	s1	462852	6144507
s1 54	7	s1	463005	6144312
s1 55	3	s1	462972	6144241
s1 56	15	s1	463068	6144218
s1 57	2	s1	465124	6138683
s1 58	1	s1	465288	6138276
s1 59	3	s1	465470	6138001
s1 60	2	s1	465570	6137808
s1 61	1	s1	465546	6137753
s1 62	3	s1	465626	6137695

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s1 63	4	s1	465695	6137569
s1 64	2	s1	465807	6137358
s1 65	1	s1	465843	6137202
s1 66	9	s1	465991	6137051
s1 67	6	s1	465964	6137007
s1 68	5	s1	466034	6136979
s1 69	4	s1	466113	6136851
s1 70	6	s1	466093	6136793
s1 71	1	s1	466171	6136697
s1 72	1	s1	466830	6136268
s1 73	1	s1	466981	6136138
s1 74	1	s1	466961	6136087
s1 75	9	s1	467518	6135750
s1 76	6	s1	467597	6135739
s1 77	8	s1	467648	6135725
s1 78	6	s1	467747	6135656
s1 79	5	s1	467887	6135635
s1 80	2	s1	468447	6135395
s1 81	2	s1	468891	6134895
s1 82	4	s1	469002	6134763
s1 83	3	s1	468991	6134703
s1 84	1	s1	469112	6134616
s1 85	10	s1	469157	6134466
s1 86	3	s1	469358	6134239
s1 87	4	s1	469494	6134144
s1 88	4	s1	469600	6133923
s1 89	1	s1	469623	6133967
s1 90	2	s1	469648	6133846

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s1 91	5	s1	469828	6133673
s1 92	5	s1	469813	6133621
s1 93	6	s1	469861	6133550
s1 94	4	s1	469911	6133549
s1 95	7	s1	469906	6133484
s1 96	3	s1	469958	6133411
s1 97	5	s1	470068	6133259
s1 98	4	s1	470126	6133254
s1 99	4	s1	470091	6133225
s1 100	3	s1	470111	6133195
s1 101	4	s1	470185	6133164
s1 102	3	s1	470179	6133102
s1 103	3	s1	470209	6133058
s1 104	3	s1	470248	6133002
s1 105	4	s1	470307	6132992
s1 106	6	s1	470389	6132883
s1 107	4	s1	470403	6132786
s1 108	3	s1	470494	6132736
s1 109	4	s1	470449	6132724
s1 110	9	s1	470582	6132539
s1 111	6	s1	470707	6132417
s1 112	2	s1	470925	6132361
s1 113	4	s1	470963	6132302
s1 114	2	s1	471137	6132295
s1 115	5	s1	471354	6132180
s1 116	2	s1	471383	6132223
s1 117	1	s1	471948	6131772
s1 118	6	s1	471964	6131697

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s1 119	6	s1	472165	6131542
s1 120	2	s1	472230	6131566
s1 121	3	s1	472629	6131241
s1 122	2	s1	472689	6131265
s1 123	6	s1	472802	6131121
s1 124	7	s1	472905	6131105
s1 125	2	s1	472971	6130995
s1 126	2	s1	472981	6131040
s1 127	6	s1	473132	6130936
s1 128	4	s1	473242	6130850
s1 129	2	s1	473307	6130749
s1 130	4	s1	473371	6130766
s1 131	4	s1	473614	6130582
s1 132	4	s1	473762	6130469
s1 133	4	s1	473824	6130437
s1 134	3	s1	474132	6130178
s1 135	5	s1	474239	6130144
s1 136	2	s1	474693	6130037
s1 137	2	s1	474856	6129987
s1 138	2	s1	475074	6129927
s1 139	6	s1	475365	6129810
s1 140	7	s1	475442	6129649
s1 141	6	s1	475547	6129578
s1 142	9	s1	475675	6129325
s1 143	13	s1	475744	6129304
s1 144	4	s1	476176	6128615
s1 145	6	s1	476139	6128565
s1 146	2	s1	476195	6128432

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s1 147	4	s1	476260	6128465
s1 148	2	s1	476235	6128369
s1 149	3	s1	476387	6128218
s1 150	2	s1	476369	6128128
s1 151	3	s1	476502	6127884
s1 152	5	s1	476550	6127911
s1 153	6	s1	477528	6127189
s1 154	3	s1	479621	6126829
s1 155	3	s1	479793	6126870
s1 156	4	s1	479946	6126902
s1 157	6	s1	479975	6126964
s1 158	2	s1	480097	6126943
s1 159	6	s1	480163	6126997
s1 160	6	s1	480287	6126973
s1 161	4	s1	480291	6127018
s1 162	6	s1	480505	6126992
s1 163	3	s1	480505	6127055
s1 164	6	s1	480578	6126996
s1 165	3	s1	480652	6127072
s1 166	4	s1	480745	6127090
s1 167	3	s1	480833	6127035
s1 168	4	s1	480974	6127124
s1 169	4	s1	481100	6127087
s1 170	3	s1	481205	6127165
s1 171	5	s1	481235	6127109
s1 172	5	s1	481270	6127176
s1 173	7	s1	481344	6127127
s1 174	4	s1	481418	6127199

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s1 175	9	s1	481465	6127148
s1 176	3	s1	481514	6127217
s1 177	5	s1	481601	6127160
s1 178	4	s1	481645	6127234
s1 179	6	s1	481696	6127185
s1 180	5	s1	481739	6127256
s1 181	6	s1	481827	6127265
s1 182	5	s1	481901	6127214
s1 183	3	s1	482043	6127302
s1 184	4	s1	482075	6127252
s1 185	6	s1	482213	6127333
s1 186	8	s1	482302	6127286
s1 187	6	s1	482425	6127322
s1 188	3	s1	482446	6127375
s1 189	4	s1	483378	6127322
s1 190	1	s1	483398	6127250
s1 191	6	s1	484062	6126997
s1 193	4	s1	484479	6126580
s1 194	3	s1	484805	6126298
s1 195	4	s1	484872	6126228
s1 196	4	s1	484945	6126166
s1 197	3	s1	485144	6125997
s1 198	4	s1	485449	6125902
s1 199	12	s1	485816	6125841
s1 200	3	s1	486026	6125772
s1 201	1	s1	486257	6125793
s1 202	1	s1	487180	6126139
s1 203	1	s1	488457	6126324

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s1 204	1	s1	488576	6126330
s1 205	1	s1	488580	6126412
s1 206	4	s1	489268	6126681
s1 207	2	s1	489682	6126538
s1 208	2	s1	489796	6126434
s1 209	4	s1	489848	6126463
s1 210	1	s1	489949	6126367
s1 211	3	s1	490111	6126341
s1 212	4	s1	490155	6126325
s1 213	2	s1	490168	6126270
s1 214	4	s1	490246	6126280
s1 215	2	s1	490261	6126227
s1 216	7	s1	490361	6126226
s1 217	3	s1	490373	6126176
s1 218	3	s1	490570	6126123
s1 219	3	s1	490641	6126033
s1 220	4	s1	490789	6126004
s1 221	6	s1	490834	6125928
s1 222	3	s1	490997	6125887
s1 223	6	s1	491092	6125833
s1 224	3	s1	491070	6125797
s1 225	4	s1	491122	6125768
s1 226	7	s1	491186	6125785
s1 227	2	s1	491223	6125712
s1 228	3	s1	491345	6125642
s1 229	4	s1	491404	6125663
s1 230	3	s1	491501	6125558
s1 231	6	s1	491545	6125583

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s1 232	4	s1	491551	6125528
s1 233	4	s1	491669	6125516
s1 234	6	s1	491731	6125433
s1 235	3	s1	491811	6125441
s1 236	5	s1	491893	6125344
s1 237	2	s1	492041	6125260
s1 238	4	s1	492139	6125260
s1 239	3	s1	492258	6125195
s1 240	2	s1	492312	6125117
s1 241	5	s1	492405	6125061
s1 242	2	s1	492453	6125085
s1 243	3	s1	492576	6125028
s1 244	3	s1	492624	6124938
s1 245	8	s1	492891	6124909
s1 246	6	s1	493004	6124865
s1 247	3	s1	492928	6124792
s1 248	4	s1	493041	6124826
s1 249	8	s1	493045	6124746
s1 250	7	s1	493111	6124716
s1 251	6	s1	493154	6124820
s1 252	20	s1	493216	6124727
s1 253	12	s1	493292	6124807
s1 254	3	s1	493400	6124728
s1 255	6	s1	493504	6124717
s1 256	4	s1	493476	6124791
s1 257	6	s1	493709	6124740
s1 258	4	s1	493600	6124782
s1 259	1	s1	493855	6124781

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s1 260	1	s1	495049	6124231
s1 261	1	s1	495567	6123960
s1 262	6	s1	495778	6123868
s1 263	4	s1	495866	6123824
s1 264	4	s1	496031	6123758
s1 265	1	s1	496494	6123597
s1 266	2	s1	496511	6123542
s1 267	4	s1	496633	6123477
s1 268	5	s1	496686	6123498
s1 269	2	s1	496753	6123413
s1 270	3	s1	496893	6123337
s1 271	4	s1	496965	6123350
s1 272	3	s1	497038	6123310
s1 273	6	s1	497050	6123256
s1 274	3	s1	497156	6123246
s1 275	6	s1	497277	6123134
s1 276	3	s1	497453	6123089
s1 277	3	s1	497586	6122971
s1 278	2	s1	497673	6122973
s1 279	5	s1	498069	6122715
s1 280	3	s1	498147	6122721
s1 281	2	s1	498192	6122648
s1 282	4	s1	498273	6122653
s1 283	4	s1	498439	6122566
s1 284	3	s1	498510	6122526
s1 285	6	s1	498587	6122487
s1 286	4	s1	498652	6122403
s1 287	5	s1	498767	6122393

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s1 288	2	s1	498737	6122355
s1 289	7	s1	498808	6122328
s1 290	3	s1	498973	6122286
s1 291	4	s1	499000	6122220
s1 292	4	s1	499605	6121898
s1 293	4	s1	499653	6121924
s1 294	3	s1	499795	6121802
s1 295	4	s1	499840	6121824
s1 296	4	s1	499942	6121723
s1 297	3	s1	500016	6121681
s1 298	4	s1	500140	6121615
s1 299	6	s1	500221	6121625
s1 300	4	s1	500360	6121497
s1 301	6	s1	500463	6121446
s1 302	5	s1	500548	6121451
s1 303	7	s1	500681	6121332
s1 304	9	s1	500733	6121349
s1 305	11	s1	500800	6121268
s1 306	6	s1	500926	6121249
s1 307	3	s1	500996	6121162
s1 308	4	s1	501083	6121117
s1 309	6	s1	501162	6121122
s1 310	9	s1	501196	6121058
s1 311	4	s1	501234	6121086
s1 312	6	s1	501392	6121004
s1 313	5	s1	501598	6120891
s1 314	6	s1	501716	6120825
s1 315	4	s1	501848	6120752

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s1 316	6	s1	501949	6120709
s1 317	3	s1	502125	6120614
s1 318	5	s1	502255	6120634
s1 319	4	s1	502270	6120587
s1 320	5	s1	502552	6120583
s1 321	6	s1	502589	6120531
s1 322	4	s1	502664	6120563
s1 323	4	s1	502848	6120532
s1 324	6	s1	502934	6120473
s1 325	6	s1	503084	6120493
s1 326	6	s1	503124	6120444
s1 327	4	s1	503189	6120477
s1 328	4	s1	503259	6120418
s1 329	7	s1	503479	6120383
s1 330	3	s1	503654	6120396
s1 331	4	s1	503719	6120342
s1 332	7	s1	503915	6120305
s1 333	9	s1	504086	6120279
s1 334	7	s1	504251	6120251
s1 335	6	s1	504315	6120289
s1 336	11	s1	504373	6120233
s1 337	5	s1	504464	6120266
s1 338	2	s1	504530	6120250
s1 339	3	s1	504624	6120190
s1 340	1	s1	504644	6120229
s1 341	3	s1	504715	6120176
s1 342	2	s1	504820	6120155
s1 343	1	s1	505015	6120126

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s1 344	2	s1	505126	6120106
s1 345	4	s1	505195	6120139
s1 346	5	s1	505206	6120092
s1 347	4	s1	505566	6120034
s1 348	2	s1	505561	6120078
s1 349	5	s1	505746	6120057
s1 350	6	s1	505830	6120004
s1 351	7	s1	505890	6120049
s1 352	9	s1	505963	6119998
s1 353	6	s1	506014	6120030
s1 354	5	s1	506105	6119968
s1 355	4	s1	506390	6119966
s1 356	4	s1	506614	6119850
s1 357	2	s1	506726	6119740
s1 358	6	s1	506731	6119669
s1 359	5	s1	506767	6119627
s1 360	6	s1	506848	6119601
s1 361	1	s1	506869	6119517
s1 362	6	s1	506913	6119466
s1 363	12	s1	506975	6119463
s1 364	4	s1	507009	6119362
s1 365	7	s1	507088	6119338
s1 366	8	s1	507141	6119212
s1 367	12	s1	507212	6119204
s1 368	6	s1	507222	6119122
s1 369	10	s1	507288	6119121
s1 370	7	s1	507300	6119041
s1 371	4	s1	507349	6119053

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s1 372	8	s1	507426	6118967
s1 373	6	s1	507370	6118966
s1 374	6	s1	507404	6118924
s1 375	4	s1	507501	6118886
s1 376	6	s1	507487	6118835
s1 377	6	s1	507580	6118724
s1 378	3	s1	507637	6118736
s1 379	4	s1	507692	6118604
s1 380	3	s1	507779	6118578
s1 381	4	s1	507800	6118490
s1 382	4	s1	507875	6118473
s1 383	6	s1	507875	6118405
s1 384	2	s1	507952	6118400
s1 385	18	s1	508086	6118222
s1 386	7	s1	508324	6118121
s1 387	2	s1	508502	6118152
s1 388	9	s1	508548	6118104
s1 389	3	s1	508620	6118146
s1 390	4	s1	508713	6118148
s1 391	4	s1	508810	6118107
s1 392	8	s1	508914	6118156
s1 393	3	s1	508997	6118113
s1 394	6	s1	509062	6118157
s1 395	3	s1	509166	6118117
s1 396	8	s1	509264	6118163
s1 397	2	s1	509354	6118124
s1 398	4	s1	509454	6118166
s1 399	3	s1	509544	6118127

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s1 400	8	s1	509603	6118174
s1 401	4	s1	509711	6118174
s1 402	2	s1	509680	6118127
s1 403	3	s1	509775	6118132
s1 404	5	s1	509866	6118134
s1 405	9	s1	509895	6118182
s1 406	4	s1	509957	6118181
s1 407	4	s1	509989	6118181
s1 408	3	s1	510063	6118142
s1 409	9	s1	510238	6118183
s1 410	4	s1	510543	6118061
s1 411	1	s1	510530	6118015
s1 412	4	s1	510601	6118021
s1 413	6	s1	510659	6117916
s1 414	3	s1	510737	6117847
s1 415	3	s1	510779	6117875
s1 416	4	s1	510883	6117731
s1 417	3	s1	510982	6117711
s1 418	4	s1	511081	6117632
s1 419	2	s1	512305	6116948
s1 420	2	s1	512624	6116898
s1 421	1	s1	512779	6116849
s1 422	2	s1	513204	6116713
s1 423	1	s1	513303	6116630
s1 424	2	s1	513329	6116676
s1 425	1	s1	513436	6116639
s1 426	2	s1	513499	6116569
s1 427	2	s1	513619	6116530

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s1 428	3	s1	513768	6116482
s1 429	3	s1	513833	6116462
s1 430	4	s1	513916	6116484
s1 431	4	s1	513914	6116434
s1 432	4	s1	513987	6116466
s1 433	3	s1	514102	6116376
s1 434	7	s1	514184	6116401
s1 435	2	s1	514253	6116328
s1 436	3	s1	514467	6116312
s1 437	4	s1	514433	6116273
s1 438	2	s1	514554	6116286
s1 439	3	s1	514600	6116218
s1 440	2	s1	514571	6116228
s1 441	4	s1	514659	6116198
s1 442	2	s1	514760	6116168
s1 443	2	s1	514800	6116205
s1 444	3	s1	514941	6116161
s1 445	2	s1	514956	6116106
s1 446	2	s1	515016	6116136
s1 447	3	s1	515100	6116107
s1 448	2	s1	515268	6116052
s1 449	1	s1	515407	6115959
s1 450	1	s1	515662	6115931
s1 451	2	s1	515858	6115814
s1 452	4	s1	515909	6115849
s1 453	1	s1	516052	6115808
s1 454	3	s1	516089	6115742
s1 455	2	s1	516309	6115722

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s1 456	1	s1	516649	6115562
s1 457	2	s1	517202	6115435
s1 458	2	s1	517320	6115400
s1 459	2	s1	517392	6115376
s1 460	3	s1	517432	6115323
s1 461	3	s1	517470	6115313
s1 462	1	s1	517568	6115289
s1 463	3	s1	517658	6115268
s1 464	5	s1	517755	6115300
s1 465	2	s1	517819	6115244
s1 466	1	s1	517925	6115284
s1 467	1	s1	518021	6115230
s1 468	3	s1	518188	6115262
s1 469	2	s1	518224	6115215
s1 470	2	s1	518339	6115247
s1 471	2	s1	518410	6115195
s1 472	2	s1	518482	6115188
s1 473	3	s1	518506	6115232
s1 474	2	s1	518590	6115221
s1 475	2	s1	518594	6115180
s1 476	1	s1	518791	6115200
s1 477	1	s1	518855	6115153
s1 478	2	s1	519290	6115102
s1 479	2	s1	519639	6115110
s1 480	1	s1	519597	6115074
s1 481	14	s1	520426	6114944
s1 482	3	s1	520482	6114816
s1 483	4	s1	520551	6114756

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s1 484	4	s1	520834	6114577
s1 485	2	s1	520873	6114622
s1 486	3	s1	520901	6114561
s1 487	2	s1	521305	6114423
s1 488	2	s1	521591	6114344
s1 489	1	s1	521685	6114316
s1 490	3	s1	522173	6114255
s1 491	1	s1	522445	6114203
s1 492	1	s1	522835	6114175
s1 493	1	s1	522855	6114122
s1 494	2	s1	523565	6114204
s1 495	1	s1	524057	6114724
s1 496	6	s1	524405	6114958
s1 497	2	s1	525824	6114755
s1 498	3	s1	526401	6114454
s2 1	10	s2	304094	6178023
s2 2	3	s2	304565	6178027
s2 3	1	s2	304738	6178060
s2 4	1	s2	305015	6178091
s2 5	4	s2	305567	6178177
s2 6	7	s2	305704	6178151
s2 7	2	s2	306968	6178361
s2 8	2	s2	307044	6178303
s2 9	1	s2	307495	6178251
s2 10	2	s2	307861	6178433
s2 11	2	s2	307894	6178388
s2 12	5	s2	308963	6178490
s2 13	1	s2	309010	6178545

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s2 14	3	s2	313342	6180175
s2 15	1	s2	313711	6180311
s2 16	1	s2	313961	6180412
s2 17	1	s2	314858	6180544
s2 18	1	s2	315241	6180836
s2 19	1	s2	316441	6181282
s2 20	1	s2	317081	6181255
s2 21	3	s2	318604	6181126
s2 22	1	s2	318617	6181030
s2 23	4	s2	322944	6181239
s2 24	4	s2	322932	6181192
s2 25	4	s2	323566	6181243
s2 26	10	s2	327713	6181342
s2 27	9	s2	328373	6181298
s2 28	1	s2	371024	6183845
s2 29	5	s2	380710	6179014
s2 30	20	s2	380904	6178973
s2 31	3	s2	381771	6178569
s2 32	2	s2	381894	6178483
s2 33	1	s2	382252	6177935
s2 34	5	s2	382440	6177464
s2 35	5	s2	382493	6177382
s2 36	2	s2	384180	6175997
s2 37	1	s2	386600	6174946
s2 38	3	s2	386693	6174787
s2 39	4	s2	386779	6174742
s2 40	3	s2	386848	6174775
s2 41	4	s2	386908	6174729

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s2 42	3	s2	386840	6174695
s2 43	3	s2	387024	6174652
s2 44	2	s2	387057	6174561
s2 45	2	s2	387116	6174582
s2 46	4	s2	387166	6174546
s2 47	3	s2	387152	6174496
s2 48	3	s2	387245	6174489
s2 49	4	s2	387220	6174452
s2 50	5	s2	387285	6174403
s2 51	3	s2	387385	6174386
s2 52	2	s2	387428	6174357
s2 53	2	s2	387450	6174286
s2 54	7	s2	387513	6174297
s2 55	4	s2	387533	6174228
s2 56	4	s2	387629	6174165
s2 57	9	s2	387693	6174117
s2 58	3	s2	387750	6174132
s2 59	3	s2	387891	6174032
s2 60	2	s2	387990	6173904
s2 61	3	s2	388015	6173941
s2 62	6	s2	388080	6173896
s2 63	5	s2	388058	6173854
s2 64	7	s2	388119	6173797
s2 65	3	s2	388167	6173838
s2 66	5	s2	388665	6173609
s2 67	1	s2	389004	6173558
s2 68	2	s2	389205	6173472
s2 69	2	s2	389426	6173487

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s2 70	2	s2	389576	6173396
s2 71	2	s2	389643	6173424
s2 72	2	s2	390164	6173223
s2 73	2	s2	390481	6173127
s2 74	1	s2	390597	6173090
s2 75	2	s2	390683	6173101
s2 76	2	s2	390786	6173070
s2 77	3	s2	390829	6173017
s2 78	2	s2	390962	6172934
s2 79	1	s2	391032	6172872
s2 80	2	s2	391107	6172841
s2 81	7	s2	392051	6171629
s2 82	8	s2	392148	6171592
s2 83	6	s2	392108	6171555
s2 84	2	s2	392672	6171140
s2 85	1	s2	392736	6171162
s2 86	1	s2	392838	6171107
s2 87	2	s2	392826	6171065
s2 88	3	s2	393537	6170798
s2 89	1	s2	393620	6170770
s2 90	3	s2	393730	6170732
s2 91	2	s2	393711	6170692
s2 92	1	s2	394031	6170630
s2 93	1	s2	394147	6170614
s2 94	1	s2	396075	6170427
s2 95	1	s2	396450	6170601
s2 96	1	s2	397457	6170962
s2 97	4	s2	398568	6171220

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s2 98	3	s2	398579	6171175
s2 99	1	s2	400369	6171303
s2 100	8	s2	402902	6171373
s2 101	2	s2	403237	6171551
s2 102	3	s2	403423	6171649
s2 103	2	s2	403538	6171710
s2 104	7	s2	403874	6171892
s2 105	3	s2	407731	6171293
s2 106	1	s2	407946	6171113
s2 107	1	s2	411149	6168576
s2 108	2	s2	412175	6168980
s2 109	4	s2	412366	6169115
s2 110	4	s2	412407	6169087
s2 111	1	s2	412629	6169158
s2 112	16	s2	412899	6169205
s2 113	10	s2	413004	6169124
s2 114	9	s2	413512	6169036
s2 115	3	s2	413472	6169002
s2 116	11	s2	413525	6168965
s2 117	13	s2	413577	6168982
s2 118	6	s2	413752	6168776
s2 119	9	s2	413781	6168755
s2 120	8	s2	413836	6168705
s2 121	8	s2	413900	6168713
s2 122	12	s2	413939	6168678
s2 123	7	s2	413945	6168618
s2 124	9	s2	414062	6168578
s2 125	3	s2	414087	6168498

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s2 126	8	s2	414131	6168520
s2 127	4	s2	414188	6168416
s2 128	6	s2	414272	6168407
s2 129	10	s2	414300	6168336
s2 130	4	s2	414398	6168343
s2 131	10	s2	414563	6168276
s2 132	12	s2	414601	6168213
s2 133	14	s2	414837	6168169
s2 134	16	s2	414845	6168112
s2 135	3	s2	414998	6168107
s2 136	8	s2	414988	6168062
s2 137	4	s2	415098	6168067
s2 138	2	s2	415079	6168025
s2 139	14	s2	415227	6168018
s2 140	13	s2	415278	6167952
s2 141	2	s2	416505	6167350
s2 142	3	s2	416502	6167296
s2 143	3	s2	416668	6167208
s2 144	3	s2	416650	6167165
s2 145	3	s2	416728	6167151
s2 146	1	s2	416836	6166968
s2 147	1	s2	416989	6166809
s2 148	3	s2	417791	6166147
s2 149	4	s2	417851	6166168
s2 150	4	s2	417943	6166128
s2 151	3	s2	418105	6166023
s2 152	2	s2	418316	6165996
s2 153	1	s2	419020	6165771

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s2 154	4	s2	419100	6165742
s2 155	2	s2	419196	6165669
s2 156	4	s2	419513	6165613
s2 157	3	s2	419515	6165571
s2 158	8	s2	419603	6165588
s2 159	12	s2	419592	6165544
s2 160	12	s2	419681	6165561
s2 161	8	s2	419692	6165512
s2 162	6	s2	419764	6165535
s2 163	6	s2	419798	6165477
s2 164	5	s2	419863	6165459
s2 165	4	s2	419947	6165479
s2 166	7	s2	420032	6165452
s2 167	1	s2	420087	6165385
s2 168	9	s2	420183	6165398
s2 169	1	s2	420305	6165314
s2 170	2	s2	420347	6165349
s2 171	9	s2	423302	6164521
s2 172	4	s2	423397	6164530
s2 173	6	s2	424101	6164207
s2 174	12	s2	424812	6163815
s2 175	7	s2	424762	6163790
s2 176	4	s2	425597	6163338
s2 177	7	s2	425640	6163369
s2 178	6	s2	427642	6162827
s2 179	6	s2	427595	6162789
s2 180	4	s2	430200	6162424
s2 181	3	s2	430217	6162473

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s2 182	5	s2	430272	6162465
s2 183	6	s2	430271	6162415
s2 184	9	s2	430420	6162397
s2 185	2	s2	430469	6162437
s2 186	2	s2	430752	6162349
s2 187	1	s2	430821	6162388
s2 188	3	s2	430924	6162375
s2 189	4	s2	431489	6162249
s2 190	1	s2	432082	6162216
s2 191	2	s2	432085	6162171
s2 192	1	s2	432229	6162196
s2 193	1	s2	432724	6162081
s2 194	2	s2	432793	6162121
s2 195	2	s2	432796	6162071
s2 196	2	s2	432862	6162104
s2 197	2	s2	432988	6162048
s2 198	2	s2	433951	6161950
s2 199	4	s2	434531	6161819
s2 200	3	s2	434921	6161814
s2 201	6	s2	434935	6161767
s2 202	5	s2	435103	6161742
s2 203	3	s2	435098	6161793
s2 204	2	s2	435290	6161717
s2 205	6	s2	435271	6161769
s2 206	3	s2	441310	6160023
s2 207	2	s2	441300	6160089
s2 208	4	s2	441875	6160260
s2 209	2	s2	442238	6160418

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s2 210	3	s2	442321	6160519
s2 211	3	s2	442741	6160569
s2 212	2	s2	442750	6160636
s2 213	8	s2	443068	6160500
s2 214	4	s2	443081	6160557
s2 215	4	s2	443257	6160495
s2 216	2	s2	443233	6160456
s2 217	8	s2	443564	6160389
s2 218	3	s2	443642	6160276
s2 219	7	s2	443448	6160387
s2 220	5	s2	443651	6160352
s2 221	10	s2	443855	6160183
s2 222	6	s2	443922	6160165
s2 223	7	s2	444063	6160215
s2 224	5	s2	444716	6160133
s2 225	3	s2	444998	6159848
s2 226	2	s2	444964	6159812
s2 227	5	s2	445142	6159684
s2 228	7	s2	445200	6159625
s2 229	5	s2	445146	6159608
s2 230	3	s2	445261	6159490
s2 231	3	s2	445273	6159545
s2 232	2	s2	445636	6159331
s2 233	5	s2	446315	6159256
s2 234	4	s2	446629	6159189
s2 235	7	s2	446629	6159120
s2 236	3	s2	446788	6159156
s2 237	15	s2	446807	6159055

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s2 238	6	s2	446975	6159090
s2 239	2	s2	447017	6158992
s2 240	4	s2	447130	6158913
s2 241	6	s2	447174	6158981
s2 242	6	s2	447236	6158866
s2 243	10	s2	447336	6158893
s2 244	3	s2	447445	6158763
s2 245	3	s2	447530	6158791
s2 246	1	s2	448422	6158073
s2 247	3	s2	448509	6158057
s2 248	4	s2	448750	6157834
s2 249	5	s2	448825	6157707
s2 250	3	s2	448971	6157705
s2 251	2	s2	449045	6157679
s2 252	4	s2	449131	6157661
s2 253	1	s2	449144	6157604
s2 254	6	s2	449403	6157594
s2 255	3	s2	449513	6157568
s2 256	2	s2	449663	6157532
s2 257	3	s2	449733	6157464
s2 258	4	s2	449830	6157488
s2 259	1	s2	449903	6157462
s2 260	4	s2	449914	6157410
s2 261	1	s2	450013	6157372
s2 262	2	s2	450095	6157342
s2 263	2	s2	450137	6157330
s2 264	5	s2	450238	6157303
s2 265	3	s2	450347	6157343

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s2 266	2	s2	450390	6157276
s2 267	3	s2	450462	6157313
s2 268	29	s2	451171	6157107
s2 269	16	s2	451250	6156973
s2 270	1	s2	451697	6156548
s2 271	2	s2	451687	6156485
s2 272	2	s2	452025	6156191
s2 273	3	s2	452052	6156229
s2 274	4	s2	452236	6156076
s2 275	3	s2	455978	6153332
s2 276	2	s2	455970	6153262
s2 277	1	s2	456082	6153308
s2 278	4	s2	456309	6153259
s2 279	3	s2	456547	6153164
s2 280	6	s2	456672	6153141
s2 281	4	s2	456784	6153117
s2 282	6	s2	456881	6153170
s2 283	5	s2	456924	6153126
s2 284	12	s2	457051	6153153
s2 285	6	s2	457077	6153204
s2 286	5	s2	457142	6153178
s2 287	4	s2	457203	6153231
s3 1	6	s3	184732	6158924
s3 2	4	s3	184884	6158677
s3 3	7	s3	184997	6158663
s3 4	6	s3	185250	6158353
s3 5	10	s3	186289	6157074
s3 6	5	s3	186247	6157056

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s3 7	4	s3	186656	6156489
s3 8	7	s3	186609	6156441
s3 9	5	s3	186744	6156339
s3 12	14	s3	187928	6154946
s3 13	12	s3	185023	6160303
s3 14	22	s3	185091	6160301
s3 15	7	s3	184775	6159913
s3 16	4	s3	193625	6153467
s3 17	4	s3	193868	6153251
s3 18	3	s3	193881	6153158
s3 19	2	s3	193990	6153130
s3 20	2	s3	194000	6153036
s3 21	9	s3	194095	6153054
s3 22	1	s3	194118	6152947
s3 23	9	s3	194292	6152877
s3 24	5	s3	196567	6151529
s3 25	3	s3	196693	6151513
s3 26	9	s3	196628	6151574
s3 27	3	s3	196758	6151509
s3 28	6	s3	196776	6151553
s3 29	5	s3	196853	6151548
s3 30	1	s3	197084	6151478
s3 31	4	s3	197296	6151498
s3 32	4	s3	197349	6151446
s3 33	2	s3	197604	6151425
s3 34	1	s3	197767	6151448
s3 35	6	s3	197867	6151392
s3 36	3	s3	197947	6151387

Section No. / HBT cluster	HBT abundance in cluster	Section	Easting MGA55	Northing MGA55
s3 37	4	s3	198036	6151372
s3 38	6	s3	198074	6151418
s3 39	5	s3	198478	6151365
s3 40	1	s3	198549	6151326
s3 41	3	s3	198822	6151330
s3 42	2	s3	198963	6151320
s3 43	1	s3	199277	6151246
s3 44	2	s3	199432	6151226
s3 45	1	s3	199636	6151203
s3 46	5	s3	199731	6151190
s3 47	7	s3	200698	6151135
s3 48	2	s3	209681	6152412
s3 49	4	s3	209749	6152466
s3 50	20	s3	290444	6174964
s3 51	6	s3	290551	6174946
s3 52	2	s3	293922	6177268
s3 53	6	s3	294023	6177224
s3 54	20	s3	294233	6177199
s3 55	2	s3	294525	6177316
s3 56	20	s3	294694	6177232
s3 57	7	s3	295653	6177474
s3 58	2	s3	295702	6177580
s3 59	1	s3	295765	6177577
s3 60	7	s3	295871	6177593
s3 61	9	s3	295886	6177527
s3 62	1	s3	300501	6177991

Section No./ HBT cluster	HBT abundance in cluster	Section	Easting MGA54	Northing MGA54
s5 1	6	s5	619463	6204981
s5 2	2	s5	628282	6201271
s5 3	6	s5	628238	6201173
s5 4	2	s5	628427	6201096
s5 5	2	s5	628416	6200971
s5 6	1	s5	629153	6200008
s5 7	4	s5	629284	6199515
s5 8	2	s5	629281	6199029
s5 9	2	s5	629333	6199046
s5 10	3	s5	629373	6198755
s5 11	4	s5	629328	6198490
s5 12	3	s5	629761	6196381
s5 13	5	s5	630677	6194804
s5 14	5	s5	630929	6194360
s5 15	10	s5	631111	6193606
s5 16	5	s5	631288	6193380
s5 17	20	s5	631635	6192604
s5 18	6	s5	631740	6192312
s5 19	10	s5	632116	6191723
s5 20	1	s5	632243	6191408
s5 21	10	s5	633029	6190409
s5 22	5	s5	633662	6189641
s5 23	1	s5	633652	6189543
s5 24	4	s5	633811	6189439

Section No./ HBT cluster	HBT abundance in cluster	Section	Easting MGA54	Northing MGA54
s5 25	6	s5	634169	6189032
s5 26	4	s5	634407	6188726
s5 27	3	s5	634544	6188633
s5 28	2	s5	634589	6188543
s5 29	1	s5	634765	6188349
s5 30	3	s5	636316	6187136
s5 31	5	s5	636422	6187038
s5 32	3	s5	638754	6187085
s5 33		s5	639927	6186536
s5 34	5	s5	641444	6185229
s5 35	6	s5	641523	6185193
s5 36	3	s5	641579	6185235
s5 37	4	s5	642841	6183798
s5 38	5	s5	643001	6183737
s5 39	4	s5	643142	6183435
s5 40	3	s5	643256	6183265
s5 41	2	s5	643511	6183006
s5 42	3	s5	643656	6182800
s5 43	3	s5	643637	6182740
s5 44	5	s5	643746	6182591
s5 45	3	s5	643980	6182352
s5 46	2	s5	644158	6182089
s5 47	4	s5	644232	6181999
s5 48	3	s5	644197	6181943

Section No./ HBT cluster	HBT abundance in cluster	Section	Easting MGA54	Northing MGA54
s5 49	3	s5	644289	6181904
s5 50	4	s5	644369	6181797
s5 51	3	s5	644393	6181657
s5 52	3	s5	644644	6181286
s5 53	4	s5	644758	6181161
s5 54	3	s5	644903	6181062
s5 55	3	s5	645563	6180542
s5 56	6	s5	645531	6180509
s5 57	5	s5	646520	6179772
s5 58	1	s5	646739	6179740
s5 59	4	s5	647073	6179629
s5 60	2	s5	647902	6179308
s5 61	2	s5	648474	6178711
s5 62	4	s5	648843	6178204
s5 63	3	s5	649160	6177803
s5 64	1	s5	649704	6177501
s5 65	1	s5	649949	6177397
s5 66	3	s5	650863	6177124
s5 67	8	s5	651813	6176683
s5 68	2	s5	652131	6176505
s5 69	5	s5	652609	6176414
s5 70	5	s5	652587	6176464
s5 71	2	s5	652702	6176421
s5 72	3	s5	652729	6176468

Section No./ HBT cluster	HBT abundance in cluster	Section	Easting MGA54	Northing MGA54
s5 73	3	s5	652842	6176489
s5 74	10	s5	653153	6176459
s5 75	4	s5	653281	6176424
s5 76	2	s5	653428	6176392
s5 77	7	s5	653809	6176194
s5 78	3	s5	653886	6176197
s5 79	4	s5	654216	6176108
s5 80	3	s5	654258	6176065
s5 81	12	s5	654457	6176069
s5 82	12	s5	654887	6175862
s5 83	4	s5	655287	6175692
s5 84	18	s5	655849	6175394
s5 85	14	s5	655890	6175323
s5 86	12	s5	656549	6174990
s5 87	1	s5	656598	6175033
s5 88	12	s5	657130	6174723
s5 89	12	s5	657196	6174761
s5 90	10	s5	657509	6174653
s5 91	10	s5	657504	6174597
s5 92	12	s5	657937	6174480
s5 93	6	s5	658185	6174378
s5 94	6	s5	658362	6174091
s4 1	12	s4	664201	6176690
s4 2	6	s4	664871	6177110

Section No./ HBT cluster	HBT abundance in cluster	Section	Easting MGA54	Northing MGA54
s4 3	7	s4	665611	6177570
s4 4	1	s4	666076	6177862
s4 5	6	s4	669637	6179212
s4 6	10	s4	669651	6179318
s4 7	4	s4	678973	6177209
s4 8	2	s4	679163	6177158
s4 9	3	s4	679506	6177028
s4 10	2	s4	679729	6176970
s4 11	3	s4	679966	6176964
s4 12	2	s4	680284	6176864
s4 13	2	s4	680735	6176754
s4 14	5	s4	681121	6176648
s4 15	2	s4	681233	6176615
s4 16	12	s4	681289	6176599
s4 17	10	s4	681479	6176549
s4 18	8	s4	681631	6176519
s4 19	4	s4	682018	6176406
s4 20	3	s4	682091	6176348
s4 21	7	s4	682189	6176361
s4 22	10	s4	682394	6176301
s4 23	10	s4	682473	6176276
s4 24	18	s4	682742	6176221
s4 25	12	s4	682956	6176156
s4 26	6	s4	683163	6176101

Section No./ HBT cluster	HBT abundance in cluster	Section	Easting MGA54	Northing MGA54
s4 27	9	s4	683349	6176053
s4 28	2	s4	683406	6175980
s4 29	6	s4	683517	6176000
s4 30	4	s4	683670	6175963
s4 31	6	s4	684833	6175650
s4 32	4	s4	684965	6175610
s4 33	3	s4	685064	6175520
s4 34	4	s4	685407	6175425
s4 35	2	s4	685677	6175417
s4 36	3	s4	685677	6175351
s4 37	2	s4	685827	6175313
s4 38	2	s4	685935	6175288
s4 39	6	s4	686167	6175216
s4 40	2	s4	686407	6175144
s4 41	3	s4	687224	6174927
s4 42	4	s4	687823	6174757
s4 43	2	s4	688235	6174651
s4 44	7	s4	691001	6173911
s4 45	4	s4	691188	6173858
s4 46	5	s4	691597	6173734
s4 47	4	s4	691707	6173707
s4 48	1	s4	691812	6173633
s4 49	2	s4	692509	6173466
s4 50	3	s4	692677	6173417

Section No./ HBT cluster	HBT abundance in cluster	Section	Easting MGA54	Northing MGA54
s4 51	3	s4	692816	6173370
s4 52	3	s4	692880	6173322
s4 53	2	s4	692999	6173318
s4 54	3	s4	693031	6173308
s4 55	10	s4	693214	6173248
s4 56	6	s4	693217	6173217
s4 57	2	s4	693732	6173086
s4 58	1	s4	693968	6173009
s4 59	1	s4	694079	6172974
s4 60	2	s4	694253	6172920
s4 61	10	s4	694511	6172842
s4 62	3	s4	694848	6172704
s4 63	6	s4	694937	6172676
s4 64	4	s4	694990	6172691
s4 65	2	s4	695051	6172672
s4 66	5	s4	695148	6172643
s4 67	2	s4	695280	6172563
s4 68	3	s4	695344	6172584
s4 69	1	s4	695628	6172490
s4 70	27	s4	695739	6172411
s4 71	4	s4	696595	6172243
s4 72	4	s4	696740	6172165
s4 73	5	s4	697158	6172016
s4 74	3	s4	697330	6171969

Section No./ HBT cluster	HBT abundance in cluster	Section	Easting MGA54	Northing MGA54
s4 75	2	s4	698286	6171663
s4 76	2	s4	698930	6171445
s4 77	4	s4	699148	6171373
s4 78	1	s4	699270	6171338
s4 79	4	s4	699518	6171257
s4 80	6	s4	699860	6171120
s4 81	5	s4	701177	6170745
s4 82	1	s4	701638	6170608
s4 83	3	s4	701764	6170570
s4 84	4	s4	701857	6170539
s4 85	3	s4	701929	6170491
s4 86	6	s4	701981	6170501
s4 87	3	s4	702063	6170478
s4 88	4	s4	702068	6170450
s4 89	4	s4	702213	6170405
s4 90	2	s4	702381	6170383
s4 91	6	s4	703177	6170111
s4 92	7	s4	703852	6169911
s4 93	3	s4	703948	6169875
s4 94	7	s4	704673	6169644
s4 95	4	s4	705113	6169528
s4 96	5	s4	705266	6169481
s4 97	2	s4	705757	6169380
s4 98	3	s4	705781	6169330

Section No./ HBT cluster	HBT abundance in cluster	Section	Easting MGA54	Northing MGA54
s4 99	6	s4	705871	6169309
s4 100	4	s4	706016	6169266
s4 101	8	s4	706072	6169251
s4 102	4	s4	706165	6169218
s4 103	2	s4	706191	6169247
s4 104	2	s4	706276	6169225
s4 105	3	s4	706357	6169205
s4 106	4	s4	706488	6169167
s4 107	6	s4	706631	6169125
s4 108	5	s4	706839	6169063
s4 109	3	s4	706832	6169005
s4 110	4	s4	706971	6169021
s4 111	6	s4	707105	6168985
s4 112	3	s4	707661	6168787
s4 113	3	s4	707668	6168823
s4 114	4	s4	707978	6168733
s4 115	3	s4	708547	6168578
s4 116	2	s4	709058	6168430
s4 117	2	s4	709478	6168294
s4 118	5	s4	715999	6166716
s4 119	3	s4	716143	6166702
s4 120	1	s4	716426	6166656
s4 121	5	s4	717351	6166559
s4 122	3	s4	717523	6166543

Section No./ HBT cluster	HBT abundance in cluster	Section	Easting MGA54	Northing MGA54
s4 123	5	s4	717566	6166546
s4 124	5	s4	717637	6166548
s4 125	5	s4	717808	6166519
s4 126	3	s4	718317	6166464
s4 127	6	s4	718804	6166417
s4 128	7	s4	718830	6166376
s4 129	9	s4	719031	6166393
s4 130	7	s4	719077	6166355
s4 131	4	s4	719143	6166380
s4 132	7	s4	719149	6166347
s4 133	8	s4	719279	6166365
s4 134	4	s4	719422	6166349
s4 135	4	s4	719563	6166338
s4 136	4	s4	719652	6166329
s4 137	3	s4	719714	6166286
s4 138	4	s4	719717	6166320
s4 139	10	s4	719882	6166309
s4 140	7	s4	719972	6166249
s4 141	3	s4	720391	6166252
s4 142	2	s4	720518	6166186
s4 143	2	s4	720837	6166202
s4 144	2	s4	720864	6166154
s4 145	2	s4	721140	6166173
s4 146	3	s4	721141	6166121

Section No./ HBT cluster	HBT abundance in cluster	Section	Easting MGA54	Northing MGA54
s4 147	4	s4	721434	6166096
s4 148	3	s4	721907	6166097
s4 149	8	s4	723235	6165905
s4 150	3	s4	723251	6165960
s4 151	2	s4	723418	6165939
s4 152	3	s4	723531	6165921
s4 153	4	s4	723559	6165870
s4 154	3	s4	723809	6165842
s4 155	3	s4	727482	6165524
s4 156	2	s4	727954	6165475
s4 157	1	s4	728085	6165462
s4 158	1	s4	728214	6165450
s4 159	6	s4	728490	6165424
s4 160	3	s4	728567	6165380
s4 161	2	s4	728652	6165409
s4 162	5	s4	728702	6165365
s4 163	4	s4	728849	6165350
s4 164	2	s4	728967	6165339
s4 165	3	s4	729344	6165334
s4 166	6	s4	729947	6165233
s4 167	4	s4	730149	6165209
s4 168	2	s4	730360	6165243
s4 169	3	s4	730612	6165173
s4 170	2	s4	730802	6165152

Section No./ HBT cluster	HBT abundance in cluster	Section	Easting MGA54	Northing MGA54
s4 171	4	s4	731076	6165171
s4 172	3	s4	731076	6165129
s4 173	4	s4	731375	6165142
s4 174	2	s4	731636	6165117
s4 175	3	s4	731690	6165068
s4 176	2	s4	732133	6165025
s4 177	1	s4	732386	6165053
s4 178	2	s4	732899	6164993
s4 179	2	s4	733113	6164904

Annexure C

Habitat assessment table

Likelihood of occurrence criteria

Likelihood	Criteria
Recorded	The species was observed in the study area during the current survey
High	It is highly likely that a species inhabits the study area and is dependant on identified suitable habitat (ie. for breeding or important life cycle periods such as winter flowering resources), has been recorded recently in the locality (10km) and is known or likely to maintain resident populations in the study area. Also includes species known or likely to visit the study area during regular seasonal movements or migration.
Moderate	Potential habitat is present in the study area. Species unlikely to maintain sedentary populations, however may seasonally use resources within the study area opportunistically or during migration. The species is unlikely to be dependent (ie. for breeding or important life cycle periods such as winter flowering resources) on habitat within the study area, or habitat is in a modified or degraded state. Includes cryptic flowering flora species that were not seasonally targeted by surveys and that have not been recorded.
Low	It is unlikely that the species inhabits the study area and has not been recorded recently in the locality (10km). It may be an occasional visitor, but habitat similar to the study area is widely distributed in the local area, meaning that the species is not dependent (ie. for breeding or important life cycle periods such as winter flowering resources) on available habitat. Specific habitat is not present in the study area or the species are a non-cryptic perennial flora species that were specifically targeted by surveys and not recorded.
None	Suitable habitat is absent from the study area. Based on a field assessment of the habitat constraints or microhabitats on the study area , the habitat is identified as being substantially degraded such that the species is unlikely to utilise the study area (or specific vegetation zones), or an expert report that is prepared that states the species is unlikely to be present on the study area or specific vegetation zones.

Habitat assessment table (Section 1)

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence (Section 1)
Sloane's Froglet <i>Crinia sloanei</i>	V	E	Associated with periodically inundated areas in grassland, woodland, and disturbed habitats	0	Low

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence (Section 1)
Southern Bell Frog <i>Litoria raniformis</i>	E	V	Usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys.	1	None
Corben's Long-eared Bat <i>Nyctophilus corbeni</i>	V	V	Inhabits a variety of vegetation types, including mallee, bulloke <i>Allocasuarina leuhmanni</i> and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland.	0	Low
Greater Broad-nosed Bat <i>Scoteanax rueppellii</i>	V	-	Uses woodland, moist and dry eucalypt forests and rainforest, mostly found in tall wet forest.	2	Moderate
Inland Forest Bat <i>Vespadelus baverstocki</i>	V	-	Little is known of the habitat requirements of this species, however known to roost in tree hollows and abandoned buildings. They have been recorded in a variety of woodland formations mostly drier habitats.	1	Low
Southern Myotis <i>Myotis Macropus</i>	V	-	Roost close to water in caves, mine shafts, hollow bearing trees, storm water channels, under bridges and in dense foliage. They forage over streams and pools.	5	Moderate
Yellow-bellied Sheathtail-bat <i>Saccolaimus flaviventris</i>	V	-	Forages in most habitats, with or without trees. Roosts in tree hollows and buildings. They can use mammal burrows in treeless areas	2	Moderate
Australasian Bittern <i>Botaurus poiciloptilus</i>	E	E	Prefers permanent freshwater wetlands with tall, dense vegetation. Spends the day in reeds or rushes and feeds mostly at night	0	Low
Australian Painted Snipe <i>Rostratula australis</i>	E	E	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	0	Low

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence (Section 1)
Barking Owl <i>Ninox connivens</i>	V	-	Inhabits woodland and open forest, including remnants and partly cleared farmland. It requires large permanent territories, about 2000 hectares in NSW habitats.	7	Moderate
Black-breasted Buzzard <i>Maiorstra melanosternon</i>	V	-	Found in a variety of habitats, particularly timbered watercourses. It often hunts over grasslands and sparsely timbered woodlands	1	Low
Black-chinned Honeyeater (eastern subspecies) <i>Melithreptus gularis gularis</i>	V	-	Inhabits drier open forests or woodland dominated by box and iron eucalypts. Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river she-oaks, and tea-trees.	5	Low
Black Falcon <i>Falco subniger</i>	V	-	The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions	10	Low
Brolga <i>Grus rubicunda</i>	V	-	They are dependent on wetlands, especially shallow swamps and often feed in dry grassland or ploughed paddocks	6	Moderate
Brown Treecreeper (eastern subspecies) <i>Climacteris picumnus victoriae</i>	V	-	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species.	121	High
Bush Stone-curlew <i>Burhinus grallarius</i>	E	-	Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber.	6	Moderate
Common Greenshank <i>Tringa nebularia</i>	-	M	Found both on the coast and inland, in estuaries and mudflats, mangrove swamps and lagoons, and in billabongs, swamps, sewage farms and flooded crops.	4	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence (Section 1)
Common Sandpiper <i>Actitis hypoleucos</i>	-	M	A small sandpiper that is widely distributed in small numbers along the coast of Australia and in many inland regions.	0	None
Curlew Sandpiper <i>Calidris ferruginea</i>	E	CE M	Widespread occurrence along the coast and inland.	3	Low
Diamond Firetail <i>Stagonopleura guttata</i>	V	-	Found in grassy woodlands including Box-Gum Woodlands and Snow Gum Woodland	35	Moderate
Dusky Woodswallow <i>Artamus cyanopterus cyanopterus</i>	V	-	Found mostly in dry, open eucalypt forests and woodlands. Depending on location and climate, it can be migratory.	19	Moderate
Eastern Curlew <i>Numenius madagascarensis</i>	-	CE M	Australia's largest shorebird. Flies to Russia and China annually to breed, returning to Australia to feed.	0	None
Flame Robin <i>Petroica pheonica</i>	V	-	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Habitat often changes in winter to include drier more open habitat including dry forests, open woodlands, native grassland, pastures and occasionally in heathland or other shrubland.	36	Moderate
Flock Bronzewing <i>Phaps histrionica</i>	E	-	Inhabits a variety of vegetation types including grassy plains, saltbush, spinifex, and open mulga.	1	None
Fork-tailed Swift <i>Apus pacificus</i>	-	M	Almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas.	5	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence (Section 1)
Freckled Duck <i>Stictonetta naevosa</i>	V	-	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds.	1	Low
Gang-gang Cockatoo <i>Callocephalon fimbriatum</i>	V	-	During spring and summer, found in tall mountain forests and woodlands usually heavily timbered and mature wet sclerophyll forests. In Autumn and winter, they generally move to drier more open forests and woodlands.	3	Low
Gilbert's Whistler <i>Pachycephala inornata</i>	V	-	Is found in a variety of habitats but generally needs a dense shrub layer. These include, mallee shrublands, box-ironbark woodlands, cypress pine and Belah woodlands, and River Red gum forests. Forage on or near the ground in shrubs and on top of small trees.	6	Moderate
Glossy Black-Cockatoo <i>Calyptorhynchus lathami</i>	V	-	Inhabit open forests and woodlands. She-oak is an important food source and they feed almost exclusively on several species (<i>Casurina</i> and <i>Allocasaurina</i>).	5	Low
Grey-crowned Babbler (eastern subspecies) <i>Pomatostomus temporalis temporalis</i>	V	-	Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Woodlands on fertile soils in coastal regions.	19	Moderate
Grey Falcon <i>Falco hypoleucos</i>	E	V	Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast.	0	Low
Hooded Robin (south-eastern form) <i>Melanodryas cucullata cucullata</i>	V		Found in open eucalypt woodlands, acacia scrub and mallee, often in or near clearings or open areas. Requires diverse habitats with mature eucalypts, saplings, small shrubs and moderately tall native grasses.	5	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence (Section 1)
Latham's Snipe <i>Gallinago hardwickii</i>	-	M	Habitat in Australia includes permanent and ephemeral wetlands.	20	Low
Little Eagle <i>Hieraaetus morphnoides</i>	V	-	Little Eagle is distributed across all of the Australian mainland except for densely vegetated areas, particularly on the Dividing Range escarpment. In NSW the Little Eagle is considered a single population. They inhabit open eucalypt woodland, woodland and open woodland, including She-oak, <i>Acacia</i> woodland and riparian woodland in arid and semi-arid regions.	33	Moderate
Little Lorikeet <i>Glossopsitta pusilla</i>	V	-	Uses riparian habitats and forages in open eucalypt forests and woodland. Roosts in treetops, often separate from feeding areas. Urban areas, paddocks and roadside remnants with flowering trees can help sustain viable populations	4	Moderate
Malleefowl <i>Leipoa ocellata</i>	E	V	Predominantly inhabit mallee communities, preferring the tall, dense and floristically-rich mallee found in higher rainfall (300 - 450 mm mean annual rainfall) areas. Utilises mallee with a spinifex understorey, but usually at lower densities than in areas with a shrub understorey.	0	None
Marsh Sandpiper <i>Tringa stagnatilis</i>	-	M	Marsh Sandpipers are commonly seen singly, or in small to large flocks in fresh or brackish (slightly salty) wetlands such as rivers, water meadows, sewage farms, drains, lagoons and swamps.	3	Low
Painted Honeyeater <i>Grantiella picta</i>	V	V	Inhabits Boree/Weeping Myall (<i>Acacia pendula</i>), Brigalow (<i>A.harpophylla</i>) and Box-Gum Woodlands and Box-Ironbark Forests. Feeds on mistletoes preferably the genus <i>Amyema</i>	1	Moderate
Pectoral Sandpiper <i>Calidris melanotos</i>	-	M	A small to medium sandpiper. In Australia it can be found in both shallow fresh and salt water. The sandpiper flies to Russia and Northern America to breed.	0	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence (Section 1)
Pink Cockatoo <i>Lophochroa leadbeateri</i>	V	-	Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water.	2	Moderate
Plains-wanderer <i>Pedionomus torquatus</i>	E	CE	Plains-wanderers live in semi-arid, lowland native grasslands that typically occur on hard red-brown soils. These grasslands support a high diversity of plant species, including a number of state and nationally threatened species.	1	Moderate
Red-necked Stint <i>Calidris ruficollis</i>	-	M	Found in sheltered inlets, bays, lagoons, estuaries, intertidal mudflats, and protected sandy or coralline shores. They can be found inland in wetlands, riverbanks, dams, flooded paddocks and damp grasslands.	5	Low
Regent Honeyeater <i>Anthochaera phrygia</i>	CE	CE	Lives in dry open forest and woodland especially Box-Ironbark woodland, and riparian forests of River Sheoak. Woodlands they inhabit often support high abundance and species richness of bird species.	3	Low
Satin Flycatcher <i>Myiagra cyanoleuca</i>	-	M	The Satin Flycatcher is found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests.	0	None
Scarlet Robin <i>Petrocia boodang</i>	V	-	Lives in dry eucalypt forests and woodlands with open grassy understorey with scattered shrubs. Lives in both mature and regrowth vegetation and usually contains abundant logs and fallen timber	14	Moderate
Sharp-tailed Sandpiper <i>Calidris acuminata</i>	-	M	Occurs in Australia during the non-breeding part of the year. Found on both the coast and inland areas. Flies north to Siberia to breed.	22	Low
Speckled Warbler <i>Chthonicola sagittate</i>	V	-	Lives in Eucalypts dominated communities that have a grassy understorey with sparse shrub layer. Large, relatively undisturbed habitats are needed for this species to remain in an area.	17	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence (Section 1)
Spotted Harrier <i>Circus assimilis</i>	V	-	Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe.	6	Moderate
Square-tailed Kite <i>Lophoictinia isura</i>	V	-	Found in timbered habitats including dry woodlands and open forests. Prefers timbered watercourses.	1	Moderate
Superb Parrot <i>Polytelis swainsonii</i>	V	V	Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.	194	Recorded
Swift Parrot <i>Lathamus discolor</i>	E	CE	Occurs in areas with flowering eucalypts or abundant lerp (from sap sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany <i>Eucalyptus robusta</i> , Spotted Gum <i>Corymbia maculata</i> , Red Bloodwood <i>C. gummifera</i> , Forest Red Gum <i>E. tereticornis</i> , Mugga Ironbark <i>E. sideroxylon</i> , and White Box <i>E. albens</i> . Commonly used lerp infested trees include Inland Grey Box <i>E. microcarpa</i> , Grey Box <i>E. moluccana</i> , Blackbutt <i>E. pilularis</i> , and Yellow Box <i>E. melliodora</i>	18	Moderate
Turquoise Parrot <i>Neophema pulchella</i>	V	-	Habitats include edges of eucalypt woodland near clearings, timbered ridges and creeks in farmlands.	3	Moderate
Varied Sittella <i>Daphoenositta chrysoptera</i>	V	-	This species is sedentary and known to inhabit most forest/woodland habitats.	5	Moderate
White-bellied Sea-eagle <i>Haliaeetus leucogaster</i>	V	M	The species is normally seen perched high in a tree, or soaring over waterways and adjacent land, particularly along coastlines, lakes and rivers.	8	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence (Section 1)
White-fronted Chat <i>Epthianura albifrons</i>	V	-	Gregarious species, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground.	13	Moderate
White-throated Needletail <i>Hirundapus caudacutus</i>	-	V M	Once believed they did not land in Australia, but now shown to roost in trees. They are more common in coastal areas compared to inland	2	Moderate
Yellow Wagtail <i>Motacilla flava</i>	-	M	Occurs in a variety of habitats, favouring damp or wet vegetation. Forages on the edges of rivers, dams and wetlands.	0	Low
Flathead Galaxias <i>Galaxias rostratus</i>	E (FM Act)	CE	Known from the southern half of the Marry-Darling Basin. Inhabits a variety of habitats including rivers, lakes and swamps.	0	Low
Macquarie Perch <i>Macquaria australasica</i>	E (FM Act)	E	Found in the upstream reaches of the Murray-Darling Basin. Found in rivers and lakes.	0	Low
Murray Cod <i>Maccullochella peelii</i>	-	V	Prefers deep, slow flowing turbid water in rivers and streams with boulders or undercut banks.	0	Moderate
Silver Perch <i>Bidyanus bidyanus</i>	V (FM Act)	CE	Found in a wide range of habitats but usually found in faster flowing water and more open sections of a river.	0	Moderate
Murray Crayfish <i>Euastacus armatus</i>	V (FM Act)	-	The Murray Crayfish originally occurred in the Murrumbidgee River system in NSW and the ACT, and parts of the Murray river system in NSW, Victoria and South Australia. The species has also been recorded from the Lachlan and Macquarie catchments in NSW, although the origin of these populations is currently unknown, and may be translocated. Murray Crayfish have an upper altitudinal range of approximately 750 – 800 m ASL	Known locally from recreational fishers	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence (Section 1)
Trout Cod <i>Maccullochella macquariensis</i>	E (FM Act)	CE	Found in the southern Murray-Darling river system, this fish inhabits fast flowing freshwater streams.	0	Low
Grey-headed flying fox <i>Pteropus poliocephalus</i>	V	V	Found in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heath and swamps as well as urban gardens and cultivated fruit crops	38	Moderate
Koala <i>Phascolarctos cinereus</i>	V	V	Inhabit eucalypt woodlands and forests. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.	218	Moderate
Spotted-tailed Quoll <i>Dasyurus maculatus</i>	V	E	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath, and inland riparian forest, from the sub-alpine zone to the coastline.	2	None
Squirrel Glider <i>Petaurus norfolcensis</i>	V	-	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas	340	High
Pink-tailed Legless Lizard <i>Aprasia parapulchella</i>	V	V	Habitat sites are generally sloping, open woodland areas with native grassy ground layer, particularly dominated by Kangaroo Grass (<i>Themeda australis</i>) Sites are well drained with rocky outcrops or scattered, partially buried rocks.	0	None
A spear-grass <i>Austrostipa wakoolica</i>	E	E	Found in floodplains of the Murray River tributaries, in open woodland on grey, silty clay or sandy loam soils.	3	None
Claypan Daisy <i>Brachyscome muelleroides</i>	V	V	Grows in damp areas on margins of claypans in moist grassland. It has also been recorded in margins of lagoons, and in association with <i>Calotis anthemoides</i>	1	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence (Section 1)
Floating Swamp Wallaby-Grass <i>Amphibromus fluitans</i>	V	V	Grows mostly in permanent swamps with at least moderate fertility. Can grow in swamp margins in mud, damn and tank beds in hard clay and in semi-dry mud lagoons	0	Low
Pine Donkey Orchid <i>Diuris tricolor</i>	V		Usually recorded in disturbed habitats. Grows in sclerophyll forests among grass, often with native Cypress Pine (<i>Callitris</i> spp.). It is found in sandy soils either on flats or small rises.	286	Moderate
Sand-hill Spider-orchid <i>Caladenia arenaria</i>	E	E	Occurs in woodland with sandy soil, especially dominated by White Cypress Pine (<i>Callitris glaucophylla</i>)	0	Moderate
Slender Darling Pea <i>Swainsona murrayana</i>	V	V	The species has been collected from clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and loams.	0	None
Small Purple-pea <i>Swainsona recta</i>	E	E	Grows in association with understorey dominants that include Kangaroo Grass <i>Themeda australis</i> , poa tussocks <i>Poa</i> spp., and spear-grasses <i>Austrostipa</i> spp.	2	Low
Tarengo Leek Orchid <i>Prasophyllum petilum</i>	E	E	Grows in open sites within Natural Temperate Grassland	0	None
Turnip Copperburr <i>Sclerolaena napiformis</i>	E	E	Grows in remnant grassland habitats on clay-loam soils and in tussock grassland in grey cracking clay to red-brown loamy clay.	0	None
Woolly Ragwort <i>Senecio garlandii</i>	V	-	Occurs on sheltered slopes of rocky outcrops	2	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence (Section 1)
Yellow Gum <i>Eucalyptus leucoxylon</i> subsp. <i>pruinosa</i>	V	-	<i>Eucalyptus leucoxylon</i> subsp. <i>pruinosa</i> is a tree species which, in New South Wales, occurs at the bases of sandy rises and on loamy clay flats on the floodplains of the Murray River and its tributaries in the Riverina Bioregion.	1	None
Yellow-lip Spider-orchid <i>Caladenia xanthochila</i>	-	E	Occupy dry woodlands on sandy soils	0	None
<i>Tylophora linearis</i>	V	E	Grows in dry scrub and open forest. It is associated with <i>Acacia hakeoides</i> , <i>Acacia lineata</i> , <i>Melaluca uncinata</i> , <i>Myoporum</i> species and <i>Casurina</i> species.	0	None
Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions	EEC	E	Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions is the name given to the ecological community that is dominated by Acacia melvillei (Yarran). Acacia melvillei Shrubland typically has an open canopy of shrubs or small trees, sometimes with scattered mid-stratum shrubs, and with a sometimes sparse, but highly variable ground layer dominated by grasses, chenopods and herbs. The structure and species composition of the community varies depending on disturbance history and temporal variability in rainfall. The open stratum of large shrubs or small trees may be reduced to isolated individuals or may be absent as a result of past clearing. The shrub/tree layer is dominated by Acacia melvillei, either in pure stands or with a range of other less abundant trees or tall shrubs. These may include Nelia (Acacia loderi), Western Rosewood (Alectryon oleifolius subsp. canescens), Belah (Casuarina pauper) and Sugarwood (Myoporum platycarpum).	-	None
Fuzzy Box Woodland on alluvial soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions	EEC	-	Tall woodland or open forest dominated by Fuzzy Box, <i>Eucalyptus conica</i> . Often occurs upstream from River Red Gum communities above frequently inundated areas of the floodplain. Also occurs on colluvium soils and lower slopes and valley flats	-	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence (Section 1)
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penepplain, Nandewar and Brigalow Belt South Bioregions	EEC	E	Occurs on fertile soils generally where average rainfall is 375-800mm annually and the mean maximum annual temperature is 22-26C. Many of the remaining patches have trees intact but the shrub and ground layers are degraded through grazing or pasture modification	-	Recorded
Mallee and Mallee-Broombrush dominated woodland and shrubland, lacking Triodia, in the NSW South Western Slopes bioregion	CEEC		There are three variants of the community. Those dominated by Bull Mallee and White Mallee occur on plains on red earths including aeolian soil known as parna. The variant dominated by Blue Mallee – Bull Mallee – Green Mallee generally occur on low hills and rises in sandy loam soils. The third variant, Broombrush – Green Mallee – Blue Mallee, occurs in loamy sands on rocky rises of sandstone and other sedimentary rock types.	-	None
Myall Woodland in the Darling Riverine, Brigalow Belt South, Cobar Penepplain, Murray-Darling Depression, Riverina and NSW South Western slopes bioregions	EEC	E	Open woodlands to woodlands, generally 5-12 m high and with a naturally shrubby or grassy understorey. They generally occur on flat areas, shallow depressions or gilgais on raised (relict) alluvial plains. These areas are not associated with active drainage channels and are rarely if ever flooded.	-	None
Natural Grasslands of the Murray Valley Plains	-	CE	The Natural Grasslands of the Murray Valley Plains ecological community ranges predominately across the southern parts of the Riverina Bioregion in NSW and Victoria, and the Wimmera plains of Victoria. Outlying occurrences extend into adjacent parts of the Murray Mallee Subregion and the NSW South Western Slopes Bioregion. The northern limit of the ecological community in NSW broadly corresponds to the northern boundary of the Murray Catchment Management Authority.	-	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence (Section 1)
Poplar Box Grassy Woodland on Alluvial Plains	-	E	Temperate to semi-arid grassy eucalypt woodland associated with alluvial plains including back plains, higher terraces and levees along rivers, ephemeral watercourses and depressions. It varies from grassland woodland to grassy open woodland.	-	None
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	EEC	-	The community can be characterised by an open tree stratum and is typically associate with prior streams and dunes, which are scattered within an extensive alluvial clay plain dominated by chenopod shrublands. It tends to grow on red-brown loamy sands with alkaline sub soils.	-	None
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	CEEC	CE	An open woodland community characterised by the presence or prior occurrence of White Box, Yellow Box and/or Blakely’s Red Gum and a generally grassy understorey. Remnants generally occur on fertile lower parts of the landscape.	-	Recorded

Habitat assessment table (Section 2)

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Sloane's Froglet <i>Crinia sloanei</i>	V	E	Associated with periodically inundated areas in grassland, woodland and disturbed habitats	2	Low
Southern Bell Frog <i>Litoria raniformis</i>	E	V	Usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys.	113	Moderate
Corben's Long-eared Bat <i>Nyctophilus corbeni</i>	V	V	Inhabits a variety of vegetation types, including mallee, bulloke <i>Allocasuarina leuhmanni</i> and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland.	0	Moderate
Inland Forest Bat <i>Vespadelus baverstocki</i>	V	-	Little is known of the habitat requirements of this species, however known to roost in tree hollows and abandoned buildings. They have been recorded in a variety of woodland formations mostly drier habitats.	3	Moderate
Little Pied Bat <i>Chalinolobus picatus</i>	V	-	Occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine forest and mallee and Bimbil box woodlands. Roosts in caves, rocky outcrops, mine shafts, tunnels, tree hollows and buildings	1	Moderate
Southern Myotis <i>Myotis Macropus</i>	V	-	Roost close to water in caves, mine shafts, hollow bearing trees, storm water channels, under bridges and in dense foliage. They forage over streams and pools.	4	Moderate
Yellow-bellied Sheath-tail-bat <i>Saccolaimus flaviventris</i>	V	-	Forages in most habitats, with or without trees. Roosts in tree hollows and buildings. They can use mammal burrows in treeless areas	2	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Australasian Bittern <i>Botaurus poiciloptilus</i>	E	E	Prefers permanent freshwater wetlands with tall, dense vegetation. Spends the day in reeds or rushes and feeds mostly at night	0	Low
Australian Bustard <i>Ardeotis australis</i>	E	-	Mainly inhabits tussock and hummock grasslands, though prefers tussock grasses to hummock grasses; also occurs in low shrublands and low open grassy woodlands; occasionally seen in pastoral and cropping country, golf courses and near dams.	1	Low
Australian Painted Snipe <i>Rostratula australis</i>	E	E	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	1	Low
Barking Owl <i>Ninox connivens</i>	V	-	Inhabits woodland and open forest, including remnants and partly cleared farmland. It requires large permanent territories, about 2000 hectares in NSW habitats.	2	Moderate
Black-chinned Honeyeater (eastern subspecies) <i>Melithreptus gularis gularis</i>	V	-	Inhabits drier open forests or woodland dominated by box and iron eucalypts. Also inhabits open forests of smooth-barked gums, strinkybarks, ironbarks, river she-oaks, and tea-trees.	1	Moderate
Black Falcon <i>Falco subniger</i>	V	-	The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions	5	Moderate
Blue-billed Duck <i>Oxyura australis</i>	V	-	The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation.	6	Low
Brolga <i>Grus rubicunda</i>	V	-	They are dependent on wetlands, especially shallow swamps and often feed in dry grassland or ploughed paddocks	5	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Brown Treecreeper (eastern subspecies) <i>Climacteris picumnus victoriae</i>	V		Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species.	122	Moderate
Bush Stone-curlew <i>Burhinus grallarius</i>	E	-	Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber.	14	Moderate
Caspian Tern <i>Hydroprogne caspia</i>	-	M	Caspian Terns are usually found near the coast, in extensive wetlands, on coastal and interior beaches and sheltered estuaries. The Caspian Tern lives equally well in fresh water and saline environments.	6	Low
Common Greenshank <i>Tringa nebularia</i>	-	M	Found both on the coast and inland, in estuaries and mudflats, mangrove swamps and lagoons, and in billabongs, swamps, sewage farms and flooded crops.	2	Low
Common Sandpiper <i>Actitis hypoleucos</i>	-	M	A small sandpiper that is widely distributed in small numbers along the coast of Australia and in many inland regions.	0	Low
Curlew Sandpiper <i>Calidris ferruginea</i>	E	CE M	Widespread occurrence along the coast and inland.	0	Low
Diamond Firetail <i>Stagonopleura guttata</i>	V	-	Found in grassy woodlands including Box-Gum Woodlands and Snow Gum Woodland	26	Moderate
Dusky Woodswallow <i>Artamus cyanopterus cyanopterus</i>	V	-	Found mostly in dry, open eucalypt forests and woodlands	14	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Eastern Curlew <i>Numenius madagascarensis</i>	-	CE M	Australia's largest shorebird. Flies to Russia and China annually to breed, returning to Australia to feed.	0	None
Flame Robin <i>Petroica pheonica</i>	V	-	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Habitat often changes in winter to include drier more open habitat including dry forests, open woodlands, native grassland, pastures and occasionally in heathland or other shrubland.	25	Moderate
Fork-tailed Swift <i>Apus pacificus</i>	-	M	Almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas.	0	Low
Freckled Duck <i>Stictonetta naevosa</i>	V	-	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds.	15	Low
Gilbert's Whistler <i>Pachycephala inornata</i>	V	-	Found in a variety of habitats but generally needs a dense shrub layer. These include, mallee shrublands, box-ironbark woodlands, cypress pine and Belah woodlands, and River Red gum forests. Forage on or near the ground in shrubs and on top of small trees.	2	Moderate
Glossy Black-Cockatoo <i>Calyptorhynchus lathami</i>	V	-	Inhabit open forests and woodlands. She-oak is an important food source and they feed almost exclusively on several species (<i>Casurina</i> and <i>Allocasaurina</i>).	1	None
Grey-crowned Babbler (eastern subspecies) <i>Pomatostomus temporalis temporalis</i>	V	-	Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Woodlands on fertile soils in coastal regions.	89	Recorded

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Grey Falcon <i>Falco hypoleucos</i>	E	V	Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast.	1	Low
Gull-billed Tern <i>Gelochelidon nilotica</i>	-	M	Gull-billed Terns are found in freshwater swamps, brackish and salt lakes, beaches and estuarine mudflats, floodwaters, sewage farms, irrigated croplands and grasslands.	5	Low
Latham's Snipe <i>Gallinago hardwickii</i>	-	M	Habitat in Australia includes permanent and ephemeral wetlands.	4	Low
Little Eagle <i>Hieraaetus morphnoides</i>	V	-	Little Eagle is distributed across all the Australian mainland except for densely vegetated areas, particularly on the Dividing Range escarpment. In NSW, the Little Eagle is considered a single population. They inhabit open eucalypt woodland, woodland and open woodland, including She-oak, <i>Acacia</i> woodland and riparian woodland in arid and semi-arid regions.	14	Recorded
Little Lorikeet <i>Glossopsitta pusilla</i>	V	-	Uses riparian habitats and forages in open eucalypt forests and woodland. Roosts in treetops, often separate from feeding areas. Urban areas, paddocks and roadside remnants with flowering trees can help sustain viable populations	0	Moderate
Magpie Goose <i>Anserenas semipalmata</i>	V	-	Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges.	3	Low
Malleefowl <i>Leipoa ocellata</i>	E	V	Predominantly inhabit mallee communities, preferring the tall, dense and floristically-rich mallee found in higher rainfall (300 - 450 mm mean annual rainfall) areas. Utilises mallee with a spinifex understorey, but usually at lower densities than in areas with a shrub understorey.	1	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Marsh Sandpiper <i>Tringa stagnatilis</i>	-	M	Marsh Sandpipers are commonly seen singly, or in small to large flocks in fresh or brackish (slightly salty) wetlands such as rivers, water meadows, sewage farms, drains, lagoons and swamps.	1	None
Night Parrot <i>Pezoporus occidentalis</i>	PE	E	The Night Parrot is known to occur within Spinifex grasslands in stony or sandy areas and samphire and chenopod associations on floodplains, salt lakes and clay pans	0	None
Painted Honeyeater <i>Grantiella picta</i>	V	V	Inhabits Boree/Weeping Myall (<i>Acacia pendula</i>), Brigalow (<i>A.harpophylla</i>) and Box-Gum Woodlands and Box-Ironbark Forests. Feeds on mistletoes preferably the genus <i>Amyema</i>	6	Moderate
Pectoral Sandpiper <i>Calidris melanotos</i>	-	M	A small to medium sandpiper. In Australia it can be found in both shallow fresh and salt water. The sandpiper flies to Russia and Northern America to breed.	0	Low
Plains-wanderer <i>Pedionomus torquatus</i>	E	CE	Plains-wanderers live in semi-arid, lowland native grasslands that typically occur on hard red-brown soils. These grasslands support a high diversity of plant species, including a number of state and nationally threatened species.	13	Moderate
Regent Honeyeater <i>Anthochaera phrygia</i>	CE	CE	Lives in dry open forest and woodland especially Box-Ironbark woodland, and riparian forests of River She-oak. Woodlands they inhabit often support high abundance and species richness of bird species.	2	Low
Satin Flycatcher <i>Myiagra cyanoleuca</i>	-	M	The Satin Flycatcher is found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests.	0	Low
Scarlet Robin <i>Petrocia boodang</i>	V	-	Lives in dry eucalypt forests and woodlands with open grassy understorey with scattered shrubs. Lives in both mature and regrowth vegetation and usually contains abundant logs and fallen timber	4	High

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Sharp-tailed Sandpiper <i>Calidris acuminata</i>	-	M	Occurs in Australia during the non-breeding part of the year. Found on both the coast and inland areas. Flies north to Siberia to breed.	2	Low
Speckled Warbler <i>Chthonicola sagittate</i>	V	-	Lives in Eucalypts dominated communities that have a grassy understorey with sparse shrub layer. Large, relatively undisturbed habitats are needed for this species to remain in an area.	29	Moderate
Spotted Harrier <i>Circus assimilis</i>	V	-	Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe.	13	Moderate
Superb Parrot <i>Polytelis swainsonii</i>	V	V	Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.	737	Recorded
Swift Parrot <i>Lathamus discolor</i>	E	CE	Occurs in areas with flowering eucalypts or abundant lerp (from sap sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany <i>Eucalyptus robusta</i> , Spotted Gum <i>Corymbia maculata</i> , Red Bloodwood <i>C. gummifera</i> , Forest Red Gum <i>E. tereticornis</i> , Mugga Ironbark <i>E. sideroxylon</i> , and White Box <i>E. albens</i> . Commonly used lerp infested trees include Inland Grey Box <i>E. microcarpa</i> , Grey Box <i>E. moluccana</i> , Blackbutt <i>E. pilularis</i> , and Yellow Box <i>E. melliodora</i>	0	Low
Turquoise Parrot <i>Neophema pulchella</i>	V	-	Habitats include edges of eucalypt woodland near clearings, timbered ridges and creeks in farmlands.	1	Recorded
Varied Sittella <i>Daphoenositta chrysoptera</i>	V	-	This species is sedentary and known to inhabit most forest/woodland habitats.	14	High

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
White-bellied Sea-eagle <i>Haliaeetus leucogaster</i>	V	M	The species is normally seen perched high in a tree, or soaring over waterways and adjacent land, particularly along coastlines, lakes and rivers.	71	Moderate
White-fronted Chat <i>Epthianura albifrons</i>	V	-	Gregarious species, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground.	7	Moderate
White-throated Needletail <i>Hirundapus caudacutus</i>	-	V M	Once believed they did not land in Australia, but now shown to roost in trees. They are more common in coastal areas compared to inland	1	Moderate
Yellow Wagtail <i>Motacilla flava</i>	-	M	Occurs in a variety of habitats, favouring damp or wet vegetation. Forages on the edges of rivers, dams and wetlands.	0	Low
Flathead Galaxias <i>Galaxias rostratus</i>	E (FM Act)	CE	Known from the southern half of the Marry-Darling Basin. Inhabits a variety of habitats including rivers, lakes and swamps.	0	Low
Macquarie Perch <i>Macquaria australasica</i>	E (FM Act)	E	Found in the upstream reaches of the Murray-Darling Basin. Found in rivers and lakes.	0	None
Murray Cod <i>Maccullochella peelii</i>	-	V	Prefers deep, slow flowing turbid water in rivers and streams with boulders or undercut banks.	Known locally from recreational fishers	Moderate
Silver Perch <i>Bidyanus bidyanus</i>	V (FM Act)	CE	Found in a wide range of habitats but usually found in faster flowing water and more open sections of a river.	0	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Murray Crayfish <i>Euastacus armatus</i>	V (FM Act)	-	The Murray Crayfish originally occurred in the Murrumbidgee River system in NSW and the ACT, and parts of the Murray river system in NSW, Victoria and South Australia. The species has also been recorded from the Lachlan and Macquarie catchments in NSW, although the origin of these populations is currently unknown, and may be translocated. Murray Crayfish have an upper altitudinal range of approximately 750 – 800 m ASL	Known locally from recreational fishers	Moderate
Trout Cod <i>Maccullochella macquariensis</i>	E (FM Act)	CE	Found in the southern Murray-Darling river system, this fish inhabits fast flowing freshwater streams.	0	Low
Grey-headed flying fox <i>Pteropus poliocephalus</i>	V	V	Found in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heath and swamps as well as urban gardens and cultivated fruit crops	1	Low
Koala <i>Phascolarctos cinereus</i>	V	V	Inhabit eucalypt woodlands and forests. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.	214	Recorded
Spotted-tailed Quoll <i>Dasyurus maculatus</i>	V	E	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	2	Low
Pink-tailed Legless Lizard <i>Aprasia parapulchella</i>	V	V	Habitat sites are generally sloping, open woodland areas with native grassy ground layer, particularly dominated by Kangaroo Grass (<i>Themeda australis</i>) Sites are well drained with rocky outcrops or scattered, partially buried rocks.	0	None
A spear-grass <i>Austrostipa wakoolica</i>	E	E	Found in floodplains of the Murray River tributaries, in open woodland on grey, silty clay or sandy loam soils.	0	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Chariot Wheels <i>Maireana cheelii</i>	V	V	Tends to grow in shallow depressions, often on eroded or scalded surfaces, and does not extend to the higher soils in the habitat. It has been found on the edges of bare, windswept claypans, in shallow depressions of eroded surfaces where rainwater collects and on a “shelf” in the crabhole complex of heavy grey soils.	3	Low
Claypan Daisy <i>Brachyscome muelleroides</i>	V	V	Grows in damp areas on margins of claypans in moist grassland. It has also been recorded in margins of lagoons, and in association with <i>Calotis anthemoides</i>	0	None
Menindee Nightshade <i>Solanum karsense</i>	V	V	Habitats are generally lake beds or floodplains of heavy grey clays with a highly self-mulching surface. Also found on sandy floodplains and ridges and in calcareous soils, red sands, red-brown earths and loamy soils.	0	None
Mossgiel Daisy <i>Brachyscome papillosa</i>	V	V	Recorded primarily in clay soils on Bladder Saltbush (<i>Atriplex vesicaria</i>) and Leafless Bluebush (<i>Maireana aphylla</i>) plains, but also in grassland and in Inland Grey Box (<i>Eucalyptus microcarpa</i>) - Cypress Pine (<i>Callitris</i> spp.) woodland.	3	Moderate
Pine Donkey Orchid <i>Diuris tricolor</i>	V		Usually recorded in disturbed habitats. Grows in sclerophyll forests among grass, often with native Cypress Pine (<i>Callitris</i> spp.). It is found in sandy soils either on flats or small rises.	298	Moderate
Sand-hill Spider-orchid <i>Caladenia arenaria</i>	E	E	Occurs in woodland with sandy soil, especially dominated by White Cypress Pine (<i>Callitris glaucophylla</i>)	0	Moderate
Slender Darling Pea <i>Swainsona murrayana</i>	V	V	The species has been collected from clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and loams.	16	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Silky Swainson-pea <i>Swainsona sericea</i>	V	-	Found in box-gum woodlands and regenerates from seed after fire	3	Moderate
Small Scurf-pea <i>Cullen parvum</i>	E	-	Found in grassland, River Red gum woodland or Box-Gum Woodland. Sometimes found on grazed land and usually on or adjacent to drainage lines or watercourses, in areas of rainfall of between 450 and 700mm.	1	Low
Spike-Rush <i>Eleocharis obicis</i>	V	V	Grows in ephemeral wet situations such as roadside mitre drains and depressions, usually in low-lying grasslands.	0	Low
Turnip Copperburr <i>Sclerolaena napiformis</i>	E	E	Grows in remnant grassland habitats on clay-loam soils and in tussock grassland in grey cracking clay to red-brown loamy clay.	0	None
Yellow Gum <i>Eucalyptus leucoxylon subsp. pruinosa</i>	V	-	<i>Eucalyptus leucoxylon subsp. pruinosa</i> is a tree species which, in New South Wales, occurs at the bases of sandy rises and on loamy clay flats on the floodplains of the Murray River and its tributaries in the Riverina Bioregion.	1	None
Yellow-lip Spider-orchid <i>Caladenia xanthochila</i>	-	E	Occupies dry woodlands on sandy soils	0	None
Winged Pepper-cress <i>Lepidium monoplacoides</i>	E	E	Occurs on seasonally moist to waterlogged sites, on heavy fertile soils, with a mean annual rainfall of around 300-500 mm. Predominant vegetation is usually an open woodland dominated by <i>Allocasuarina luehmannii</i> (Bulloak) and/or eucalypts, particularly <i>Eucalyptus largiflorens</i> (Black Box) or <i>Eucalyptus populnea</i> (Poplar Box). The field layer of the surrounding woodland is dominated by tussock grasses.	0	Low

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions	EEC	-	Typically occurs on sandhills and undulating sandplains with red-brown, sandy loam soils. The structure and species composition varies depending on the disturbance history and temporal variability in rainfall.	-	Recorded
Allocasaurina luehmanni Woodland in the Riverina and Murray-Darling Depression Bioregions	EEC	EEC	Usually comprises an open tree canopy with a sparse and highly variable ground layer dominated by grasses and herbs, sometimes with scattered shrubs and/or small trees. It is dominated by Buloke (<i>Allocasaurina luehmanni</i>). It typically occurs on patches of red brown. It typically occupies patches of red-brown loamy sands with alkaline sub-soils on the alluvial plain of the Murray River and its tributaries in south-western NSW.	-	None
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	EEC	EEC	Occurs on fertile soils generally where average rainfall is 375-800mm annually and the mean maximum annual temperature is 22-26C. Many of the remaining patches have trees intact but the shrub and ground layers are degraded through grazing or pasture modification	-	Recorded
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	EEC	-	The community can be characterised by an open tree stratum and is typically associate with prior streams and dunes, which are scattered within an extensive alluvial clay plain dominated by chenopod shrublands. It tends to grow on red-brown loamy sands with alkaline sub soils.	-	Recorded
Poplar Box Grassy Woodland on Alluvial Plains		E	Temperate to semi-arid grassy eucalypt woodland associated with alluvial plains including back plains, higher terraces and levees along rivers, ephemeral watercourses and depressions. It varies from grassland woodland to grassy open woodland.	-	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Myall Woodland in the Darling Riverine, Brigalow Belt South, Cobar Penplain, Murray-Darling Depression, Riverina and NSW South Western slopes bioregions	EEC	EEC	The Myall Woodlands are open woodlands to woodlands, generally 5-12 m high and with a naturally shrubby or grassy understorey. They generally occur on flat areas, shallow depressions or gilgais on raised (relict) alluvial plains. These areas are not associated with active drainage channels and are rarely if ever flooded.	-	Recorded
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	CEEC	CEEC	An open woodland community characterised by the presence or prior occurrence of White Box, Yellow Box and/or Blakely’s Red Gum and a generally grassy understorey. Remnants generally occur on fertile lower parts of the landscape.	-	Recorded

Habitat assessment table (Section 3)

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Southern Bell Frog <i>Litoria raniformis</i>	E	V	Usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys.	11	Moderate
Corben's Long-eared Bat <i>Nyctophilus corbeni</i>	V	V	Inhabits a variety of vegetation types, including mallee, bulloke <i>Allocasuarina leuhmanni</i> and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland.	0	Moderate
Australasian Bittern <i>Botaurus poiciloptilus</i>	E	E	A heron-like bird which inhabits wetlands.	1	Low
Australian Bustard <i>Ardeotis australis</i>	E	-	Mainly inhabits tussock and hummock grasslands, though prefers tussock grasses to hummock grasses; also occurs in low shrublands and low open grassy woodlands; occasionally seen in pastoral and cropping country, golf courses and near dams.	1	Low
Australian Painted Snipe <i>Rostratula australis</i>	E	E	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	0	Low
Black Falcon <i>Falco subniger</i>	V	-	The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions	5	Moderate
Blue-billed Duck <i>Oxyura australis</i>	V	-	The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation.	7	Low

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Brown Treecreeper (eastern subspecies) <i>Climacteris picumnus victoriae</i>	V	-	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species.	6	High
Bush Stone-curlew <i>Burhinus grallarius</i>	E	-	Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber.	4	Moderate
Caspian Tern <i>Hydroprogne caspia</i>	-	M	Caspian Terns are usually found near the coast, in extensive wetlands, on coastal and interior beaches and sheltered estuaries. The Caspian Tern lives equally well in fresh water and saline environments.	10	Low
Common Greenshank <i>Tringa nebularia</i>	-	M	Found both on the coast and inland, in estuaries and mudflats, mangrove swamps and lagoons, and in billabongs, swamps, sewage farms and flooded crops.	2	Low
Common Sandpiper <i>Actitis hypoleucos</i>	-	M	A small sandpiper that is widely distributed in small numbers along the coast of Australia and in many inland regions.	0	Low
Curlew Sandpiper <i>Calidris ferruginea</i>	E	CE M	Widespread occurrence along the coast and inland.	0	Low
Diamond Firetail <i>Stagonopleura guttata</i>	V	-	Found in grassy woodlands including Box-Gum Woodlands and Snow Gum Woodland	1	Moderate
Dusky Woodswallow <i>Artamus cyanopterus cyanopterus</i>	V	-	Found mostly in dry, open eucalypt forests and woodlands	6	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Eastern Curlew <i>Numenius madagascarensis</i>	-	CE M	Australia's largest shorebird. Flies to Russia and China annually to breed, returning to Australia to feed.	0	Low
Fork-tailed Swift <i>Apus pacificus</i>	-	M	Almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas.	2	Moderate
Freckled Duck <i>Stictonetta naevosa</i>	V	-	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds.	13	Low
Grey-crowned Babbler (eastern subspecies) <i>Pomatostomus temporalis temporalis</i>	V	-	Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Woodlands on fertile soils in coastal regions.	20	Recorded
Grey Falcon <i>Falco hypoleucos</i>	E	-	Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast.	0	None
Gull-billed Tern <i>Gelochelidon nilotica</i>	-	M	Gull-billed Terns are found in freshwater swamps, brackish and salt lakes, beaches and estuarine mudflats, floodwaters, sewage farms, irrigated croplands and grasslands.	7	Low
Latham's Snipe <i>Gallinago hardwickii</i>	-	M	Habitat in Australia includes permanent and ephemeral wetlands.	0	Low

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Little Eagle <i>Hieraaetus morphnoides</i>	V	-	Little Eagle is distributed across all of the Australian mainland except for densely vegetated areas, particularly on the Dividing Range escarpment. In NSW the Little Eagle is considered a single population. They inhabit open eucalypt woodland, woodland and open woodland, including Sheoak, <i>Acacia</i> woodland and riparian woodland in arid and semi-arid regions.	3	Recorded
Magpie Goose <i>Anserenas semipalmata</i>	V	-	Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges.	1	Low
Marsh Sandpiper <i>Tringa stagnatilis</i>	-	M	Marsh Sandpipers are commonly seen singly, or in small to large flocks in fresh or brackish (slightly salty) wetlands such as rivers, water meadows, sewage farms, drains, lagoons and swamps.	1	Low
Night Parrot <i>Pezoporus occidentalis</i>	PE	E	The Night Parrot is known to occur within Spinifex grasslands in stony or sandy areas and samphire and chenopod associations on floodplains, salt lakes and clay pans	0	None
Painted Honeyeater <i>Grantiella picta</i>	V	V	Inhabits Boree/Weeping Myall (<i>Acacia pendula</i>), Brigalow (<i>A.harpophylla</i>) and Box-Gum Woodlands and Box-Ironbark Forests. Feeds on mistletoes preferably the genus <i>Amyema</i>	0	Moderate
Pectoral Sandpiper <i>Calidris melanotos</i>	-	M	A small to medium sandpiper. In Australia it can be found in both shallow fresh and salt water. The sandpiper flies to Russia and Northern America to breed.	0	Low
Pied Honeyeater <i>Certhionyx variegatus</i>	V	-	Inhabits wattle shrub, primarily Mulga (<i>Acacia aneura</i>), mallee, spinifex and eucalypt woodlands, usually when shrubs are flowering; feeds on nectar, predominantly from various species of emu-bushes (<i>Eremophila</i> spp.); also from mistletoes and various other shrubs (e.g. <i>Grevillea</i> spp.); also eats saltbush fruit, berries, seed, flowers and insects.	1	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Pink Cockatoo <i>Lophochroa leadbeateri</i>	V	-	Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water.	27	Moderate
Plains-wanderer <i>Pedionomus torquatus</i>	E	CE	Plains-wanderers live in semi-arid, lowland native grasslands that typically occur on hard red-brown soils. These grasslands support a high diversity of plant species, including a number of state and nationally threatened species.	3	Moderate
Redthroat <i>Pyrholaemus brunneus</i>	V	-	In NSW the species has been recorded mainly in chenopod shrublands including Old Man Saltbush, Black Bluebush and Dillon Bush shrublands. Around Broken Hill it appears to be associated with the denser vegetation, particularly Acacias, found in drainage lines that run from the rocky hills. In other locations it is known from Cane grass and Lignum swamps and depressions, particularly on floodplains.	2	Moderate
Regent Parrot (eastern) <i>Polytelis anthopeplus monarchoides</i>	E	V	Principal foraging habitat is mallee woodlands, though foraging also occurs in riverine forests and woodlands.	1	None
Satin Flycatcher <i>Myiagra cyanoleuca</i>	-	M	The Satin Flycatcher is found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests.	0	Low
Sharp-tailed Sandpiper <i>Calidris acuminata</i>	-	M	Occurs in Australia during the non-breeding part of the year. Found on both the coast and inland areas. Flies north to Siberia to breed.	5	Low
Spotted Harrier <i>Circus assimilis</i>	V	-	Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe.	7	Moderate
Superb Parrot <i>Polytelis swainsonii</i>	V	V	Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.	1	Recorded

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Varied Sittella <i>Daphoenositta chrysoptera</i>	V	-	This species is sedentary and known to inhabit most forest/woodland habitats.	1	Low
White-bellied Sea-eagle <i>Haliaeetus leucogaster</i>	V	M	The species is normally seen perched high in a tree, or soaring over waterways and adjacent land, particularly along coastlines, lakes and rivers.	23	Moderate
White-fronted Chat <i>Epthianura albifrons</i>	V	-	Gregarious species, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground.	19	Recorded
Yellow Wagtail <i>Motacilla flava</i>	-	M	Occurs in a variety of habitats, favouring damp or wet vegetation. Forages on the edges of rivers, dams and wetlands.	0	None
Flathead Galaxias <i>Galaxias rostratus</i>	E (FM Act)	CE	Known from the southern half of the Murray-Darling Basin. Inhabits a variety of habitats including rivers, lakes and swamps.	0	None
Macquarie Perch <i>Macquaria australasica</i>	E (FM Act)	E	Found in the upstream reaches of the Murray-Darling Basin. Found in rivers and lakes.	0	None
Murray Cod <i>Maccullochella peelii</i>	-	V	Prefers deep, slow flowing turbid water in rivers and streams with boulders or undercut banks.	0	None
Murray Hardyhead <i>Craterocephalus fluviatilis</i>	CE (FM Act)	E	Prefers open water, shallow, slow-flowing or still habitats, with sand or silt substrates. It can also be found in deeper habitats with dense vegetation. https://www.mdba.gov.au/sites/default/files/archived/mdbc-NFS-reports/2203_factsheet_native_murray_hardyhead.pdf	0	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Trout Cod <i>Maccullochella macquariensis</i>	E (FM Act)	E	Found in the southern Murray-Darling river system, this fish inhabits fast flowing freshwater streams.	0	None
Koala <i>Phascolarctos cinereus</i>	V	V	Inhabit eucalypt woodlands and forests. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.	0	None
Spotted-tailed Quoll <i>Dasyurus maculatus</i>	V	E	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	1	Low
Striped Legless Lizard <i>Delma impar</i>	V	V	Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Also found in secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland.	0	None
A spear-grass <i>Austrostipa metatoris</i>	V	V	Grows in sandy areas of the Murray Valley; habitats include sandhills, sand ridges, undulating plains and flat open mallee country, with red to red-brown clay-loam to sandy-loam soils.	0	None
Chariot Wheels <i>Maireana cheelii</i>	V	V	Tends to grow in shallow depressions, often on eroded or scalded surfaces, and does not extend to the higher soils in the habitat. It has been found on the edges of bare, windswept claypans, in shallow depressions of eroded surfaces where rainwater collects and on a "shelf" in the crabhole complex of heavy grey soils.	3	Low
Menindee Nightshade <i>Solanum karsense</i>	V	V	Habitats are generally lake beds or floodplains of heavy grey clays with a highly self-mulching surface. Also found on sandy floodplains and ridges and in calcareous soils, red sands, red-brown earths and loamy soils.	6	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Mossgiel Daisy <i>Brachyscome papillosa</i>	V	V	Recorded primarily in clay soils on Bladder Saltbush (<i>Atriplex vesicaria</i>) and Leafless Bluebush (<i>Maireana aphylla</i>) plains, but also in grassland and in Inland Grey Box (<i>Eucalyptus microcarpa</i>) - Cypress Pine (<i>Callitris</i> spp.) woodland.	5	Moderate
Slender Darling Pea <i>Swainsona murrayana</i>	V	V	The species has been collected from clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and loams.	8	Moderate
Spike-Rush <i>Eleocharis obicis</i>	V	V	Grows in ephemerally wet situations such as roadside mitre drains and depressions, usually in low-lying grasslands.	0	Low
Winged Pepper-cress <i>Lepidium monoplocoides</i>	E	E	Occurs on seasonally moist to waterlogged sites, on heavy fertile soils, with a mean annual rainfall of around 300-500 mm. Predominant vegetation is usually an open woodland dominated by <i>Allocasuarina luehmannii</i> (Bulloak) and/or eucalypts, particularly <i>Eucalyptus largiflorens</i> (Black Box) or <i>Eucalyptus populnea</i> (Poplar Box). The field layer of the surrounding woodland is dominated by tussock grasses.	2	Moderate
Yellow Gum <i>Eucalyptus leucoxydon</i> subsp. <i>pruinosa</i>	V	-	<i>Eucalyptus leucoxydon</i> is a tree species which, in New South Wales, occurs at the bases of sandy rises and on loamy clay flats on the floodplains of the Murray River and its tributaries in the Riverina Bioregion.	1	None
Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions	EEC	-	Typically occurs on sandhills and undulating sandplains with red-brown, sandy loam soils. The structure and species composition varies depending on the disturbance history and temporal variability in rainfall.	-	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Allocasaurina luehmanni Woodland in the Riverina and Murray-Darling Depression Bioregions	EEC	EEC	Usually comprises an open tree canopy with a sparse and highly variable ground layer dominated by grasses and herbs, sometimes with scattered shrubs and/or small trees. It is dominated by Buloke (<i>Allocasaurina luehmanni</i>). It typically occurs on patches of red brown. It typically occupies patches of red-brown loamy sands with alkaline sub-soils on the alluvial plain of the Murray River and its tributaries in south-western NSW.	-	None
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penepplain, Nandewar and Brigalow Belt South Bioregions	EEC	EEC	Occurs on fertile soils generally where average rainfall is 375-800mm annually and the mean maximum annual temperature is 22-26C. Many of the remaining patches have trees intact but the shrub and ground layers are degraded through grazing or pasture modification	-	None
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	EEC	-	The community can be characterised by an open tree stratum and is typically associate with prior streams and dunes, which are scattered within an extensive alluvial clay plain dominated by chenopod shrublands. It tends to grow on red-brown loamy sands with alkaline sub soils.	-	None
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	CEEC	CEEC	An open woodland community characterised by the presence or prior occurrence of White Box, Yellow Box and/or Blakely’s Red Gum and a generally grassy understorey. Remnants generally occur on fertile lower parts of the landscape	-	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Myall Woodland in the Darling Riverine, Brigalow Belt South, Cobar Penplain, Murray-Darling Depression, Riverina and NSW South Western slopes bioregions	EEC	EEC	The Myall Woodlands are open woodlands to woodlands, generally 5-12 m high and with a naturally shrubby or grassy understorey. They generally occur on flat areas, shallow depressions or gilgais on raised (relict) alluvial plains. These areas are not associated with active drainage channels and are rarely if ever flooded.	-	None

Habitat assessment table (Section 4)

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Southern Bell Frog <i>Litoria raniformis</i>	E	V	Usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys.	5	Moderate
Corben's Long-eared Bat <i>Nyctophilus corbeni</i>	V	V	Inhabits a variety of vegetation types, including mallee, bulloke <i>Allocasuarina leuhmanni</i> and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland.	6	Moderate
Inland Forest Bat <i>Vespadelus baverstocki</i>	V		Little is known of the habitat requirements of this species, however known to roost in tree hollows and abandoned buildings. They have been recorded in a variety of woodland formations mostly drier habitats.	21	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Little Pied Bat <i>Chalinolobus picatus</i>	V	-	Occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine forest and mallee and Bimbil box woodlands. Roosts in caves, rocky outcrops, mine shafts, tunnels, tree hollows and buildings	5	Moderate
Australasian Bittern <i>Botaurus poiciloptilus</i>	E	E	A heron-like bird which inhabits wetlands.	0	Low
Australian Painted Snipe <i>Rostratula australis</i>	E	E	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	0	Low
Black-breasted Buzzard <i>Mairostra melanosternon</i>	V	-	Found in a variety of habitats, particularly timbered watercourses. It often hunts over grasslands and sparsely timbered woodlands	1	Moderate
Black Falcon <i>Falco subniger</i>	V	-	The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions	1	Moderate
Black-eared Miner <i>Manorina melanotis</i>	CE	E	Found in large tracts (30,000 hectares or greater) of mature, unfragmented mallee on more fertile soils. They prefer areas post fire of 25 years, but most prevalent in areas 50 years post fire.	0	None (as only known population well clear of study area)
Blue-billed Duck <i>Oxyura australis</i>	V	-	The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation.	2	Low
Brown Treecreeper (eastern subspecies) <i>Climacteris picumnus victoriae</i>	V	-	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species.	41	None (as eastern subspecies only occurs east of Newell Highway)

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Caspian Tern <i>Hydroprogne caspia</i>	-	M	Caspian Terns are usually found near the coast, in extensive wetlands, on coastal and interior beaches and sheltered estuaries. The Caspian Tern lives equally well in fresh water and saline environments.	12	Low
Chestnut Quail-thrush <i>Cinlosoma castanotum</i>	V	-	Mainly found in mallee scrub, but also in <i>Acacia</i> scrubs, dry sclerophyll woodland, heath and native pine.	60	Moderate
Common Greenshank <i>Tringa nebularia</i>	-	M	Found both on the coast and inland, in estuaries and mudflats, mangrove swamps and lagoons, and in billabongs, swamps, sewage farms and flooded crops.	0	Low
Common Sandpiper <i>Actitis hypoleucos</i>	-	M	A small sandpiper that is widely distributed in small numbers along the coast of Australia and in many inland regions.	0	Low
Curlew Sandpiper <i>Calidris ferruginea</i>	E	CE M	Widespread occurrence along the coast and inland.	0	Low
Dusky Woodswallow <i>Artamus cyanopterus cyanopterus</i>	V	-	Found mostly in dry, open eucalypt forests and woodlands	2	Moderate
Eastern Curlew <i>Numenius madagascarensis</i>	-	CE M	Australia's largest shorebird. Flies to Russia and China annually to breed, returning to Australia to feed.	0	Low
Fork-tailed Swift <i>Apus pacificus</i>	-	M	Almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas.	4	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Freckled Duck <i>Stictonetta naevosa</i>	V	-	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds.	4	Low
Gilbert's Whistler <i>Pachycephala inornata</i>	V	-	Is found in a variety of habitats but generally needs a dense shrub layer. These include, mallee shrublands, box-ironbark woodlands, cypress pine and Belah woodlands, and River Red gum forests. Forage on or near the ground in shrubs and on top of small trees.	45	Moderate
Grey-crowned Babbler (eastern subspecies) <i>Pomatostomus temporalis temporalis</i>	V	-	Inhabits open Box-Gum Woodlands on the slopes, and Box-Cypress-pine and open Box Woodlands on alluvial plains. Woodlands on fertile soils in coastal regions.	9	Moderate
Grey Falcon <i>Falco hypoleucos</i>	E	-	Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast.	0	Low
Gull-billed Tern <i>Gelochelidon nilotica</i>	-	M	Gull-billed Terns are found in freshwater swamps, brackish and salt lakes, beaches and estuarine mudflats, floodwaters, sewage farms, irrigated croplands and grasslands.	2	Low
Hooden Robin (south-eastern form) <i>Melanodryas cucullata cucullata</i>	V	-	Found in lightly wooded country, usually near open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas	8	Moderate
Latham's Snipe <i>Gallinago hardwickii</i>	-	M	Habitat in Australia includes permanent and ephemeral wetlands.	0	Low

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Little Eagle <i>Hieraaetus morphnoides</i>	V	-	Little Eagle is distributed across all of the Australian mainland except for densely vegetated areas, particularly on the Dividing Range escarpment. In NSW the Little Eagle is considered a single population. They inhabit open eucalypt woodland, woodland and open woodland, including She-oak, <i>Acacia</i> woodland and riparian woodland in arid and semi-arid regions.	7	Moderate
Malleefowl <i>Leipoa ocellata</i>	E	V	Predominantly inhabit mallee communities, preferring the tall, dense and floristically-rich mallee found in higher rainfall (300 - 450 mm mean annual rainfall) areas. Utilises mallee with a spinifex understorey, but usually at lower densities than in areas with a shrub understorey.	87	Moderate
Night Parrot <i>Pezoporus occidentalis</i>	PE	E	The Night Parrot is known to occur within Spinifex grasslands in stony or sandy areas and samphire and chenopod associations on floodplains, salt lakes and clay pans	0	None
Painted Honeyeater <i>Grantiella picta</i>	V	V	Inhabits Boree/Weeping Myall (<i>Acacia pendula</i>), Brigalow (<i>A.harpophylla</i>) and Box-Gum Woodlands and Box-Ironbark Forests. Feeds on mistletoes preferably the genus <i>Amyema</i>	0	Low
Pectoral Sandpiper <i>Calidris melanotos</i>	-	M	A small to medium sandpiper. In Australia it can be found in both shallow fresh and salt water. The sandpiper flies to Russia and Northern America to breed.	0	Low
Pied Honeyeater <i>Certhionyx variegatus</i>	V	-	Inhabits wattle shrub, primarily Mulga (<i>Acacia aneura</i>), mallee, spinifex and eucalypt woodlands, usually when shrubs are flowering; feeds on nectar, predominantly from various species of emu-bushes (<i>Eremophila</i> spp.); also from mistletoes and various other shrubs (e.g. <i>Grevillea</i> spp.); also eats saltbush fruit, berries, seed, flowers and insects.	1	Moderate
Pink Cockatoo <i>Lophochroa leadbeateri</i>	V	-	Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water.	29	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Plains-wanderer <i>Pedionomus torquatus</i>	E	CE	Plains-wanderers live in semi-arid, lowland native grasslands that typically occur on hard red-brown soils. These grasslands support a high diversity of plant species, including a number of state and nationally threatened species.	0	Low
Redthroat <i>Pyrholaemus brunneus</i>	V	-	In NSW the species has been recorded mainly in chenopod shrublands including Old Man Saltbush, Black Bluebush and Dillon Bush shrublands. Around Broken Hill it appears to be associated with the denser vegetation, particularly Acacias, found in drainage lines that run from the rocky hills. In other locations it is known from Cane grass and Lignum swamps and depressions, particularly on floodplains.	2	Moderate
Regent Parrot (eastern) <i>Polytelis anthopeplus monarchoides</i>	E	V	Principal foraging habitat is mallee woodlands, though foraging also occurs in riverine forests and woodlands.	149	Recorded
Satin Flycatcher <i>Myiagra cyanoleuca</i>	-	M	The Satin Flycatcher is found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests.	0	None
Sharp-tailed Sandpiper <i>Calidris acuminata</i>	-	M	Occurs in Australia during the non-breeding part of the year. Found on both the coast and inland areas. Flies north to Siberia to breed.		Low
Shy Heathwren <i>Hylacola cautus</i>	V	-	Inhabits mallee woodlands with a relatively dense understorey of shrubs and health plants. Prefers areas of one to five years post fire or in those long unburnt (greater than 40 years), but is found in all age classes of vegetation.	7	Moderate
Southern Scrub-robin <i>Drymodes brunneopygia</i>	V	-	Is found in mallee and acai scrub, particularly areas with dense sub-shrubs in the understorey. It is most abundant in areas post fire of 26-40 years but can be found in post fire age of 4-80 years.	10	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Speckled Warbler <i>Chthonicola sagittate</i>	V	-	Lives in Eucalypts dominated communities that have a grassy understorey with sparse shrub layer. Large, relatively undisturbed habitats are needed for this species to remain in an area.	1	Moderate
Spotted Harrier <i>Circus assimilis</i>	V	-	Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe.	3	Moderate
Superb Parrot <i>Polytelis swainsonii</i>	V	V	Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.	1	Moderate
Swift Parrot <i>Lathamus discolor</i>	E	CE	Occurs in areas with flowering eucalypts or abundant lerp (from sap sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany <i>Eucalyptus robusta</i> , Spotted Gum <i>Corymbia maculata</i> , Red Bloodwood <i>C. gummifera</i> , Forest Red Gum <i>E. tereticornis</i> , Mugga Ironbark <i>E. sideroxylon</i> , and White Box <i>E. albens</i> . Commonly used lerp infested trees include Inland Grey Box <i>E. microcarpa</i> , Grey Box <i>E. moluccana</i> , Blackbutt <i>E. pilularis</i> , and Yellow Box <i>E. melliodora</i>	1	Low
Varied Sittella <i>Daphoenositta chrysoptera</i>	V	-	This species is sedentary and known to inhabit most forest/woodland habitats.	6	Moderate
White-bellied Sea-eagle <i>Haliaeetus leucogaster</i>	V	M	The species is normally seen perched high in a tree, or soaring over waterways and adjacent land, particularly along coastlines, lakes and rivers.	23	Moderate
White-fronted Chat <i>Epthianura albifrons</i>	V	-	Gregarious species, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground.	4	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Yellow Wagtail <i>Motacilla flava</i>	-	M	Occurs in a variety of habitats, favouring damp or wet vegetation. Forages on the edges of rivers, dams and wetlands.	0	None
Flathead Galaxias <i>Galaxias rostratus</i>	E (FM Act)	CE	Known from the southern half of the Marry-Darling Basin. Inhabits a variety of habitats including rivers, lakes and swamps.	0	None
Macquarie Perch <i>Macquaria australasica</i>	E (FM Act)	E	Found in the upstream reaches of the Murray-Darling Basin. Found in rivers and lakes.	0	None
Murray Cod <i>Maccullochella peelii</i>	-	V	Prefers deep, slow flowing turbid water in rivers and streams with boulders or undercut banks.	0	None
Murray Hardyhead <i>Craterocephalus fluviatilis</i>	CE (FM Act)	E	Prefers open water, shallow, slow-flowing or still habitats, with sand or silt substrates. It can also be found in deeper habitats with dense vegetation.	0	None
Silver Perch <i>Bidyanus bidyanus</i>	V	CE	Found in a wide range of habitats but usually found in faster flowing water and more open sections of a river	0	None
Murray Crayfish <i>Euastacus armatus</i>	V (FM Act)	-	The Murray Crayfish originally occurred in the Murrumbidgee River system in NSW and the ACT, and parts of the Murray river system in NSW, Victoria and South Australia. The species has also been recorded from the Lachlan and Macquarie catchments in NSW, although the origin of these populations is currently unknown, and may be translocated. Murray Crayfish have an upper altitudinal range of approximately 750 – 800 m ASL	0	None
Trout Cod <i>Maccullochella macquariensis</i>	E (FM Act)	E	Found in the southern Murray-Darling river system, this fish inhabits fast flowing freshwater streams.	0	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Koala <i>Phascolarctos cinereus</i>	V	V	Inhabit eucalypt woodlands and forests. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.	0	Low
Southern Ningai <i>Ningai yvonnae</i>	V	-	Closely linked to vegetation with spinifex clumps (in NSW mainly mallee woodlands) but found in other habitats. Shelters in spinifex clumps, beneath logs, and in dense vegetation.	22	High
Spotted-tailed Quoll <i>Dasyurus maculatus</i>	V	E	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	1	Low
Western Pygmy Possum <i>Cercartetus concinnus</i>	E	-	Found in Mallee shrubland either dominated by spinifex or an understorey of tea-tree as well as woodlands with dense health understorey.	8	High
Mallee Worm-lizard <i>Aprasia inaurita</i>	E		Inhabits semi-arid, mallee woodlands on red sands	11	High
Striped Legless Lizard <i>Delma impar</i>	V	V	Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Also found in secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland.	0	None
A spear-grass <i>Austrostipa metatoris</i>	V	V	Grows in sandy areas of the Murray Valley; habitats include sandhills, sand ridges, undulating plains and flat open mallee country, with red to red-brown clay-loam to sandy-loam soils.	2	Low
Bitter Quandong <i>Santalum murrayanum</i>	E	-	Usually found in mallee communities on gravelly and sandy loam soils. Grows on dunes, open woodland, tall shrubland and has been found in sand in spinifex-shrub steppe.	19	Recorded

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Menindee Nightshade <i>Solanum karsense</i>	V	V	Habitats are generally lake beds or floodplains of heavy grey clays with a highly self-mulching surface. Also found on sandy floodplains and ridges and in calcareous soils, red sands, red-brown earths and loamy soils.	6	Moderate
Mossgiel Daisy <i>Brachyscome papillosa</i>	V	V	Recorded primarily in clay soils on Bladder Saltbush (<i>Atriplex vesicaria</i>) and Leafless Bluebush (<i>Maireana aphylla</i>) plains, but also in grassland and in Inland Grey Box (<i>Eucalyptus microcarpa</i>) - Cypress Pine (<i>Callitris</i> spp.) woodland.	0	Low
Slender Darling Pea <i>Swainsona murrayana</i>	V	V	The species has been collected from clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and loams.	0	Low
Swamp She-oak <i>Casuarina obesa</i>	E	-	Needs moist, slightly saline soils. Can be found in shorelines of permanent, ephemeral or relict lakes these can be either freshwater or saline-influenced	8	None
Winged Pepper-cress <i>Lepidium monoplocoides</i>	E	E	Occurs on seasonally moist to waterlogged sites, on heavy fertile soils, with a mean annual rainfall of around 300-500 mm. Predominant vegetation is usually an open woodland dominated by <i>Allocasuarina luehmannii</i> (Bulloak) and/or eucalypts, particularly <i>Eucalyptus largiflorens</i> (Black Box) or <i>Eucalyptus populnea</i> (Poplar Box). The field layer of the surrounding woodland is dominated by tussock grasses.	1	Low
Yellow Gum <i>Eucalyptus leucoxyloides</i> subsp. <i>pruinosa</i>	V	-	<i>Eucalyptus leucoxyloides</i> subsp. <i>pruinosa</i> is a tree species which, in New South Wales, occurs at the bases of sandy rises and on loamy clay flats on the floodplains of the Murray River and its tributaries in the Riverina Bioregion.	1	None
Yellow Swainson-pea <i>Swainsona pyrophila</i>	V	V	Grows in Mallee scrub on sandy or loamy soil, usually found only after fire. Can be found on both cleared or burnt mallee scrub including roadsides and bulldozed firebreaks adjacent to wheat paddocks	0	Low

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Acacia loderi shrublands	EEC	-	It has a naturally open structure of individual shrubs to small stress with a low understory. The community is dominated by <i>Acacia loderi</i> (often called <i>Nelia</i>) and is found on solonised brown and duplex soils on level on undulating plains or on calcareous red earths. Generally has a rainfall range of 240mm to 280mm.	-	None
Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions	EEC	-	Typically occurs on sandhills and undulating sandplains with red-brown, sand loam soils. The structure and species composition varies depending on the disturbance history and temporal variability in rainfall.	-	Recorded
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penepplain, Nandewar and Brigalow Belt South Bioregions	EEC	EEC	Occurs on fertile soils generally where average rainfall is 375-800mm annually and the mean maximum annual temperature is 22-26C. Many of the remaining patches have trees intact but the shrub and ground layers are degraded through grazing or pasture modification	-	None
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	EEC	-	The community can be characterised by an open tree stratum and is typically associate with prior streams and dunes, which are scattered within an extensive alluvial clay plain dominated by chenopod shrublands. It tends to grow on red-brown loamy sands with alkaline sub soils.	-	Recorded
Tecticornia lylei, Wiry Glasswort, low open-shrubland in the Murray Darling Depression Bioregion	EEC	-	Occurs on saline clay soils on beds of small salt lakes and around the perimeter of larger salt lakes.	-	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Myall Woodland in the Darling Riverine, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western slopes bioregions	EEC	EEC	Open woodlands to woodlands, generally 5-12 m high and with a naturally shrubby or grassy understorey. They generally occur on flat areas, shallow depressions or gilgais on raised (relict) alluvial plains. These areas are not associated with active drainage channels and are rarely if ever flooded.	-	None

Habitat assessment table (Section 5)

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Southern Bell Frog <i>Litoria raniformis</i>	E	V	Usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys.	13	None
Corben's Long-eared Bat <i>Nyctophilus corbeni</i>	V	V	Inhabits a variety of vegetation types, including mallee, bulloke <i>Allocasuarina leuhmanni</i> and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland.	1	Moderate
Inland Forest Bat <i>Vespadelus baverstocki</i>	V	-	Little is known of the habitat requirements of this species, however known to roost in tree hollows and abandoned buildings. They have been recorded in a variety of woodland formations mostly drier habitats.	12	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Little Pied Bat <i>Chalinolobus picatus</i>	V	-	Occurs in dry open forest, open woodland, mulga woodlands, chenopod shrublands, cypress pine forest and mallee and Bimbil box woodlands. Roosts in caves, rocky outcrops, mine shafts, tunnels, tree hollows and buildings	1	Moderate
Yellow-bellied Sheath-tail-bat <i>Saccolaimus flaviventris</i>	V	-	Forages in most habitats, with or without trees. Roosts in tree hollows and buildings. They can use mammal burrows in treeless areas	2	Moderate
Australasian Bittern <i>Botaurus poiciloptilus</i>	E	E	A heron-like bird which inhabits wetlands.	1	Low
Australian Painted Snipe <i>Rostratula australis</i>	E	E	Prefers fringes of swamps, dams, and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	4	Low
Bar-tailed Godwit <i>Limosa lapponica baueri</i>	-	V M	Rarely found in inland wetlands or in areas of short grass such as farmland, paddocks and airstrips. Usually found along coastal habitats including intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays.	1	Low
Black-breasted Buzzard <i>Maiorstra melanosternon</i>	V	-	Found in a variety of habitats, particularly timbered watercourses. It often hunts over grasslands and sparsely timbered woodlands	1	Moderate
Black-chinned Honeyeater (eastern subspecies) <i>Melithreptus gularis gularis</i>	V	-	Inhabits drier open forests or woodland dominated by box and iron eucalypts. Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river she-oaks, and tea-trees.	8	Moderate
Black-eared Miner <i>Manorina melanotis</i>	CE	E	Found in large tracts (30,000 hectares or greater) of mature, unfragmented mallee on more fertile soils. They prefer areas post fire of 25 years, but most prevalent in areas 50 years post fire.	0	None (only population occurs well clear of the study area)

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Black-tailed Godwit <i>Limosa limosa</i>	V	M	Inland habitats include mudflats, and water less than 10cm deep around muddy lakes and swamps	3	None
Black Falcon <i>Falco subniger</i>	V	-	The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions	1	Low
Blue-billed Duck <i>Oxyura australis</i>	V	-	The Blue-billed Duck prefers deep water in large permanent wetlands and swamps with dense aquatic vegetation.	4	Low
Brolga <i>Grus rubicunda</i>	V	-	They are dependent on wetlands, especially shallow swamps and often feed in dry grassland or ploughed paddocks	1	Moderate
Brown Treecreeper (eastern subspecies) <i>Climacteris picumnus victoriae</i>	V	-	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species.	78	None (as eastern subspecies occurs only east of Newell Highway)
Bush Stone-curlew <i>Burhinus grallarius</i>	E	-	Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber.	1	Moderate
Caspian Tern <i>Hydroprogne caspia</i>	-	M	Caspian Terns are usually found near the coast, in extensive wetlands, on coastal and interior beaches and sheltered estuaries. The Caspian Tern lives equally well in fresh water and saline environments.	30	Low
Chestnut Quail-thrush <i>Cinlosoma castanotum</i>	V	-	Mainly found in mallee scrub, but also in <i>Acacia</i> scrubs, dry sclerophyll woodland, heath and native pine.	47	High

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Common Greenshank <i>Tringa nebularia</i>	-	M	Found both on the coast and inland, in estuaries and mudflats, mangrove swamps and lagoons, and in billabongs, swamps, sewage farms and flooded crops.	12	Low
Common Sandpiper <i>Actitis hypoleucos</i>	-	M	A small sandpiper that is widely distributed in small numbers along the coast of Australia and in many inland regions.	0	Low
Curlew Sandpiper <i>Calidris ferruginea</i>	E	CE M	Widespread occurrence along the coast and inland.	5	Low
Double-banded Plover <i>Charadrius bicinctus</i>	-	M	Found on coastal beaches, mudflats, sewage farms, riverbanks, fields, dunes, upland tussock grasses and shingle.	0	Low
Dusky Woodswallow <i>Artamus cyanopterus cyanopterus</i>	V	-	Found mostly in dry, open eucalypt forests and woodlands	8	Moderate
Eastern Curlew <i>Numenius madagascarensis</i>	-	CE M	Australia's largest shorebird. Flies to Russia and China annually to breed, returning to Australia to feed.	0	Low
Flame Robin <i>Petroica pheonicea</i>	V	-	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Habitat often changes in winter to include drier more open habitat including dry forests, open woodlands, native grassland, pastures and occasionally in heathland or other shrubland.	1	Low
Fork-tailed Swift <i>Apus pacificus</i>	-	M	Almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas.	1	Low

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Freckled Duck <i>Stictonetta naevosa</i>	V	-	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds.	6	Low
Gilbert's Whistler <i>Pachycephala inornata</i>	V	-	Is found in a variety of habitats but generally needs a dense shrub layer. These include, mallee shrublands, box-ironbark woodlands, cypress pine and Belah woodlands, and River Red gum forests. Forage on or near the ground in shrubs and on top of small trees.	23	Moderate
Grey Falcon <i>Falco hypoleucos</i>	E	V	Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast.	1	Low
Gull-billed Tern <i>Gelochelidon nilotica</i>	-	M	Gull-billed Terns are found in freshwater swamps, brackish and salt lakes, beaches and estuarine mudflats, floodwaters, sewage farms, irrigated croplands and grasslands.	5	Low
Hooden Robin (south-eastern form) <i>Melanodryas cucullata cucullata</i>	V	-	Found in lightly wooded country, usually near open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas	19	Moderate
Latham's Snipe <i>Gallinago hardwickii</i>	-	M	Habitat in Australia includes permanent and ephemeral wetlands.	0	Low
Little Eagle <i>Hieraaetus morphnoides</i>	V	-	Little Eagle is distributed across all of the Australian mainland except for densely vegetated areas, particularly on the Dividing Range escarpment. In NSW the Little Eagle is considered a single population. They inhabit open eucalypt woodland, woodland and open woodland, including She-oak, <i>Acacia</i> woodland and riparian woodland in arid and semi-arid regions.	17	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Malleefowl <i>Leipoa ocellata</i>	E	V	Predominantly inhabit mallee communities, preferring the tall, dense and floristically rich mallee found in higher rainfall (300 - 450 mm mean annual rainfall) areas. Utilises mallee with a spinifex understorey, but usually at lower densities than in areas with a shrub understorey.	32	High
Marsh Sandpiper <i>Tringa stagnatilis</i>	-	M	Marsh Sandpipers are commonly seen singly, or in small to large flocks in fresh or brackish (slightly salty) wetlands such as rivers, water meadows, sewage farms, drains, lagoons and swamps.	7	Low
Night Parrot <i>Pezoporus occidentalis</i>	PE	E	The Night Parrot is known to occur within Spinifex grasslands in stony or sandy areas and samphire and chenopod associations on floodplains, salt lakes and clay pans	0	None
Pacific Golden Plover <i>Pluvialis fulva</i>	-	M	Found on muddy, rocky and sandy wetlands, shores, paddocks, saltmarsh, coastal golf courses, estuaries and lagoons.	2	Low
Painted Honeyeater <i>Grantiella picta</i>	V	V	Inhabits Boree/Weeping Myall (<i>Acacia pendula</i>), Brigalow (<i>A.harpophylla</i>) and Box-Gum Woodlands and Box-Ironbark Forests. Feeds on mistletoes preferably the genus <i>Amyema</i>	0	Low
Pectoral Sandpiper <i>Calidris melanotos</i>	-	M	A small to medium sandpiper. In Australia it can be found in both shallow fresh and salt water. The sandpiper flies to Russia and Northern America to breed.	32	Low
Pied Honeyeater <i>Certhionyx variegatus</i>	V	-	Inhabits wattle shrub, primarily Mulga (<i>Acacia aneura</i>), mallee, spinifex and eucalypt woodlands, usually when shrubs are flowering; feeds on nectar, predominantly from various species of emu-bushes (<i>Eremophila</i> spp.); also from mistletoes and various other shrubs (e.g. <i>Grevillea</i> spp.); also eats saltbush fruit, berries, seed, flowers and insects.	2	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Pink Cockatoo <i>Lophochroa leadbeateri</i>	V	-	Inhabits a wide range of tree and treeless inland habitats, always within easy reach of water.	24	High
Plains-wanderer <i>Pedionomus torquatus</i>	E	CE	Plains-wanderers live in semi-arid, lowland native grasslands that typically occur on hard red-brown soils. These grasslands support a high diversity of plant species, including a number of state and nationally threatened species.	0	Low
Purple-crowned Lorikeet <i>Glossopsitta porphyrocephala</i>	V	-	Found in open forests and woodlands, particularly where there are large flowering eucalypts. Also recorded from mallee habitats.	4	Moderate
Purple-gaped Honeyeater <i>Lichenostomus cratitius</i>	V		Inhabits mallee heathlands and sometimes in mallee with a more open understorey (such as Spinifex associations). Occasionally found in River Red Gums along waterways	1	Moderate
Red-necked Stint <i>Calidris ruficollis</i>	-	M	Found in sheltered inlets, bays, lagoons, estuaries, intertidal mudflats and protected sandy or coralline shores. They may also be seen in saltworks, sewage farms, saltmarsh, shallow wetlands including lakes, swamps, riverbanks, waterholes, bore drains, dams, soaks and pools in salt flats, flooded paddocks or damp grasslands.	5	Low
Regent Parrot (eastern) <i>Polytelis anthopeplus monarchoides</i>	E	V	Principal foraging habitat is mallee woodlands, though foraging also occurs in riverine forests and woodlands.	186	Recorded
Ruddy Turnstone <i>Arenaria interpres</i>	-	M	Found only occasionally inland. They are mainly found on exposed rocks or reefs, often with shallow pools, and on beaches. In the north, they are found in a wider range of habitats, including mudflats	1	Low
Satin Flycatcher <i>Myiagra cyanoleuca</i>	-	M	The Satin Flycatcher is found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests.	0	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Sharp-tailed Sandpiper <i>Calidris acuminata</i>	-	M	Occurs in Australia during the non-breeding part of the year. Found on both the coast and inland areas. Flies north to Siberia to breed.	19	Low
Shy Heathwren <i>Hylacola cautus</i>	V	-	Inhabits mallee woodlands with a relatively dense understorey of shrubs and health plants. Prefers areas of one to five years post fire or in those long unburnt (greater than 40 years), but is found in all age classes of vegetation.	8	Moderate
Southern Scrub-robin <i>Drymodes brunneopygia</i>	V	-	Is found in mallee and acai scrub, particularly areas with dense sub-shrubs in the understorey. It is most abundant in areas post fire of 26-40 years but can be found in post fire age of 4-80 years.	10	Moderate
Speckled Warbler <i>Chthonicola sagittate</i>	V	-	Lives in Eucalypts dominated communities that have a grassy understorey with sparse shrub layer. Large, relatively undisturbed habitats are needed for this species to remain in an area.	1	Moderate
Spotted Harrier <i>Circus assimilis</i>	V	-	Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe.	4	Moderate
Square-tailed Kite <i>Lophoictinia isura</i>	V	-	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.	6	Moderate
Superb Parrot <i>Polytelis swainsonii</i>	V	V	Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.	1	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Swift Parrot <i>Lathamus discolor</i>	E	CE	Occurs in areas with flowering eucalypts or abundant lerp (from sap sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany <i>Eucalyptus robusta</i> , Spotted Gum <i>Corymbia maculata</i> , Red Bloodwood <i>C. gummifera</i> , Forest Red Gum <i>E. tereticornis</i> , Mugga Ironbark <i>E. sideroxylon</i> , and White Box <i>E. albens</i> . Commonly used lerp infested trees include Inland Grey Box <i>E. microcarpa</i> , Grey Box <i>E. moluccana</i> , Blackbutt <i>E. pilularis</i> , and Yellow Box <i>E. melliodora</i>	1	None
Varied Sittella <i>Daphoenositta chrysoptera</i>	V	-	This species is sedentary and known to inhabit most forest/woodland habitats.	14	Recorded
White-bellied Sea-eagle <i>Haliaeetus leucogaster</i>	V	M	The species is normally seen perched high in a tree, or soaring over waterways and adjacent land, particularly along coastlines, lakes and rivers.	4	Moderate
White-fronted Chat <i>Epthianura albifrons</i>	V	-	Gregarious species, usually found foraging on bare or grassy ground in wetland areas, singly or in pairs. They are insectivorous, feeding mainly on flies and beetles caught from or close to the ground.	35	Moderate
White-winged Black Tern <i>Chlidonias leucopterus</i>	-	M	Found in wetlands including tidal estuaries, lagoons, grassy swamps, and sewage ponds	1	None
Wood Sandpiper <i>Tringa glareola</i>	-	M	Known to visit shallow freshwater wetlands. They prefer ponds and pools with emergent reeds and grass, surrounded by tall plants or dead trees and fallen timber.	3	Low
Yellow Wagtail <i>Motacilla flava</i>	-	M	Occurs in a variety of habitats, favouring damp or wet vegetation. Forages on the edges of rivers, dams and wetlands.	0	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Flathead Galaxias <i>Galaxias rostratus</i>	E (FM Act)	CE	Known from the southern half of the Marry-Darling Basin. Inhabits a variety of habitats including rivers, lakes and swamps.	0	None
Macquarie Perch <i>Macquaria australasica</i>	E (FM Act)	E	Found in the upstream reaches of the Murray-Darling Basin. Found in rivers and lakes.	0	None
Murray Cod <i>Maccullochella peelii</i>	-	V	Prefers deep, slow flowing turbid water in rivers and streams with boulders or undercut banks.	0	None
Murray Hardyhead <i>Craterocephalus fluviatilis</i>	CE (FM Act)	E	Prefers open water, shallow, slow-flowing or still habitats, with sand or silt substrates. It can also be found in deeper habitats with dense vegetation.	0	None
Silver Perch <i>Bidyanus bidyanus</i>	V	CE	Found in a wide range of habitats but usually found in faster flowing water and more open sections of a river	0	None
Murray Crayfish <i>Euastacus armatus</i>	V (FM Act)	-	The Murray Crayfish originally occurred in the Murrumbidgee River system in NSW and the ACT, and parts of the Murray river system in NSW, Victoria and South Australia. The species has also been recorded from the Lachlan and Macquarie catchments in NSW, although the origin of these populations is currently unknown, and may be translocated. Murray Crayfish have an upper altitudinal range of approximately 750 – 800 m ASL	Known locally from recreational fishers	Moderate
Trout Cod <i>Maccullochella macquariensis</i>	E (FM Act)	E	Found in the southern Murray-Darling river system, this fish inhabits fast flowing freshwater streams.	0	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Brush-tailed Bettong (South-east Mainland) <i>Bettongia penicillata penicillata</i>	PE	E	Found in grassland, heath and sclerophyll woodland as well as open eucalypt forest. It is adapted to habitat subject to frequent fires.	2	None
Koala <i>Phascolarctos cinereus</i>	V	V	Inhabit eucalypt woodlands and forests. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.	1	Low
Mitchell's Hopping-mouse <i>Notomys mitchellii</i>	PE	-	Found in mallee shrubland especially areas with sandy soils and slight dune formations	1	None
Southern Ningai <i>Ningai yvonnae</i>	V	-	Closely linked to vegetation with spinifex clumps (in NSW mainly mallee woodlands),but found in other habitats. Shelters in spinifex clumps, beneath logs, and in dense vegetation.	46	Moderate
Spotted-tailed Quoll <i>Dasyurus maculatus</i>	V	E	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	1	Low
Western Pygmy Possum <i>Cercartetus concinnus</i>	E	-	Found in Mallee shrubland either dominated by spinifex or an understorey of tea-tree as well as woodlands with dense health understorey.	39	Moderate
Western Quoll <i>Dasyurus geoffroii</i>	PE	V	inhabit most kinds of wooded habitat within its current range including eucalypt forest (especially Jarrah, <i>Eucalyptus marginata</i>), dry woodland and mallee shrublands. In Jarrah forest, populations occur in both moist, densely vegetated, steeply sloping forest and drier, open, gently sloping forest. The densest populations of the western quoll have been found in riparian forest.	1	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Mallee Worm-lizard <i>Aprasia inaurita</i>	E	-	Inhabits semi-arid, mallee woodlands on red sands	15	High
Pink-tailed Legless Lizard <i>Aprasia parapulchella</i>	V	V	Habitat sites are generally sloping, open woodland areas with native grassy ground layer, particularly dominated by Kangaroo Grass (<i>Themeda australis</i>) Sites are well drained with rocky outcrops or scattered, partially buried rocks.	0	Low
Western Blue-tongued Lizard <i>Tiliqua occipitalis</i>	V	-	Inhabits plains, swales, ranges and sometimes dunes of loamy or clayey/sandy soils vegetated by woodlands, especially mallee, shrublands (including chenopods), heaths or hummock grasslands. Preferred vegetation type appears to be mixed mallee/ <i>Triodia</i> communities	1	Moderate
Yellow-tailed Plain Slider <i>Lerista xanthura</i>	V	-	Occurs in a variety of semi-arid and arid habitats including grassed alluvial sands and sand dunes. Can be found in dry open woodlands and spinifex-dominated red sand plains.	6	Moderate
A spear-grass <i>Austrostipa metatoris</i>	V	V	Grows in sandy areas of the Murray Valley; habitats include sandhills, sand ridges, undulating plains and flat open mallee country, with red to red-brown clay-loam to sandy-loam soils.	1	Low
Bitter Quandong <i>Santalum murrayanum</i>	E	-	Usually found in mallee communities on gravely and sandy loam soils. Grows on dunes, open woodland, tall shrubland and has been found in sand in spinifex-shrub steppe.	70	Recorded
Menindee Nightshade <i>Solanum karsense</i>	V	V	Habitats are generally lake beds or floodplains of heavy grey clays with a highly self-mulching surface. Also found on sandy floodplains and ridges and in calcareous soils, red sands, red-brown earths and loamy soils.	3	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Mossgiel Daisy <i>Brachyscome papillosa</i>	V	V	Recorded primarily in clay soils on Bladder Saltbush (<i>Atriplex vesicaria</i>) and Leafless Bluebush (<i>Maireana aphylla</i>) plains, but also in grassland and in Inland Grey Box (<i>Eucalyptus microcarpa</i>) - Cypress Pine (<i>Callitris</i> spp.) woodland.	0	Low
Slender Darling Pea <i>Swainsona murrayana</i>	V	V	The species has been collected from clay-based soils, ranging from grey, red and brown cracking clays to red-brown earths and loams.	0	Low
Thyme Rice-Flower <i>Pimelea serpyllifolia</i> subsp. <i>serpyllifolia</i>	E	-	Grows in scrub and woodland on calcareous soils. Often found in sandy red soils supporting mallee scrub	10	Moderate
Winged Pepper-cress <i>Lepidium monoplacoides</i>	E	E	Occurs on seasonally moist to waterlogged sites, on heavy fertile soils, with a mean annual rainfall of around 300-500 mm. Predominant vegetation is usually an open woodland dominated by <i>Allocasuarina luehmannii</i> (Bulloak) and/or eucalypts, particularly <i>Eucalyptus largiflorens</i> (Black Box) or <i>Eucalyptus populnea</i> (Poplar Box). The field layer of the surrounding woodland is dominated by tussock grasses.	0	Low
Yellow Gum <i>Eucalyptus leucoxydon</i> subsp. <i>pruinosa</i>	V	-	<i>Eucalyptus leucoxydon</i> subsp. <i>pruinosa</i> is a tree species which, in New South Wales, occurs at the bases of sandy rises and on loamy clay flats on the floodplains of the Murray River and its tributaries in the Riverina Bioregion.	1	None
Yellow Swainson-pea <i>Swainsona pyrophila</i>	V	V	Grows in Mallee scrub on sandy or loamy soil, usually found only after fire. Can be found on both cleared or burnt mallee scrub including roadsides and bulldozed firebreaks adjacent to wheat paddocks	4	Low

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Acacia Ioderi shrublands	EEC	-	It has a naturally open structure of individual shrubs to small stress with a low understory. The community is dominated by <i>Acacia Ioderi</i> (often called Nelia) and is found on solonised brown and duplex soils on level on undulating plains or on calcareous red earths. Generally has a rainfall range of 240mm to 280mm.	-	None
Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions	EEC	EEC	<i>Allocasuarina luehmannii</i> Woodland typically occupies patches of red-brown loamy sands with alkaline sub-soils on the alluvial plain of the Murray River and its tributaries in south-western NSW.	-	None
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penepplain, Nandewar and Brigalow Belt South Bioregions	EEC	EEC	Occurs on fertile soils generally where average rainfall is 375-800mm annually and the mean maximum annual temperature is 22-26C. Many of the remaining patches have trees intact but the shrub and ground layers are degraded through grazing or pasture modification	-	None
Myall Woodland in the Darling Riverine, Brigalow Belt South, Cobar Penepplain, Murray-Darling Depression, Riverina and NSW South Western slopes bioregions	EEC	EEC	Open woodlands to woodlands, generally 5-12 m high and with a naturally shrubby or grassy understorey. They generally occur on flat areas, shallow depressions or gilgais on raised (relict) alluvial plains. These areas are not associated with active drainage channels and are rarely if ever flooded.	-	None
Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions	EEC	-	The community can be characterised by an open tree stratum and is typically associate with prior streams and dunes, which are scattered within an extensive alluvial clay plain dominated by chenopod shrublands. It tends to grow on red-brown loamy sands with alkaline sub soils.	-	Recorded

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Tecticornia lylei, Wiry Glasswort, low open-shrubland in the Murray Darling Depression Bioregion	EEC	-	Occurs on saline clay soils on beds of small salt lakes and around the perimeter of larger salt lakes.	-	None

Annexure D

Significance assessments (BC Act, FM Act & EPBC Act)

In Section 7.3 of the BC Act are five factors which are to be considered when determining if a proposed development or activity *'is likely to have a significant effect on the threatened species, or ecological communities, or their habitats'*. These five factors must be taken into account by consent or determining authorities when considering a development proposal or development application. This enables a decision to be made as to whether there is likely to be a significant effect on the species.

The habitat assessment table in Annexure C found that 69 threatened biota or threatened ecological communities listed under the BC Act that were known to, or have the potential to occur within the study area based on the evaluation completed. Given this, further assessment by application of the 5-part test is completed on the following biota:

- Southern Bell Frog
- Microbats (Corben's Long-eared Bat, Greater Broad-nosed Bat, Inland Forest Bat, Little Pied Bat, Southern Myotis, Yellow-bellied Sheathtail Bat)
- Barking Owl
- Birds of Prey (Black-breasted Buzzard, Black Falcon, Little Eagle, Spotted Harrier, Square-tailed Kite, White-bellied Sea-eagle)
- Woodland/Shrubland Birds (Black-chinned Honeyeater, Brown Treecreeper, Bush Stone-curlew, Diamond Firetail, Grey-crowned Babbler, Hooded Robin, Little Lorikeet, Painted Honeyeater, Pink Cockatoo, Regent Parrot, Scarlet Robin, Speckled Warbler, Superb Parrot, Swift Parrot, Turquoise Parrot, Varied Sittella)
- Habitat generalists (Flame Robin, Dusky Woodswallow, Fork-tailed Swift, Pied Honeyeater)
- Open grassland/cleared land Birds (Plains Wanderer, White-fronted Chat, Brolga)
- Birds of the mallee (Chestnut Quail-thrush, Gilberts Whistler, Malleefowl, Purple-crowned Lorikeet, Purple-gaped Honeyeater, Shy Heathwren, Southern Scrub-robin)
- Birds of the chenopod shrublands (Redthroat, Rufous Fieldwren)
- Grey-headed Flying-fox
- Koala
- Southern Ningau
- Squirrel Glider
- Western Pygmy-possum
- Reptiles of the Mallee (Mallee Worm-lizard, Western Blue-tongued Lizard, Yellow-tailed Plain Slider)
- Bitter Quandong
- Orchids (Pine Donkey Orchid, Sand-hill Spider Orchid)
- Peas (Slender Darling Pea, Silky Swainson-pea, Small Purple-pea)
- Other flora (Menindee Nightshade, Mossgiel Daisy, Thyme Rice-flower, Winged Peppergrass)
- Acacia Melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions endangered ecological community
- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions endangered ecological community
- Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions endangered ecological community
- Myall Woodland in the Darling Riverine, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western slopes bioregions endangered ecological community
- 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 endangered ecological community

Southern Bell Frog

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

In NSW, the species was once distributed along the Murray and Murrumbidgee Rivers and their tributaries, the southern slopes of the Monaro district and the central southern tablelands as far north as Tarana, near Bathurst. Currently, the species is known to exist only in isolated populations in the Coleambally Irrigation Area, the Lowbidgee floodplain, the Murray and Murrumbidgee Irrigation Area and around Lake Victoria. The species is also found in Victoria, Tasmania and South Australia, where it has also become endangered.

They are known from in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains. They are also found in irrigated rice crops, particularly where there is no available natural habitat.

While no Southern Bell Frog were recorded during this survey, the species is well known from within close proximity to the proposal, with significant populations from the Coleambally Irrigation Area, Balaranald and Hay floodplains of the Lachlan and Murrumbidgee Rivers and in more recent times, the species was rediscovered in the Murrumbidgee Irrigation Area (Clemann and Gillespie, 2013, Wassens et al., 2010, Wassens et al., 2008b, Wassens, 2008, Wassens et al., 2008a, Pyke and Muir, 2008, Wassens et al., 2007, Wassens, 2005).

OEH (2021) identify to two known threats to this species of relevance to this proposal. These being:

- Habitat loss and degradation through the draining of waterbodies or clearing of terrestrial habitat
- Road kills, which have been identified along Kidman Way through the Coleambally Irrigation Area

Should this proposal proceed, about 19.95 hectares of marginally potential terrestrial habitat would be removed within sections 2, 3 and 4. No aquatic habitat would be removed. These areas comprise of River Red Gum and Black Box dominated vegetation communities in section 2, 3 and 4. These areas provide habitat when connected to the river through flood events. Based on existing mapping, about 4,177 hectares of these vegetation communities exist within a 550m buffer of sections 2, 3 and 4. This represents less than 0.49% of terrestrial habitat in the region meaning that more than 4,157 hectares of similar habitat remains.

On this basis, and given that the proposed work is not being carried out in significant areas of known habitat, it is *unlikely* that the proposed activity could have an adverse effect on the life cycle of Southern Bell Frog or their habitats, such that a viable local population is likely to be placed at risk of extinction.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

This species is not listed as an endangered ecological community or critically endangered ecological community.

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

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

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

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

- i. The proposed work would result in the removal of up to 19.95 hectares of terrestrial habitat that is not considered to provided habitat on a permanent basis
- ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists given the ability of these species to move, the relatively minor nature of proposed work spread over a long distance, and the extent and quality of river red gum and black box dominated vegetation communities within the road corridor, adjacent to the study area as well as the wider locality (>4,157 hectares in sections 2,3 and 4), which would remain unaffected by the proposed work
- iii. The potential habitat to be removed is considered to be of minor importance to the long-term viability of this species in the locality given that higher quality wetland habitats remain unaffected by the proposal and that these vegetation communities are widespread.

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

No declared areas of outstanding biodiversity value are known from the vicinity of the proposed work.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, is of potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

The clearing of about 19.95 hectares of native vegetation that is considered to provide potential marginal habitat for Southern Bell Frog is necessary to carry out the proposal to provide improved road user safety along this section of the Sturt Highway. In the context of the same vegetation communities within a 550m buffer of sections 2, 3, and 4 which are of relevance to Southern Bell Frog, only about 0.49% would be impacted.

Conclusion

This Test of Significance has determined that the proposed activity is ‘*unlikely*’ to have a ‘*significant effect*’ on Southern Bell Frog or their habitat.

Microbats (Corben’s Long-eared Bat, Greater Broad-nosed Bat, Inland Forest Bat, Little Pied Bat, Southern Myotis, Yellow-bellied Sheathtail Bat)

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

Corbens Long-eared Bat, Greater Broad-nosed Bat, Inland Forest Bat and Yellow-bellied Sheathtail Bat are hollow-dependant species with Southern Myotis and Little Pied Bat, while a cave dweller, is also known to roost in culverts, old buildings, bridges and mine shafts and tree hollows (Churchill, 2008). All species have been recorded at various locations along the proposal. However, microbats are generally regarded as highly mobile fauna extending their foraging ranges over tens of kilometres from their roosting sites (Pavey, 1998, Barclay et al., 2000, Pavey and Burwell, 2004, Pennay and Freeman, 2005). In the context of their ecology, portions of the study area could form habitat of some importance given the presence of hollow-bearing trees.

OEH (2021) identify that the main threats to these species are disturbance to known roost and maternity sites, and clearing of habitat. The clearing of potential habitat ranges from 5.03 hectares for Greater Broad-nosed Bat to about 83.65 hectares for remaining species. The presence of tree hollows, in particular, stags (standing dead trees) suggests that the study area could contain potential roosting habitat. The loss of up to 83.65 hectares of potential habitat is considered negligible in the context of the native vegetation within the road corridor (2,549 hectares) with about 3% being impacted. Within a 550-metre buffer of the road corridor (about 37,539.9 hectares) about 0.21% would be impacted. Woodland also occurs across the wider locality which would remain unaffected confirming that extensive areas of potential and known habitat would remain. Up to 343 HBT would be removed. While the removal of 343 HBT equates to about 6.4% of the HBT within the road corridor, 93.6% remain. Nonetheless, potential impacts could result if the removal of HBT (when any animals present would be roosting during daylight hours), were not subject to inspection combined with retrieval and relocation protocols to adjoining habitat. Removal of hollow-bearing trees should only be conducted with regard to the mitigation measures outlined within section 6.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of these species such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

These biota are is not listed as an endangered ecological community or critically endangered ecological community.

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

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
 - (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
 - (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**
- i. The proposed work would result in the removal of up to 83.65 hectares of native vegetation, comprising potential habitat for these biota. 343 HBT would also be removed
 - ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists given the ability of these species to move (fly), the relatively small nature of proposed work spread over a long distance, and the extent and quality of woodlands within the road corridor,

adjacent to the study area as well as the wider locality, which would remain unaffected by the proposed work

- iii. For these biota, the potential and known habitat to be removed is considered to be of minor importance to the long-term viability of these biota in the locality. However, any impacts to HBT should be appropriately mitigated, such as recommended within this Biodiversity assessment.

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

No declared areas of outstanding biodiversity value are known from vicinity of the proposal.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, and *Loss of hollow-bearing trees* are potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

The clearing of about 83.65 hectares of native vegetation is necessary to carry out the proposal to provide improved road user safety along this section of the Sturt Highway. In the context of the native vegetation within the road corridor (2,549.4 hectares) about 3% would be impacted. Within a 550-metre buffer of the road corridor (about 37,539.9 hectares) about 0.2% would be impacted. Native vegetation also occurs across the wider the locality which would remain unaffected confirming that extensive areas of native vegetation would remain.

The proposal would also result in the loss of up to 343 HBT (or about 6.4% of the HBT within the road corridor). However, 5,055 HBT would remain (or about 93.6%). Nonetheless, potential impacts could result if the removal of HBT (when any animals present would be roosting during daylight hours), were not subject to inspection combined with retrieval and relocation protocols to adjoining habitat. Removal of hollow-bearing trees should only be conducted with regard to the mitigation measures outlined within section 6.

Conclusion

This Test of Significance has determined that the proposed activity is ‘*unlikely*’ to have a ‘*significant effect*’ on Corben’s Long-eared Bat, Greater Broad-nosed Bat, Inland Forest Bat, Little Pied Bat, Southern Myotis, Yellow-bellied Sheathtail Bat or their habitats.

Barking Owl

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

The Barking Owl is widely distributed around Australia but sparsely in NSW (OEH, 2021c, NPWS, 2003b). They can be found in a range of coastal habitats, but in northern Australia and semi-arid areas, riparian areas dominated by red gum and *Melaleuca* species seem preferred.

The moderately large owl is often seen along timbered watercourses, especially in dense vegetation where they will roost. The species roost in shaded portions of tree canopies, including tall mid-story trees with

dense foliage such as *Acacia* and *Casuarina* species. Nesting occurs during mid-winter and spring within large old hollows, where nests are usually repeated.

The species opportunistically hunts for terrestrial, arboreal and aerial prey between dusk and dawn and occasionally in daylight (Kavanagh, 2002). Home ranges are thought to be between 200 and 6000 ha (NPWS, 2003b). The main threats to this species is the loss and degradation of habitat as well as the loss of hollow-bearing trees (OEH, 2021c) both of which are of relevance to the proposal.

The potential impact for this species relates to the removal of woodland habitat in section 1 and 2. This equates to about 55.23 hectares. The loss of up to 55.23 hectares of potential habitat is considered negligible in the context of the native vegetation within the general road corridor (2,549 hectares) with about 2% being impacted. Within a 550-metre buffer of the road corridor of section 1 and 2 (about 13,830.3 hectares) about 0.4% would be impacted. Woodland also occurs across the wider locality which would remain unaffected confirming that extensive areas of potential and known habitat would remain. Up to 282 HBT would be removed in section 1 and 2. While the removal of 282 HBT equates to about 5.2% of the HBT within the road corridor, 93.6% remain. Further, while no data was taken on the size of hollows, few were actually large enough to support this species for roosting. Removal of hollow-bearing trees should only be conducted with regard to the mitigation measures outlined within section 6.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Barking Owl such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

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

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

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

This species is not listed as an endangered ecological community or critically endangered ecological community.

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

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

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

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

- i. The proposed work would result in the removal of up to 55.23 hectares of native vegetation in section 1 and 2, comprising potential habitat. 282 HBT would also be removed
- ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists given the ability of these species to move (fly), the nature of proposed work spread over a long distance, and the extent and quality of woodlands within the road corridor, adjacent to the study area as well as the wider locality, which would remain unaffected by the proposed work
- iii. The potential habitat to be removed is considered to be of minor importance to the long-term viability of these biota in the locality given the proximity to the existing highway formation. It is more likely that the extensive woodlands adjacent to the Murrumbidgee River are of greater importance to the population given breeding and foraging resources.

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

No declared areas of outstanding biodiversity value are known from the vicinity of the proposal.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, and *Loss of hollow-bearing trees* are potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

The clearing of about 55.23 hectares of native vegetation is necessary to carry out the proposal to provide improved road user safety along this section of the Sturt Highway. In the context of the native vegetation within the road corridor (2,549.4 hectares) about 2% would be impacted. Within a 550-metre buffer of the road corridor (about 13,830.3 hectares) about 0.4% would be impacted. Native vegetation also occurs across the wider the locality which would remain unaffected confirming that extensive areas of native vegetation would remain.

The proposal would also result in the loss of up to 282 HBT. However, 5,116 HBT would remain within the road corridor confirming that these are well represented habitat features. Nonetheless, potential impacts could result if the removal of HBT (when any animals present would be roosting during daylight hours), were not subject to inspection combined with retrieval and relocation protocols to adjoining habitat. Removal of hollow-bearing trees should only be conducted with regard to the mitigation measures outlined within section 6.

Conclusion

This Test of Significance has determined that the proposed activity is ‘*unlikely*’ to have a ‘*significant effect*’ on Barking Owl or their habitat.

Birds of Prey (Black-breasted Buzzard, Black Falcon, Little Eagle, Spotted Harrier, Square-tailed Kite, White-bellied Sea-eagle)

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

Black-breasted Buzzard

The Black-breasted Buzzard is found sparsely in areas of less than 500mm rainfall, from north-western NSW and north-eastern South Australia to the east coast at about Rockhampton, then across northern Australia south almost to Perth, avoiding only the Western Australian deserts.

It occurs in a range of inland habitats, especially along timbered watercourses which is the preferred breeding habitat. The species is also known to hunt over grasslands and sparsely timbered woodlands where it will prey on small reptiles, small mammals, birds, including nestlings and sometimes feed on carrion. It is also an egg specialist, feeding on large eggs such as Emu which it cracks on rocks.

While no Black-breasted Buzzard were recorded during the field survey, the potential for them to occur was identified within sections 4 & 5. The proposal would result in the removal of about 23.75 hectares of potential habitat (all native vegetation) within these sections. No evidence of nesting was identified within the road corridor by past or current nest sites.

The loss of up to 23.75 hectares of potential habitat is considered negligible in the context of the native vegetation within the general road corridor (2,549 hectares) with about 1% being impacted. Within a 550-metre buffer of the road corridor of section 4 and 5 (about 11,690.8 hectares) about 0.2% would be impacted. Woodland also occurs across the wider locality which would remain unaffected confirming that extensive areas of potential and known habitat would remain.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Black-breasted Buzzard such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Black Falcon

The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. Some reports of 'Black Falcons' on the tablelands and coast of New South Wales are likely to be referable to the Brown Falcon. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres (Marchant and Higgins, 1993). The Black Falcon occurs as solitary individuals, in pairs, or in family groups of parents and offspring.

No Black Falcon were recorded during the field survey. However, the habitat assessment completed in Annexure C confirms that all native vegetation within sections 2, 3 and 4 could provide potential habitat for this species. The proposal would result in the removal of about 56.07 hectares of native vegetation in these sections.

The loss of up to 55.64 hectares of potential habitat is considered negligible in the context of the native vegetation within the general road corridor (2,549 hectares) with about 2% being impacted. Within a 550-metre buffer of the road corridor of sections 2, 3 and 4 (about 11,690.8 hectares) about 0.2% would be impacted. Woodland also occurs across the wider locality which would remain unaffected confirming that extensive areas of potential and known habitat would remain.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Black Falcon such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Little Eagle

The Little Eagle is found across mainland Australia except in densely forested areas. They nest in tall, living trees, where a large stick nest is built in winter. The species lays two or three eggs during spring, and young fledge in early summer. The field survey at least one pair of Little Eagle in section 2. A second pair was also observed in the same section, however, it cannot be stated with any level of certainty that was the same pair or two different pairs. Given the relatively large range of this species, it is more than likely to be a single pair detected on two separate occasions. No nesting sites (past or present) were identified in the road corridor.

The habitat assessment completed in Annexure C confirms that Little Eagle could potentially occur across all sections of the proposal. Should the proposal proceed in its entirety, this would result in the removal of about 83.91 hectares of potential and known habitat in the form of woodland and shrubland.

The loss of up to 83.91 hectares of potential habitat is considered negligible in the context of the native vegetation within the general road corridor (2,549 hectares) with about 3.1% being impacted. Within a 550-metre buffer of the road corridor (about 37,539.9 hectares) about 0.2% would be impacted. Woodland also

occurs across the wider locality which would remain unaffected confirming that extensive areas of potential and known habitat would remain.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Little Eagle such that a viable local population is likely to be placed at risk of extinction.

Spotted Harrier

The Spotted Harrier occurs in open woodland habitats across mainland Australia. It builds a stick nest in a live tree and breeds in Spring, occasionally Autumn (DECCW, 2010). Field surveys failed to reveal the presence of this species, nor were any nest sites located. Potential habitat is more likely in the grassy groundcover areas adjacent to creeklines as these attributes aid foraging techniques for the species.

No Spotted Harrier were recorded during the field survey. However, the habitat assessment completed in Annexure C confirms that all woodlands within all sections could provide potential habitat for this species. Given this, the proposal would result in the removal of about 63.56 hectares of native vegetation in these sections.

The loss of up to 63.56 hectares of potential habitat is considered negligible in the context of the native vegetation within the general road corridor (2,549 hectares) with about 2% being impacted. Within a 550-metre buffer of the road corridor (about 37,539.9 hectares) about 0.18% would be impacted. Woodland also occurs across the wider locality which would remain unaffected confirming that extensive areas of potential and known habitat would remain.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Spotted Harrier such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Square-tailed Kite

This species' preferred habitat is open eucalypt forest and woodland where it is a predator primarily of small birds and their nestlings, foraging in the tree tops of the forest (DECCW, 2009, Morcombe, 2004, NPWS, 1999b). It is sparsely distributed with resident pairs having territories of greater than 100 km², and is also believed to be nomadic (NPWS, 1999b, Garnett and Crowley, 2000). Habitat requirements essential for the lifecycle of these species are areas of intact forest that provide forage habitat and nest sites (OEH, 2021c). It has been suggested however, that the Square-Tailed Kite prefers a landscape that is structurally diverse and that the mixed landscape created by partial clearing may favour it. The comprehensive field survey identified a single bird in section 2. No past or current nest sites were identified. However, the study area could form part of this large territory and essentially, a potential foraging resource.

Considering the large territories that this species occupies, potential foraging resources are not regarded as limited within the locality given the extent of the native vegetation in the locality. The habitat assessment completed in Annexure C confirms that all woodlands within all sections could provide potential habitat for this species. Given this, the proposal would result in the removal of about 67.25 hectares of native vegetation in these sections.

The loss of up to 67.25 hectares of potential habitat is considered negligible in the context of the native vegetation within the general road corridor (2,549 hectares) with about 2% being impacted. Within a 550-metre buffer of the road corridor (about 37,539.9 hectares) about 0.18% would be impacted. Woodland also occurs across the wider locality which would remain unaffected confirming that extensive areas of potential and known habitat would remain.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Square-tailed Kite such that a viable local population is likely to be placed at risk of extinction.

White-bellied Sea-eagle

The White-bellied Sea-eagle is distributed around the Australian coastline, including Tasmania, and well inland along rivers and wetlands of the Murray Darling Basin. They inhabit large areas of open water including larger rivers, swamps, lakes, and the sea. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees. This species feeds mainly on fish and freshwater turtles, but also waterbirds, reptiles, mammals, and carrion (OEH, 2021b).

In the absence of detecting this species in the field survey, the habitat assessment completed in Annexure C found that river red gum communities were most likely to provide potential habitat in the road corridor in the absence of large wetlands. On this basis, up to 3.11 hectares of potential habitat would be affected by the proposal.

The loss of up to 3.11 hectares of potential habitat is considered negligible in the context of the native vegetation within the general road corridor (2,549 hectares) with about 0.13% being impacted. Within a 550-metre buffer of the road corridor (about 37,539.9 hectares) about 0.18% would be impacted. Woodland also occurs across the wider locality which would remain unaffected confirming that extensive areas of potential and known habitat would remain.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of White-bellied Sea-eagle such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

These biota not listed as an endangered ecological community or critically endangered ecological community.

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

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**
 - i. The proposed work would result in the removal of up to 88.91 hectares of native vegetation
 - ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists given the ability of these species to move (fly), the nature of proposed work spread over a long distance, and the extent and quality of woodlands and native vegetation within the road corridor, adjacent to the study area as well as the wider locality, which would remain unaffected by the proposed work
 - iii. For these biota the potential and known habitat to be removed is considered to be of some importance to the long-term viability of these biota in the locality. However, the extensive woodlands and forests of Murrumbidgee River floodplain and surrounding woodlands is likely to be of greater importance to the population given breeding and foraging resources in those locations.

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

No declared areas of outstanding biodiversity value are known from the vicinity of the proposal.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, is of relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

The loss of up to 88.91 hectares of potential habitat is considered negligible in the context of the native vegetation within the general road corridor (2,549 hectares) with about 3% being impacted. Within a 550-metre buffer of the road corridor (about 37,539.9 hectares) about 0.2% would be impacted. Woodland also occurs across the wider locality which would remain unaffected confirming that extensive areas of potential and known habitat would remain.

Conclusion

This Test of Significance has determined that the proposed activity is ‘unlikely’ to have a ‘significant effect’ on Black-breasted Buzzard, Black Falcon, Little Eagle, Spotted Harrier, Square-tailed Kite, White-bellied Sea-eagle.

Woodland/Shrubland Birds (Black-chinned Honeyeater, Brown Treecreeper, Bush Stone-curlew, Diamond Firetail, Grey-crowned Babbler, Hooded Robin, Little Lorikeet, Painted Honeyeater, Pink Cockatoo, Regent Parrot, Scarlet Robin, Speckled Warbler, Superb Parrot, Swift Parrot, Turquoise Parrot, Varied Sittella)

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

Black-chinned Honeyeater

The Black-chinned Honeyeater is found in dry open forests and woodlands dominated by box or ironbark eucalypts (OEH, 2021c). The species is often seen in pairs but also in small groups as many as a dozen or more individuals. Foraging ranges are generally at least five hectares making this species locally nomadic to exploit food resources. No Black-chinned Honeyeater were recorded during the field survey however, the habitat assessment completed in Annexure C found that there was a moderate potential for occurrence with the woodlands and shrublands of section 2 and 5.

OEH (2021c) identify the following threats to Black-chinned Honeyeater:

- Clearing of remnant open forest and woodland habitat.
- Poor regeneration of open forest and woodland habitats because of intense grazing.
- May be excluded from smaller remnants by aggressive species such as the Noisy Miner (*Manorina melanoccephala*).

The clearing of about 50.4 hectares of potential habitat is necessary to carry out the proposal. This is considered negligible in the context of the woodlands within the road corridor (2,549.4 hectares, or about

2% impacted), within a 550-metre buffer of the road corridor of section 2 and 5 (about 17,980 hectares, or about 0.3% impacted) and within the wider the locality which would remain unaffected. This suggests that the extensive areas of potential habitat remain within the road corridor and locality would continue to provide habitat for this species. Temporary impacts would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Black-chinned Honeyeater such that a viable local population is likely to be placed at risk of extinction.

Brown Treecreeper

The Brown Treecreeper occurs in sub-coastal environments and the slopes of the Great Dividing Range through central NSW (Wagga Wagga, Temora, Forbes, Dubbo, Inverell) (Morcombe, 2004). Whilst it has a large range the species has greatly reduced in density over most of that range (Reid, 1999). They are found in eucalypt woodlands dominated by stringybarks or other roughbark eucalypt, usually with an open grassy understory (including Box-gum Woodland) and dry open forest occurs in eucalypt forests and woodland of inland plains and slopes of the Great Dividing Range (OEH, 2021c).

The Brown Treecreeper has also declined or disappeared from most remaining remnants that are smaller than 300 hectares, at least partly because females disperse from these areas or die preferentially and are not replaced (Cooper et al., 2002, Cooper and Walters, 2002). Once lost from a remnant, recolonisation is unlikely without assistance. Extensive field surveys in the vicinity of the proposal, did not reveal any Brown Treecreeper which was very surprising. However, given the Newell Highway is considered the generally boundary between the eastern subspecies (threatened) and the western (non-threatened), only potential habitat is considered to be present in section 1.

OEH (2021c) identify the following threats to Brown Treecreeper:

- Historical loss of woodland, forest and mallee habitats as a result of agriculture, forestry, mining and residential development.
- Fragmentation of woodland and forest remnants which isolates populations and causes local extinctions.
- Ongoing degradation of habitat, particularly the loss of tree hollows and fallen timber from firewood collection and overgrazing.
- Lack of regeneration of eucalypt overstorey in woodland due to overgrazing and too-frequent fires.
- Loss of ground litter from compaction and overgrazing.
- Inappropriate forestry management practices.

The clearing of about 18.85 hectares of potential woodland habitat is necessary to carry out the proposal. The presence of tree hollows, in particular, stags (standing dead trees) suggests that the study area could contain potential breeding habitat. The loss of 18.85 5 hectares of woodland vegetation is considered negligible in the context of the woodlands within the road corridor, within a 550-metre buffer of the road corridor and within the wider locality which would remain unaffected. Up to 203 HBT would be removed from section 1 of the proposal. While the removal of 203 HBT equates to about 4% of the HBT within the road corridor, significant numbers of HBT would be retain. HBT appear widespread and do not appear to be a limiting resource in the locality. Temporary impacts to about 0.14 hectares within section 1 would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Brown Treecreeper such that a viable local population is likely to be placed at risk of extinction.

Bush Stone-curlew

The current distribution of Bush Stone-curlew in NSW is patchy with the area bounded by Albury, Wagga Wagga, Hay and Wentworth considered the stronghold (DEC, 2006). However, scattered populations are also known around the Forbes-Caragabal, Gulargambone-Collie and Mungindi districts

The species occurs in open forests, woodlands and shrublands with a sparse grassy groundcover (DEC, 2006). The species is considered largely nocturnal in nature, especially active on moonlight nights, where they forage for invertebrates and small frogs, snakes and lizards (OEH, 2021c). They build their nests on the ground in a scrape or small bare patch, laying two eggs in spring and early summer.

The habitat assessment completed in Annexure C found that there was some likelihood of occurrence within the woodland habitats in section 1, 2, 3 and 5. On this basis, the potential impacts to this species would result in the removal of up to 74.1 hectares of potential habitat. No Bush Stone-curlew were identified within the road reserve.

The clearing of about 74.1 hectares of potential woodland habitat is necessary to carry out the proposal. The loss of this potential habitat is considered minor in the context of the woodlands within the road corridor, within a 550-metre buffer of the road corridor and within the wider locality which would remain unaffected. Temporary impacts to about 5.34 hectares would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Bush Stone-curlew such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Diamond Firetail

Diamond Firetail is widely distributed in NSW, with a concentration of records from the Northern, Central and Southern Tablelands, the Northern, Central and South-western Slopes and the North-west Plains and Riverina (OEH, 2021c, Morcombe, 2004). Although they are not commonly found in coastal districts, there are records from near Sydney, the Hunter Valley and the Bega Valley (OEH, 2021c). They are considered relatively sedentary; however, many populations are known to disperse, especially during drought periods. They are known to build bottle-shaped nests in trees and bushes and preferentially choose mistletoe as a nest site (Cooney and Watson, 2005). It has declined in numbers in many areas and has disappeared from parts of its former range with Reid (1999) identifying it as a 'decliner' in a review of bird species' status in the NSW sheep-wheatbelt (Reid, 1999). No Diamond Firetail were recorded during the field survey however, the habitat assessment in Annexure C found that they are likely to occur in all native vegetation in sections 1, 2 and 3.

OEH (2021c) identify the following threats to Diamond Firetail:

- Clearing and fragmentation of woodland, open forest, grassland and mallee habitat for agriculture and residential development, and firewood collection.
- Poor regeneration of open forest and woodland habitats.
- Invasion of weeds, resulting in the loss of important food plants.
- Modification and destruction of ground- and shrub layers within habitat through: removal of native plants, litter and fallen timber; introduction of exotic pasture grasses; heavy grazing and compaction by stock; and frequent fire.
- Predation of eggs and nestlings by increased populations of native predators such as the Pied Currawong *Strepera graculina*.
- Risk of local extinction due to small, isolated populations.

The clearing of about 65.46 hectares of potential habitat in sections 1, 2, and 3 is necessary to carry out the proposal. This is considered negligible in the context of the native vegetation within the road corridor (2,549.4 hectares) with about 3% being impacted. Within a 550-metre buffer of the road corridor of sections 1, 2 and 3 (about 25,847 hectares), about 0.3% would be impacted. Potential habitat also occurs across the wider the locality which would remain unaffected. Areas of temporary impact would be rehabilitated at the conclusion of construction.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Diamond Firetail such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Grey-crowned Babbler

The Grey-crowned Babbler is found on the western slopes of the Great Dividing Range as well as some locations in the Hunter Valley where it inhabits woodlands in family groups of up to fifteen individuals (Reid, 1999, OEH, 2021c, Garnett and Crowley, 2000). These family groups maintain territories that can range from one to fifty hectares which are defended all year round, where disputes with neighbouring groups are frequent (OEH, 2021c).

Grey-crowned Babbler was recorded on a number of occasions in section 2. Breeding evidence was also revealed with one observation of young birds being fed by adult birds. The habitat assessment in Annexure C also found that there was some potential for the species to occur in sections 1, 3 and 4 based on the presence of potentially suitable habitat.

On this basis, the proposal would result in the removal of up to 68.55 hectares of known and potential habitat. A number of home ranges of the species would also be partially affected. The loss of habitat is considered potentially significant, however, in the context of the native vegetation within the road corridor (2,549.4 hectares) and within a 550-metre buffer of the road corridor of sections 1, 2, 3 and 4 (about 32,209 hectares), about 0.2% would be impacted. Potential habitat also occurs across the wider the locality which would remain unaffected. Areas of temporary impact would be rehabilitated at the conclusion of construction. Site specific mitigation measures around pre-clearance surveys of any babbler nests are provided in this BA.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Grey-crowned Babbler such that a viable local population is likely to be placed at risk of extinction.

Hooded Robin

The Hooded Robin is found across many parts of Australia in woodlands, acacia scrub and mallee (Sass, 2009, Reid, 1999). It is generally considered that the Hooded Robin requires a structurally diverse habitat including microhabitat such as native grasses, shrubs and fallen timber across a breeding territory of around 10 hectares (OEH, 2021c). However, it is believed that the species generally exhibits demanding requirements for both habitat complexity and area (>100ha) (Watson et al., 2001).

While no Hooded Robin were recorded during the field survey, the habitat assessment in Annexure C found that potential habitat was present in the woodland and shrubland habitats of sections 1, 4 and 5. This equates to a proposed impact to about 42.4 hectares of potential habitat. The loss of habitat could be considered potentially significant, however, in the context of the native vegetation within the road corridor (2,549.4 hectares) and within a 550-metre buffer of the road corridor of sections 1, 4 and 5 (about 13,982 hectares), only about 0.3% would be impacted. Potential habitat also occurs across the wider the locality which would remain unaffected. Areas of temporary impact would be rehabilitated at the conclusion of construction.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Hooded Robin such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Little Lorikeet

The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia (OEH, 2021c). NSW provides a large portion of the species' core habitat, with lorikeets found westward as far as Dubbo and Albury. Nomadic movements are common, influenced by season and food availability, although some areas retain residents for much of the year and 'locally nomadic' movements are suspected of breeding pairs (OEH, 2021c).

Little Lorikeets are gregarious, usually foraging in small flocks, often with other species of lorikeet. They feed primarily on nectar and pollen in the tree canopy, particularly on profusely-flowering eucalypts, but also on a variety of other species including, melaleucas and mistletoes. Riparian habitats are particularly used for foraging, due to higher soil fertility and therefore, greater productivity. Isolated flowering trees in paddocks, roadside reserves and urban trees also help sustain populations of the species.

Little Lorikeets nest in HBT typically of smooth-barked eucalypts but also nests in proximity to feeding areas if possible, most typically selecting hollows in the limb or trunk of smooth-barked Eucalypts and in riparian trees, species such as *Allocasuarina* are used.

While no Little Lorikeet were recorded in the field survey, the habitat assessment in Annexure C found that potential habitat is likely to occur in all areas of woodland in sections 1 and 2. On this basis, and with consideration of the proposal, about 55.23 hectares of potential habitat would be directly affected. The loss of this amount of habitat could be considered potentially significant, however, in the context of the native vegetation within the road corridor (2,549.4 hectares) and within a 550-metre buffer of the road corridor of sections 1 and 2 (about 13,829 hectares), only about 0.4% would be impacted.

The proposal would also result in the loss of up to 282 HBT in section 1 and 2 (or about 5.2% of the HBT within the road corridor). However, 5,116 HBT would remain. Potential habitat also occurs across the wider the locality which would remain unaffected. Nonetheless, safeguards detailed within section 6 of this BA provide a framework for minimising impacts to this species. Areas of temporary impact would be rehabilitated at the conclusion of construction.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Little Lorikeet such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Painted Honeyeater

The Painted Honeyeater is a highly nomadic species that lives in Boree, Brigalow, Box-Gum Woodlands and Box-Ironbark Woodlands at low densities throughout its range (OEH, 2021c). Its primary food is the fruit of mistletoes though it will also take some nectar and insects (Oliver et al., 2003, Oliver et al., 1998). Its distribution is dictated by distribution of mistletoes, which are largely restricted to older trees, and the seasonality of their fruiting. No Painted Honeyeater was recorded during the comprehensive field surveys during this study. However, the habitat assessment provided in Annexure C found that potential habitat and therefore potential occurrence is within sections 1, 2 and 3. The proposal is likely to directly impact about 59.86 hectares of potential habitat for Painted Honeyeater. The loss of this amount of habitat could be considered potentially significant, however, in the context of the native vegetation within the road corridor (2,549.4 hectares) and within a 550-metre buffer of the road corridor of sections 12, and 3 (about 25,829 hectares), only about 0.24% would be impacted. Given the highly mobile nature of this species, potential impacts as a result of the proposal are considered negligible.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Painted Honeyeater such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Pink Cockatoo

The Pink Cockatoo is found in arid and semi-arid zone woodlands dominated by mulga, mallee and box eucalypts, cypress pine or Belah where it feeds primarily on seeds, roots and fruits (OEH, 2021c, Morcombe, 2004, Sass, 2009). Breeding pairs occupy nests at least 1 km apart with densities of about one pair per 30 km² recorded (OEH, 2021c).

No Pink Cockatoo were recorded during the field survey. However, the habitat assessment completed in Annexure C found there was some potential for occurrence based on habitat presence in sections 1, 3, 4 and 5. This corresponds with all woody vegetation in these sections. On that basis, and in consideration of the proposal, about 75.5 hectares of potential habitat would be directly affected should the proposal proceed. Additionally, about 264 HBT would be removed from those sections, which could provide potential breeding resources for Pink Cockatoo.

The loss of this amount of habitat could be considered potentially significant, however, in the context of the native vegetation within the road corridor (2,549.4 hectares) and within a 550-metre buffer of the road corridor of sections 1, 3,4 and 5 (about 26,002 hectares), only about 0.3% would be impacted. Additionally, about 5,398 HBT are known from within the road corridor so the loss of these hollows in the context of those remaining should the proposal proceed, is considered negligible.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Pink Cockatoo such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Regent Parrot

The eastern subspecies is restricted to areas around the Murray River in South Australia, Victoria and NSW. In NSW it occurs along the Murray River downstream of Tooleybuc (though there are few records between Mildura and the South Australian border), the Wakool River downstream of Kyalite, and the Murrumbidgee River immediately upstream from the junction with the Murray River and adjoining areas of mallee. There are scattered records along the Darling River as far north as Menindee, but at this stage the species has not been confirmed to breed along this river. The species nests within River Red Gum forests along the Murray, Wakool and lower Murrumbidgee Rivers, and possibly the Darling River downstream of Pooncarie. Typical nest trees are large, mature healthy trees with many spouts (though dead trees are used) and are usually located close to a watercourse. Principal foraging habitat is mallee woodlands, though foraging also occurs in riverine forests and woodlands. Mallee woodland within 20 kilometres of nesting sites is critical foraging habitat for breeding birds.

Regent Parrot were recorded on numerous occasions in section 4 and 5, and in all instances, were birds travelling away or toward the location of Murrumbidgee River or Murray River, and travelling away or towards the general location of large expanses of mallee. None of the birds observed in the field survey were recorded foraging within the road reserve.

Combined with the sightings of Regent Parrot during the field survey, the habitat assessment within Annexure C also confirmed that there is the potential for the mallee and eucalypt PCT to provide potential foraging habitat within sections 4 and 5. Based on this, the proposal would directly impact about 21.69 hectares of potential foraging habitat. Breeding habitat is not considered present, as Regent Parrot breed along the river banks in large river red gums, features not present in the proposal area.

The loss of this amount of habitat could be considered potentially significant, however, in the context of the native vegetation within the road corridor and within a 550-metre buffer of the road corridor of sections 4 and 5 (about 11,690 hectares), only about 0.2% would be impacted.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Regent Parrot such that a viable local population is likely to be placed at risk of extinction.

Scarlet Robin

In NSW, the Scarlet Robin occurs in open forests and woodlands from the coast to the inland slopes and in winter, dispersing birds are known to appear in the east of the inland plains (OEH 2012b). The Scarlet Robin is considered sensitive to habitat fragmentation and the reductions of structural complexity of habitat and native ground covers. (Barrett *et al.* 2007; Watson *et al.* 2001). No Scarlet Robin have been detected during the field survey.

OEH (2021c) identify the following threats to Scarlet Robin:

- Historical habitat clearing and degradation.
- Habitat modification due to overgrazing.
- Reduction of size of remnant patches.
- Reduction in the structural complexity of habitat, including reductions in canopy cover, shrub cover, ground cover, logs, fallen branches and leaf litter.
- Reduction of the native ground cover in favour of exotic grasses.
- Loss of nest sites, food sources and foraging sites, such as standing dead timber, logs and coarse woody debris from depletion by grazing, firewood collection and 'tidying up' of rough pasture.
- Predation by over-abundant populations of Pied Currawong (*Strepera graculina*) which are supported by planted exotic berry-producing shrubs; this pressure, in addition to that from other native and exotic predators, may be a potentially severe threat to the breeding success of Scarlet Robin populations.
- Predation by feral cats (*Felis catus*).
- Robbing of nests and predation of fledglings by rats.
- Isolation of patches of habitat, particularly where these patches are smaller than 30 ha, and in landscapes where clearing has been heavy or where remnants are surrounded by cropping or stock grazing.
- Habitat for the Scarlet Robin may become unsuitable if dense regeneration occurs after bushfires or other disturbances.

The clearing of about 55.24 hectares of potential woodland habitat (within section 1 and 2) is necessary to carry out the proposal. This is considered negligible in the context of the woodlands within the road corridor and within a 550-metre buffer of the road corridor of section 1 and 2 (about 13,829 hectares) as only about 0.4% would be impacted. The woodlands of the wider locality would remain unaffected and would continue to provide potential habitat for this species. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Scarlet Robin such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Speckled Warbler

The Speckled Warbler has a patchy distribution throughout south-eastern Queensland, the eastern half of NSW and into Victoria, as far west as the Grampians. The species is most frequently reported from the hills and tablelands of the Great Dividing Range, and rarely from the coast. There has been a decline in population density throughout its range, with the decline exceeding 40% where no vegetation remnants larger than 100ha survive. The Speckled Warbler lives in a wide range of *Eucalyptus* dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. Large, relatively undisturbed remnants are required for the species to persist in an area.

Pairs are sedentary and occupy a breeding territory of about ten hectares, with a slightly larger home-range when not breeding.

While no Speckled Warbler were recorded during the field survey, the habitat assessment in Annexure C found that all woody vegetation in sections 1, 2, 4 and 5 could provide potential habitat for this species. The clearing of about 78.73 hectares of potential habitat is necessary to carry out the proposal. The loss of this amount of habitat could be considered potentially significant, however, in the context of the native vegetation within the road corridor and within a 550-metre buffer of the road corridor of section 1, 2, 4 and 5 (about 25,521 hectares), it is considered relatively minor as only about 0.3% would be impacted. The woodlands of the wider locality would remain unaffected and would continue to provide potential habitat for this species. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Speckled Warbler such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Superb Parrot

Superb Parrots are known to nest in box-gum woodland, riparian woodland and isolated paddock trees, where they may travel as far as 10 kilometre to suitable foraging habitat (OEH, 2021c, CSU, 2006b). In the south-west slopes, their core breeding habitat has been identified as roughly bordered by the towns of Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west making the study area in core breeding habitat. Other known breeding sites are located within the corridors of the Murrumbidgee, Murray and Edward Rivers. Migration of these populations occurs at the end of the breeding season, when birds move north toward the Upper Namoi and Gwydir River regions. Superb Parrot were regularly recorded during the field surveys, and were frequently recorded feeding on flowering eucalypts and inspecting tree hollows. The field survey was not during the known breeding season however, numerous Superb Parrot were recorded in section 1 and 2.

OEH (2021c) identify the following threats to Superb Parrot:

- Removal of hollow-bearing trees
- Clearing of woodland remnants
- Poor regeneration of nesting trees and food resources
- Feeding on grain spills and subsequently being struck by vehicles
- Loss of hollows to feral bees and native and exotic hollow-nesting birds
- Illegal trapping.

With the results of the field survey and the habitat assessment in Annexure C, it was found that all woodland areas in all five sections could provide foraging and potential breeding habitat for the species. Given this, the proposal would result in the clearing of about 64.26 hectares of potential habitat is necessary to carry out the proposal. The loss of this amount of habitat could be considered potentially significant, however, in the context of the native vegetation within the road corridor and within a 550-metre buffer of the road corridor (about 37,539 hectares), it is considered relatively minor as only about 0.18% would be impacted. The woodlands of the wider locality would remain unaffected and would continue to provide potential habitat for this species. As many as 343 HBT would also be directly impacted which equates to about 6.4% of the total number of HBT mapped within the road corridor. Site-specific safeguards have been developed to minimise the potential risk to both adult birds, and chicks in nests (should any be present) at the time of the proposed work to an acceptable level. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Superb Parrot such that a viable local population is likely to be placed at risk of extinction.

Swift Parrot

Swift Parrot is a winter (March-September) visitor to southern and eastern New South Wales, where it inhabits eucalypt forests and woodlands (OEH, 2021c, Brereton et al., 2004, Mac Nally and Horrocks, 2000). It feeds mostly on the flowers of eucalypts (particularly prolifically flowering species), but also eats psyllids and exotic fruits (Brereton et al., 2004, Mac Nally and Horrocks, 2000). This species is highly nomadic and relatively large numbers can arrive at and vacate areas depending on local and regional flowering of favoured species (Mac Nally and Horrocks, 2000). No Swift Parrot were recorded during the field surveys, but they are known to occur within the Tarcutta district including the Mates Gully Travelling Stock Reserve. Swift Parrot does not breed on the Australian mainland.

OEH (2021c) identify the following threats to Swift Parrot:

- On the mainland the main threat is loss of habitat through clearing for agriculture, and urban and industrial development; and
- Collisions with wire netting fences, windows and cars, during the breeding season and winter migration (especially where such obstacles are in close proximity to suitable habitat).

The habitat assessment in Annexure C found that all areas of woodland in section 1 had some level of potential as foraging habitat for this species. Given this, about 18.85 hectares of potential foraging habitat would be removed by the proposal. The loss of this amount of habitat could be considered potentially significant, however, in the context of the native vegetation within the road corridor and within a 550-metre buffer of the road corridor (about 2,292 hectares), it is considered relatively minor as only about 0.9% would be impacted. The woodlands of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species. Despite being a hollow-dependant species, Swift Parrot breeds only in Tasmania so the loss of hollows as a result of this proposal is of no relevance. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Swift Parrot such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Turquoise Parrot

The Turquoise Parrot occurs from southern Queensland through to northern Victoria where it is known from woodland and riparian habitats particularly those with a grassy or shrubby understorey (OEH, 2021c). The species is often seen at the ecotone between woodland and open farmland, along timbered ridges and watercourses. No Turquoise Parrot have been recorded within the vicinity of the proposal but they have been recorded in woodland to the east (Ellerslie Nature Reserve).

OEH (2020c) identify the following threats to Turquoise Parrot:

- Clearing of grassy-woodland and open forest habitat.
- Loss of hollow-bearing trees.
- Degradation of habitat through heavy grazing, firewood collection and establishment of exotic pastures.
- Predation by foxes and cats.
- Illegal trapping of birds and collection of eggs which also often results in the destruction of hollows.

The habitat assessment in Annexure C found that all areas of woodland in section 1 and 2 had some level of potential as habitat for this species. This was confirmed by our record of this species of a small flock in

section 2. Given this, about 37.06 hectares of potential and known foraging habitat would be removed by the proposal. The loss of this amount of habitat could be considered potentially significant, however, in the context of the native vegetation within the road corridor and within a 550-metre buffer of the road corridor in sections 1 and 2 (about 13,829 hectares), it is considered relatively minor as only about 0.3% would be impacted. The woodlands of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Turquoise Parrot such that a viable local population is likely to be placed at risk of extinction.

Varied Sittella

The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands, with a nearly continuous distribution in NSW from the coast to the far west (Morcombe, 2004, OEH, 2021c, OEH, 2021a). It inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and *Acacia* woodland. The Varied Sittella feeds on arthropods gleaned from crevices in rough or decorticated bark, dead branches, standing dead trees, and from small branches and twigs in the tree canopy. It builds a cup-shaped nest of plant fibres and cobweb in an upright tree fork high in the living tree canopy, and often re-uses the same fork or tree in successive years.

OEH (2021c) identify the following threats to Varied Sittella:

- Apparent decline has been attributed to declining habitat. The sedentary nature of the Varied Sittella makes cleared land a potential barrier to movement.
- The Varied Sittella is also adversely affected by the dominance of Noisy Miners in woodland patches.
- Threats include habitat degradation through small-scale clearing for fencelines and road verges, rural tree decline, loss of paddock trees and connectivity, 'tidying up' on farms, and firewood collection.

The field survey did confirm the presence of Varied Sittella within the road corridor, and the habitat assessment within Annexure C found that it was likely potential habitat occurs within section 1, 2, 4 and 5. Given this, about 78.73 hectares of potential and known foraging habitat would be removed by the proposal. The loss of this amount of habitat could be considered potentially significant, however, in the context of the native vegetation within the road corridor and within a 550-metre buffer of the road corridor in these sections (about 25,521 hectares), it is considered relatively minor as only about 0.32% would be impacted. The woodlands of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Varied Sittella such that a viable local population is likely to be placed at risk of extinction.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

These biota are not listed as an endangered ecological community or critically endangered ecological community.

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

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**
 - i. The proposed work would result in the removal of up to 78.73 hectares of native vegetation, comprising potential and known habitat for these biota. 343 HBT would also be removed
 - ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists given the ability of these species to move (fly), the nature of proposed work spread over a long distance, and the extent and quality of woodlands within the road corridor, adjacent to the study area as well as the wider locality, which would remain unaffected by the proposed work
 - iii. For these biota, the potential and known habitat to be removed is considered to be of some importance to the long-term viability of these biota in the locality. However, these biota are unlikely to rely on the resources within the road corridor and would require the landscape level functionality as a greater level of importance.

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

No declared areas of outstanding biodiversity value are known from the vicinity of the proposal.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, and *Loss of hollow-bearing trees* are potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

The clearing of up to 78.73 hectares of native vegetation is necessary to carry out the proposal to provide improved road user safety along this section of the Sturt Highway. In the context of the native vegetation within the road corridor (2,549 hectares) only about 3.5% would be impacted. Within a 550-metre buffer of the road corridor (about 37,539 hectares) about 0.25% would be impacted. Native vegetation also occurs across the wider the locality which would remain unaffected confirming that extensive areas of native vegetation would remain.

The proposal would also result in the loss of up to 343 HBT (or about 6.4% of the HBT within the road corridor). However, 5,055 HBT would remain (or about 93.6%). Nonetheless, potential impacts could result if the removal of HBT (when any animals present) were not subject to inspection combined with retrieval and relocation protocols to adjoining habitat. Removal of hollow-bearing trees should only be conducted with regard to the mitigation measures outlined within section 6.

Conclusion

This Test of Significance has determined that the proposed activity is '*unlikely*' to have a '*significant effect*' on Black-chinned Honeyeater, Brown Treecreeper, Bush Stone-curlew, Diamond Firetail, Grey-crowned Babbler, Hooded Robin, Little Lorikeet, Painted Honeyeater, Pink Cockatoo, Regent Parrot, Scarlet Robin, Speckled Warbler, Superb Parrot, Swift Parrot, Turquoise Parrot, Varied Sittella or their habitats.

Habitat generalists (Flame Robin, Dusky Woodswallow, Pied Honeyeater)

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

Flame Robin

In NSW, the Flame Robin breeds in upland, moist eucalypt forests and woodlands spending winter in more open lowland habitats such as grassland with scattered trees and open woodland on the inland slopes and plains. Often occurs in recently burn areas, however habitat becomes unsuitable as vegetation closes up following regeneration.

The Flame Robin is threatened by the clearing and degradation of breeding habitat, and relevant to the study area, the degradation of wintering habitats such as overgrazing and simplification of the microhabitat structure of woodlands.

The field survey did not confirm the presence of Flame Robin within the road corridor, however, the habitat assessment within Annexure C found that it was likely potential habitat occurs within section 1 and 2 in the form of cleared land and all PCT. Given this, about 87.25 hectares of potential habitat would be removed by the proposal. The loss of this amount of habitat could be considered potentially significant, however, in the context of the native vegetation only within the road corridor and within a 550-metre buffer of the road corridor in these sections (about 13,829 hectares), it is considered relatively minor as only about 0.64% would be impacted. The native vegetation of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Flame Robin such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Dusky Woodswallow

Dusky Woodswallow occur in a wide range of habitats including open eucalypt forests, woodlands, shrub lands, heathlands, farm land on the edges of woodland or forest and very occasionally in moist forest or rainforest. Most of the breeding activity occurs on the western slopes of the Great Dividing Range, a region dominated by woodland and open dry forest.

While the field survey did not record any Dusky Woodswallow within the road corridor, the habitat assessment within Annexure C found that it was likely potential habitat occurs within all areas of native vegetation, cleared land and tree plantings. Given this, about 137.03 hectares of potential habitat would be removed by the proposal. The loss of this amount of habitat could be considered potentially significant, however, in the context of the native vegetation only within the road corridor and within a 550-metre buffer of the road corridor in these sections (about 37,539 hectares), it is considered relatively minor as only about 0.4% would be impacted. The native vegetation of the wider locality would remain unaffected and would

continue to provide potential foraging habitat for this species. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Dusky Woodswallow such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Pied Honeyeater

The Pied Honeyeater is a widespread species found throughout a variety of vegetation communities across arid and semi-arid regions of NSW (OEH, 2021c) with numerous records from across the region (Sass, 2009, CSU, 2006a, EnviroKey, 2010). Pied Honeyeater are considered highly nomadic and follow the erratic flowering of shrubs where they feed on nectar but also eating saltbush fruits, berries, seeds and insects (OEH, 2021c). As with other semi-arid honeyeaters (Oliver et al., 2003, Watson, 1997, Yan, 1993), Pied Honeyeaters also rely heavily on mistletoe.

While no Pied Honeyeater were recorded during the field survey, the habitat assessment in Annexure C found that potential habitat occurred as woodland and tall shrublands in sections 3,4 and 5. On this basis,

Given this, about 28.3 hectares of potential habitat would be removed by the proposal. The loss of this amount of habitat could be considered potentially significant, however, in the context of the native vegetation only within the road corridor and within a 550-metre buffer of the road corridor in these sections (about 11,690 hectares), it is considered relatively minor as only about 0.25% would be impacted. The native vegetation of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Pied Honeyeater such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

These biota are not listed as an endangered ecological community or critically endangered ecological community.

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

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
 - (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
 - (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**
- i. The proposed work would result in the removal of up to 137.03 hectares in native vegetation and cleared land

- ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists given the ability of these species to move (fly), the relatively small nature of proposed work spread over a long distance, and the extent and quality of woodlands within the road corridor, adjacent to the study area as well as the wider locality, which would remain unaffected by the proposed work
- iii. For these biota, the potential and known habitat to be removed is considered to be of minor importance to the long-term viability of these biota in the locality given the extent of native vegetation within a 550m buffer of the proposal.

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

No declared areas of outstanding biodiversity value are known from the vicinity of the proposal.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, and *Loss of hollow-bearing trees* are potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

About 83.91 hectares of native vegetation (of relevance to these biota) would be removed by the proposal. The loss of this amount of habitat could be considered potentially significant, however, in the context of the native vegetation only within the road corridor and within a 550-metre buffer of the road corridor in these sections (about 13,829 hectares), it is considered relatively minor as only about 0.64% would be impacted. The native vegetation of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species. Areas of temporary impact would be rehabilitated at the conclusion of construction.

Conclusion

This Test of Significance has determined that the proposed activity is ‘*unlikely*’ to have a ‘*significant effect*’ on Flame Robin, Dusky Woodswallow, Pied Honeyeater or their habitats.

Open grassland/cleared land Birds (Plains Wanderer, White-fronted Chat, Brolga)

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

Plains Wanderer

The Plains-wanderer is a ground-dwelling grassland bird, which is cryptic and very difficult to observe during the day (AusGov, 2016, Parker and Oliver, 2006). Graziers have seen Plains-wanderers during the day when mustering sheep. The species can only be properly surveyed at night using spotlighting techniques.

The vast majority (>99%) of records of Plains-wanderers in NSW over the past 30 years come from an area of the western Riverina bounded by Hay and Narrandera on the Murrumbidgee River in the north, the Cobb Highway in the west, the Billabong Creek in the south, and Urana in the east. Even within its western

Riverina stronghold, the Plains-wanderer has a very patchy distribution. Surveys in the 1990s across 5,000km² of the western Riverina covering 37 properties found only 5% of the total area comprised suitable habitat. The amount of high quality habitat in the Riverina drops to 1-2% during very wet or dry years when grasslands become too dense or are grazed too bare for Plains-wanderers.

Habitat structure appears to play a more important role than plant species composition. Preferred habitat of the Plains-wanderer typically comprises 50% bare ground, 10% fallen litter, and 40% herbs, forbs and grasses. Most of the grassland habitat of the Plains-wanderer is <5 cm high, but some vegetation up to a maximum of 30 cm is important for concealment, as long as grass tussocks are spaced 10-20 cm apart. During prolonged drought, the denudation of preferred habitats may force birds into marginal denser and taller grassland habitats that become temporarily suitable.

The average home range of a single bird is about 12 ha. Breeding pairs have overlapping home ranges that total approximately 18 ha.

During the current field survey, all grassland habitat within the road corridor did not meet the specific attributes as detailed above. All vegetation was long (>30cm tall and in some cases higher than 1m tall) and dense. Nonetheless, the habitat assessment in Annexure C found that the areas of native grassland in sections 1,2 and 3 could be construed as potential albeit marginal habitat. On this basis, about 4.34 hectares of potential, marginal habitat would be removed by the proposal. The loss of this amount of habitat could be considered potentially significant, however, in the context of the native grassland within the road corridor (about 522 hectares) only about 0.83% of available habitat would be affected. Within a 550-metre buffer of the road corridor in these sections, areas of native grassland are also present. The native vegetation of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species where suitable grassland habitat occurs. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Plains-wanderer such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

White-fronted Chat

White-fronted Chat can be found across the southern half of Australia mostly within temperate and arid climates (Morcombe, 2004). In New South Wales they are mostly in the southern half of the state, occurring in damp open habitats along the coast, and near waterways in the western part of the state (Higgins et al., 2006). White-fronted Chats are generally not found in the northern parts of the state, however, there are a number of records for the species across the Cobar Peneplain Bioregion. The species is regarded as 'resident' in many areas, however, there is evidence to suggest that individuals will respond to increases in food abundance by temporary gathering (OEH, 2021c). Infrequently recorded in western NSW, dozens of White-fronted Chat were recorded within section 3 and 4 of the proposal foraging in chenopod shrublands.

On this basis and with consideration of the habitat assessment in Annexure C, it was found that all chenopod communities along with areas of grassland and cleared land, could provide potential habitat for White-fronted Chat. On this basis, about 50.7 hectares of known habitat would be removed by the proposal. The loss of this amount of habitat could be considered potentially significant, however, in the context of the habitat within the road corridor (about 1,000 hectares) only about 0.6% of available habitat would be affected. Within a 550-metre buffer of the road corridor in these sections, areas of native grassland are also present. The native vegetation of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species where suitable grassland habitat occurs. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of White-fronted Chat such that a viable local population is likely to be placed at risk of extinction.

Brolga

The Brolga occurs within the northern tropics, but becomes very sparse across the southern parts of Australia (OEH, 2021c, Veltheim, 2018, Sheldon, 2005). The species often feeds in dry grassland, ploughed paddocks, desert claypans, wetlands especially shallow swamps where they will forage with their head entirely submerged. Brolga nests comprises of a platform of grasses and sticks, augmented with mud, on an island or in the water.

While no Brolga were recorded during the field survey, the habitat assessment in Annexure C found that they could potentially occur in the grassland and cleared land sections of sections 1, 2 and 5. On this basis, this would result in the clearing of up to 3.2 hectares of native grassland and 31.4 hectares of cleared land. The loss of this amount of habitat could be considered potentially significant, however, in the context of the habitat within the road corridor and within a 550-metre buffer of the road corridor in these sections, areas of native grassland and cleared land would continue to provide suitable habitat should the proposal proceed. The native vegetation of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species where suitable grassland habitat occurs. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Brolga such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

These biota are not listed as an endangered ecological community or critically endangered ecological community.

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

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
 - (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
 - (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**
- i. The proposed work would result in the removal of up to 50.7 hectares of native vegetation (in the case of the White-fronted Chat), comprising some areas of potential and known habitat for remaining biota.
 - ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists given the ability of these species to move (fly), the relatively small nature of proposed work spread over a long distance, and the extent and quality of grasslands, chenopod shrublands and cleared land within the road corridor, adjacent to the study area as well as the wider locality, which would remain unaffected by the proposed work
 - iii. For these biota, the potential and known habitat to be removed is considered to be of little importance to the long-term viability of these biota in the locality.

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

No declared areas of outstanding biodiversity value are known from the vicinity of the proposal..

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, is of potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

The clearing of about up to 50.7 hectares of native vegetation (in the case of White-fronted Chat) is necessary to carry out the proposal to provide improved road user safety along this section of the Sturt Highway. In the context of the other habitat within the road corridor and within a 550-metre buffer of the road corridor, this is not considered to be significant. Native vegetation also occurs across the wider the locality which would remain unaffected.

Conclusion

This Test of Significance has determined that the proposed activity is ‘*unlikely*’ to have a ‘*significant effect*’ on Plains-wanderer, Brolga and White-fronted Chat or their habitats.

Birds of the mallee (Chestnut Quail-thrush, Gilberts Whistler, Malleefowl, Purple-crowned Lorikeet, Purple-gaped Honeyeater, Shy Heathwren, Southern Scrub-robin)

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

Chestnut Quail-thrush

Chestnut Quail-thrush is considered a mallee specialist in NSW where it (OEH, 2021c). Only rarely is it recorded in other vegetation communities, but usually a dense shrubby understorey is needed. In south-west NSW, surveys across 60 sites found them to be the most frequently encountered threatened bird species, being recorded at 42 of the survey sites (Val et al., 2012). There are 38 existing records of Chestnut Quail-thrush within Mallee Cliffs NP, and field surveys by AWC also recorded this species on three occasions.

OEH (2021c) identify the following threats to this species:

- Loss of habitat as a result of clearing has led to a decline in species distribution and abundance.
- Fragmentation, resulting from clearing or degradation of the habitat has reduced genetic variability and reproductive opportunities and has increased genetic isolation and the potential for significant impacts arising from stochastic events such as drought or fire.
- Degradation of the habitat, as a result of inappropriate grazing or fire regimes, has resulted in changes to the physical nature of the habitat, for example change in diversity and structure of floristics or invertebrates. Changes to the habitat may result in it being unsuitable for the species or may increase other threatening processes such as predation.

- Fire may cause the direct loss of individuals, and inappropriate fire regimes may cause long-term changes to physical features such as floristic structure or leaf litter, which is unfavourable to sustaining a viable population of the species.
- Predation by foxes or cats may have an impact, particularly where populations have already declined.
- Anthropogenic climate change is a long term significant threat as it will alter physical characteristics of the habitat such that it is no longer able to sustain a viable population.

While no Chestnut Quail-thrush were recorded during the field survey, the habitat assessment in Annexure C found that they could potentially occur in the mallee areas of sections 4 and 5. On this basis, this would result in the clearing of up to 14.45 hectares of potential habitat. The loss of this amount of habitat could be considered potentially significant, however, in the context of the habitat within the road corridor and within a 550-metre buffer of the road corridor in these sections, areas of mallee would continue to provide suitable habitat should the proposal proceed. The native vegetation of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species where suitable grassland habitat occurs. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Chestnut Quail-thrush such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Gilberts Whistler

Gilbert's Whistler occurs in a range of habitats within NSW including mallee shrublands (OEH, 2021c). Within mallee, the presence of spinifex or a shrubby understorey is generally preferred habitat, Gilbert's Whistler is generally associated with larger, better condition vegetation remnants given its apparent sensitivity to fragmentation and patch size (Murphy, 1999, Watson et al., 2000).

OEH (2021c) identifies the following threats to Gilbert's Whistler:

- Clearing and fragmentation of the species' mallee, woodland and Red Gum forest habitat.
- Overgrazing may remove the litter layer of foraging habitat and may also prevent or delay regeneration of the shrub layer and open dense thickets of cypress pine regrowth in *Callitris* woodlands.
- High frequency fires will restrict regeneration of the shrubby foraging and nesting habitat.
- Infestation of habitat by invasive weeds.
- Aggressive exclusion from forest and woodland habitat by over abundant Noisy Miners.
- Climate change impacts including reduction in resources due to drought.

While no Gilberts Whistler were recorded during the field survey, the habitat assessment in Annexure C found that they could potentially occur in the mallee areas and pine dominated areas of sections 1, 2, 4 and 5. On this basis, this would result in the clearing of up to 38.7 hectares of potential habitat. The loss of this amount of habitat could be considered potentially significant, however, in the context of the habitat within the road corridor and within a 550-metre buffer of the road corridor in these sections, areas of mallee and cypress pine-dominant vegetation would continue to provide suitable habitat should the proposal proceed. The native vegetation of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species where suitable grassland habitat occurs. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Gilberts Whistler such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Malleefowl

Malleefowl is a large, ground dwelling bird that primarily occurs in mallee across southern Australia but is also known to inhabit eucalypt woodlands and acacia shrublands that provide some refuge in the form of dense shrubby understory (Benshemesh, 2007, NPWS, 1999a, Parsons et al., 2008, Priddel and Wheeler, 1999). Malleefowl vary in the size of their home range which is likely influenced by the level of available resources. These are known to range between 50 and 500 hectares in area. Malleefowl incubate eggs in large mounds that are comprised of large volumes of sandy soil and leaf litter. Males continually add leaf litter to these mounds as the decomposition provides moisture and heat required for successful egg incubation.

OEH (2021c) identify the following threats to this species:

- Loss of habitat due to clearing has led to a decline in distribution and abundance.
- Fragmentation, resulting from clearing or degradation of habitat, may reduce the size of populations and increase the extent to which they are isolated. Small, isolated populations have a greater risk of extinction due to genetic effects and chance events (e.g., drought and fire).
- Degradation of the habitat, a result of inappropriate grazing or fire regimes, may result in changes to the physical and biological nature of the habitat (e.g., changes in the structure and floristics of vegetation, diversity and abundance of invertebrates). These changes may render habitat unsuitable or increase the risk posed by other threatening processes (e.g., predation).
- Fire removes litter for mound construction, shelter from predators, and food sources, especially seeds. Mounds are not usually constructed in an area within 15-20 years after a fire and it may be 40 years before maximum densities are attained.
- Predation by foxes or cats has a significant impact on populations, particularly on young birds.
- Accidental death of a small number of birds occurs each year. For small isolated populations these losses can be significant. Birds crossing roads or feeding on spilt grain beside roads are particularly vulnerable.
- Anthropogenic climate change is a long term threat as it may alter habitat characteristics (e.g., change in physical structure or productivity) such that its capacity to support viable populations is reduced.
- Uncertainty with respect to the species' reproductive ecology and the effects of different predators on breeding success.
- Competition for food, and disturbance to nesting mounds, by feral goats.
- Disturbance to nesting mounds by feral pigs.

While no Malleefowl were recorded during the field survey, they are well known in the western end of the proposal. The habitat assessment in Annexure C found that they are known from the mallee areas of sections 4 and 5. On this basis, this would result in the clearing of up to 14.45 hectares of known habitat. The loss of this amount of habitat could be considered potentially significant, however, in the context of the mallee habitat within the road corridor (518 hectares) and within a 550-metre buffer of the road corridor in these sections (about 7,610 hectares), areas of mallee would continue to provide suitable habitat should the proposal proceed with less than 0.2% of these being impacted by the proposal. The native vegetation of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species where suitable mallee habitat occurs. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Malleefowl such that a viable local population is likely to be placed at risk of extinction.

Purple-crowned Lorikeet

Purple-crowned Lorikeet occurs in the southern areas of Australia, ranging from Victoria to south-west Western Australia. They are uncommon in NSW and most records are associated with flowering events. This species is nomadic and found in open forest and woodlands, particularly where large flowering eucalypts are present. This species utilises hollow branches or holes in trees for breeding. Feeding and breeding areas can be separated by several kilometres (OEH, 2021c).

While no Purple-crowned Lorikeet were recorded during the field survey, they are known in the western end of the proposal. The habitat assessment in Annexure C found that they have the potential to occur in all eucalypt communities of section 5. On this basis, this would result in the clearing of up to 14.03 hectares of potential habitat. The loss of this amount of habitat could be considered potentially significant, however, in the context of the woodland habitat within the road corridor and within a 550-metre buffer of the road corridor in section 5, these would continue to provide suitable habitat should the proposal proceed. The native vegetation of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species where suitable habitat occurs. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Purple-crowned Lorikeet such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Purple-gaped Honeyeater

Purple-gaped Honeyeater occurs in disjunct populations across southern Australia, with the eastern population largely occurring south of the Murray River. NSW forms the extreme north-east of their range. They inhabit mallee heathlands, and less commonly, associated mallee with open associations including spinifex (OEH, 2021c).

OEH (2021c) identify that the clearing of mallee is the main threat to this species by removing food plants and nesting sites. Given the largely lineal nature of the proposed clearing, and that this species is highly mobile as it cross the landscape in search of food, the loss of about 21.73 hectares of potential habitat (in the form of mallee and river red gum PCT in section 5) is considered *unlikely* to result in an adverse effect on the life cycle of Purple-gaped Honeyeater such that a viable local population is likely to be placed at risk of extinction. The levels of habitat available to the Purple-gaped Honeyeater will not be significantly affected by the proposal.

Shy Heathwren

Shy Heathwren is a mallee specialist, generally occurring where there is a dense understorey of shrubs (OEH, 2021c). In rocky hills outside of mallee, the species can also occur where a thick shrub layer such as broombush or tea-tree is present.

While no Shy Heathwren were recorded during the field survey, they are known in the western end of the proposal in mallee habitats in section 4 & 5. On this basis, this would result in the clearing of up to 14.45 hectares of known habitat. The loss of this amount of habitat could be considered potentially significant, however, in the context of the mallee habitat within the road corridor (518 hectares) and within a 550-metre buffer of the road corridor in these sections (about 7,610 hectares), areas of mallee would continue to provide suitable habitat should the proposal proceed with less than 0.2% of these being impacted by the proposal. The native vegetation of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species where suitable mallee habitat occurs. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Shy Heathwren such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Southern Scrub-robin

Southern Scrub-robin is restricted to mallee and shrublands across southern Australia. In NSW, the main population has been centred on the Round Hill and Nombinnie NRs and surrounds, however, in recent times, a population in Mallee Cliffs NP has been detected (Val et al., 2012, OEH, 2021c). Habitat occupancy is determined by time since fire, as the species is dependent on a well-developed shrub layer. Information relating to the home range of Southern Scrub-wren is not known, however, it is likely that they have some similarities to other small passerines. Home ranges of the similarly sized Hooded Robin are around 10 hectares (OEH, 2021c).

While no Southern Scrub-robin were recorded during the field survey, they are known in the western end of the proposal in mallee habitats in section 4 & 5. On this basis, this would result in the clearing of up to 14.45 hectares of known habitat. The loss of this amount of habitat could be considered potentially significant, however, in the context of the mallee habitat within the road corridor (518 hectares) and within a 550-metre buffer of the road corridor in these sections (about 7,610 hectares), areas of mallee would continue to provide suitable habitat should the proposal proceed with less than 0.2% of these being impacted by the proposal. The native vegetation of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species where suitable mallee habitat occurs. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Southern Scrub-robin such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

These biota are not listed as an endangered ecological community or critically endangered ecological community.

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

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
 - (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
 - (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**
- i. The proposed work would result in the removal of up to 21.73 hectares (in the case of Purple-gaped Honeyeater) of native vegetation, comprising potential and known habitat for the remaining biota.
 - ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists given the ability of these species to move (fly), the relatively small nature of proposed work spread over a long distance, and the extent and quality of woodlands within the road corridor,

adjacent to the study area as well as the wider locality, which would remain unaffected by the proposed work

- iii. For these biota, the potential and known habitat to be removed is considered to be of some importance to the long-term viability of these biota in the locality.

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

No declared areas of outstanding biodiversity value are known from within the vicinity of the proposal.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, is of potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

The clearing of about 21.73 hectares of native vegetation is necessary to carry out the proposal to provide improved road user safety along this section of the Sturt Highway. In the context of the woodlands within the road corridor and within a 550-metre buffer of the road corridor, impacts are relatively minimal. Woodlands also occurs across the wider locality which would remain unaffected should the proposal proceed.

A total of 343 hollow-bearing trees (HBT) are also proposed for removal. The majority of these are within section 1 (203 HBT) followed by section 2 (79 HBT).

Conclusion

This Test of Significance has determined that the proposed activity is ‘*unlikely*’ to have a ‘*significant effect*’ on Chestnut Quail-thrush, Gilberts Whistler, Malleefowl, Purple-crowned Lorikeet, Purple-gaped Honeyeater, Shy Heathwren, Southern Scrub-robin or their habitats.

Birds of the chenopod shrublands (Redthroat, Rufous Fieldwren)

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

Redthroat

The Redthroat is a small, nondescript bird of inland shrublands in western NSW as well as other Australian states and the NT (OEH, 2021c). The species is known from chenopod shrublands, Acacia shrublands and lignum and canegrass swamps and depressions (OEH, 2021c). In the Broken Hill area, it is regularly recorded from chenopod shrublands as well as dense vegetation associated with drainage lines (OEH, 2021c, Sass, 2009).

In NSW the species has been recorded mainly in chenopod shrublands including Old Man Saltbush, Black Bluebush and Dillon Bush shrublands. Around Broken Hill it appears to be associated with the denser

vegetation, particularly Acacias, found in drainage lines that run from the rocky hills. In other locations it is known from Canegrass and Lignum swamps and depressions, particularly on floodplains.

While no Redthroat were recorded during the field survey, the habitat assessment in Annexure C found that they were likely to occur in chenopod shrubland communities within sections 3 and 4. On this basis, the proposal would result in the clearing of up to 1.05 hectares of potential habitat. The loss of this amount of habitat could be considered potentially significant, however, in the context of the chenopod shrublands within the road corridor and within a 550-metre buffer of the road corridor in these sections, extensive areas of chenopod shrublands would continue to provide suitable habitat should the proposal proceed. The native vegetation of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species where suitable habitat occurs. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Redthroat such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Rufous Fieldwren

The Rufous Fieldwren is a small wren-like bird of inland shrublands and is known to occur in saltbush and bluebush communities and around inland saline lakes (OEH, 2021c). Breeding is known to occur between July and December but may be in response to rain events. The species usually nests on the ground which is likely to exacerbate the effects of predation by foxes and cats.

One Rufous Fieldwren was recorded during the field survey in section 3. On this basis, and within the habitat assessment in Annexure C, it was found that potential habitat occurs as chenopod shrublands in sections 3 and 4. Given this, the proposal would result in the clearing of up to 1.05 hectares of potential habitat. The loss of this amount of habitat could be considered potentially significant, however, in the context of the chenopod shrublands within the road corridor and within a 550-metre buffer of the road corridor in these sections, extensive areas of chenopod shrublands would continue to provide suitable habitat should the proposal proceed. The native vegetation of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species where suitable habitat occurs. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Rufous Fieldwren such that a viable local population is likely to be placed at risk of extinction.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

These biota are not listed as an endangered ecological community or critically endangered ecological community.

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

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

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

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

- i. The proposed work would result in the removal of up to 1.05 hectares of potential and known habitat
- ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists given the ability of these species to move (fly), the relatively small nature of proposed work spread over a long distance, and the extent and quality of chenopod shrublands within the road corridor, adjacent to the study area as well as the wider locality, which would remain unaffected by the proposed work
- iii. For these biota, the potential and known habitat to be removed is considered to be of some importance to the long-term viability of these biota in the locality however, in the context of the extensive areas adjacent to the road reserve, this is likely to be reduced to of little importance.

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

No declared areas of outstanding biodiversity value are known from the vicinity of the proposal

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, is of potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

The clearing of about 1.05 hectares of native vegetation (of relevance to these biota) is necessary to carry out the proposal to provide improved road user safety along this section of the Sturt Highway. In the context of the chenopod shrublands within the road corridor and within a 550-metre buffer of the road corridor, the impact is minor. Extensive areas of chenopod shrubland occur across the wider the locality which would remain unaffected should the proposal proceed.

Conclusion

This Test of Significance has determined that the proposed activity is ‘*unlikely*’ to have a ‘*significant effect*’ on Redthroat and Rufous Fieldwren or their habitats.

Grey-headed Flying-fox

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

The Grey-headed Flying-fox is the largest Australian bat and is generally found within 200km of the east coast of Australia (OEH, 2021c). They occur in rainforest, forests and woodlands, heaths and swamps as well as urban areas. Roosting camps are generally located within 20km of a regular food source and are commonly found in gullies. Fidelity to roost sites is high and impacts to this species largely come about direct impacts to roost camps through disturbance.

Across the region, sporadic occurrences of this species occur in response to drought, bushfires and significant weather events resulting in occasional but semi-regular records across the NSW south-west slopes. Particularly, individuals often find themselves in towns where plentiful food sources occur (fruit trees, flowering street trees etc).

While no Grey-headed Flying-fox were recorded during the field survey, there are often records in the River Red Gum communities along the Murrumbidgee River including within the town of Narrandera and the city of Wagga Wagga. Based on the habitat assessment in Annexure C, this found that any woodland habitat within section 1 could be a potential foraging resource. It is unlikely that any of this vegetation would form a roosting resource, as it lacks the normal attributes of a roost camp (CSIRO, 2020, ELA, 2016). On this basis, the proposal would result in the clearing of up to 18.85 hectares of potential foraging habitat.

The loss of this amount of foraging habitat could be considered potentially significant, however, in the context of the woodlands within the road corridor and within a 550-metre buffer of the road corridor, and the ability of this species to forage wide distances, these retained areas of woodland would continue to provide suitable foraging habitat should the proposal proceed. The native vegetation of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species where suitable habitat occurs. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Grey-headed Flying-fox such that a viable local population is likely to be placed at risk of extinction.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

These biota are not listed as an endangered ecological community or critically endangered ecological community.

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

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**
 - i. The proposed work would result in the removal of up to 18.85 hectares of potential foraging habitat
 - ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists given the ability of these species to move (fly), the nature of proposed work spread over a long distance, and the extent and quality of woodlands within the road corridor, adjacent to the study area as well as the wider locality, which would remain unaffected by the proposed work
 - iii. For this species, the potential foraging habitat to be removed is considered to be of little importance to the long-term viability of this species in the locality.

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

No declared areas of outstanding biodiversity value are known from the vicinity of the proposal.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, is of potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

The clearing of about 18.85 hectares of native vegetation is necessary to carry out the proposal to provide improved road user safety along this section of the Sturt Highway. In the context of the woodlands within the road corridor and within a 550-metre buffer of the road corridor and the ability of this species to forage widely, this is considerable relatively minor. Woodland also occurs across the wider the locality which would remain unaffected confirming that extensive areas of native vegetation would remain.

Conclusion

This Test of Significance has determined that the proposed activity is ‘*unlikely*’ to have a ‘*significant effect*’ on Grey-headed Flying-fox or their habitat.

Koala

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

The Koala occurs in a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia (OEH, 2018b, OEH, 2016, DECC, 2008, Kavanagh et al., 2007, Disque et al., 2003). The marsupial is found in eucalypt forest and woodland and is known to feed on the foliage of more than 70 eucalypt species and 30 non-eucalypt species. The species is inactive for most of the day, feeding and moving mostly at night.

Habitat suitability is largely dependent on tree species and maturity, nutrients in the soil, the area of habitat and its disturbance history (DECC, 2008). Koalas change trees frequently, with swamp mahogany (*Eucalyptus robusta*) the preferred tree, particularly at night and by breeding females (Matthews et al., 2007). Koalas show a preference to large tree diameter of >30cm and use significantly taller trees in summer (Matthews et al., 2007).

Habitat connectivity is considered critical to persistence of Koalas in any area (McAlpine et al., 2006) given that they are less able to traverse between habitats due to their low energy diet. Habitat loss is recognised as the key problem for long-term survival of the Koala.

Koala were recorded during the field survey on four separate occasions, each time, relatively clear of the road corridor. There is a known population in the Narrandera LGA, and this is centred on the town common and Lake Talbot areas where river red gum communities are dominant (Booth&Associates, 2011).

On this basis, the proposal would result in the clearing of up to 8.46 hectares of likely Koala habitat, but none within the Narrandera Flora and Fauna Reserve.

The loss of this amount of habitat could be considered potentially significant, however, in the context of the river red gum woodlands within the road corridor (about 80 hectares) and within a 550-metre buffer of the road corridor of section 2 (about 1000 hectares), large areas of potential Koala habitat remain should the proposal proceed. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to Koala are detailed within this BA.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Koala such that a viable local population is likely to be placed at risk of extinction.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

This species is not listed as an endangered ecological community or critically endangered ecological community.

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

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**
 - i. The proposed work would result in the removal of up to 8.46 hectares of likely habitat
 - ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists given the ability of these species to move, the nature of proposed work spread over a long distance, and the extent and quality of woodlands within the road corridor, adjacent to the study area as well as the wider locality, which would remain unaffected by the proposed work
 - iii. The potential habitat to be removed is considered to be of some importance to the long-term viability of Koala in the locality. However, in the context of the extent that would remain (about 1,000 hectares) should the proposal proceed, it is likely reduced to be of little importance.

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

No declared areas of outstanding biodiversity value are known from the vicinity of the proposal.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, is of potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

Conclusion

This Test of Significance has determined that the proposed activity is *'unlikely'* to have a *'significant effect'* on Koala or their habitat.

Squirrel Glider

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

Squirrel Glider is known to occur in mature Box-Gum/Box Ironbark woodlands and River Red Gum forests west of the Great Dividing Range and in Blackbutt/Bloodwood forests with a heathy understory in coastal areas (OEH 2020c) where they utilise hollow-bearing trees for denning purposes. Our field survey did not detect this species, but this is likely an artefact of survey effort and methods, rather than non-presence. Given this, and given the known presence of Squirrel Glider at Pomingarlina Park and in the Silvalite Reserve at the eastern end of the proposal, we have considered Squirrel Glider to be present in the woodlands of section 1.

OEH (2021c) identify the following threats to Squirrel Glider:

- Loss, fragmentation and degradation of habitat.
- Loss of hollow-bearing trees.
- Loss of flowering understorey and midstorey shrubs in forests.
- Individuals can get caught in barbed wire fences while gliding.
- Loss of hollow availability due to takeover by feral honeybees and exotic birds.

The clearing of about 18.85 hectares of potential Squirrel Glider habitat and up to 203 HBT within section 1 is necessary to carry out the proposal. Tree hollows, particularly small and medium sized hollows, provide significant denning resources for Squirrel Glider.

While the loss of 18.85 hectares of woodland vegetation is considered negligible in the context of the woodlands within the road corridor and within the 550 m buffer of the section 1 proposal (about 2,292 hectares), with only about 0.9% being impacted, it is important to note that site-specific safeguards are considered necessary to minimise impacts to an acceptable level. The potential for mortality of individual gliders during the tree removal process is high without pre-clearance survey and without adequate supervision by a suitably qualified and experienced person. This is critical for the removal of HBT given that as many as 203 HBT would be removed. As Squirrel Glider are nocturnal, these animals may be present within the HBT at the time of removal, and with adequate safeguards, these fauna can be adequately managed and relocated to adjacent, unaffected habitat.

It is recognised that Squirrel Glider can persist in lineal remnants such as those on Sturt Highway (Holland et al., 2007, Van der Ree, 2002) and the configuration of the proposed impacts suggests that Squirrel Glider will be able to continue using the remaining vegetation within the road corridor. Potential impacts can also occur if areas become fragmented or isolated and unable to be accessed by Squirrel Glider. The proposal will increase the existing canopy gap between vegetation either side of Sturt Highway however, given that Squirrel Glider have the ability to regularly glide between 20-40 metres and up to 75 metres (Van der Ree, 2002), the proposal is unlikely to impede on connectivity to vegetation on either side of Sturt Highway post-construction.

With consideration of these factors, it is *unlikely* that the proposed activity could have an adverse effect on the life cycle of Squirrel Glider or their habitats, such that a viable local population is likely to be placed at risk of extinction.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

This species is not listed as an endangered ecological community or critically endangered ecological community.

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

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

- i. The proposed work would result in the removal of up to 18.85 hectares of potential habitat and up to 203 HBT
- ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists given the nature of proposed work spread over a long distance, and the extent and quality of woodlands within the road corridor, adjacent to the study area as well as the wider locality, which would remain unaffected by the proposed work
- iii. For this species, the potential and known habitat to be removed is considered to be of some importance to the long-term viability of this species the locality.

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

No declared areas of outstanding biodiversity value are known from within the vicinity of the proposal.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation* and the *Loss of hollow-bearing trees* are of potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

The proposal would also result in the loss of up to 203 HBT in section 1 (or about 4% of the HBT within the road corridor). Nonetheless, potential impacts could result if the removal of HBT (when any animals present) were not subject to inspection combined with retrieval and relocation protocols to adjoining habitat. Removal of hollow-bearing trees should only be conducted with regard to the mitigation measures outlined within section 6.

Conclusion

This Test of Significance has determined that the proposed activity is '*unlikely*' to have a '*significant effect*' on Squirrel Glider and their habitat.

Southern Ningai

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

The Southern Ningai is known from scattered locations across southern Western Australia, South Australia, north western Victoria and south western New South Wales. Within this area it appears to be patchily distributed, but can be locally common (as is the case in some locations in NSW). In NSW most records are from the far south west, including the Scotia mallee (Tarawi Nature Reserve, Scotia Sanctuary and surrounding properties) and east of the Darling River (Mungo and Mallee Cliffs National Parks and many surrounding properties). An apparently isolated population occurs in central NSW mallee with most records from Nombinnie, Round Hill and western Yathong Nature Reserves and one single record from remnant mallee near Taleeban (south west of West Wyalong).

The habitat assessment in Annexure C found that they are known in the western end of the proposal in mallee habitats in section 4 & 5. On this basis, the proposal would result in the clearing of up to 14.45 hectares of known habitat. The loss of this amount of habitat could be considered potentially significant, however, in the context of the mallee habitat within the road corridor (518 hectares) and within a 550-metre buffer of the road corridor in these sections (about 7,610 hectares), areas of mallee would continue to provide suitable habitat should the proposal proceed with less than 0.2% of these being impacted by the proposal. The native vegetation of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species where suitable mallee habitat occurs. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Southern Ningai such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

This species is not listed as an endangered ecological community or critically endangered ecological community.

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

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

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

- i. The proposed work would result in the removal of up to 14.45 hectares of potential habitat
- ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists given the nature of proposed work spread over a long distance, and the extent and quality of woodlands within the road corridor, adjacent to the study area as well as the wider locality, which would remain unaffected by the proposed work
- iii. The potential and known habitat to be removed is considered to be of some importance to the long-term viability of this species.

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

No declared areas of outstanding biodiversity value are known from within the vicinity of the proposal.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, is of potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

Conclusion

This Test of Significance has determined that the proposed activity is ‘*unlikely*’ to have a ‘*significant effect*’ on Southern Ningau and their habitat.

Western Pygmy-possum

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

The Western Pygmy Possum occurs in temperate to arid woodlands across southern Australia, extending from the south west corner of Western Australia, through South Australia and western Victoria, with the eastern limit in south-western NSW. In NSW it was first trapped in Mallee Cliffs National Park in surveys in 1996, though subsequent investigations revealed a specimen in the National Museum of Victoria collected near Gol Gol in 1958. A number of trapping programs conducted since 1996 have captured this species at a number of sites in woodlands east of the Darling River, with many on Mallee Cliffs NP and surrounding properties and more scattered records to the north and east of this reserve. Recently confirmed in Mungo National Park. West of the Darling River it appears to occur at much lower densities, with less than ten records from both Tarawi Nature Reserve and Scotia Sanctuary. Based on trapping results in NSW the numbers in the local population appear to vary significantly from year to year, though the factors causing this are not known (though fluctuations elsewhere are suspected to be linked to rainfall and subsequent food availability).

The habitat assessment in Annexure C found that they are known in the western end of the proposal in mallee habitats in section 4 & 5. On this basis, the proposal would result in the clearing of up to 15.26 hectares of potential habitat (mallee and black oak communities). The loss of this amount of habitat could

be considered potentially significant, however, in the context of the mallee and black oak habitat within the road corridor (551 hectares) and within a 550-metre buffer of the road corridor in these sections (about 8,000 hectares), areas of potential habitat would continue to provide suitable habitat should the proposal proceed with less than 0.2% of these being impacted by the proposal. The native vegetation of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species where suitable habitat occurs. In section 4 and 5, as many as 55 HBT would be removed should the proposal proceed. Given the diminutive size of this species, protocols in terms of supervision of clearing, would be required in suitable habitat to minimise the risk of fatalities during the clearing stage. Details of these are included within section 6 of this BA.

Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Western Pygmy-possum such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

This species is not listed as an endangered ecological community or critically endangered ecological community.

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

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
 - (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
 - (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**
- i. The proposed work would result in the removal of up to 15.26 hectares of potential habitat. 55 HBT would also be removed
 - ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists given the nature of proposed work spread over a long distance, and the extent and quality of woodlands within the road corridor, adjacent to the study area as well as the wider locality, which would remain unaffected by the proposed work
 - iii. The potential habitat to be removed is considered to be of some importance to the long-term viability of these biota in the locality. However, it is not a limiting resource, with about 8,000 hectares remaining in the 550m buffer of the road reserve.

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

No declared areas of outstanding biodiversity value are known from within the vicinity of the proposal.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, and *Loss of hollow-bearing trees* are potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

The clearing of about 15.26 hectares of native vegetation is necessary to carry out the proposal to provide improved road user safety along this section of the Sturt Highway. In the context of the woodlands within the road corridor and within a 550-metre buffer of the road corridor (about 8,000 hectares), the proposal would result in the removal of about 0.2%. Woodland also occurs across the wider the locality which would remain unaffected confirming that extensive areas of native vegetation would remain.

The proposal would also result in the loss of up to 55 HBT. This is considered relatively minor given the density of HBT remaining within the road corridor.

Conclusion

This Test of Significance has determined that the proposed activity is ‘*unlikely*’ to have a ‘*significant effect*’ on Western Pygmy-possum and their habitat.

Reptiles of the Mallee (Mallee Worm-lizard, Western Blue-tongue lizard, Yellow-tailed Plain Slider)

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

Mallee Worm-lizard

This species has been recorded across the four southern mainland states, though its distribution in both Western Australian and New South Wales is restricted. Most records in NSW are from the south west corner of the state, though there are two records from the central mallee (Pulletop and Gubbata NRs) from 1999. Most records are from the mallee between Balranald and Gol Gol centred on Mallee Cliffs NP, though recent surveys in the Scotia mallee have also recorded this species.

The habitat assessment in Annexure C found that they are likely to occur in the western end of the proposal in mallee habitats in section 4 & 5. On this basis, the proposal would result in the clearing of up to 14.45 hectares of known habitat. The loss of this amount of habitat could be considered potentially significant, however, in the context of the mallee habitat within the road corridor (518 hectares) and within a 550-metre buffer of the road corridor in these sections (about 7,610 hectares), areas of mallee would continue to provide suitable habitat should the proposal proceed with less than 0.2% of these being impacted by the proposal. The native vegetation of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species where suitable mallee habitat occurs. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species given that they are most vulnerable during clearing operations due to their small size.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Mallee Worm-lizard such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Western Blue-tongue lizard

The Western Blue Tongue Lizard is a robust pale brown skink with a series of broad brown transverse bands on the body and tail. It is known to occur across a variety of habitats including plains, swales and ranges vegetated by woodlands and shrublands with a definite preference for mixed Mallee/Spinifex communities (OEH, 2021c, Swan et al., 2004, Wilson and Swan, 2013, Sass, 2006).

The habitat assessment in Annexure C found that they are known in the western end of the proposal in mallee habitats in section 4 & 5. On this basis, the proposal would result in the clearing of up to 14.45 hectares of known habitat. The loss of this amount of habitat could be considered potentially significant, however, in the context of the mallee habitat within the road corridor (518 hectares) and within a 550-metre buffer of the road corridor in these sections (about 7,610 hectares), areas of mallee would continue to provide suitable habitat should the proposal proceed with less than 0.2% of these being impacted by the proposal. The native vegetation of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species where suitable mallee habitat occurs. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Western Blue-tongue lizard such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

Yellow-tailed Plain Slider

This species is most commonly recorded from spinifex habitats on red sands and is often found in loose soil, or beneath logs and litter.

The habitat assessment in Annexure C found that they are known in the western end of the proposal in mallee habitats in section 4 & 5. On this basis, the proposal would result in the clearing of up to 14.45 hectares of known habitat. The loss of this amount of habitat could be considered potentially significant, however, in the context of the mallee habitat within the road corridor (518 hectares) and within a 550-metre buffer of the road corridor in these sections (about 7,610 hectares), areas of mallee would continue to provide suitable habitat should the proposal proceed with less than 0.2% of these being impacted by the proposal. The native vegetation of the wider locality would remain unaffected and would continue to provide potential foraging habitat for this species where suitable mallee habitat occurs. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Yellow-tailed Plain Slider such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

These biota are not listed as an endangered ecological community or critically endangered ecological community.

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

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**
 - i. The proposed work would result in the removal of up to 14.45 hectares of potential habitat
 - ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists given the nature of proposed work spread over a long distance, and the extent and quality of woodlands within the road corridor, adjacent to the study area as well as the wider locality, which would remain unaffected by the proposed work
 - iii. For these biota, the potential and known habitat to be removed is considered to be of some importance to the long-term viability of these biota in the locality.

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

No declared areas of outstanding biodiversity value are known from the Wagga City Council LGA.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, is of potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

The clearing of about 14.45 hectares of known habitat. The loss of this amount of habitat could be considered potentially significant, however, in the context of the mallee habitat within the road corridor (518 hectares) and within a 550-metre buffer of the road corridor in these sections (about 7,610 hectares), areas of mallee would continue to provide suitable habitat should the proposal proceed with less than 0.2% of these being impacted by the proposal. Woodland also occurs across the wider the locality which would remain unaffected confirming that extensive areas of native vegetation would remain.

Conclusion

This Test of Significance has determined that the proposed activity is ‘*unlikely*’ to have a ‘*significant effect*’ on Mallee Worm-lizard, Western Blue tongue lizard and Yellow-tailed Plains Slider.

Bitter Quandong

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

The Bitter Quandong are a root-parasitic shrub to small tree that flowers from August to January. Fruits mostly during September and October but can also be seen from January to August. The Bitter Quandong usually grows in mallee communities in gravelly and sandy loam soils on dunes, in open woodland and tall shrubland. Many of the NSW records occur within the vicinity of the Sturt Highway (between Dareton and Balranald), but recently more plants have been over a much wider distribution, including between Kyalite and Moulamein in the east, west of Lake Victoria in the west and in mallee to the south east of Menindee in the north. Only one plant is known from formal conservation reserves in NSW (Mallee Cliffs NP), though another is known from the Travelling Stock Route within northern Mungo NP and a number are known from various conservation initiatives on leasehold land. This species can be found as either a single tree or in small to large groups of plants scattered over a small area.

During the field survey, 155 individuals were recorded (152 within section 4 / 3 in section 5). During project planning, avoiding potential impacts to these plants were part of the design process. While some work is still planned in the immediate vicinity of these plants, careful management and mitigation should ensure that impacts to any individuals are unlikely. Given this, a series of recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to this species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Bitter Quandong such that a viable local population is likely to be placed at risk of extinction.

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

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

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

This species is not listed as an endangered ecological community or critically endangered ecological community.

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

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

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

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

- i. The proposed work would not remove or modify any known habitat
- ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists.
- iii. The habitat present within the road corridor is considered to be of high importance to the long-term survival of this species. Mitigation measures specifically to avoid impacts to the known individuals within the road corridor are detailed in section 6.

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

No declared areas of outstanding biodiversity value are known from the vicinity of the proposal.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, is of potential relevance. However, for this species, no clearing of native vegetation would occur in the direct vicinity of the identified populations.

Conclusion

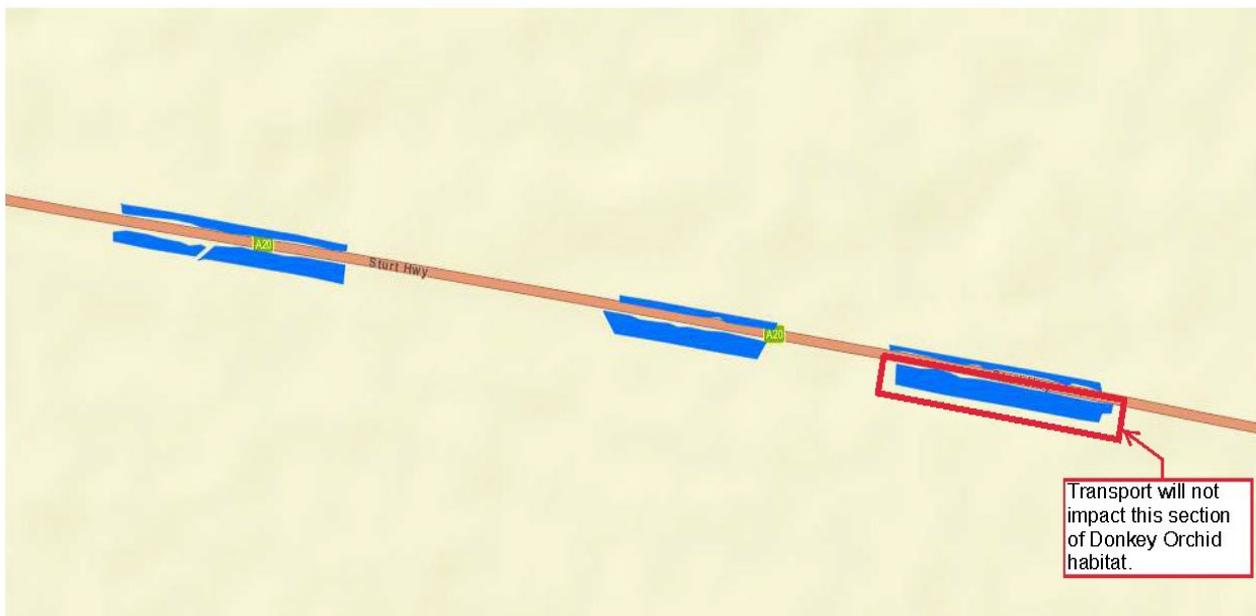
This Test of Significance has determined that the proposed activity is ‘*unlikely*’ to have a ‘*significant effect*’ on Bitter Quandong or their habitat.

Orchids (Pine Donkey Orchid, Sand-hill Spider Orchid)

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

Pine Donkey Orchid is found on the western slopes of NSW and is known from the Narrandera, Coolamon, Wagga Wagga areas of the south-west slopes and other areas across the state. The Pine Donkey Orchid grows in sclerophyll forest among grass, often with native Cypress Pine (*Callitris* spp.). It is found in sandy soils, either on flats or small rises. While the species can be locally common in some regions, some populations are known to occur as one or two plants. A population was recorded on the southern side of the Sturt Highway, within the road corridor, and largely within the proposed impact area. The site is located east of the Belvedere Almond Farm site office entrance. The closest known population is Gillenbah State Forest, about 25kms south-east of this population. This is well past the pollination ability of the bees/wasps that might pollinate these three plants, so it is stated with certainty that the three plants within the study area occur as the local population (as defined by the BC Act). Without a proposal modification, it is *likely* that the proposal could have an adverse effect on the life cycle of Pine Donkey Orchid such that a viable local population is likely to be placed at risk of extinction. However, Transport have made a commitment to avoid ANY work in the section where the population of Pine Donkey Orchid was found to occur. This is the eastern section of PCT 19 in the vicinity of Belvedere Almond Farm as identified below.

Given that the area of a known population of Pine Donkey Orchid identified during the target orchid surveys has now been removed from the proposed scope of work, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Pine Donkey Orchid such that a viable local population is likely to be placed at risk of extinction.



Caladenia arenaria is found mostly on the south west plains and western south west slopes. The original description is of a plant from Nangus, west of Gundagai (1865) and there is a report of the species from Adelong near Tumut. A record near Cootamundra needs verifying. The Sand-hill Spider Orchid is currently only known to occur in the Riverina between Urana and Narrandera.

The high quality habitat of the Pine Donkey Orchid could also support this species as they are known to co-occur across their range, particularly south of Narrandera. While none were recorded during the target survey and the species was flowering at Buckingham State Forest (which was used as a reference site), there is some chance they may occur with Pine Donkey Orchid in PCT 19 west of Narrandera. Given that Transport have made a commitment to avoid ANY work in the section where the population of Pine Donkey Orchid was found to occur (see above), it is *unlikely* that the proposal could have an adverse effect on the life cycle of Sand-hill Spider Orchid such that a viable local population is likely to be placed at risk of extinction.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

These biota are not listed as an endangered ecological community or critically endangered ecological community.

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

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**

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

The habitat to be removed is unlikely to be importance to these species given that none were identified during appropriately timed field surveys. The known habitat area that was found to support a population, would not be impacted by the proposal.

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

No declared areas of outstanding biodiversity value are known from the vicinity of the proposal.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, is of potential relevance. However, for this species, no clearing of native vegetation would occur in the direct vicinity of the identified populations.

Conclusion

This Test of Significance has determined that the proposed activity is *'likely'* to have a *'significant effect'* on Pine Donkey Orchid and Sandhill Spider Orchid.

Peas (Slender Darling Pea, Silky Swainson-pea, Small Purple-pea)

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

Slender Darling Pea is found throughout NSW growing in many vegetation types including bladder saltbush, black box and grassland communities on level plains, floodplains and depressions and is often found with *Maireana* species. This species may need some disturbance as it has also been found in remnant native grasslands or grassy woodlands that have been intermittently grazed or cultivated. It has been recorded in the Jerilderie and Deniliquin areas of the southern riverine plain, the Hay plain as far north as Willandra National Park, near Broken Hill and in various localities between Dubbo and Moree. Growth occurs in winter-spring and flowering occurs in spring to early summer, dying back after flowering.

Silky Swainson-pea flowers in spring and is known to regenerate from seed after fire. It is found in Natural Temperate Grassland and Snow Gum Woodland on the Monaro and in Box-Gum Woodland in the Southern Tablelands and South West Slopes. It has been recorded from the Northern Tablelands to the Southern Tablelands and further inland on the slopes and plains. There is one isolated record from the far north-west of NSW. Its stronghold is on the Monaro.

Small Purple-pea flowers throughout spring, dying back in summer and reshooting in autumn. Some plants have been known to live for up to 20 years. Small Purple-pea are generally tolerant of fire, which also enhances germination by breaking the seed coat and reduces competition from other species.

This species was recorded historically from places such as Carcoar, Culcairn and Wagga Wagga where it is probably now extinct. Populations still exist in the Queanbeyan and Wellington-Mudgee areas. Over 80% of the southern population grows on a railway easement.

Small Purple-pea grows in association with understorey dominants that include Kangaroo Grass *Themeda australis*, poa tussocks *Poa* spp. and spear-grasses *Austrostipa* spp. Before European settlement Small Purple-pea occurred in the grassy understorey of woodlands and open-forests dominated by Blakely's Red Gum *Eucalyptus blakelyi*, Yellow Box *E. melliodora*, Candlebark Gum *E. rubida* and Long-leaf Box *E. goniocalyx*.

While none of these species were recorded during the field survey, the habitat assessment in Annexure C found that there was some potential for occurrence, For Silky Swainson-pea and Small Purple-pea, this was found to be the woodlands and native grasslands in section 2, and for Slender Darling-pea, this was found to be the Black box communities, native grasslands, and bladder saltbush communities in section 2. On this basis, the proposal would result in the clearing of up to 24.54 hectares of potential habitat for Silky Swainson-pea and Small Purple-pea and up to 16.69 hectares of Slender Darling-pea.

The loss of this amount of habitat could be considered potentially significant, however, in the context of the habitat within the road corridor and within a 550-metre buffer of the road corridor in section 2 (about 11,537 hectares), other areas of potential habitat would continue to provide suitable habitat should the proposal proceed, with less than 0.2% of these being impacted by the proposal. The native vegetation of the wider locality would remain unaffected and would continue to provide potential habitat for these species. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to these species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Slender Darling Pea, Silky Swainson-pea, or Small Purple-pea such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

These biota are not listed as an endangered ecological community or critically endangered ecological community.

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

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
 - (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
 - (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**
- i. The proposed work would result in the removal of up to 24.54 hectares of potential habitat. However, no individuals of these species were recorded during the field surveys.
 - ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists given the nature of proposed work spread over a long distance, and the extent and quality of potential habitat areas within the road corridor, adjacent to the study area as well as the wider locality, which would remain unaffected by the proposed work
 - iii. For these biota, the potential habitat to be removed is considered to be of little importance to the long-term viability of these biota in the locality given that none were recorded during the field surveys and none of known from existing records within the road corridor.

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

No declared areas of outstanding biodiversity value are known from the vicinity of the proposal.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, and *Loss of hollow-bearing trees* are potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change. The proposed work is unlikely to significant increase this KTP.

Conclusion

This Test of Significance has determined that the proposed activity is ‘*unlikely*’ to have a ‘*significant effect*’ on Slender Darling Pea, Silky Swainson-pea, or Small Purple-pea and their habitats.

Other flora (Menindee Nightshade, Mossgiel Daisy, Thyme Rice-flower, Winged Peppergrass)

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

Menindee Nightshade flowers mostly in spring. This species grows in occasionally flooded depressions with heavy soil, including level river floodplains of grey clay with Black Box and Old Man Saltbush, and open treeless plains with solonized brown soils. Endemic to NSW, Menindee Nightshade is restricted to the far south-western plains, extending up the Darling River to the Menindee and Wilcannia districts. Mainly restricted to the area between the Darling and Lachlan Rivers. Localities include Kars Station, Lake Tandou, Lake Cawndilla, Oxley area, between Broken Hill and Menindee, and the Darling River. It has been recorded from Kinchega National Park and Nearie Lake Nature Reserve. This species appears after rain and also tolerates disturbance. While much of this species’ original dry lake habitat has been modified it still occupies the margins of appropriate habitat, and due to its capacity to tolerate disturbance is regarded by some as a weed

The Mossgiel Daisy is endemic to NSW and chiefly occurs within the Riverina Bioregion, from Mossgiel in the north, Murrumbidgee Valley (Yanga) National Park in the south west to Urana in the south east. Sites are scattered across this Bioregion including the Jerilderie area, the Hay Plain (Maude and Oxley) and around Darlington Point. In addition, there are a number of records from the Willandra Lakes World Heritage Area (including Mungo National Park) with a north-western outlier at Byrnedale Station, north of Menindee. The only known site on South Western Slopes is Ganmain Reserve. This species flowers from June to December. It appears as locally occasional to common in populations mostly in clay soils on Bladder Saltbush and Leafless Bluebush plains.

Thyme Rice-flower is not common in NSW. It is only found in the far south-western plains in the Euston district. This species grows in scrub and woodland on calcareous soils. Often found in sandy red soils supporting mallee scrub. Flowering for most of the year but especially July to November. Thyme Rice-flower has been recorded as scattered and occasional, to common and frequent in populations. Plants may respond to fire as a known population west of Euston were noted as been frequent in an area that was

burnt within five years. This species is threatened by the clearing of mallee habitat (the species is restricted to an area of high agricultural use).

Winged Peppercross is widespread in the semi-arid western plains regions of NSW. This species occurs on seasonally moist to waterlogged sites, on heavy fertile soils, with a mean annual rainfall of around 300-500 mm. It does not tolerate grazing disturbance. While there are many historical records it has been most recently recorded from the Hay Plain, south-eastern Riverina, and from near Pooncarie. Flowering occurs from August to October. This species is highly dependent on seasonal conditions and has been recorded as uncommon to locally common with hundreds of plants at some sites

The loss of this amount of habitat could be considered potentially significant, however, in the context of the habitat within the road corridor and within a 550-metre buffer of the road corridor in section 2 (about 11,537 hectares), other areas of potential habitat would continue to provide suitable habitat should the proposal proceed, with less than 0.2% of these being impacted by the proposal. The native vegetation of the wider locality would remain unaffected and would continue to provide potential habitat for these species. Areas of temporary impact would be rehabilitated at the conclusion of construction. Recommendations detailed within section 6 provide a framework for minimising potential direct and indirect impacts to these species.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Menindee Nightshade, Mossgiel Daisy, Thyme Rice-flower, Winged Peppercross such that a viable local population (should one occur there) is likely to be placed at risk of extinction.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

These biota are not listed as an endangered ecological community or critically endangered ecological community.

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

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**
 - i. The proposed work would result in the removal of up to 11.98 hectares of potential habitat for Menindee Nightshade, up to 0.19 hectares for Mossgiel Daisy, 7.7 hectares for Thyme Rice-flower and 4.54 hectares for Winged Peppercross
 - ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists given the nature of proposed work spread over a long distance, and the extent and quality of habitats within the road corridor, adjacent to the study area as well as the wider locality, which would remain unaffected by the proposed work
 - iii. For these biota, it is unlikely that the habitat to be removed is of importance given that they were not observed during the field survey, or, that they are in areas that have some level of general disturbance

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

No declared areas of outstanding biodiversity value are known from within the vicinity of the proposal

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, is of potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

The clearing of up to 11.98 hectares of potential habitat for Menindee Nightshade, up to 0.19 hectares for Mossgiel Daisy, 7.7 hectares for Thyme Rice-flower and 4.54 hectares for Winged Peppergrass is necessary to carry out the proposal to provide improved road user safety along this section of the Sturt Highway. In the context of the native vegetation within the road corridor and within a 550-metre buffer of the road corridor, less than about 0.5% would be impacted.

Conclusion

This Test of Significance has determined that the proposed activity is ‘*unlikely*’ to have a ‘*significant effect*’ on Menindee Nightshade, Mossgiel Daisy, Thyme Rice-flower, Winged Peppergrass or their habitats.

Acacia melvillei Shrubland in the Riverina and Murray-Darling Depression bioregions endangered ecological community

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

This ecological community is not listed as a threatened species.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

- (i) About 0.85 hectares of this EEC would be removed. This EEC is widespread in the locality based on regional mapping held by OEH (16.9 hectares), and the removal of a relatively small area of EEC is unlikely to have an adverse effect on the extent of this EEC to the extent that it would be placed at risk of extinction.
- (ii) The proposed work would not substantially or adversely modify the composition of the EEC such that it would be placed at risk of extinction.

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

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

- i. The proposal would result in the removal of up to 0.85 hectares of this EEC
- ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists given the relatively minor nature of proposed work spread over a long distance
- iii. This area of TEC is considered to be of minor importance to the long-term viability of these TEC in the locality.

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

No declared areas of outstanding biodiversity value are known from within the vicinity of the proposal.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, is of potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

The clearing of about 0.85 hectares of this TEC is necessary to carry out the proposal to provide improved road user safety along this section of the Sturt Highway. This TEC would remain relatively well represented within the road corridor and within a 550-metre of the proposal (about 16 hectares remaining).

Conclusion

This Test of Significance has determined that the proposed activity is ‘*unlikely*’ to have a ‘*significant effect*’ on *Acacia melvillei* Shrubland in the Riverina and Murray-Darling Depression bioregions endangered ecological community.

Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penneplain, Nandewar and Brigalow Belt South Bioregions endangered ecological community

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

This ecological community is not listed as a threatened species.

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

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

- (i) About 12.92 hectares of this EEC would be removed. This EEC is widespread in the locality based on regional mapping held by OEH (>700 hectares), and the removal of a relatively small area of EEC is unlikely to have an adverse effect on the extent of this EEC to the extent that it would be placed at risk of extinction.
- (ii) The proposed work would not substantially or adversely modify the composition of the EEC such that it would be placed at risk of extinction.

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

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

- i. The proposed work would result in the removal of up to 12.92 hectares of this TEC (12.6 hectares of which meets the EPBC Act criteria)
- ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists on the Sturt Highway given the nature of proposed work spread over a long distance, and the extent and quality of woodlands within the road corridor, adjacent to the study area as well as the wider locality, which would remain unaffected by the proposed work
- iii. The known habitat to be removed is considered to be of little importance to the long-term viability of these biota in the locality given that more than 160 hectares occurs within the road reserve, and a further 700 hectares occurs within a 550-metre buffer of the proposal.

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

No declared areas of outstanding biodiversity value are known from the vicinity of the proposal.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, is of potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

The clearing of about 12.92 hectares of this TEC is necessary to carry out the proposal to provide improved road user safety along this section of the Sturt Highway. In the context of the TEC within the road corridor (160 hectares) about 8% would be impacted. Within a 550-metre buffer of the road corridor (about 700 hectares) about 2% would be impacted. This TEC also occurs across the wider locality which would remain unaffected.

Conclusion

This Test of Significance has determined that the proposed activity is *'unlikely'* to have a *'significant effect'* on Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions endangered ecological community.

Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions endangered ecological community

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

This EEC is not a threatened species.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions is the name given to the ecological community dominated by White Cypress Pine (*Callitris glaucophylla*). Sandhill Pine Woodland is characterised by an open tree stratum, which may be reduced to isolated individuals or may be absent as a result of past clearing. The tree layer is dominated by *C. glaucophylla*, either in pure stands or with a range of other less abundant trees or tall shrubs.

In the Riverina bioregion and the far south-western portion of the NSW South Western Slopes bioregion, the community is typically associated with prior streams and aeolian source-bordering dunes, which are scattered within an extensive alluvial clay plain dominated by chenopod shrublands.

The proposal would result in the removal of about 1 hectare of the EEC, with about 287 hectares known within the locality of the proposal. A known population of Pine Donkey Orchid (which forms part of this EEC) would also be impacted. Through detailed design, impacts to this EEC have been minimised, and impact to the Pine Donkey orchid have been avoided.

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

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

The proposal would result in the removal of about 1 hectare of the EEC, with about 287 hectares known within the locality of the proposal.

The current design would result in a high quality area of the EEC be removed and would lead to increases in fragmentation and potential isolation.

The area of EEC to be removed contains a local population of the Pine Donkey Orchid. Through detailed design, impacts to this EEC have been minimised, and impact to the Pine Donkey orchid have been avoided.

Given this, it is unlikely that the proposal would have a significant impact on this EEC.

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

No declared areas of outstanding biodiversity value are known from the vicinity of the proposal.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, is of potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

Conclusion

This Test of Significance has determined that the proposed activity is ‘*unlikely*’ to have a ‘*significant effect*’ on Sandhill Pine Woodland in the Riverina, Murray-Darling Depression and NSW South Western Slopes bioregions endangered ecological community.

Myall Woodland in the Darling Riverine, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and NSW South Western slopes bioregions endangered ecological community

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

This ecological community is not listed as a threatened species.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

- (i) About 18.17 hectares of this EEC would be removed. This EEC is somewhat limited in the road reserve (109 hectares) but based on regional mapping held by OEHL, is generally widespread within a 550-metre buffer of the road reserve (about 1028 hectares). Given this, the removal of this area of EEC is unlikely to have an adverse effect on the extent of this EEC to the extent that it would be placed at risk of extinction.
- (ii) The proposed work would not substantially or adversely modify the composition of the EEC such that it would be placed at risk of extinction.

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

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and**
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and**
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,**
 - i. The proposed work would result in the removal of up to 18.17 hectares of this TEC (8.19 hectares of which meets the criteria of the EPBC Act listing for this TEC).
 - ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists given the nature of proposed work spread over a long distance, and the extent and quality of this TEC within the road corridor, adjacent to the study area as well as the wider locality, which would remain unaffected by the proposed work
 - iii. The known habitat to be removed is considered to be of some importance to the long-term viability of this TEC in the locality.

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

No declared areas of outstanding biodiversity value are known from the vicinity of the proposal.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, is of potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

The clearing of about 18.17 hectares of this TEC is necessary to carry out the proposal to provide improved road user safety along this section of the Sturt Highway. In the context of the TEC within the road corridor (109 hectares) about 17% would be impacted. Within a 550-metre buffer of the road corridor (about 1028 hectares) about 2% would be impacted. This TEC also occurs across the wider locality which would remain unaffected.

Conclusion

This Test of Significance has determined that the proposed activity is ‘*unlikely*’ to have a ‘*significant effect*’ on Myall Woodland in the Darling Riverine, Brigalow Belt South, Cobar Penneplain, Murray-Darling Depression, Riverina and NSW South Western slopes bioregions endangered ecological community.

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 endangered ecological community

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

This ecological community is not listed as a threatened species.

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

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

- (i) About 6.33 hectares of this TEC would be removed (about 5.88 hectares of this meets the EPBC Act listing criteria). This TEC is somewhat limited in the road reserve (76 hectares) but based on regional mapping held by OEH, is generally widespread within a 550-metre buffer of the road reserve (about 867 hectares). Given this, the removal of this area of TEC is unlikely to have an adverse effect on the extent of this EEC to the extent that it would be placed at risk of extinction.
- (ii) The proposed work would not substantially or adversely modify the composition of the TEC such that it would be placed at risk of extinction.

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

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

- i. The proposed work would result in the removal of about 6.33 hectares of this TEC would be removed (about 5.88 hectares of this meets the EPBC Act listing criteria)
- ii. The proposal would not isolate or fragment other areas of habitats further than the impact that pre-exists given the nature of proposed work spread over a long distance, and the extent and quality of woodlands within the road corridor, adjacent to the study area as well as the wider locality, which would remain unaffected by the proposed work
- iii. The area of TEC is considered to be of some importance to the long-term viability in the locality.

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

No declared areas of outstanding biodiversity value are known from the vicinity of the proposal.

(e) whether the action proposed constitutes or is part of a key threatening process or is likely to increase the impact of, a key threatening process.

While the proposed activity – safety improvement work – are not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, is of potential relevance.

The ‘clearing of native vegetation’ is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may impact on biological diversity such as habitat fragmentation

limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change.

The clearing of about 6.33 hectares of this TEC would be removed (about 5.88 hectares of this meets the EPBC Act listing criteria). This TEC is somewhat limited in the road reserve (76 hectares) but based on regional mapping held by OEHL, is generally widespread within a 550-metre buffer of the road reserve (about 867 hectares). This TEC also occurs across the wider locality which would remain unaffected confirming that extensive areas of native vegetation would remain.

Conclusion

This Test of Significance has determined that the proposed activity is *'unlikely'* to have a *'significant effect'* on 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 endangered ecological community.

NSW Fisheries Management Act 1994

In the FM Act, there are seven factors which are to be considered when determining if a proposed development or activity *'is likely to have a significant effect on the threatened species, or ecological communities, or their habitats'*. These seven factors must be taken into account by consent or determining authorities when considering a development proposal or development application. This enables a decision to be made as to whether there is likely to be a significant effect on the species.

The habitat assessment table in Annexure C found that two threatened biota listed under the FM Act that were known to, or have the potential to occur within the study area based on the evaluation completed. Given this, further assessment by application of the 7-part test is completed on the following biota:

- Silver Perch
- Murray Crayfish

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

Murray Crayfish and Silver Perch are all known from NSW Fisheries surveys in the locality. While field surveys did not specifically target these species through instream sampling, the habitat assessment confirms that the study area, namely Yanco Creek and Bullenbung Creek provides potential habitat for these species.

The proposal would not involve any work within these waterways or within the immediate riparian zone. Trimming of some branches of riparian vegetation may be necessary. Overall, the proposal can be managed through the implementation of adequate safeguards to minimise the potential to impact these biota and it is *unlikely* that the proposal could have an adverse effect on the life cycle of the Murray Crayfish, Silver Perch their habitats, such that a viable local population is likely to be placed at risk of extinction.

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

These biota are not listed as endangered populations.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

- (i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or**
- (ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,**

Murray Crayfish and Silver Perch are not listed as an endangered ecological community or critically endangered ecological community.

(d) in relation to the habitat of a threatened species, population or ecological community:

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

- i. The proposal would not result in any direct impact to the aquatic environment of Yanco Creek or Bullenbung Creek.
- ii. No aquatic habitat would be isolated or fragmented as a result of the proposal.
- iii. The aquatic habitats of the study area are considered to be in relatively good condition given the presence of riparian vegetation and large woody debris. It is likely that the habitats present are of importance to the long-term survival of the aquatic biota the subject of this assessment. None of the aquatic habitat would be impacted by the proposal.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical habitat has been declared for these species under the FM Act.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

A recovery plan has not been prepared for these species. However, should one exist, it is likely that the proposal is consistent with the objectives of such a plan in that through detailed design, the proposal avoids direct impact to aquatic habitats.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

While the proposal – safety improvement works – are not recognised as a key threatening process (KTP) under the FM Act, the *Degradation of native riparian vegetation along NSW watercourses, and increased sedimentation and erosion during construction* are of relevance to the proposal. However, the detailed design of the proposal confirms that no direct impacts would occur to aquatic habitats.

Mitigation measures provided in section 6 provide a framework to minimise the potential impacts of these KTP during construction. With consideration of the proposal design, the proposal is unlikely to result in the operation of, or increase the impact of, a key threatening process.

Conclusion

This Assessment of Significance has determined that the proposal is *'unlikely'* to have a *'significant effect'* on Murray Crayfish, Silver Perch or their habitats. Therefore, the proposal will not require a Species Impact Statement.

Matters of National Environmental Significance

Migratory Species

Protected under several international agreements to which Australia is a signatory, Migratory species are considered Matters of National Environmental Significance under the EPBC Act.

Six migratory species were found to have a moderate to high potential, or were known to occur within the vicinity of the proposal; White-bellied Sea-eagle, Fork-tailed Swift, Great Egret, Cattle Egret, Rainbow Bee-eater and White-throated Needletail (Habitat Assessment, Annexure C).

Under the EPBC Act, an action is likely to have a significant impact on a migratory species if it substantially modifies, destroys or isolates an area of 'important habitat' for the species (DEWHA, 2009a). The study area is not considered to comprise 'important habitat' as it does not contain:

- Habitat used by a migratory species occasionally or periodically within a region that supports an ecological significant proportion of the population of the species.
- Habitat that is of critical importance to the species at particular life-cycle stages.
- Habitat used by a migratory species that is at the limit of the species' range.
- Habitat within an area where the species is declining.

Given this, the proposal would not impact on White-bellied Sea-eagle, Fork-tailed Swift, Great Egret, Cattle Egret, Rainbow Bee-eater and White-throated Needletail or any migratory species and are not considered further.

Threatened Species

The study area and immediate surrounds contains potential habitat for biota listed as threatened under the EPBC Act; Southern Bell Frog, Corbens Long-eared Bat, Malleefowl, Painted Honeyeater, Superb Parrot, Swift Parrot, Silver Perch, Koala, Menindee Nightshade, Mossgiel Daisy, Sandhill Spider-orchid, Slender Darling-pea, Small Purple-pea, Murray Cod, Silver Perch, Inland Grey Box Woodland, Myall Woodland and White Box Woodland (also assessed under the BC Act and FM Act in Annexure D). The following section provides significance assessment for this biota.

[Vulnerable Species \(Southern Bell Frog, Corbens Long-eared Bat, Painted Honeyeater, Superb Parrot, Regent Honeyeater, Malleefowl, Koala, Menindee Nightshade, Mossgiel Daisy, Slender Darling-pea, Murray Cod\)](#)

Will the action lead to a long-term decrease in the size of an important population of a species?

No. There is no evidence that an 'important population' as defined by the EPBC Act occurs within the study area. Nonetheless, the proposed action would result in the direct impact of both native vegetation and hollow-bearing trees. However, extensive areas of native vegetation remain within both the road reserve, and within the wider locality which would remain unaffected confirming that extensive areas of potential and known habitat would remain. A series of site-specific safeguards to minimise potential impacts have been developed for biodiversity and would be implemented should the proposed action proceed.

For Murray Cod, no direct impacts are proposed by the proposed action. Safeguards within section 6 of this BA provide a framework for minimise indirect impacts.

Given this, it is unlikely that the proposed action would lead to a long-term decrease in an area of occupancy of an important population of this species.

Will the action reduce the area of occupancy of an important population?

No. While there is no evidence to suggest that an 'important' population even occurs within the study area, the proposed action would result in the direct impact native vegetation and HBT. There are large areas of

existing native vegetation within the road reserve and in the wider locality which would remain unaffected by the proposal and would continue to provide habitat for these species in the locality. No direct impacts are proposed for aquatic habitat. Given this, it is unlikely that the proposed action would lead to a long-term decrease in an area of occupancy of an important population of this species (should one occur there).

Will the action fragment an existing population into two or more populations?

No population would be fragmented into two or more populations by the current design of the proposed action and the existing fragmentation along Sturt Highway. No impacts are proposed to aquatic habitats.

Will the action adversely affect habitat critical to the survival of a species?

No. The habitat present is not considered critical for the survival of these species.

Will the action disrupt the breeding cycle of an important population?

No. The proposal has the potential to impact the breeding cycle of Superb Parrot. However, there is no evidence to confirm the presence of an 'important population'. Regardless, this BA has developed site-specific safeguards to ensure that potential impacts to breeding cycles are minimised through the provision of a suitably qualified and experienced person to supervise HBT removal. No impacts are proposed to aquatic habitat.

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

No. The potential habitat proposed for removal would not result in Superb Parrot being likely to decline. For Murray Cod, no impacts are proposed to aquatic habitats.

Will the action result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat?

No. Mitigation measures within section 6 provide a framework to minimise the risk of weed species becoming established as a result of this proposal.

Will the action introduce disease that may cause the species to decline?

No. Recommendations within section 6 provide a framework for managing potential risks to biodiversity.

Will the action interfere with the recovery of the species?

No. Mitigation measures outlined within section 6 suggest that it is unlikely that the proposed action would have an impact on the recovery of this species given the relatively minor level of impact proposed and that a range of mitigation measures designed specifically to minimise potential impacts to Superb Parrot and Murray Cod would be implemented.

Endangered Species and Critically Endangered Species (Sandhill Spider-orchid, Plains-wanderer, Swift Parrot, Silver Perch, Small Purple-pea)

Will the action lead to a long-term decrease in the size of a population of a species?

No. While Swift Parrot could potentially forage in the Sturt Highway road corridor, the species breeds only in Tasmania. For the remaining species, the potential habitats are considered marginal, and none were recorded during the field survey. Target surveys for Sandhill Spider-orchid failed to identify any within the road corridor despite them being detectable in other locations south of Narrandera. Should the proposal, the proposal is unlikely to lead to a long-term decrease in the size of a population as they are not present.

For Silver Perch, no impacts to aquatic habitat are proposed. Given this, it is unlikely that the proposed action would lead to a long-term decrease in the size of a population of either species (should they even occur there).

Will the action reduce the area of occupancy of the species?

No. There is no evidence to suggest that a population relies upon the resources of the study area in its entirety particularly given the highly mobile nature of these species

Will the action fragment an existing population into two or more populations?

No population would be fragmented into two or more populations given the context of vegetation along the Sturt Highway, the design of the proposal and the high mobility of these species. For Sandhill Spider Orchid, none were found within the road corridor during an appropriately timed field survey so impacts are unlikely. No impacts to aquatic habitat are proposed.

Will the action adversely affect habitat critical to the survival of a species?

No. The habitat located adjacent to the Sturt Highway is not considered critical to these species for their survival.

Will the action disrupt the breeding cycle of a population?

No. Swift Parrot breed only in Tasmania, and no aquatic habitat would be directly affected by the proposed action.

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

No. The availability of habitat in the locality indicates that the proposal is unlikely to impact potential habitat to the extent these species are likely to decline.

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

No. Mitigation measures within section 6 provide a framework to minimise the risk of weed species invading adjoining habitats.

Will the action introduce disease that may cause the species to decline?

No. Recommendations within section 6 provide a framework for managing potential risks to biodiversity.

Will the action interfere with the recovery of the species?

No. Given the relatively minor nature of the proposed action, the extent of similar or higher quality habitats in the locality, the highly mobile nature of these fauna, and that no Sandhill Spider Orchid were observed during an appropriately timed field survey, that no direct impacts to aquatic habitats are proposed and the adoption of the mitigation measures outlined within this BA, it is unlikely that the proposed action would have an impact on the recovery of these species.

[Critically endangered and endangered ecological communities \(Box Gum Woodland, Inland Grey Box Woodland, Myall Woodland\)](#)

Will the action reduce the extent of an ecological community?

Yes. The proposed action will result in the removal of 5.88 hectares of Box-gum Woodland, 12.6 hectares of Inland Grey Box Woodland and 8.19 hectares of Myall Woodland that meets with the EPBC Act criteria. However, in the context of the extent of these TEC, all are relatively widespread within the Sturt Highway road reserve and the wider locality, and they would remain unaffected by the proposal.

Will the action fragment or increase fragmentation of an ecological community?

No area of these TECs would be fragmented into two or more populations given the design of the proposal and the existing environment.

Will the action adversely affect habitat critical to the survival of an ecological community?

No. These TEC are located adjacent to the existing highway and are not considered critical to these communities for survival given the extent adjoining the proposal, along the Sturt Highway and across the locality.

Will the action modify or destroy abiotic (non-living) factors necessary for an ecological communities survival, including reduction of groundwater levels or substantial alteration of surface water drainage patterns?

No. The proposal will not modify or destroy abiotic factors necessary for the survival of the retained portions of these communities within the road reserve or where they extends beyond the boundaries of the road reserve.

Will the action cause a substantial change in species composition of an occurrence of an ecological community, including causing a decline or loss of functionality of important species?

No. While a portion of these TEC will be removed by the proposal, retained areas of these ecological communities will not be affected particularly in the context of the mitigation measures outlined within Chapter 6.

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

- *Assisting invasive species, that are harmful to the listed ecological community, to become established?*
- *Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community?*

No. The removal of these portions of TEC are considered relatively minor in the context of those portions retained within and outside the road reserve, and in the locality. With the implementation of the mitigation measures outlined in Chapter 6, it is unlikely that the action would cause a substantial reduction in the quality or integrity of the retained areas of these TEC.

Will the action interfere with the recovery of an ecological community?

No. Given the relatively minor nature of the proposed action, the extent of similar quality habitats along the Sturt Highway and in the locality, and the adoption of the mitigation measures outlined in Chapter 6, it is unlikely that the proposal would have an impact on the recovery of this TEC.

Conclusion

With consideration of the assessments completed within Appendix D, the proposal is *unlikely* to have a significant effect on threatened or migratory biota or endangered or critically endangered TEC as listed by the EPBC Act.

Annexure E

Protected Matters Search Tool results

Annexure F

Priority Weed Declarations

Priority weeds for the Riverina

Note: this region includes the local council areas of Bland, Carrathool (lower), Coolamon, Cootamundra-Gundagai, Griffith, Hay (lower), Hilltops (western), Junee, Leeton, Lockhart Shire Council, Murrumbidgee (upper), Narrandera, Snowy Valleys (upper), Temora and Wagga Wagga.

[Select another region](#)

Weed

Duty

All plants

General Biosecurity Duty

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

African boxthorn

Lycium ferocissimum

Prohibition on dealings

Must not be imported into the State or sold

Alligator weed

Alternanthera philoxeroides

Prohibition on dealings

Must not be imported into the State or sold

Alligator weed

Alternanthera philoxeroides

Biosecurity Zone

The Alligator Weed Biosecurity Zone is established for all land within the state except land in the following regions: Greater Sydney; Hunter (but only in the local government areas of City of Lake Macquarie, City of Maitland, City of Newcastle or Port Stephens).

Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone

Alligator weed

Alternanthera philoxeroides

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Anchored water hyacinth

Eichhornia azurea

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Athel pine

Tamarix aphylla

Prohibition on dealings

Must not be imported into the State or sold

Bellyache bush

Jatropha gossypifolia

Prohibition on dealings

Must not be imported into the State or sold

Bitou bush

Chrysanthemoides monilifera subsp.
rotundata

Prohibition on dealings

Must not be imported into the State or sold

Bitou bush

Chrysanthemoides monilifera subsp.
rotundata

Biosecurity Zone

The Bitou Bush Biosecurity Zone is established for all land within the State except land within 10 kilometres of the mean high water mark of the Pacific Ocean between Cape Byron in the north and Point Perpendicular in the south.

Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone

Bitou bush

Chrysanthemoides monilifera subsp.
rotundata

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Black knapweed

Centaurea x moncktonii

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Black willow

Salix nigra

Prohibition on dealings

Must not be imported into the State or sold

Black willow

Salix nigra

Regional Recommended Measure

Land managers should mitigate the risk of the plant being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant.

Blackberry

Rubus fruticosus species aggregate

Prohibition on dealings

Must not be imported into the State or sold

All species in the *Rubus fruticosus* species aggregate have this requirement, except for the varieties Black Satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smooth Stem, and Thornfree

Boneseed

Chrysanthemoides monilifera subsp. *monilifera*

Prohibition on dealings

Must not be imported into the State or sold

Boneseed

Chrysanthemoides monilifera subsp. *monilifera*

Control Order

Bonseed Control Zone: Whole of NSW

Bonseed Control Zone (Whole of NSW): Owners and occupiers of land on which there is boneseed must notify the local control authority of new infestations; immediately destroy the plants; ensure subsequent generations are destroyed; and ensure the land is kept free of the plant. A person who deals with a carrier of boneseed must ensure the plant (and any seed and propagules) is not moved from the land; and immediately notify the local control authority of the presence of the plant.

Boxing glove cactus

Cylindropuntia fulgida var. *mamillata*

Prohibition on dealings

Must not be imported into the State or sold

Bridal creeper

Asparagus asparagoides

Prohibition on dealings

Must not be imported into the State or sold

***this requirement also applies to the Western Cape form of bridal creeper**

Bridal veil creeper

Asparagus declinatus

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Broomrapes

Orobanche species

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species of *Orobanche* are Prohibited Matter in NSW, except Clover broomrape, *Orobanche minor* and Australian broomrape, *Orobanche cernua* var. *australiana*.

Cabomba

Cabomba caroliniana

Prohibition on dealings

Must not be imported into the State or sold

Cane cactus

Austrocyllindropuntia cylindrica

Prohibition on dealings

Must not be imported into the State or sold

All species in the *Austrocyllindropuntia* genus have this requirement

Cane needle grass

Nassella hyalina

Regional Recommended Measure

Eradication zone: whole region except for the containment zone of Wagga Wagga City Council

Eradication zone: The plant should be eradicated from the land and the land kept free of the plant. Containment zone: Land managers should prevent spread from their land.

Whole region: managers should mitigate the risk of new weeds being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment.

Cape broom

Genista monspessulana

Prohibition on dealings

Must not be imported into the State or sold

Cape broom

Genista monspessulana

Regional Recommended Measure

Snowy Valleys Council

Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land.

Cape broom

Genista monspessulana

Regional Recommended Measure

Whole region excluding Snowy Valleys Council

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment.

Cat's claw creeper

Dolichandra unguis-cati

Prohibition on dealings

Must not be imported into the State or sold

Chilean needle grass

Nassella neesiana

Prohibition on dealings

Must not be imported into the State or sold

Chilean needle grass

Nassella neesiana

Regional Recommended Measure

Land managers should mitigate the risk of the plant being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant.

Chinese violet

Asystasia gangetica subsp. *micrantha*

Control Order

Owners and occupiers of land on which there is Chinese violet must notify the local control authority for the area if the Chinese violet is part of a new infestation on the land, destroy all Chinese violet on the land ensuring that subsequent generations of Chinese violet are destroyed; and keep the land free of Chinese violet. A person who deals with a carrier of Chinese violet must ensure the plant (and any seed and propagules) is not moved from the land; and immediately notify the local control authority of the presence of the plant on the land, or on or in a carrier.

Climbing asparagus

Asparagus africanus

Prohibition on dealings

Must not be imported into the State or sold

Climbing asparagus fern

Asparagus plumosus

Prohibition on dealings

Must not be imported into the State or sold

Common pear

Opuntia stricta

Prohibition on dealings

Must not be imported into the State or sold

Coolatai grass

Hyparrhenia hirta

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Eurasian water milfoil

Myriophyllum spicatum

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Eve's needle cactus

Austrocyllindropuntia subulata

Prohibition on dealings

Must not be imported into the State or sold

All species in the Austrocyllindropuntia genus have this requirement

Fireweed

Senecio madagascariensis

Prohibition on dealings

Must not be imported into the State or sold

Fireweed

Senecio madagascariensis

Regional Recommended Measure

Land managers should mitigate the risk of the plant being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant.

Flax-leaf broom

Genista linifolia

Prohibition on dealings

Must not be imported into the State or sold

Foxtail fern

Asparagus densiflorus

Prohibition on dealings

Must not be imported into the State or sold

Frogbit

Limnobium laevigatum

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species of Limnobium are Prohibited Matter

Gamba grass
Andropogon gayanus

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Gorse
Ulex europaeus

Prohibition on dealings

Must not be imported into the State or sold

Gorse
Ulex europaeus

Regional Recommended Measure

Land managers should mitigate the risk of the plant being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant.

Grey sallow
Salix cinerea

Prohibition on dealings

Must not be imported into the State or sold

Grey sallow
Salix cinerea

Regional Recommended Measure

Land managers should mitigate the risk of the plant being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant.

Ground asparagus
Asparagus aethiopicus

Prohibition on dealings

Must not be imported into the State or sold

Hawkweeds
Pilosella species

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species in the genera *Pilosella* and *Hieracium* are Prohibited Matter except for *Hieracium murorum*.

Horsetails
Equisetum species

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Hudson pear
Cylindropuntia pallida

Prohibition on dealings

Must not be imported into the State or sold

Hydrocotyl

Hydrocotyle ranunculoides

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Hymenachne

Hymenachne amplexicaulis and hybrids

Prohibition on dealings

Must not be imported into the State or sold

Karoo thorn

Vachellia karroo

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Kidney-leaf mud plantain

Heteranthera reniformis

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Kochia

Bassia scoparia

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Excluding the subspecies *trichophylla*

Koster's curse

Clidemia hirta

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Lagarosiphon
Lagarosiphon major

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Lantana
Lantana camara

Prohibition on dealings

Must not be imported into the State or sold

Madeira vine
Anredera cordifolia

Prohibition on dealings

Must not be imported into the State or sold

Mesquite
Prosopis species

Prohibition on dealings

Must not be imported into the State or sold

All species in the genus *Prosopis* have this requirement

Mesquite
Prosopis species

Regional Recommended Measure

Land managers should mitigate the risk of the plant being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant.

Mexican feather grass
Nassella tenuissima

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Miconia
Miconia species

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species of *Miconia* are Prohibited Matter in NSW

Mikania vine
Mikania micrantha

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

***all species in the genus *Mikania* are Prohibited Matter in NSW**

Mimosa

Mimosa pigra

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Mother-of-millions

Bryophyllum species

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Ox-eye daisy

Leucanthemum vulgare

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Parkinsonia

Parkinsonia aculeata

Prohibition on dealings

Must not be imported into the State or sold

Parkinsonia

Parkinsonia aculeata

Control Order

Parkinsonia Control Zone: Whole of NSW

Parkinsonia Control Zone (Whole of NSW): Owners and occupiers of land on which there is parkinsonia must notify the local control authority of new infestations; immediately destroy the plants; ensure subsequent generations are destroyed; and ensure the land is kept free of the plant. A person who deals with a carrier of parkinsonia must ensure the plant (and any seed and propagules) is not moved from the land; and immediately notify the local control authority of the presence of the plant.

Parthenium weed

Parthenium hysterophorus

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Parthenium weed

Parthenium hysterophorus

Prohibition on dealings

The following equipment must not be imported into NSW from Queensland: grain harvesters (including the comb or front), comb trailers (including the comb or front), bins used for holding grain during harvest operations, augers or similar for moving grain, vehicles used to transport grain harvesters, support vehicles driven in paddocks during harvest operations, mineral exploration drilling rigs and vehicles used to transport those rigs, unless set out as an exception in Division 5, Part 2 of the Biosecurity Order (Permitted Activities) 2017

Perennial ground cherry

Physalis longifolia

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Pond apple

Annona glabra

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Prairie ground cherry

Physalis hederifolia

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Prickly acacia

Vachellia nilotica

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Prickly pears - Austrocyllindropuntias

Austrocyllindropuntia species

Prohibition on dealings

Must not be imported into the State or sold

All species in the Austrocyllindropuntia genus have this requirement

Prickly pears - Cyndropuntias
Cylindropuntia species

Prohibition on dealings

Must not be imported into the State or sold

All species in the *Cylindropuntia* genus have this requirement

Prickly pears - Opuntias
Opuntia species

Prohibition on dealings

Must not be imported into the State or sold

Except for *Opuntia ficus-indica* (Indian fig)

Ragwort
Senecio jacobaea

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Rope pear
Cylindropuntia imbricata

Prohibition on dealings

Must not be imported into the State or sold

All species in the *Cylindropuntia* genus have this requirement

Rubber vine
Cryptostegia grandiflora

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Sagittaria
Sagittaria platyphylla

Prohibition on dealings

Must not be imported into the State or sold

Sagittaria
Sagittaria platyphylla

Regional Recommended Measure

Land managers should mitigate the risk of the plant being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant.

Salvinia
Salvinia molesta

Prohibition on dealings

Must not be imported into the State or sold

Salvinia
Salvinia molesta

Regional Recommended Measure

Land managers should mitigate the risk of the plant being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant.

Scotch broom

Cytisus scoparius subsp. *scoparius*

Prohibition on dealings

Must not be imported into the State or sold

Scotch broom

Cytisus scoparius subsp. *scoparius*

Regional Recommended Measure

Snowy Valleys Council.

Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land.

Scotch broom

Cytisus scoparius subsp. *scoparius*

Regional Recommended Measure

Whole region excluding Snowy Valleys Council

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment.

Senegal tea plant

Gymnocoronis spilanthoides

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Serrated tussock

Nassella trichotoma

Prohibition on dealings

Must not be imported into the State or sold

Serrated tussock

Nassella trichotoma

Regional Recommended Measure

Land managers should mitigate the risk of the plant being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant.

Siam weed

Chromolaena odorata

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Silverleaf nightshade

Solanum elaeagnifolium

Prohibition on dealings

Must not be imported into the State or sold

Smooth tree pear

Opuntia monacantha

Prohibition on dealings

Must not be imported into the State or sold

Snakefeather

Asparagus scandens

Prohibition on dealings

Must not be imported into the State or sold

Spongeplant

Limnobium spongia

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species of *Limnobium* are Prohibited Matter

Spotted knapweed

Centaurea stoebe subsp. *micranthos*

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Tiger pear

Opuntia aurantiaca

Prohibition on dealings

Must not be imported into the State or sold

Tropical soda apple

Solanum viarum

Control Order

Tropical Soda Apple Control Zone: Whole of NSW
Tropical Soda Apple Control Zone (Whole of NSW): Owners and occupiers of land on which there is tropical soda apple must notify the local control authority of new infestations; destroy the plants including the fruit; ensure subsequent generations are destroyed; and ensure the land is kept free of the plant. A person who deals with a carrier of tropical soda apple must ensure the plant (and any seed and propagules) is not moved from the land; and immediately notify the local control authority of the presence of the plant on the land, or on or in a carrier.

Velvety tree pear

Opuntia tomentosa

Prohibition on dealings

Must not be imported into the State or sold

Water caltrop

Trapa species

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species in the *Trapa* genus are Prohibited Matter in NSW

Water hyacinth

Eichhornia crassipes

Prohibition on dealings

Must not be imported into the State or sold

Water hyacinth

Eichhornia crassipes

Biosecurity Zone

The Water Hyacinth Biosecurity Zone applies to all land within the State, except for the following regions: Greater Sydney or North Coast, North West (but only the local government area of Moree Plains), Hunter (but only in the local government areas of City of Cessnock, City of Lake Macquarie, MidCoast, City of Maitland, City of Newcastle or Port Stephens), South East (but only in the local government areas of Eurobodalla, Kiama, City of Shellharbour, City of Shoalhaven or City of Wollongong).

Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone

Water hyacinth

Eichhornia crassipes

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment.

Water lettuce

Pistia stratiotes

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Water lilies

Nymphaea species

Regional Recommended Measure

The plant should be eradicated from the land and the land kept free of the plant. Land managers should mitigate the risk of new weeds being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment.

This Regional Recommended Measure applies to *Nymphaea mexicana* (Mexican water lily)

Water poppy

Hydrocleys nymphoides

Regional Recommended Measure

Land managers should mitigate the risk of the plant being introduced to their land. Land managers should mitigate spread from their land. Notify local control authority if found.

Water soldier

Stratiotes aloides

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Willows

Salix species

Prohibition on dealings

Must not be imported into the State or sold

All species in the *Salix* genus have this requirement, except *Salix babylonica* (weeping willows), *Salix x calodendron* (pussy willow) and *Salix x reichardtii* (sterile pussy willow)

Witchweeds

Striga species

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species in the *Striga* genus are Prohibited Matter in NSW, except the native *Striga parviflora*

Yellow burrhead

Limnocharis flava

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

The content provided here is for information purposes only and is taken from the *Biosecurity Act 2015* and its subordinate legislation, and the Regional Strategic Weed Management Plans (published by each Local Land Services region in NSW). It describes the state and regional priorities for weeds in New South Wales, Australia.

Priority weeds for the Western

Note: this region includes the local council areas of Balranald, Bogan (upper), Bourke, Brewarrina, Broken Hill, Carrathool (upper), Central Darling, Cobar, Hay (upper), Unincorporated and Wentworth.

[Select another region](#)

Weed

Duty

All plants

General Biosecurity Duty

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

African boxthorn

Lycium ferocissimum

Prohibition on dealings

Must not be imported into the State or sold

African boxthorn

Lycium ferocissimum

Regional Recommended Measure

Land managers mitigate the risk of the plant spreading from their land. Land managers reduce impact of plant on priority assets (riparian areas and floodplains).

Alligator weed

Alternanthera philoxeroides

Prohibition on dealings

Must not be imported into the State or sold

Alligator weed

Alternanthera philoxeroides

Biosecurity Zone

The Alligator Weed Biosecurity Zone is established for all land within the state except land in the following regions: Greater Sydney; Hunter (but only in the local government areas of City of Lake Macquarie, City of Maitland, City of Newcastle or Port Stephens).

Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone

Anchored water hyacinth

Eichhornia azurea

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Arrowhead

Sagittaria calycina var. *calycina*

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Athel pine

Tamarix aphylla

Prohibition on dealings

Must not be imported into the State or sold

Bellyache bush

Jatropha gossypifolia

Prohibition on dealings

Must not be imported into the State or sold

Bitou bush

Chrysanthemoides monilifera subsp. *rotundata*

Prohibition on dealings

Must not be imported into the State or sold

Bitou bush

Chrysanthemoides monilifera subsp. *rotundata*

Biosecurity Zone

The Bitou Bush Biosecurity Zone is established for all land within the State except land within 10 kilometres of the mean high water mark of the Pacific Ocean between Cape Byron in the north and Point Perpendicular in the south.

Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone

Black knapweed

Centaurea x moncktonii

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Black willow

Salix nigra

Prohibition on dealings

Must not be imported into the State or sold

Blackberry

Rubus fruticosus species aggregate

Prohibition on dealings

Must not be imported into the State or sold

All species in the *Rubus fruticosus* species aggregate have this requirement, except for the varieties Black Satin, Chehalem, Chester Thornless, Dirksen Thornless, Loch Ness, Murrindindi, Silvan, Smooth Stem, and Thornfree

Boneseed

Chrysanthemoides monilifera subsp.
monilifera

Prohibition on dealings

Must not be imported into the State or sold

Boneseed

Chrysanthemoides monilifera subsp.
monilifera

Control Order

Bonseed Control Zone: Whole of NSW

Boneseed Control Zone (Whole of NSW): Owners and occupiers of land on which there is boneseed must notify the local control authority of new infestations; immediately destroy the plants; ensure subsequent generations are destroyed; and ensure the land is kept free of the plant. A person who deals with a carrier of boneseed must ensure the plant (and any seed and propagules) is not moved from the land; and immediately notify the local control authority of the presence of the plant.

Boxing glove cactus

Cylindropuntia fulgida var. *mamillata*

Prohibition on dealings

Must not be imported into the State or sold

Boxing glove cactus

Cylindropuntia fulgida var. *mamillata*

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Bridal creeper

Asparagus asparagoides

Prohibition on dealings

Must not be imported into the State or sold

***this requirement also applies to the Western Cape form of bridal creeper**

Bridal creeper

Asparagus asparagoides

Regional Recommended Measure

Land managers mitigate the risk of the plant spreading from their land. Land managers reduce impact of plant on priority assets (riparian areas and commercial horticultural areas).

Bridal veil creeper
Asparagus declinatus

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Broomrapes
Orobanche species

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species of Orobanche are Prohibited Matter in NSW, except Clover broomrape, Orobanche minor and Australian broomrape, Orobanche cernua var. australiana.

Burr ragweed
Ambrosia confertiflora

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Cabomba
Cabomba caroliniana

Prohibition on dealings

Must not be imported into the State or sold

Cane cactus
Austrocyllindropuntia cylindrica

Prohibition on dealings

Must not be imported into the State or sold

All species in the Austrocyllindropuntia genus have this requirement

Cape broom
Genista monspessulana

Prohibition on dealings

Must not be imported into the State or sold

Cat's claw creeper
Dolichandra unguis-cati

Prohibition on dealings

Must not be imported into the State or sold

Chilean needle grass
Nassella neesiana

Prohibition on dealings

Must not be imported into the State or sold

Chinese violet

Asystasia gangetica subsp. *micrantha*

Control Order

Owners and occupiers of land on which there is Chinese violet must notify the local control authority for the area if the Chinese violet is part of a new infestation on the land, destroy all Chinese violet on the land ensuring that subsequent generations of Chinese violet are destroyed; and keep the land free of Chinese violet. A person who deals with a carrier of Chinese violet must ensure the plant (and any seed and propagules) is not moved from the land; and immediately notify the local control authority of the presence of the plant on the land, or on or in a carrier.

Climbing asparagus

Asparagus africanus

Prohibition on dealings

Must not be imported into the State or sold

Climbing asparagus fern

Asparagus plumosus

Prohibition on dealings

Must not be imported into the State or sold

Clockweed

Oenothera curtiflora

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Common pear

Opuntia stricta

Prohibition on dealings

Must not be imported into the State or sold

Common pear

Opuntia stricta

Regional Recommended Measure

Land managers mitigate the risk of the plant spreading from their land. Land managers mitigate the risk of the plant being introduced to their land. Land managers reduced impact of the plant on priority assets (grazing, conservation and urban areas). The plant or parts of the plant are not traded, carried, grown or released into the environment.

***This Regional Recommended Measure applies to all species of *Opuntia* except for *Opuntia ficus-indica* (Indian fig)**

Coolatai grass

Hyparrhenia hirta

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Eurasian water milfoil
Myriophyllum spicatum

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Eve's needle cactus
Austrocyllindropuntia subulata

Prohibition on dealings

Must not be imported into the State or sold

All species in the Austrocyllindropuntia genus have this requirement

Fireweed
Senecio madagascariensis

Prohibition on dealings

Must not be imported into the State or sold

Flax-leaf broom
Genista linifolia

Prohibition on dealings

Must not be imported into the State or sold

Foxtail fern
Asparagus densiflorus

Prohibition on dealings

Must not be imported into the State or sold

Frogbit
Limnobium laevigatum

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species of Limnobium are Prohibited Matter

Gamba grass
Andropogon gayanus

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Giant reed

Arundo donax

Regional Recommended Measure

Exclusion zone: whole region except for the core infestation area of Wentworth Shire Council

Whole region: Land managers should mitigate the risk of the plant being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant. Core infestation area: Land managers should mitigate spread from their land. Land managers reduce the impact of the plant on priority assets (rivers and natural watercourses).

Gorse

Ulex europaeus

Prohibition on dealings

Must not be imported into the State or sold

Grey willow

Salix cinerea

Prohibition on dealings

Must not be imported into the State or sold

Ground asparagus

Asparagus aethiopicus

Prohibition on dealings

Must not be imported into the State or sold

Harrisia cactus

Harrisia species

Regional Recommended Measure

Land managers should mitigate spread from their land. Land managers reduce impact of plant on priority assets (grazing conservation and urban areas). The plant should not be bought, sold, grown, carried or released into the environment.

This Regional Recommended Measure applies to *Harrisia martinii*

Hawkweeds

Pilosella species

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species in the genera *Pilosella* and *Hieracium* are Prohibited Matter except for *Hieracium murorum*.

Hudson pear

Cylindropuntia pallida

Prohibition on dealings

Must not be imported into the State or sold

Hudson pear

Cylindropuntia pallida

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Hydrocotyl

Hydrocotyle ranunculoides

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Hymenachne

Hymenachne amplexicaulis and hybrids

Prohibition on dealings

Must not be imported into the State or sold

Karoo thorn

Vachellia karroo

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Kochia

Bassia scoparia

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Excluding the subspecies *trichophylla*

Koster's curse

Clidemia hirta

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Lagarosiphon
Lagarosiphon major

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Lantana
Lantana camara

Prohibition on dealings

Must not be imported into the State or sold

Madeira vine
Anredera cordifolia

Prohibition on dealings

Must not be imported into the State or sold

Mesquite
Prosopis species

Prohibition on dealings

Must not be imported into the State or sold

All species in the genus *Prosopis* have this requirement

Mesquite
Prosopis species

Regional Recommended Measure

Exclusion zone: whole region except for the core infestation area of Evelyn, Yantara, Mootwingee, Yancowinna, Menindee, Tandora, Livingstone and Windeyer counties
Whole region: Land managers should mitigate the risk of the plant being introduced to their land. The plant should not be bought, sold, grown, carried or released into the environment. Exclusion zone: The plant should be eradicated from the land and the land kept free of the plant.
Core infestation area: Land managers should mitigate spread from their land. Land managers reduce the impact of the plant on priority assets (grazing areas, native vegetation).

Mexican feather grass
Nassella tenuissima

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Miconia
Miconia species

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species of *Miconia* are Prohibited Matter in NSW

Mikania vine

Mikania micrantha

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

***all species in the genus *Mikania* are Prohibited Matter in NSW**

Mimosa

Mimosa pigra

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Mother-of-millions

Bryophyllum species

Regional Recommended Measure

Exclusion zone: whole region except core infestation area of maintained gardens

Whole region: Plant should not be bought, sold, grown, carried or released into the environment (except in maintained gardens). Exclusion Zone: The plant should be eradicated from the land and the land kept free of the plant. Land managers should mitigate the risk of the plant being introduced to their land. Core infestation: Land managers should mitigate spread from their land.

This Regional Recommended Measure also applies to *Bryophyllum* hybrids

Parkinsonia

Parkinsonia aculeata

Prohibition on dealings

Must not be imported into the State or sold

Parkinsonia

Parkinsonia aculeata

Control Order

Parkinsonia Control Zone: Whole of NSW

Parkinsonia Control Zone (Whole of NSW): Owners and occupiers of land on which there is parkinsonia must notify the local control authority of new infestations; immediately destroy the plants; ensure subsequent generations are destroyed; and ensure the land is kept free of the plant. A person who deals with a carrier of parkinsonia must ensure the plant (and any seed and propagules) is not moved from the land; and immediately notify the local control authority of the presence of the plant.

Parthenium weed

Parthenium hysterophorus

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Parthenium weed

Parthenium hysterophorus

Prohibition on dealings

The following equipment must not be imported into NSW from Queensland: grain harvesters (including the comb or front), comb trailers (including the comb or front), bins used for holding grain during harvest operations, augers or similar for moving grain, vehicles used to transport grain harvesters, support vehicles driven in paddocks during harvest operations, mineral exploration drilling rigs and vehicles used to transport those rigs, unless set out as an exception in Division 5, Part 2 of the Biosecurity Order (Permitted Activities) 2017

Pond apple

Annona glabra

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Prickly acacia

Vachellia nilotica

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Prickly pears - Austrocyllindropuntias

Austrocyllindropuntia species

Prohibition on dealings

Must not be imported into the State or sold

All species in the Austrocyllindropuntia genus have this requirement

Prickly pears - Cyllindropuntias

Cyllindropuntia species

Prohibition on dealings

Must not be imported into the State or sold

All species in the Cyllindropuntia genus have this requirement

Prickly pears - Opuntias

Opuntia species

Prohibition on dealings

Must not be imported into the State or sold

Except for *Opuntia ficus-indica* (Indian fig)

Prickly pears - Opuntias

Opuntia species

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land. The plant should not be bought, sold, grown, carried or released into the environment.

This Regional Recommended Measure applies to all species of *Opuntia* except for *Opuntia ficus-indica* (Indian fig)

Rope pear

Cylindropuntia imbricata

Prohibition on dealings

Must not be imported into the State or sold

All species in the *Cylindropuntia* genus have this requirement

Rope pear

Cylindropuntia imbricata

Regional Recommended Measure

Land managers should mitigate spread from their land. Land managers reduce impact of plant on priority assets (grazing conservation and urban areas). The plant should not be bought, sold, grown, carried or released into the environment.

Rubber vine

Cryptostegia grandiflora

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Sagittaria

Sagittaria platyphylla

Prohibition on dealings

Must not be imported into the State or sold

Sagittaria

Sagittaria platyphylla

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Salvinia

Salvinia molesta

Prohibition on dealings

Must not be imported into the State or sold

Scotch broom

Cytisus scoparius subsp. *scoparius*

Prohibition on dealings

Must not be imported into the State or sold

Serrated tussock

Nassella trichotoma

Prohibition on dealings

Must not be imported into the State or sold

Siam weed

Chromolaena odorata

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Silverleaf nightshade

Solanum elaeagnifolium

Prohibition on dealings

Must not be imported into the State or sold

Silverleaf nightshade

Solanum elaeagnifolium

Regional Recommended Measure

Land managers mitigate the risk of the plant spreading from their land. Land managers reduce impact of plant on priority assets (dryland farming areas).

Smooth tree pear

Opuntia monacantha

Prohibition on dealings

Must not be imported into the State or sold

Smooth tree pear

Opuntia monacantha

Regional Recommended Measure

Land managers mitigate the risk of the plant spreading from their land. Land managers mitigate the risk of the plant being introduced to their land. Land managers reduced impact of the plant on priority assets (grazing, conservation and urban areas). The plant or parts of the plant are not traded, carried, grown or released into the environment.

***This Regional Recommended Measure applies to all species of Opuntia except for Opuntia ficus-indica (Indian fig)**

Snakefeather

Asparagus scandens

Prohibition on dealings

Must not be imported into the State or sold

Spiny burrgrass - longispinus

Cenchrus longispinus

Regional Recommended Measure

Land managers mitigate the risk of the plant spreading from their land. Land managers reduce impact of plant on priority assets (commercial horticultural areas, grazing lands and conservation areas). The plant or parts of the plant are not traded, carried, grown or released into the environment.

Spiny burrgrass - spinifex

Cenchrus spinifex

Regional Recommended Measure

Land managers mitigate the risk of the plant spreading from their land. Land managers reduce impact of plant on priority assets (commercial horticultural areas, grazing lands and conservation areas). The plant or parts of the plant are not traded, carried, grown or released into the environment.

Spongeplant

Limnobium spongia

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species of *Limnobium* are Prohibited Matter

Spotted knapweed

Centaurea stoebe subsp. *micranthos*

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Tiger pear

Opuntia aurantiaca

Prohibition on dealings

Must not be imported into the State or sold

Tiger pear

Opuntia aurantiaca

Regional Recommended Measure

Land managers mitigate the risk of the plant spreading from their land. Land managers mitigate the risk of the plant being introduced to their land. Land managers reduced impact of the plant on priority assets (grazing, conservation and urban areas). The plant should not be bought, sold, grown, carried or released into the environment.

This Regional Recommended Measure applies to all species of *Opuntia* except for *Opuntia ficus-indica* (Indian fig)

Tropical soda apple

Solanum viarum

Control Order

Tropical Soda Apple Control Zone: Whole of NSW

Tropical Soda Apple Control Zone (Whole of NSW): Owners and occupiers of land on which there is tropical soda apple must notify the local control authority of new infestations; destroy the plants including the fruit; ensure subsequent generations are destroyed; and ensure the land is kept free of the plant. A person who deals with a carrier of tropical soda apple must ensure the plant (and any seed and propagules) is not moved from the land; and immediately notify the local control authority of the presence of the plant on the land, or on or in a carrier.

Velvety tree pear

Opuntia tomentosa

Prohibition on dealings

Must not be imported into the State or sold

Velvety tree pear

Opuntia tomentosa

Regional Recommended Measure

Land managers mitigate the risk of the plant spreading from their land. Land managers mitigate the risk of the plant being introduced to their land. Land managers reduced impact of the plant on priority assets (grazing, conservation and urban areas). The plant or parts of the plant are not traded, carried, grown or released into the environment.

This Regional Recommended Measure applies to all species of *Opuntia* except for *Opuntia ficus-indica* (Indian fig)

Water caltrop

Trapa species

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species in the *Trapa* genus are Prohibited Matter in NSW

Water hyacinth

Eichhornia crassipes

Prohibition on dealings

Must not be imported into the State or sold

Water hyacinth

Eichhornia crassipes

Biosecurity Zone

The Water Hyacinth Biosecurity Zone applies to all land within the State, except for the following regions: Greater Sydney or North Coast, North West (but only the local government area of Moree Plains), Hunter (but only in the local government areas of City of Cessnock, City of Lake Macquarie, MidCoast, City of Maitland, City of Newcastle or Port Stephens), South East (but only in the local government areas of Eurobodalla, Kiama, City of Shellharbour, City of Shoalhaven or City of Wollongong).

Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone

Water hyacinth

Eichhornia crassipes

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Water soldier

Stratiotes aloides

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

Willow rhus

Searsia lancea

Regional Recommended Measure

Land managers should mitigate the risk of new weeds being introduced to their land. The plant should be eradicated from the land and the land kept free of the plant. The plant should not be bought, sold, grown, carried or released into the environment. Notify local control authority if found.

Willows

Salix species

Prohibition on dealings

Must not be imported into the State or sold

All species in the *Salix* genus have this requirement, except *Salix babylonica* (weeping willows), *Salix x calodendron* (pussy willow) and *Salix x reichardtii* (sterile pussy willow)

Witchweeds

Striga species

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

All species in the *Striga* genus are Prohibited Matter in NSW, except the native *Striga parviflora*

Yellow burrhead

Limnocharis flava

Prohibited Matter

A person who deals with prohibited matter or a carrier of prohibited matter is guilty of an offence. A person who becomes aware of or suspects the presence of prohibited matter must immediately notify the Department of Primary Industries

The content provided here is for information purposes only and is taken from the *Biosecurity Act 2015* and its subordinate legislation, and the Regional Strategic Weed Management Plans (published by each Local Land Services region in NSW). It describes the state and regional priorities for weeds in New South Wales, Australia.

Annexure G

BAM plot data sheets

BAM Site – Field Survey Form						Site Sheet no:	
Date		Survey Name		Plot Identifier		Recorders	
31/3/21				BAMB SEC 2		SS/L5	
Zone		IBRA region		Photo #		Zone ID	
Datum							
Easting		Dimensions		Orientation of midline from the 0m point			
Northing							
Vegetation Class						Confidence:	
						H M L	
Plant Community Type						EEC:	
PCT 2						Confidence:	
						H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)		Sum values	
Count of Native Richness	Trees		
	Shrubs		
	Grasses etc.		
	Forbs		
	Ferns		
	Other		
Sum of Cover of native vascular plants by growth from group	Trees		
	Shrubs		
	Grasses etc.		
	Forbs		
	Ferns		
	Other		
High Threat Weed cover			

BAM Attribute (20 x 50 m plot)				# Tree Stems Count			
dbh		Euc*		Non Euc		Hollows [†]	
Large trees for Euc* & Non Euc		80 + cm	6	—		6	
		50 – 79 cm	1				
		30 – 49 cm	1				
		20 – 29 cm					
		10 – 19 cm	12				
		5 – 9 cm	8			n/a	
		< 5 cm				n/a	
Length of logs (m) (≥10cm diameter, >50cm in length)				total			
				72			

*includes all species of Eucalyptus, Corymbia, Angophora, Lophostemon and Syncarpia

†Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300

For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	40	70	20	30	20	10	0	10	0	0	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots																				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Flood Plain	Landform Patter	Height of tallest veg	20m
Lithology	Soil Surface Texture		Soil Colour	Height of shrub layer	
Slope	Aspect		Site Drainage	Height of ground layer	0.5m

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			Firewood (removed)
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			ROADSIDE
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form						Site Sheet no:	
Date		Survey Name		Plot Identifier		Recorders	
24/3/21				BAM3- SEC3			
Zone	Datum	IBRA region		Photo #		Zone ID	
Easting	Northing	Dimensions		Orientation of midline from the 0m point			
Vegetation Class						Confidence: H M L	
Plant Community Type						EEC:	
PCT 11? RED Gum LIGNUM						Confidence: H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)		Sum values	
Count of Native Richness	Trees		
	Shrubs		
	Grasses etc.		
	Forbs		
	Ferns		
	Other		
Sum of Cover of native vascular plants by growth from group	Trees		
	Shrubs		
	Grasses etc.		
	Forbs		
	Ferns		
	Other		
High Threat Weed cover			

BAM Attribute (20 x 50 m plot)				# Tree Stems Count			
dbh		Euc*		Non Euc		Hollows [†]	
Large trees for Euc* & Non Euc		80 + cm	6.			6	
50 – 79 cm							
30 – 49 cm							
20 – 29 cm							
10 – 19 cm		4					
5 – 9 cm		4				n/a	
< 5 cm						n/a	
Length of logs (m) (≥10cm diameter, >50cm in length)				total			
				0			

*includes all species of Eucalyptus, Corymbia, Angophora, Lophostemon and Syncarpia

†Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300

For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	80	70	70	40	10	20	10	10	40	15	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots																				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			Firewood removal
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form						Site Sheet no:	
Date		Survey Name		Plot Identifier		Recorders	
22/3/21				BAM3 SECS		SS/LS	
Zone	Datum	IBRA region		Photo #		Zone ID	
Easting	Northing	Dimensions		Orientation of midline from the 0m point			
Vegetation Class						Confidence: H M L	
Plant Community Type						EEC:	
Black Box - Lignum						Confidence: H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)		Sum values	BAM Attribute (20 x 50 m plot)				# Tree Stems Count				Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately *includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> †Record total number of stems by size class with hollows (including dead stems/trees)
Count of Native Richness	Trees		dbh		Euc*	Non Euc	Hollows†				
	Shrubs		Large trees for Euc* & Non Euc		80 + cm						
	Grasses etc.		50 – 79 cm		2						
	Forbs		30 – 49 cm		6						
	Ferns		20 – 29 cm		2						
	Other		10 – 19 cm		1	1	1				
				5 – 9 cm					n/a		
Sum of Cover of native vascular plants by growth from group	Trees		< 5 cm						n/a		
	Shrubs		Length of logs (m) (≥10cm diameter, >50cm in length)						total		
	Grasses etc.								7		
	Forbs										
Ferns											
Other											
High Threat Weed cover											

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	100	90	75	85	100	0	10	25	15	0	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots																				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form						Site Sheet no: _____					
Date 29/3/21		Survey Name		Plot Identifier BAM1 - SR 2		Recorders					
Zone	Datum	IBRA region		Photo #		Zone ID					
Easting	Northing		Dimensions		Orientation of midline from the 0m point						
Vegetation Class								Confidence: H M L			
Plant Community Type PCT 15 BLACK BOX								EEC:		Confidence: H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)		Sum values	
Count of Native Richness	Trees		
	Shrubs		
	Grasses etc.		
	Forbs		
	Ferns		
	Other		
Sum of Cover of native vascular plants by growth from group	Trees		
	Shrubs		
	Grasses etc.		
	Forbs		
	Ferns		
	Other		
High Threat Weed cover			

BAM Attribute (20 x 50 m plot)				# Tree Stems Count			
dbh		Euc*		Non Euc		Hollows†	
Large trees for Euc* & Non Euc	80 + cm	6				6	
50 – 79 cm		2				1	
30 – 49 cm							
20 – 29 cm							
10 – 19 cm				4			
5 – 9 cm				6		n/a	
< 5 cm						n/a	
Length of logs (m) (≥10cm diameter, >50cm in length)				total 8			

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	10	20	30	15	20	10	5	5	10	5	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots																				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			Road AGRICULTURAL TRACKS ADJOINING
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form Site Sheet no: _____

Survey Name		Plot Identifier		Recorders	
Date	30/3/24	BAMC-SEC2		SS/LS	
Zone	Dajum	IBRA region	Photo #	Zone ID	
Easting	Northing	Dimensions		Orientation of midline from the 0m point	
Vegetation Class					Confidence: H M L
Plant Community Type					Confidence: H M L

PCT 19 CYPRUS DUNE

EEC: D

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values
Count of Native Richness	
Trees	
Shrubs	
Grasses etc.	
Forbs	
Ferns	
Other	
Sum of Cover of native vascular plants by growth from group	
Trees	
Shrubs	
Grasses etc.	
Forbs	
Ferns	
Other	
High Threat Weed cover	

BAM Attribute (20 x 50 m plot)			# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately *includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> †Record total number of stems by size class with hollows (including dead stems/trees)
dbh	Euc*	Non Euc	Hollows†		
Large trees for Euc* & Non Euc	80 + cm				
	50 – 79 cm				
	30 – 49 cm	4	### III		
	20 – 29 cm				
	10 – 19 cm				
	5 – 9 cm		50 +	n/a	
	< 5 cm			n/a	
Length of logs (m) (≥10cm diameter, >50cm in length)					

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
 For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	5	0	5	20	0	0	0	0	0	10	30	0	0	0	0	0	0	0	0	
Average of the 5 subplots																				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element	SAD DUNE	Landform Patter		Height of tallest veg	
Lithology		Soil Surface Texture		Soil Colour		Height of shrub layer	
Slope		Aspect		Site Drainage		Height of ground layer	

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			NOT BAP CONSIDERED
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form					Site Sheet no:				
Date		Survey Name		Plot Identifier		Recorders			
Zone		Datum		IBRA region		Photo #		Zone ID	
Easting		Northing		Dimensions		Orientation of midline from the 0m point			
Vegetation Class		Lot 23 Lot 23. ACACIA? Same as GSB Hwy.					Confidence:		
Plant Community Type							EEC:		

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)		Sum values	
Count of Native Richness	Trees		
	Shrubs		
	Grasses etc.		
	Forbs		
	Ferns		
	Other		
Sum of Cover of native vascular plants by growth from group	Trees		
	Shrubs		
	Grasses etc.		
	Forbs		
	Ferns		
	Other		
High Threat Weed cover			

BAM Attribute (20 x 50 m plot)				# Tree Stems Count			
dbh		Euc*		Non Euc		Hollows [†]	
Large trees for Euc* & Non Euc	80 + cm						
	50 – 79 cm						
30 – 49 cm				1			
20 – 29 cm				3			
10 – 19 cm				15			
5 – 9 cm				18		n/a	
< 5 cm						n/a	
Length of logs (m) (≥10cm diameter, >50cm in length)				total			
				27			

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
 For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				Bare ground cover (%)				Cryptogam cover (%)				Rock cover (%)						
Subplot score (% in each)	50	30	70	40	10	40	70	30	60	90	0	0	0	0	10	10	0	0	0
Average of the 5 subplots																			

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/stock)			RAABHS !!
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form Site Sheet no:

Date: 29/3/21		Survey Name		Plot Identifier: BAM 4 SEC 2		Recorders: SS/LS	
Zone	Datum	IBRA region	Photo #		Zone ID		
Easting	Northing	Dimensions		Orientation of midline from the 0m point			
Vegetation Class						Confidence: <input checked="" type="radio"/> H <input type="radio"/> M <input type="radio"/> L	
Plant Community Type: PCT26 MYRLE WOODLAND						EEC: 25 Confidence: <input checked="" type="radio"/> H <input type="radio"/> M <input type="radio"/> L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)		Sum values	BAM Attribute (20 x 50 m plot)				# Tree Stems Count	Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately *includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> †Record total number of stems by size class with hollows (including dead stems/trees)
Count of Native Richness	Trees		dbh	Euc*	Non Euc	Hollows†		
	Shrubs		Large trees for Euc* & Non Euc	80 + cm				
	Grasses etc.		50 – 79 cm					
	Forbs		30 – 49 cm			1		
	Ferns		20 – 29 cm			12		
	Other		10 – 19 cm			36		
Sum of Cover of native vascular plants by growth from group	Trees		5 – 9 cm			17	n/a	
	Shrubs		< 5 cm			/	n/a	
	Grasses etc.		Length of logs (m) (≥10cm diameter, >50cm in length)			total		
	Forbs					9		
Ferns								
Other								

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				Bare ground cover (%)				Cryptogam cover (%)				Rock cover (%)							
Subplot score (% in each)	20	15	35	20	20	30	10	10	30	10	10	5	0	10	0	0	0	0	0	0
Average of the 5 subplots																				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			ROADSIDE AGRICULTURAL ACTIVITY
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form						Site Sheet no:	
Date: <u>22/3/21</u>		Survey Name: <u>BAM 1 SECS</u>		Plot Identifier:		Recorders: <u>SS/CS</u>	
Zone	Datum	IBRA region		Photo #		Zone ID	
Easting	Northing	Dimensions		Orientation of midline from the 0m point			
Vegetation Class						Confidence: H M L	
Plant Community Type: <u>Cypress Dominant</u>						EEC: <u>?</u>	
						Confidence: H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values
Count of Native Richness	Trees
	Shrubs
	Grasses etc.
	Forbs
	Ferns
	Other
Sum of Cover of native vascular plants by growth from group	Trees
	Shrubs
	Grasses etc.
	Forbs
	Ferns
	Other
High Threat Weed cover	

BAM Attribute (20 x 50 m plot)			# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately *includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> †Record total number of stems by size class with hollows (including dead stems/trees)
dbh	Euc*	Non Euc	Hollows†		
Large trees for Euc* & Non Euc	80+ cm				
	50 – 79 cm				
	30 – 49 cm		12/12		
	20 – 29 cm		4		
	10 – 19 cm		4		
	5 – 9 cm		6		
	< 5 cm		/		
Length of logs (m) (≥10cm diameter, >50cm in length)			750mt.		

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				Bare ground cover (%)				Cryptogam cover (%)				Rock cover (%)			
Subplot score (% in each)																
Average of the 5 subplots																

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form						Site Sheet no:	
Survey Name		Plot Identifier		Recorders			
Date	31/3/21		BAM7 - SEC 2		SS/LS		
Zone	Datum	IBRA region	Photo #	Zone ID			
Easting	Northing	Dimensions		Orientation of midline from the 0m point			
Vegetation Class						Confidence: H M L	
Plant Community Type						EEC:	
PCT 45 PLAINS GRASSLAND						Confidence: H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values
Count of Native Richness	Trees
	Shrubs
	Grasses etc.
	Forbs
	Ferns
	Other
Sum of Cover of native vascular plants by growth from group	Trees
	Shrubs
	Grasses etc.
	Forbs
	Ferns
	Other
High Threat Weed cover	

BAM Attribute (20 x 50 m plot)			# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately *includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> †Record total number of stems by size class with hollows (including dead stems/trees)
dbh	Euc*	Non Euc	Hollows†		
Large trees for Euc* & Non Euc	80 + cm				
50 – 79 cm					
30 – 49 cm					
20 – 29 cm					
10 – 19 cm					
5 – 9 cm				n/a	
< 5 cm				n/a	
Length of logs (m) (≥10cm diameter, >50cm in length)			total		

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				Bare ground cover (%)				Cryptogam cover (%)				Rock cover (%)			
Subplot score (% in each)	5	0	0	0	2	0	5	10	5	0	0	0	2	0	0	0
Average of the 5 subplots																

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

FIREWOOD CREATED FIREBREAK IN ROWS RESISTANT

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form Site Sheet no: _____

Date		Survey Name		Plot Identifier		Recorders	
Zone		Datum		IBRA region		Photo #	
Easting		Northing		Dimensions		Orientation of midline from the 0m point	
Vegetation Class		Plant Community Type		EEC:		Confidence: H M L	

Date: _____ Survey Name: _____ Plot Identifier: **BAMS SEC 3** Recorders: _____
 Zone: _____ Datum: _____ IBRA region: _____ Photo #: _____
 Easting: _____ Northing: _____ Dimensions: _____ Orientation of midline from the 0m point: _____
 Vegetation Class: _____ Plant Community Type: **PCT4b** EEC: _____ Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values
Count of Native Richness	Trees
	Shrubs
	Grasses etc.
	Forbs
	Ferns
	Other
Sum of Cover of native vascular plants by growth from group	Trees
	Shrubs
	Grasses etc.
	Forbs
	Ferns
	Other
High Threat Weed cover	

BAM Attribute (20 x 50 m plot)			# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately *includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> †Record total number of stems by size class with hollows (including dead stems/trees)
dbh	Euc*	Non Euc	Hollows [†]		
Large trees for Euc* & Non Euc	80 + cm				
	50 – 79 cm				
	30 – 49 cm				
	20 – 29 cm				
	10 – 19 cm				
	5 – 9 cm			n/a	
	< 5 cm			n/a	
Length of logs (m) (≥10cm diameter, >50cm in length)					

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
 For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	20	20	50	10	30	20	70	40	10	10	0	0	0	30	30	0	0	0	0	0
Average of the 5 subplots																				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			/
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form						Site Sheet no: _____							
		Survey Name				Plot Identifier				Recorders			
Date		22/3/21				BAMLY SEC 5							
Zone		Datum		IBRA region		Photo #		Zone ID					
Easting		Northing		Dimensions				Orientation of midline from the 0m point					
Vegetation Class		PCT 58								Confidence: H M L			
Plant Community Type		BLACK OAK WOODLAND								EEC: H M L			

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values
Count of Native Richness	Trees
	Shrubs
	Grasses etc.
	Forbs
	Ferns
	Other
Sum of Cover of native vascular plants by growth from group	Trees
	Shrubs
	Grasses etc.
	Forbs
	Ferns
	Other
High Threat Weed cover	

BAM Attribute (20 x 50 m plot)				# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately *includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> †Record total number of stems by size class with hollows (including dead stems/trees)	
dbh	Euc*		Non Euc		Hollows [†]		
Large trees for Euc* & Non Euc	80 + cm						
	50 – 79 cm						
	30 – 49 cm						7
	20 – 29 cm						
	10 – 19 cm						
	5 – 9 cm				n/a		/
	< 5 cm				n/a		
Length of logs (m) (≥10cm diameter, >50cm in length)					total 6		

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
 For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)					
Subplot score (% in each)	50	60	90	80	90	30	10	5	10	5	10	10	0	10	5	0	0	0	0	0	0
Average of the 5 subplots																					

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form						Site Sheet no:	
Date		Survey Name		Plot Identifier		Recorders	
29/3/24				BAM 2-SEC 2		SS/LB	
Zone	Datum	IBRA region		Photo #		Zone ID	
Easting	Northing	Dimensions		Orientation of midline from the 0m point			
Vegetation Class						Confidence: H M L	
Plant Community Type						EEC:	
PCT 74 YBox						Confidence: H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)		Sum values	
Count of Native Richness	Trees		
	Shrubs		
	Grasses etc.		
	Forbs		
	Ferns		
	Other		
Sum of Cover of native vascular plants by growth from group	Trees		
	Shrubs		
	Grasses etc.		
	Forbs		
	Ferns		
	Other		
High Threat Weed cover			

BAM Attribute (20 x 50 m plot)				# Tree Stems Count			
dbh		Euc*		Non Euc		Hollows†	
Large trees for Euc* & Non Euc	80 + cm	3				2	
50 – 79 cm		1		1		1	
30 – 49 cm		1		1			
20 – 29 cm							
10 – 19 cm		1					
5 – 9 cm				20		n/a	
< 5 cm						n/a	
Length of logs (m) (≥10cm diameter, >50cm in length)				—			
				total 12			

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				Bare ground cover (%)				Cryptogam cover (%)				Rock cover (%)				
Subplot score (% in each)	5	10	0	5	10	0	0	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots																	

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			ROADSIDE / Agricultural
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form						Site Sheet no:	
Date		Survey Name		Plot Identifier		Recorders	
29/3/21				BAM 3 SEC 2		SS/LS	
Zone		IBRA region		Photo #		Zone ID	
Datum							
Easting		Dimensions		Orientation of midline from the 0m point			
Northing							
Vegetation Class						Confidence:	
						H M L	
Plant Community Type						EEC:	
PCT 75						Confidence:	
						H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values
Count of Native Richness	
Trees	
Shrubs	
Grasses etc.	
Forbs	
Ferns	
Other	
Sum of Cover of native vascular plants by growth from group	
Trees	
Shrubs	
Grasses etc.	
Forbs	
Ferns	
Other	
High Threat Weed cover	

BAM Attribute (20 x 50 m plot)				# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately *includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> †Record total number of stems by size class with hollows (including dead stems/trees)
dbh	Euc*		Non Euc	Hollows†		
Large trees for Euc* & Non Euc	80 + cm	3		2		
50 – 79 cm			3			
30 – 49 cm		1				
20 – 29 cm						
10 – 19 cm						
5 – 9 cm			25	n/a		
< 5 cm				n/a		
Length of logs (m) (≥10cm diameter, >50cm in length)			—		total 32	

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	10	5	5	10	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots																				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal	3		firewood removed
Grazing (identify native/stock)			
Fire damage			
Storm damage	2		hollows
Weediness	3		
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form Site Sheet no: _____

Date 31/3/21		Survey Name		Plot Identifier Bam1/SEC1		Recorders SS/CS	
Zone	Datum	IBRA region		Photo #		Zone ID	
Easting	Northing	Dimensions		Orientation of midline from the 0m point			
Vegetation Class							Confidence: H M L
Plant Community Type PCT 76 w/long box							Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)		Sum values
Count of Native Richness	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth from group	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
High Threat Weed cover		

BAM Attribute (20 x 50 m plot)				# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately *includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> †Record total number of stems by size class with hollows (including dead stems/trees)
dbh	Euc*		Non Euc	Hollows†		
Large trees for Euc* & Non Euc	80 + cm	9		8		
	50 – 79 cm	2		1		
	30 – 49 cm	4		3		
	20 – 29 cm					
	10 – 19 cm					
	5 – 9 cm			n/a		
	< 5 cm			n/a		
Length of logs (m) (≥10cm diameter, >50cm in length)						

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
 For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)					
Subplot score (% in each)	70	60	40	70	50	00	10	05	00	00	00	00	00	00	00	00	00	00	00	00	00
Average of the 5 subplots																					

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Patter		Height of tallest veg	
Lithology		Soil Surface Texture		Soil Colour		Height of shrub layer	
Slope		Aspect		Site Drainage		Height of ground layer	

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form						Site Sheet no:	
Date		Survey Name		Plot Identifier		Recorders	
30/3/21				BAM 5-SUC2		SS/LS	
Zone	Datum	IBRA region		Photo #		Zone ID	
Easting	Northing	Dimensions		Orientation of midline from the 0m point			
Vegetation Class						Confidence: H M L	
Plant Community Type						Confidence: H M L	
PCT 80 WESTERN GRASS BX						EEC: Y	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)		Sum values	BAM Attribute (20 x 50 m plot)				# Tree Stems Count	Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately
Count of Native Richness	Trees		dbh	Euc*	Non Euc	Hollows [†]		
	Shrubs		Large trees for Euc* & Non Euc	80 + cm	1		1	
	Grasses etc.		50 – 79 cm					
	Forbs		30 – 49 cm					
	Ferns		20 – 29 cm					
	Other		10 – 19 cm					
	Sum of Cover of native vascular plants by growth from group	Trees		5 – 9 cm				n/a
Shrubs			< 5 cm				n/a	
Grasses etc.			Length of logs (m) (≥10cm diameter, >50cm in length)				total	
Forbs							32	
Ferns								
Other								

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
 For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				Bare ground cover (%)				Cryptogam cover (%)				Rock cover (%)						
Subplot score (% in each)	0	60	30	70	10	0	5	5	0	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots																			

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			Firewood collection
Grazing (identify native/stock)			ACKNOWLEDGE
Fire damage			
Storm damage			
Weediness			ROADSIDE
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form						Site Sheet no:	
Date: 22/3/21		Survey Name		Plot Identifier: BAM 2 SECS		Recorders: SS/LS	
Zone	Datum	IBRA region		Photo #		Zone ID	
Easting	Northing	Dimensions		Orientation of midline from the 0m point			
Vegetation Class						Confidence: H M L	
Plant Community Type: PRICKLY WATTLEWOOD SUBCLAND						EEC: N.	
						Confidence: (H) M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)		Sum values	BAM Attribute (20 x 50 m plot)				# Tree Stems Count				Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately *includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> †Record total number of stems by size class with hollows (including dead stems/trees)
Count of Native Richness	Trees		dbh		Euc*	Non Euc	Hollows †				
	Shrubs		Large trees for Euc* & Non Euc		80 + cm						
	Grasses etc.		50 – 79 cm								
	Forbs		30 – 49 cm								
	Ferns		20 – 29 cm								
	Other		10 – 19 cm								
				5 – 9 cm				n/a			
Sum of Cover of native vascular plants by growth from group	Trees		< 5 cm				n/a				
	Shrubs		Length of logs (m) (≥10cm diameter, >50cm in length)		0				total		
	Grasses etc.								0		
	Forbs										
Ferns											
Other											
High Threat Weed cover											

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				Bare ground cover (%)				Cryptogam cover (%)				Rock cover (%)			
Subplot score (% in each)	5	10	0	5	10	0	5	10	5	0	0	0	5	0	0	0
Average of the 5 subplots																

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form						Site Sheet no:	
		Survey Name		Plot Identifier		Recorders	
Date	23/3/21			BAM1 - SGT 4			
Zone	Datum	IBRA region		Photo #		Zone ID	
Easting	Northing	Dimensions		Orientation of midline from the 0m point			
Vegetation Class						Confidence: H M L	
Plant Community Type						EEC:	
PCT 153 BLACK BLUEBUSH						Confidence: H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)		Sum values
Count of Native Richness	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth from group	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
High Threat Weed cover		

BAM Attribute (20 x 50 m plot)			# Tree Stems Count	
dbh	Euc*	Non Euc	Hollows [†]	
Large trees for Euc* & Non Euc	80 + cm			
50 – 79 cm				
30 – 49 cm				
20 – 29 cm				
10 – 19 cm				
5 – 9 cm				n/a
< 5 cm				n/a
Length of logs (m) (≥10cm diameter, >50cm in length)			total 0.	

*includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*
[†]Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
 For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				Bare ground cover (%)				Cryptogam cover (%)				Rock cover (%)						
Subplot score (% in each)	50	70	0	70	30	40	10	80	30	70	0	0	0	0	0	0	0	0	0
Average of the 5 subplots																			

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			RABBIT WARRETS
Firewood/CWD removal			RABBITS!
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form Site Sheet no: _____

Survey Name		Plot Identifier		Recorders	
Date 25/3/21			BAM9-SEC3		
Zone	Datum	IBRA region	Photo #	Zone ID	
Easting	Northing	Dimensions		Orientation of midline from the 0m point	
Vegetation Class					Confidence: H M L
Plant Community Type PCT157 BLADDER SAMBUSH.					EEC: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values	
Count of Native Richness	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth from group	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
High Threat Weed cover		

BAM Attribute (20 x 50 m plot)			# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately *includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> †Record total number of stems by size class with hollows (including dead stems/trees)
dbh	Euc*	Non Euc	Hollows†		
Large trees for Euc* & Non Euc	80 + cm				
	50 – 79 cm				
	30 – 49 cm				
	20 – 29 cm				
	10 – 19 cm				
	5 – 9 cm			n/a	
	< 5 cm			n/a	
Length of logs (m) (≥10cm diameter, >50cm in length)					

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				Bare ground cover (%)				Cryptogam cover (%)				Rock cover (%)					
Subplot score (% in each)	20	80	90	15	30	30	50	5	5	0	0	0	0	0	0	0	0	0
Average of the 5 subplots																		

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion	2		TABLE DEAM
Firewood/CWD removal			
Grazing (identify native/stock)	2		
Fire damage			
Storm damage			
Weediness	2		ROAD
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form					Site Sheet no:			
		Survey Name		Plot Identifier		Recorders		
Date				BAM2-SEC3		SS/LS		
Zone	Datum	IBRA region		Photo #		Zone ID		
Easting	Northing	Dimensions				Orientation of midline from the 0m point		
Vegetation Class							Confidence:	
							H M L	
Plant Community Type							EEC:	
PCT 157							H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)		Sum values	BAM Attribute (20 x 50 m plot)				# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately *includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> †Record total number of stems by size class with hollows (including dead stems/trees)
Count of Native Richness	Trees		dbh	Euc*		Non Euc	Hollows [†]		
	Shrubs		Large trees for Euc* & Non Euc	80 + cm					
	Grasses etc.		50 – 79 cm						
	Forbs		30 – 49 cm						
	Ferns		20 – 29 cm						
	Other		10 – 19 cm						
			5 – 9 cm				n/a		
Sum of Cover of native vascular plants by growth from group	Trees		< 5 cm				n/a		
	Shrubs		Length of logs (m) (≥10cm diameter, >50cm in length)					total	
	Grasses etc.								
	Forbs								
Ferns									
Other									
High Threat Weed cover									

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
 For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)				Bare ground cover (%)				Cryptogam cover (%)				Rock cover (%)			
Subplot score (% in each)																
Average of the 5 subplots																

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Patter		Height of tallest veg	
Lithology		Soil Surface Texture		Soil Colour		Height of shrub layer	
Slope		Aspect		Site Drainage		Height of ground layer	

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form						Site Sheet no:	
		Survey Name		Plot Identifier		Recorders	
Date	25/3/21			BAM7 SEC3			
Zone	Datum	IBRA region			Photo #	Zone ID	
Easting	Northing	Dimensions				Orientation of midline from the 0m point	
Vegetation Class						Confidence:	
						H M L	
Plant Community Type						EEC:	
PCT 160.						H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values	
Count of Native Richness	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth from group	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
High Threat Weed cover		

BAM Attribute (20 x 50 m plot)				# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately *includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> †Record total number of stems by size class with hollows (including dead stems/trees)
dbh	Euc*		Non Euc	Hollows†		
Large trees for Euc* & Non Euc	80 + cm					
	50 – 79 cm					
	30 – 49 cm					
	20 – 29 cm					
	10 – 19 cm					
	5 – 9 cm				n/a	
	< 5 cm				n/a	
Length of logs (m) (≥10cm diameter, >50cm in length)						

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
 For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	100	0	20	10	60	0	100	70	50	10	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots																				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			Planted road reserve
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form Site Sheet no: _____

Date		Survey Name		Plot Identifier		Recorders	
Zone		Datum		IBRA region		Photo #	
Easting		Northing		Dimensions		Orientation of midline from the 0m point	
Vegetation Class		Plant Community Type		EEC:		Confidence: H M L	

Record easting and northing from the plot marker. If applicable, orient plot so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values
Count of Native Richness	Trees
	Shrubs
	Grasses etc.
	Forbs
	Ferns
	Other
Sum of Cover of native vascular plants by growth from group	Trees
	Shrubs
	Grasses etc.
	Forbs
	Ferns
	Other
High Threat Weed cover	

BAM Attribute (20 x 50 m plot)				# Tree Stems Count			
dbh		Euc*		Non Euc		Hollows†	
Large trees for Euc* & Non Euc		80 + cm					
		50 – 79 cm					
30 – 49 cm							
20 – 29 cm							
10 – 19 cm							
5 – 9 cm						n/a	
< 5 cm						n/a	
Length of logs (m) (≥10cm diameter, >50cm in length)				total			

*includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*
†Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	30	25	20	10	10	40	40	50	30	20	0	10	20	10	10	0	0	0	0	0
Average of the 5 subplots																0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form Site Sheet no: _____

Survey Name		Plot Identifier		Recorders			
Date	25/3/21	BAMB-SEC3		SS/CS			
Zone	Datum	IBRA region	Photo #	Zone ID			
Easting	Northing	Dimensions		Orientation of midline from the 0m point			
Vegetation Class							Confidence: H M L
Plant Community Type							Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values
Count of Native Richness	Trees
	Shrubs
	Grasses etc.
	Forbs
	Ferns
	Other
Sum of Cover of native vascular plants by growth from group	Trees
	Shrubs
	Grasses etc.
	Forbs
	Ferns
	Other
High Threat Weed cover	

BAM Attribute (20 x 50 m plot)				# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately *includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> †Record total number of stems by size class with hollows (including dead stems/trees)	
dbh	Euc*	Non Euc	Hollows†				
Large trees for Euc* & Non Euc	80 + cm						
	50 – 79 cm						
	30 – 49 cm						
	20 – 29 cm						
	10 – 19 cm						
	5 – 9 cm				n/a		
	< 5 cm				n/a		
Length of logs (m) (≥10cm diameter, >50cm in length)							total

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	5	30	10	0	10	5	5	10	0	0	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots																				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			highly ploughed between road + fence.
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form Site Sheet no: _____

Date: 22/3/21		Survey Name: _____		Plot Identifier: BAMS SECS		Recorders: SS/LS	
Zone	Datum	IBRA region		Photo #		Zone ID	
Easting	Northing	Dimensions		Orientation of midline from the 0m point			
Vegetation Class						Confidence: H M L	
Plant Community Type: SANDPLAIN UENO RD MUDCI						EEC: _____	
						Confidence: H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values
Count of Native Richness	Trees
	Shrubs
	Grasses etc.
	Forbs
	Ferns
	Other
Sum of Cover of native vascular plants by growth from group	Trees
	Shrubs
	Grasses etc.
	Forbs
	Ferns
	Other
High Threat Weed cover	

BAM Attribute (20 x 50 m plot)			# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately *includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> †Record total number of stems by size class with hollows (including dead stems/trees)
dbh	Euc*	Non Euc	Hollows†		
Large trees for Euc* & Non Euc	80 + cm				
	50 – 79 cm				
	30 – 49 cm	1		1	
	20 – 29 cm	2			
	10 – 19 cm	13			
	5 – 9 cm			n/a	
	< 5 cm			n/a	
Length of logs (m) (≥10cm diameter, >50cm in length)					

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	0	5	5	20	95	10	5	40	80	5	90	90	55	0	0	0	0	0	0	0
Average of the 5 subplots																				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form						Site Sheet no:	
Date		Survey Name		Plot Identifier		Recorders	
22/3/21				BAM 6. SEC 5			
Zone	Datum	IBRA region		Photo #		Zone ID	
Easting	Northing	Dimensions			Orientation of midline from the 0m point		
Vegetation Class						Confidence: H M L	
Plant Community Type						EEC:	
171 SPINIFEX DUNE MANNA						Confidence: H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)		Sum values
Count of Native Richness	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth from group	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
High Threat Weed cover		

BAM Attribute (20 x 50 m plot)			# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately *includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> †Record total number of stems by size class with hollows (including dead stems/trees)
dbh	Euc*	Non Euc	Hollows†		
Large trees for Euc* & Non Euc	80 + cm	—			
50 – 79 cm		—			
30 – 49 cm		—			
20 – 29 cm		—			
10 – 19 cm		21			
5 – 9 cm		—	n/a		
< 5 cm		—	n/a		
Length of logs (m) (≥10cm diameter, >50cm in length)					

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	10	10	20	40	0	10	0	10	10	0	80	70	5	0	0	0	0	0	0	0
Average of the 5 subplots																				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form Site Sheet no: _____

Survey Name		Plot Identifier		Recorders	
Date 25/3/21	Datum	BAM 6-SEE 3		SS/LS	
Zone	IBRA region	Photo #	Zone ID		
Easting	Northing	Dimensions	Orientation of midline from the 0m point		
Vegetation Class					Confidence: H M L
Plant Community Type PCT #57 216					EEC: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values
Count of Native Richness	
Trees	
Shrubs	
Grasses etc.	
Forbs	
Ferns	
Other	
Sum of Cover of native vascular plants by growth from group	
Trees	
Shrubs	
Grasses etc.	
Forbs	
Ferns	
Other	
High Threat Weed cover	

BAM Attribute (20 x 50 m plot)				# Tree Stems Count			
dbh	Euc*			Non Euc		Hollows [†]	
Large trees for Euc* & Non Euc	80 + cm						
	50 – 79 cm						
	30 – 49 cm						
	20 – 29 cm						
	10 – 19 cm						
	5 – 9 cm					n/a	
	< 5 cm					n/a	
Length of logs (m) (≥10cm diameter, >50cm in length)				total			

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
 For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	20	20	70	80	60	10	70	5	5	20	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots																				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			NORTH
Cultivation (inc. pasture)			TRUCK REST AREA
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form						Site Sheet no: _____			
		Survey Name		Plot Identifier		Recorders			
Date 24/3/21				BAM4-SEC3		SS/LS			
Zone	Datum	IBRA region		Photo #		Zone ID			
Easting	Northing	Dimensions				Orientation of midline from the 0m point			
Vegetation Class								Confidence:	
								H M L	
Plant Community Type								EEC:	
								H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)		Sum values
Count of Native Richness	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth from group	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
High Threat Weed cover		

BAM Attribute (20 x 50 m plot)				# Tree Stems Count			
dbh		Euc*		Non Euc		Hollows†	
Large trees for Euc* & Non Euc		80 + cm					
50 – 79 cm							
30 – 49 cm							
20 – 29 cm							
10 – 19 cm							
5 – 9 cm						n/a	
< 5 cm						n/a	
Length of logs (m) (≥10cm diameter, >50cm in length)				total			

Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately

*includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

†Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300

For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	30	70	5	5	70	40	20	90	20	10	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots																				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form						Site Sheet no:					
Date		Survey Name		Plot Identifier		Recorders					
31/3/21				BAM 9/SEC2		SS/LG					
Zone	Datum	IBRA region		Photo #		Zone ID					
Easting	Northing	Dimensions		Orientation of midline from the 0m point							
Vegetation Class								Confidence:			
								H M L			
Plant Community Type								EEC:		Confidence:	
Pct 237										H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values
Count of Native Richness	Trees
	Shrubs
	Grasses etc.
	Forbs
	Ferns
	Other
Sum of Cover of native vascular plants by growth from group	Trees
	Shrubs
	Grasses etc.
	Forbs
	Ferns
	Other
High Threat Weed cover	

BAM Attribute (20 x 50 m plot)			# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately *includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> †Record total number of stems by size class with hollows (including dead stems/trees)
dbh	Euc*	Non Euc	Hollows†		
Large trees for Euc* & Non Euc	80 + cm				
50 – 79 cm		2			
30 – 49 cm		1			
20 – 29 cm					
10 – 19 cm					
5 – 9 cm			n/a		
< 5 cm			n/a		
Length of logs (m) (≥10cm diameter, >50cm in length)					

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	10	5	30	20	10	10	0	0	0	10	0	0	0	0	0	0	0	0	0	
Average of the 5 subplots																				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			APPROX TRIPLE PLANT
Firewood/CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			ROCKSTONE
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form Site Sheet no: _____

Date 31/3/24		Survey Name		Plot Identifier BAM3/SEC 1		Recorders SS/LS	
Zone	Datum	IBRA region		Photo #		Zone ID	
Easting	Northing	Dimensions		Orientation of midline from the 0m point			
Vegetation Class						Confidence: H M L	
Plant Community Type PCT 267 uBox CYP						EEC: H M L	

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)	Sum values	
Count of Native Richness	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth from group	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
High Threat Weed cover		

BAM Attribute (20 x 50 m plot)				# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately *includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> †Record total number of stems by size class with hollows (including dead stems/trees)
dbh	Euc*		Non Euc	Hollows†		
Large trees for Euc* & Non Euc	80 + cm	3				
	50 – 79 cm					
	30 – 49 cm					
	20 – 29 cm					
	10 – 19 cm					
	5 – 9 cm				n/a	
	< 5 cm				n/a	
Length of logs (m) (≥10cm diameter, >50cm in length)						

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	10	30	30	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots																				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/stock)			HOUSE ADJACENT
Fire damage			
Storm damage			
Weediness			ROADSIDE
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

BAM Site – Field Survey Form					Site Sheet no:		
Date		Survey Name		Plot Identifier		Recorders	
31/3/24				BAM 2/SECI		SS/LS	
Zone	Datum	IBRA region		Photo #		Zone ID	
Easting	Northing	Dimensions		Orientation of midline from the 0m point			
Vegetation Class							Confidence: H M L
Plant Community Type							Confidence: H M L
PCT 277							EEC:

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline. Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

BAM Attribute (400 m ² plot)		Sum values
Count of Native Richness	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth from group	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
High Threat Weed cover		

BAM Attribute (20 x 50 m plot)			# Tree Stems Count		Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately *includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i> †Record total number of stems by size class with hollows (including dead stems/trees)
dbh	Euc*	Non Euc	Hollows†		
Large trees for Euc* & Non Euc	80 + cm				
	50 – 79 cm	11			
	30 – 49 cm				
	20 – 29 cm				
	10 – 19 cm				
	5 – 9 cm			n/a	
	< 5 cm			n/a	
Length of logs (m) (≥10cm diameter, >50cm in length)					

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30, ..., 100, 200, 300
For a multi stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not count the hollows in that stem. Only count as 1 stem per tree when the tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	20	10	40	20	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Average of the 5 subplots																				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional – the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description.

Physiography + safe features that may help in determining PCT and Management Zone (optional)

Morphological Type	Landform Element	Landform Patter	Height of tallest veg
Lithology	Soil Surface Texture	Soil Colour	Height of shrub layer
Slope	Aspect	Site Drainage	Height of ground layer

Plot Disturbance	Severity Code	Age Code	Observational evidence
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood/CWD removal			
Grazing (identify native/stock)			Oblique adjacent
Fire damage			ROADSIDE
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)



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