



Olympic Highway (MR78) Route Safety Review Safety Improvements

Biodiversity Assessment Report
Transport for NSW | December 2022

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Executive summary

Transport for NSW (Transport) propose to carry out safety improvement work on Olympic Highway (MR78) between the intersection of the Hume Highway near Albury to Cowra. 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 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 Olympic Highway. The RSR identified key roadside infrastructure and line marking safety improvements along this 318 kilometre length of road 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 24.53 hectares of native vegetation (23.59 hectares of which is part of a threatened ecological community), 2 hectares of native tree planting, 22.66 hectares of cleared/highly disturbed/non-native vegetation and up to 162 hollow-bearing trees. Temporary impacts are also likely to about 2.76 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 a number of Mitchell landscapes. Combined with portions of the proposal occurring within highly modified agricultural landscapes, the plant community types (PCT) are also extensive. Thirteen 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.

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

- Box-gum Woodland (BC Act /EPBC Act)
- Inland Grey Box Woodland (BC Act/EPBC Act).

During the field surveys, six threatened species were recorded. These being:

- Dusky Woodswallow (listed as vulnerable under the BC Act)
- Hooded Robin (listed as vulnerable under the BC Act)
- Superb Parrot (listed as vulnerable under the BC Act and EPBC Act)
- Brown Treecreeper (listed as vulnerable under the BC Act)
- Grey-crowned Babbler (listed as vulnerable under the BC Act)
- Diamond Firetail (listed as vulnerable under the BC 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 a number of threatened or 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. As a result of habitat assessment, targeted surveys for two threatened flora species (Pine Donkey Orchid and Crimson Spider Orchid) were completed in areas of potentially suitable habitat and during an appropriate timing for detection. Reference sites were used to confirm timing (Crimson Spider Orchid 'Bethungra' population, and for Pine Donkey Orchid Gillenbah State Forest population) which confirmed the field survey on MR78 coincided with the flowering of these two species in those locations, and therefore, detectability. An additional scope of work was added in Autumn 2022 with extensions to culverts. As a result, a habitat assessment

and search for microbats was carried out. This survey found no microbats were roosting within the culverts at the time of the field assessment.

Assessments of Significance completed in accordance with the NSW *Biodiversity Conservation Act 2016* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* concluded that the proposal is *unlikely* to have a *significant impact* on any threatened biota or their habitats.

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 using the Transport *Biodiversity Guidelines: Protecting and Managing Biodiversity on Transport projects* and site-specific safeguards to minimise potential impact to biodiversity. Biodiversity impacts would be mitigated or offset in accordance the Transport Biodiversity Policy (2022).

Glossary

Definitions

Accredited person or assessor	Means as person accredited under section 6.10 (of the BC Act) to prepare reports in accordance with the BAM.
Biodiversity Assessment Method	The Biodiversity Assessment Method is established under section 6.7 of the BC Act. The BAM is established for the purpose of assessing certain impacts on threatened species and threatened ecological communities (TECs), and their habitats, and the impact on biodiversity values.
Biodiversity offsets	The gain in biodiversity values achieved from the implementation of management actions on areas of land, to compensate for losses to biodiversity values from the impacts of development (DPIE 2020a).
Biodiversity Assessment Method Calculator	Biodiversity Assessment Method Calculator (BAM-C) – the online computer program that provides decision support to assessors and proponents by applying the BAM and referred to as the BAM-C. The BAM-C contains biodiversity data from the Bionet Vegetation Classification and the Threatened Biodiversity Data Collection that the assessor is required to use in a BAM assessment. The BAM-C applies the equations used in the BAM, including those to determine the number and class of biodiversity credits required to offset the impacts of a development, or created at a biodiversity stewardship site. It is published by the Department (DPIE 2020a).
Biodiversity credit report	The report produced by the BAM-C that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site (DPIE 2020a).
Biodiversity Offsets and Agreement Management System	The online system used to administer the Biodiversity Offsets Scheme. The BOAMS is used by accredited assessors (to carry out specific BAM-related tasks involving access to the BAM-C to perform assessments, submit data, generate credits and calculate a credit price), by landholders (to apply for a Biodiversity Stewardship Agreement and manage ongoing reporting obligations for their agreement) and by proponents of developments (to view their credit obligation or the payment required to the Biodiversity Conservation Fund).
Biodiversity Stewardship site	Refers to land which is the subject to a Biodiversity Stewardship Agreement under the BC Act.
BioNet Atlas	The DPIE database of flora and fauna records (formerly known as the NSW Wildlife Atlas). The Atlas contains records of plants, mammals, birds, reptiles, amphibians, some fungi, some invertebrates (such as insects and snails listed under the BC Act) and some fish (DPIE 2020a).
BioNet Vegetation classification	Refers to the vegetation community-level classification for use in vegetation mapping programs and regulatory biodiversity impact assessment frameworks in NSW. The BioNet Vegetation Classification is published by the Department and available at www.environment.nsw.gov.au/research/Visclassification.htm (DPIE 2020a).
Construction footprint	The area to be directly impacted by the proposal during construction activities. See also definition for subject land.

Definitions

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) (DPIE 2020a).
Ecosystem credit species	Threatened species or components of species habitat that are identified in the Threatened Species Data Collection as requiring assessment for ecosystem credits. This is analogous with the definition of 'predicted species'.
Ecosystem credits	A measurement of the value of threatened ecological communities, threatened species habitat for species that can be reliably predicted to occur with a PCT, and PCTs generally. Ecosystem credits measure the loss in biodiversity values at a development, activity, clearing or biodiversity certification site and the gain in biodiversity values at a biodiversity stewardship site (DPIE 2020a).
Habitat	An area or areas occupied, or periodically or occasionally occupied, by a species, population or ecological community, including any biotic or abiotic component (DPIE 2020a).
Indirect impact	Impacts that occur when the proposal affects native vegetation and threatened species habitat beyond the development footprint or within retained areas (e.g. transporting weeds or pathogens, dumping rubbish). This includes impacts from activities related to the construction or operational phase of the proposal and prescribed impacts (DPIE 2020a).
Local population	<p>The population that occurs in the study area. The assessment of the local population may be extended to include individuals beyond the study area if it can be clearly demonstrated that contiguous or interconnecting parts of the population continue beyond the study area, according to the following definitions:</p> <ul style="list-style-type: none"> • The local population of a threatened plant species comprises those individuals occurring in the study area or the cluster of individuals that extend into habitat adjoining and contiguous with the study area that could reasonably be expected to be cross-pollinating with those in the study area. • The local population of resident fauna species comprises those individuals known or likely to occur in the study area, as well as any individuals occurring in adjoining areas (contiguous or otherwise) that are known or likely to utilise habitats in the study area. • The local population of migratory or nomadic fauna species comprises those individuals that are likely to occur in the study area from time to time or return year to year (OEI 2018).
Matter of national environmental significance	A matter of national environmental significance (MNES) is any of the nine defined components protected by a provision of Part 3 of the EPBC Act (Commonwealth).
NSW (Mitchell) landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000 (DPIE 2020a).
Mitigation	Action to reduce the severity of an impact.

Definitions

Native vegetation	<p>Has the same meaning as in section 1.6 of the BC Act and section 60B of the LLS Act. In summary,</p> <ul style="list-style-type: none"> (a) trees (including any sapling or shrub or any scrub), (b) understorey plants, (c) groundcover (being any type of herbaceous vegetation), (d) plants occurring in a wetland. <p>A plant is native to New South Wales if it was established in New South Wales before European settlement (BC Act).</p> <p>Native vegetation does not extend to marine vegetation (being mangroves, seagrasses or any other species of plant that at any time in its life cycle must inhabit water other than fresh water). Marine vegetation is covered by the provisions of the FM Act.</p>
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.
Patch size	<p>An area of native vegetation that:</p> <ul style="list-style-type: none"> • occurs on the development site or biodiversity stewardship site • includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or ≤30 m for non-woody ecosystems). <p>Patch size may extend onto adjoining land that is not part of the development site or biodiversity stewardship site (DPIE 2020a).</p>
PlantNET	An online database of the flora of New South Wales which contains currently accepted taxonomy for plants found in the State, both native and exotic.
Population	A group of organisms, all of the same species, occupying a particular area (DPIE 2020a).
Spatial datasets	<p>Spatial databases required to prepare a BDAR</p> <ul style="list-style-type: none"> • BioNet NSW (Mitchell) Landscapes – Version 3.1 • NSW Interim Biogeographic Regions of Australia (IBRA region and sub-regions) – Version 7 • NSW soil profiles • hydrogeological landscapes • acid sulfate soils risk • digital cadastral database • Vegetation Information Systems maps • Geological sites of NSW.
Species credit species	Threatened species or components of species habitat that are identified in the Threatened Species Data Collection as requiring assessment for species credits (DPIE 2020a). This is analogous with the definition of ‘candidate species’.
Species credits	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection (DPIE 2020a).

Definitions

Species polygon	An area of land identified in Chapter 5 (of the BAM) that contains habitat or is occupied by a threatened species (DPIE 2020a).
Subject land	Land subject to a development, activity, clearing, biodiversity certification or a biodiversity stewardship proposal. It excludes the landscape assessment area which surrounds the subject land (ie the area of land in the 1500 m buffer zone around the subject land or 500m buffer zone for linear proposals). In the case of a biodiversity certification proposal, subject land includes the biodiversity certification assessment area (DPIE 2020a). See also definition for construction footprint.
Study area	The area directly affected by the proposal (subject land or construction footprint) and any additional areas likely to be affected by the proposal, either directly or indirectly.
Threatened Biodiversity Data Collection	<p>A publicly assessable online database (registration required) which contains information for listed threatened species, populations and ecological communities (DPIE 2020a).</p> <p>Part of the BioNet database, published by EESG and accessible from the BioNet website at www.bionet.nsw.gov.au.</p>
Vegetation integrity (score)	The condition of native vegetation assessed for each vegetation zone against the benchmark for the PCT. The vegetation integrity score is the quantitative measure of vegetation condition calculated by the BAM-C (DPIE 2020a).
Vegetation zone	A relatively homogeneous area of native vegetation on a development site, clearing site, land to be biodiversity certified or biodiversity stewardship site that is the same PCT and has the same broad condition state (DPIE 2020a).

Abbreviations

AOBV	Area of Outstanding Biodiversity Value
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method calculator
BC Act	<i>Biodiversity Conservation Act 2016</i> (NSW)
BC Regulation	Biodiversity Conservation Regulation 2017 (NSW)
BDAR	Biodiversity Development Assessment Report
BOAMS	Biodiversity Offsets and Agreement Management System
BOS	Biodiversity Offset Scheme
CEEC	Critically Endangered Ecological Community
CEMP	Construction Environmental Management Plan
DAWE	Department of Agriculture, Water and the Environment
DIWA	Directory of Important Wetlands in Australia
DPI	Department of Primary Industries
DPIE	Department of Planning, Industry and Environment
EEC	Endangered ecological community
EESG	NSW Environment Energy and Science Group within the Department of Planning, Industry and Environment
EIS	Environmental Impact Statement
EP&A Act	<i>Environment Planning and Assessment Act 1979</i> (NSW)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)
Fisheries NSW Policy and Guidelines	Fisheries NSW Policy and guidelines for fish habitat conservation and management (Update 2013)
FM Act	<i>Fisheries Management Act 1994</i> (NSW)
GDE	Groundwater dependent ecosystems
IBRA	Interim Biogeographically Regionalisation of Australia
MNES	Matters of national environmental significance

Abbreviations

PCT	Plant community type
PMST	Protected Matters Search Tool
REF	Review of Environmental Factors
SAII	Serious and Irreversible Impacts
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SSD	State Significant Development
SSI	State Significant Infrastructure
TBDC	Threatened Biodiversity Data Collection
TECs	Threatened ecological communities (VECs, EECs and CEECs)
TfNSW	Transport for NSW
VEC	Vulnerable Ecological Community

1 Introduction

1.1 Proposal background

The Olympic Highway (MR78) is a two lane flexible pavement of mostly single carriageway that forms a state highway link starting with an intersection with the Hume Highway near Albury to Cowra, NSW (Figure 1-1).

Transport for NSW (Transport) have carried out a Routine Safety Review (RSR) which has identified key roadside infrastructure and line marking safety improvements along the Olympic Highway which is about 318 kilometres in length.

Transport and the NSW State government is committed to the Towards Zero initiative to reduce the road toll. To achieve this outcome, the Safe System approach has been adopted. The Safe System approach has four main pillars, Safer People, Safer Vehicles, Safer Speeds and Safer Roads. This project is focusing on the Safer Roads pillar of the Safe System approach.

The Safe Systems approach recognises that drivers are human and will make mistakes. A Safer Roads project aims to address the likelihood of a crash occurring through preventative safety measures such as wide centre line and audio tactile line marking and the severity of a crash should it occur through the removal of road side hazards and implementation of safety barrier. Safety barrier is a recognised primary treatment in addressing the severity of a crash by up to 95%.

1.2 The proposal

The Olympic Highway (MR78) is a two lane flexible pavement of mostly single carriageway that forms a state highway link starting with an intersection with the Hume Highway near Albury to Cowra, NSW. Transport have carried out a Route Safety Review (RSR) which has identified key roadside infrastructure and line marking safety improvements along the Olympic Highway which is about 318 kilometres in length.

The proposal will include:

- Road edge repair and road widening at various locations including culvert and drainage structure widening works
- Reinstatement of a hazard free roadside where possible by; removing trees, maintenance of vegetation regrowth, batter flattening and table drain reshaping
- Installation of roadside safety barriers at various locations where a hazard free roadside cannot be achieved (nominally 10m from the existing carriageway edge line)
- Intersection upgrades at various locations
- Road signage upgrades
- Installation of new audio tactile line-marking in line with Transport policy
- Reinstatement of line marking and raised pavement markers on completion
- Beneficial re-use of surplus material

Transport have provided an ESRI shapefile (221107_MR78_Culvert_Impacts, 221107_MR78_Impact_Polygon) of the final footprint, allowing the calculation of impacts as a result of the proposal. For this BAR, the road corridor is the study area.

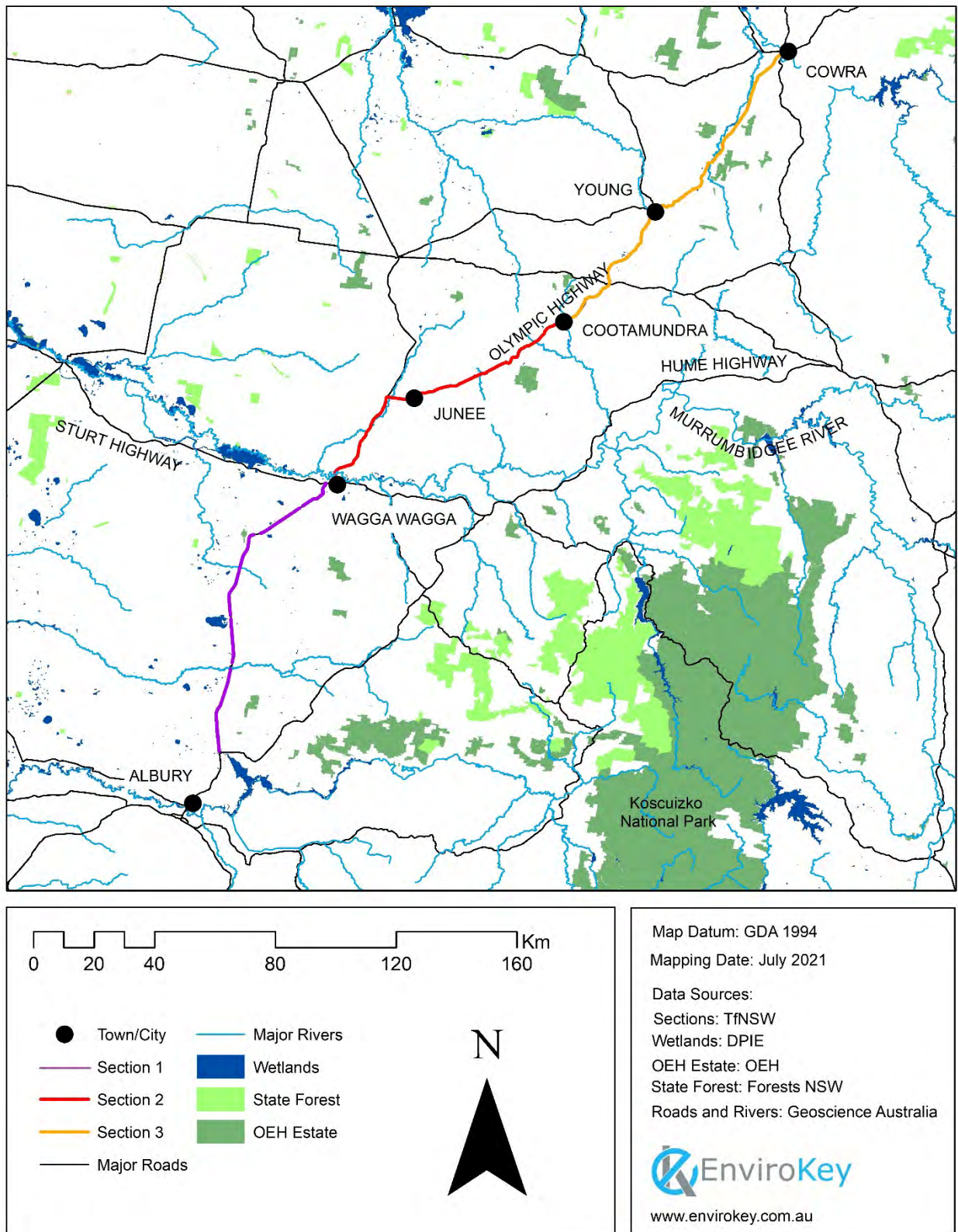


Figure 1-1: Proposal context

1.3 Legislative context

A Review of Environmental Factors (REF) is prepared to satisfy Transport duties under Section 5.5 of the EP&A Act to “examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity” and Section 5.7 in making decisions on the likely significance of any environmental impacts. This biodiversity impact assessment forms part of the REF being prepared for the Olympic Highway Route Safety Review Safety Improvement Work. It assesses the biodiversity impacts of the proposal to meet the requirements of the EP&A Act.

Part 7 of the BC Act requires that the significance of the impact on threatened species, populations and threatened ecological communities is assessed using a five-part test listed in Section 7.3 of the BC Act. Similarly, Part 7A of the FM Act requires that significance assessments are undertaken in accordance with Division 12 of the FM Act. Where a significant impact is likely to occur, a species impact statement (SIS) must be prepared in accordance with the Environment Agency Head’s requirements, or a Biodiversity Development Assessment Report (BDAR) must be prepared by an accredited assessor in accordance with the Biodiversity Assessment Method (BAM) (DPIE 2020a).

In September 2015, a “strategic assessment” approval was granted by the Federal Minister in accordance with the EPBC Act. The approval applies to Transport’s road 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 road proposals assessed via an REF:

- Must address and consider potential impacts on EPBC Act 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 Department of Agriculture, Water and the Environment (DAWE) for these matters, even if the activity is likely to have a significant impact
- Must use the Biodiversity Offset Scheme (BOS) to offset impacts.

To assist with this, assessments of significance are required for all relevant biodiversity values 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 qualifications and role of people involved in the assessment are described in Table 2-1 below.

Table 2-1: Personnel

Name	Role	Qualifications
Steve Sass	Principal Ecologist	B.App.Sci (Env.Sci) (Hons) GradCertCaptVertMngt (CSU)
Linda Sass	Senior Ecologist	Ass.Deg.Gn.St (Science), BA, DipEd (Sec)
Alexandra Metcalfe	Project Officer (Ecology)	B.Env.Sci (on-going), Cert III CaptAnimMngt
Zoe Sass	Project Officer (GIS)	B.Sci (GIS), BA (Geography)

2.2 Background research

Background research was carried out to collect and review information on the presence or likelihood of occurrence of:

- Threatened terrestrial and aquatic species and their habitat
- Threatened ecological communities
- Important habitat for migratory species
- Areas of outstanding biodiversity value.

The following databases and information sources were reviewed:

- BioNet - the website for the Atlas of NSW Wildlife and Threatened Biodiversity Data Collection (TBDC) – searched [17/07/2021]
- BioNet Vegetation Classification database – reviewed [17/07/2021]
- Department of Agriculture, Water and the Environment (DAWE) Protected Matters Search Tool – searched [16/08/2021]
- SEED Layer Intersection Tool – searched [17/07/2021].
- NSW DPI Fisheries Spatial Data Portal
- State Vegetation Type Map: Central Tablelands Region Version 1.0. VIS_ID 4778 (Office of Environment and Heritage, 2021)
- State Vegetation Type Map: Riverina Region Version 1.2. VIS_ID 4769 (OEH, 2018)
- The Commonwealth Bureau of Meteorology's Atlas of Groundwater Dependent Ecosystems (GDE): <http://www.bom.gov.au/water/groundwater/gde/map.shtml>
- Core Koala Habitat identified by the Koala Habitat Protection SEPP 2021
- REF, MR78 Verdale Olympic Highway Pavement and Culvert Widening (NGH, 2013b)
- REF and BA, MR78 Bethungra Pavement Widening and Reconstruction (NGH, 2013a)
- REF, Bridge Maintenance and Repair Works along the Olympic Highway (MR78) (NGH, 2009)
- REF and BA, MR78 Smiths Hill Pavement Reconstruction (NGH, 2016)

- REF and BA, MR78 Apps Lane Curve Realignment and Intersection Upgrade (EnviroKey, 2015).

2.3 Vegetation assessment

2.3.1 Vegetation mapping

To better understand the extent of native vegetation in the general vicinity of the proposal an assessment 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: Central West (OEH, 2018). These existing datasets identify 35 plant community types (PCT) within a 550-metre radius of the proposal (Table 2-2). The SVT mapping datasets are produced through a combination of previous map sets and GIS modelling. There is limited ground validation, so the mapping often has 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. These were used to guide field surveys and understand vegetation types and extent beyond the boundaries of the proposal.

Table 2-2: Existing vegetation mapping within 550 metres of the proposal length

Plant community type (PCT)	Threatened ecological community	Area (ha)
PCT 2: River Red Gum-sedge dominated very tall open forest	Not a TEC	1.64
PCT 5: River Red Gum herbaceous-grassy very tall open forest wetland	Not a TEC	168.46
PCT 9: River Red Gum - wallaby grass tall woodland wetland	Not a TEC	11.01
PCT 45: Plains Grass grassland	Not a TEC in this region	29.47
PCT 70: White Cypress Pine woodland	Not a TEC	12.24
PCT 74: Yellow Box - River Red Gum tall grassy riverine woodland	Critically Endangered (BC Act and EPBC Act)	49.35
PCT 75: Yellow Box - White Cypress Pine grassy woodland	Critically Endangered (BC Act and EPBC Act)	9.68
PCT 76: Western Grey Box tall grassy woodland	Endangered (BC Act and EPBC Act)	396.74
PCT 79: River Red Gum shrub/grass riparian tall woodland or open forest wetland	Not a TEC	132.87

Plant community type (PCT)	Threatened ecological community	Area (ha)
PCT 80: Western Grey Box - White Cypress Pine tall woodland	Endangered (BC Act and EPBC Act)	166.03
PCT 110: Western Grey Box - Cypress Pine shrubby woodland	Endangered (BC Act and EPBC Act)	169.28
PCT 185: Dwyer's Red Gum - White Cypress Pine - Currawang shrubby woodland	Not a TEC	1.57
PCT 186: Dwyer's Red Gum - Black Cypress Pine - Currawang shrubby low woodland	Not a TEC	84.5
PCT 201: Fuzzy Box Woodland	Endangered (BC Act)	0.05
PCT 217: Mugga Ironbark - Western Grey Box - cypress pine tall woodland	Not a TEC	166.91
PCT 249: River Red Gum swampy woodland wetland	Not a TEC	0.42
PCT 266: White Box grassy woodland	Critically Endangered (BC Act and EPBC Act)	252.12
PCT 267: White Box - White Cypress Pine - Western Grey Box shrub/grass/forb woodland	Critically Endangered (BC Act and EPBC Act)	188.29
PCT 268: White Box - Blakely's Red Gum - Long-leaved Box - Nortons Box - Red Stringybark grass-shrub woodland	Critically Endangered (BC Act and EPBC Act)	12.29
PCT 276: Yellow Box grassy tall woodland	Critically Endangered (BC Act and EPBC Act)	17.27
PCT 277: Blakely's Red Gum - Yellow Box grassy tall woodland	Critically Endangered (BC Act and EPBC Act)	2,008.25
PCT 278: Riparian Blakely's Red Gum - box - shrub - sedge - grass tall open forest	Critically Endangered (BC Act and EPBC Act)	61.25
PCT 282: Blakely's Red Gum - White Box - Yellow Box - Black Cypress Pine box grass/shrub woodland	Critically Endangered (BC Act and EPBC Act)	94.31
PCT 283: Apple Box - Blakely's Red Gum moist valley and footslopes grass-forb open forest	Critically Endangered (BC Act and EPBC Act)	50.36

Plant community type (PCT)	Threatened ecological community	Area (ha)
PCT 287: Long-leaved Box - Red Box - Red Stringybark mixed open forest	Critically Endangered (BC Act and EPBC Act)	4.28
PCT 292: She oak - Fringe Myrtle heathland	Not a TEC	6.31
PCT 309: Black Cypress Pine - Red Stringybark - red gum - box low open forest	Not a TEC	68.55
PCT 317: Currawang very tall shrubland	Not a TEC	64.73
PCT 321: Red Stringybark - Long-leaved Box - Black Cypress Pine shrub/grass woodland	Not a TEC	2.39
PCT 335: Tussock grass - sedgeland fen - rushland - reedland wetland	Not a TEC	9.86
PCT 342: Mugga Ironbark - mixed box woodland	Critically Endangered (BC Act and EPBC Act)	13.83
PCT 346: White Box - Blakely's Red Gum - White Cypress Pine shrubby woodland	Not a TEC	45.41
PCT 347: White Box - Blakely's Red Gum shrub/grass woodland	Critically Endangered (BC Act and EPBC Act)	49.24
PCT 348: Red Stringybark - Long-leaved Box - Joycea pallida grassy open forest	Not a TEC	1.82
PCT 796: Derived grassland	Critically Endangered (BC Act and EPBC Act)	532.98
Cleared/Non-native	Not a TEC	28,459.56

2.3.2 Vegetation survey and classification

Threatened species searches and general vegetation surveys were carried out between 12 July – 20 July 2021. A total of 9 field surveys days by three people were completed (27-person days) (**Figure 3-1 to 3-38**).

The aims of the flora surveys were to:

- Determine all vegetation communities present in the study area and assess their condition and extent, with reference to the OEH plant community type (PCT) classification
- Identify potential Threatened Ecological Communities (TECs) in the study area and determine their condition and extent

- Identify whether threatened flora species are present in the study area, and whether it is likely that any have the potential to occur in 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.

Based on the field assessment and Air Photo Interpretation, vegetation communities were assigned as being in low or moderate-good condition. Low condition woodland communities are those that are generally small in area and contain few overstorey and mid-storey species, while areas in moderate to good condition, were those that were either moderate to large in size, and had good species diversity. Patches of woodland in mod-good condition also meet the condition criteria assigned under the EPBC Act for Box-gum Woodland.

A single BAM plot/transects using the Biodiversity Assessment Method (BAM) was also completed in each PCT. For any road corridors that were narrow, the 20m x 50m BAM plot was modified in accordance with and as accepted by the BAM (the provision being as long as the plot was 1,000m² in area).

Native vegetation communities/types were classified in accordance with the NSW Vegetation Information System (DPIE/OEH, 2022b). Threatened ecological communities (if present) were classified in accordance with relevant State and Federal threatened ecological community descriptions (DPIE/BCS, 2022b, SPRAT, 2017).

Exotic species were checked for priority weed status on the Department of Primary Industries websites (DPI, 2022).

2.3.2.1 Plot-based vegetation survey

Plot-based full floristic survey was completed in accordance with the BAM. A modified BAM was agreed by Transport given the length of the proposal whereby a single BAM plot was carried out within each PCT (**Figure 3-1 to 3-38**).

2.4 Threatened species assessment

2.4.1 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 2-20** provides the spatial locations of records of these biota in the locality of the proposal (10 kilometre radius).

A habitat assessment for the threatened and migratory species with potential to occur in the vicinity of the proposal is provided in Annexure B. This identified 46 threatened or migratory biota were known to, or had a moderate to high potential to occur in the vicinity of the proposal (**Figure 2-1 to Figure 2-20**).

EnviroKey completed a general Habitat Assessment with each BAM plot. One BAM plot was done in each PCT. Given the importance of Hollow-bearing trees (HBT) in the landscape, mapping of all HBT using a pre-determined method (ie, within 10 metres of the existing edge line) was carried out. Estimates of HBT outside of the 10 metres were also carried out using density data.

2.4.2 Targeted fauna surveys

Targeted fauna surveys were carried out between 12 July – 20 July 2021. A total of 9 field surveys days by three persons was completed (27-person days). Locations of all fauna surveys carried out during the field survey are mapped on **Figure 3-1** to **Figure 3-38**.

Targeted microbat surveys of culverts where work is proposed, were carried out between 15-18 May 2022.

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 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 searched for active frogs, and through leaf litter, roadside rubbish and under fallen timber.

Culvert Search for Microbats

Of the culverts proposed for extension, each was searched for signs of past or current occupation by microbats. This included searches for guano, dead microbats and insect exoskeletons. Continuous recording camera equipment on extension poles was also used when access to entrance of any culvert was made difficult by standing water.

2.4.3 Targeted flora surveys

Potential suitable habitat for Crimson Spider Orchid and Pine Donkey Orchid was identified on site. Targeted flora surveys for both species were carried out within their known flowering period. Discussions with the Accountable Officer at DPIE for Crimson Spider Orchid confirmed that the species was flowering during the survey period (13-17 September 2021) adjacent to the road corridor on private land. Pine Donkey Orchid could not be located by EnviroKey at Kindra State Forest near Coolamon, a previously known site, so Gillenbah State Forest near Narrandera was used as a reference site. Confirmation that these species were flowering elsewhere within its range allows a reasonable assumption that it would have been flowering during the project field survey between 11-15 October 2021, if it were present.

2.5 Limitations

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 B.

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.

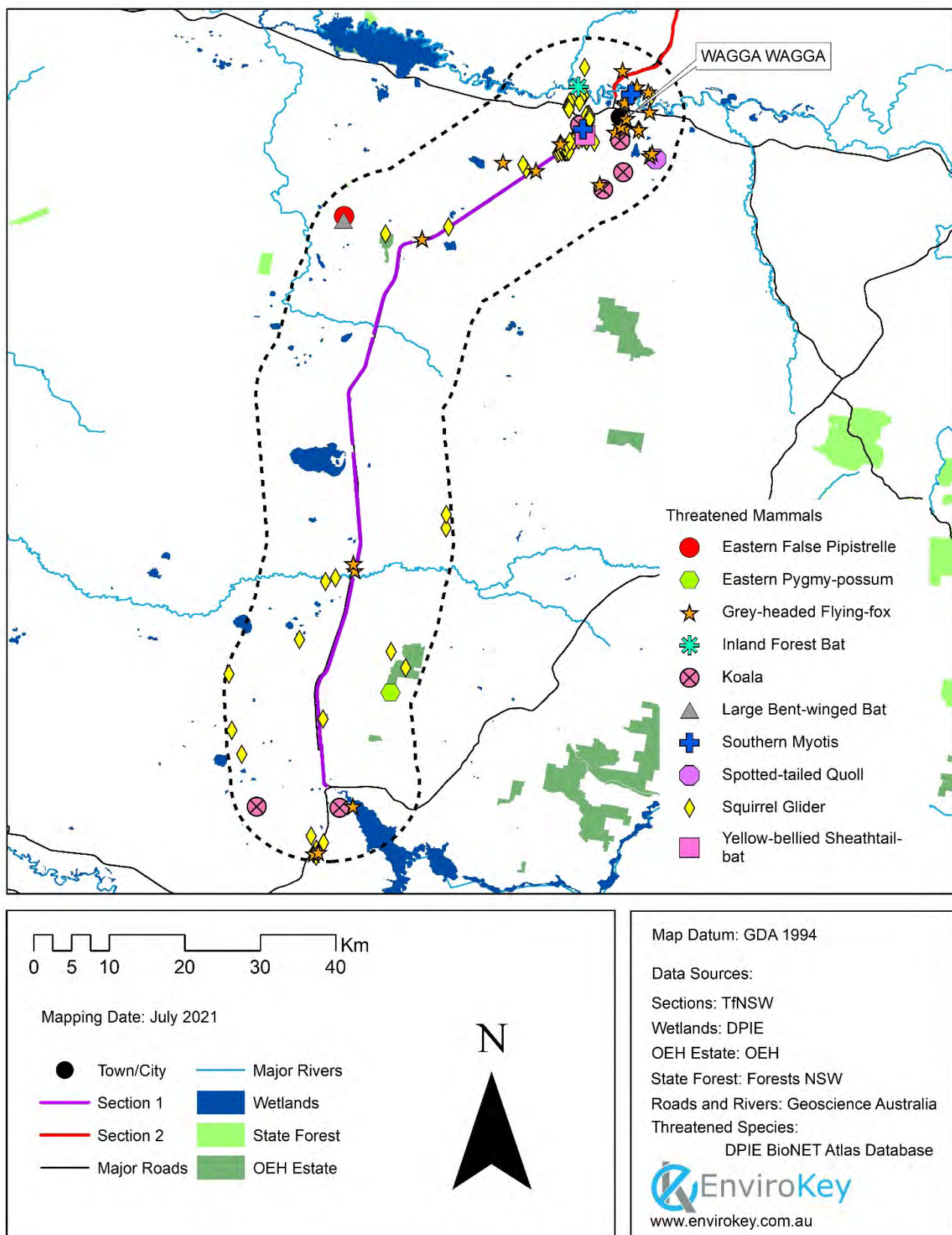


Figure 2-1: Existing threatened species records within section 1 of the proposal

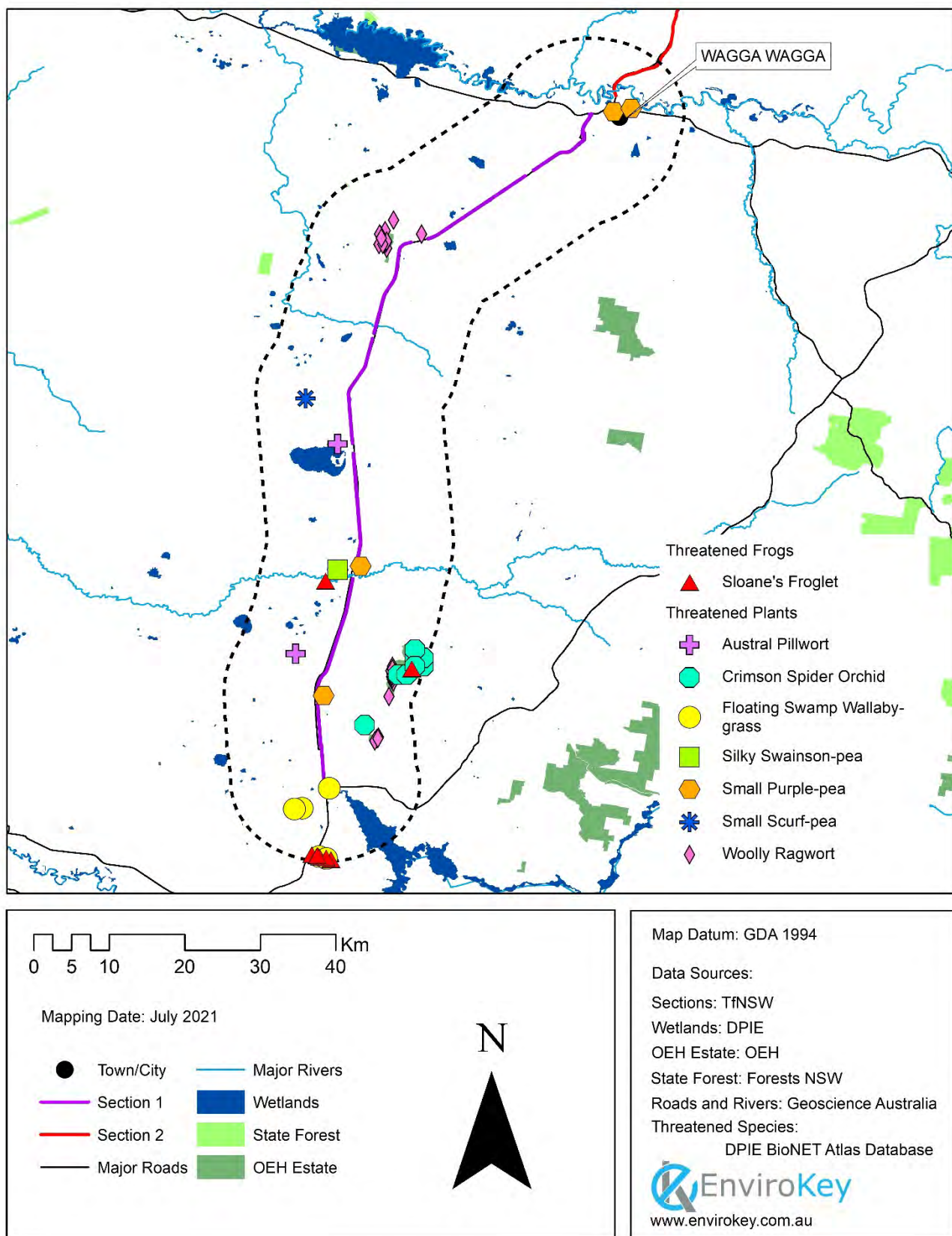


Figure 2-2: Existing threatened species records within section 1 of the proposal

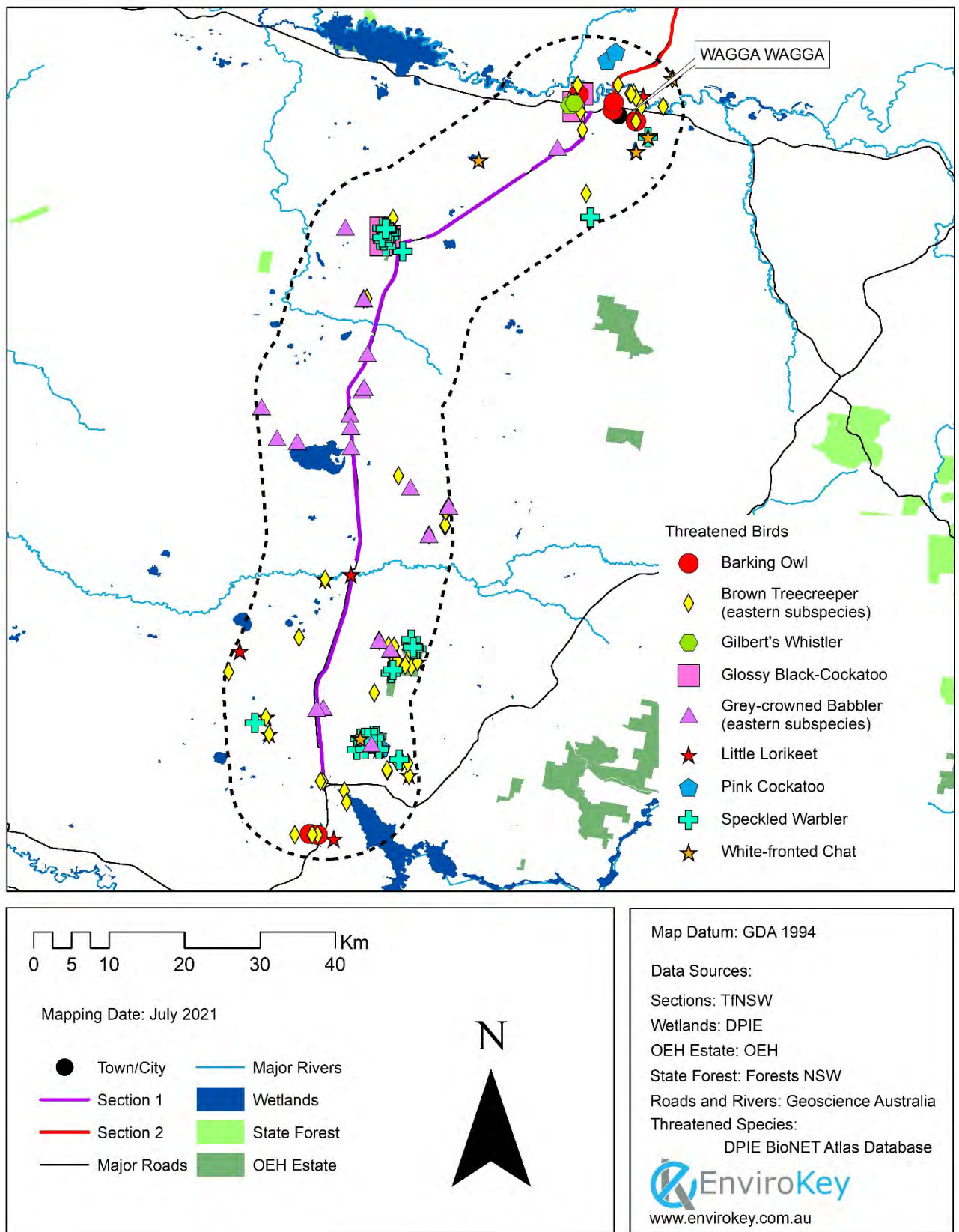


Figure 2-3: Existing threatened species records within section 1 of the proposal

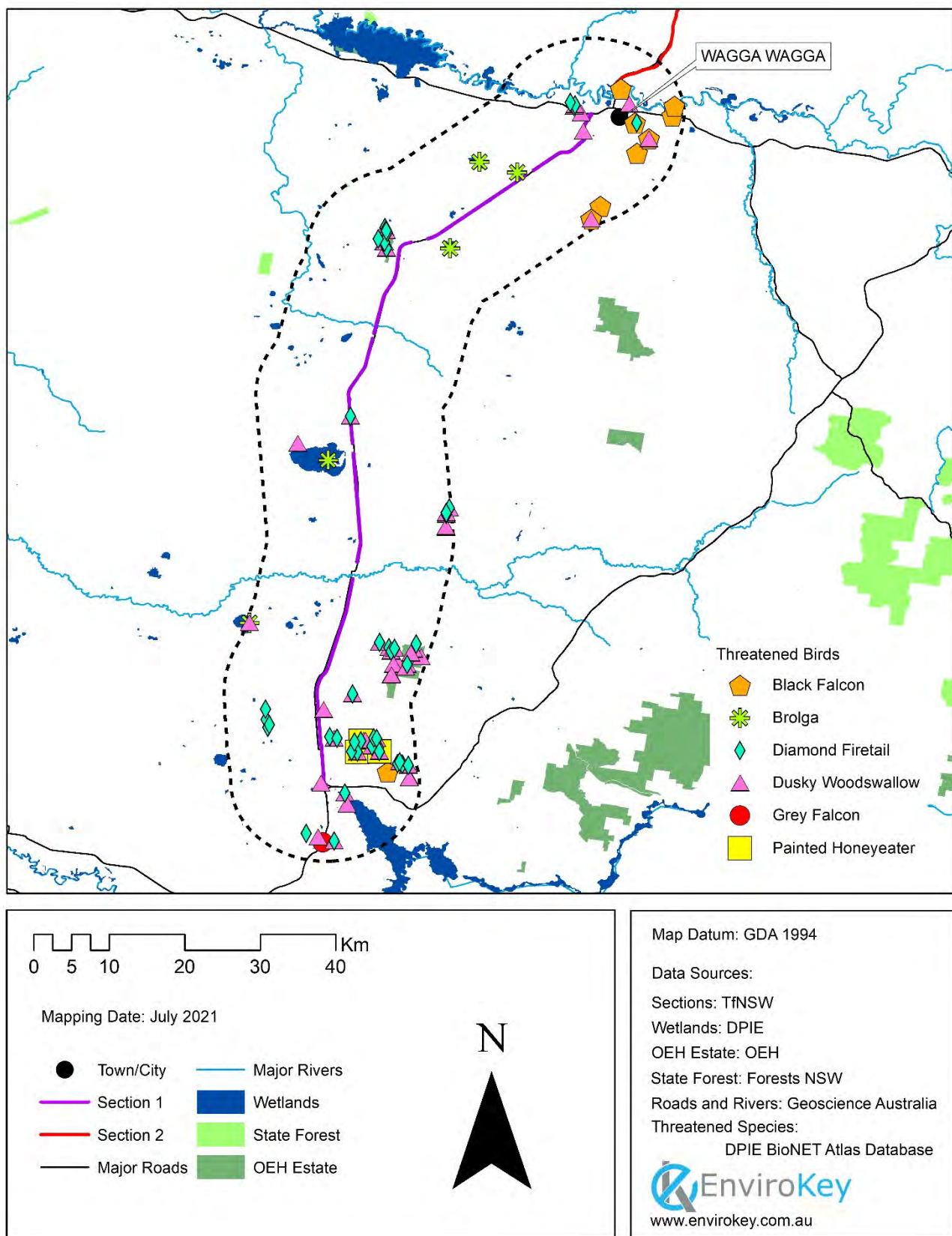


Figure 2-4: Existing threatened species records within section 1 of the proposal

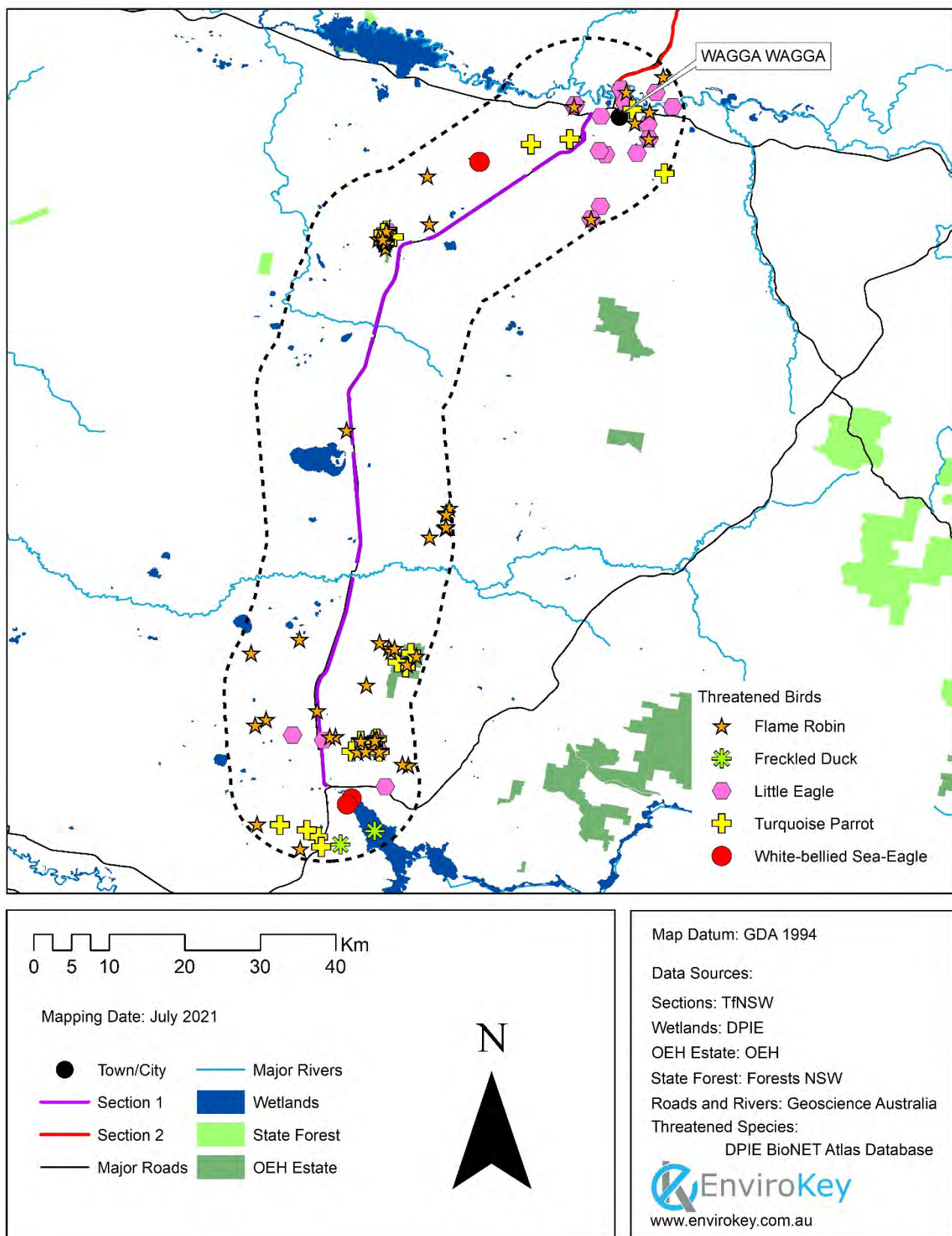


Figure 2-5: Existing threatened species records within section 1 of the proposal

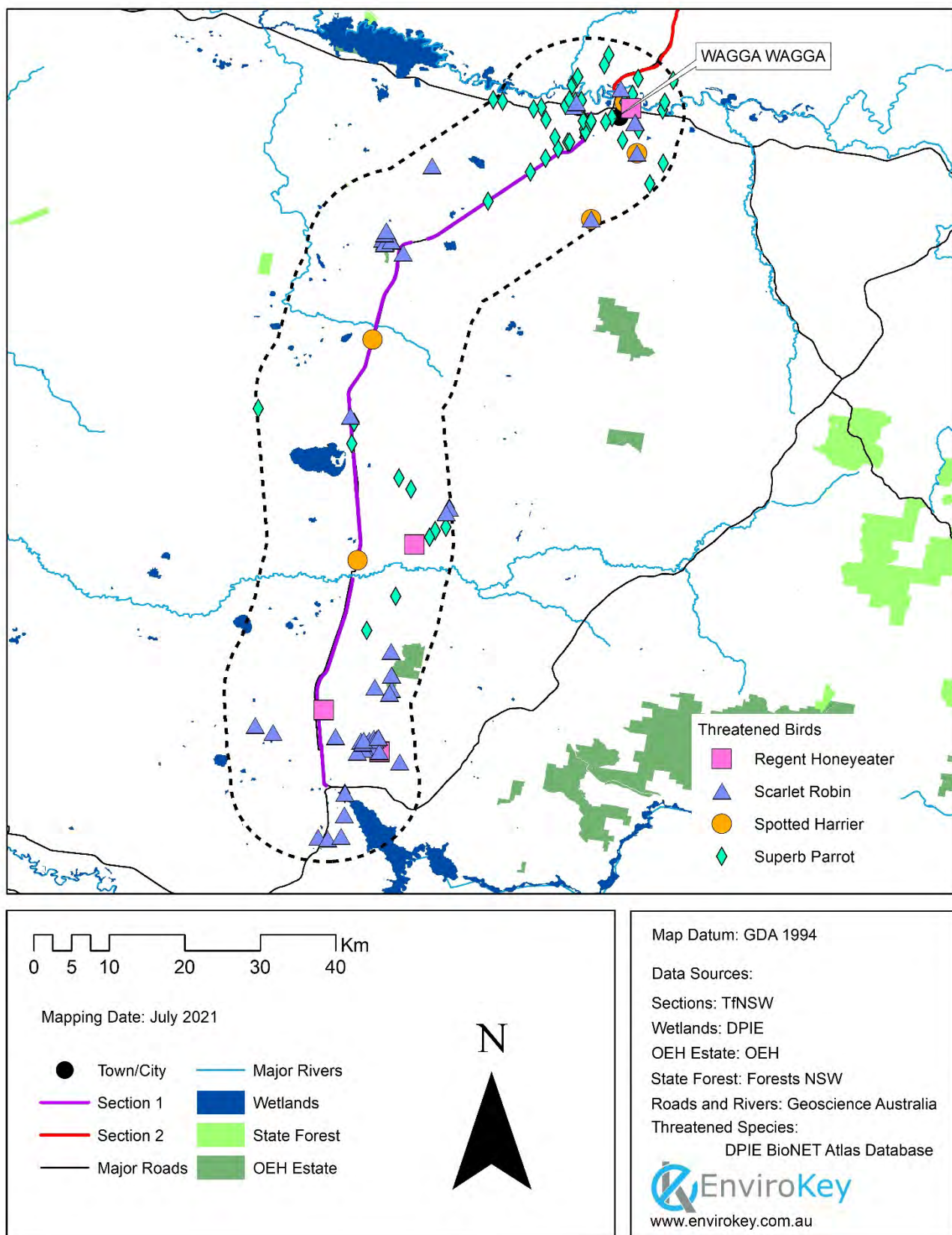


Figure 2-6: Existing threatened species records within section 1 of the proposal

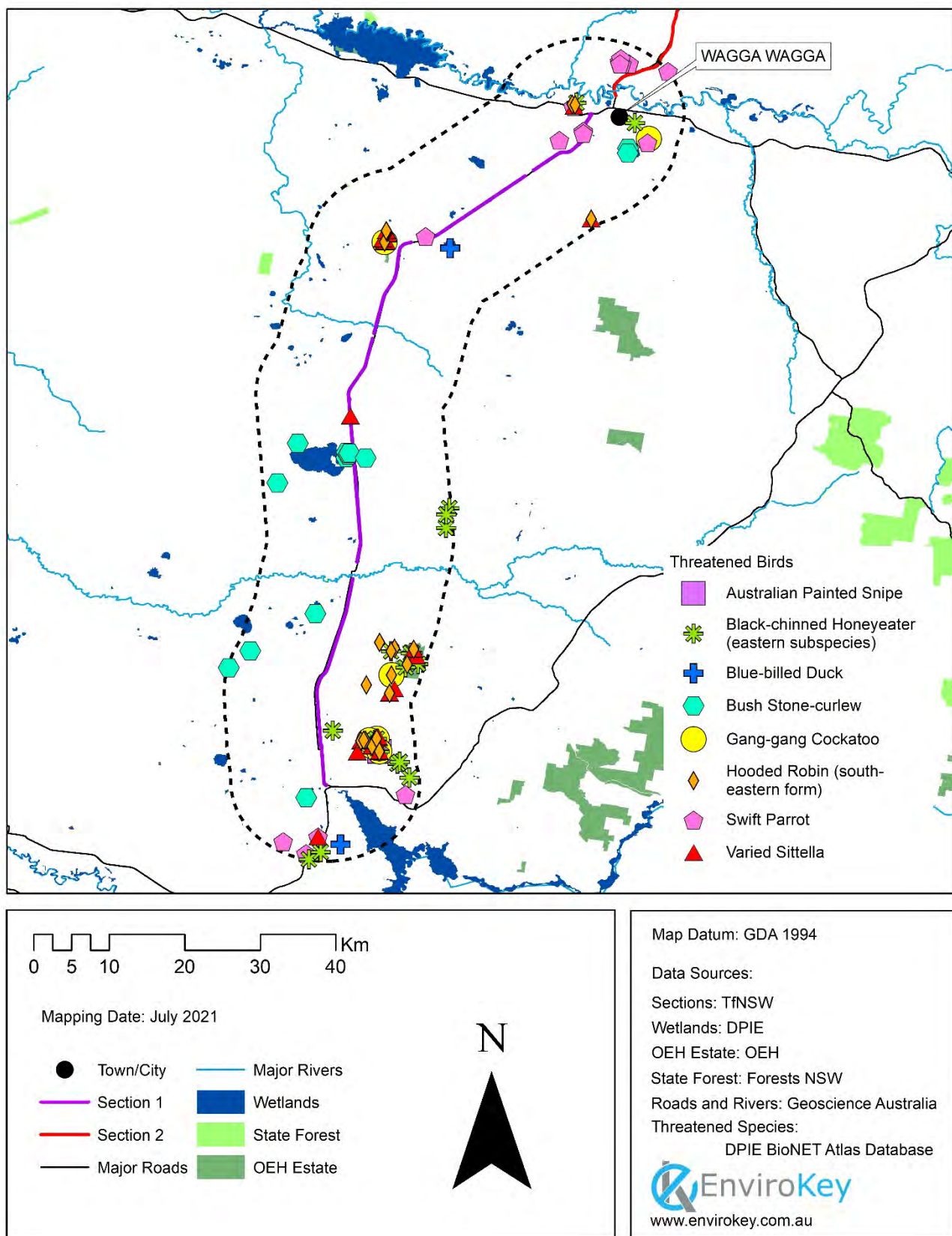


Figure 2-7: Existing threatened species records within section 1 of the proposal

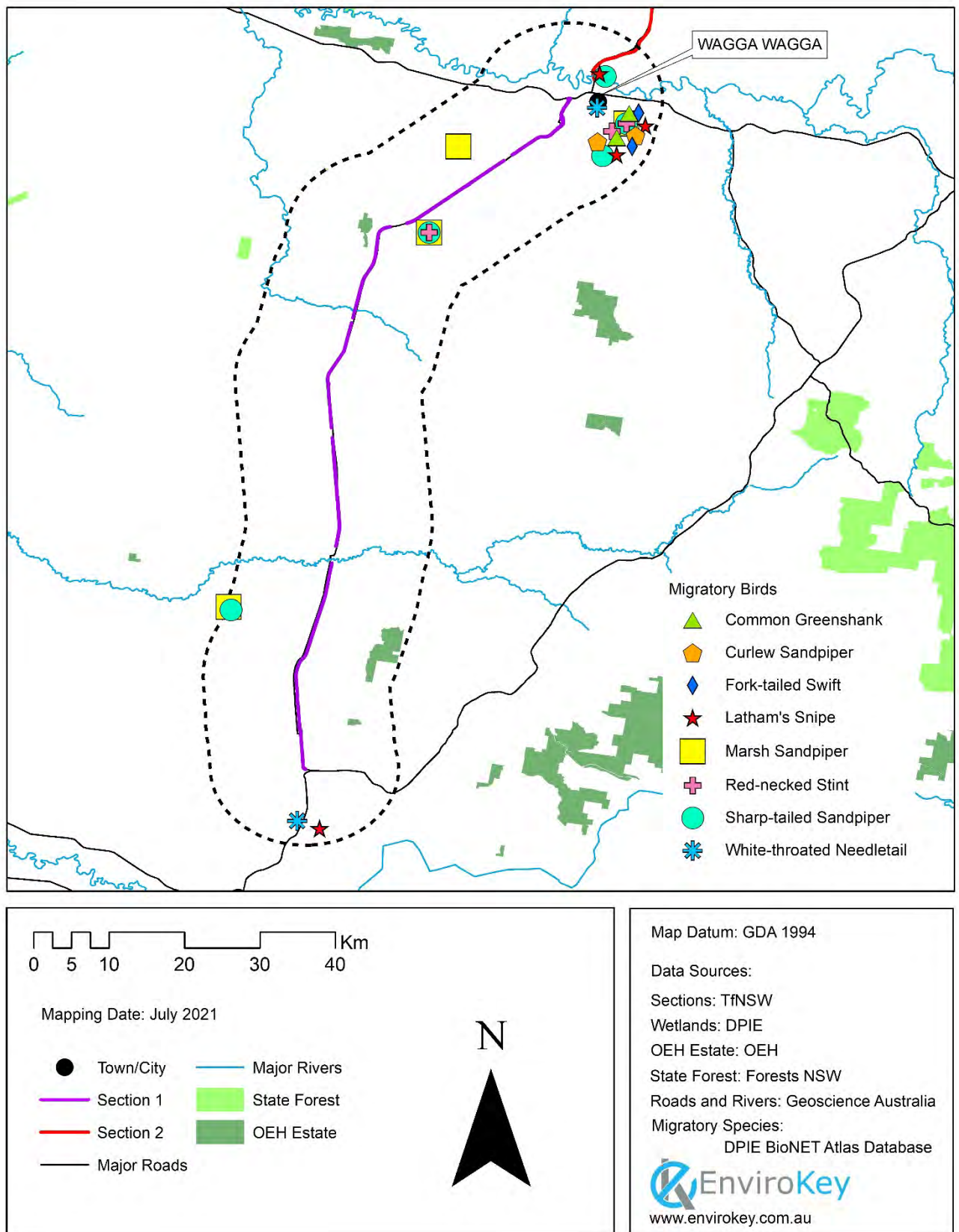


Figure 2-8: Existing threatened species records within section 1 of the proposal

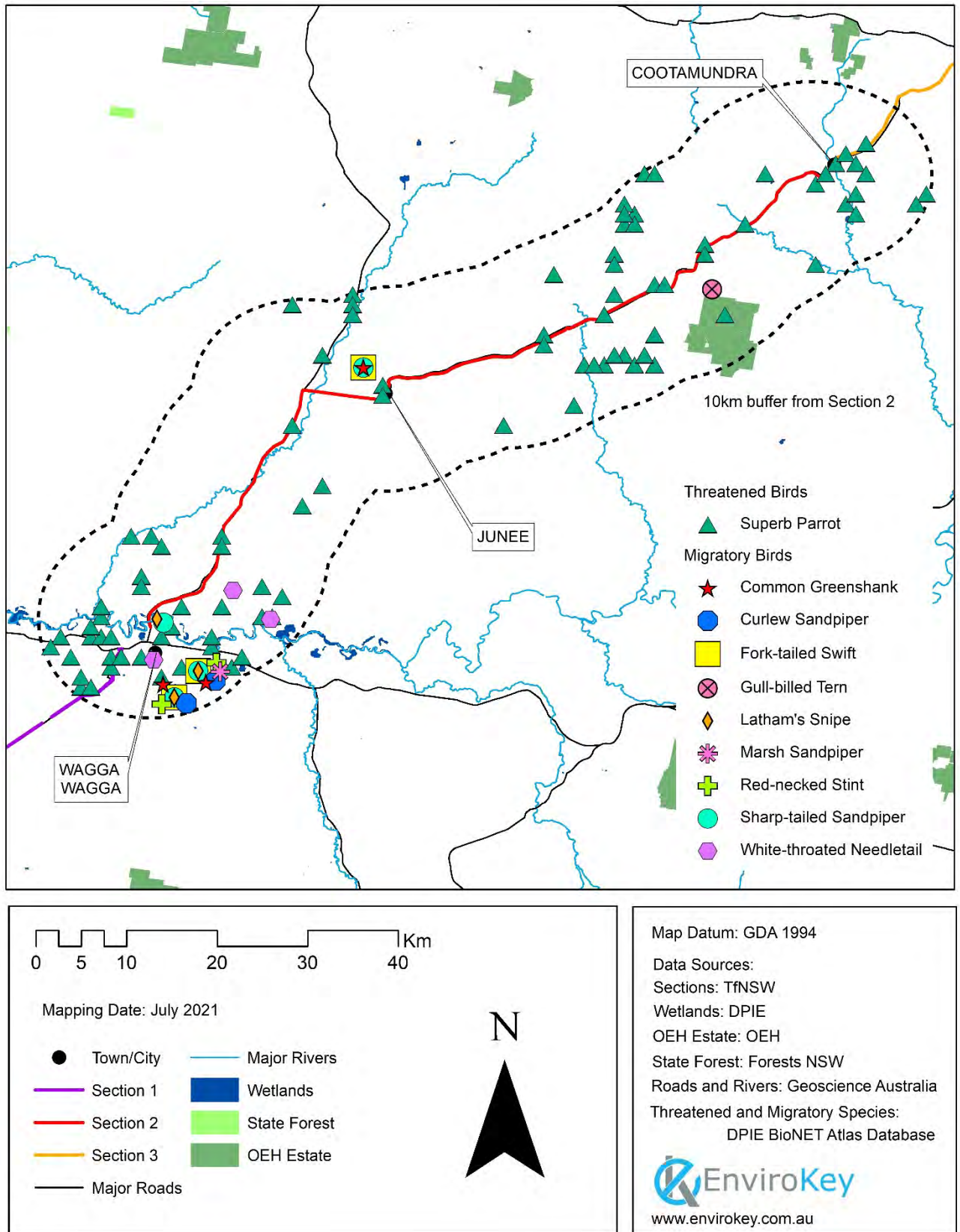


Figure 2-9: Existing threatened species records within section 2 of the proposal

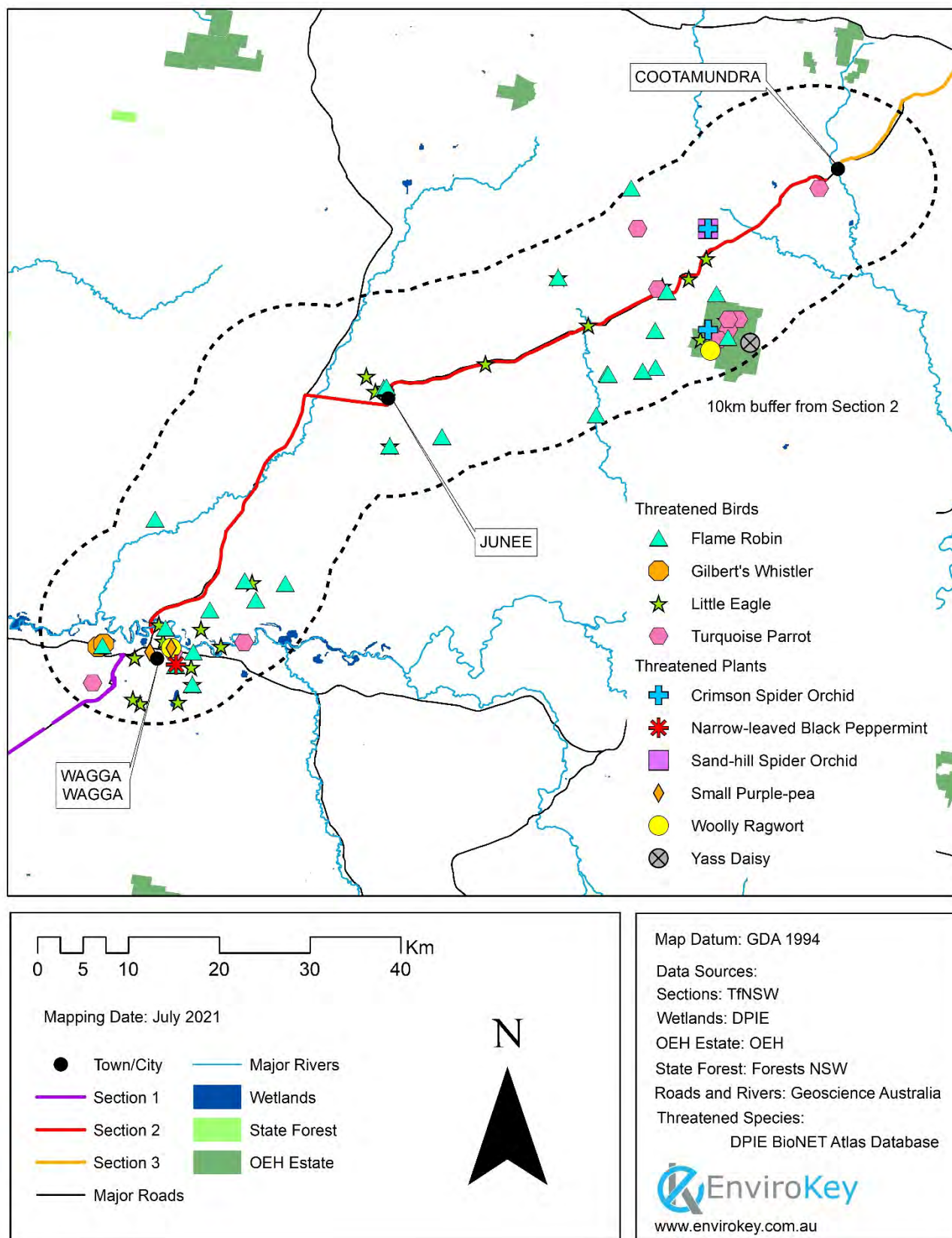


Figure 2-10: Existing threatened species records within section 2 of the proposal

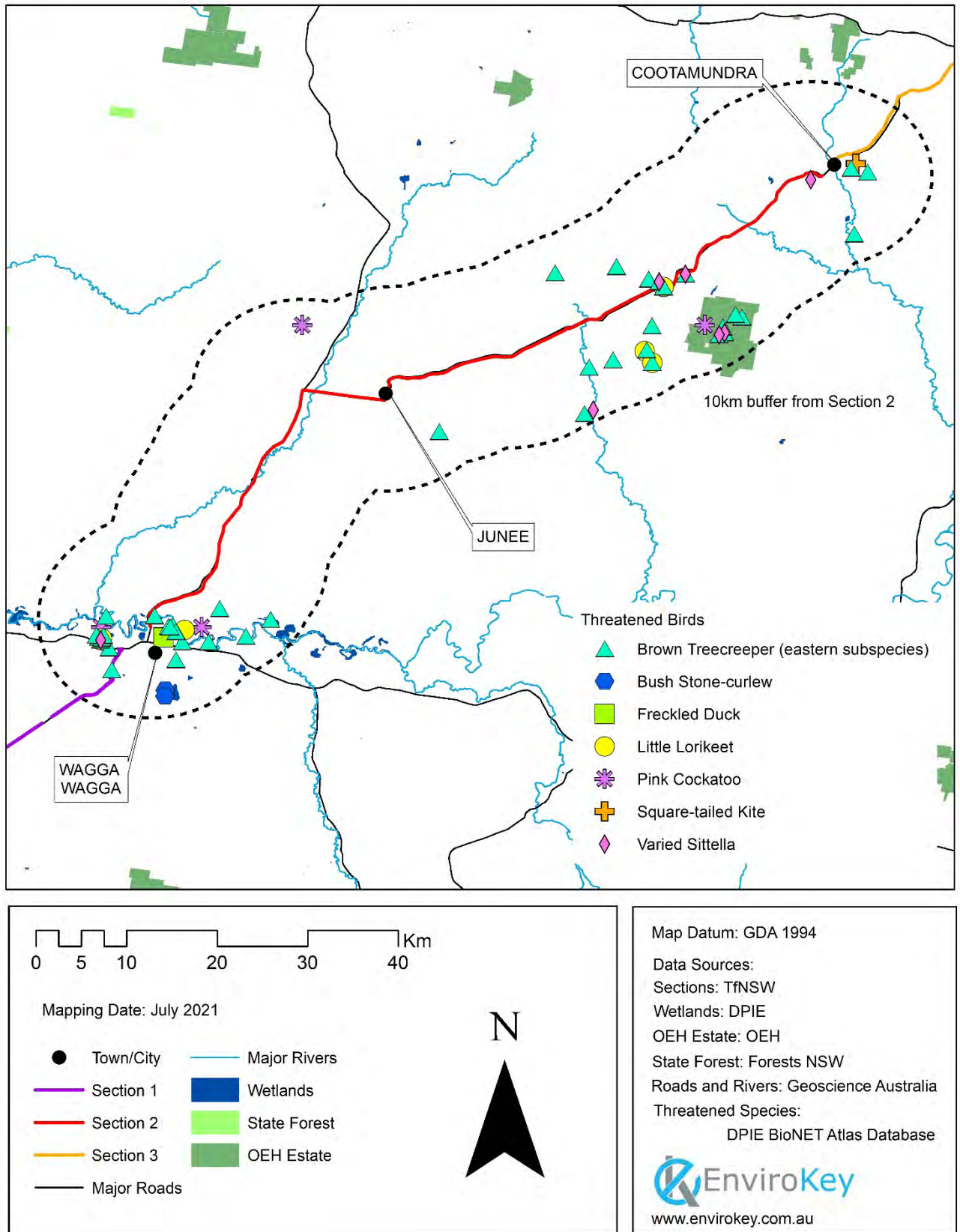


Figure 2-11: Existing threatened species records within section 2 of the proposal

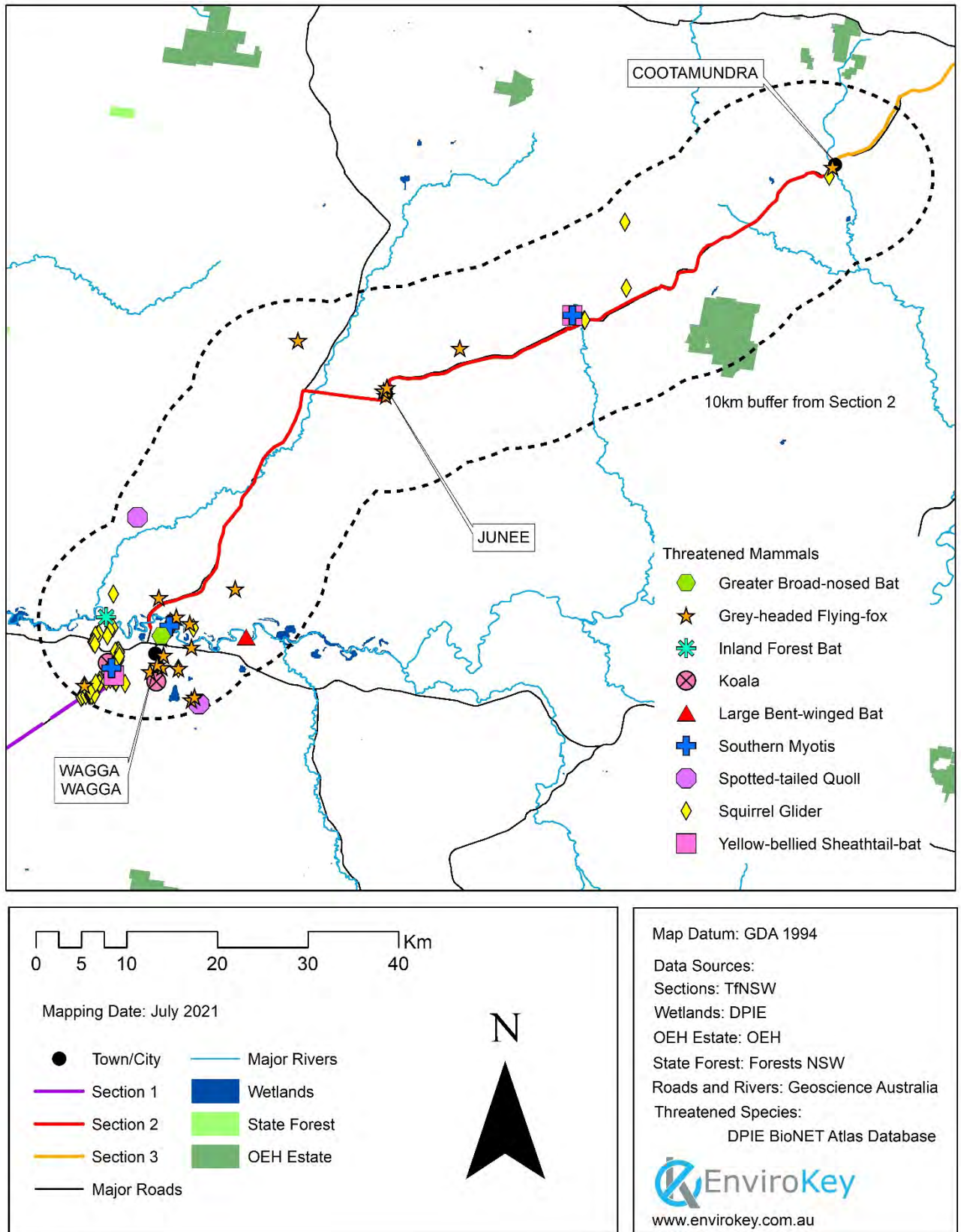


Figure 2-12: Existing threatened species records within section 2 of the proposal

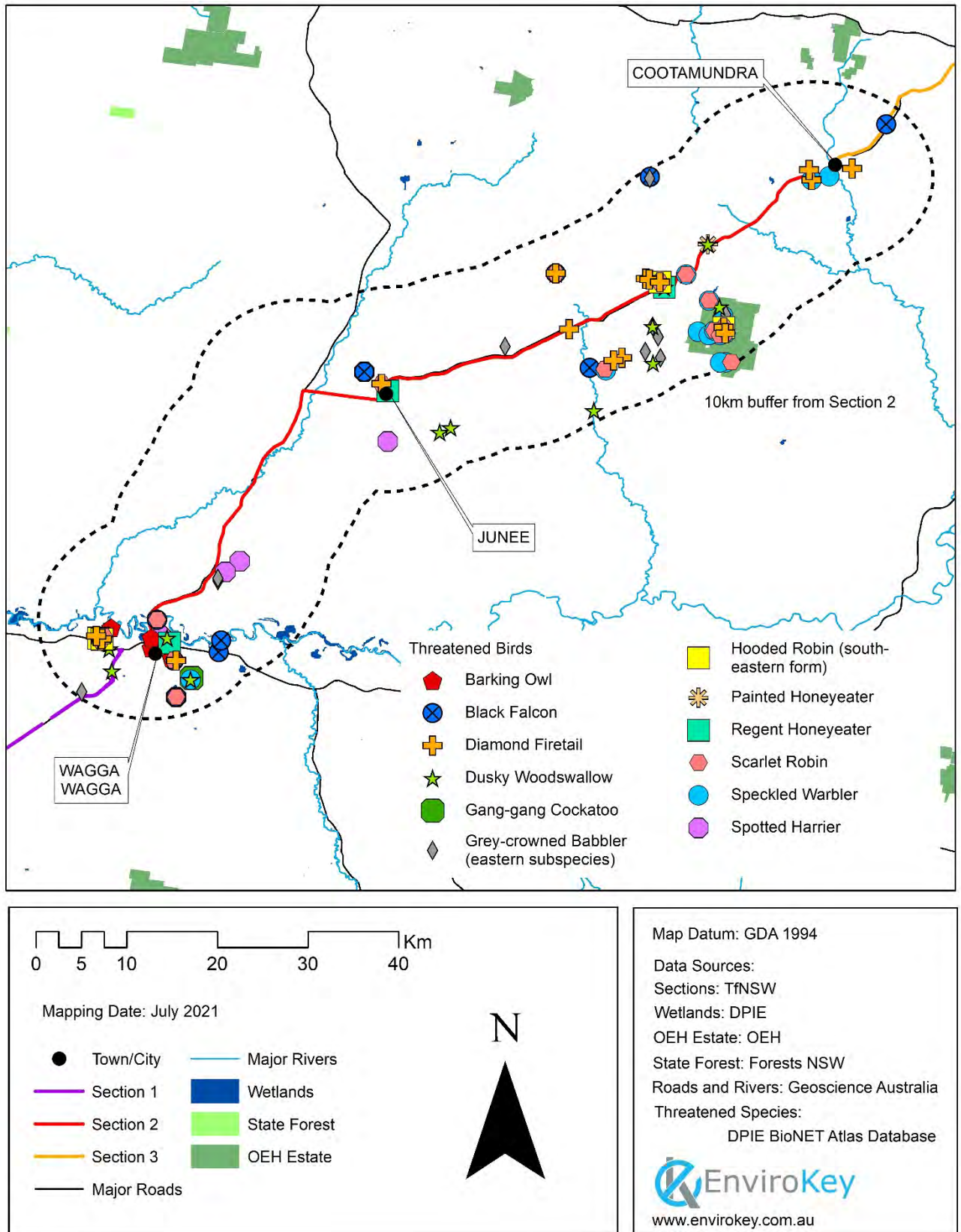


Figure 2-13: Existing threatened species records within section 2 of the proposal

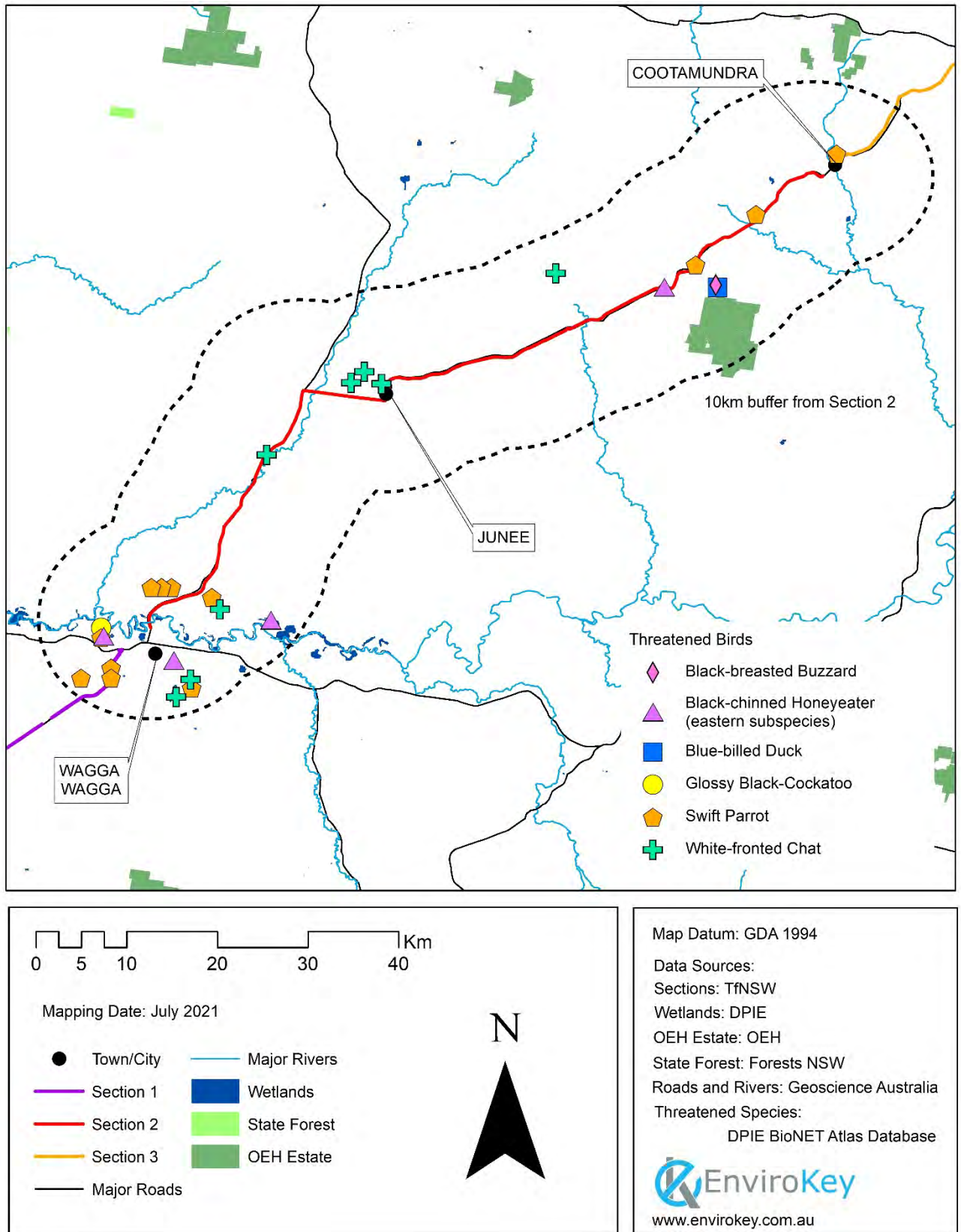


Figure 2-14: Existing threatened species records within section 2 of the proposal

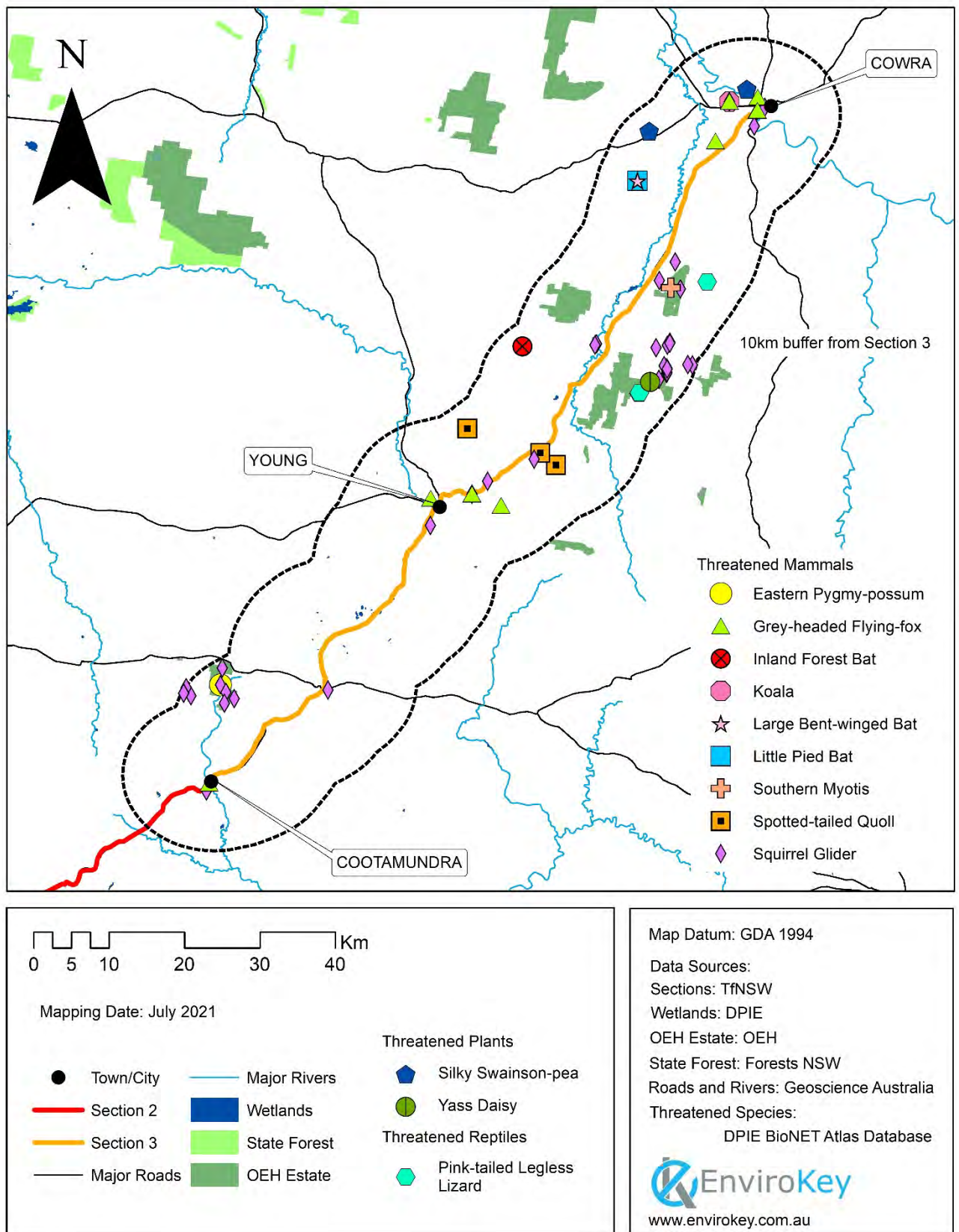


Figure 2-15: Existing threatened species records within section 3 of the proposal

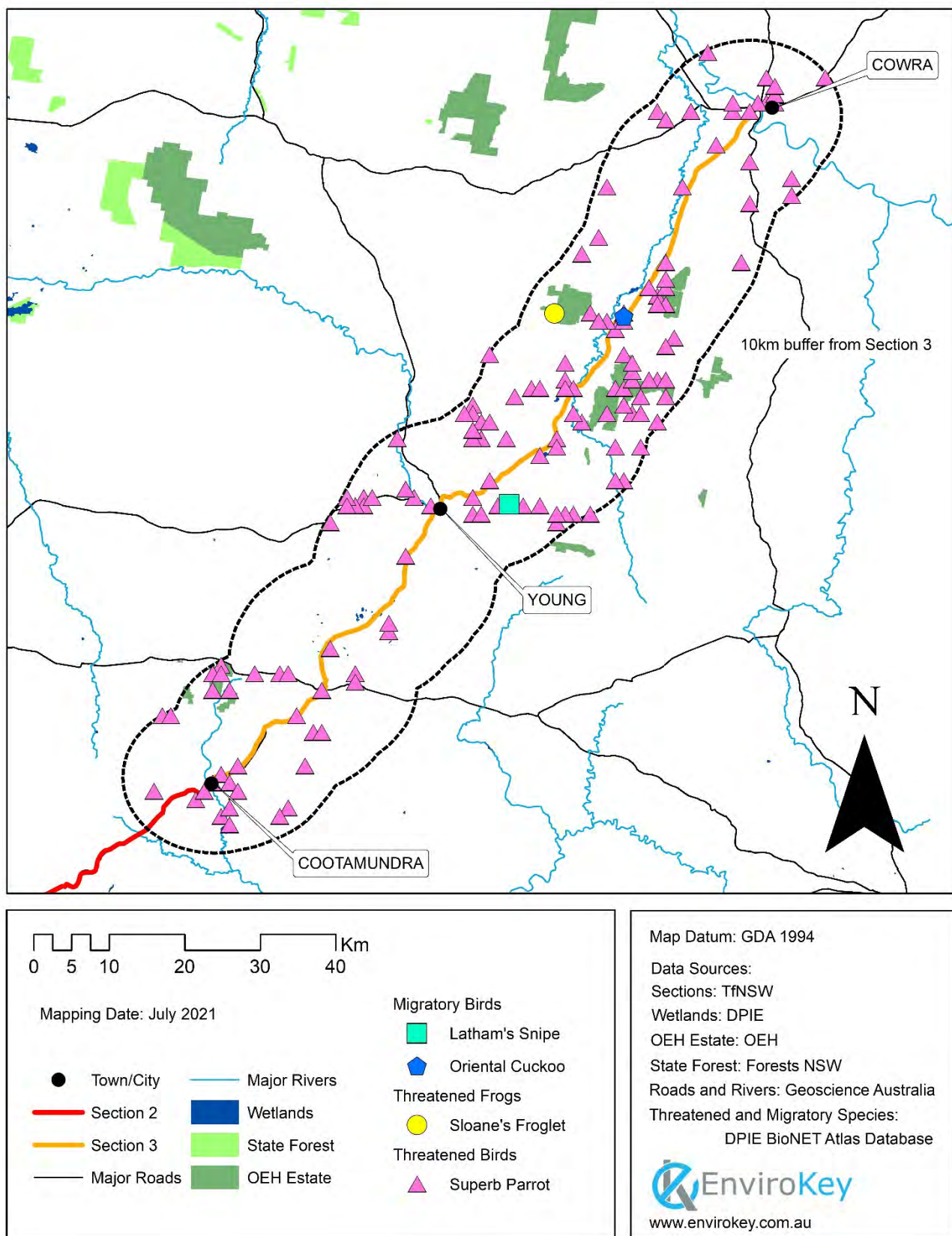


Figure 2-16: Existing threatened species records within section 3 of the proposal

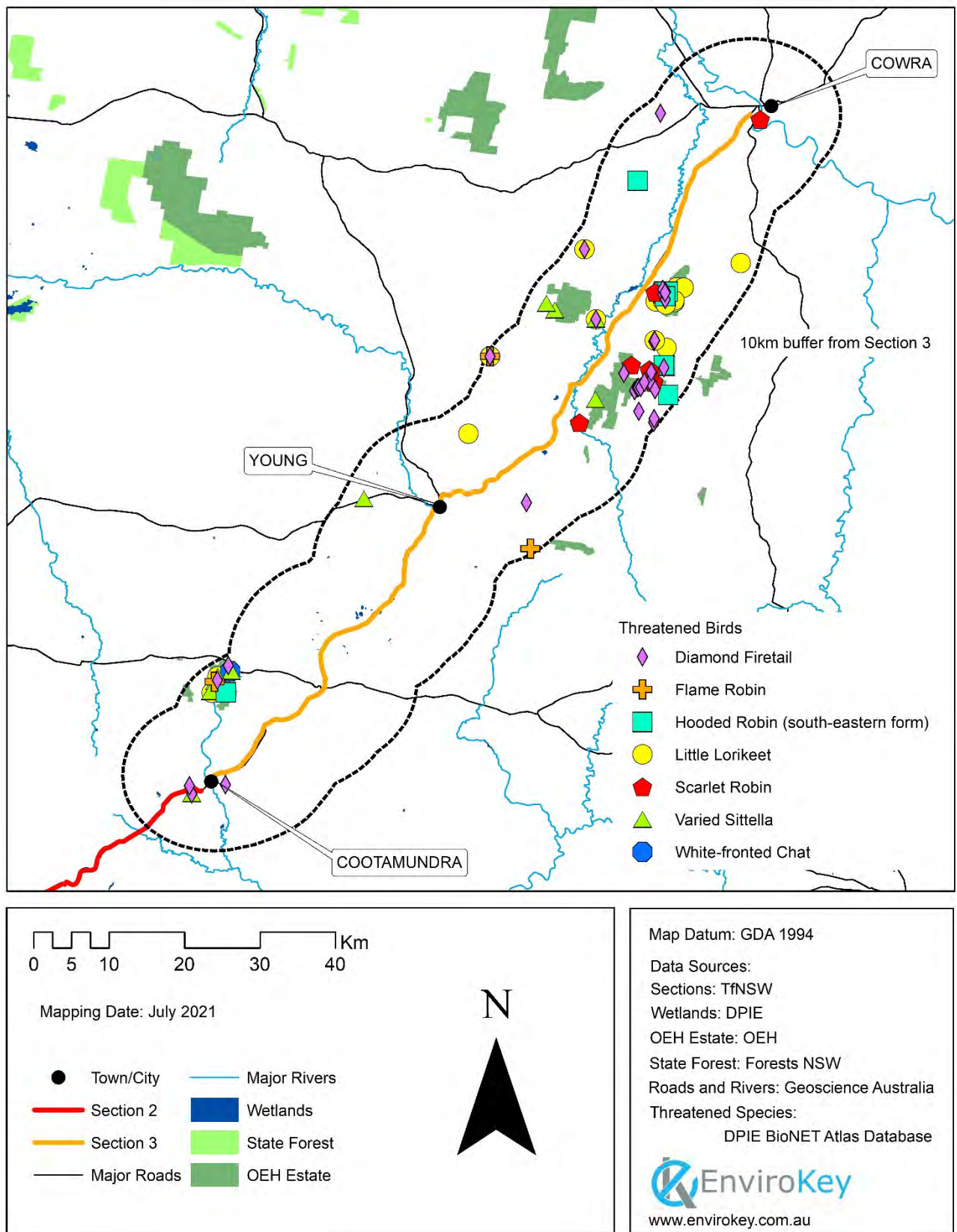


Figure 2-17: Existing threatened species records within section 3 of the proposal

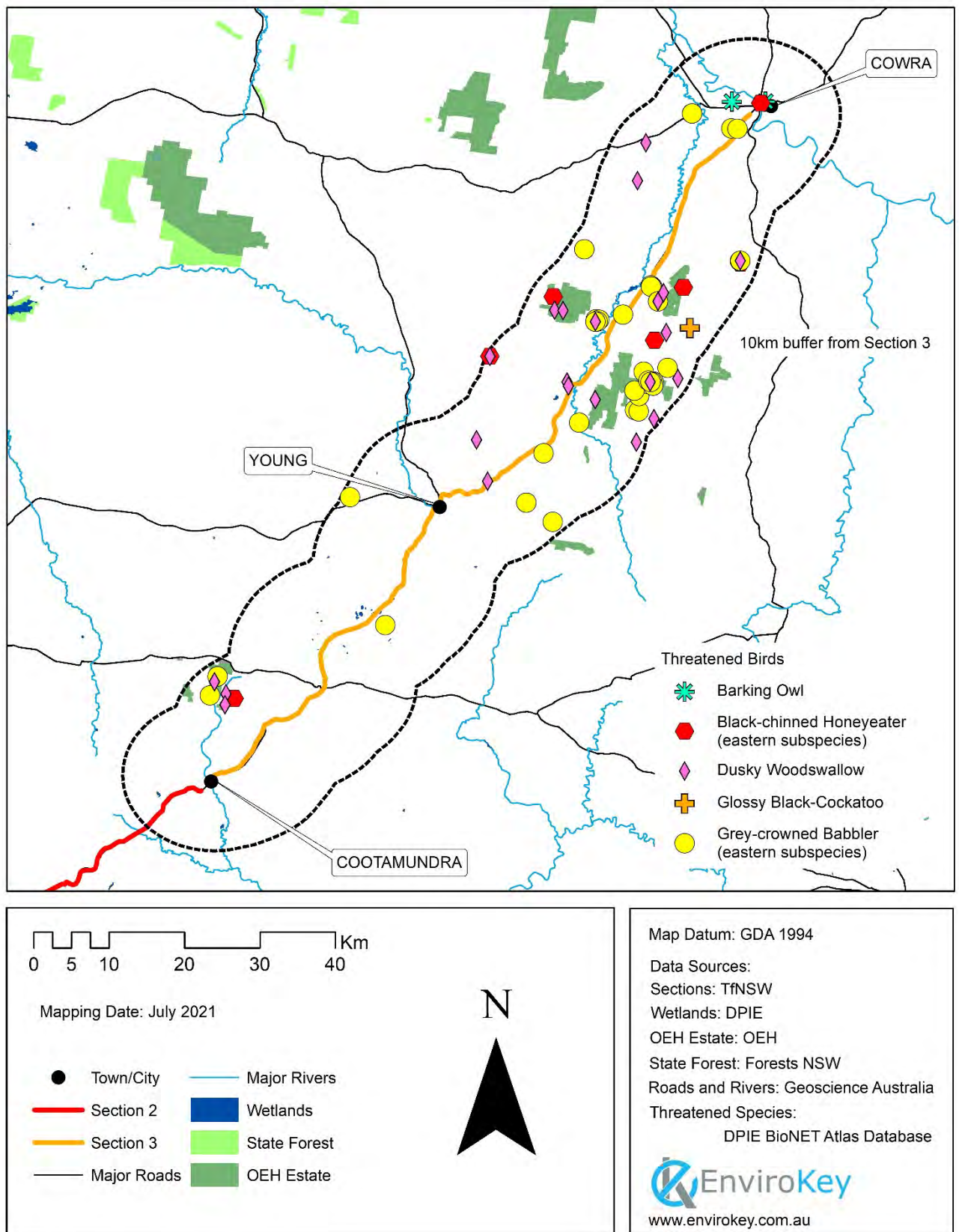


Figure 2-18: Existing threatened species records within section 3 of the proposal

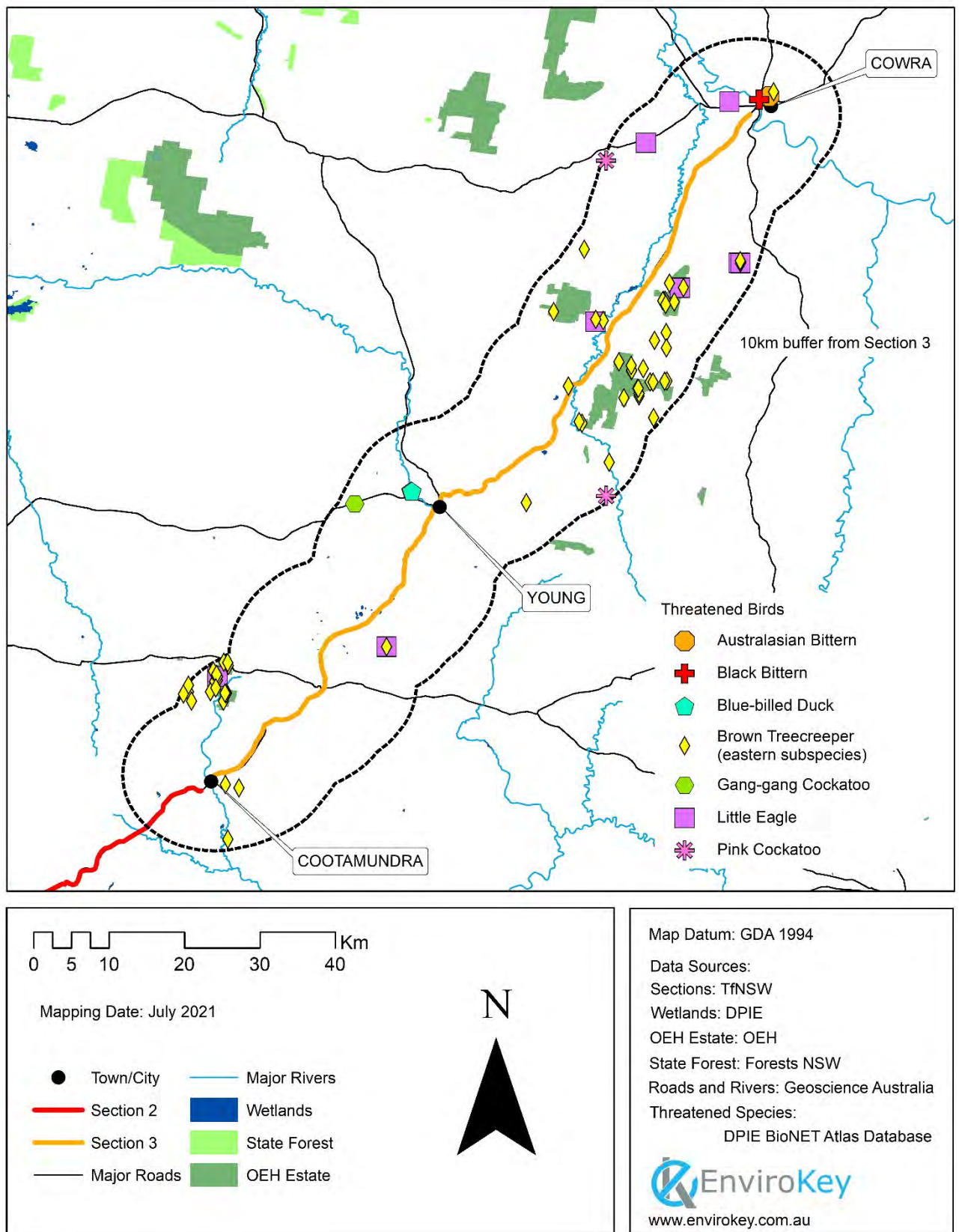


Figure 2-19: Existing threatened species records within section 3 of the proposal

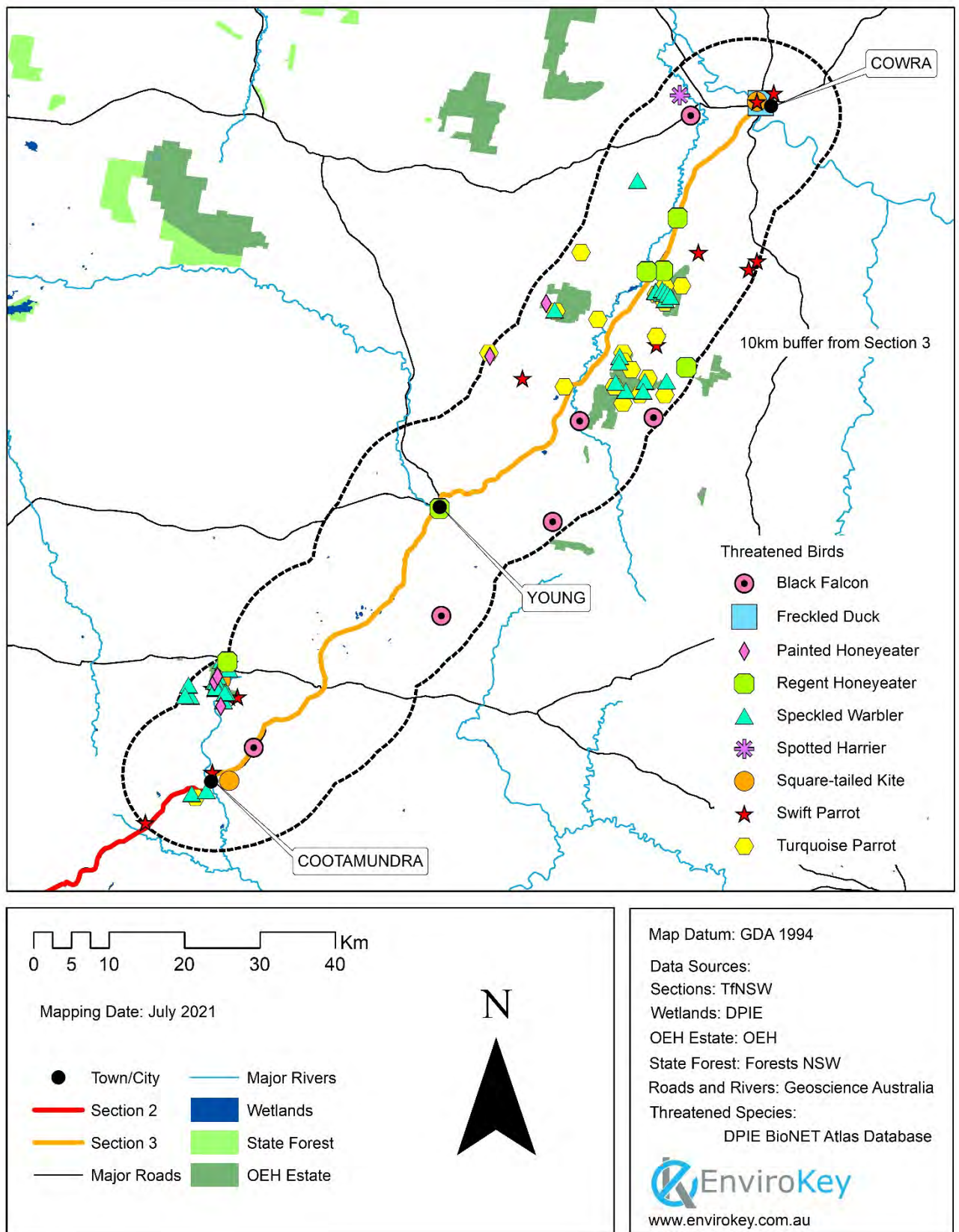


Figure 2-20: Existing threatened species records within section 3 of the proposal

3 Existing environment

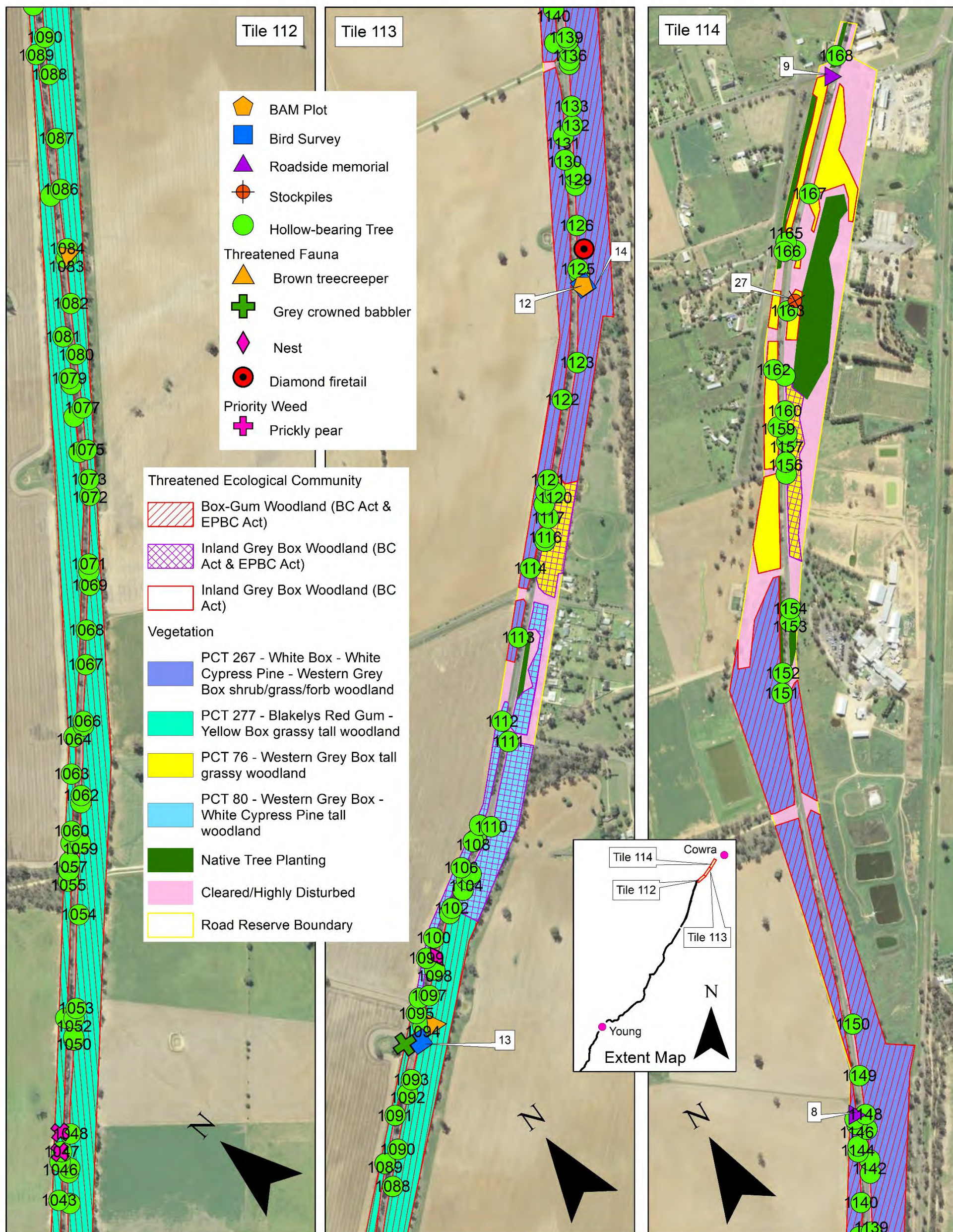
3.1 Plant community types and vegetation zones

The field survey revealed the confirmed presence of 13 PCT and the extent of these is provided in **Figure 3-1** to **Figure 3-38** and summarised in **Table 3-1**. The field survey also revealed extensive inaccuracies in the existing mapping, including large areas of Box-gum Woodland communities (i.e, PCT 277 etc.) were mapped as non-native vegetation. Given this, the accuracy value of the existing vegetation community mapping is doubtful.

Table 3-1: Plant community types and vegetation zones

Plant community type (PCT)	Threatened ecological community	Area (ha)	
		Subject land	Study area
<i>River Red Gum herbaceous-grassy very tall open forest wetland (5) (Moderate-good)</i>	<i>Not a TEC</i>	0.02	29.96
<i>River Red Gum herbaceous-grassy very tall open forest wetland (5) (Low)</i>	<i>Not a TEC</i>	0.0	0.21
<i>Yellow Box-White Cypress Pine grassy woodland (75) (Moderate-good)</i>	<i>Box-gum Woodland (BC Act & EPBC Act)</i>	0.05	4.39
<i>Yellow Box-White Cypress Pine grassy woodland (75) (Low)</i>	<i>Box-gum Woodland (BC Act)</i>	0.0	0.09
<i>Western Grey Box tall grassy woodland (76) (Moderate-Good)</i>	<i>Inland Grey Box Woodland (BC Act & EPBC Act)</i>	1.91	27.52
<i>Western Grey Box tall grassy woodland (76) (Low)</i>	<i>Inland Grey Box Woodland (BC Act)</i>	0.45	6.1
<i>River Red Gum shrub/grass riparian tall woodland or open forest wetland (79) (Moderate-good)</i>	<i>Not a TEC</i>	0.26	5.82
<i>River Red Gum shrub/grass riparian tall woodland or open forest wetland (79) (Low)</i>	<i>Not a TEC</i>	0	0.11
<i>Western Grey Box – White Cypress Pine tall woodland (80) (Moderate-good)</i>	<i>Inland Grey Box Woodland (BC Act & EPBC Act)</i>	1.21	37.76
<i>Western Grey Box – White Cypress Pine tall woodland (80) (Low)</i>	<i>Inland Grey Box Woodland (BC Act)</i>	0.01	0.28

Plant community type (PCT)	Threatened ecological community	Area (ha)	
		Subject land	Study area
<i>Western Grey Box – White Cypress Pine shrubby (110) (Moderate-good)</i>	<i>Inland Grey Box Woodland (BC Act & EPBC Act)</i>	0	0.73
<i>Dwyers Red Gum – Black Cypress Pine – Currawang shrubby low woodland (186) (Moderate-good)</i>	<i>Not a TEC</i>	0	13.69
<i>Mugga Ironbark – Western Grey Box – cypress pine tall woodland (217) (Moderate-good)</i>	<i>Not a TEC</i>	0.8	13.11
<i>Mugga Ironbark – Western Grey Box – cypress pine tall woodland (217) (Low)</i>	<i>Not a TEC</i>	0	0.7
<i>White Box grassy woodland (266) (Moderate-good)</i>	<i>Box-gum Woodland (BC Act & EPBC Act)</i>	0.17	2.03
<i>White Box grassy woodland (266) (Low)</i>	<i>Box-gum Woodland (BC Act)</i>	0.22	1.54
<i>White Box – White Cypress Pine – Western Grey Box shrub/grass/forb woodland (267) (Moderate-good)</i>	<i>Box-gum Woodland (BC Act & EPBC Act)</i>	0.59	36.93
<i>White Box – White Cypress Pine – Western Grey Box shrub/grass/forb woodland (267) (Low)</i>	<i>Box-gum Woodland (BC Act)</i>	0.03	0.4
<i>Yellow Box grassy tall woodland (276) (Moderate-good)</i>	<i>Box-gum Woodland (BC Act & EPBC Act)</i>	0.58	41.76
<i>Blakely's Red Gum – Yellow Box grassy tall woodland (277) (Moderate-good)</i>	<i>Box-gum Woodland (BC Act & EPBC Act)</i>	13.72	406.09
<i>Blakely's Red Gum – Yellow Box grassy tall woodland (277) (Low)</i>	<i>Box-gum Woodland (BC Act)</i>	5.71	37.72
<i>Black Cypress Pine – Red Stringybark – red gum – box low open forest (309) (Moderate-good)</i>	<i>Not a TEC</i>	0.01	0.55



Mapping Date: May 2022

Map Coordinate System: GDA94, MGA Zone 55

0 0.125 0.25 0.5 0.75 1 Km

Data Sources:

Proposed Impact Area: Transport

Proposed Culvert Works: Transport

Road Reserve Boundary: Transport

Vegetation, Other Survey Data: Envirokey

Aerial Imagery: SIX Maps (NSW Govt)



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

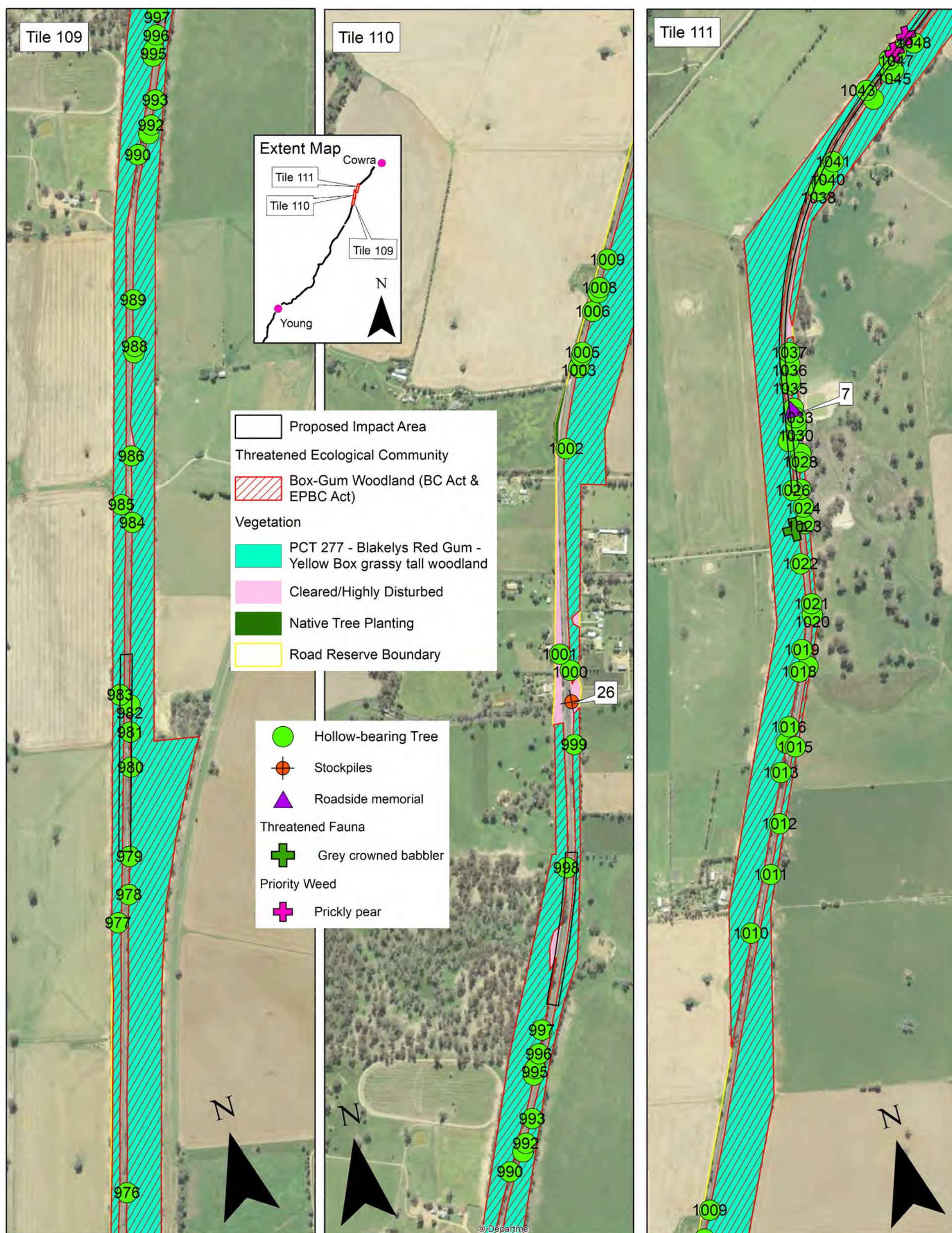
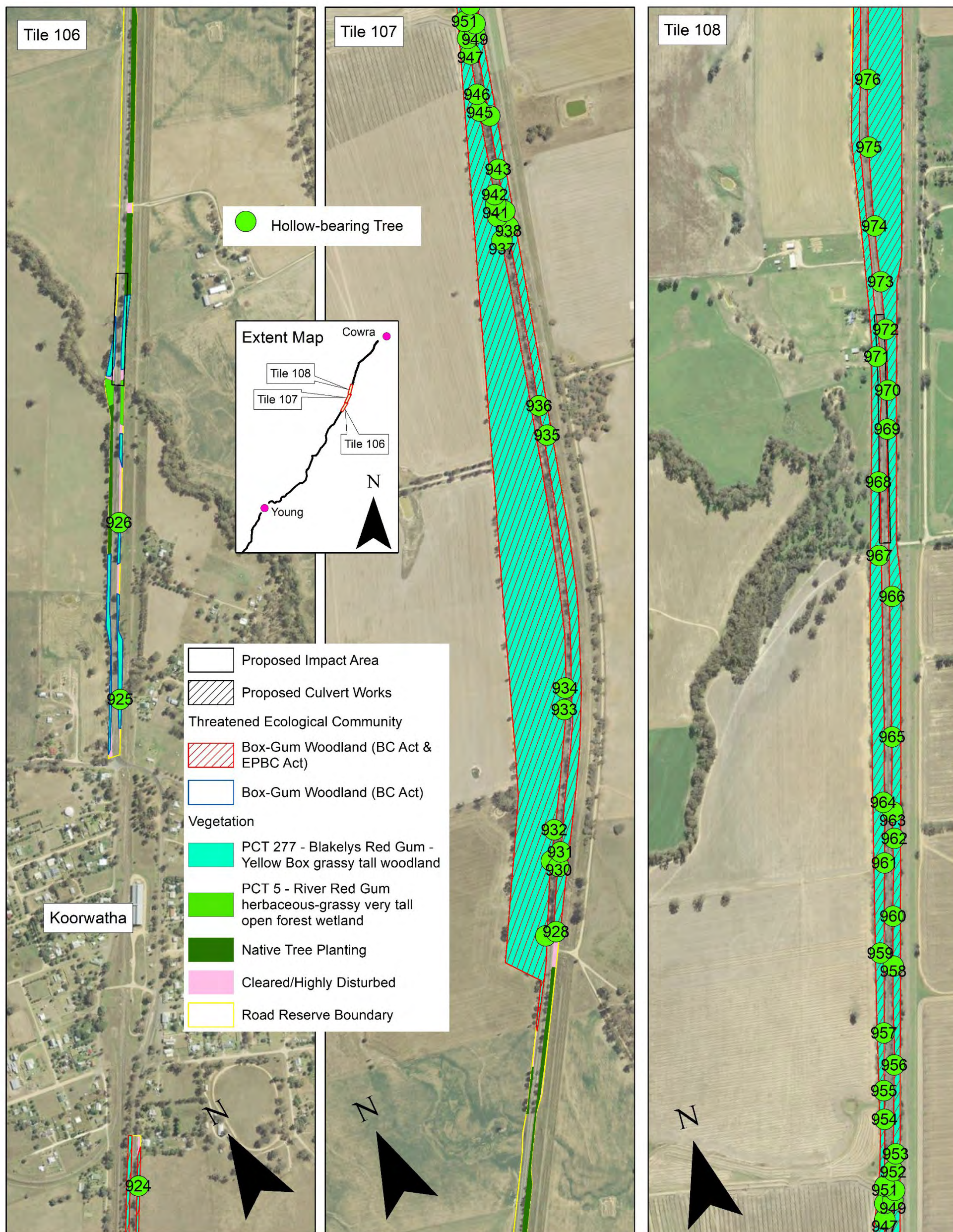


Figure 3-2: Plant community types and other points of interest within the study area



Mapping Date: May 2022

Map Coordinate System: GDA94, MGA Zone 55

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Data Sources:

Proposed Impact Area: Transport

Proposed Culvert Works: Transport

Road Reserve Boundary: Transport

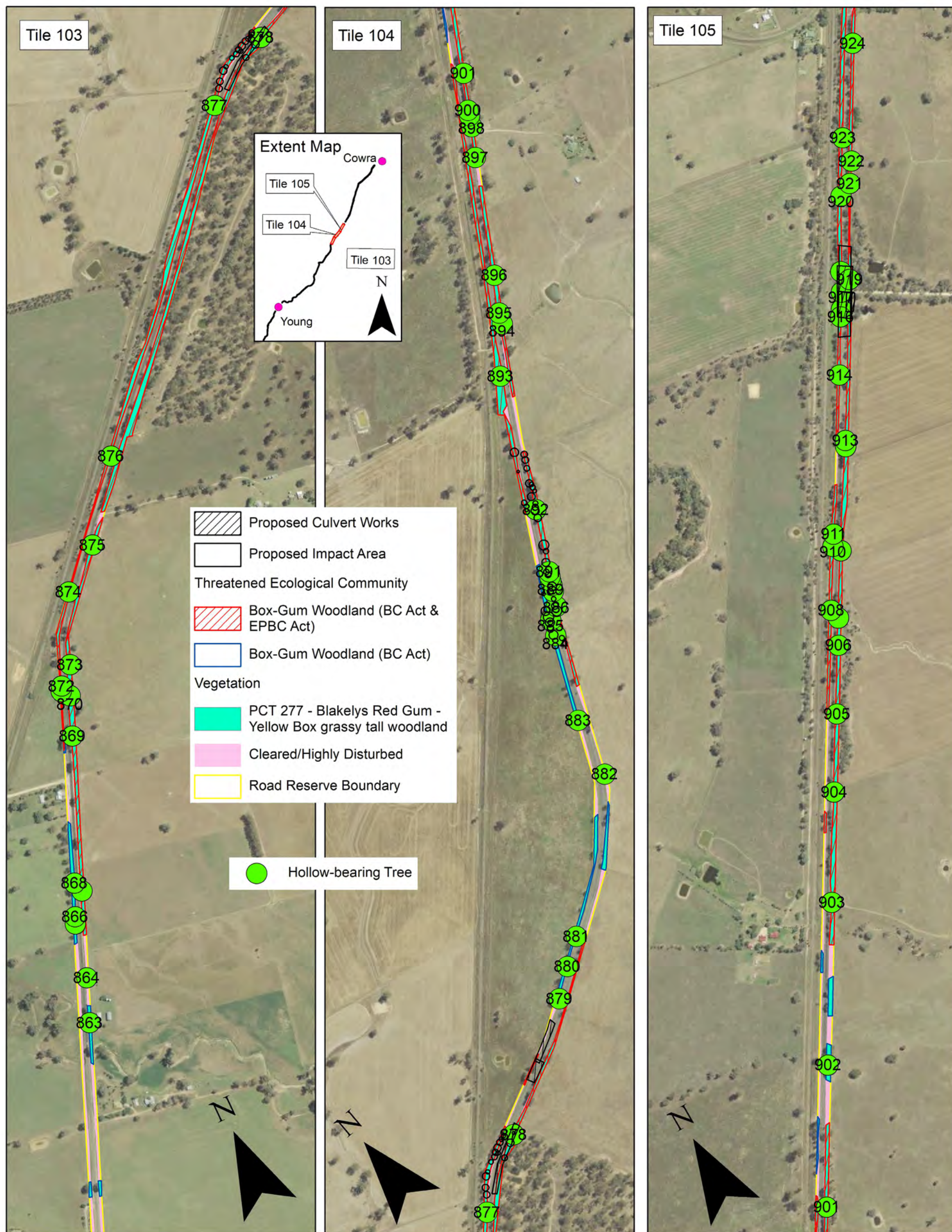
Vegetation, Other Survey Data: Envirokey

Aerial Imagery: SIX Maps (NSW Govt)



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



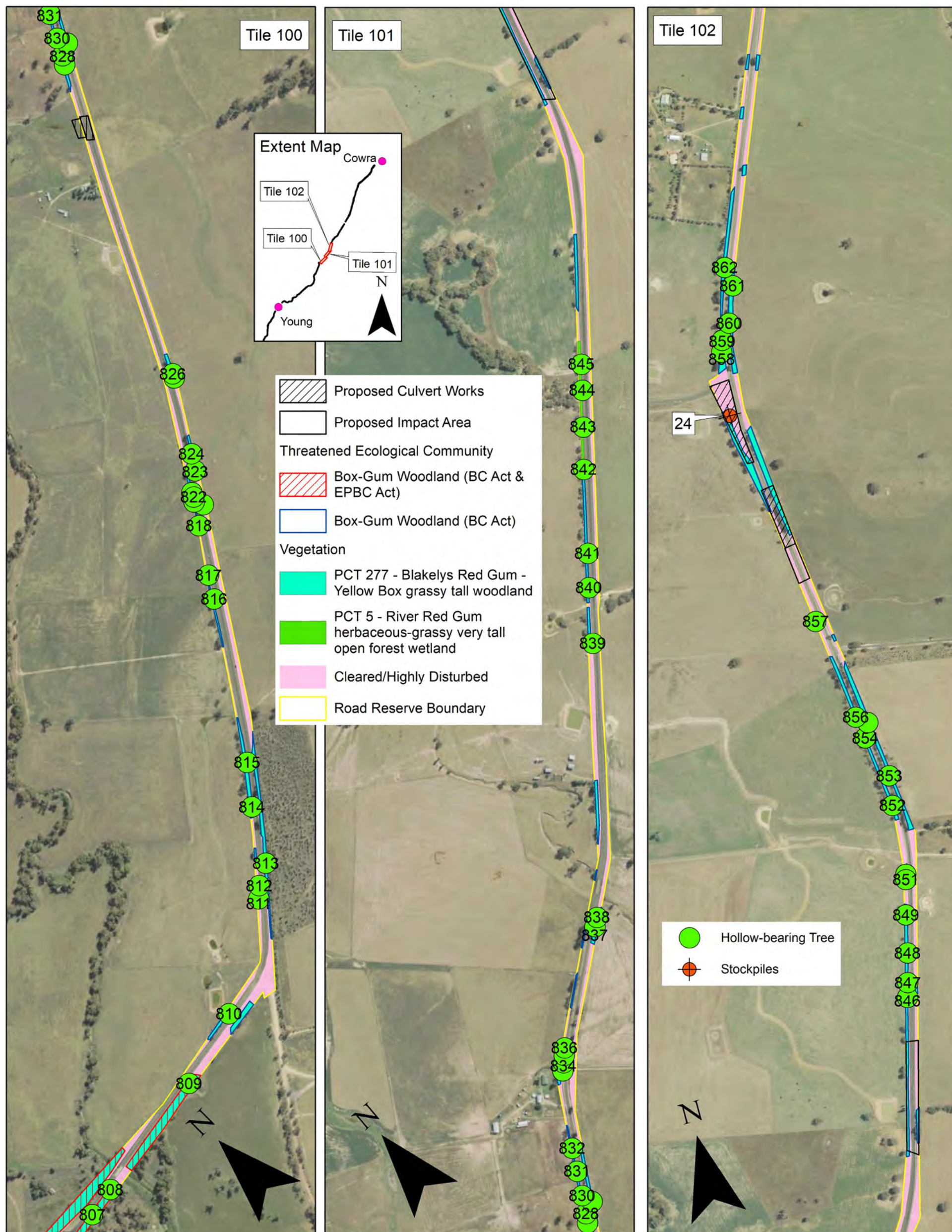
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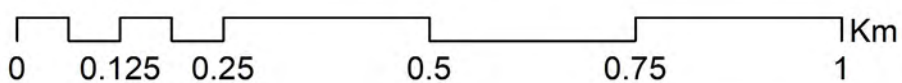
Data Sources:
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 Proposed Culvert Works: Transport
 Road Reserve Boundary: Transport
 Vegetation, Other Survey Data: Envirokey
 Aerial Imagery: SIX Maps (NSW Govt)

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

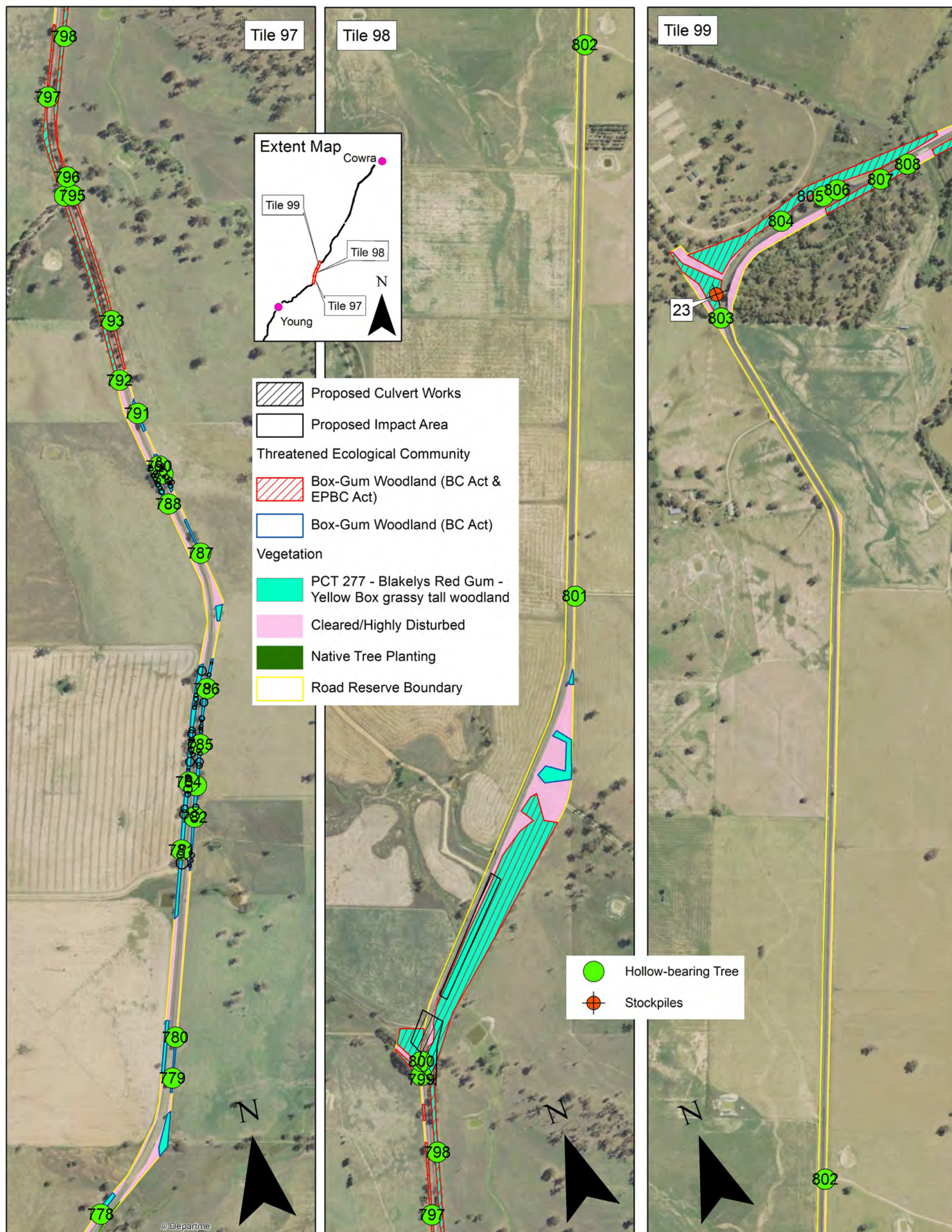


Mapping Date: November 2022
 Map Coordinate System: GDA94, MGA Zone 55



Data Sources:
 Proposed Impact Area: Transport
 Proposed Culvert Works: Transport
 Road Reserve Boundary: Transport
 Vegetation, Other Survey Data: Envirokey
 Aerial Imagery: SIX Maps (NSW Govt)

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



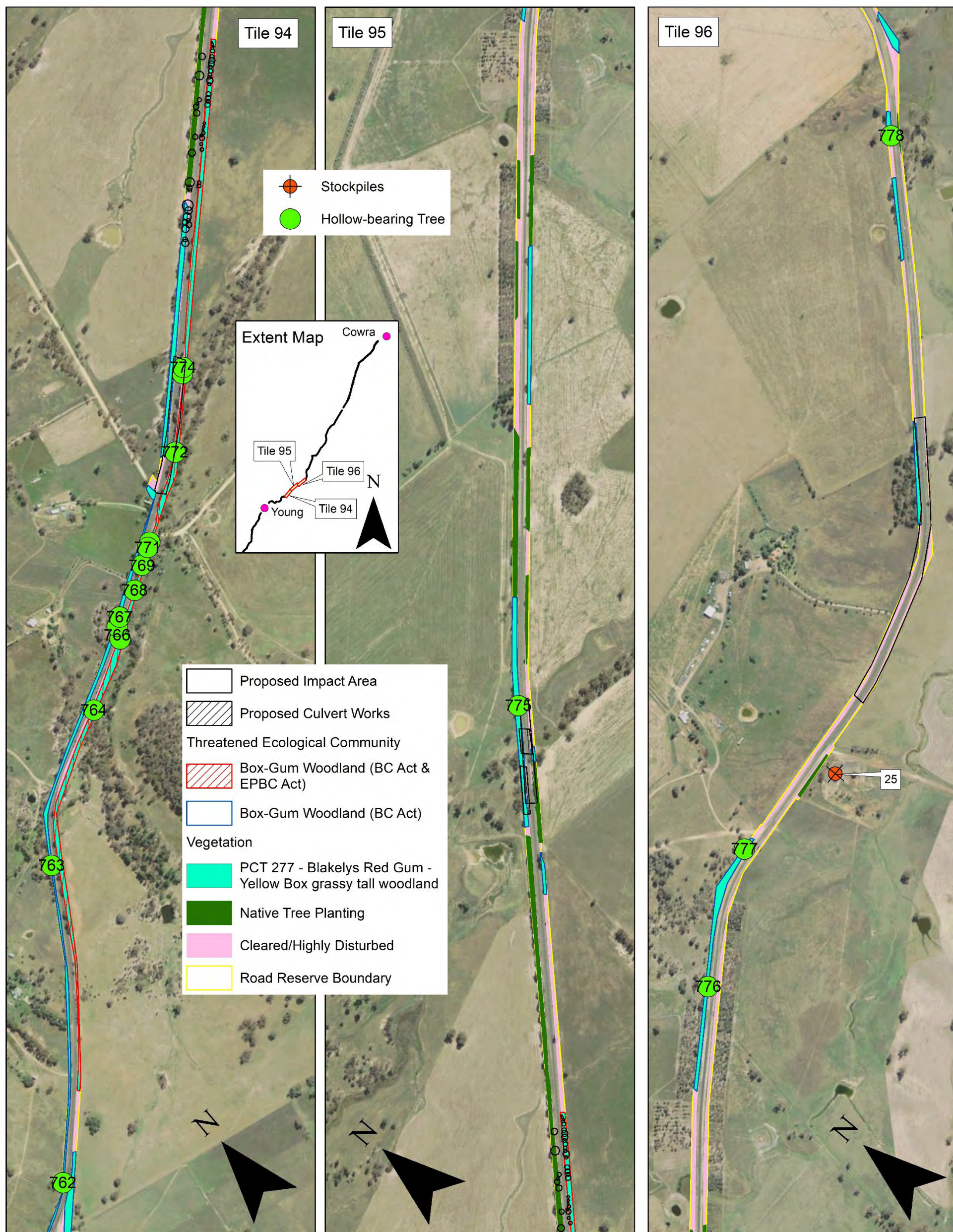
Mapping Date: November 2022
 Map Coordinate System: GDA94, MGA Zone 55

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Data Sources:
 Proposed Impact Area: Transport
 Proposed Culvert Works: Transport
 Road Reserve Boundary: Transport
 Vegetation, Other Survey Data: Envirokey
 Aerial Imagery: SIX Maps (NSW Govt)

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



Mapping Date: May 2022
 Map Coordinate System: GDA94, MGA Zone 55

Data Sources:
 Proposed Impact Area: Transport
 Proposed Culvert Works: Transport
 Road Reserve Boundary: Transport
 Vegetation, Other Survey Data: Envirokey
 Aerial Imagery: SIX Maps (NSW Govt)

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

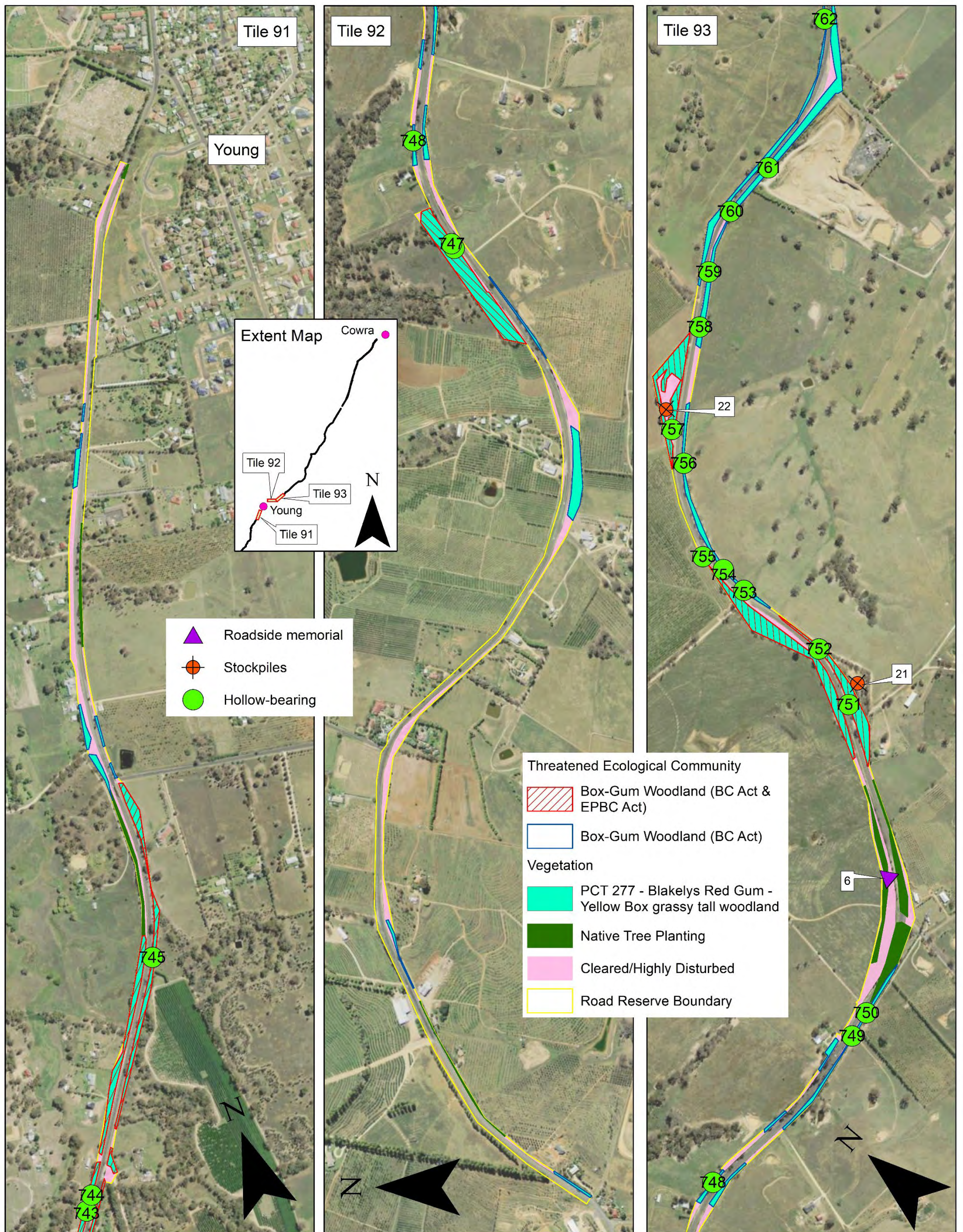
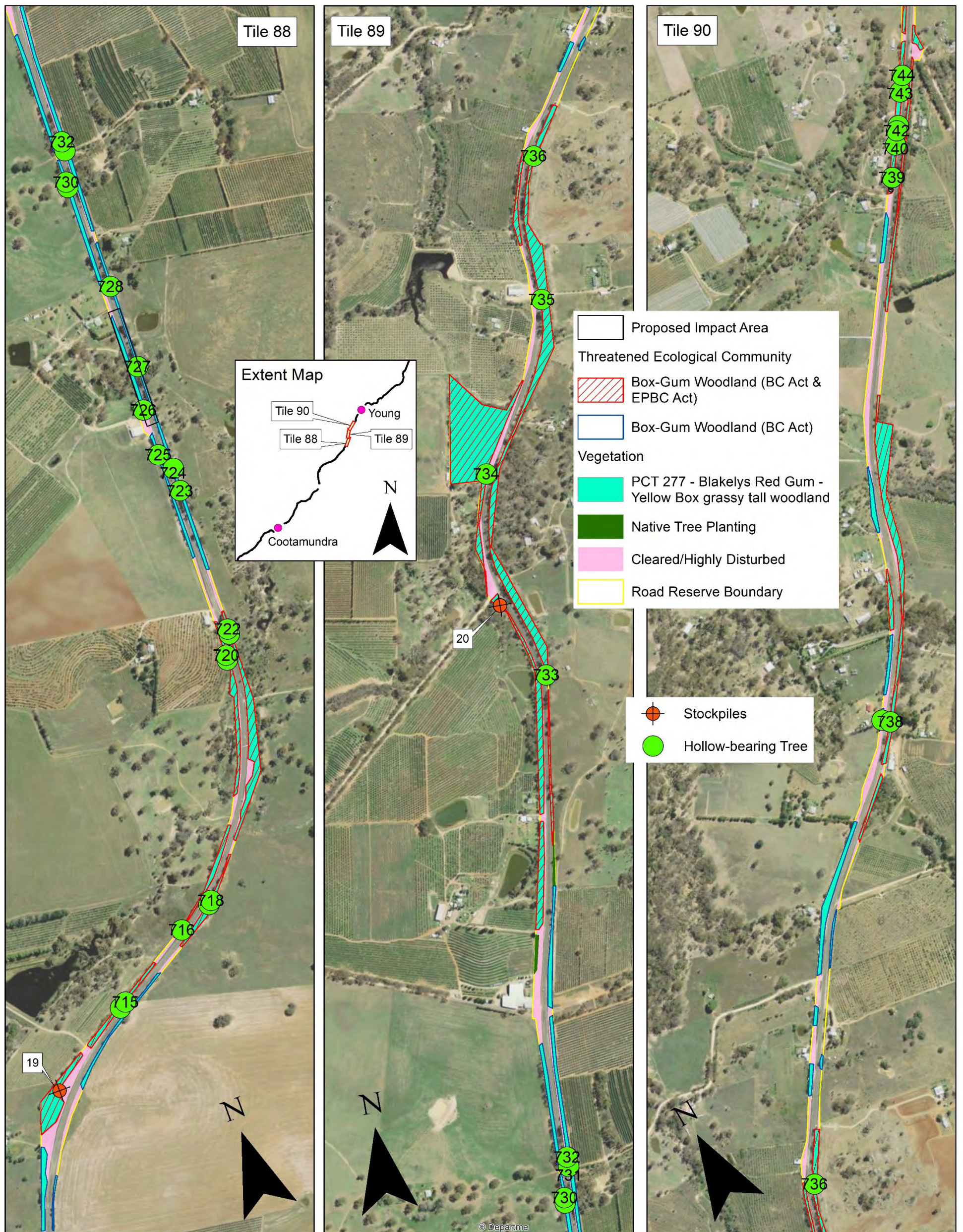


Figure 3-8: Plant community types and other points of interest within the study area



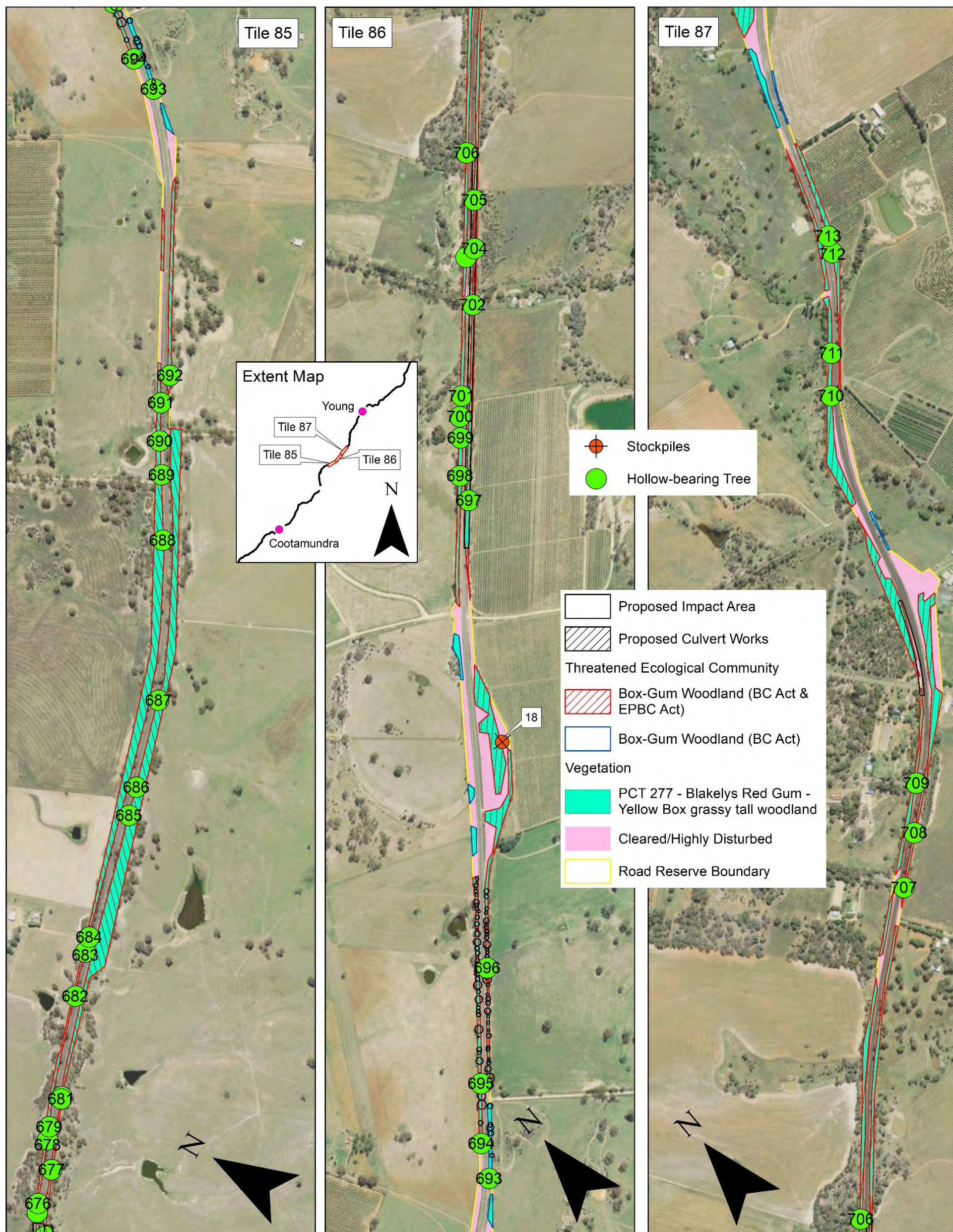
Mapping Date: May 2022
Map Coordinate System: GDA94, MGA Zone 55

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Data Sources:
Proposed Impact Area: Transport
Proposed Culvert Works: Transport
Road Reserve Boundary: Transport
Vegetation, Other Survey Data: Envirokey
Aerial Imagery: SIX Maps (NSW Govt)

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



Mapping Date: May 2022
 Map Coordinate System: GDA94, MGA Zone 55

Data Sources:
 Proposed Impact Area: Transport
 Proposed Culvert Works: Transport
 Road Reserve Boundary: Transport
 Vegetation, Other Survey Data: Envirokey
 Aerial Imagery: SIX Maps (NSW Govt)

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

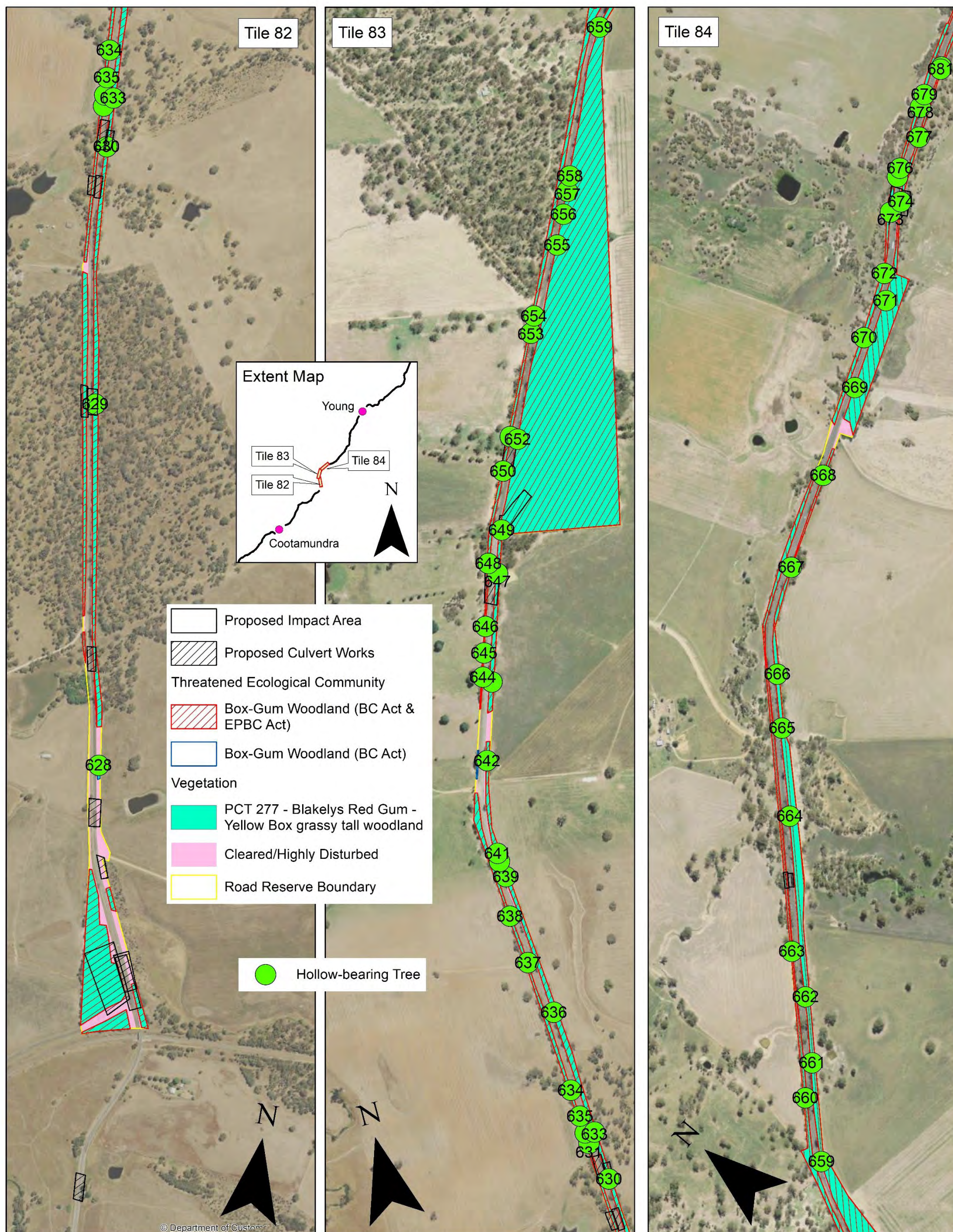
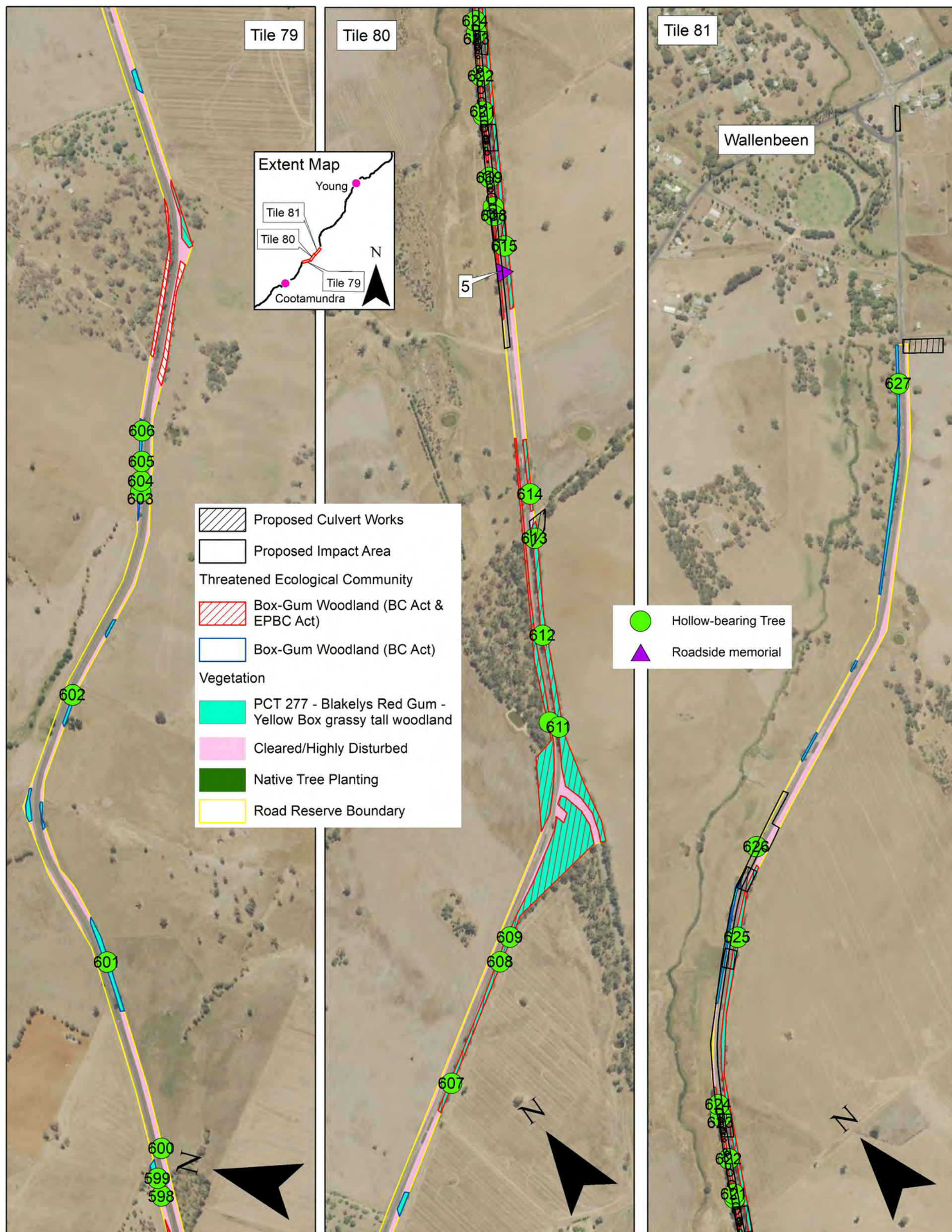


Figure 3-11: Plant community types and other points of interest within the study area



Mapping Date: November 2022
 Map Coordinate System: GDA94, MGA Zone 55

Data Sources:
 Proposed Impact Area: Transport
 Proposed Culvert Works: Transport
 Road Reserve Boundary: Transport
 Vegetation, Other Survey Data: Envirokey
 Aerial Imagery: SIX Maps (NSW Govt)

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

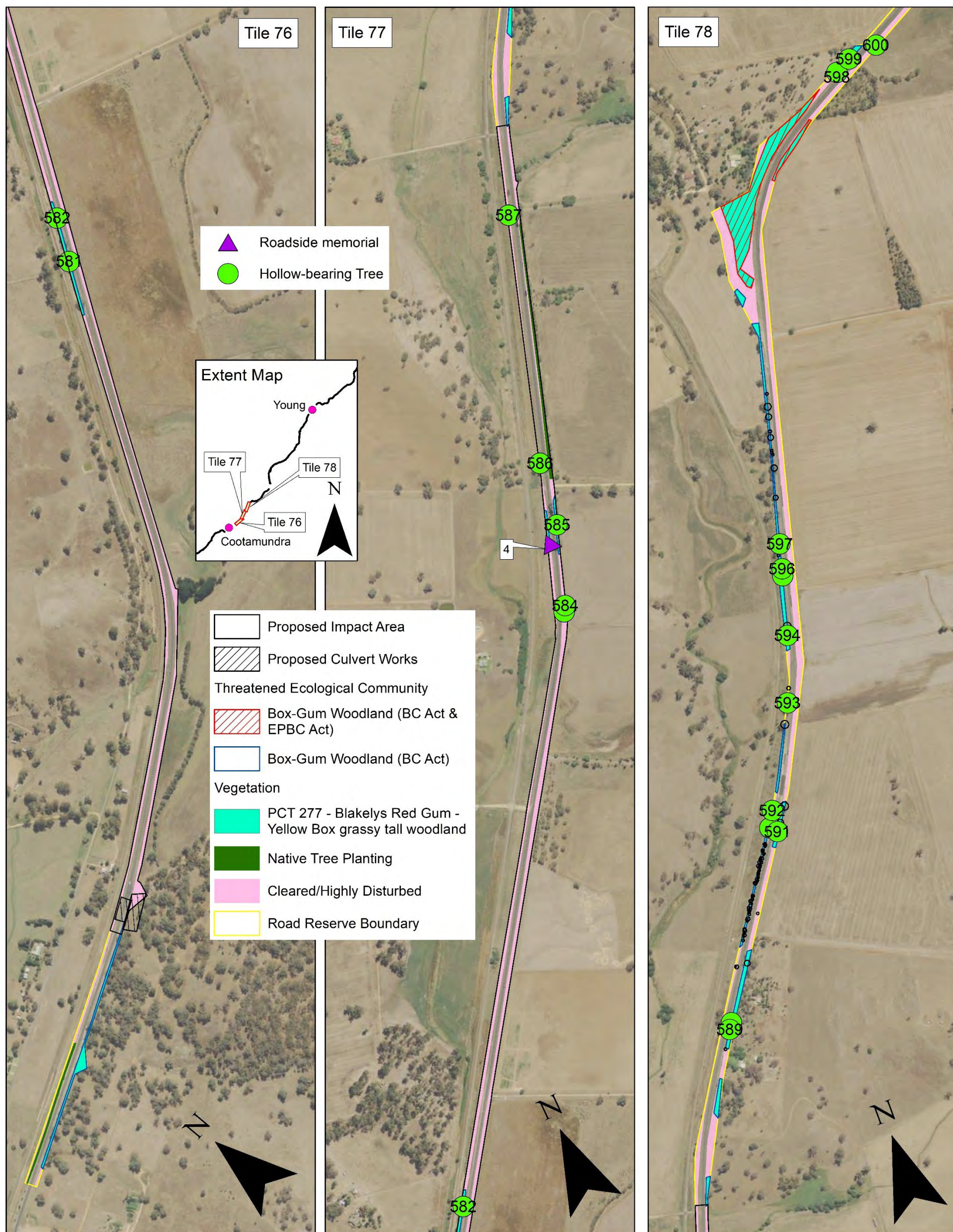
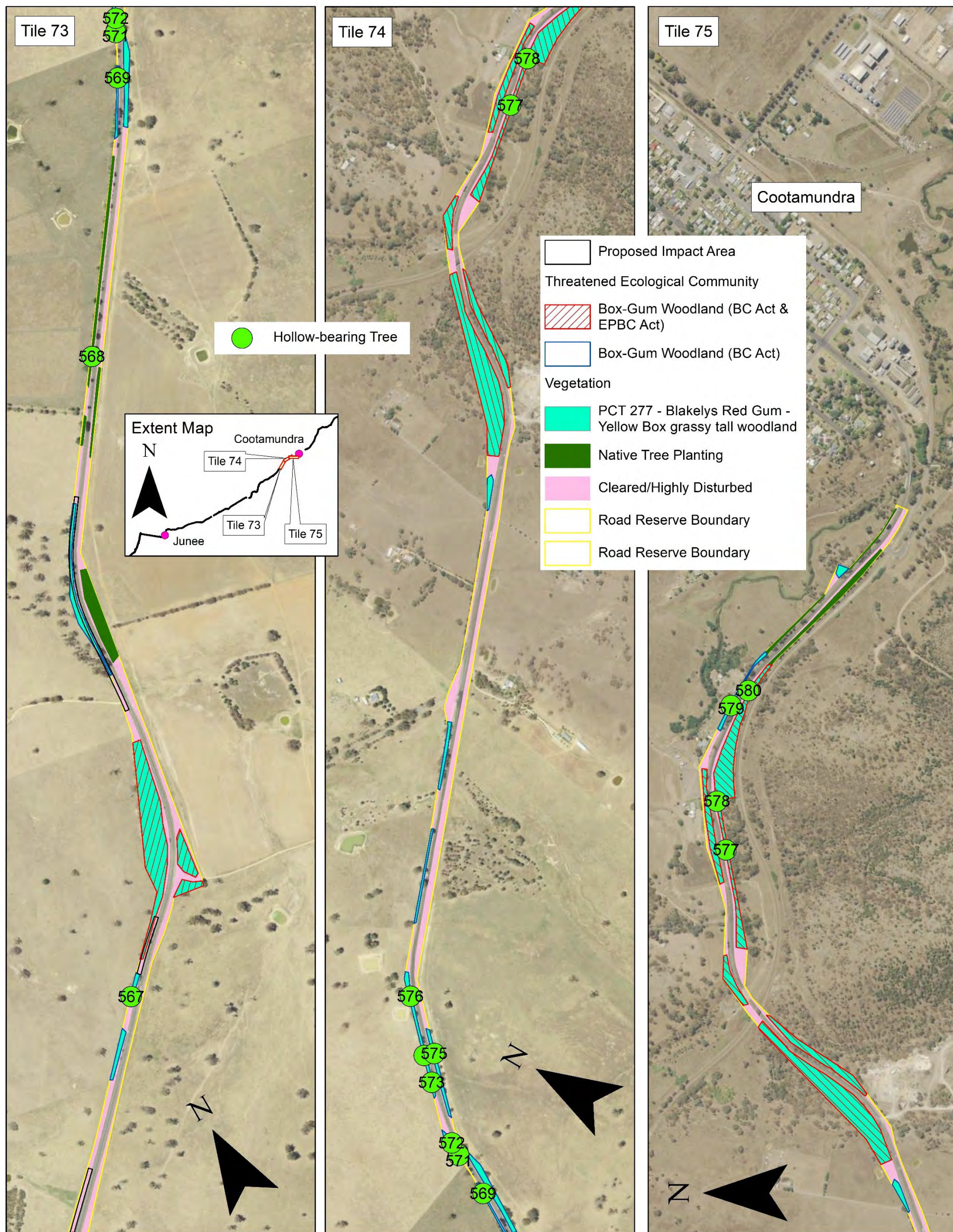


Figure 3-13: Plant community types and other points of interest within the study area



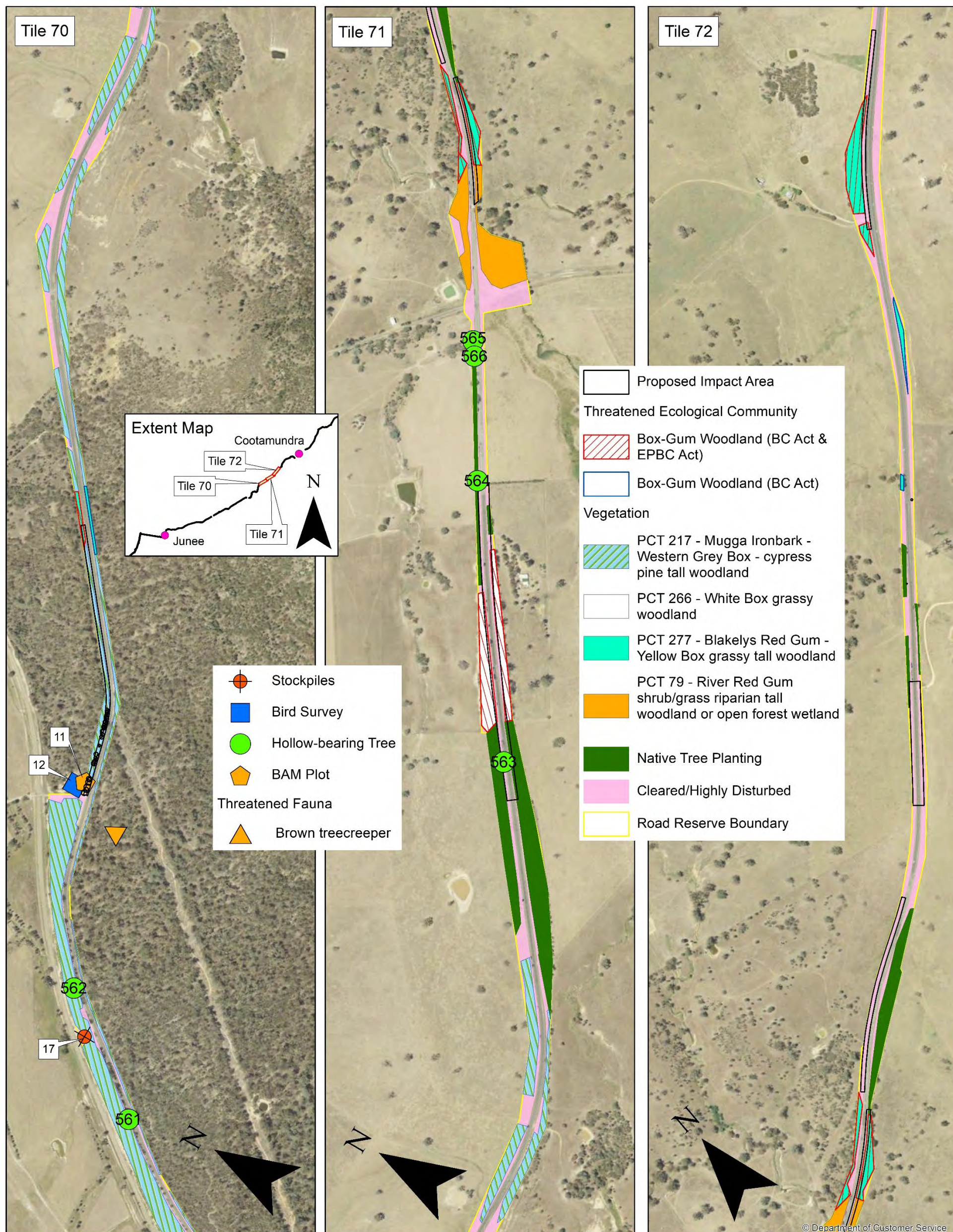
Mapping Date: May 2022
Map Coordinate System: GDA94, MGA Zone 55

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Data Sources:
Proposed Impact Area: Transport
Proposed Culvert Works: Transport
Road Reserve Boundary: Transport
Vegetation, Other Survey Data: Envirokey
Aerial Imagery: SIX Maps (NSW Govt)

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

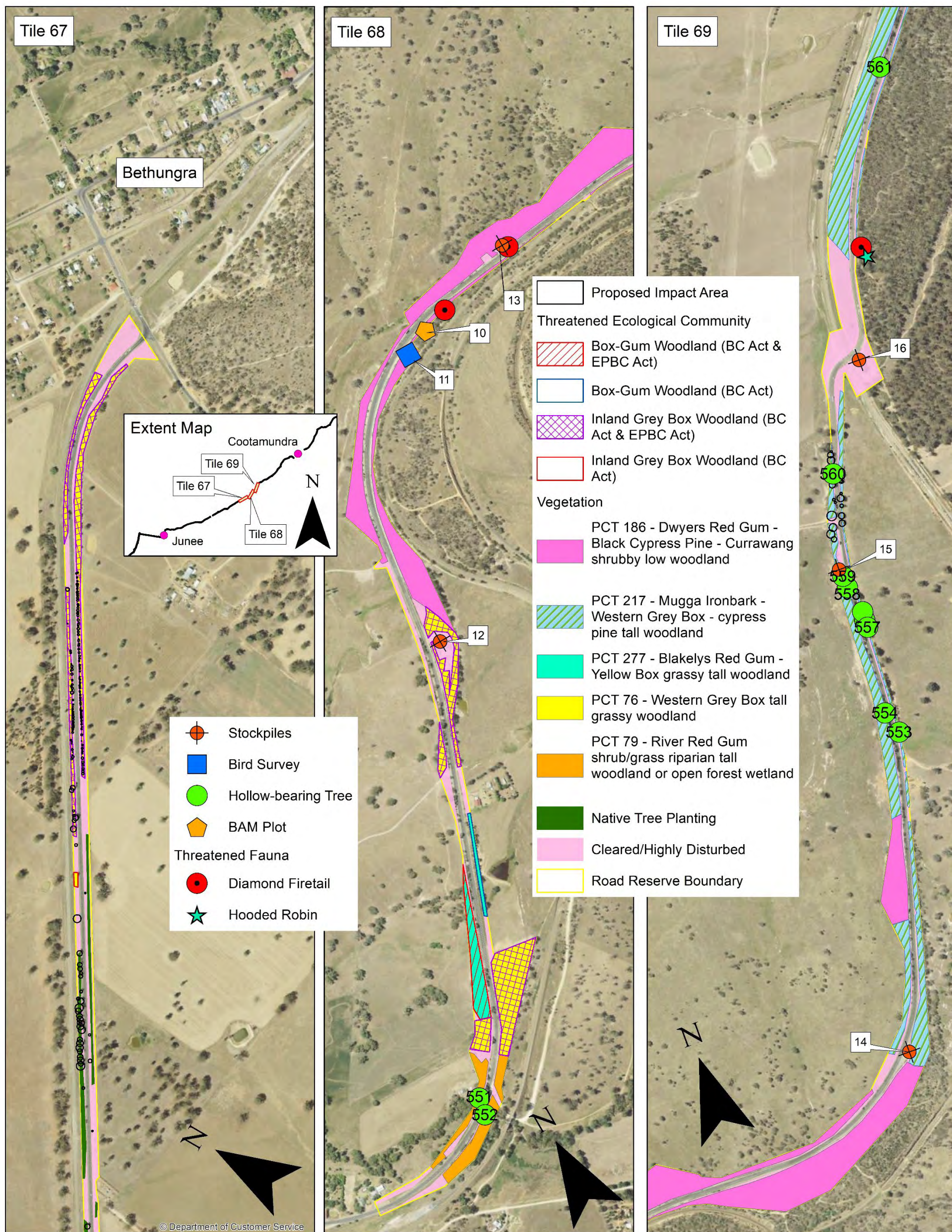


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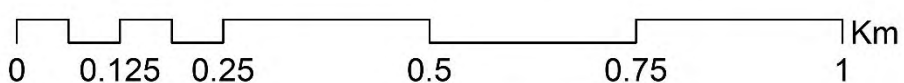
Data Sources:
Proposed Impact Area: Transport
Proposed Culvert Works: Transport
Road Reserve Boundary: Transport
Vegetation, Other Survey Data: Envirokey
Aerial Imagery: SIX Maps (NSW Govt)

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



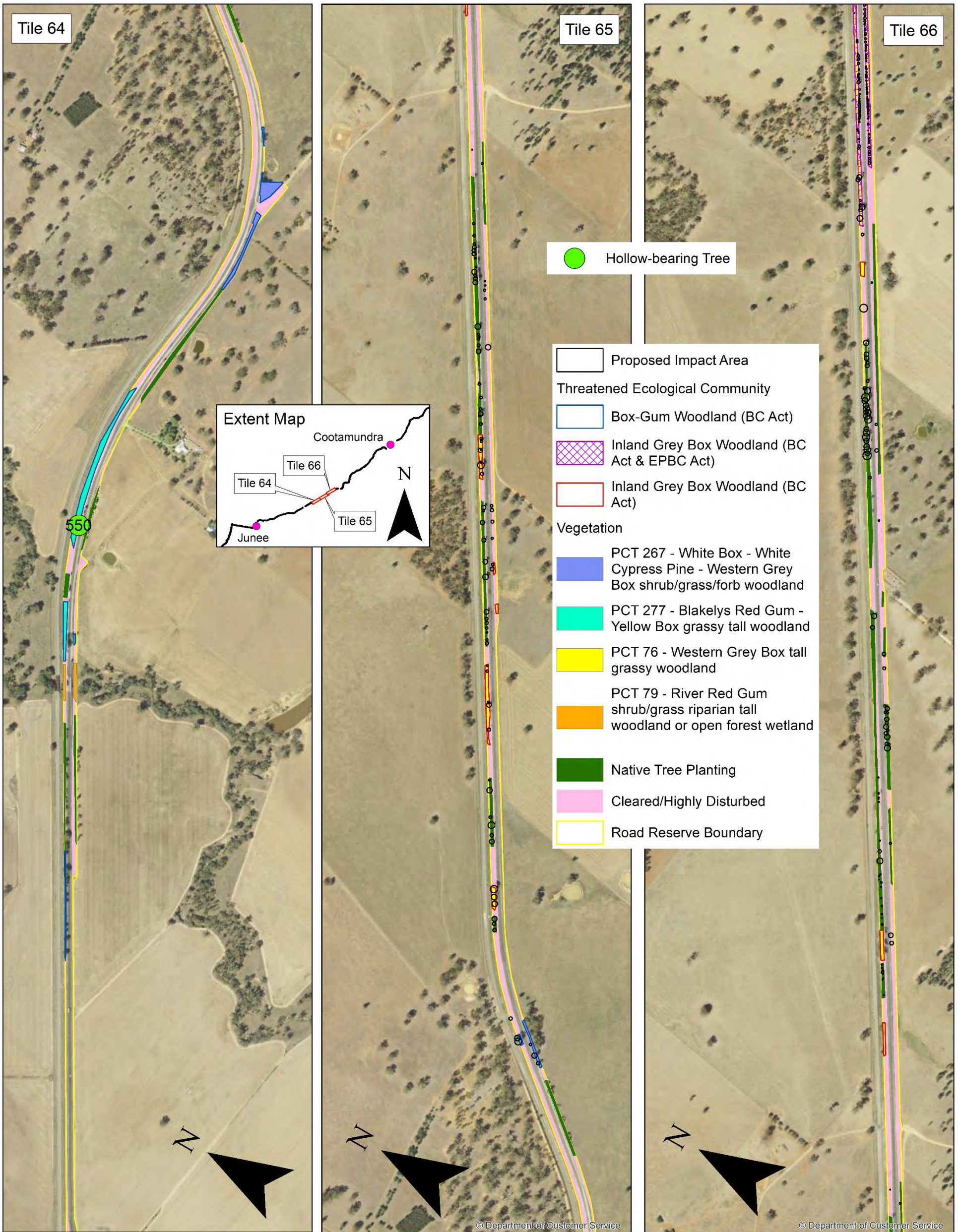
Mapping Date: May 2022
Map Coordinate System: GDA94, MGA Zone 55



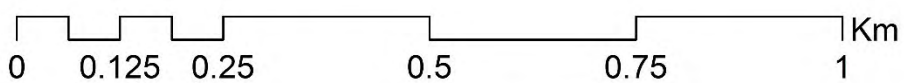
Data Sources:
Proposed Impact Area: Transport
Proposed Culvert Works: Transport
Road Reserve Boundary: Transport
Vegetation, Other Survey Data: Envirokey
Aerial Imagery: SIX Maps (NSW Govt)

EnviroKey
www.envirokey.com.au

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



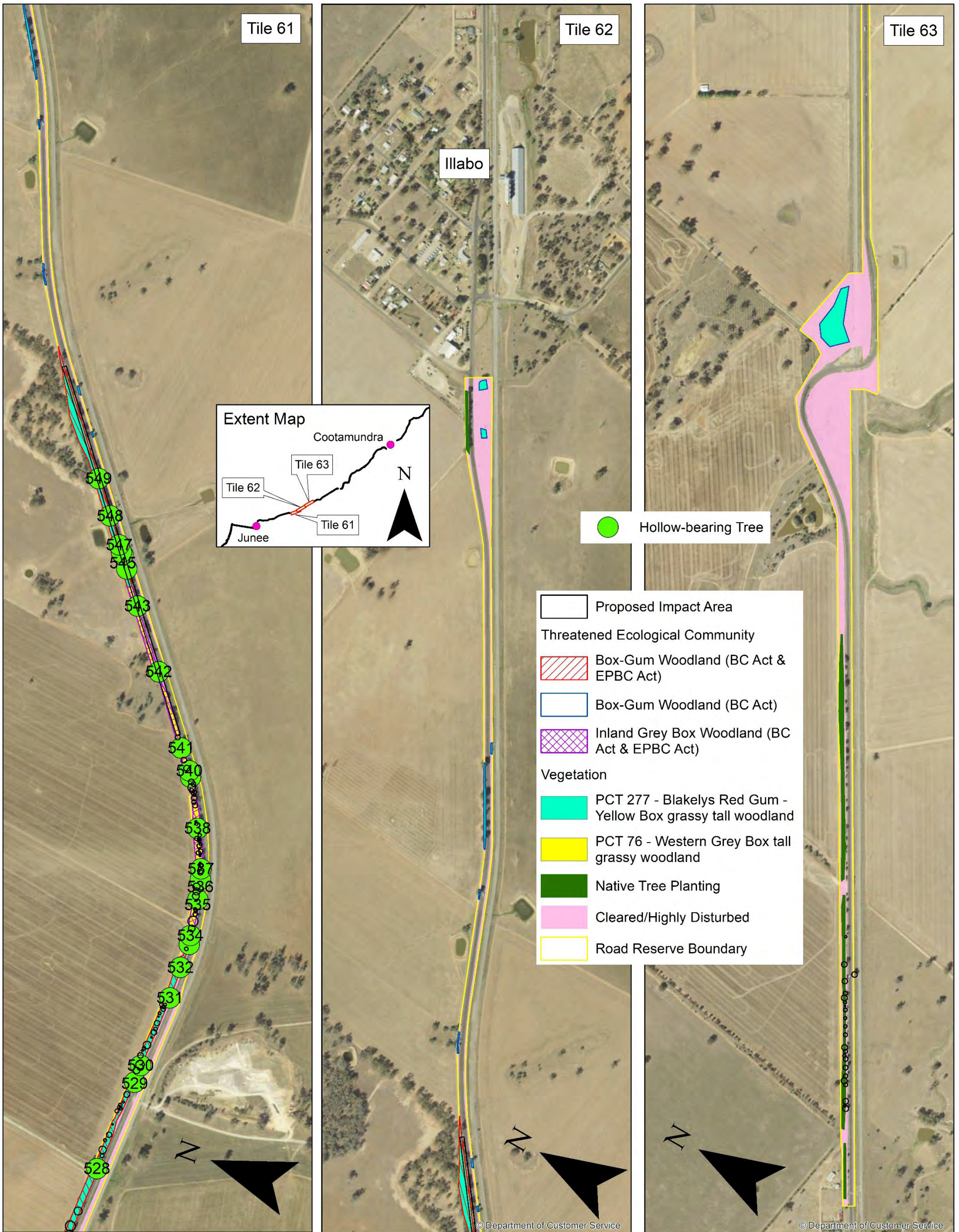
Mapping Date: May 2022
 Map Coordinate System: GDA94, MGA Zone 55



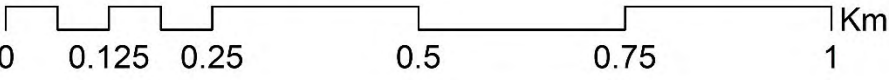
Data Sources:
 Proposed Impact Area: Transport
 Proposed Culvert Works: Transport
 Road Reserve Boundary: Transport
 Vegetation, Other Survey Data: Envirokey
 Aerial Imagery: SIX Maps (NSW Govt)

EnviroKey
www.envirokey.com.au

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



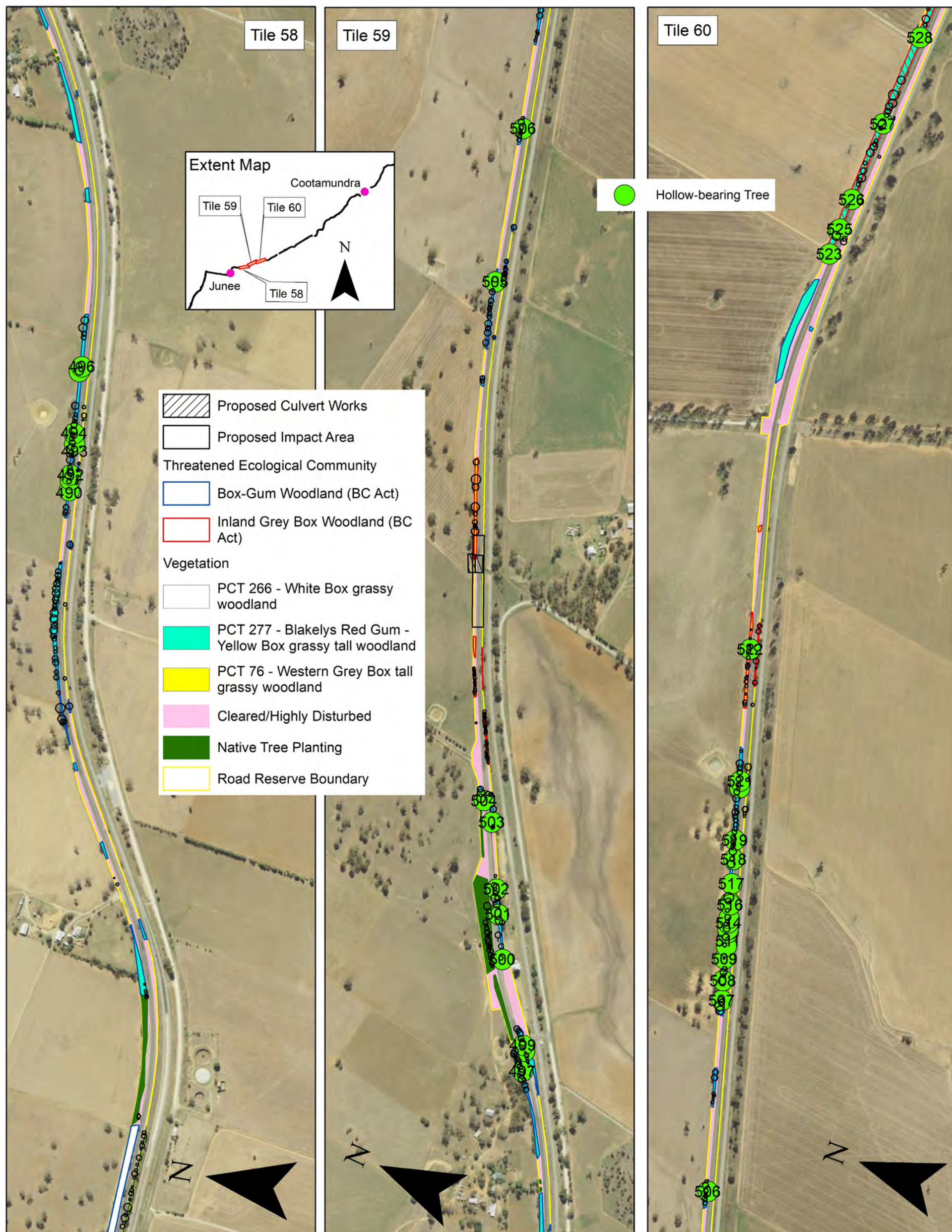
Mapping Date: May 2022
 Map Coordinate System: GDA94, MGA Zone 55



Data Sources:
 Proposed Impact Area: Transport
 Proposed Culvert Works: Transport
 Road Reserve Boundary: Transport
 Vegetation, Other Survey Data: Envirokey
 Aerial Imagery: SIX Maps (NSW Govt)

EnviroKey
www.envirokey.com.au

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



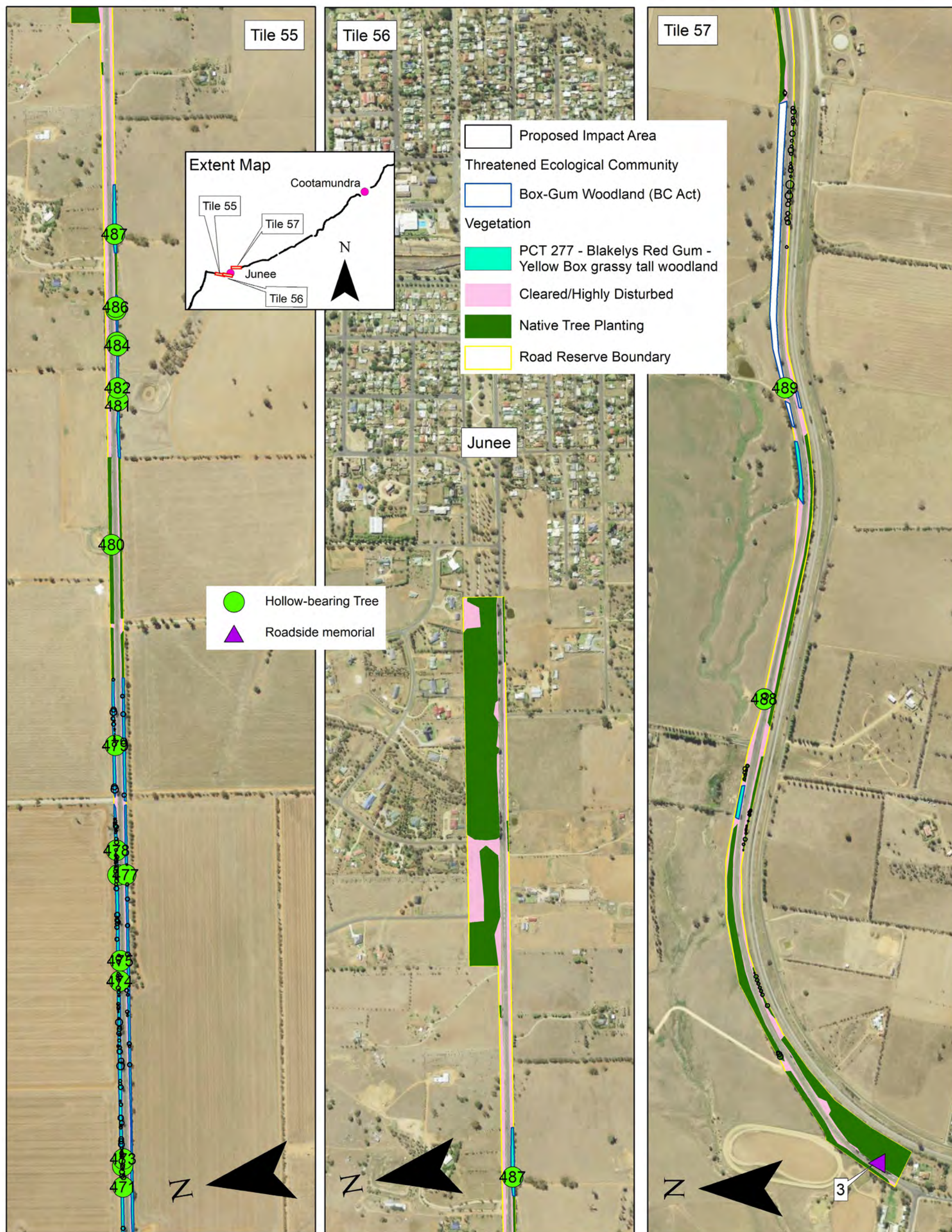
Mapping Date: November 2022
 Map Coordinate System: GDA94, MGA Zone 55

0 0.125 0.25 0.5 0.75 1 Km

Data Sources:
 Proposed Impact Area: Transport
 Proposed Culvert Works: Transport
 Road Reserve Boundary: Transport
 Vegetation, Other Survey Data: Envirokey
 Aerial Imagery: SIX Maps (NSW Govt)

EnviroKey
 www.envirokey.com.au

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

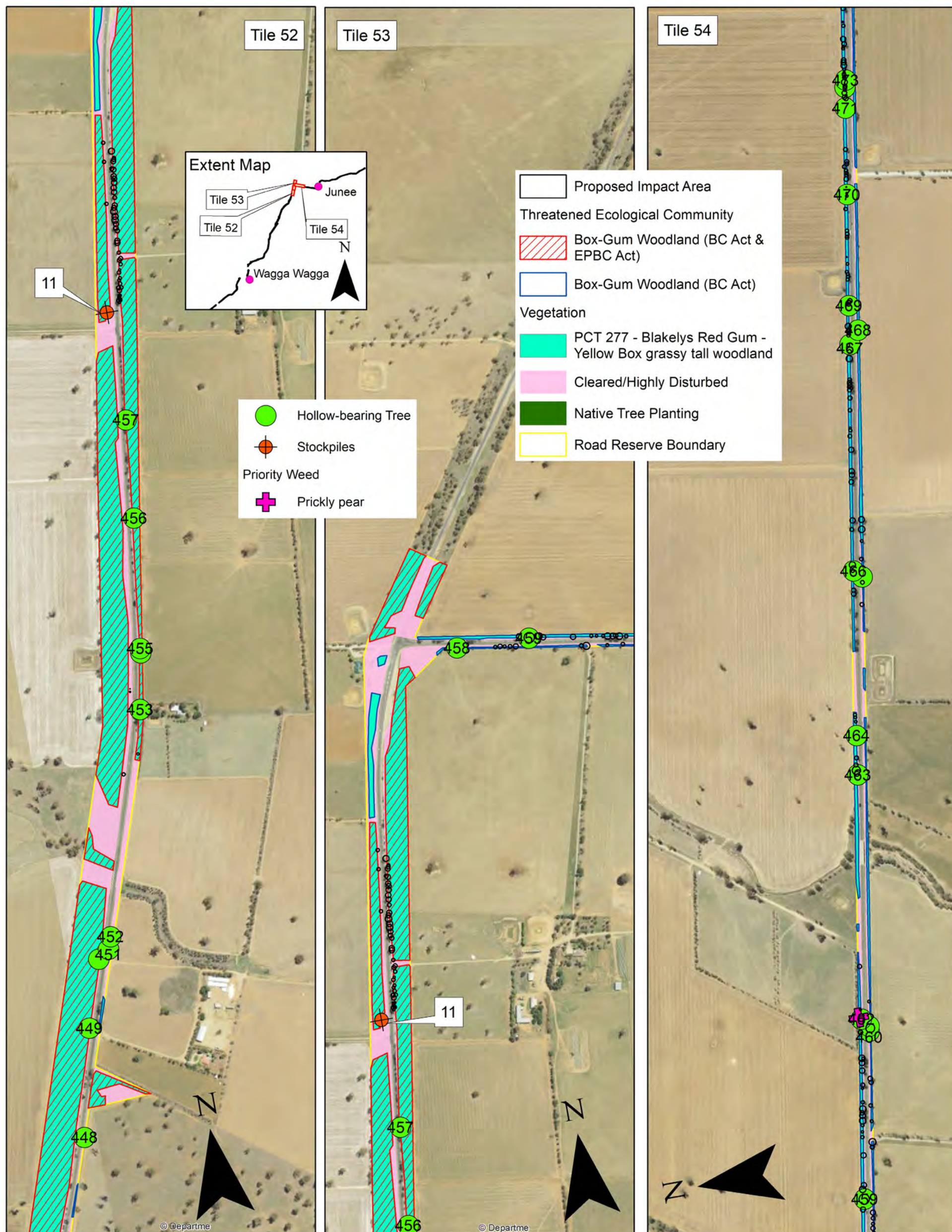


Mapping Date: November 2022
Map Coordinate System: GDA94, MGA Zone 55

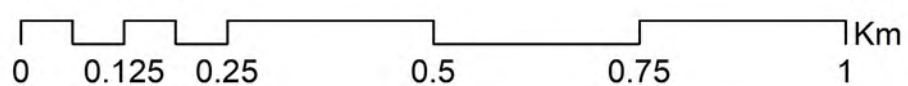
Data Sources:
Proposed Impact Area: Transport
Proposed Culvert Works: Transport
Road Reserve Boundary: Transport
Vegetation, Other Survey Data: Envirokey
Aerial Imagery: SIX Maps (NSW Govt)

 EnviroKey
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Figure 3-20: Plant community types and other points of interest within the study area



Mapping Date: November 2022
Map Coordinate System: GDA94, MGA Zone 55



Data Sources:
Proposed Impact Area: Transport
Proposed Culvert Works: Transport
Road Reserve Boundary: Transport
Vegetation, Other Survey Data: Envirokey
Aerial Imagery: SIX Maps (NSW Govt)

EnviroKey
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Figure 3-21: Plant community types and other points of interest within the study area

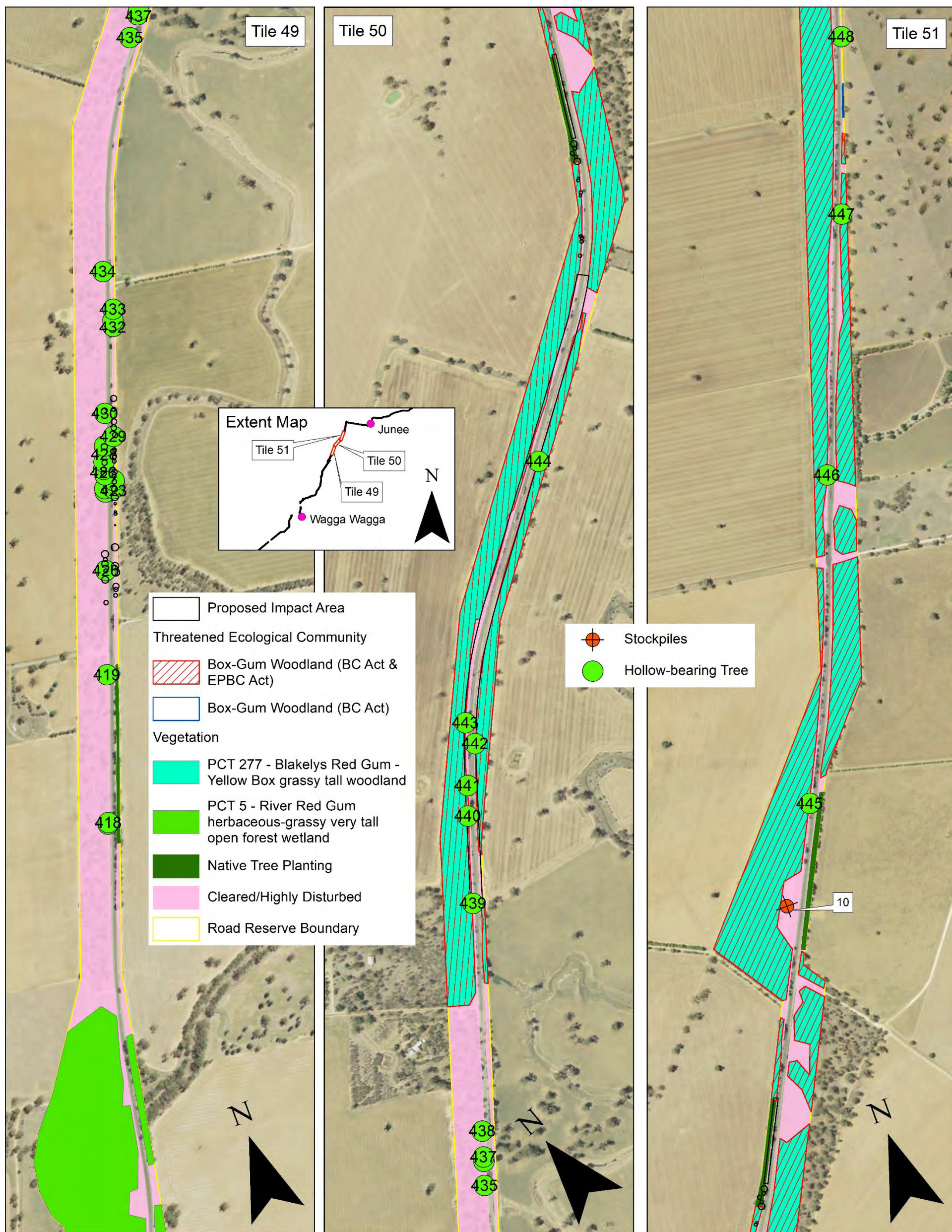
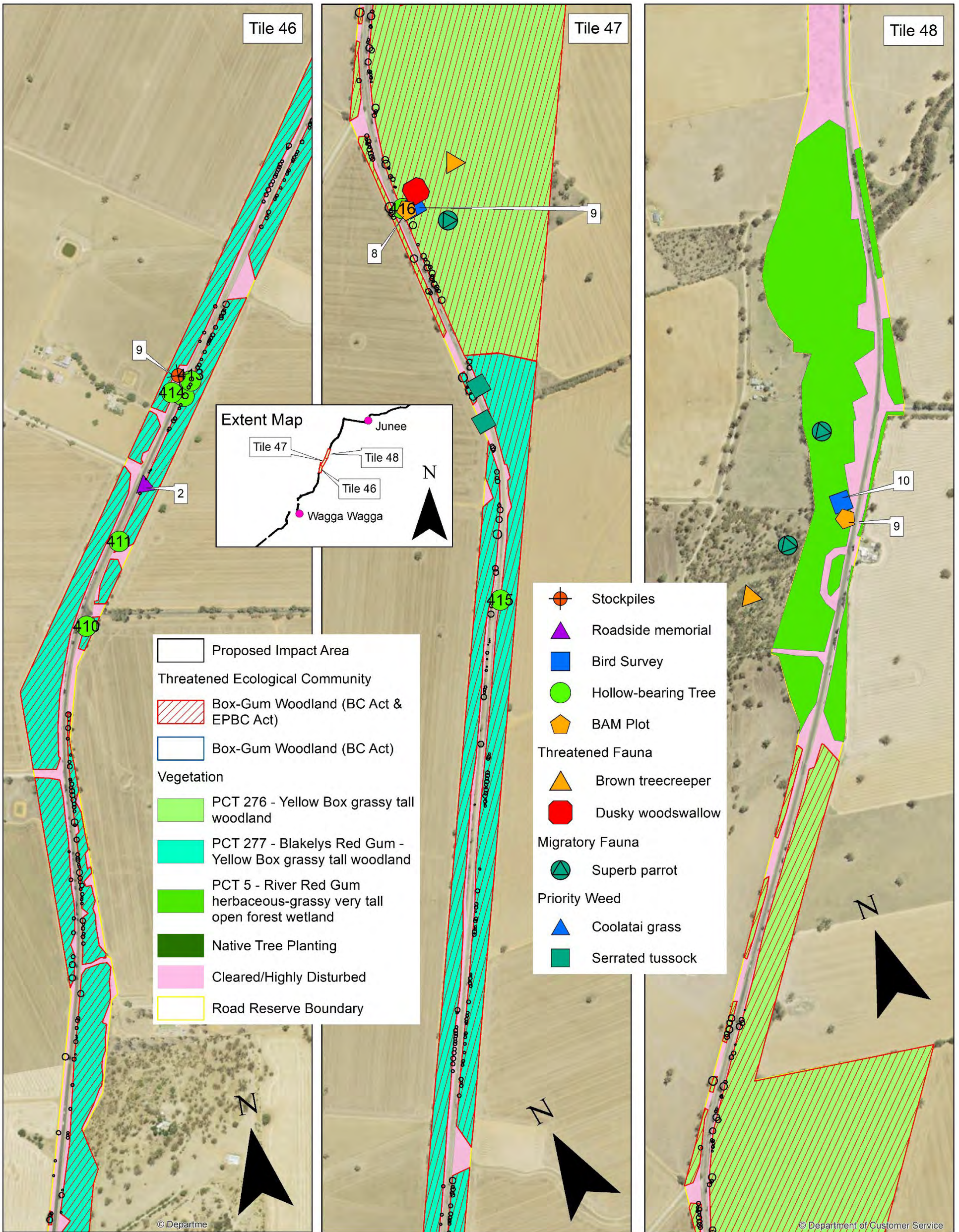


Figure 3-22: Plant community types and other points of interest within the study area



Mapping Date: May 2022
 Map Coordinate System: GDA94, MGA Zone 55

0 0.125 0.25 0.5 0.75 1 Km

Data Sources:
 Proposed Impact Area: Transport
 Proposed Culvert Works: Transport
 Road Reserve Boundary: Transport
 Vegetation, Other Survey Data: Envirokey
 Aerial Imagery: SIX Maps (NSW Govt)

EnviroKey
 www.envirokey.com.au

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

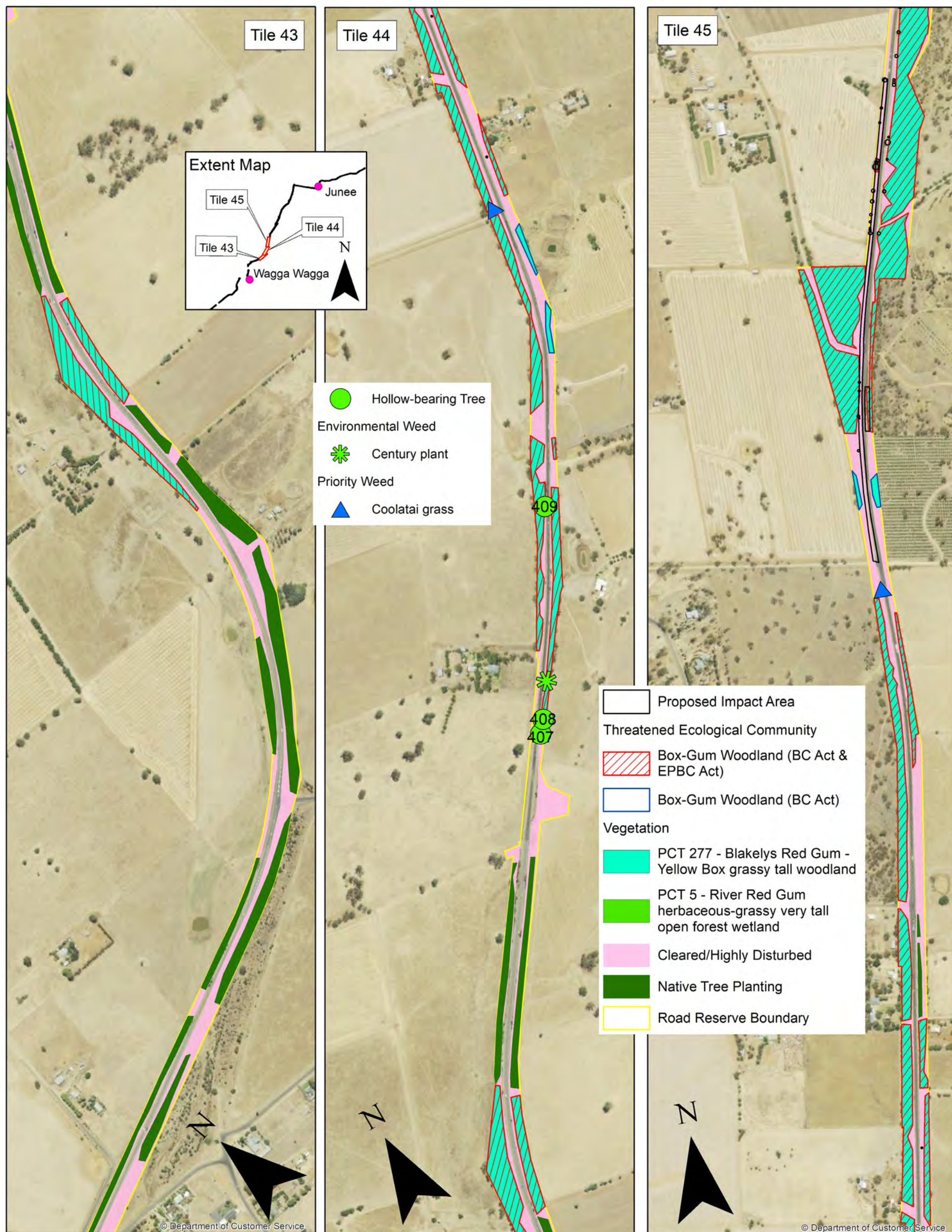
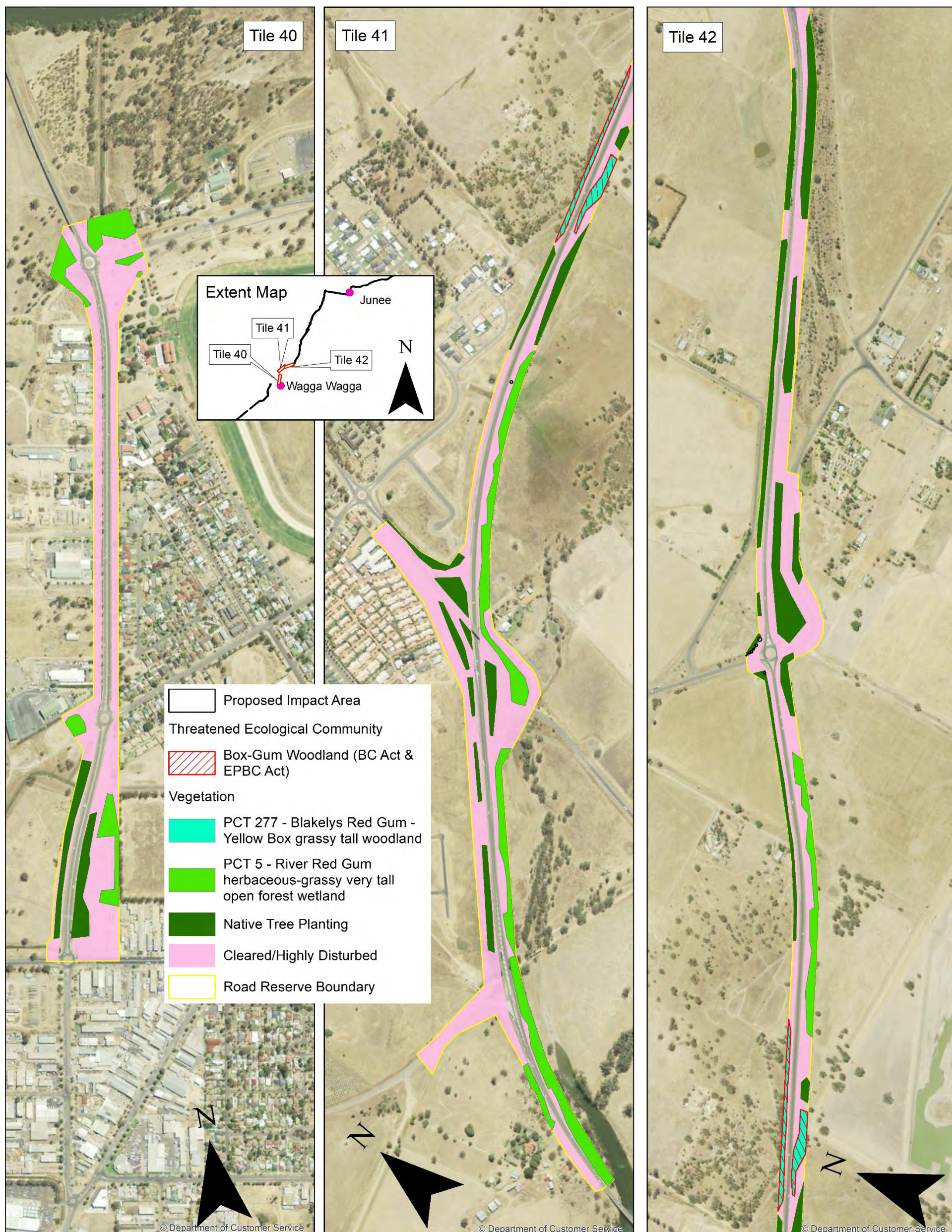
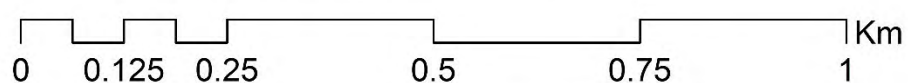


Figure 3-24: Plant community types and other points of interest within the study area



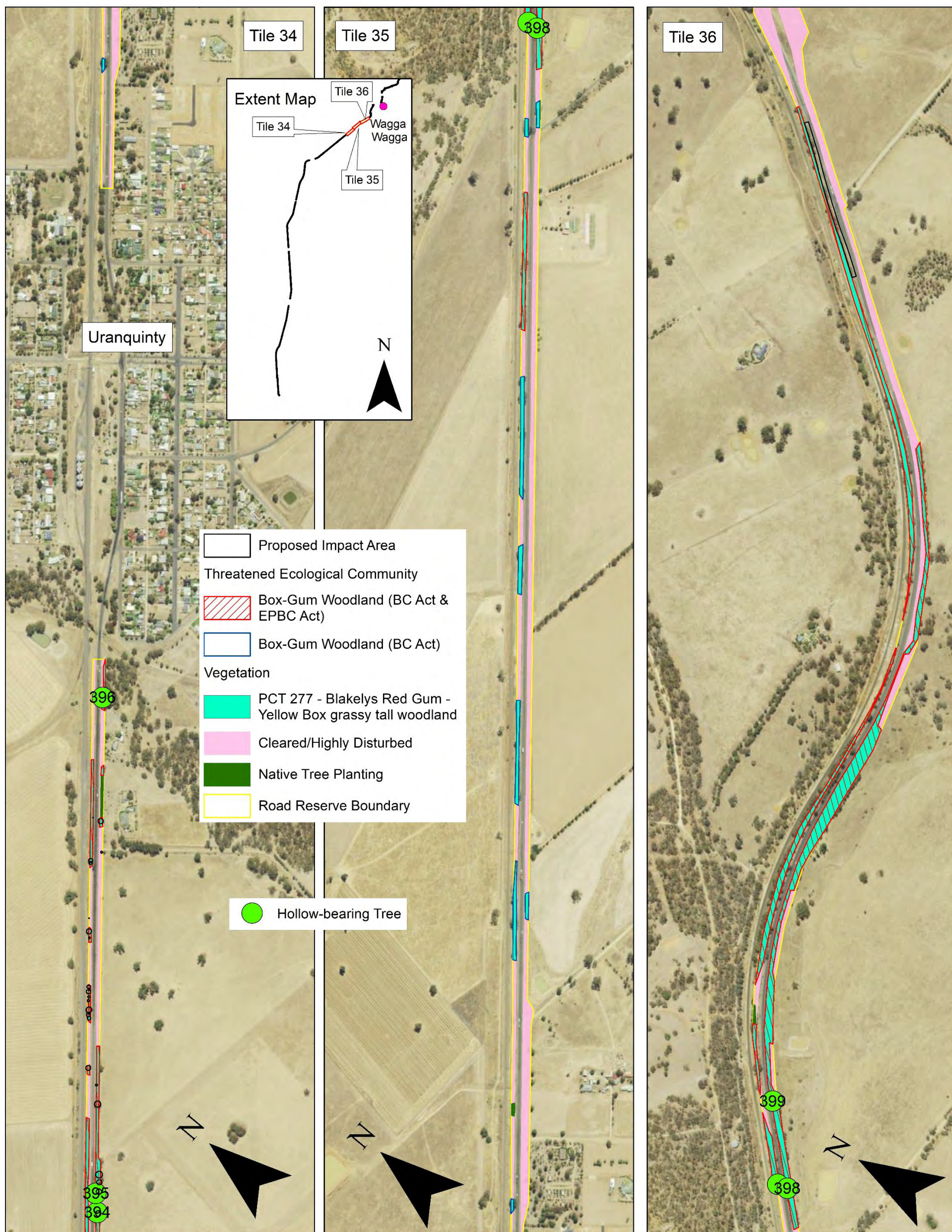
Mapping Date: May 2022
 Map Coordinate System: GDA94, MGA Zone 55



Data Sources:
 Proposed Impact Area: Transport
 Proposed Culvert Works: Transport
 Road Reserve Boundary: Transport
 Vegetation, Other Survey Data: Envirokey
 Aerial Imagery: SIX Maps (NSW Govt)

EnviroKey
www.envirokey.com.au

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



Mapping Date: May 2022

Map Coordinate System: GDA94, MGA Zone 55

0 0.125 0.25 0.5 0.75 1 Km

Data Sources:

Proposed Impact Area: Transport

Proposed Culvert Works: Transport

Road Reserve Boundary: Transport

Vegetation, Other Survey Data: Envirokey

Aerial Imagery: SIX Maps (NSW Govt)

 EnviroKey

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

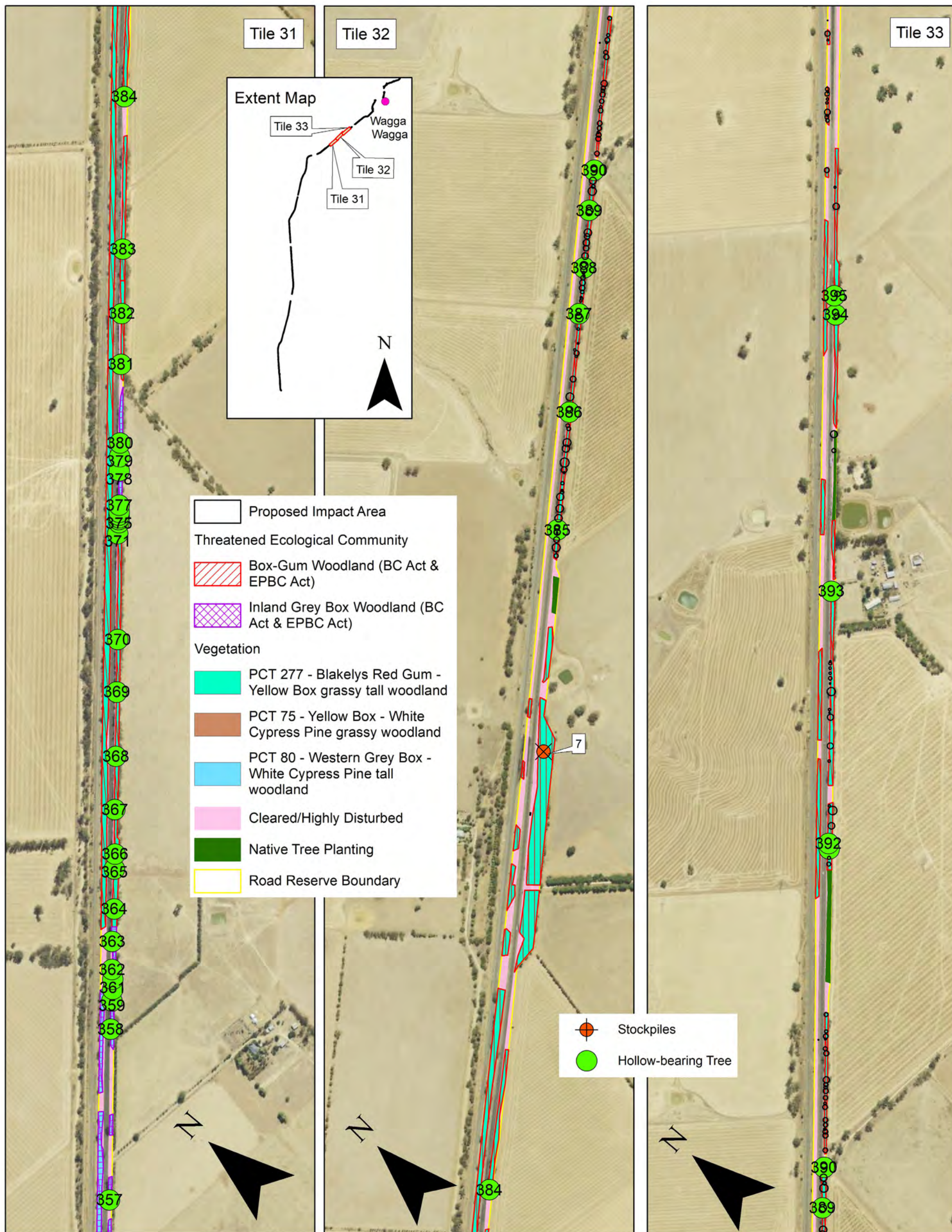


Figure 3-28: Plant community types and other points of interest within the study area

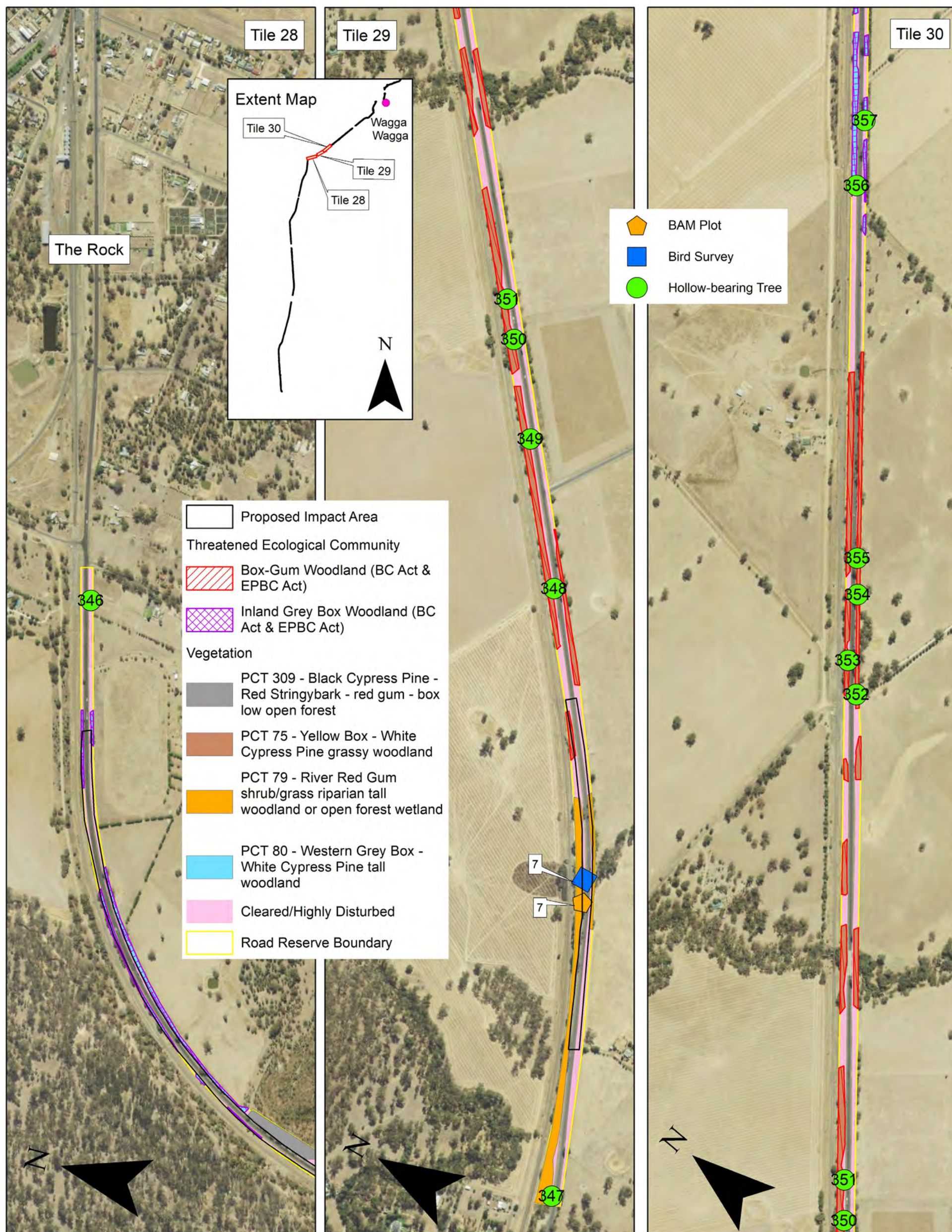
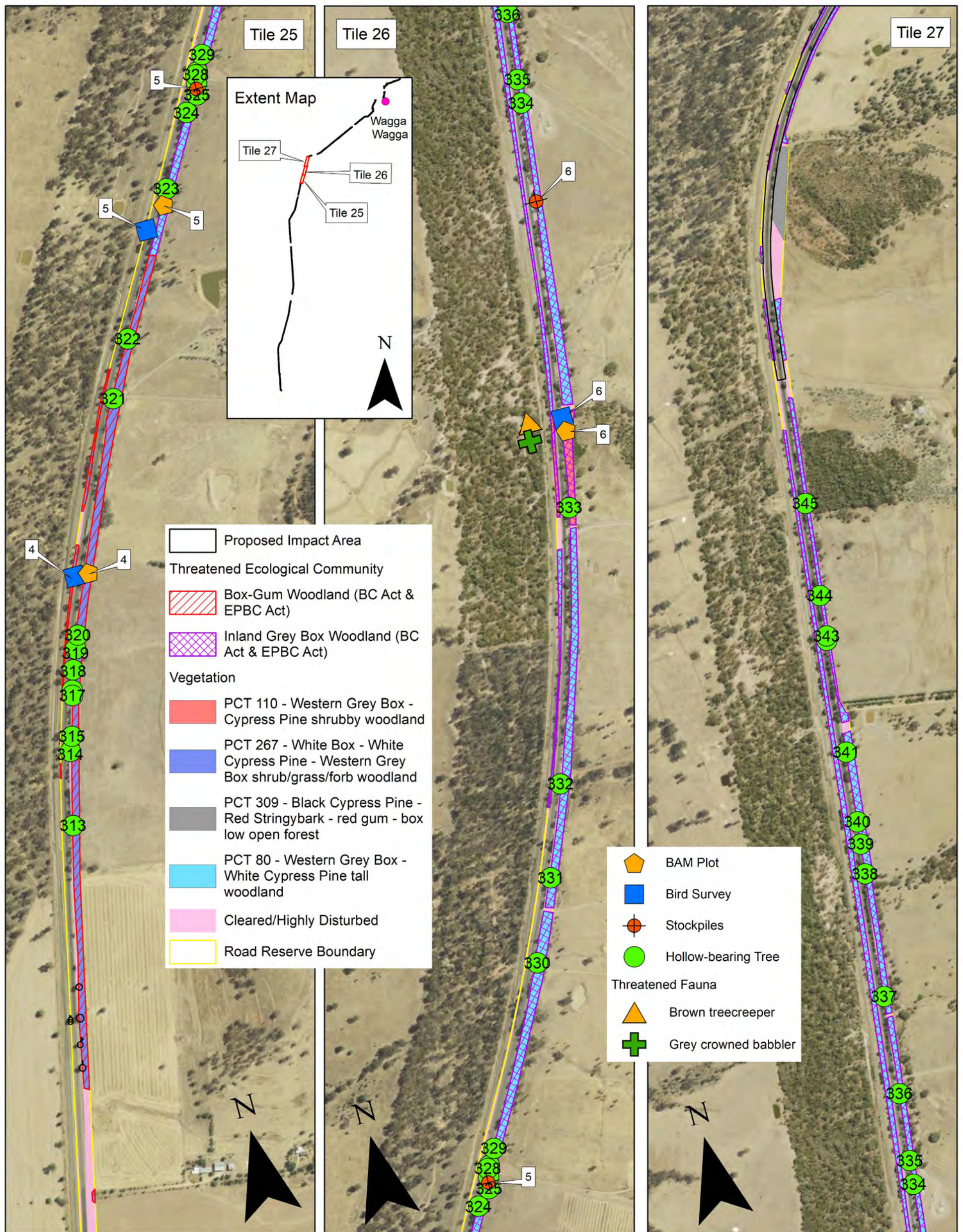


Figure 3-29: Plant community types and other points of interest within the study area

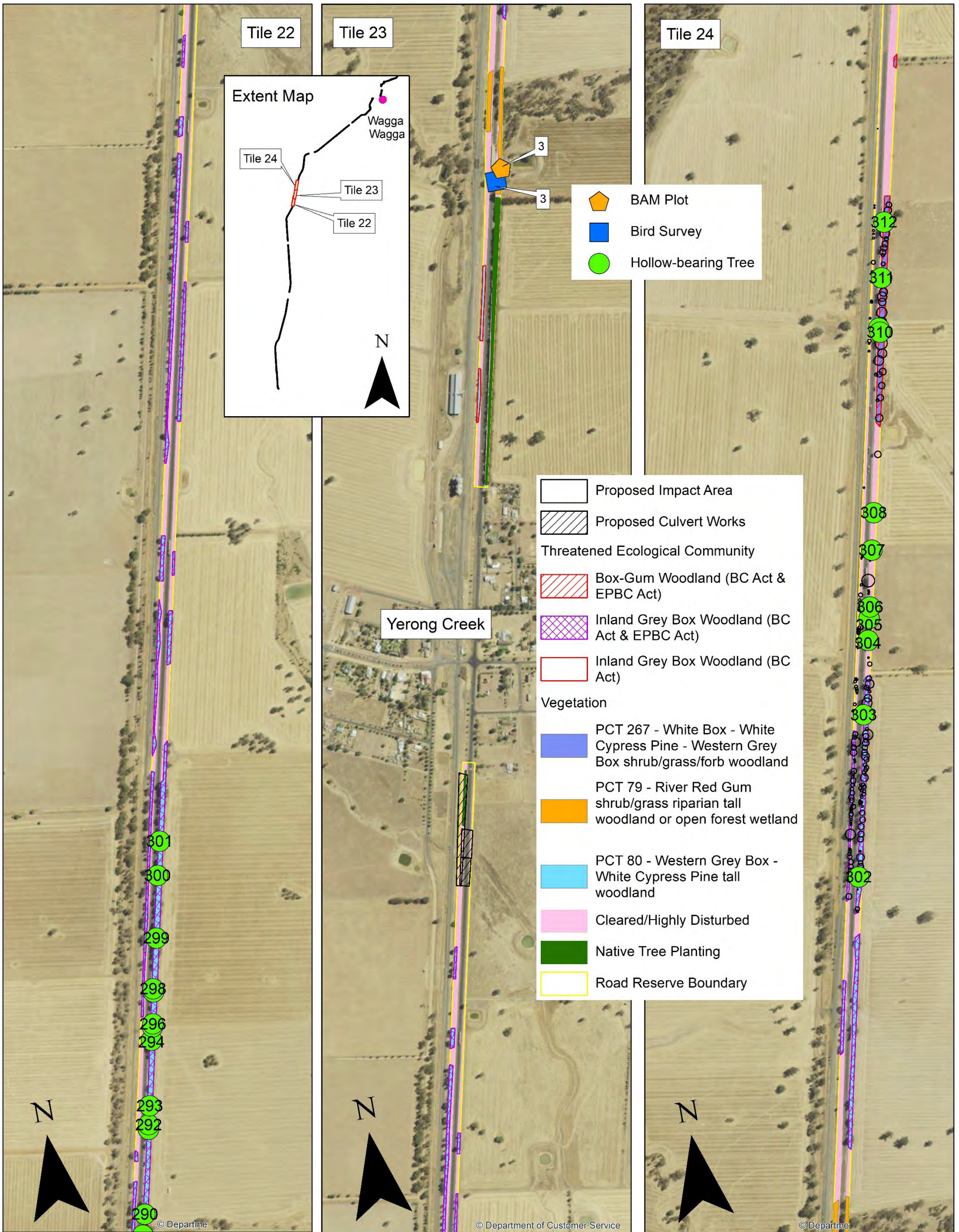


Mapping Date: November 2022
Map Coordinate System: GDA94, MGA Zone 55

Data Sources:
Proposed Impact Area: Transport
Proposed Culvert Works: Transport
Road Reserve Boundary: Transport
Vegetation, Other Survey Data: Envirokey
Aerial Imagery: SIX Maps (NSW Govt)

EnviroKey
www.envirokey.com.au

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



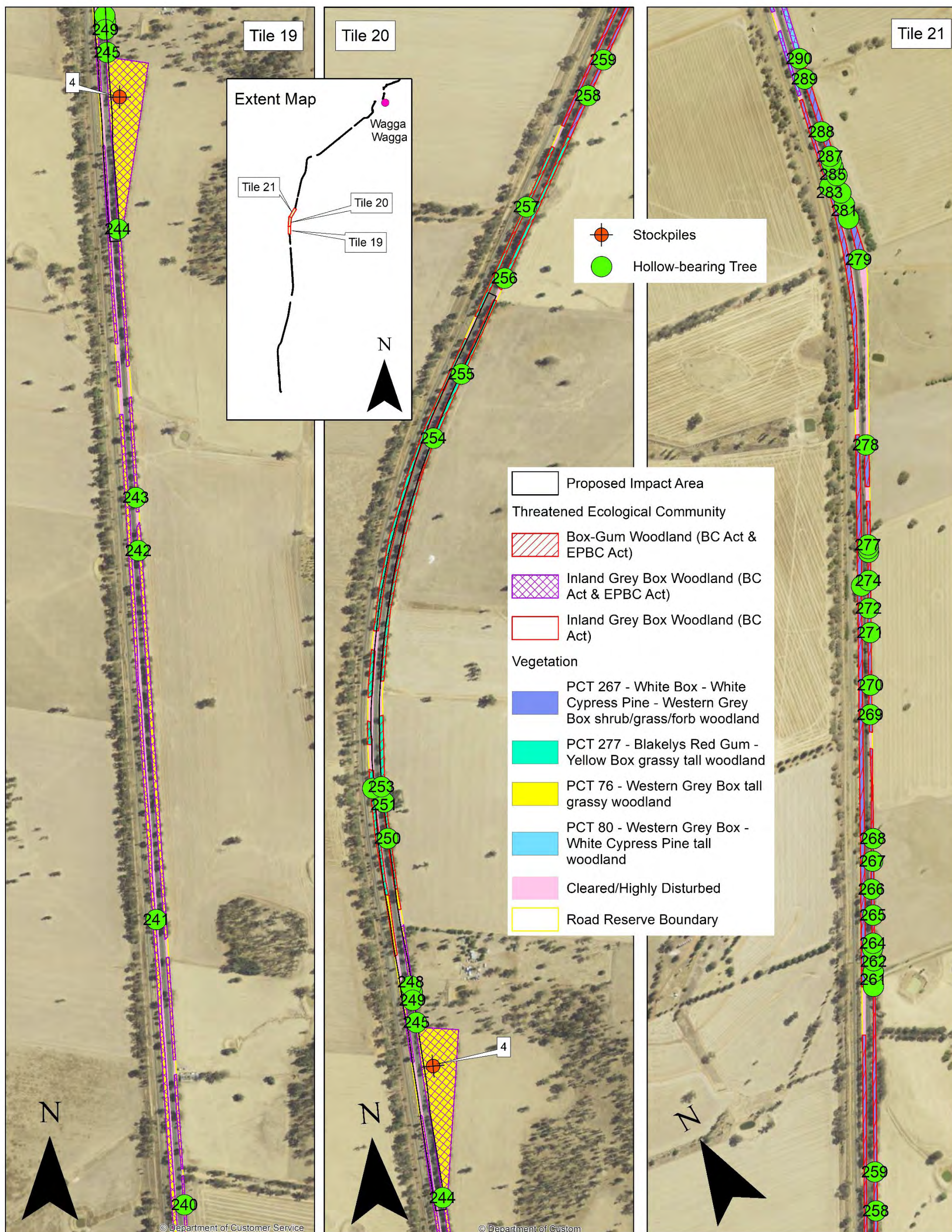
Mapping Date: May 2022
Map Coordinate System: GDA94, MGA Zone 55

0 0.125 0.25 0.5 0.75 1 Km

Data Sources:
Proposed Impact Area: Transport
Proposed Culvert Works: Transport
Road Reserve Boundary: Transport
Vegetation, Other Survey Data: Envirokey
Aerial Imagery: SIX Maps (NSW Govt)

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



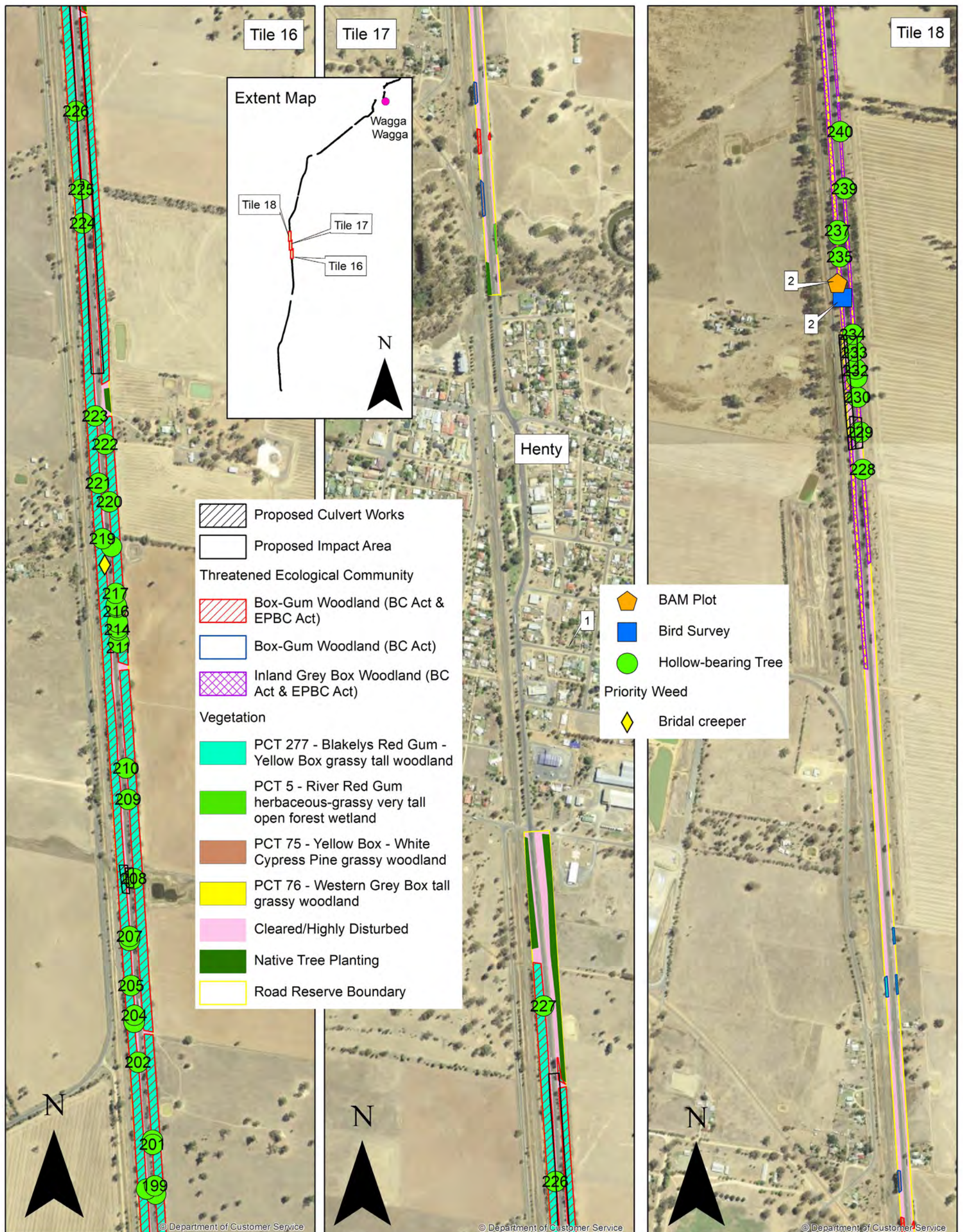
Mapping Date: May 2022
Map Coordinate System: GDA94, MGA Zone 55

0 0.125 0.25 0.5 0.75 1 Km

Data Sources:
Proposed Impact Area: Transport
Proposed Culvert Works: Transport
Road Reserve Boundary: Transport
Vegetation, Other Survey Data: Envirokey
Aerial Imagery: SIX Maps (NSW Govt)

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



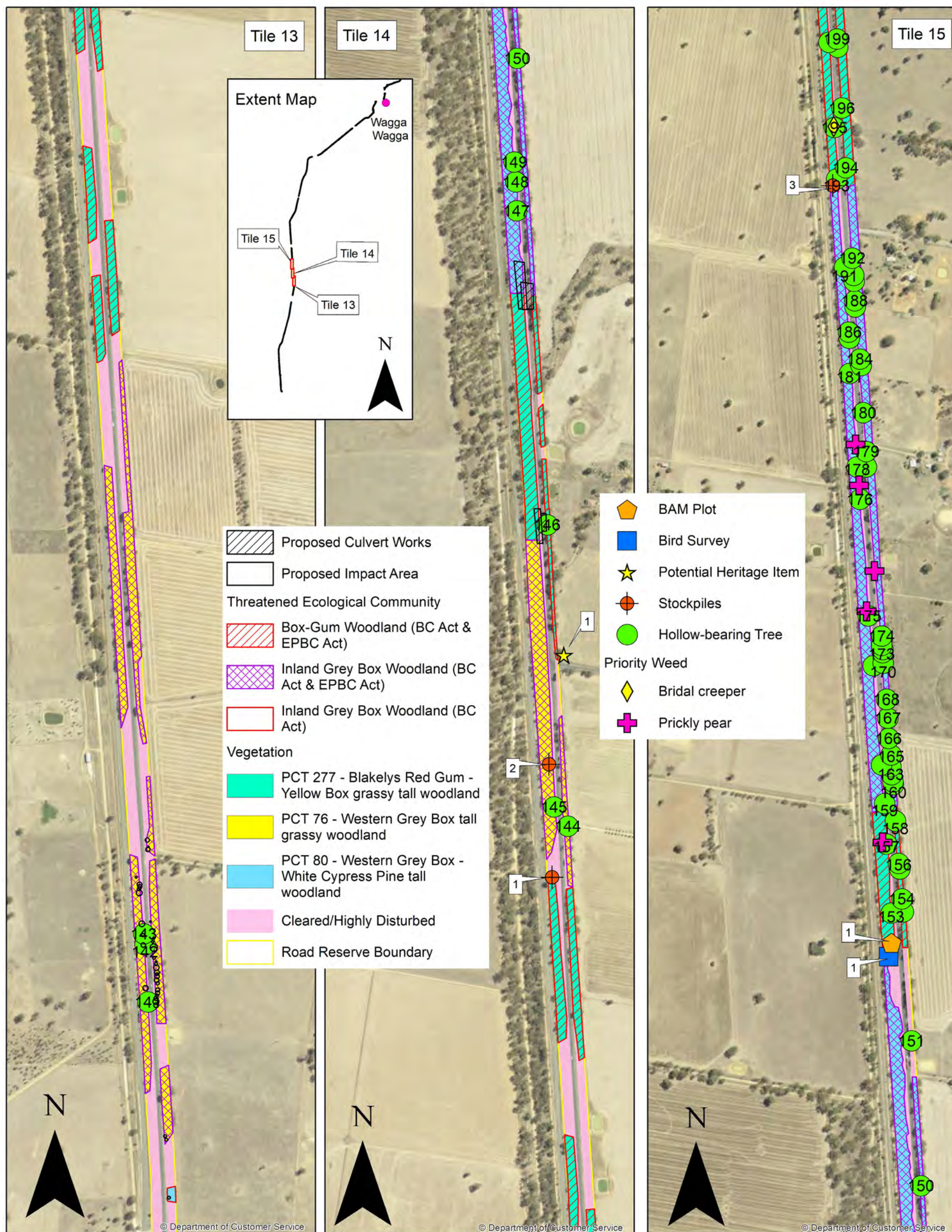
Mapping Date: November 2022
 Map Coordinate System: GDA94, MGA Zone 55

0 0.125 0.25 0.5 0.75 1 Km

Data Sources:
 Proposed Impact Area: Transport
 Proposed Culvert Works: Transport
 Road Reserve Boundary: Transport
 Vegetation, Other Survey Data: Envirokey
 Aerial Imagery: SIX Maps (NSW Govt)

EnviroKey
 www.envirokey.com.au

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



Mapping Date: November 2022
Map Coordinate System: GDA94, MGA Zone 55

0 0.125 0.25 0.5 0.75 1 Km

Data Sources:
Proposed Impact Area: Transport
Proposed Culvert Works: Transport
Road Reserve Boundary: Transport
Vegetation, Other Survey Data: Envirokey
Aerial Imagery: SIX Maps (NSW Govt)

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

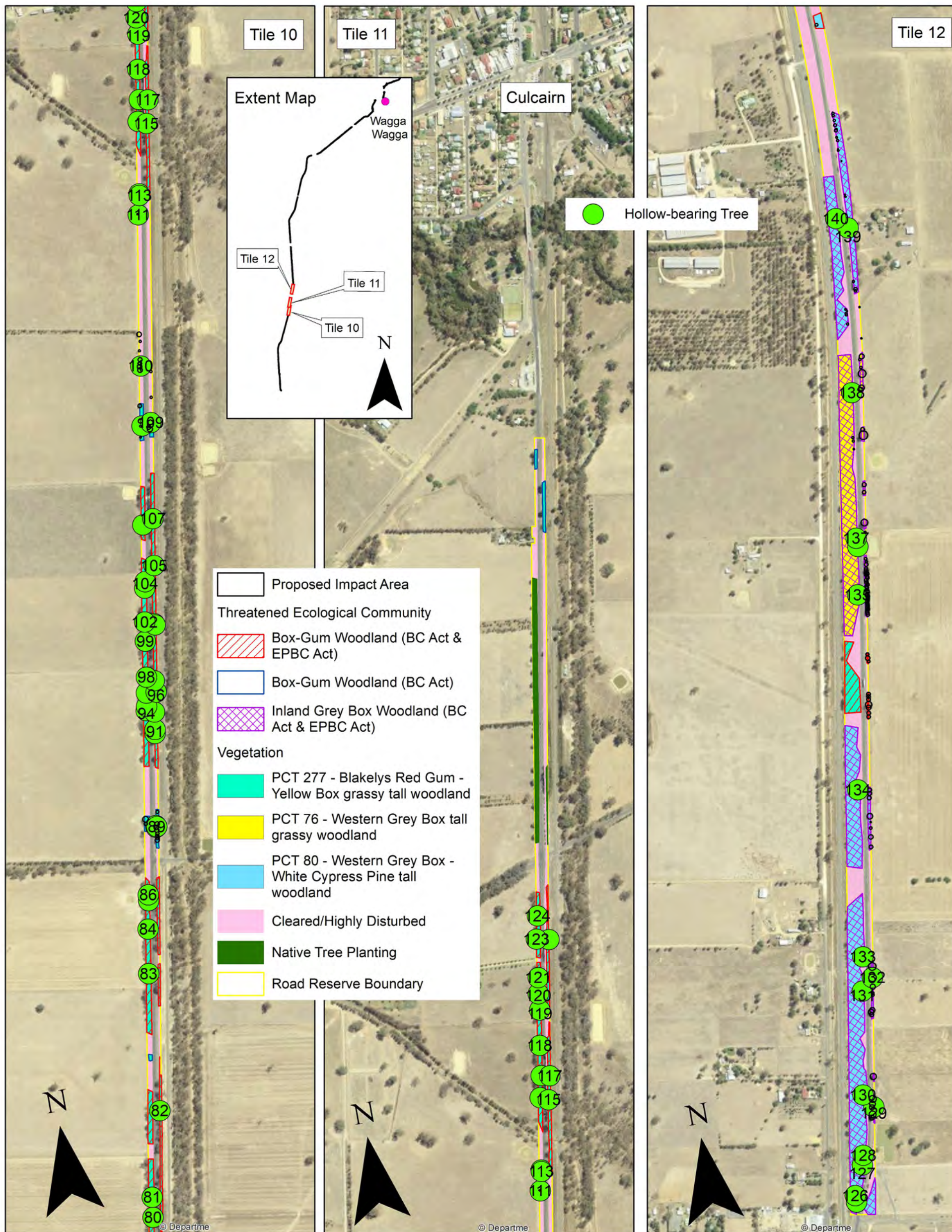
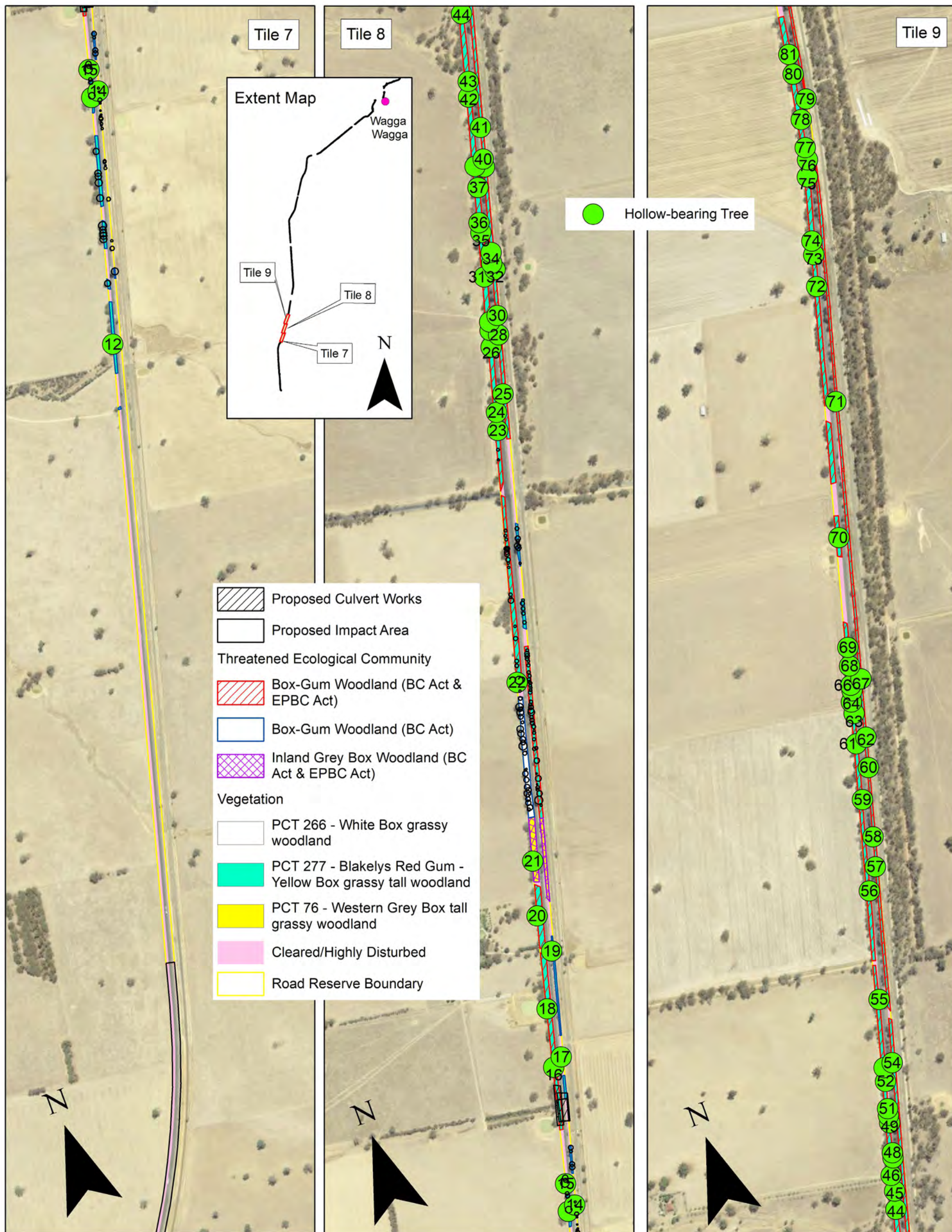


Figure 3-35: Plant community types and other points of interest within the study area

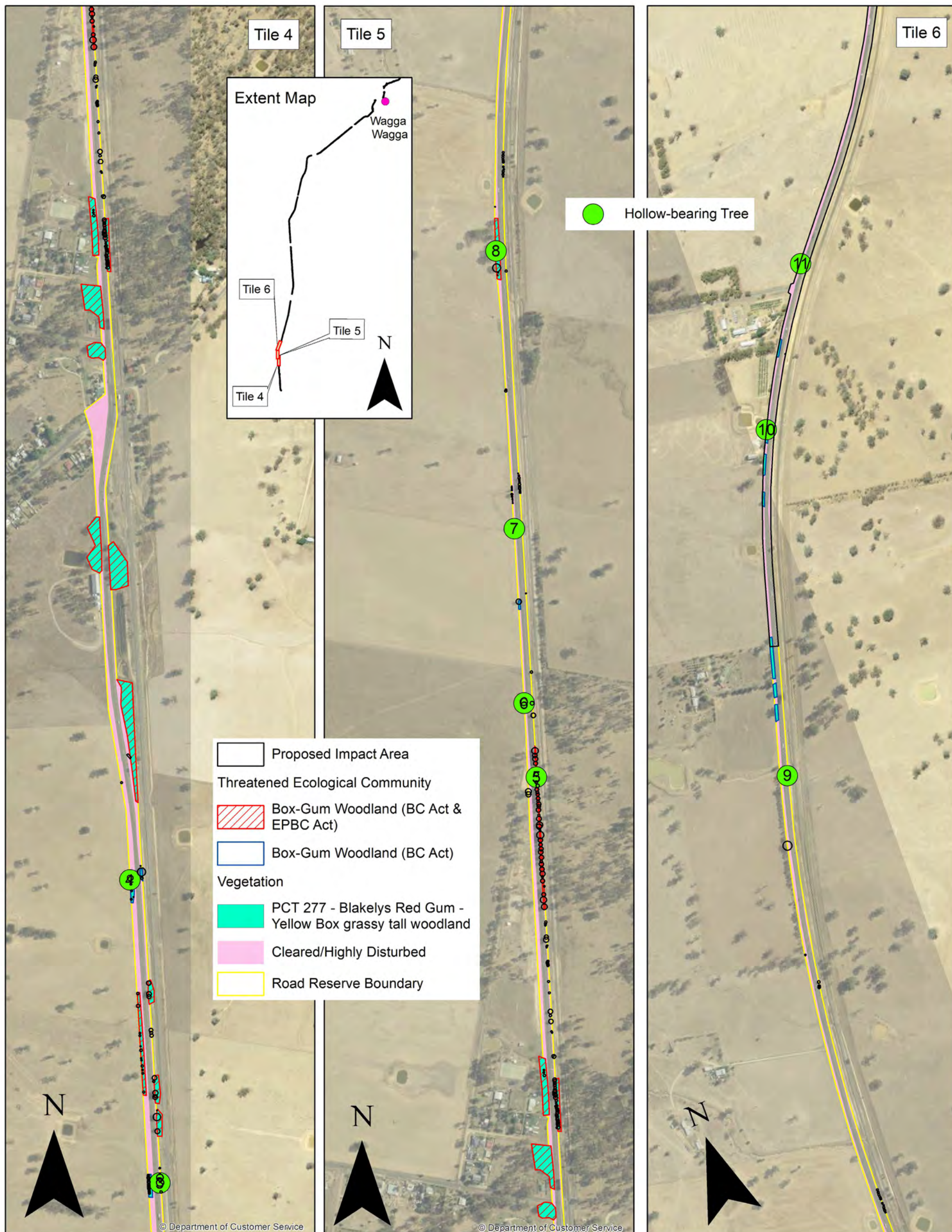


Mapping Date: November 2022
Map Coordinate System: GDA94, MGA Zone 55

Data Sources:
Proposed Impact Area: Transport
Proposed Culvert Works: Transport
Road Reserve Boundary: Transport
Vegetation, Other Survey Data: Envirokey
Aerial Imagery: SIX Maps (NSW Govt)

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



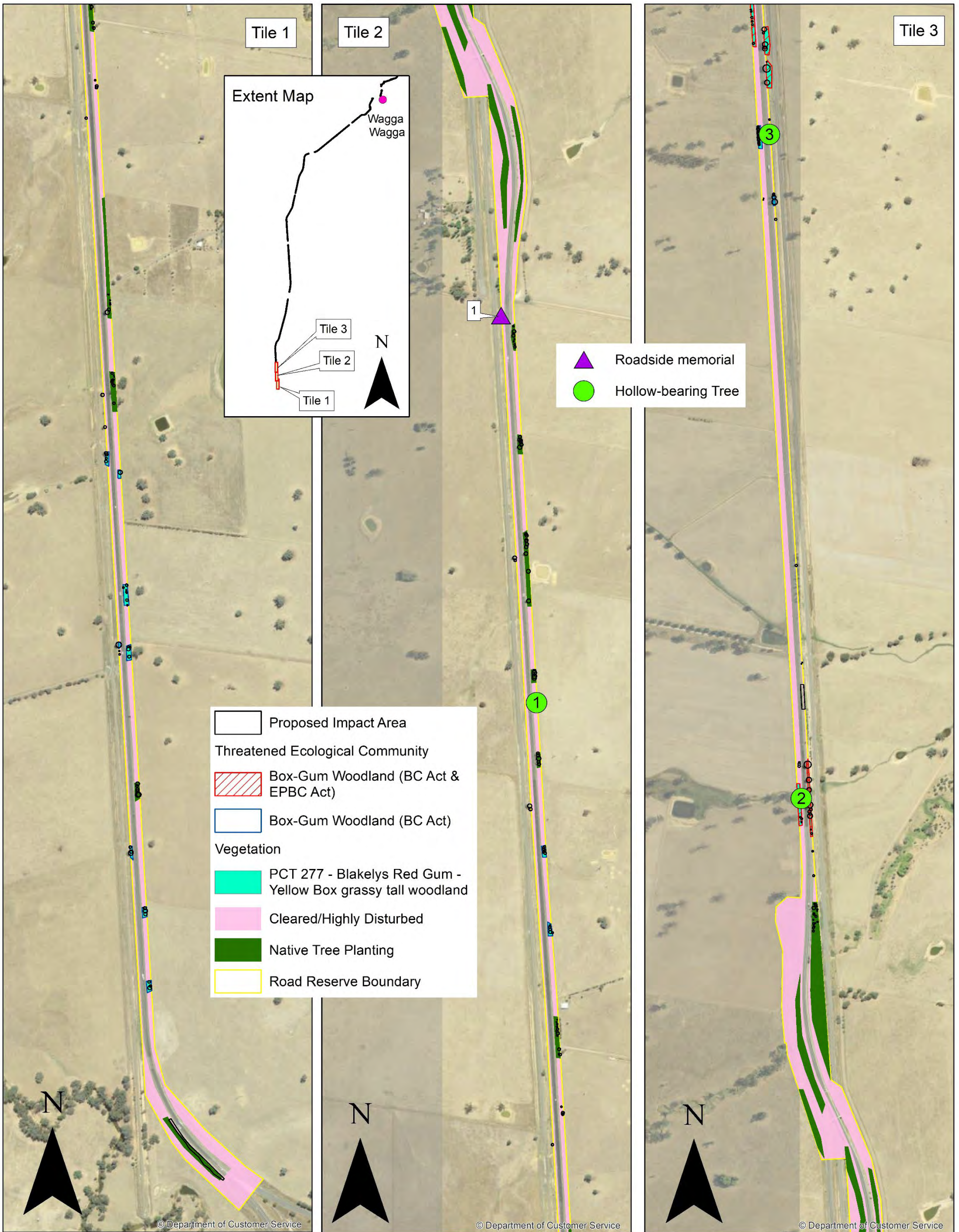
Mapping Date: November 2022
Map Coordinate System: GDA94, MGA Zone 55

0 0.125 0.25 0.5 0.75 1 Km

Data Sources:
Proposed Impact Area: Transport
Proposed Culvert Works: Transport
Road Reserve Boundary: Transport
Vegetation, Other Survey Data: Envirokey
Aerial Imagery: SIX Maps (NSW Govt)

EnviroKey
www.envirokey.com.au

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



Mapping Date: May 2022
Map Coordinate System: GDA94, MGA Zone 55

0 0.125 0.25 0.5 0.75 1 Km

Data Sources:
Proposed Impact Area: Transport
Proposed Culvert Works: Transport
Road Reserve Boundary: Transport
Vegetation, Other Survey Data: Envirokey
Aerial Imagery: SIX Maps (NSW Govt)

EnviroKey
www.envirokey.com.au

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

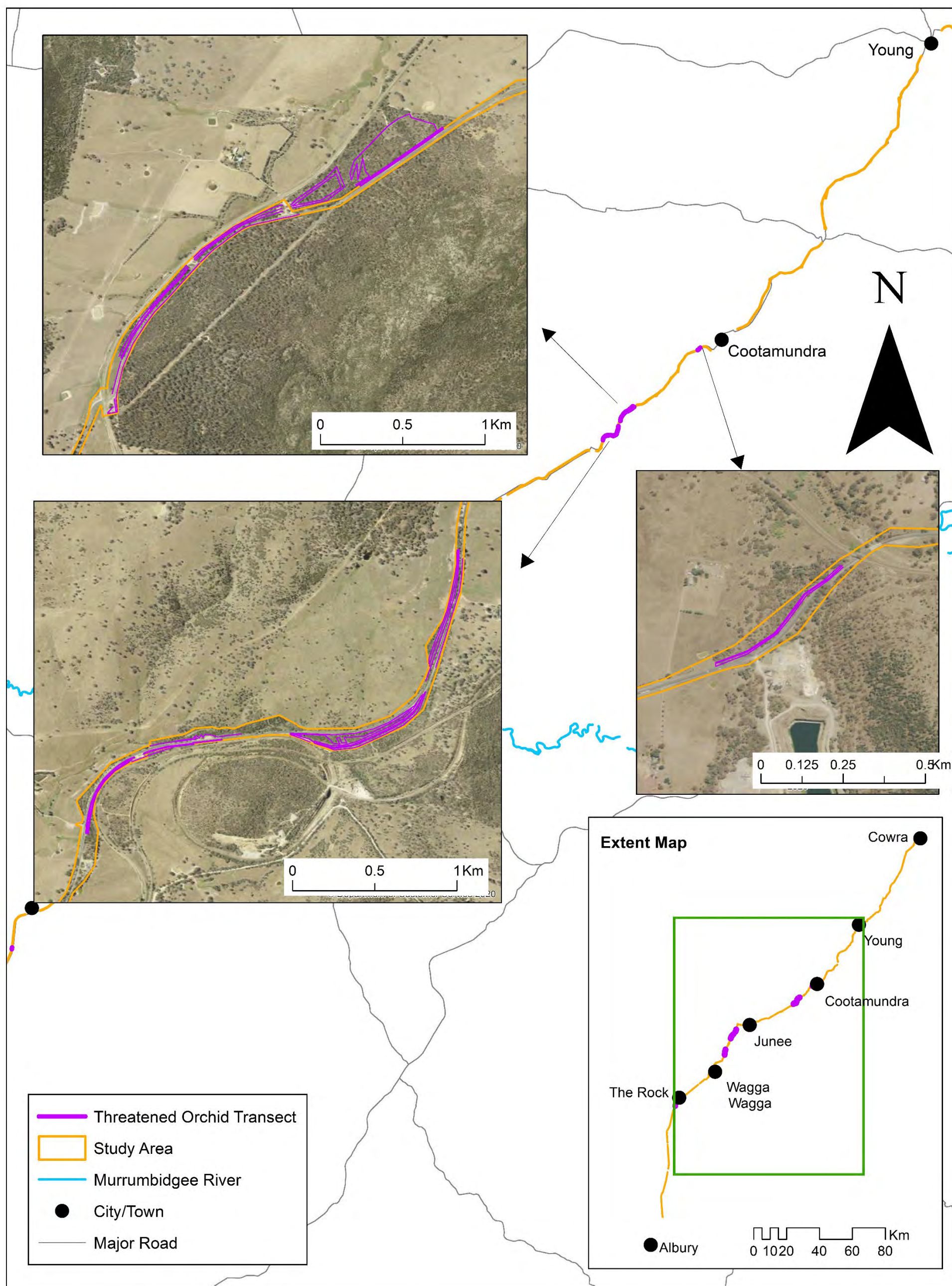


Figure 3-39: Crimson Spider Orchid surveys near Bethungra

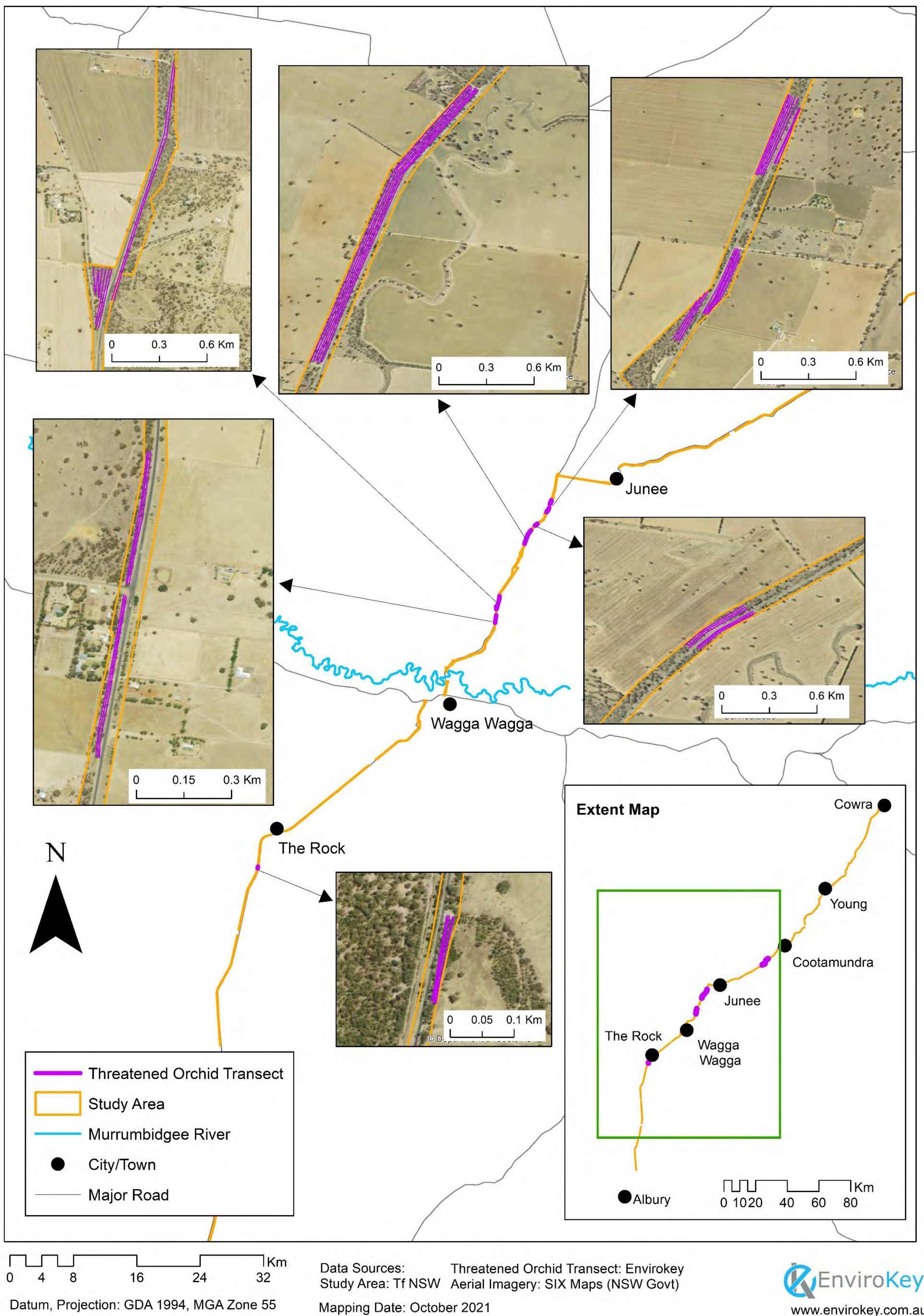
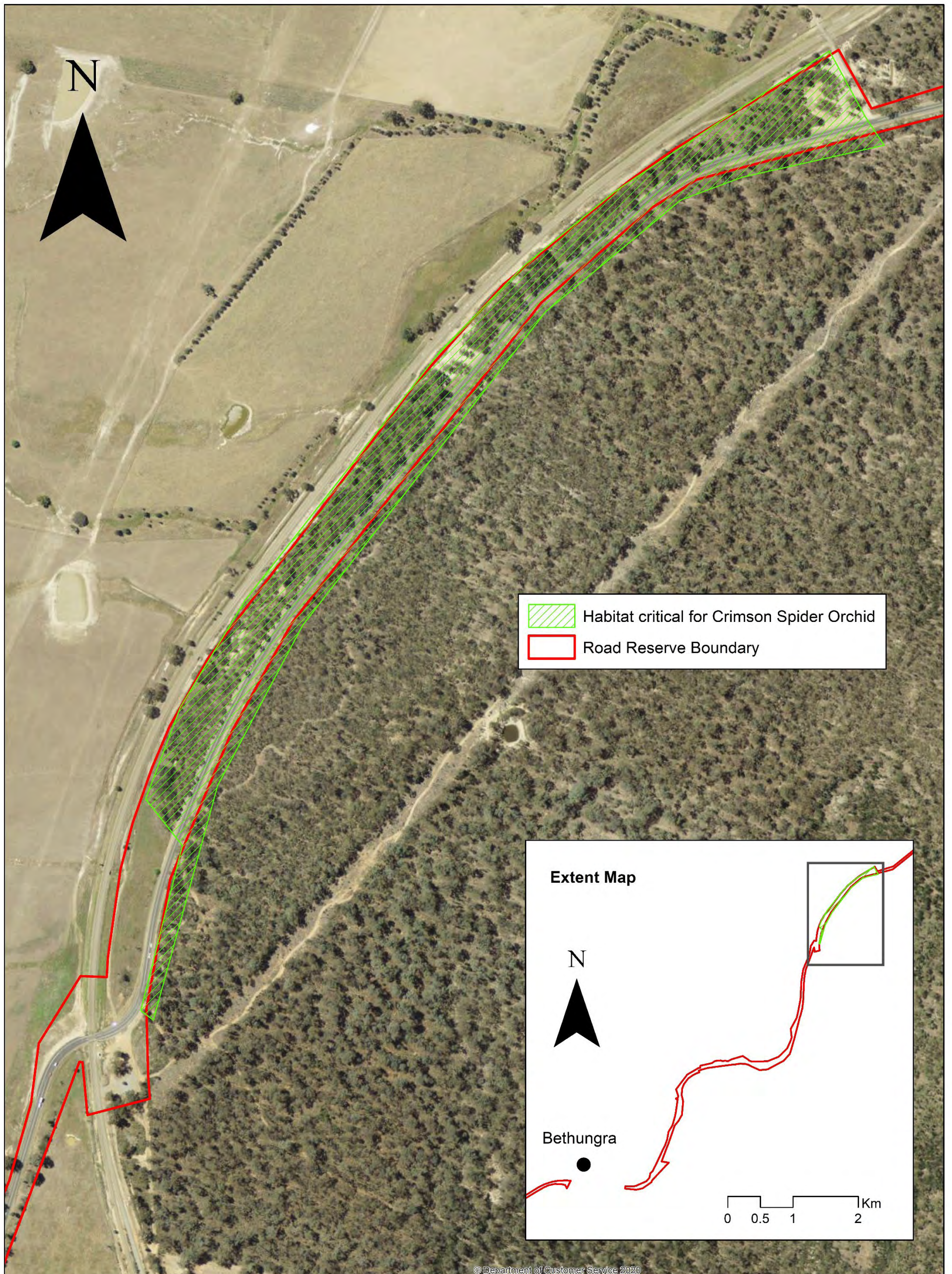


Figure 3-40: Pine Donkey Orchid surveys near Wagga Wagga



0 55 110 220 330 m
Datum, Projection: GDA 1994, MGA Zone 55

Data Sources:
Road Reserve Boundary: Tf NSW
Mapping Date: October 2021

Critical Habitat: Envirokey
Aerial Imagery: SIX Maps (NSW Govt)

EnviroKey
www.envirokey.com.au

Figure 3-41: Habitat critical for Crimson Spider Orchid

3.1.1 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

Vegetation formation: Forested Wetlands

Vegetation class: Inland Riverine Forests

PCT ID: 5

Conservation status: Not a TEC

Estimate of percent cleared: 40 %

Vegetation zones (condition) and plots:

- Moderate- good – Plot 9

Description:

PCT 5 is a very tall open forest dominated by River Red Gum (*Eucalyptus camaldulensis*) with trees averaging about 25 m high and a canopy cover of about 40%. The shrub layer is sparse or absent with *Acacia dealbata* sometimes present. It is known from four IBRA bioregions; Murray Darling Depression, Cobar Peneplain, NSW South Western Slopes and Riverina.

PCT 5 occurs on silty-sandy loam clays on levels or other raised landform elements adjacent to rivers and wetlands, mainly along the Murray and Murrumbidgee Rivers and their tributaries where vegetation is dominated by River Red Gum such as those portions mapped within the study area.

Two condition classes were identified within the study area:

- Moderate - Good 29.96 hectares
- Low 0.21 hectares

Floristic and structural summary of PCT 5 within the study area

Growth form	Typical species
Trees	<i>Eucalyptus camaldulensis</i>
Shrubs	<i>Acacia dealbata</i>
Grass and grass-like	<i>Bothriochloa macra</i> , <i>Carex appressa</i> , <i>Eleocharis pusilla</i> , <i>Austrodanthonia caespitosa</i>
Forb	<i>Ranunculus undosus</i>
Fern	-
Other	<i>Amyema miquelii</i>



Photo 3-1: Plot 9 showing vegetation zone PCT 5

3.1.2 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 ID: 75

Conservation status: Critically endangered BC Act and EPBC Act

Estimate of percent cleared: 92 %

Vegetation zones (condition) and plots:

- Moderate- good – Plot 7

Description:

PCT 75 is a mid-high to tall woodland dominated by Yellow Box (*Eucalyptus melliodora*) and White Cypress Pine (*Callitris glaucophylla*) with Kurrajong (*Brachychiton populneus*). This community occurs on well drained, deep, medium and light textured, sandy-loam soils, often on sandy rises, or sandhills on floodplains or on rolling downs.

Two condition classes were identified within the study area:

- Moderate - Good 4.39 hectares
- Low 0.09 hectares

Floristic and structural summary of PCT 75 within the study area

Growth form	Typical species
Trees	<i>Eucalyptus melliodora</i> , <i>Callitris glaucophylla</i> , <i>Brachychiton populneus</i>
Shrubs	<i>Acacia deanei</i> , <i>Eremophila longifolia</i> , <i>Pittosporum angustifolium</i> , <i>Dodonaea viscosa</i> , <i>Acacia decora</i>
Grass and grass-like	<i>Chloris truncata</i> , <i>Austrostipa scabra</i>
Forb	<i>Enchylaena tomentosa</i> , <i>Sida corrugata</i>
Fern	-

Growth form	Typical species
Other	-



Photo 3-2: Plot 7 showing vegetation zone PCT 75

3.1.3 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 ID: 76

Conservation status: Endangered BC Act and EPBC Act

Estimate of percent cleared: 92 %

Vegetation zones (condition) and plots:

- Moderate- good – Plot 2

Description:

PCT 76 is a tall woodland to 25 m high dominated by Western Grey Box (*Eucalyptus microcarpa*) and is often the only tree species present. However, Yellow Box (*Eucalyptus mellidora*) is sometimes present. PCT 76 occurs on undulating alluvial plains throughout the NSW South Western Slopes Bioregion.

Two condition classes were identified within the study area:

- Moderate - Good 27.52 hectares
- Low 6.1 hectares

Floristic and structural summary of PCT 76 within the study area

Growth form	Typical species
Trees	<i>Eucalyptus microcarpa</i> , <i>Callitris glaucophylla</i> , <i>Allocasuarina luehmannii</i> <i>Eucalyptus melliodora</i>
Shrubs	<i>Dodonaea viscosa</i> , <i>Acacia buxifolia</i> , <i>Exocarpos aphyllus</i>
Grass and grass-like	<i>Austrodanthonia caespitosa</i> , <i>Chloris truncata</i> , <i>Themeda australis</i> ,
Forb	<i>Sida corrugata</i> , <i>Einadia nutans</i> , <i>Enchylaena tomentosa</i>
Fern	-
Other	-



Photo 3-3: Plot 2 showing vegetation zone PCT 76

3.1.4 River Red Gum shrub/grass riparian tall woodland or open forest wetland mainly in the upper slopes subregion of the NSW South Western Slopes Bioregion and western South Eastern Highlands Bioregion

Vegetation formation: Forested Wetlands

Vegetation class: Inland Riverine Forests

PCT ID: 79

Conservation status: Not a TEC

Estimate of percent cleared: 66 %

Vegetation zones (condition) and plots:

- Moderate- good – Plot 3

Description:

PCT 79 is a very tall to tall riparian woodland dominated by River Red Gum (*Eucalyptus camaldulensis*) and can sometimes grade into River Oak (*Casuarina cunninghamiana*) and Blakelys Red Gum (*Eucalyptus blakelyi*). PCT 79 occurs on river banks and adjacent flats on generally permanent watercourses in the NSW South Western Slopes Bioregion.

Two condition classes were identified within the study area:

- Moderate - Good 5.82 hectares
- Low 0.11 hectares

Floristic and structural summary of PCT 79 within the study area

Growth form	Typical species
Trees	<i>Eucalyptus camaldulensis</i> , <i>Casuarina cunninghamiana</i> , <i>Eucalyptus blakelyi</i> , <i>Eucalyptus melliodora</i>
Shrubs	<i>Acacia dealbata</i> , <i>Bursaria spinosa</i> , <i>Acacia melanoxylon</i> , <i>Kunzea ericoides</i>
Grass and grass-like	<i>Carex appressa</i> , <i>Elymus scaber</i> , <i>Austrodanthonia sp.</i> , <i>Eleocharis pusilla</i> , <i>Juncus sp.</i>
Forb	<i>Rumex brownii</i>
Fern	-
Other	-



Photo 3-4: Plot 3 showing vegetation zone PCT 79

3.1.5 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 ID: 80

Conservation status: Endangered, BC Act and EPBC Act

Estimate of percent cleared: 83 %

Vegetation zones (condition) and plots:

- Moderate- good – Plot 5

Description:

PCT 80 is a tall woodland up to 25 m high but averaging about 20 m co-dominated by Western Grey Box (*Eucalyptus microcarpa*) and White Cypress Pine (*Callitris glaucophylla*) with the pine tending to be shorter than the eucalypts. Other trees may include Yellow Box (*Eucalyptus melliodora*), Buloke (*Allocasuarina luehmannii*), *Pittosporum angustifolium* and Kurrajong (*Brachychiton populneus*). A sparse layer of shrubs may be present however they may be absent where grazing has been intense or the understorey has been cleared. Two condition classes were identified within the study area:

- Moderate - Good 37.76 hectares
- Low 0.28 hectares

Floristic and structural summary of PCT 80 within the study area

Growth form	Typical species
Trees	<i>Eucalyptus microcarpa</i> , <i>Callitris glaucophylla</i> , <i>Eucalyptus melliodora</i> , <i>Allocasuarina luehmannii</i> , <i>Brachychiton populneus</i>
Shrubs	<i>Maireana microphylla</i> , <i>Acacia deanei</i> , <i>Acacia hakeoides</i> , <i>Geijera parviflora</i> , <i>Exocarpos aphyllus</i>
Grass and grass-like	<i>Austrostipa scabra</i> , <i>Austrodanthonia setacea</i> , <i>Austrodanthonia caespitosa</i> ,
Forb	<i>Sida corrugata</i> , <i>Maireana enchylaenoides</i> , <i>Chrysocephalum apiculatum</i>
Fern	-
Other	-



Photo 3-5: Plot 5 showing vegetation zone PCT 80

3.1.6 Western Grey Box – White Cypress Pine shrubby woodland on stony footslopes in the NSW South Western Slopes Bioregion and Riverina Bioregion

Vegetation formation: Dry Sclerophyll Forests (Shrubby sub-formation)

Vegetation class: Western Slopes Dry Sclerophyll Forests

PCT ID: 110

Conservation status: Endangered, BC Act and EPBC Act

Estimate of percent cleared: 75 %

Vegetation zones (condition) and plots:

- Moderate- good – Plot 6

Description:

PCT 110 is a moderately tall woodland up to 15-20 m high dominated by Western Grey Box (*Eucalyptus microcarpa*) with Black Cypress Pine (*Callitris endlicheri*) and sometimes White Cypress Pine (*Callitris glaucophylla*). A sparse layer of shrubs can be present within the road reserve particularly in the absence of grazing. PCT 110 can be found on stony clay or loam colluvial soils on foot slopes of low hills. One condition class was identified within the study area:

- Moderate - Good 0.73 hectares

Floristic and structural summary of PCT 110 within the study area

Growth form	Typical species
Trees	<i>Eucalyptus microcarpa</i> , <i>Callitris endlicheri</i> , <i>Callitris glaucophylla</i> , <i>Eucalyptus sideroxylon</i> , <i>Eucalyptus albens</i>
Shrubs	<i>Dodonaea viscosa</i> , <i>Acacia buxifolia</i> , <i>Acacia paradoxa</i> , <i>Cassinia arcuate</i> , <i>Hibbertia riparia</i>
Grass and grass-like	<i>Austrostipa scabra</i> , <i>Austrodanthonia setacea</i> , <i>Austrodanthonia caespitosa</i> , <i>Microlaena stipoides</i> , <i>Poa sieberiana</i>
Forb	<i>Einadia hastata</i> , , <i>Xerochrysum viscosum</i> , <i>Calotis cuneifolia</i> , <i>Wahlenbergia luteola</i>
Fern	<i>Cheilanthes sieberi</i> subsp. <i>sieberi</i>
Other	-



Photo 3-6: Plot 6 showing vegetation zone PCT 110

3.1.7 Dwyers Red Gum – Black Cypress Pine – Currawang shrubby low woodland on rocky hills mainly in the NSW South Western Slopes Bioregion

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

Vegetation class: Inland Rocky Hill Woodlands

PCT ID: 186

Conservation status: Not a TEC

Estimate of percent cleared: 17 %

Vegetation zones (condition) and plots:

- Moderate- good – Plot 10

Description:

PCT 186 is woodland dominated by Dwyers Red Gum (*Eucalyptus dwyeri*), Black Cypress Pine (*Callitris endlicheri*) and Currawang (*Acacia doratoxylon*). Drooping She-oak can also be present, particularly in an absence of fire. PCT 186 generally occurs on steep upper slopes, ridgelines or steep gullies on rocky hills. One condition class was identified within the study area:

- Moderate - Good 13.69 hectares

Floristic and structural summary of PCT 186 within the study area

Growth form	Typical species
Trees	<i>Eucalyptus dwyeri</i> , <i>Callitris endlicheri</i> , <i>Acacia doratoxylon</i> , <i>Eucalyptus dealbata</i> , <i>Allocasuarina verticillata</i> , <i>Eucalyptus macrorhyncha</i>
Shrubs	<i>Calytrix tetragona</i> , <i>Dodonaea viscosa</i> , <i>Acacia linearifolia</i> , <i>Hibbertia obtusifolia</i> , <i>Kunzea ambigua</i> , <i>Acacia lineata</i> , <i>Acacia verniciflua</i>
Grass and grass-like	<i>Austrostipa densiflora</i> , <i>Austrodanthonia caespitosa</i> , <i>Poa siebriana</i> , <i>Amphipogon</i> sp.
Forb	<i>Gonocarpus elatus</i> , <i>Chrysocephalum semipapposum</i> , <i>Lomandra filiformis</i> , <i>Xerochrysum viscosum</i>
Fern	<i>Cheilanthes sieberi</i>
Other	-



Photo 3-7: Plot 10 showing vegetation zone PCT 186

3.1.8 **Mugga Ironbark – Western Grey Box – cypress pine tall woodland on footslopes of low hills in the NSW South Western Slopes Bioregion**

Vegetation formation: Dry Sclerophyll Forests (Shrubby sub-formation)

Vegetation class: Western Slopes Dry Sclerophyll Forests

PCT ID: 217

Conservation status: Not a TEC

Estimate of percent cleared: 69 %

Vegetation zones (condition) and plots:

- Moderate- good – Plot 11

Description:

PCT 217 is a tall to very tall open forest to woodland dominated by Mugga Ironbark (*Eucalyptus sideroxylon*) and Western Grey Box (*Eucalyptus macrocarpa*) with either White Cypress Pine (*Callitris glaucophylla*) or Black Cypress Pine (*Callitris endlicheri*) Other eucalypts can also be present. PCT 217 generally occurs on footslopes of rises or low hills in the undulating central west slopes region of NSW. Two condition classes were identified within the study area:

- Moderate - Good 13.11 hectares
- Low 0.7 hectares

Floristic and structural summary of PCT 217 within the study area

Growth form	Typical species
Trees	<i>Eucalyptus sideroxylon</i> , <i>Eucalyptus microcarpa</i> , <i>Eucalyptus dwyeri</i> , <i>Callitris endlicheri</i> , <i>Acacia doratoxylon</i> , <i>Allocasuarina verticillata</i>

Growth form	Typical species
Shrubs	<i>Lissanthe strigose</i> , <i>Dodonaea viscosa</i> , <i>Acacia deanei</i> , <i>Acacia hakeoides</i> , <i>Cassinia aculeata</i> , <i>Stypandra glauca</i>
Grass and grass-like	<i>Austrostipa densiflora</i> , <i>Austrodanthonia caespitosa</i> , <i>Poa siebriana</i> , <i>Amphipogon</i> sp., <i>Austrodanthonia setacea</i> ,
Forb	<i>Olearia muelleri</i> , <i>Oxalis perennans</i> , <i>Xerochrysum viscosum</i> , <i>Einadia hastata</i> , <i>Hydrocotyle laxiflora</i> , <i>Chrysocephalum semipapposum</i>
Fern	<i>Cheilanthes sieberi</i>
Other	-



Photo 3-8: Plot 11 showing vegetation zone PCT 217

3.1.9 White Box grassy woodland in the upper slopes sub-region of the NSW South Western Slopes Bioregion

Vegetation formation: Grassy Woodlands

Vegetation class: Western Slopes Grassy Woodlands

PCT ID: 266

Conservation status: Critically Endangered BC Act, EPBC Act

Estimate of percent cleared: 94 %

Vegetation zones (condition) and plots:

- Moderate- good – Plot 4

Description:

PCT 266 is a woodland dominated by White Box (*Eucalyptus albens*) often as the only tree species, however, Kurrajong (*Brachychiton populneus*) is often present. The shrub layer is generally sparse. PCT 266 generally on the slopes and crests in hill landform patterns in

the NSW South Western Slopes Bioregion. Two condition classes were identified within the study area:

- Moderate - Good 2.03 hectares
- Low 1.54 hectares

Floristic and structural summary of PCT 266 within the study area

Growth form	Typical species
Trees	<i>Eucalyptus albens</i> , <i>Eucalyptus blakelyi</i> , <i>Eucalyptus bridgesiana</i> , <i>Brachychiton populneus</i>
Shrubs	<i>Acacia decora</i> , <i>Acacia implexa</i> , <i>Dodonea viscosa</i> , <i>Cassinia aculeata</i>
Grass and grass-like	<i>Themeda australis</i> , <i>Poa sieberiana</i> , <i>Panicum effusum</i> , <i>Microlaena stipoides</i> , <i>Aristida ramosa</i>
Forb	<i>Asperula conferta</i> , <i>Xerochrysum viscosum</i> , <i>Glycine sp.</i>
Fern	-
Other	-



Photo 3-9: Plot 4 showing vegetation zone PCT 266

3.1.10 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 ID: 267

Conservation status: Critically Endangered BC Act, EPBC Act

Estimate of percent cleared: 89 %

Vegetation zones (condition) and plots:

- Moderate- good – Plot 12

Description:

PCT 267 is a tall woodland or open woodland to about 20 m high dominated by White Box (*Eucalyptus albens*), White Cypress Pine (*Callitris glaucophylla*) and often Western Grey Box (*Eucalyptus microcarpa*). PCT 267 generally occurs on undulating low hills. Two condition classes were identified within the study area:

- Moderate - Good 36.93 hectares
- Low 0.4 hectares

Floristic and structural summary of PCT 267 within the study area

Growth form	Typical species
Trees	<i>Eucalyptus albens</i> , <i>Callitris glaucophylla</i> , <i>Eucalyptus microcarpa</i> , <i>Eucalyptus melliodora</i>
Shrubs	<i>Acacia decora</i> , <i>Dodonaea viscosa</i> , <i>Maireana microphylla</i> , <i>Pittosporum angustifolium</i> , <i>Acacia implexa</i>
Grass and grass-like	<i>Austrostipa scabra</i> , <i>Austrodanthonia caespitosa</i> , <i>Lomandra filiformis</i> , <i>Dianella revoluta</i> , <i>Lomandra multiflora</i>
Forb	<i>Hydrocotyle laxiflora</i> , <i>Chenopodium desertorum</i> , <i>Wahlenbergia communis</i>
Fern	-
Other	-



Photo 3-10: Plot 12 showing vegetation zone PCT 267

3.1.11 Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in the NSW South Western Slopes Bioregion

Vegetation formation: Grassy Woodlands

Vegetation class: Western Slopes Grassy Woodlands

PCT ID: 276

Conservation status: Critically Endangered BC Act, EPBC Act

Estimate of percent cleared: 90 %

Vegetation zones (condition) and plots:

- Moderate- good – Plot 8

Description:

PCT 276 is a tall grassy woodland dominated by Yellow Box (*Eucalyptus melliodora*) generally without other tree species, that occurs on rich alluvial soils on flats. A shrub layer is generally absent but where it does occur, shrub density is very low.

One condition class was identified within the study area:

- Moderate - Good 41.76 hectares

Floristic and structural summary of PCT 276 within the study area

Growth form	Typical species
Trees	<i>Eucalyptus melliodora</i> , <i>Eucalyptus blakelyi</i> , <i>Eucalyptus bridgesiana</i>
Shrubs	<i>Acacia decora</i> , <i>Maireana microphylla</i> , <i>Acacia deanei</i> , <i>Acacia implexa</i> , <i>Acacia pycnantha</i> , <i>Acacia paradoxa</i>
Grass and grass-like	<i>Bothriochloa macra</i> , <i>Austrostipa bigeniculata</i> , <i>Elymus scaber</i> , <i>Austrodanthonia auriculata</i> ,
Forb	<i>Convolvulus graminetinus</i> , <i>Sida corrugate</i> , <i>Calotis cuneata</i> , <i>Rumex brownii</i>
Fern	-
Other	-



Photo 3-11: Plot 8 showing vegetation zone PCT 276

3.1.12 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 ID: 277

Conservation status: Critically Endangered BC Act, EPBC Act

Estimate of percent cleared: 94 %

Vegetation zones (condition) and plots:

- Moderate- good – Plot 1

Description:

PCT 277 is a tall woodland to about 20 m high dominated by Blakely's Red Gum (*Eucalyptus blakelyi*) and Yellow Box (*Eucalyptus melliodora*). Blakely's Red Gum or Yellow Box may vary in their dominance and either can be absent in some places grading into areas with more Apple Box (*Eucalyptus bridgesiana*), Long-leaved Box (*Eucalyptus goniacalyx*) and rarely other Eucalypts. Shrubs are sparse or absent (pending on disturbance) but may include *Acacia dealbata*. The ground cover may be dense to sparse depending on rainfall and is dominated by grass species including *Poa sieberiana*, *Bothriochloa macra*, *Aristida ramosa*, *Themeda australis*, *Austrodanthonia* spp and *Austrostipa* spp. Forbs include *Vittadinia cuneata*, *Chrysocephalum apiculatum* and *Sida corrugata*. PCT 277 is a very widespread community and dominates the road reserve as the most widespread native plant community. It generally occurs on fertile deep, loam or clay soils derived from a range of substrates including fine-grained sedimentary and metamorphic rocks but also volcanics and fine-grained granite mainly in the upper slopes sub-region of the NSW South-western Slopes Bioregion.

Two condition classes were identified within the study area:

- Moderate - Good 406.09 hectares
- Low 37.72 hectares

Floristic and structural summary of PCT 277 within the study area

Growth form	Typical species
Trees	<i>Eucalyptus blakelyi</i> , <i>Eucalyptus melliodora</i> , <i>Eucalyptus bridgesiana</i> , <i>Eucalyptus albens</i> , <i>Eucalyptus conica</i> , <i>Callitris glaucophylla</i>
Shrubs	<i>Acacia dealbata</i> , <i>Hibbertia obtusifolia</i>
Grass and grass-like	<i>Themeda australis</i> , <i>Poa sieberiana</i> , <i>Bothriochloa macra</i> , <i>Aristida ramosa</i> , <i>Austrostipa verticillata</i> , <i>Cymbopogon refractus</i> , <i>Enteropogon acicularis</i>
Forb	<i>Alternanthera nana</i> , <i>Sida corrugata</i> , <i>Wahlenbergia luteola</i> ,
Fern	<i>Cheilanthes sieberi</i>
Other	<i>Amyema miquelii</i>



Photo 3-12: Plot 1 showing vegetation zone PCT 277

3.1.13 Black Cypress Pine – Red Stringybark – red gum – box low open forest on siliceous rocky outcrops in the NSW South Western Slopes Bioregion

Vegetation formation: *Dry Sclerophyll Forests (Shrubby sub-formation)*

Vegetation class: *Western Slopes Dry Sclerophyll Forests*

PCT ID: 309

Conservation status: Not a TEC

Estimate of percent cleared: 15 %

Vegetation zones (condition) and plots:

- Moderate- good – No plot able to be taken as road reserve fenced and deemed too dangerous to climb. No gate access noted.

Description:

PCT 309 is a low to mid-high open forest dominated by Black Cypress Pine (*Callitris endlicheri*) often with Red Stringybark (*Eucalyptus macrorhyncha*). Dwyer's Red Gum (*Eucalyptus dwyeri*) may also be present. Shrubs are sparse and include *Calytrix tetragona*, *Acacia paradoxa*, *Melichrus urceolatus*, *Dodonaea viscosa*, *Acacia implexa* and *Cassinia* spp.. Mostly restricted to skeletal lithosol brown loamy sand soils derived from coarse-grained igneous or sedimentary rocks on ridges, rock flats or upper steep slopes in hill landform patterns with northern or western aspects in the upper slopes sub-region of the NSW South-western Slopes Bioregion in the adjoining South East Highlands Bioregion. Within the road reserve, only a small patch was identified south of The Rock. This portion of the road reserve was fenced and access was unable to be safely made during the field survey.

One condition class was identified within the study area:

- Moderate - Good 0.55 hectares

Floristic and structural summary of PCT 309 within the study area

Growth form	Typical species
Trees	<i>Eucalyptus macrorhyncha</i> , <i>Callitris endlicheri</i> , <i>Eucalyptus dwyeri</i> , <i>Eucalyptus gonicalyx</i>
Shrubs	<i>Calytrix tetragona</i> , <i>Acacia paradoxa</i> , <i>Hibbertia obtusifolia</i> , <i>Stypantra glauca</i>

Growth form	Typical species
Grass and grass-like	<i>Microlaena stipoides</i> , <i>Themeda australis</i> , <i>Poa sieberiana</i> , <i>Bothriochloa macra</i> , <i>Aristida ramosa</i> , <i>Austrostipa verticillata</i> , <i>Cymbopogon refractus</i> , <i>Enteropogon acicularis</i>
Forb	<i>Wahlenbergia communalis</i>
Fern	<i>Cheilanthes sieberi</i>



Photo 3-13: PCT 309 within the study area

3.1.14 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, 60.19 hectares of native tree plantings were mapped within the road corridor. 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 2.15 hectares of native tree plantings.



Photo 3-14: An example of Native tree plantings within the study area

3.1.15 Cleared land

The field survey identified large areas of cleared land. Cleared land is defined as areas dominated by non-native vegetation (>50% cover) (ie, exotic flora, weeds), and, or is highly disturbed clearly visible by landform change (ie a road batter).

Cleared land is widespread in the locality and is not of preferred habitat to threatened biota.



Photo 3-15: An example of cleared land within the study area

3.2 Threatened ecological communities

A review of each PCT recorded was undertaken against the BioNET Vegetation Information System (BioNET VIS) classification to determine if any PCT was assigned to a threatened ecological community (DPIE/OEH, 2022a). Based on that review, two threatened ecological communities (TEC) were present during the field survey. These being:

- Box-gum Woodland (BC Act /EPBC Act)
- Inland Grey Box Woodland (BC Act /EPBC Act)

Box-gum Woodland occurs as the following PCT as defined by BioNET VIS within the study area:

- PCT 75, PCT 266, PCT 267, PCT 276 and PCT 277

Inland Grey Box Woodland TEC occurs as the following PCT as defined by BioNET VIS within the study area:

- PCT 76, PCT 80, and PCT 110

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 (DEWHA, 2008, DEH, 2006, 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.



Photo 3-16: Inland Grey Box Woodland TEC Left - PCT 76 north of Bethungra; Right - PCT 80 south of Henty



Photo 3-17: Box-gum Woodland (PCT 277) Left - south of Koorawatha; Right – north of Koorawatha

Table 3-2: Threatened ecological communities, their legal status and extent within the study area

Threatened ecological community	Legal Status	Area (ha)
Box-gum Woodland	BC Act	39.75
Box-gum Woodland	BC Act/EPBC Act	491.2
Inland Grey Box Woodland	BC Act	6.38
Inland Grey Box Woodland	BC Act/EPBC Act	66.01

3.3 Threatened species

The field survey revealed the presence, or moderate to high likelihood of presence of 46 threatened and migratory biota within the study area. The threatened species recorded during the field survey were as follows:

- Brown Treecreeper
- Diamond Firetail
- Dusky Woodswallow

- Grey-crowned Babbler
- Superb Parrot
- Hooded Robin

Table 3-3: Threatened species survey results

Species	EPBC Act	BC Act	Identification method (not recorded, assumed, recorded, expert report)	Results
<i>Scoteanax rueppellii</i> (Greater Broad-nosed Bat)	-	V	Assumed	Moderate likelihood of occurrence
<i>Vespadelus baverstocki</i> (Inland Forest Bat)	-	V	Assumed	Moderate likelihood of occurrence
<i>Chalinolobus picatus</i> (Little Pied Bat)	-	V	Assumed	Moderate likelihood of occurrence
<i>Myotis Macropus</i> (Southern Myotis)	-	V	Assumed	Moderate likelihood of occurrence
<i>Saccolaimus flaviventris</i> (Yellow-bellied Sheath-tail-bat)	-	V	Assumed	Moderate likelihood of occurrence
<i>Ninox connivens</i> (Barking Owl)	-	V	Assumed	Moderate likelihood of occurrence.
<i>Melithreptus gularis gularis</i> (Black-chinned Honeyeater (eastern subspecies))	-	V	Assumed	High likelihood of occurrence
<i>Falco subniger</i> (Black Falcon)	-	V	Assumed	Moderate likelihood of occurrence
<i>Climacteris picumnus victoriae</i> (Brown Treecreeper (eastern subspecies))	-	V	Recorded	Recorded
<i>Burhinus grallarius</i> (Bush Stone-curlew)	-	E	Assumed	High likelihood of occurrence
<i>Stagonopleura guttata</i> (Diamond Firetail)	-	V	Recorded	High likelihood of occurrence
<i>Artamus cyanopterus cyanopterus</i> (Dusky Woodswallow)	-	V	Recorded	Recorded

Species	EPBC Act	BC Act	Identification method (not recorded, assumed, recorded, expert report)	Results
<i>Petroica pheonica</i> (Flame Robin)	-	V	Assumed	High likelihood of occurrence
<i>Callocephalon fimbriatum</i> (Gang-gang Cockatoo)	-	V	Assumed	Moderate likelihood of occurrence
<i>Pomatostomus temporalis temporalis</i> (Grey-crowned Babbler (eastern subspecies))	-	V	Recorded	Recorded
<i>Melanodryas cucullata cucullata</i> (Hooded Robin (south-eastern form))	-	V	Recorded	High likelihood of occurrence
<i>Hieraaetus morphnoides</i> (Little Eagle)	-	V	Assumed	Moderate likelihood of occurrence
<i>Glossopsitta pusilla</i> (Little Lorikeet)	-	V	Assumed	High likelihood of occurrence
<i>Cuculus optatus</i> (Oriental Cuckoo)	M	-	Assumed	Moderate likelihood of occurrence
<i>Grantiella picta</i> (Painted Honeyeater)	V	V	Assumed	Moderate likelihood of occurrence
<i>Certhionyx variegatus</i> (Pied Honeyeater)	-	V	Assumed	Moderate likelihood of occurrence
<i>Lophochroa leadbeateri</i> (Pink Cockatoo)	-	V	Assumed	Moderate likelihood of occurrence
<i>Glossopsitta porphyrocephala</i> (Purple-crowned Lorikeet)	-	V	Assumed	Moderate likelihood of occurrence
<i>Merops ornatus</i> (Rainbow Bee-eater)	M	-	Assumed	Moderate likelihood of occurrence
<i>Anthochaera phrygia</i> (Regent Honeyeater)	CE	CE	Assumed	Moderate likelihood of occurrence
<i>Petrocia boodang</i> (Scarlet Robin)	-	V	Assumed	High likelihood of occurrence

Species	EPBC Act	BC Act	Identification method (not recorded, assumed, recorded, expert report)	Results
<i>Chthonicola sagittate</i> (Speckled Warbler)	-	V	Assumed	Moderate likelihood of occurrence
<i>Circus assimilis</i> (Spotted Harrier)	-	V	Assumed	Moderate likelihood of occurrence
<i>Lophoictinia isura</i> (Square-tailed Kite)	-	V	Assumed	Moderate likelihood of occurrence
<i>Polytelis swainsonii</i> (Superb Parrot)	V	V	Recorded	Recorded
<i>Lathamus discolor</i> (Swift Parrot)	CE	E	Assumed	High likelihood of occurrence
<i>Neophema pulchella</i> (Turquoise Parrot)	-	V	Assumed	High likelihood of occurrence
<i>Daphoenositta chrysoptera</i> (Varied Sittella)	-	V	Assumed	High likelihood of occurrence
<i>Epthianura albifrons</i> (White-fronted Chat)	-	V	Assumed	Moderate likelihood of occurrence
<i>Galaxias rostratus</i> (Flathead Galaxias)	CE	E(FM Act)		Moderate, but rivers and creeks outside of proposed work area. No further assessment required
<i>Maccullochella peelii</i> (Murray Cod)	V	-		Moderate, but rivers and creeks outside of proposed work area. No further assessment required
<i>Phascogale tapoatafa</i> (Brush-tailed Phascogale)	-	V	Assumed	Moderate likelihood of occurrence
<i>Pteropus poliocephalus</i> (Grey-headed Flying Fox)	V	V	Assumed	Moderate likelihood of occurrence
<i>Dasyurus maculatus</i> (Spotted-tailed Quoll)	E	V	Assumed	Moderate likelihood of occurrence
<i>Petaurus norfolcensis</i> (Squirrel Glider)	-	V	Assumed	High likelihood of occurrence

Species	EPBC Act	BC Act	Identification method (not recorded, assumed, recorded, expert report)	Results
<i>Caladenia concolor</i> (Crimson Spider Orchid)	V	E	Not recorded	High in Bethungra Hills. Target surveys completed failed to identify any plants. High quality habitat identified
<i>Leucochrysum albicans</i> <i>var. tricolor</i> (Hoary Sunray)	E	-	Assumed	Moderate likelihood of occurrence.
<i>Diuris tricolor</i> (Pine Donkey Orchid)	-	V	Not recorded	High in pine dominant vegetation between Wagga Wagga and Jail Brake Inn. Target surveys completed failed to identify any plants
<i>Swainsona sericea</i> (Silky Swainson-pea)	-	V	Assumed	Moderate likelihood of occurrence.
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions	EEC	EEC	Recorded	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	EEC	Recorded	Recorded

Microbats

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.

Barking Owl

The Barking Owl is widely distributed around Australia but sparsely in NSW (DPIE/BCS, 2022b, 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 (DPIE/BCS, 2022b) both of which are of relevance to the proposal.

Birds of Prey (Black Falcon, Little Eagle, Spotted Harrier, Square-tailed Kite)

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.

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. No Little Eagle were recorded during the field survey. No nesting sites (past or present) were identified in the road corridor.

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 creek lines as these attributes aid foraging techniques for the species.

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, 1999). It is sparsely distributed with resident pairs having territories of greater than 100 km², and is also believed to be nomadic (NPWS, 1999, 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 (DPIE/BCS, 2022b). 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 failed to identify this species and 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 these species occupy, potential foraging resources are not regarded as limited within the locality given the extent of the native vegetation in the locality.

Woodland/shrubland Birds (Black-chinned Honeyeater, Brown Treecreeper, Bush Stone-curlew, Diamond Firetail, Gang-gang Cockatoo, Grey-crowned Babbler, Hooded Robin, Little Lorikeet, Painted Honeyeater, Pink Cockatoo, Purple-crowned Lorikeet, Regent Honeyeater, Scarlet Robin, Speckled Warbler, Superb Parrot, Swift Parrot, Turquoise Parrot, Varied Sittella)

The Black-chinned Honeyeater is found in dry open forests and woodlands dominated by box or ironbark eucalypts (DPIE/BCS, 2022b). 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.

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 rough bark 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 (DPIE/BCS, 2022b).

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. Brown Treecreeper were recorded during field surveys.

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-Cowra, 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 (DPIE/BCS, 2022b). They build their nests on the ground in a scrape or small bare patch, laying two eggs in spring and early summer.

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 (DPIE/BCS, 2022b, Morcombe, 2004). Although they are not commonly found in coastal districts, there are records from near Sydney, the Hunter Valley and the Bega Valley (DPIE/BCS, 2022b). 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). Diamond Firetail were recorded during the field survey.

The Gang-gang Cockatoo is distributed from southern Victoria through south- and central-eastern New South Wales. In New South Wales, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and

south-west slopes. It occurs regularly in the Australian Capital Territory. It is rare at the extremities of its range, with isolated records known from as far north as Coffs Harbour and as far west as Mudgee (OEH, 2021c). Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts (OEH, 2021c). No Gang-gang Cockatoo were recorded during field surveys.

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, DPIE/BCS, 2022b, 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 (DPIE/BCS, 2022b). This species was recorded during the field survey.

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 (DPIE/BCS, 2022b). 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 first field survey, it was determined that there is some likelihood that the species could occur within the road reserve. During the Crimson Spider Orchid surveys in September, a pair of Hooded Robin was recorded foraging within and adjacent to the road reserve, north of Bethungra.

The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia (DPIE/BCS, 2022b). 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 (DPIE/BCS, 2022b).

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. No Little Lorikeet were recorded during the field survey.

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 (DPIE/BCS, 2022b). 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 field surveys.

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 (DPIE/BCS, 2022b, Morcombe, 2004, Sass, 2009). Breeding pairs occupy nests at least 1 km apart with densities of about one pair per 30 km² recorded (DPIE/BCS, 2022b). No Pink Cockatoo were recorded during the field survey.

The Purple-crowned Lorikeet occurs across the southern parts of the continent from Victoria to south-west Western Australia. It is uncommon in NSW, with records scattered

across the box-ironbark woodlands of the Riverina and south west slopes, the River Red Gum forests and mallee of the Murray Valley as far west as the South Australian border, and, more rarely, the forests of the South Coast. The species is nomadic and most, if not all, records from NSW are associated with flowering events (OEH, 2021c). No Purple-crowned Lorikeet were recorded in the field survey.

The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. The Regent Honeyeater is a flagship threatened woodland bird whose conservation will benefit a large suite of other threatened and declining woodland fauna. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. The Regent Honeyeater is a generalist forager, although it feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. Key eucalypt species include Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany. No Regent Honeyeater were recorded during the field survey.

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.

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. No Speckled Warbler were recorded during the field survey.

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 (DPIE/BCS, 2022b, 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 survey.

Swift Parrot is a winter (March-September) visitor to southern and eastern New South Wales, where it inhabits eucalypt forests and woodlands (DPIE/BCS, 2022b, 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.

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 (DPIE/BCS, 2022b). 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.

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, DPIE/BCS, 2022b, DPIE/BCS, 2022a). 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.

Habitat generalists (Flame Robin, Dusky Woodswallow, Pied Honeyeater)

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 burnt 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 but they are likely to occur there.

Dusky Woodswallow occur in a wide range of habitats including open eucalypt forests, woodlands, shrub lands, heathlands, farmland 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. Dusky Woodswallow were recorded during field surveys and this is not a surprising result as they are regularly recorded across the NSW South Western Slopes Bioregion.

The Pied Honeyeater is a widespread species found throughout a variety of vegetation communities across arid and semi-arid regions of NSW (DPIE/BCS, 2022b) 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 (DPIE/BCS, 2022b). As with other semi-arid honeyeaters (Oliver et al., 2003, Watson, 1997, Yan, 1993), Pied Honeyeaters also rely heavily on mistletoe. No Pied Honeyeater were recorded during the field survey.

Open grassland/Cleared land birds (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 (DPIE/BCS, 2022b).

No White-fronted Chat were recorded during field surveys.

Brush-tailed Phascogale

The Brush-tailed Phascogale has a patchy distribution around the coast of Australia. In NSW it is mainly found east of the Great Dividing Range although there are occasional records west of the divide. This species preferring dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs, or leaf litter. Females have exclusive territories of around 20 – 40 hectares, while males have overlapping territories often greater than 100 hectares. Nest and shelter in tree hollows with entrances 2.5 – 4 centimetres wide.

No Brush-tailed Phascogale were recorded during field surveys.

Grey-headed Flying-fox

The Grey-headed Flying-fox is the largest Australian bat and is generally found within 200km of the east coast of Australia (DPIE/BCS, 2022b). 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 and Lachlan River including within the city of Wagga Wagga and town of Cowra.

Spotted-tailed Quoll

The range of the Spotted-tailed Quoll has contracted considerably since European settlement. It is now found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania. Only in Tasmania is it still considered relatively common. Quolls use hollow-bearing trees, fallen logs, other animal burrows, small caves and rock outcrops as den sites. Mostly nocturnal, although will hunt during the day; spend most of the time on the ground, although also an excellent climber and will hunt possums and gliders in tree hollows and prey on roosting birds. Females occupy home ranges of 200-500 hectares, while males occupy very large home ranges from 500 to over 4000 hectares, are known to traverse their home ranges along densely vegetated creek lines (OEH, 2021c).

No Spotted-tailed Quoll were recorded during field surveys.

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 2021c) 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.

Squirrel Glider are known from Box-gum Woodlands throughout the NSW South Western Slopes Bioregion, including within the road reserve at various locations along the length of the road. There is a high potential for occurrence in any of the moderate-good quality box-gum woodland remnants within the road reserve wherever hollows are present.

Crimson Spider Orchid

The Crimson Spider Orchid is from a group of orchids characterised by five long spreading petals and sepals around a broad down-curved labellum (Scannell, 2012, Jones and Jones, 2000, Todd, 2000) . The current NSW Scientific Committee listing incorporates two populations which have each been described as separate species by D.L. Jones. One of these populations comprises a few hundred plants on private property near Bethungra and the other of about 100 plants occurs in Burrinjuck Nature reserve. The other occurrences of

the Crimson Spider Orchid in NSW are from the Nail Can Hill Crown Reserve near Albury. The species also occurs at two localities in Victoria near Beechworth and Chiltern.

The dominant trees are Blakely's Red Gum (*Eucalyptus blakelyi*), Red Stringybark (*E. macrorhyncha*), Red Box (*E. polyanthemos*) and White Box (*E. albens*); the diverse understorey includes Silver Wattle (*Acacia dealbata*), Hop Bitter-pea (*Daviesia latifolia*), Common Beard-heath (*Leucopogon virgatus*), Spreading Flax-lily (*Dianella revoluta*) and Poa Tussock (*Poa sieberiana*).

Discussions with the Accountable Officer at DPIE for Crimson Spider Orchid confirmed that the species was flowering during the survey period (13-17 September 2021). As the property owner did not permit access to EnviroKey, he did provide confirmation with photographic evidence that the orchids were flowering during our survey within the road reserve. While no Crimson Spider Orchid were recorded within the road reserve, we were able to confirm that a section of MR78 road reserve provides habitat likely to be critical for the recovery of this species in the long term. This is detailed within Figure 3-41.

Pine Donkey Orchid

The Pine Donkey Orchid is known in pine dominated woodland areas south and west of Narrandera as well as other areas on the western slopes of NSW and extending into QLD. There is a known population around Coolamon. Despite target surveys during an appropriate flowering season (confirmed by the use of a reference site), none were detected within the road reserve. No further assessment is required.

Silky Swainson-pea

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. However, a population is also known from Main Road 279 (Gocup Road) between Gundagai and Tumut (EnviroKey, 2013a, EnviroKey, 2013b), confirming that the species is present within the box-gum woodlands of the South Western Slopes Bioregion.

No Silky Swainson-peas were recorded during field surveys.

Hoary Sunray

Hoary Sunray is endemic to south-eastern Australia, where it is currently known from three geographically separate areas in Tasmania, Victoria and south-eastern NSW and ACT. In NSW it currently occurs on the Southern Tablelands adjacent areas in an area roughly bounded by Albury, Bega, and Goulburn, with a few scattered localities known from beyond this region. It occurs in a wide variety of grassland, woodland and forest habitats, generally on relatively heavy soils, can occur in modified habitats such as semi-urban areas and roadsides and is highly dependent on the presence of bare ground for germination (OEH, 2021c).

No Hoary Sunray were recorded during field surveys.

Inland Grey Box Woodland threatened ecological community

Inland Grey Box Woodland are dominated by *Eucalyptus macrocarpa* (Inland Grey Box), and are often found in association with *E. populnea* subsp. *bimble* (Bimble or Poplar Box), *Callitris glaucophylla* (White Cypress Pine), *Brachychiton populneus* (Kurrajong), *Allocasuarina luehmannii* (Bulloak) or *E. melliodora* (Yellow Box). This community is located along the Olympic Highway corridor in small occurrences.

Box-gum Woodland threatened ecological community

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 (DPIE/BCS, 2022b). 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 is the dominant vegetation community within the road reserve.

3.4 Fauna habitat

Field surveys revealed the presence of two general habitats. These being Woodland and Cleared land. Mapping of all PCT is provided on Figure 3-1 to Figure 3-40. 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 1,168 HBT were identified to occur within 10 metres of the existing edge line. Many of these occurred within a single PCT (PCT 277 Blakely's Red Gum – Yellow Box grassy tall woodland) with 551 HBT present. There were 418 HBT mapped within Cleared land/Highly-disturbed land respectively. Many of the HBT within these areas occurred as isolated trees and/or dead trees (stags). 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. Within the study area (i.e, the road reserve) but outside of the 10 metre buffer applied to the edge line, HBT were estimated based on density per PCT (based on data collection from inside of the 10 metre buffer line). Using this method, a total of 3,067 HBT were estimated outside of the 10 metre buffer but within the road reserve boundary. Based on Table 3-4, a total of 4,235 HBT are estimated to be within the road reserve of MR78.

Table 3-4: Estimates of hollow-bearing trees within each plant community type, Cleared/highly disturbed land and Native tree plantings

Vegetation community	Actual HBT density per ha	Total HBT within each vegetation community (based on estimate)
Cleared/highly disturbed	2.21	802
Native tree planting	0.61	51
PCT 5	0.79	23
PCT 75	2.52	11
PCT 76	5.07	170
PCT 79	0.92	5
PCT 80	9.86	375
PCT 110	0.00	0

Vegetation community	Actual HBT density per ha	Total HBT within each vegetation community (based on estimate)
PCT 186	0.00	0
PCT 217	2.61	36
PCT 266	0.97	3
PCT 267	8.91	333
PCT 276	1.15	47
PCT 277	5.36	2379
PCT 309	0.00	0
Total HBT within Road Reserve		4,235

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* are present in the study area or in the Albury City, Greater Hume, Lockhart, Wagga Wagga City, Junee, Cootamundra-Gundagai, Hilltops, and Cowra 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 South-west slopes regions (Spooner and Lunt, 2004). The proposal lies within a highly modified, agricultural landscape. Nonetheless, the road corridors in many instances, provide the only landscape scale connectivity across a bioregion which is generally highly modified with extensive clearing for agricultural (NPWS, 2003a). In some cases, only 4% of native vegetation remains. The value of road corridors to many threatened species is well known the threatened species. This includes arboreal mammals like the Squirrel Glider and woodland birds including Superb Parrot (BakerDabb, 2011, CSU, 2006b, van der Ree et al., 2001, Brearley et al., 2011, Goldingay et al., 2011, Bell et al., 2011, Crane et al., 2010, McCall et al., 2010, Goldingay et al., 2010, Van der Ree, 2008, Crane et al., 2008). The long, lineal remnants within the road corridor of the Olympic Highway are 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

Three Matters of National Environmental Significance (MNES) were recorded during the field surveys. These being Superb Parrot, Box-gum Woodland EEC and Inland Grey Box Woodland EEC. Locations of MNES are provided on Figure 3-1 to Figure 3-40.

The EPBC Act Protected Matters Search identified a number of MNES with potential to occur within the study area. There are no wetlands of international importance within the vicinity of the proposal. The proposal is located within 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 Appendix B.

4 Avoidance and minimisation

A key part of Transport's management of biodiversity for this proposal is the application of the 'avoid, minimise, mitigate and offset' hierarchy as follows:

1. Avoid and minimise impacts.
2. Mitigate impacts.
3. Offset impacts in accordance with Transport guidelines.

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 minimising the areas of impact in these areas (where not possible to avoid). Some areas or features were avoided for reasons other than protecting biodiversity values. This includes avoiding landscape features that may contain Aboriginal Sites or Places or roadside memorials. The primary reason for avoiding these areas may not have been to avoid biodiversity impacts but biodiversity impacts may have been avoided by this process as well.

For this proposal, extensive redesign of the scope of the proposed work occurred once the field survey data was collected and analysed. 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. This includes an area deemed critical to the long-term survival of the Bethungra population of the Crimson Spider Orchid. This is identified in Figure 4-41.

Originally, the proposed design would have resulted in the removal of up to:

- 94.19 hectares of native vegetation
- 4.22 hectares of native tree planting
- 55.45 hectares of cleared/highly disturbed/non-native vegetation
- 829 hollow-bearing trees.

With significant redesign by Transport to avoid and minimise biodiversity impacts, the proposed work (as assessed within this revised BA) would result in the removal of up to:

- 24.53 hectares of native vegetation
- 2 hectares of native tree planting
- 22.66 hectares of cleared/highly disturbed/non-native vegetation
- 162 hollow-bearing trees.

5 Impact assessment

5.1 Construction direct impacts

Road construction, operation and associated maintenance can have a range of potential impacts to biodiversity. The potential impacts as a result of 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
- Injury and mortality
- Invasion and spread of weeds
- Noise, light and vibration.

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 up to 24.53 hectares of native vegetation that is consistent with a plant community type (PCT) (ie, not native tree planting). The area of impact has been calculated using a geographic information system (GIS) shapefile of the proposed impact areas which was then overlain onto our vegetation mapping prepared from the field surveys. The potential extent of clearing expected as a result of the proposal is listed by PCT in Table 5-1.

Table 5-1: Summary of direct impacts on native vegetation

Plant community type (PCT) (Broad condition class)	Threatened ecological community	Direct impacts	
		Proposal footprint (ha)	Temporary impacts (ha)
River Red Gum herbaceous-grassy very tall open forest wetland (5) (Moderate-good)	Not a TEC	0.02	0
Yellow Box-White Cypress Pine grassy woodland (75) (Moderate-good)	Box-gum Woodland (BC Act & EPBC Act)	0.05	0.
Western Grey Box tall grassy woodland (76) (Moderate-Good)	Inland Grey Box Woodland (BC Act & EPBC Act)	1.66	0.33
Western Grey Box tall grassy woodland (76) (Low)	Inland Grey Box Woodland (BC Act)	0.42	0

Plant community type (PCT) (Broad condition class)	Threatened ecological community	Direct impacts	
		Proposal footprint (ha)	Temporary impacts (ha)
River Red Gum shrub/grass riparian tall woodland or open forest wetland (79) (Moderate-good)	Not a TEC	0.26	0
Western Grey Box – White Cypress Pine tall woodland (80) (Moderate-good)	Inland Grey Box Woodland (BC Act & EPBC Act)	1.1	0.11
Western Grey Box – White Cypress Pine tall woodland (80) (Low)	Inland Grey Box Woodland (BC Act)	0.01	
Mugga Ironbark – Western Grey Box – cypress pine tall woodland (217) (Moderate-good)	Not a TEC	0.65	0.06
White Box grassy woodland (266) (Moderate-good)	Box-gum Woodland (BC Act & EPBC Act)	0.17	0.03
White Box grassy woodland (266) (Low)	Box-gum Woodland (BC Act)	0.18	
White Box – White Cypress Pine – Western Grey Box shrub/grass/forb woodland (267) (Moderate-good)	Box-gum Woodland (BC Act & EPBC Act)	0.53	0.04
White Box – White Cypress Pine – Western Grey Box shrub/grass/forb woodland (267) (Low)	Box-gum Woodland (BC Act)	0.02	
Yellow Box grassy tall woodland (276) (Moderate-good)	Box-gum Woodland (BC Act & EPBC Act)	0.50	0.06
Blakely's Red Gum – Yellow Box grassy tall woodland (277) (Moderate-good)	Box-gum Woodland (BC Act & EPBC Act)	13.62	1.26
Blakely's Red Gum – Yellow Box grassy tall woodland (277) (Low)	Box-gum Woodland (BC Act)	5.33	

Plant community type (PCT) (Broad condition class)	Threatened ecological community	Direct impacts	
		Proposal footprint (ha)	Temporary impacts (ha)
Black Cypress Pine – Red Stringybark – red gum – box low open forest (309) (Moderate-good)	Not a TEC	0.01	0

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 B, and the known habitat requirements of each species.

A total of 162 hollow-bearing trees (HBT) are proposed for removal. Details of the trees is included in Appendix E.

Table 5-2: Summary of direct impacts on threatened fauna and habitat

Species	Potential occurrence (Moderate, High, Recorded)	Impact (ha)
<i>Scoteanax rueppellii</i> (Greater Broad-nosed Bat)	Moderate	24.53 Up to 162 HBT
<i>Vespadelus baverstocki</i> (Inland Forest Bat)	Moderate	24.53 Up to 162 HBT
<i>Chalinolobus picatus</i> (Little Pied Bat)	Moderate	24.53 Up to 162 HBT
<i>Myotis Macropus</i> (Southern Myotis)	Moderate	0.35 Up to 162 HBT
<i>Saccolaimus flaviventris</i> (Yellow-bellied Sheath-tail-bat)	Moderate	24.53 Up to 162 HBT
<i>Ninox connivens</i> (Barking Owl)	Moderate	24.53 Up to 162 HBT
<i>Melithreptus gularis gularis</i> (Black-chinned Honeyeater (eastern subspecies))	High	24.53

Species	Potential occurrence (Moderate, High, Recorded)	Impact (ha)
<i>Falco subniger</i> (Black Falcon)	Moderate	49.19
<i>Climacteris picumnus victoriae</i> (Brown Treecreeper (eastern subspecies))	Recorded	24.53 Up to 162 HBT
<i>Burhinus grallarius</i> (Bush Stone-curlew)	High	24.53
<i>Stagonopleura guttata</i> (Diamond Firetail)	Recorded	24.53
<i>Artamus cyanopterus cyanopterus</i> (Dusky Woodswallow)	Recorded	49.19
<i>Petroica pheonicea</i> (Flame Robin)	High	49.19
<i>Callocephalon fimbriatum</i> (Gang-gang Cockatoo)	Moderate	24.53 Up to 162 HBT
<i>Pomatostomus temporalis temporalis</i> (Grey-crowned Babbler (eastern subspecies))	Recorded	24.53
<i>Melanodryas cucullata cucullata</i> (Hooded Robin (south-eastern form))	Recorded	24.53
<i>Hieraaetus morphnoides</i> (Little Eagle)	Moderate	24.53
<i>Glossopsitta pusilla</i> (Little Lorikeet)	High	24.53 Up to 162 HBT
<i>Cuculus optatus</i> (Oriental Cuckoo)	Moderate	24.53
<i>Grantiella picta</i> (Painted Honeyeater)	Moderate	24.53

Species	Potential occurrence (Moderate, High, Recorded)	Impact (ha)
<i>Certhionyx variegatus</i> (Pied Honeyeater)	Moderate	24.53
<i>Lophochroa leadbeateri</i> (Pink Cockatoo)	Moderate	24.53 Up to 162 HBT
<i>Glossopsitta porphyrocephala</i> (Purple-crowned Lorikeet)	Moderate	24.53 Up to 162 HBT
<i>Merops ornatus</i> (Rainbow Bee-eater)	Moderate	49.19
<i>Anthochaera phrygia</i> (Regent Honeyeater)	Moderate	24.53
<i>Petrocia boodang</i> (Scarlet Robin)	High	24.53
<i>Chthonicola sagittate</i> (Speckled Warbler)	Moderate	24.53
<i>Circus assimilis</i> (Spotted Harrier)	Moderate	49.19
<i>Lophoictinia isura</i> (Square-tailed Kite)	Moderate	24.53
<i>Polytelis swainsonii</i> (Superb Parrot)	Recorded	24.53 Up to 162 HBT
<i>Lathamus discolor</i> (Swift Parrot)	High	24.53
<i>Neophema pulchella</i> (Turquoise Parrot)	High	49.19 Up to 162 HBT
<i>Daphoenositta chrysoptera</i> (Varied Sittella)	High	24.53
<i>Epthianura albifrons</i> (White-fronted Chat)	Moderate	49.19

Species	Potential occurrence (Moderate, High, Recorded)	Impact (ha)
<i>Galaxias rostratus</i> (Flathead Galaxias)	Moderate	Nil (indirect impacts only to aquatic)
<i>Maccullochella peelii</i> (Murray Cod)	Moderate	Nil (indirect impacts only to aquatic)
<i>Phascogale tapoatafa</i> (Brush-tailed Phascogale)	Moderate	24.53 Up to 162 HBT
<i>Pteropus poliocephalus</i> (Grey-headed Flying Fox)	Moderate	24.53
<i>Dasyurus maculatus</i> (Spotted-tailed Quoll)	Moderate	24.53
<i>Petaurus norfolcensis</i> (Squirrel Glider)	High	24.53 Up to 162 HBT
<i>Leucochrysum albicans</i> var. <i>tricolor</i> (Hoary Sunray)	Moderate	49.19
<i>Swainsona sericea</i> (Silky Swainson-pea)	Moderate	24.53
Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Penplain, Nandewar and Brigalow Belt South Bioregions	Recorded	3.19
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	20.4

5.1.3 Removal of threatened flora

No threatened flora species were recorded in this field survey. Absence of the two threatened orchid species (Crimson Spider Orchid and Pine Donkey Orchid) was confirmed by appropriately timing field surveys and their known flowering at a reference site. An area of habitat for Crimson Spider Orchid directly adjacent to the Bethungra population was

identified which was in high quality condition and is consistent with the habitat requirements of the species. There is a high likelihood that the area also provides a significant buffer to agricultural weed invasion for Crimson Spider Orchid. The area of habitat is detailed on Figure 3-41.

5.1.4 Removal of threatened ecological communities

The proposal would result in the removal of good quality areas of threatened ecological communities along the proposal length (Table 5-3). These are located directly adjacent to the existing road formations.

Table 5-3: Summary of direct impacts to threatened ecological communities

Threatened ecological community	Legal Status	Area (ha)
Box-gum Woodland	BC Act	5.96
Box-gum Woodland	BC Act/EPBC Act	15.11
Inland Grey Box Woodland	BC Act	0.46
Inland Grey Box Woodland	BC Act/EPBC Act	3.12

5.2 Indirect and 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.

While the current gap between vegetation on either side of the road varies, in most parts where patches of native vegetation are present, current connectivity between vegetation on either side of the existing road is separated by up to 17 metres. The proposal may (in some locations) increase this gap by 5-10 metres with the maximum gap expected to be up to 27 metres. This is relatively minor in the context of mobile fauna such as woodland birds and microchiropteran bats. However, in the case of gliding arboreal mammals, further consideration is necessary.

Squirrel Glider have the ability to persist in lineal remnants such as those within the vicinity of the proposal in fragmented landscapes such as the NSW South Western Slopes (Van der Ree 2002). However, with their ability to regularly glide between 20-40 metres and up to 75 metres (Van der Ree 2002), the proposal in its current form is unlikely to impede on connectivity to vegetation where it occurs on both sides of the highway, post-construction. Edge to area ratios are also likely to only marginally increase given the scope of work is confined mostly to trees within close proximity to the existing edge.

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

5.2.2 Injury and mortality

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

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 162 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 Olympic Highway.

5.2.3 Invasion and spread of weeds

Across the study area, weed species are widespread 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. Six Priority Weeds were identified during the field survey. These being Prickly Pear, Bridal Creeper, Coolatai Grass, Serrated Tussock, Blackberry and White Horehound. For the first four species, these are identified on Figure 3-1 to 3-38. However, Blackberry and White Horehound were extensive across the study area and it was too difficult to map the extent. For other potential priority weeds and given the length of the proposal and the survey effort, there is some potential that other 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 some significance to the long-term viability of the retained vegetation within the study area. This is due to the reduction in patch width over long sections of the Olympic Highway which will allow weed invasions to creep further into roadside lineal remnants. In the long-term, reductions in patch width are likely to lead to a greater impact

However, in other areas of native vegetation, weeds are virtually absent which is a rarity in many landscapes, particularly agricultural dominated ones. Appropriate safeguards regarding machinery and vehicle parking are required to minimise impacts to areas of retained native vegetation.

5.2.4 Invasion and spread of pathogens and disease

Pathogens result in disease in flora and fauna and can be found living in organisms such as fungus, bacteria and virus. 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.

5.2.5 Noise, light, dust and vibration

Noise, vibration and light impact already exists on Olympic 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 300 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.

5.3 Cumulative impacts

While the proposal would result in the permanent removal of 24.53 hectares of native vegetation communities, there is also the potential for a proposal on the Sturt Highway (HW14) near the Olympic Highway around Wagga Wagga.

In both landscapes, significant levels of clearing have already occurred across the region for agricultural activity. However, the designs for both MR78 and HW14 have aimed to reduce impacts through careful design and modification of the proposal footprints. For the Olympic Highway, about 3.5% of the native vegetation within the road corridor would be directly impacted should this proposal proceed. The impacts of the proposal are by nature, large given the overall length of the proposal. However, it is unlikely that cumulative impacts would occur given the relatively minor loss of vegetation within the road corridor in general.

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 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 Test of Significance (Annexure C) 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:

- Greater Broad-nosed Bat
- Inland Forest Bat
- Little Pied Bat
- Southern Myotis
- Yellow-bellied Sheath-tail-bat
- Barking Owl
- Black-chinned Honeyeater
- Black Falcon
- Brown Treecreeper

- Diamond Firetail
- Bush Stone Curlew
- Dusky Woodswallow
- Flame Robin
- Gang-gang Cockatoo
- Grey-crowned Babbler
- Hooded Robin
- Little Eagle
- Little Lorikeet
- Painted Honeyeater
- Pied Honeyeater
- Pink Cockatoo
- Purple-crowned Lorikeet
- Regent Honeyeater
- Scarlet Robin
- Speckled Warbler
- Spotted Harrier
- Square-tailed Kite
- Superb Parrot
- Swift Parrot
- Turquoise Parrot
- Varied Sittella
- White-fronted Chat
- Brush-tailed Phascogale
- Grey-headed Flying-fox
- Spotted-tailed Quoll
- Squirrel Glider
- Hoary Sunray
- Silky Swainson-pea
- Inland Grey Box Woodland
- White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Box-gum Woodland)

Table 5-4: Summary of BC Act significance assessments findings

Threatened species, or communities	a	b	c	d	e	Likely significant impact?
<i>Greater Broad-nosed Bat</i>	N	X	N	N	N	No
<i>Inland Forest Bat</i>	N	X	N	N	N	No
<i>Little Pied Bat</i>	N	X	N	N	N	No
<i>Southern Myotis</i>	N	X	N	N	N	No
<i>Yellow-bellied Sheath-tail-bat</i>	N	X	N	N	N	No
<i>Barking Owl</i>	N	X	N	N	N	No

Threatened species, or communities	a	b	c	d	e	Likely significant impact?
<i>Black-chinned Honeyeater</i> (eastern subspecies)	N	X	N	N	N	No
<i>Black Falcon</i>	N	X	N	N	N	No
<i>Brown Treecreeper</i> (eastern subspecies)	N	X	N	N	N	No
<i>Bush Stone-curlew</i>	N	X	N	N	N	No
<i>Diamond Firetail</i>	N	X	N	N	N	No
<i>Dusky Woodswallow</i>	N	X	N	N	N	No
<i>Flame Robin</i>	N	X	N	N	N	No
<i>Gang-gang Cockatoo</i>	N	X	N	N	N	No
<i>Grey-crowned Babbler</i> (eastern subspecies)	N	X	N	N	N	No
<i>Hooded Robin</i> (south-eastern subspecies)	N	X	N	N	N	No
<i>Little Eagle</i>	N	X	N	N	N	No
<i>Little Lorikeet</i>	N	X	N	N	N	No
<i>Painted Honeyeater</i>	N	X	N	N	N	No
<i>Pied Honeyeater</i>	N	X	N	N	N	No
<i>Pink Cockatoo</i>	N	X	N	N	N	No
<i>Purple-crowned Lorikeet</i>	N	X	N	N	N	No
<i>Regent Honeyeater</i>	N	X	N	N	N	No
<i>Scarlet Robin</i>	N	X	N	N	N	No
<i>Speckled Warbler</i>	N	X	N	N	N	No
<i>Spotted Harrier</i>	N	X	N	N	N	No
<i>Square-tailed Kite</i>	N	X	N	N	N	No
<i>Superb Parrot</i>	N	X	N	N	N	No

Threatened species, or communities	a	b	c	d	e	Likely significant impact?
<i>Swift Parrot</i>	N	X	N	N	N	No
<i>Turquoise Parrot</i>	N	X	N	N	N	No
<i>Varied Sitella</i>	N	X	N	N	N	No
<i>White-fronted Chat</i>	N	X	N	N	N	No
<i>Brush-tailed Phascogale</i>	N	X	N	N	N	No
<i>Grey-headed Flying Fox</i>	N	X	N	N	N	No
<i>Spotted-tailed Quoll</i>	N	X	N	N	N	No
<i>Squirrel Glider</i>	N	X	N	N	N	No
<i>Crimson Spider Orchid</i>	N	X	N	N	N	No
<i>Pine Donkey Orchid</i>	N	X	N	N	N	No
<i>Silky Swainson-pea</i>	N	X	N	N	N	No
<i>Inland Grey Box</i> <i>Woodland in the Riverina,</i> <i>NSW South Western</i> <i>Slopes, Cobar Peneplain,</i> <i>Nandewar and Brigalow</i> <i>Belt South Bioregions</i>	X	N	N	N	N	No
<i>White Box – Yellow Box –</i> <i>Blakely's Red Gum</i> <i>Grassy Woodland and</i> <i>Derived Native Grassland</i> <i>in the NSW North Coast,</i> <i>New England, Tableland,</i> <i>Nandewar, Brigalow Belt</i> <i>South, Sydney Basin,</i> <i>South Eastern Highlands,</i> <i>NSW South Western</i> <i>Slopes, South East</i> <i>Corner and Riverina</i> <i>Bioregions</i>	X	N	N	N	N	No
<p>Notes: Y = Yes (negative impact), N = No (no or positive impact), X = yes/no answer not applicable, ? = unknown impact.</p> <p>* Section 7.2 of the BC Act and Threatened Species Test of Significance Guidelines (OEH 2018)</p>						

Table 5-5: Summary of EPBC Act significance assessments findings

Threatened species, or communities	Important population*	Likely significant impact?
<i>Oriental Cuckoo</i>	<i>N</i>	<i>No</i>
<i>Painted Honeyeater</i>	<i>N</i>	<i>No</i>
<i>Rainbow Bee-eater</i>	<i>N</i>	<i>No</i>
<i>Regent Honeyeater</i>	<i>N</i>	<i>No</i>
<i>Superb Parrot</i>	<i>N</i>	<i>No</i>
<i>Swift Parrot</i>	<i>N</i>	<i>No</i>
<i>Flathead Galaxias</i>	<i>N</i>	<i>No</i>
<i>Murray Cod</i>	<i>N</i>	<i>No</i>
<i>Grey-headed Flying Fox</i>	<i>N</i>	<i>No</i>
<i>Spotted-tailed Quoll</i>	<i>N</i>	<i>No</i>
<i>Crimson Spider Orchid</i>	<i>N</i>	<i>No</i>
<i>Hoary Sunray</i>	<i>N</i>	<i>No</i>
<i>Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions</i>	<i>X</i>	<i>No</i>
<i>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</i>	<i>X</i>	<i>No</i>
Notes: Y = Yes (negative impact), N = No (no or positive impact), X = not applicable, ? = unknown impact.		
* Significant Impact Guidelines 1.1 (DoE 2013)		

Table 5-6: Summary of FM Act significance assessments findings

Threatened species, or communities	Significance assessment question*							Likely significant impact?
	<i>a</i>	<i>b</i>	<i>c</i>	<i>d</i>	<i>e</i>	<i>f</i>	<i>g</i>	
<i>Flathead Galaxias</i>	<i>N</i>	<i>X</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>N</i>	<i>No</i>

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

* Threatened Species Assessment Guidelines (DPI 2008)

6 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), Transport *Biodiversity Policy* (2022) and site-specific mitigation measures have been specifically developed for the proposed work as deemed necessary.

Table 6-1: Mitigation measures

Impact	Mitigation measure	Timing and duration	Likely efficacy of mitigation	Residual Impacts anticipated?	Responsibility
Removal of native vegetation	Native vegetation removal will be minimised through detailed design.	Detailed design	Effective	None	Transport
	Pre-clearing surveys will be undertaken in accordance with <i>Guide 1: Pre-clearing process</i> of the <i>Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (RTA 2011).	Prior to construction	Effective	None	Transport
	Vegetation removal will be undertaken in accordance with <i>Guide 4: Clearing of vegetation and removal of bushrock</i> of the <i>Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (RTA 2011).	During construction	Effective	None	Transport
	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	Proven	None	Transport
	Pruning of mature trees is to be in accordance with Part 5 of the Australian Standard 4373-2007 Pruning of amenity trees.	During construction	Proven	None	Transport
	Parking options should be limited to existing hard stand areas	During construction	Proven	None	Transport
	Biodiversity impacts would be mitigated or offset in accordance the Transport Biodiversity Policy (2022) and Transport tree and hollow replacement guideline (2022)	Prior to construction	Proven	None	Transport
Removal of threatened flora habitat	No clearing of any habitat as identified as Critical for Crimson Spider Orchid would occur (Figure 3-41)	Any time	Effective	None	Transport
Removal of threatened fauna habitat	Fauna will be managed in accordance with <i>Guide 9: Fauna handling</i> of the <i>Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (RTA 2011).	During construction	Effective	None	Transport

Impact	Mitigation measure	Timing and duration	Likely efficacy of mitigation	Residual Impacts anticipated?	Responsibility
	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	Transport
	Habitat 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	Transport
Aquatic impacts	Aquatic habitat will be protected in accordance with <i>Guide 10: Aquatic habitats and riparian zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (RTA 2011) and <i>Section 3.3.2 Standard precautions and mitigation measures of the Policy and guidelines for fish habitat conservation and management Update 2013</i> (DPI (Fisheries NSW) 2013).	During construction	Effective	None	Transport
	No work is to be carried out within any of the waterways within the road reserve the subject of the proposed work	During construction	Effective	None	Transport
Invasion and spread of weeds	Weed species will be managed in accordance with <i>Guide 6: Weed management of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (RTA 2011).	During construction	Effective	None	Transport
Invasion and spread of pathogens and disease	Pathogens will be managed in accordance with <i>Guide 2: Exclusion zones of the Biodiversity Guidelines: Protecting and managing biodiversity on RTA projects</i> (RTA 2011).	Detailed design	Effective	None	Transport

7 Offset strategy

7.1 Quantification of offset or revegetation requirements

Biodiversity impacts would be mitigated or offset in accordance with the Transport Biodiversity Policy (2022) and Transport tree and hollow replacement guidelines (2022). A Biodiversity Offset Strategy (BOS) will be prepared and implemented.

The proposal would result in the following threshold triggers:

- Clearing of any NSW or national listed CEEC (20.4 hectares of Box-gum Woodland)
- Clearing of >1 hectare of nationally listed endangered ecological community (14.51 hectares of Inland Grey Box Woodland)
- Clearing of >5 hectares of a NSW endangered ecological community (3.19 hectares of Inland Grey Box Woodland)
- Clearing of >5 hectares of a NSW listed ecosystem credit species (almost all species the subject of this assessment (Table 5-2))
- Clearing of a significant number of hollow-bearing trees (162)

8 Conclusion

This assessment has confirmed that the study area occurs within a highly modified agricultural landscape. Our field surveys identified 13 plant community types (PCT) as well 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.

For threatened and migratory 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 or their habitats.

A number of mitigation measures have been recommended to minimise and mitigate impacts from the proposal, particularly for hollow-dependant fauna, as well as other threatened species. Overall, the measures aim to mitigate impacts to threatened species, threatened flora and fauna species habitat and habitat features, and other potential impacts identified by this BA.

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Appendix A – Species recorded

Recorded flora

Scientific Name	Common Name	Family
<i>EXOTICS</i>		
* <i>Agave americana</i>	Century Plant	Asparagaceae
* <i>Amaranthus sp.</i>	Pigweed	Amaranthaceae
* <i>Arctotheca calendula</i>	Capeweed	Asteraceae
* <i>Asphodelus fistulosus</i>	Onion Weed	Asphodelaceae
* <i>Avena barbata</i>	Bearded Oats	Poaceae
* <i>Avena fatua</i>	Wild oats	Poaceae
* <i>Bouteloua dactyloides</i>	Buffalo grass	Poaceae
* <i>Brassica fruticulosa</i>	Twiggy Turnip	Brassicaceae
* <i>Brassica napus</i>	Rapeseed	Brassicaceae
* <i>Brassica rapa</i>	Wild Turnip	Brassicaceae
* <i>Briza minor</i>	Shivery Grass	Poaceae
* <i>Bromus diandrus</i>	Great Brome	Poaceae

Scientific Name	Common Name	Family
* <i>Capsella bursa-pastoris</i>	Shepherd's Purse	Brassicaceae
* <i>Carrichtera annua</i>	Ward's Weed	Brassicaceae
* <i>Carthamus lanatus</i>	Saffron thistle	Asteraceae
* <i>Centaurium erythraea</i>	Common Centaury	Gentianaceae
* <i>Chloris gayana</i>	Rhodes Grass	Poaceae
* <i>Chondrilla juncea</i>	Skeleton weed	Asteraceae
* <i>Citrullus amarus</i>	Camel Melon	Cucurbitaceae
* <i>Conyza bonariensis</i>	Flaxleaf Fleabane	Asteraceae
* <i>Cytisus scoparius</i>	Scotch Broom	Fabaceae
* <i>Datura inoxia</i>	Downy Thornapple	Solanaceae
* <i>Echium plantagineum</i>	Pattersons curse	Boraginaceae
* <i>Eragrostis curvula</i>	African lovegrass	Poaceae
* <i>Euphorbia prostrata</i>	Red Caustic Weed	Euphorbiaceae
* <i>Foeniculum vulgare</i>	Fennel	Apiaceae
* <i>Fumaria officinalis</i>	Common fumitory	Papaveraceae
* <i>Galium aprine</i>	Goosegrass	Rubiaceae

Scientific Name	Common Name	Family
<i>*Gazannia sp.</i>	Gazannia	Asteraceae
<i>*Gibasis pellucida</i>	Tahitian Bridal Veil	Commelinaceae
<i>*Helianthus tuberosus</i>	Jerusalem Artichoke	Asteraceae
<i>*Heliotropium europaeum</i>	Potato Weed	Boraginaceae
<i>*Heliotropium supinum</i>	Prostrate Heliotrope	Boraginaceae
<i>*Hordeum leporinum</i>	Barley Grass	Poaceae
<i>*Hypericum perforatum</i>	St. Johns Wort	Hypericaceae
<i>*hypochaeris radicata</i>	Flatweed	Asteraceae
<i>*Ipomoea purpurea</i>	Morning Glory	Convolvulaceae
<i>*Lactuca serriola</i>	Prickly lettuce	Asteraceae
<i>*Lepidium africanum</i>	Common Peppergrass	Brassicaceae
<i>*Lepidium draba</i>	Hoary Cress	Brassicaceae
<i>*Malva parviflora</i>	Small-flowered mallow	Malvaceae
<i>*Melia azedarach</i>	White Cedar	Meliaceae
<i>*Narcissus tazetta</i>	Jonquil	Amaryllidaceae
<i>*Oenothera biennis</i>	Evening Primrose	Onagraceae

Scientific Name	Common Name	Family
<i>*Olea europaea subsp. cuspidata</i>	African Olive	Oleaceae
<i>*Oxalis pes-caprae</i>	African Wood-sorrel	Oxalidaceae
<i>*Paspalum dilatatum</i>	Paspalum	Poaceae
<i>*Phalaris aquatica</i>	Phalaris	Poaceae
<i>*Phalaris paradoxa</i>	Paradoxa Grass	Poaceae
<i>*Phoenix canariensis</i>	Canary Island Palm	Arecaceae
<i>*Photinia serratifolia</i>	Chinese photinia	Rosaceae
<i>*Phytolacca octandra</i>	Ink weed	Phytolaccaceae
<i>*Pinus sp.</i>	A Pine Tree	Pinaceae
<i>*Plantago lanceolata</i>	Ribwort	Plantaginaceae
<i>*Poa annua</i>	Winter Grass	Poaceae
<i>*Populus nigra</i>	Lombardy Poplar	Salicaceae
<i>*Romulea rosea</i>	Onion Grass	Iridaceae
<i>*Rosa rubiginosa</i>	Rose Briar	Rosaceae
<i>*Rubus fruticosus</i>	Blackberry	Rosaceae
<i>*Rumex acetosella</i>	Sheep's Sorrel	Polygonaceae

Scientific Name	Common Name	Family
<i>*Rosa rubiginosa</i>	Rose Briar	Polygonaceae
<i>*Rubus fruticosus</i>	Blackberry	Lamiaceae
<i>*Rumex acetosella</i>	Sheep's Sorrel	Anacardiaceae
<i>*Rumex crispus</i>	Curled Dock	Asteraceae
<i>*Salvia verbenaca</i>	Wild sage	Brassicaceae
<i>*Schinus molle</i>	Pepper Tree	Solanaceae
<i>*Silybum marianum</i>	Varigated thistle	Asteraceae
<i>*Sisymbrium erysimoides</i>	Smooth Mustard	Asteraceae
<i>*Solanum nigrum</i>	Black-berry Nightshade	Lamiaceae
<i>*Soliva pterosperma</i>	Bindi-eye	Asteraceae
<i>*Sonchus ciliaris</i>	Common Sowthistle	Rosaceae
<i>*Stachys byzantina</i>	Lamb's Ear	Polygonaceae
<i>*Tribulus terrestris</i>	Cat-head	Polygonaceae
<i>*Trifolium angustifolium</i>	Narrow-leaved Clover	Fabaceae
<i>*Trifolium repens</i>	White Clover	Fabaceae
<i>*Verbena bonariensis</i>	Purple top	Verbenaceae

Scientific Name	Common Name	Family
<i>*Yucca sp.</i>	Yucca	Asparagaceae
NATIVES		
<i>Acacia acinacea</i>	Gold-dust Wattle	Fabaceae
<i>Acacia baileyana</i>	Cootamundra Wattle	Fabaceae
<i>Acacia buxifolia</i>	Box-leaf Wattle	Fabaceae
<i>Acacia dealbata</i>	Silver Wattle	Fabaceae
<i>Acacia decora</i>	Western Silver Wattle	Fabaceae
<i>Acacia difformis</i>	Drooping Wattle	Fabaceae
<i>Acacia doratoxylon</i>	Currawang	Fabaceae
<i>Acacia flexifolia</i>	Bent-leaf Wattle	Fabaceae
<i>Acacia genistifolia</i>	Early Wattle	Fabaceae
<i>Acacia hakeoides</i>	Hakea Wattle	Fabaceae
<i>Acacia lanigera</i>	Woolly Wattle	Fabaceae
<i>Acacia paradoxa</i>	Kangaroo Thorn	Fabaceae
<i>Acacia pravissima</i>	Ovens Wattle	Fabaceae
<i>Acacia pycnantha</i>	Golden Wattle	Fabaceae

Scientific Name	Common Name	Family
<i>Acacia salicina</i>	Cooba	Fabaceae
<i>Acacia verniciflua</i>	Varnish Wattle	Fabaceae
<i>Acaena novae-zelandiae</i>	Bidgee-Widgee	Rosaceae
<i>Acaena ovina</i>	Sheep's Burr	Rosaceae
<i>Allocasuarina verticillata</i>	Drooping Sheoak	Casuarinaceae
<i>Alternanthera nana</i>	Hairy Joyweed	Amaranthaceae
<i>Amyema miquelii</i>	Box Mistletoe	Loranthaceae
<i>Aristida behriana</i>	Bunch Wiregrass	Poaceae
<i>Aristida jerichoensis</i>	Jericho Wiregrass	Poaceae
<i>Aristida ramosa</i>	Purple Wiregrass	Poaceae
<i>Aristida sp.</i>		Poaceae
<i>Asperula conferta</i>	Common Woodruff	Rubiaceae
<i>Atriplex semibaccata</i>	Creeping Saltbush	Chenopodiaceae
<i>Austrostipa aristiglumis</i>	Plains Grass	Poaceae
<i>Austrostipa scabra</i>	Speargrass	Poaceae
<i>Bothriochloa macra</i>	Red-leg grass	Poaceae

Scientific Name	Common Name	Family
<i>Brachychiton populneus</i>	Kurrajong	Malvaceae
<i>Burchardia umbellata</i>	Milkmaids	Colchicaceae
<i>Bursaria spinosa</i>	Sweet Busaria	Pittosporaceae
<i>Callitris endlicheri</i>	Black Cypress Pine	Cupressaceae
<i>Callitris glaucophylla</i>	White Cypress Pine	Cupressaceae
<i>Calotis sp.</i>		Asteraceae
<i>Carex appressa</i>	Tall Sedge	Cyperaceae
<i>Carex inversa</i>	Knob Sedge	Cyperaceae
<i>Carex tereticaulis</i>	Rush Sedge	Cyperaceae
<i>Cassinia aculeata</i>	Dolly Bush	Asteraceae
<i>Cassinia sifton</i>	Sifton Bush	Asteraceae
<i>Casuarina cunninghamiana</i>	River She-oak	Casuarinaceae
<i>Centipeda cunninghamii</i>	Common Sneezeweed	Asteraceae
<i>Chamaesyce drummondii</i>	Caustic Weed	Euphorbiaceae
<i>Cheilanthes austrotenuifolia</i>	Rock Fern	Pteridaceae
<i>Chenopodium desertorum</i>	Desert Goosefoot	Pteridaceae

Scientific Name	Common Name	Family
<i>Chloris truncata</i>	Windmill Grass	Chenopodiaceae
<i>Chrysocephalum apiculatum</i>	Common Everlasting	Poaceae
<i>Convolvulus graminetinus</i>	A Bindweed	Asteraceae
<i>Crassula sieberiana</i>	Australian Stonecrop	Convolvulaceae
<i>Cymbopogon refractus</i>	Barbed Wire Grass	Crassulaceae
<i>Cynodon dactylon</i>	Couch	Poaceae
<i>Cyperus eragrostis</i>	Tall Flatsedge	Poaceae
<i>Daucus glochidiatus</i>	Native Carrot	Cyperaceae
<i>Daviesia sp.</i>		Apiaceae
<i>Dianella revoluta</i>	Blue Flax-lily	Asphodelaceae
<i>Dichelachne crinita</i>	Plume grass	Poaceae
<i>Dichopogon strictus</i>	Chocolate Lily	Asparagaceae
<i>Dodonaea viscosa subsp. cuneata</i>	Wedge-leaf Hop-bush	Sapindaceae
<i>Einadia nutans subsp. nutans</i>	Climbing Saltbush	Chenopodiaceae
<i>Eleocharis acuta</i>	Common Spikerush	Cyperaceae

Scientific Name	Common Name	Family
<i>Elymus scaber</i> var. <i>scaber</i>	Wheatgrass	Poaceae
<i>Enchylaena tomentosa</i>	Ruby Saltbush	Chenopodiaceae
<i>Enteropogon ramosus</i>	Curly Windmill Grass	Poaceae
<i>Epilobium billardioreanum</i> subsp. <i>cinereum</i>	Willow Herb	Onagraceae
<i>Eremophila deserti</i>	Turkeybush	Scrophulariaceae
<i>Eremophila longifolia</i>	Emubush	Scrophulariaceae
<i>Eryngium ovinum</i>	Blue Devil	Apiaceae
<i>Eucalyptus albens</i>	White Box	Myrtaceae
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum	Myrtaceae
<i>Eucalyptus camaldulensis</i>	River Red Gum	Myrtaceae
<i>Eucalyptus dealbata</i>	Tumbledown Red Gum	Myrtaceae
<i>Eucalyptus dwyeri</i>	Dwyer's Red Gum	Myrtaceae
<i>Eucalyptus gonicalyx</i>	Long-leaved Box	Myrtaceae
<i>Eucalyptus melliodora</i>	Yellow Box	Myrtaceae
<i>Eucalyptus microcarpa</i>	Grey Box	Myrtaceae

Scientific Name	Common Name	Family
<i>Eucalyptus sideroxylon</i>	Mugga Ironbark	Myrtaceae
<i>Exocarpos cupressiformis</i>	Native Cherry	Santalaceae
<i>Geranium solanderi</i>	Native Geranium	Geraniaceae
<i>Glycine clandestina</i>	Twining Glycine	Fabaceae
<i>Goodenia ovata</i>	Hop Goodenia	Goodeniaceae
<i>Grevillea floribunda</i>	Seven Dwarfs Grevillea	Proteaceae
<i>Grevillea robusta</i>	Silky Oak	Proteaceae
<i>Hibbertia obtusifolia</i>	Hoary Guinea Flower	Dilleniaceae
<i>Hydrocotyle laxiflora</i>	Stinking Pennywort	Araliaceae
<i>Juncus sp.</i>	A Juncus	Juncaceae
<i>Kennedia prostrata</i>	Running Postman	Fabaceae
<i>Leptospermum divaricatum</i>	Hill Tea-tree	Myrtaceae
<i>Lomandra filiformis</i> subsp. <i>filiformis</i>	Wattle Mat-rush	Asparagaceae
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	Asparagaceae
<i>Lomandra multiflora</i>	Many-flowered Mat-rush	Asparagaceae

Scientific Name	Common Name	Family
<i>Lomatia myricoides</i>	River Lomatia	Proteaceae
<i>Maireana decalvans</i>	Black Cotton Bush	Chenopodiaceae
<i>Maireana enchylaenoides</i>	Wingless Fissure-weed	Chenopodiaceae
<i>Maireana microphylla</i>	Small-leaf Bluebush	Chenopodiaceae
<i>Melichrus sp.</i>	Urn Heath	Ericaceae
<i>Microlaena stipoides</i>	Weeping grass	Poaceae
<i>Microtis sp.</i>		Orchidaceae
<i>Panicum effusum</i>	Hairy Panic	Poaceae
<i>Panicum simile</i>	Two-colour Panic	Poaceae
<i>Paspalidium constrictum</i>	Knottybutt Grass	Poaceae
<i>Persicaria prostrata</i>	Creeping Knotweed	Polygonaceae
<i>Philothea difformis subsp. difformis</i>	Small-leaf Wax-flower	Rutaceae
<i>Pittosporum angustifolium</i>	Butterbush	Pittosporaceae
<i>Plantago debilis</i>	Shade Plantain	Plantaginaceae
<i>Plantago varia</i>	Variable Plantain	Plantaginaceae

Scientific Name	Common Name	Family
<i>Poa sieberiana</i>	Blue Tussock Grass	Poaceae
<i>Rumex brownii</i>	Swamp Dock	Polygonaceae
<i>Rytidosperma caespitosum</i>	Ringed Wallaby Grass	Poaceae
<i>Rytidosperma racemosum</i>	Wallaby Grass	Poaceae
<i>Rytidosperma setaceum</i>	Smallflower Wallaby Grass	Poaceae
<i>Rytidosperma sp.</i>		Poaceae
<i>Salsola tragus subsp. tragus</i>	Buckbush	Chenopodiaceae
<i>Santalum acuminatum</i>	Sweet Quandong	Santalaceae
<i>Sclerolaena muricata</i>	Black Rolypoly	Chenopodiaceae
<i>Senna form taxon 'artemisioides'</i>	Silver Cassia	Fabaceae
<i>Sida corrugata</i>	Corrugated Side	Malvaceae
<i>Sida cunninghamii</i>	Ridged Sida	Malvaceae
<i>Stypantra glauca</i>	Nodding Blue Lily	Asphodelaceae
<i>Themeda australis</i>	Kangaroo Grass	Poaceae
<i>Vittadinia cuneata</i>	Fuzzweed	Asteraceae
<i>Vittadinia gracilis</i>	Woolly New Holland Daisy	Asteraceae

Scientific Name	Common Name	Family
<i>Wahlenbergia communis</i>	Tufted Bluebell	Campanulaceae
<i>Wahlenbergia gracilis</i>	Australian Bluebell	Campanulaceae
<i>Xerochrysum viscosum</i>	Sticky Everlasting	Asteraceae

Recorded fauna

Class	Scientific name	Common name	Status	
			BC Act	EPBC Act
<i>Amphibia</i>	<i>Crinia parinsignifera</i>	<i>Beeping Froglet</i>		
<i>Amphibia</i>	<i>Uperoleia laevisgata</i>	<i>Smooth Gungan</i>		
<i>Amphibia</i>	<i>Litoria peronii</i>	<i>Perons Tree Frog</i>		
<i>Amphibia</i>	<i>Limnodynastes tasmaniensis</i>	<i>Spotted Marsh Frog</i>		
<i>Aves</i>	<i>Acanthiza chrysorrhoa</i>	<i>Yellow-rumped Thornbill</i>		
<i>Aves</i>	<i>Acridotheres tristis</i>	<i>Indian Myna</i>		

Class	Scientific name	Common name	Status	
			BC Act	EPBC Act
Aves	<i>Accipiter fasciatus</i>	Brown Goshawk		
Aves	<i>Anas superciliosa</i>	Pacific Black Duck		
Aves	<i>Anthochaera carunculata</i>	Red Wattlebird		
Aves	<i>Aquila audax</i>	Wedge-tailed Eagle		
Aves	<i>Artamus cyanopterus</i>	Dusky Woodswallow	V	
Aves	<i>Cacatua galerita</i>	Sulphur-crested Cockatoo		
Aves	<i>Cacatua sanguinea</i>	Little Corella		
Aves	<i>Chenonetta jubata</i>	Australian Wood Duck		
Aves	<i>Cincloramphus cruralis</i>	Brown Songlark		
Aves	<i>Climacteris picumnus</i>	Brown Treecreeper	V	
Aves	<i>Columba livia</i>	Feral Pigeon		
Aves	<i>Coracina novaehollandiae</i>	Black-faced Cuckoo-shrike		
Aves	<i>Corcorax melanorhamphos</i>	White-winged Chough		
Aves	<i>Corvus coronoides</i>	Australian Raven		
Aves	<i>Cracticus nigrogularis</i>	Pied Butcherbird		
Aves	<i>Cracticus tibicen</i>	Australian Magpie		

Class	Scientific name	Common name	Status	
			BC Act	EPBC Act
Aves	<i>Dacelo novaeguineae</i>	Laughing Kookaburra		
Aves	<i>Dicaeum hirundinaceum</i>	Mistletoebird		
Aves	<i>Dromaius novaehollandiae</i>	Emu		
Aves	<i>Egretta novaehollandiae</i>	White-faced Heron		
Aves	<i>Elanus axillaris</i>	Black-shouldered Kite		
Aves	<i>Entomyzon cyanotis</i>	Blue-faced Honeyeater		
Aves	<i>Eolophus roseicapillus</i>	Galah		
Aves	<i>Falco cenchroides</i>	Nankeen Kestrel		
Aves	<i>Falcunculus frontatus</i>	Crested Shrike-tit		
Aves	<i>Gallinula tenebrosa</i>	Dusky Moorhen		
Aves	<i>Geopelia striata</i>	Peaceful Dove		
Aves	<i>Grallina cyanoleuca</i>	Magpie-lark		
Aves	<i>Hirundo neoxena</i>	Welcome Swallow		
Aves	<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater		
Aves	<i>Malurus cyaneus</i>	Superb Fairy-wren		
Aves	<i>Manorina melanocephala</i>	Noisy Miner		

Class	Scientific name	Common name	Status	
			BC Act	EPBC Act
Aves	<i>Northiella haematogaster</i>	Blue Bonnet		
Aves	<i>Ocyphaps lophotes</i>	Crested Pigeon		
Aves	<i>Pachycephala pectoralis</i>	Golden Whistler		
Aves	<i>Pachycephala rufiventris</i>	Rufous Whistler		
Aves	<i>Pardalotus striatus</i>	Striated Pardalote		
Aves	<i>Passer domesticus</i>	House Sparrow		
Aves	<i>Pelecanus conspicillatus</i>	Australian Pelican		
Aves	<i>Phalacrocorax varius</i>	Pied Cormorant		
Aves	<i>Phaps chalcoptera</i>	Common Bronzewing		
Aves	<i>Philemon corniculatus</i>	Noisy Friarbird		
Aves	<i>Platalea flavipes</i>	Yellow-billed Spoonbill		
Aves	<i>Platycercus eximius</i>	Eastern Rosella		
Aves	<i>Polytelis swainsonii</i>	Superb Parrot	V	V
Aves	<i>Pomatostomus temporalis</i>	Grey-crowned Babbler	V	
Aves	<i>Psephotus haematonotus</i>	Red-rumped Parrot		
Aves	<i>Rhipidura albiscapa</i>	Grey Fantail		

Class	Scientific name	Common name	Status	
			BC Act	EPBC Act
Aves	<i>Rhipidura leucophrys</i>	Willie Wagtail		
Aves	<i>Smicrornis brevirostris</i>	Weebill		
Aves	<i>Stagonopleura guttata</i>	Diamond Firetail	V	
Aves	<i>Strepera graculina</i>	Pied Currawong		
Aves	<i>Struthidea cinerea</i>	Apostlebird		
Aves	<i>Sturnus vulgaris</i>	Common Starling		
Aves	<i>Trichoglossus haematodus</i>	Rainbow Lorikeet		
Aves	<i>Turdus merula</i>	Common Blackbird		
Aves	<i>Vanellus miles</i>	Masked Lapwing		
Mammalia	<i>Macropus giganteus</i>	Eastern Grey Kangaroo		
Mammalia	<i>Oryctolagus cuniculus</i>	Rabbit		
Mammalia	<i>Vulpes vulpes</i>	Fox		
Mammalia	<i>Felis catus</i>	Feral Cat		
Reptilia	<i>Morethia boulengeri</i>	Boulengers skink		
Reptilia	<i>Lerista timida</i>	Wood Mulch-slider		
Reptilia	<i>Christinus marmoratus</i>	Southern Marbled Gecko		

Appendix B – Habitat assessment table

Likelihood of occurrence criteria

Likelihood	Criteria
Recorded	The species was observed in the study area during the current survey or has been recorded within the past five years (known from a reputable source).
High	<p>A species is considered highly likely to occur in the study area if:</p> <ul style="list-style-type: none"> There are previous credible records on BioNet within the study area from the last 10 years and suitable habitat is present. <p><u>OR</u></p> <ul style="list-style-type: none"> The species is highly mobile, dependent on identified suitable habitat within the study area (i.e., for breeding or important life cycle periods such as winter flowering resources) and has been recorded recently (within five years) on BioNet in the locality. This also includes species known or likely to visit the study area during regular seasonal movements or migration.
Moderate	<p>A species is considered moderately likely to occur in the study area if:</p> <ul style="list-style-type: none"> Any suitable habitat (e.g. foraging) is present in the study area, the species is highly mobile and has been recorded in the locality in the last 10 years on BioNet. The species may be 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 (i.e., for breeding or important life cycle periods such as winter flowering resources) on habitat within the study area. <p><u>OR</u></p> <ul style="list-style-type: none"> The species is not highly-mobile, dependent on identified suitable habitat features (eg hollows, rocky outcrops) within the study area and has been recorded in the locality in the last 10 years on BioNet. <p><u>OR</u></p> <ul style="list-style-type: none"> For flora species that are associated with PCTs in the study area (see TBDC) or have been recorded in the locality in the last 10 years on BioNet – the associated PCT/habitat present in the study area is not degraded and the species was not targeted by surveys in accordance with the BAM and relevant survey guidelines. In addition, for flora species known to occur in disturbed areas (e.g. orchids), records from any time within the locality may warrant inclusion in this category.

Likelihood	Criteria
Low	<p>A species is considered to have a low likelihood of occurring in the study area if:</p> <ul style="list-style-type: none"> For highly mobile species, the species may be an occasional visitor, but habitat similar to the study area is widely distributed in the locality, meaning that the species is not dependent (ie for breeding or important life cycle periods such as winter flowering resources) on habitats in the study area and the species has not been recorded in the locality in the last 10 years on BioNet. <p><u>OR</u></p> <ul style="list-style-type: none"> The species is not highly-mobile, dependent on identified suitable habitat features (eg hollows, rocky outcrops) within the study area and has not been recorded in the locality in the last 10 years on BioNet. <p><u>OR</u></p> <ul style="list-style-type: none"> For flora species that are associated with PCTs in the study area (see TBDC) and the species was not identified following targeted surveys in accordance with the BAM and relevant survey guidelines. Flora species that have been recorded in the locality on BioNet at any time, associated suitable habitat (see the TBDC) is not present in the study area, though similar habitats of the same vegetation formation is present in the study area.
Unlikely	Suitable habitat for the species is absent from the study area.

Habitat assessment table

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
FROGS					
Booroolong Frog <i>Litoria booroolongensis</i>	E	E	Lives in permanent streams with some fringing vegetation cover. Can be found sheltering under rocks or amongst vegetation near stream edge.	0	None
Sloane's Froglet <i>Crinia sloanei</i>	E	E	Associated with periodically inundated areas in grassland, woodland, and disturbed habitats.	10	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.	0	None
MICROBATS					
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
Eastern False Pipistrelle <i>Falsistrellus tasmaniensis</i>	V		Roosts in eucalypts hollows as well as loose bark on trees or on buildings. Prefers moist habitats with trees taller than 20m.	1	Low
Eastern Long-eared bat <i>Nyctophilus bifax</i>	V		Found in lowland subtropical rainforest and wet and swamp eucalypt forest, extending into adjacent moist eucalypt forest.	1	None
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	2	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			abandoned buildings. They have been recorded in a variety of woodland formations mostly drier habitats.		
Large-eared Pied Bat <i>Chalinolobus dwyeri</i>	V	V	Found in well-timbered areas containing gullies often staying loyal to the same cave for many years. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (<i>Petrochelidon ariel</i>).	0	None
Large Bent-winged Bat <i>Miniopterus orianae oceanensis</i>	V		Prefers caves but also uses derelict mines, storm water tunnels, buildings, and other built structures for roosting. They hunt in forested areas.	3	Low
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
BIRDS					
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.	1	None
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.	0	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
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	None
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.	9	Moderate
Black-breasted Buzzard <i>Maioratra melanosternon</i>	V		Found in a variety of habitats, particularly timbered watercourses. It often hunts over grasslands and sparsely timbered woodlands.	1	Low
Black-tailed Godwit <i>Limosa limosa</i>	V		In inland areas they can be found on mudflats and in water less than 10cm deep, around muddy lakes and swamps. They have been found in wet fields and sewerage treatment works.	0	None
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.	39	High
Black-necked Stork <i>Ephippiorhynchus asiaticus</i>	E		Found in floodplain wetlands (swamps, billabongs, watercourses, and dams) of major coastal rivers, also can be found in minor floodplains, coastal sandplain wetlands and estuaries.	0	None
Black-tailed Godwit <i>Limosa limosa</i>	V		In inland areas they can be found on mudflats and in water less than 10cm deep, around muddy lakes and swamps. They have been found in wet fields and sewerage treatment works.	0	None
Black Bittern <i>Ixobrychus flavicollis</i>	V		Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest, and mangroves.	1	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Black Falcon <i>Falco subniger</i>	V		The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions.	25	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.	5	None
Brolga <i>Grus rubicunda</i>	V		They are dependent on wetlands, especially shallow swamps and often feed in dry grassland or ploughed paddocks.	6	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.	343	Recorded
Bush Stone-curlew <i>Burhinus grallarius</i>	E		Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber.	22	High
Chestnut Quail-thrush <i>Cinlosoma castanotum</i>	V		Throughout its distribution it occurs in a wide range of arid and semi-arid habitats; mainly in the low shrubs and undergrowth of mallee scrub, but also in Acacia scrubs, dry sclerophyll woodland, heath, and native pine. However, in NSW it seems to occur almost exclusively in mallee habitats, with understorey dominated by spinifex, chenopods or other shrubs including Acacia species.	0	None
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.	6	None
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

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Curlw Sandpiper <i>Calidris ferruginea</i>	E	CE M	Widespread occurrence along the coast and inland.	3	None
Diamond Firetail <i>Stagonopleura guttata</i>	V		Found in grassy woodlands including Box-Gum Woodlands and Snow Gum Woodland.	154	High
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.	137	Recorded
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
Eastern Osprey <i>Pandion cristatus</i>	V		Favour coastal areas, especially the mouths of large rivers, lagoons, and lakes.	0	None
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.	112	High
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.	6	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.	4	None
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,	16	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			they generally move to drier more open forests and woodlands.		
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.	5	Low
Glossy Black-Cockatoo <i>Calyptrorhynchus lathamii</i>	V		Inhabit open forests and woodlands. She-oak is an important food source and they feed almost exclusively on several species (<i>Casuarina</i> and <i>Allocasuarina</i>).	12	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.	127	Recorded
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.	1	None
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.	53	High
Latham's Snipe <i>Gallinago hardwickii</i>		M	Habitat in Australia includes permanent and ephemeral wetlands.	19	None
Little Eagle <i>Hieraaetus morphnoides</i>	V		Little Eagle is distributed across all of the Australian mainland except for densely vegetated areas,	74	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			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.		
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.	47	High
Magpie Goose <i>Anseranas semipalmata</i>	V		Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges.	0	None
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.	6	None
Masked Owl <i>Tyto novaehollandiae</i>	V		Lives in dry eucalypt forests and woodlands from sea level to 1100m. Pairs have a home range of 500-1000 hectares and can often be seen hunting along edges of forests, including roadsides. Breeds in moist eucalypt forested gullies, using hollows or caves for nesting.	0	Low
Oriental Cuckoo <i>Cuculus optatus</i>		M	They are found in a range of open forest types and in farmland with scattered trees	1	Moderate
Painted Honeyeater	V	V	Inhabits Boree/Weeping Myall (<i>Acacia pendula</i>), Brigalow (<i>A. harpophylla</i>) and Box-Gum Woodlands	9	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
<i>Grantiella picta</i>			and Box-Ironbark Forests. Feeds on mistletoes preferably the genus <i>Amyema</i>		
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
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.	0	Moderate
Pink Cockatoo <i>Lophochroa leadbeateri</i>	V		Inhabits a wide range of treed and treeless inland habitats, always within easy reach of water.	7	Moderate
Pink Robin <i>Petroica rodinogaster</i>	V		Inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies.	0	None
Powerful Owl <i>Ninox strenua</i>	V		inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. Size of territory varies depending on the quality and can range from 400 metres to 4000 hectares.	0	None
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	None
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.	0	Moderate
Rainbow Bee-eater		M	Occurs throughout mainland Australia, is widespread, except in desert areas. Breeds throughout most of its	0	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
<i>Merops ornatus</i>			range, with southern birds moving north to winter. Most often found in open forests, woodlands and shrublands, and cleared areas, usually near water. It can be found on farmlands and the species will use disturbed sites such as quarries, cuttings, and mines to build its nesting tunnels.		
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.	6	None
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.	26	Moderate
Rufous Fantail <i>Rhipidura rufifrons</i>		M	Found in rainforest, dense wet forests, swamp woodlands and mangroves, preferring deep shade, and is often seen close to the ground. During migration, it may be found in more open habitats or urban areas.	0	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	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.	99	High
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.	25	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	0	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			unburnt (greater than 40 years) but is found in all age classes of vegetation.		
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.	0	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.	137	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.	12	Moderate
Square-tailed Kite <i>Lophoictinia isura</i>	V		Found in timbered habitats including dry woodlands and open forests. Prefers timbered watercourses.	4	Moderate
Superb Parrot <i>Polytelis swainsonii</i>	V	V	Inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.	489	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> .	54	High
Turquoise Parrot <i>Neophema pulchella</i>	V		Habitats include edges of eucalypt woodland near clearings, timbered ridges, and creeks in farmlands.	92	High
Varied Sittella <i>Daphoenositta</i>	V		This species is sedentary and known to inhabit most forest/woodland habitats.	57	High

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
<i>chrysoptera</i>					
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.	5	Low
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.	23	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.	4	None
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
FISH					
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	Moderate, but rivers and creeks outside of proposed work area. No further assessment required.
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	Moderate, but rivers and creeks outside of proposed work area. No further

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
					assessment required.
Southern Pygmy Perch <i>Nannoperca australis</i>	V (FM Act)	E	Often found in small systems with a low flow rate and quiet vegetated areas in streams, billabongs, lakes and even irrigation channels. Not usually found in open water, prefers covered habitats.	0	None
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	None
MAMMALS					
Brush-tailed Phascogale <i>Phascogale tapoatafa</i>	V		Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs, or leaf litter. Also inhabit heath, swamps, rainforest, and wet sclerophyll forest.	0	Moderate
Brush-tailed Rock-wallaby <i>Petrogale penicillata</i>	E	V	Occurs on rocky escarpments, outcrops, and cliffs. Shelters in rock crevices, caves, and overhangs.	0	None
Eastern Pygmy-possum <i>Cercartetus nanus</i>	V		Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred.	2	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.	147	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.	7	Low
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.	5	Moderate

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
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.	415	High
Stripe-faced Dunnart <i>Sminthopsis macroura</i>	V		Native dry grasslands and low dry shrublands, often along drainage lines where food and shelter resources tend to be better.	0	Low
Yellow-bellied Glider <i>Petaurus australis</i>	V		Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils.	0	None
REPTILES					
Pale-headed Snake <i>Hoplocephalus bitorquatus</i>	V		Found mainly in dry eucalypt forests and woodlands, cypress forest and occasionally in rainforest or moist eucalypt forest. They are a highly cryptic species that can spend weeks at a time hidden in tree hollows.	0	None
Pink-tailed Legless Lizard <i>Aprasia parapulchella</i>		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.	11	None
Rosenberg's Goanna <i>Varanus rosenbergi</i>	V		Found in heath, open forest and woodland with individuals requiring large areas of habitat. Associated with termites and are a critical habitat component.	0	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
INVERTEBRATES					

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Golden Sun Moth <i>Synemon plana</i>	E	CE	Occurs in Natural Temperate Grasslands and grassy Box-Gum Woodlands in which groundlayer is dominated by wallaby grasses <i>Austrodanthonia</i> spp. Adults do not feed and larvae are thought to feed exclusively on roots of wallaby grasses.	0	Low
PLANTS					
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
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
Ausfeld's Wattle <i>Acacia ausfeldii</i>	V		Associated species include <i>Eucalyptus albens</i> , <i>E. blakelyi</i> and <i>Callitris</i> spp., with an understorey dominated by <i>Cassinia</i> spp. and grasses. Associated with dry sclerophyll forest, grasslands, and grassy woodlands.	0	Low
Austral Pillwort <i>Pilularia novae-hollandiae</i>	E		Grows in shallow swamps and waterways, often among grasses and sedges. It is most often recorded in drying mud as this is when it is most conspicuous.	6	Low
Austral Toadflax <i>Thesium australe</i>	V	V	Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (<i>Themeda australis</i>).	0	Low
Black Gum <i>Eucalyptus aggregate</i>	V	V	Grows on alluvial soils, on cold, poorly drained flats and hollows adjacent to creeks and small rivers on lowest parts of the landscapes. Can occur as isolated paddock trees.	0	Low
Bluegrass <i>Dichanthium setosum</i>	V	V	Associated with heavy basaltic black soils and red-brown loams with clay subsoil. Often found in moderately disturbed areas such as cleared	0	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			woodland, grassy roadside remnants, and highly disturbed pasture.		
Capertee Stringybark <i>Eucalyptus cannonii</i>	V		Capertee Stringybark has a broad altitudinal range, from around 450m to 1,050m. Within this range, the species appears to tolerate most situations except the valley floors.	0	None
Clandulla Geebung <i>Persoonia marginate</i>	V	V	Grows in dry sclerophyll forest and woodland communities on sandstone. Reported fire response of adult plants varies with the species sometimes resprouting after fire and at other times killed by fire.	0	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> .	0	None
Cocoparra Pomaderris <i>Pomaderris cocoparrana</i>	E	E	Associated with Western slopes dry sclerophyll forests and inland rocky hill woodlands.	0	None
Cotoneaster Pomaderris <i>Pomaderris cotoneaster</i>	E	E	Has been recorded in a range of habitats in predominantly forested country. The habitats include forest with deep, friable soil, amongst rock beside a creek, on rocky forested slopes and in steep gullies between sandstone cliffs. Little is known about the ecology of this species. Populations are not apparently influenced by local variations in habitat - it is not obvious why they are only growing where they are.	0	None
Crimson Spider Orchid <i>Caladenia concolor</i>	E	V	Habitat is regrowth woodland on granite ridge country that has retained a high diversity of plant species, including other orchids. Flowering does not take place every year for reasons that are not fully understood, though each plant probably lives for a considerable number of years.	485	Low, absence confirmed by target surveys. Habitat critical for this species was identified.
Dwarf Bush-pea	V		It is found in isolated remnants of native woodland and forest communities that occur in extensively	0	Low

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
<i>Pultenaea humilis</i>			cleared agricultural landscapes. Occurs on a variety of soils ranging from sandy loams to clays.		
Fairy Bells <i>Homoranthus darwinioides</i>	V	V	Grows in various woodland habitats with shrubby understoreys, usually in gravely sandy soils. Landforms the species has been recorded growing on include flat sunny ridge tops with scrubby woodland, sloping ridges, gentle south-facing slopes, and a slight depression on a roadside with loamy sand.	0	Low
Fleshy Minuria <i>Kippistia suaedifolia</i>	E		Grows around saline lakes and depressions, often in association with gypsum. Rare in NSW, recorded only from a restricted area on a loamy and highly gypseous soil.	0	None
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, dam and tank beds in hard clay and in semi-dry mud lagoons.	5	Low
Granite Zieria <i>Zieria obcordata</i>	E	E	Grows in eucalypt woodland or shrubland dominated by species of Acacia on rocky hillsides. Also occurs in Eucalyptus and Callitris dominated woodland with an open, low shrub understorey, on moderately steep, mainly west to north-facing slopes in sandy loam amongst granite boulders. The altitude range of sites is 500 to 830 metres.	0	None
Hoary Sunray <i>Leucochrysum albicans</i> <i>var. tricolor</i>		E	Occurs in a wide variety of grassland, woodland, and forest habitats, generally on relatively heavy soils.	0	Moderate
Holly-leaf Grevillea <i>Grevillea ilicifolia</i> subsp. <i>ilicifolia</i>	CE		It has been recorded from shrubby mallee communities and in sandy loam soils.	0	None
Keith's Zieria <i>Zieria ingramii</i>	E	E	Grows in dry sclerophyll forest on light sandy soils. All known populations have been recorded in Eucalyptus-Callitris woodland or open forest with a	0	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			shrubby to heathy understorey. Mostly from gentle slopes in red-brown and yellow-brown sandy loams, often with a rocky surface.		
Lanky Buttons <i>Leptorhynchos orientalis</i>	E		Grows in woodland or grassland, sometimes on the margins of swamps. Communities include a Bimble Box plain in red-brown soil, dense <i>Acacia pendula</i> woodland with herbaceous understorey on red clay to clay-loam, open grassland areas on red soils, and red clay plains at the edge of a Canegrass swamp.	0	None
Large-fruit Fireweed <i>Senecio macrocarpus</i>		V	Occurs in grassland, sedgeland, woodland and shrubland, generally on relatively heavy soils.	0	Low
Leafless Indigo <i>Indigofera efoliata</i>	E	E	It almost certainly dies back to a substantial underground rootstock in unfavourable seasons, and it is possible that aerial parts do not appear at all unless there is significant rainfall. Associated species include <i>Allocasuarina luehmannii</i> , <i>Exocarpos cupressiformis</i> , <i>Alectryon oleifolius</i> , <i>Geijera parviflora</i> , <i>Eucalyptus melliodora</i> , <i>Acacia deanei</i> , <i>Acacia buxifolia</i> , <i>Acacia hakeoides</i> , <i>Acacia spectabilis</i> , <i>Acacia lineata</i> , <i>Acacia oswaldii</i> , <i>Eremophila mitchellii</i> , <i>Myoporum platycarpum</i> , <i>Hakea leucoptera</i> , <i>Dodonaea viscosa</i> , <i>Apophyllum anomalum</i> , <i>Cassinia aculeata</i> and <i>Lissanthe strigosa</i> .	0	None
Mueller's Eyebright <i>Euphrasia collina subsp. muelleri</i>	E	E	Little is known about the habitat this species preferred, although there is a reference to "damp places" in an early von Mueller collection. Extant populations in Victoria occur in heathy woodland.	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.	0	Low
Narrow-leaved Black Peppermint	V	V	Typically grows in dry grassy woodland, on shallow soils of slopes and ridges, generally on lower slopes.	1	Low

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
<i>Eucalyptus nicholii</i>			Found primarily on infertile soils derived from granite or metasedimentary rock.		
Oaklands Diuris <i>Diuris</i> sp. (Oaklands, D.L. Jones 5380)	E		Grows in White Cypress Pine (<i>Callitris glaucophylla</i>) Woodland, either among dense grasses in flat areas with associated eucalypts, or amongst sparse grasses and forbs on low sandhills. Grows on mostly sandy loam soils.	0	None
Phantom Wattle <i>Acacia phasmoides</i>	V	V	Grows in shrubby woodland on sandy, granitic soil near creeks or in rocky crevices.	0	None
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.	0	Low, as target surveys ruled out presence
Raleigh Sedge <i>Carex raleighii</i>	E		Grows in sphagnum bogs and high mountain wetlands, as well as damp grasslands and stream-edges of sub-alpine plains.	0	None
Robertson's Peppermint <i>Eucalyptus robertsonii</i> <i>subsp. hemisphaerica</i>	V	V	Locally frequent in grassy or dry sclerophyll woodland or forest, on lighter soils and often on granite. Usually found in closed grassy woodlands in locally sheltered sites. Habitats include quartzite ridges, upper slopes, and a slight rise of shallow clay over volcanics.	0	None
Rosella Spider Orchid <i>Caladenia rosella</i>	PE	E	In Victoria, the species is found in woodlands and low forests of Red Box (<i>Eucalyptus polyanthemos</i>), Long-leaved Box (<i>E. goniocalyx</i>) and Red Stringybark (<i>E. macrorhyncha</i>) in well-drained, skeletal soils.	0	None
Round-leafed Wilsonia <i>Wilsonia rotundifolia</i>	E		Grows in mud in coastal saltmarsh and inland saline or brackish lake beds. It may be a clonal species so large population may be from a few genetically distinct individuals.	0	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
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>).	1	None
Scant Pomaderris <i>Pomaderris queenslandica</i>	E		Found in moist eucalypt forest or sheltered woodlands with a shrubby understorey, and occasionally along creeks.	0	None
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
Silky Swainson-pea <i>Swainsona sericea</i>	V		Found in box-gum woodlands and regenerates from seed after fire.	7	Moderate
Small Pale Grass-lily <i>Caesia parviflora</i> var. <i>minor</i>	E		Found in damp places in open forest on sandstone.	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 spp.</i> , and spear-grasses <i>Austrostipa spp.</i>	5	Low
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 ephemerally wet situations such as roadside mitre drains and depressions, usually in low-lying grasslands.	0	Low
Spiny Peppercress <i>Lepidium aschersonii</i>	V	V	Found on ridges of gilgai clays dominated by Brigalow (<i>Acacia harpophylla</i>), Belah (<i>Casuarina cristata</i>), Buloke (<i>Allocasuarina luehmannii</i>) and Grey Box (<i>Eucalyptus microcarpa</i>). In the south has been recorded growing in Bull Mallee (<i>Eucalyptus behriana</i>). Often the understorey is dominated by	0	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
			introduced plants. The species grows as a component of the ground flora, in grey loamy clays. Vegetation structure varies from open to dense, with sparse grassy understorey and occasional heavy litter.		
Sturdy Leek-orchid <i>Prasophyllum validum</i>		V	Tends to grow in drier woodland habitats, generally with a low sparse understorey. Little is known of specific habitat requirements, and some sites have been disturbed by periodic fire, stock grazing and timber removal.	0	Low
Tarengo Leek Orchid <i>Prasophyllum petilum</i>	E	E	Grows in open sites within Natural Temperate Grassland.	0	None
Thick Lip Spider Orchid <i>Caladenia tessellata</i>	E	V	Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.	0	None
Tumut Grevillea <i>Grevillea wilkinsonii</i>	CE	E	At the Goobarragandra River sites the species generally grows in close proximity to the water, at altitudes between 310 and 340 m. Most healthy adult plants occur in open sunny areas, and those plants found under the canopy of dense vegetation tend to be spindly. The population at Gundagai is growing on the upper slope of a steep hill on Serpentinite rock.	0	None
Winged Peppercress <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	None
Woolly Ragwort <i>Senecio garlandii</i>	V		Occurs on sheltered slopes of rocky outcrops.	64	Low

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Yass Daisy <i>Ammobium craspedioides</i>	V	V	Found in moist or dry forest communities, Box-Gum Woodland and secondary grassland derived from clearing of these communities. Apparently unaffected by light grazing, as populations persist in some grazed sites.	2	Low
<i>Acacia meiantha</i>	E	E	Associated with dry sclerophyll forests, freshwater wetlands, grassy woodlands, and heathlands.	0	None
<i>Bossiaea fragrans</i>	CE	CE	Occurs on spilite, rhyolite or slate and volcanic substrates and is often associated with Red Stringybark (<i>Eucalyptus macrorhyncha</i>) - Red Box (<i>Eucalyptus polyanthemos</i>) woodland +/- White Box (<i>Eucalyptus albens</i>).	0	Low
<i>Eucalyptus alligatrix</i> <i>subsp. alligatrix</i>	V	V	Grows in dry sclerophyll woodland on shallow relatively infertile soils (grey brown loam with ironstone). It may have been part of a more-extensive open woodland community prior to the commencement of clearing and grazing.	0	Low
<i>Euphrasia arguta</i>	CE	CE	Associated with eucalypt forest with a mixed grass and shrub understorey. Historic records of the species noted the following habitats: 'in the open forest country around Bathurst in sub humid places', 'on the grassy country near Bathurst', and 'in meadows near rivers'.	0	None
<i>Philotheca angustifolia</i> <i>subsp. angustifolia</i>	PE		Mostly in mallee on sandy soil.	0	None
<i>Pimelea bracteata</i>	CE		In wet heath and along creek banks at higher altitudes in the Kiandra area.	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	Low
ECOLOGICAL COMMUNITIES					

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
Coolac-Tumut Serpentine Shrubby Woodland in the NSW South Western Slopes and South Eastern Highlands Bioregions	EEC		Consists of an overstorey of drooping sheoak (<i>Allocasuarina verticillata</i>) with the shrubs hickory wattle (<i>Acacia implexa</i>), grasstrees (<i>Xanthorrhoea glauca</i>) and <i>Ricinocarpos bowmanii</i> . The groundlayer is consists of a range of native grasses and herbs, often including kangaroo grass (<i>Themeda australis</i>), wiregrasses (<i>Aristida spp.</i>), wallaby grasses (<i>Rytidosperma spp.</i>), <i>Senecio quadridentatus</i> , rock fern (<i>Cheilanthes seiberi</i>) and <i>Carex breviculmis</i> .	0	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.	0	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.	0	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.	0	None
Myall Woodland in the Darling Riverine, Brigalow Belt South, Cobar Peneplain, Murray-Darling Depression, Riverina and	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	0	None

Common Name (Scientific Name)	BC Act	EPBC Act	Habitat requirements	Number of records (source)	Likelihood of occurrence
NSW South Western slopes bioregions			active drainage channels and are rarely if ever flooded.		
Poplar Box Grassy Woodland on Alluvial Plains		EEC	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.	0	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.	0	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	EEC	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.	0	Recorded

Appendix C – Significance Assessments

Test of Significance (BC Act)

In Section 5A of the EP&A 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, populations 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 and hence if a Species Impact Statement is required (DECC, 2007).

The above table found that there are a threatened biota 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 Test of Significance is completed on the following biota:

- Micro bats (Greater Broad-nosed Bat, Inland Forest Bat, Little Pied Bat, Southern Myotis, Yellow-bellied Sheathtail Bat)
- Barking Owl
- Birds of Prey (Black Falcon, Little Eagle, Spotted Harrier, Square-tailed Kite)
- Woodland/Shrubland Birds (Black-chinned Honeyeater, Brown Treecreeper, Bush Stone-curlew, Diamond Firetail, Gang-gang Cockatoo, Grey-crowned Babbler, Hooded Robin, Little Lorikeet, Oriental Cuckoo, Painted Honeyeater, Pink Cockatoo, Purple-crowned Lorikeet, Rainbow Bee-eater, Regent Honeyeater, Scarlet Robin, Speckled Warbler, Superb Parrot, Swift Parrot, Turquoise Parrot, Varied Sittella)
- Habitat generalists (Flame Robin, Dusky Woodswallow, Pied Honeyeater)
- Open grassland/cleared land Birds (White-fronted Chat)
- Brush-tailed Phascogale
- Grey-headed Flying-fox
- Spotted-tailed Quoll
- Squirrel Glider
- Peas (Silky Swainson-pea)
- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South 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 critically endangered ecological community

Microbats (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,

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, micron bats 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 of up to 0.35 hectares for Southern Myotis and up to 24.53 hectares for the remaining species. The presence of tree hollows, in particular, snags (standing dead trees) suggests that the study area could contain potential roosting habitat. The loss of up to 24.53 hectares of potential habitat is considered negligible in the context of the native vegetation within the road corridor (727 hectares) with about 3.5% being impacted. Within a 550-metre buffer of the road corridor (about 4,883 hectares) about 0.5% 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 162 HBT would be removed. While the removal of 162 HBT equates to about 4.2% of the HBT within the road corridor, an estimated 4,116 HBT 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 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 24.53 hectares of native vegetation, comprising potential habitat for these biota. Up to 162 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 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 – is not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, and *Loss of hollow-bearing trees* are relevant.

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 24.53 hectares of native vegetation is necessary to carry out the proposal to provide improved road user safety along this section of the Olympic Highway. In the context of the native vegetation within the road corridor (727 hectares) about 3.5% would be impacted. Within a 550-metre buffer of the road corridor (about 4883.73 hectares) about 0.5% 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 162 HBT (or about 4.2% of the HBT within the road corridor). 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 Greater Broad-nosed Bat, Inland Forest Bat, Little Pied Bat, Southern Myotis, Yellow-bellied Sheath-tail-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 (DPIE/BCS, 2022b, 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 (DPIE/BCS, 2022b) both of which are of relevance to the proposal.

The potential impact for this species relates to the removal of woodland habitat. This equates to about 24.53 hectares. The loss of up to 24.53 hectares of potential habitat is considered negligible in the context of the native vegetation within the general road corridor (727 hectares) with about 3.5% being impacted. Within a 550-metre buffer of the road corridor (about 4883.73 hectares) about 0.5% 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 162 HBT would be removed which equates to about 4.2% of the estimated HBT within the road corridor. Further, while no data was taken on the size of hollows within each HBT, not all 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:

- (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 24.53 hectares of native vegetation comprising potential habitat. Up to 162 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 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 and large creeks lined with River Red Gum are of greater importance to a Barking Owl population given breeding and foraging opportunities.

(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 – is not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, and *Loss of hollow-bearing trees* are relevant.

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 24.53 hectares of native vegetation is necessary to carry out the proposal to provide improved road user safety along this section of the Olympic Highway. In the context of the native vegetation within the road corridor (727 hectares) about 3.5% would be impacted. Within a 550-metre buffer of the road corridor (about 4883.73 hectares) about 0.5% 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 162 HBT or about 4.2% of the HBT within the road reserve. 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 Falcon, Little Eagle, Spotted Harrier, Square-tailed Kite)

(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 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 B confirms that all native vegetation and disturbed areas could provide potential habitat for this species. The proposal would result in the removal of about 24.53 hectares of native vegetation and up to 22.66 of cleared/highly disturbed vegetation.

The loss of potential habitat (native vegetation and cleared land is considered relatively minor in the context of these wide ranging species, the vegetation remaining within the general road corridor and within a 550-metre buffer of the road corridor. Woodland and cleared land also occur 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. No Little Eagle were recorded during the field survey. 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 B confirms that Little Eagle could potentially occur across the proposal.

The loss of up to 24.53 hectares of potential habitat is considered relatively minor in the context of the native vegetation within the general road corridor (727 hectares) with about 3.5% being impacted, the wide ranging nature of this species, and that within a 550-metre buffer of the road

corridor, only about 0.5% 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 creek lines 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 B confirms that all woodlands within the study area could provide potential habitat for this species. Given this, the proposal would result in the removal of about 24.53 hectares of native vegetation and up to 22.66 of cleared/highly disturbed vegetation.

The loss of up to 24.53 hectares of potential habitat is considered relatively minor in the context of the native vegetation within the general road corridor (727 hectares) with about 3.5% being impacted, the wide ranging nature of this species, and that within a 550-metre buffer of the road corridor, only about 0.5% 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, 1999). It is sparsely distributed with resident pairs having territories of greater than 100 km², and is also believed to be nomadic (NPWS, 1999, 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 (DPIE/BCS, 2022b). 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 failed to identify this species and 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 B confirms that all woodlands could provide potential habitat for this species. Given this, the proposal would result in the removal of about 24.53 hectares of native vegetation.

The loss of up to 24.53 hectares of potential habitat is considered relatively minor in the context of the wide ranging nature of this species, the native vegetation within the general road corridor (727

hectares) with about 3.5% being impacted and that within a 550-metre buffer of the road corridor (about 4883.73 hectares) about 0.5% 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.

(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 49.19 hectares (for Spotted Harrier, Black Falcon – less for other 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 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.

(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 – is 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 24.53 hectares of potential habitat is considered relatively minor in the context of the native vegetation within the general road corridor (727 hectares) with about 3.5% being impacted, the wide ranging nature of these species, and that within a 550-metre buffer of the road corridor, only about 0.5% would be impacted. Woodland and cleared areas also occurs across the wider locality which would remain unaffected confirming that extensive areas of potential and known habitat would remain.

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 Falcon, Little Eagle, Spotted Harrier, Square-tailed Kite.

Woodland/Shrubland Birds (Black-chinned Honeyeater, Brown Treecreeper, Bush Stone-curlew, Diamond Firetail, Gang-gang Cockatoo, Grey-crowned Babbler, Hooded Robin, Little Lorikeet, Painted Honeyeater, Pink Cockatoo, Purple-crowned Lorikeet, Regent Honeyeater, 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 (DPIE/BCS, 2022b). 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 B found that there was a moderate potential for occurrence with the woodlands within the proposal.

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 melanocephala*).

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 (DPIE/BCS, 2022b).

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. Brown Treecreeper were recorded during field surveys.

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.

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 (DPIE/BCS, 2022b). 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 B found that there was some likelihood of occurrence within the woodland habitats of the proposal. On this basis, the potential impacts to this species would result in the removal of up to 24.53 hectares of potential habitat. No Bush Stone-curlew were identified within the road reserve.

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 (DPIE/BCS, 2022b, Morcombe, 2004). Although they are not commonly found in coastal districts, there are records from near Sydney, the Hunter Valley and the Bega

Valley (DPIE/BCS, 2022b). 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). Diamond Firetail were recorded during the field survey in multiple locations.

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.

Gang-gang Cockatoo

The Gang-gang Cockatoo is distributed from southern Victoria through south- and central-eastern New South Wales. In New South Wales, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. It occurs regularly in the Australian Capital Territory. It is rare at the extremities of its range, with isolated records known from as far north as Coffs Harbour and as far west as Mudgee (OEH, 2021c).

Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 10 cm in diameter or larger and at least 9 m above the ground in eucalypts (OEH, 2021c).

No Gang-gang Cockatoo were recorded during field surveys. However, the habitat assessment completed in Annexure B confirms that all woodlands within the proposal could provide potential habitat for this species. Given this, the proposal would result in the removal of about 24.53 hectares of native vegetation.

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, DPIE/BCS, 2022b, 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 (DPIE/BCS, 2022b).

Grey-crowned Babbler were recorded during the field survey.

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 (DPIE/BCS, 2022b). However, it is believed that the species generally exhibits demanding requirements for both habitat complexity and area (>100ha) (Watson et al., 2001). Hooded Robin were recorded during the field survey.

Little Lorikeet

The Little Lorikeet is distributed widely across the coastal and Great Divide regions of eastern Australia from Cape York to South Australia (DPIE/BCS, 2022b). 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 (DPIE/BCS, 2022b).

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 B found that potential habitat is likely to occur in all areas of woodland.

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 (DPIE/BCS, 2022b). 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 B found that potential habitat and therefore potential occurrence is within the proposal. The proposal is likely to directly impact about 24.53 hectares of potential habitat for Painted Honeyeater.

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 (DPIE/BCS, 2022b, Morcombe, 2004, Sass, 2009). Breeding pairs occupy nests at least 1 km apart with densities of about one pair per 30 km² recorded (DPIE/BCS, 2022b).

No Pink Cockatoo were recorded during the field survey. However, the habitat assessment completed in Annexure B found there was some potential for occurrence based on habitat presence. This corresponds with all woody vegetation. On that basis, and in consideration of the

proposal, about 24.53 hectares of potential habitat would be directly affected should the proposal proceed. Additionally, about 162 HBT would be removed, which could provide potential breeding resources for Pink Cockatoo.

Purple-crowned Lorikeet

The Purple-crowned Lorikeet occurs across the southern parts of the continent from Victoria to south-west Western Australia. It is uncommon in NSW, with records scattered across the box-ironbark woodlands of the Riverina and south west slopes, the River Red Gum forests and mallee of the Murray Valley as far west as the South Australian border, and, more rarely, the forests of the South Coast. The species is nomadic and most, if not all, records from NSW are associated with flowering events (OEH, 2021c).

Feed primarily on nectar and pollen of flowering Eucalypts, including planted trees in urban areas. Breeds away from feeding areas, utilising hollow branches or holes in trees. Also roosts in dense vegetation up to several kilometres away from feeding areas (OEH, 2021c).

While no Purple-crowned Lorikeet were recorded in the field survey, the habitat assessment in Annexure B found that potential habitat is likely to occur in all areas of woodland. On this basis, and with consideration of the proposal, about 24.53 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 (727 hectares) 3.5%, and within a 550-metre buffer of the road corridor (about 4883.73 hectares), only about 0.5% would be impacted.

Regent Honeyeater

The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. The Regent Honeyeater is a flagship threatened woodland bird whose conservation will benefit a large suite of other threatened and declining woodland fauna. The species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River Sheoak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. The Regent Honeyeater is a generalist forager, although it feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. Key eucalypt species include Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany. No Regent Honeyeater were recorded during the field survey.

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.

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 B found that all woody vegetation could provide potential habitat for this species.

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 (DPIE/BCS, 2022b, 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 confirming the presence of a sedentary population.

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 B, it was found that all woodland areas could provide foraging and potential breeding habitat 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 (DPIE/BCS, 2022b, 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 B found that all areas of woodland had some level of potential as foraging habitat for this species.

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 (DPIE/BCS, 2022b). 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 (2021c) 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 B found that all areas of woodland had some level of potential as habitat for this species.

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, DPIE/BCS, 2022b, DPIE/BCS, 2022a). 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 not confirm the presence of Varied Sittella within the road corridor, however the habitat assessment within Annexure B found that it was likely potential habitat is present.

For all of these woodland bird species, the proposal should it proceed, would result in the removal of potential and known woodland habitat. This equates to about 24.53 hectares along the 318 kilometre proposal length. The loss of up to 24.53 hectares of potential and known habitat is considered relatively major in the context of the native vegetation within the general road corridor given the surrounding landscape which is highly fragmented. About 727 hectares occur within the road reserve, so the impact equates to about 3.5% of the road reserve being removed. Within a 550-metre buffer of the road corridor, there is about 4883.73 hectares of native vegetation, so from a more local perspective, the proposal is impacting about 0.5% of the remaining vegetation within these landscapes. Up to 162 HBT which could provide breeding habitat for a number of these species. This proposed removal equates to about 4.2% of the estimated HBT within the road corridor. Further, while no data was taken on the size of hollows within each HBT, there is some probability that not all of these HBT would provide habitat for these species. Removal of hollow-bearing trees should only be conducted with regard to the mitigation measures outlined within section 6. This includes managing the removal of vegetation and HBT by a suitably qualified person and with the full implementation of the safeguards provided.

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 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 24.53 hectares of native vegetation, comprising potential and known habitat for these biota. Up to 162 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 – is not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, and *Loss of hollow-bearing trees* are relevant

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 24.53 hectares of native vegetation is necessary to carry out the proposal to provide improved road user safety along this section of the Olympic Highway. In the context of the native vegetation within the road corridor (727 hectares) about 3.5% would be impacted. Within a 550-metre buffer of the road corridor (about 4883.73 hectares) about 0.5% 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 162 HBT (or about 4.2% of the HBT within the road corridor). 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 Black-chinned Honeyeater, Brown Treecreeper, Bush Stone-curlew, Diamond Firetail, Gang-gang Cockatoo, Grey-crowned Babbler, Hooded Robin, Little Lorikeet, Painted Honeyeater, Pink Cockatoo, Purple-crowned Lorikeet, Regent Honeyeater, 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 burnt 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 B found that it was likely potential habitat occurs within the road reserve including in cleared areas. Given this, about 49.19 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 and cleared land within the road corridor and within a 550-metre buffer of the road corridor it is considered relatively minor.

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, farmland 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.

Dusky Woodswallow were recorded during field surveys and the habitat assessment within Annexure B found that it was likely potential habitat occurs within all areas of native vegetation, cleared land and tree plantings. Given this, about 50.19 hectares of potential and 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 relative mobility of this species, and the extent of native vegetation within the road corridor and within a 550-metre buffer of the road corridor, it is considered relatively minor as only about 0.5% of these habitats 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 (DPIE/BCS, 2022b) 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 (DPIE/BCS, 2022b). 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 B found that potential habitat occurred as woodland. Given this, about 24.53 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 mobility and nomadic nature of this species, and the extent of the native vegetation only within the road corridor and within a 550-metre buffer of the road corridor it is considered relatively minor as only about 0.5% 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 24.53 hectares of native vegetation and about 22.22 hectares of 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 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 – is not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation*, and *Loss of hollow-bearing trees* are relevant.

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 24.53 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, it is considered relatively minor as only about 0.5% 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 (White-fronted Chat)

(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,

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 (DPIE/BCS, 2022b).

No White-fronted Chat were recorded during field surveys. However, with consideration of the habitat assessment in Annexure B, it was found that all areas of cleared land, could provide potential habitat for White-fronted Chat. On this basis, about 22.66 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 363.5 hectares) about 15.25% of available habitat would be affected. Within a 550-metre buffer of the road corridor, cleared areas are extensive given the high level of agricultural activity in the region. 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.

(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 biota 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 22.66 hectares of 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 this species to move (fly), the nature of proposed work spread over a long distance, and the extent and quality of 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 this species, 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 – is 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 native vegetation is necessary to carry out the proposal to provide improved road user safety along this section of the Olympic 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 White-fronted Chat or their habitats.

Brush-tailed Phascogale

(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 Brush-tailed Phascogale has a patchy distribution around the coast of Australia. In NSW it is mainly found east of the Great Dividing Range although there are occasional records west of the divide. This species preferring dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs, or leaf litter. Females have exclusive territories of around 20 – 40 hectares, while males have overlapping territories often greater than 100 hectares. Nest and shelter in tree hollows with entrances 2.5 – 4 centimetres wide.

While no Brush-tailed Phascogale were recorded during the field survey, based on the habitat assessment in Annexure B, this found that any woodland habitat could provide potential habitat.

As many as 162 HBT would also be directly impacted which equates to about 4.2% of the total number of HBT mapped and estimated within the road corridor. Site-specific safeguards have been developed to minimise the potential risk to both adult marsupial, and joeys in nests (should any be present) at the time of the proposed work to an acceptable level.

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, retained areas of woodland would continue to provide suitable habitat should the proposal proceed. This is also particularly important in the ability of this species to move through fragmented landscapes, albeit with limited success (Van der Ree et al., 2006, van der Ree et al., 2001). 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 Brush-tailed Phascogale such that a viable local population (should one occur) 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 biota 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 24.53 hectares of potential habitat and up to 162 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 habitat to be removed is considered to be of moderate importance to the long-term viability of this species in the locality, as is any area of woodland in this highly fragmented south-west slopes bioregion.

(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 relevant.

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 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 162 HBT (or about 4.2% 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 Brush-tailed Phascogale or their habitat.

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 (DPIE/BCS, 2022b). 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 and Lachlan River including within the city of Wagga Wagga and town of Cowra. Based on the habitat assessment in Annexure B, this found that any woodland habitat around major waterways. 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) however, the species is known to roost in river red gum communities. On this basis, the proposal would result in the clearing of up to 0.02 hectares of potential habitat

The loss of this amount of habitat, 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, is considered of little consequence, given that retained areas of woodland 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 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,**

This biota 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 0.02 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 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 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 – is 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 0.02 hectares of potential habitat is necessary to carry out the proposal to provide improved road user safety along this section of the Olympic 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.

Spotted-tailed Quoll

(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 range of the Spotted-tailed Quoll has contracted considerably since European settlement. It is now found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania. Only in Tasmania is it still considered relatively common. Quolls use hollow-bearing trees, fallen logs, other animal burrows, small caves and rock outcrops as den sites. Mostly nocturnal, although will hunt during the day; spend most of the time on the ground, although also an excellent climber and will hunt possums and gliders in tree hollows and prey on roosting birds. Females occupy home ranges of 200-500 hectares, while males occupy very large home ranges from 500 to over 4000 hectares. They are also known to traverse their home ranges along densely vegetated creek lines (OEH, 2021c).

No Spotted-tailed Quoll were recorded during field surveys. However, the habitat assessment in Annexure B found that potential impact for this species relates to the removal of woodland habitat. This equates to about 24.53 hectares. The loss of up to 24.53 hectares of potential habitat is considered negligible in the context of the native vegetation within the general road corridor (727 hectares) with about 3.5% being impacted. Within a 550-metre buffer of the road corridor (about 4,883 hectares) about 0.5% 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. 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 Spotted-tailed Quoll 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 24.53 hectares of potential habitat. Up to 162 HBT would also be removed, however, most of these were arboreal, not terrestrial.
- 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 – is not recognised as a key threatening process (KTP) under the BC Act, the *Clearing of native vegetation* and *Loss of hollow-bearing trees* are relevant.

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 Spotted-tailed Quoll and 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. They are known to occur within the road reserve of the Olympic Highway and are usually detected when targeted using appropriate methods. Given this, there is a high likelihood of occurrence in the woodlands of the road reserve.

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 24.53 hectares of Squirrel Glider habitat and up to 162 HBT is necessary to carry out the proposal. Tree hollows, particularly small and medium sized hollows, provide significant denning resources for Squirrel Glider (Ball et al., 2011, Crane et al., 2010).

In the context of the road reserve, about 3.5% of the woodland habitat within the road reserve would be removed should this proposal proceed. The home ranges of Squirrel Glider are known to vary geographically and in response to habitat quality. For example, Goldingay et al (2010) found that in south east QLD, home ranges were about 4.6 hectares, while on the central coast of NSW, these were around 14 hectares (Goldingay et al., 2010). However, in linear remnants such as road reserves where habitat quality was high such as the Olympic Highway road reserve, home ranges were much smaller with a study in the woodlands of central Victoria confirming these were between 1.4-2.8 hectares (van der Ree and Bennett, 2003). Importantly, these were as low as 0.69 hectares. These home ranges were long, narrow and linear (coinciding with the road reserve) although that study confirmed that gliders will cross cleared agricultural land to reach other woodland patches up to 240 metres away. This can only mean that animals travelled across the ground, as glider distance in this species is significantly much less (Taylor and Goldingay, 2013, Goldingay and Taylor, 2009) and places these individuals at extreme risk to predation by foxes,

feral cats and dogs. The only real benefit to occupying lineal remnants in the defence of a glider groups home range. In lineal, roadside remnants, gliders only need to defend the terminal ends of their range, in contrast to large continuous areas of habitat where they may need to defend from all directions. This would equate to a reduction of energy and resources required to persist (van der Ree and Bennett, 2003). With consideration of the proposal, impacts to vegetation within the road corridor would not only result in the direct removal about 12% of the woodland in the road reserve, it is likely to have indirect impacts on habitat quality by reducing the lineal width.

The removal of up to 162 HBT is also likely to have a significant effect on habitat extent and quality for Squirrel Glider. Squirrel Glider generally use up to 13 HBT in their home range (with an average of 7), with a small number of den trees used more frequently than others (Crane et al., 2010). Den tree use is significant and nocturnal activity is generally within 400 metres of their den tree (Crane et al., 2010) which in this fragmented landscape, is most likely within the road reserve boundary.

With consideration of these factors, it is *unlikely* that the proposal 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 24.53 hectares of woodland habitat and up to 162 HBT
- ii. The proposal is unlikely to 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 woodland habitat to be removed is considered to be of high 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. For Squirrel Glider, In the context of the road reserve, about 3.5% of the woodland habitat would be removed should this proposal proceed.

Conclusion

This Test of Significance has determined that the proposed activity is ‘*unlikely*’ to have a ‘*significant effect*’ on Squirrel Glider and their habitat.

Silky Swainson-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,

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.

While this species was not recorded during the field survey, the habitat assessment in Annexure B found that there was some potential for occurrence, albeit low given that it is not known from the road reserve from previous records and many areas were subject to high ground disturbance

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 other areas of potential habitat 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 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 this species should it occur there.

With consideration of these factors, it is *unlikely* that the proposal could have an adverse effect on the life cycle of Silky Swainson-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,**

This biota 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 24.53 hectares of potential habitat. However, no individuals of these species were recorded during the field surveys and it is not known from the MR78 road reserve.
 - 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 this 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 Silky Swainson-pea and their habitats.

Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, 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 3.19 hectares of this EEC would be removed. This EEC is widespread in the locality based on regional mapping held by OEH (>864 hectares), and the removal of a relatively small area of EEC (about 0.42%) 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 3.19 hectares of this TEC (14.51 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 Olympic 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 72 hectares occurs within the road reserve, and a further 800 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 – is 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 3.19 hectares of this TEC is necessary to carry out the proposal to provide improved road user safety along this section of the Olympic Highway. In the context of the TEC within the road corridor (72 hectares) about 20% would be impacted. Within a 550-metre buffer of the road corridor (about 864 hectares) about 1.7% 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.

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 20.4 hectares of this TEC would be removed (about 15.11 hectares of this meets the EPBC Act listing criteria). This TEC is somewhat limited in the road reserve (530 hectares) but based on regional mapping held by OEH is also occurs within a 550-metre buffer of the road reserve (about 2,025 hectares). On that basis, the proposal would result in the removal of about 3.96% of the Box-gum Woodland in the road reserve. It would also equate to a loss of about 1.05% of the total extent of Box-gum Woodland within a 550-metre buffer, however, the quality of woodlands outside of the road reserve cannot be considered. However, it is likely that these are of lesser condition than the woodlands of the road reserve given the pressures of grazing and agriculture in general as the majority of land is freehold and not within gazetted areas under the NP&W Act. It is more likely that the woodlands of the road reserve are therefore in higher condition than outside of the road reserve, and provide a high contribution to the long-term viability of the local occurrence of this community.

Given this, the removal of this area of TEC has the potential 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 result in a reduction in the width of the vegetation within the road corridor. This reduction would likely result in edge effects including weed invasion moving into parts of the lineal remnants that have minor levels of exotic flora placing the lineal patches at increased risk of substantially and adversely modifying the composition of the TEC. A reduction in function of woodland patches that are currently not under grazing pressures, would potentially affect the local occurrence given that they are likely to be contributing more to the long-term viability than patches on freehold land subject to agricultural activity.

- (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 20.4 hectares of this TEC would be removed (about 15.11 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 high importance to the long-term viability of this community in the locality. This is likely due to the road reserve remnants being in higher condition than the woodland patches on the freehold land adjacent that are most likely subject to grazing and other agricultural activity. This is particularly important given the lack of gazetted land under the NP&W Act within the locality that contains this TEC.

(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 – is 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 clearing of about 20.4 hectares of this TEC is necessary to carry out the proposal to provide improved road user safety along the Olympic Highway. In the context of the TEC within the road corridor (530.95 hectares) about 3.96% would be impacted.

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.

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.

Two migratory species were found to have a moderate to high potential, or were known to occur within the vicinity of the proposal; Oriental Cuckoo and Rainbow Bee-eater (Habitat Assessment, Annexure B).

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, 2009). 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 Oriental Cuckoo, Rainbow Bee-eater or any migratory species and are not considered further.

Threatened Species

The study area and immediate surrounds contains potential habitat for a number of biota listed as threatened under the EPBC Act; Painted Honeyeater, Regent Honeyeater, Superb Parrot, Swift Parrot, Flathead Galaxias, Murray Cod, Grey-headed Flying-Fox, Spotted-tailed Quoll, Hoary Sunray, Inland Grey Box 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 (Painted Honeyeater, Superb Parrot, Murray Cod, Grey-headed Flying-fox)

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 Olympic 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. This BA has identified 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 through a site-specific plan. 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 (Regent Honeyeater, Swift Parrot, Flathead Galaxias, Spotted-tailed Quoll, Hoary Sunray)

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 Olympic 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. Extensive areas of habitat remain for Spotted-tailed Quoll and Regent Honeyeater should they occur in the locality.

For Flathead Galaxias, 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 Swift Parrot and Regent Honeyeater. For Spotted-tailed Quoll, it is unlikely that the species would rely solely on the resources of the road reserve. For Flathead Galaxias, no impacts to aquatic habitat are proposed. Given these factors, the action is unlikely to reduce any area of occupancy to the detriment 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 Olympic Highway, the design of the proposal and the high mobility of the species. 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 Olympic 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. Known breeding habitat for Regent Honeyeater is well clear of the Olympic Highway as determined by the DPIE Important Habitat Areas for this species.

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 Swift Parrot and Regent Honeyeater and that Spotted-tailed Quoll seems to prefer large, continuous areas of habitat, that no direct impacts to waterways are proposed (Flathead Galaxias) and the adoption of the mitigation measures outlined within section 5, it is unlikely that the proposed action would have an impact on the recovery of these species.

Critically endangered and endangered ecological communities (Inland Grey Box Woodland, Box Gum Woodland)

Will the action reduce the extent of an ecological community?

Yes. The proposed action will result in the removal of 15.11 hectares of Box-gum Woodland (BGW) and 3.12 hectares of Inland Grey Box Woodland that meets with the EPBC Act criteria.

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?

Yes for BGW. Locality. The area of TEC is considered to be of high importance to the long-term viability of this community in the locality. This is likely due to the road reserve remnants being in higher condition than the woodland patches on the freehold land adjacent that are most likely subject to grazing and other agricultural activity. This is particularly important given the lack of gazetted land under the NP&W Act within the locality that contains this TEC. Unlikely for IGBW.

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 extend 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?

The proposed work would result in a reduction in the width of the vegetation within the road corridor. This reduction would likely result in edge effects including weed invasion moving into parts of the lineal remnants that have minor levels of exotic flora placing the lineal patches at increased risk of substantially and adversely modifying the composition of the TEC. A reduction in function of

woodland patches that are currently not under grazing pressures, would potentially affect the local occurrence given that they are likely to be contributing more to the long-term viability than patches on freehold land subject to agricultural activity.

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?

Areas of BGW would be subject to a greater edge to area ratio from the decreased patch width, likely to result in increased exotic flora invasion (listed as various KTP), therefore, reducing the function and ultimately long-term viability of this TEC.

Will the action interfere with the recovery of an ecological community?

No. The removal of about 3.96% of BGW CEEC within the road reserve is unlikely to interfere with the recovery of this CEEC in the NSW South-western Slopes. Furthermore, it would not interfere with the recovery of this community across its geographical distribution. The same would apply to Inland Grey Box Woodland.

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. Based on this, referral to the Commonwealth Minister is not warranted.

Appendix D – Plot-based field data sheets

BAM Site – Field Survey Form						Site Sheet no:	
Date		Survey Name		Plot Identifier		Recorders	
14/7		OLYMPIC		BAM1		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: BCW	
277						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
dbh	Euc*	Non Euc	Hollows [†]		
Large trees for Euc* & Non Euc	80 + cm	1			*includes all species of <i>Eucalyptus</i> , <i>Corymbia</i> , <i>Angophora</i> , <i>Lophostemon</i> and <i>Syncarpia</i>
50 – 79 cm		111		1	
30 – 49 cm		1			
20 – 29 cm		1111			
10 – 19 cm		11111	11		
5 – 9 cm		111	20	n/a	
< 5 cm			21	n/a	
Length of logs (m) (≥10cm diameter, >50cm in length)		8			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)	30	70	50	60	20	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)			
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)

400 m ² plot: Sheet	of	Survey Name	Plot Identifier	Recorders
Date	14.7	OLYMPIC	BAM 1	SS/LS

[illegible]

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ... 100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form						Site Sheet no:	
		Survey Name		Plot Identifier		Recorders	
Date	14/7	Cymf		BAM 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		PCT 76					EEC: 1 GBW 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		3				
30 – 49 cm		7				
20 – 29 cm		3	2			
10 – 19 cm			1			
5 – 9 cm				n/a		
< 5 cm				n/a		
Length of logs (m) (≥10cm diameter, >50cm in length)					total 2	

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	10	0	10	20	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)			
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)

400 m ² plot: Sheet of		Survey Name	Plot Identifier	Recorders
Date	14-7-	OL7MPIC	BAM 2.	SS / LS

[illegible]

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

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						Confidence:	
						H M L	
Plant Community Type						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	9		—		
50 – 79 cm		3		—		
30 – 49 cm		5		—		
20 – 29 cm						
10 – 19 cm						
5 – 9 cm				n/a		
< 5 cm				n/a		
Length of logs (m) (≥10cm diameter, >50cm in length)		3		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	10	20	10	10	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)

400 m ² plot: Sheet of		Survey Name	Plot Identifier	Recorders
Date	15/7/21	OLYNP	BAM 3.	SS/LS

[illegible]

N: native, **E:** exotic, **HTE:** high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m; 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no:

Date		Survey Name		Plot Identifier		Recorders	
15/7/21		044m		BAM 4		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 266						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	5	3		
50 – 79 cm		1	1		
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	
				28	

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	10	20	10	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
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)

400 m ² plot: Sheet of		Survey Name	Plot Identifier	Recorders
Date	15/7/21	OLYMP	BAM 4	SS/LS

[illegible]

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ... 100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

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						Confidence:	
Plant Community Type						EEC:	
						H M L	
						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					
30 – 49 cm					
20 – 29 cm					
10 – 19 cm			1		
5 – 9 cm			2	n/a	
< 5 cm				n/a	
Length of logs (m) (≥10cm diameter, >50cm in length)				total	
				10	

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 5 0 0 5	1 1 1 1 1	1 1 1 1 1	1 1 1 1 1
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)

400 m ² plot: Sheet	of	Survey Name	Plot Identifier	Recorders
Date	15/7/21	OLYM	Bam 5	SS/CS

[illegible]

N: native, **E:** exotic, **HTE:** high threat exotic

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ..., 100, 200, ..., 1000, ...

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						Confidence:	
Plant Community Type						Confidence:	
PCT 110						EEC:	
						H M L	
						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			4				
10 – 19 cm			3	85			
5 – 9 cm						n/a	
< 5 cm						n/a	
Length of logs (m) (≥10cm diameter, >50cm in length)				total			
				23			

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)	60	20	80	70	15	10	0	0	0	5	0	0	0	0	10	30	10	20	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)

400 m ² plot: Sheet of		Survey Name	Plot Identifier	Recorders
Date	15/7/21	OLYMP	BAM. 6.	SS/LS

[illegible]

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ... 100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form						Site Sheet no:	
		Survey Name		Plot Identifier		Recorders <i>SS/LS</i>	
Date	<i>15/7/21</i>	<i>OLY mp.</i>		<i>BAM 7.</i>			
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:	
<i>PCT75 YBx WHCYP.</i>						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	<i>4</i>				
50 – 79 cm		<i>1</i>				
30 – 49 cm		<i>✓</i>				
20 – 29 cm		<i>✓</i>				
10 – 19 cm		<i>8</i>	<i>20.</i>			
5 – 9 cm		<i>1</i>	<i>20</i>	n/a		
< 5 cm		<i>✓</i>	<i>30.</i>	n/a		
Length of logs (m) (≥10cm diameter, >50cm in length)					total <i>3</i>	

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)	<i>40</i>	<i>10</i>	<i>20</i>	<i>10</i>	<i>10</i>	<i>5</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>			
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)

400 m ² plot: Sheet of		Survey Name	Plot Identifier	Recorders
Date	15/7/21.	OLYMP	BAM?	SS/LJ.

[illegible]

N: native, **E:** exotic, **HTE:** high threat exotic

GF – circle code if 'top 3'

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across. 0.5% cover represents an area of approximately 1.4 x 1.4 m. and 1% = 2.0 x 2.0 m. 5% = 4 x 5 m. 25% = 10 x 10 m.

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form						Site Sheet no:	
		Survey Name		Plot Identifier		Recorders	
Date	16/7/21	OlynP		Bam 8		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 276.					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	4			3.
50 – 79 cm		4			1
30 – 49 cm		3			
20 – 29 cm		4			
10 – 19 cm		2			
5 – 9 cm		6	1	n/a	
< 5 cm		4	2	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	10	20	0	50	10	30	20	40	5	20	10	10	20	5	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			THREAT
Firewood/CWD removal			
Grazing (identify native/stock)			TRAVELLING STOCK RESERVE
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)

400 m ² plot: Sheet of		Survey Name	Plot Identifier	Recorders
Date	16/7/21	Bam8	047n	SS/CS

[illegible]

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form						Site Sheet no:	
		Survey Name		Plot Identifier		Recorders	
Date	16/7/21	OLYMP		BAM 9		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 5. RRG					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	1				
50 – 79 cm		2				
30 – 49 cm		-				
20 – 29 cm		3				
10 – 19 cm		12				
5 – 9 cm		-			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)																
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			NEXT TO ROADSIDE REST AREA
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m ² plot: Sheet of		Survey Name	Plot Identifier	Recorders
Date	16/7/21	Olymp	BAM 9	SS/LS

[illegible]

N: native, **E:** exotic, **HTE:** high threat exotic

GF – circle code if 'top 3'.

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form						Site Sheet no:	
Date		Survey Name		Plot Identifier		Recorders	
18/7/21		OLYNP		BAM 10.		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: No. 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		2			
30 – 49 cm	1				
20 – 29 cm	4				
10 – 19 cm	7				
5 – 9 cm	2		n/a		
< 5 cm	6		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)	30	20	20	10	20	10	10	20	10	10	0	0	10	0	10	30	40	30	50	30
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)

400 m ² plot: Sheet of		Survey Name	Plot Identifier	Recorders
Date	16/7/21	OLYmp	BAM 10.	SS/LS.

[illegible]

N: native, **E:** exotic, **HTE:** high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ..., 100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form						Site Sheet no:	
		Survey Name		Plot Identifier		Recorders	
Date	18/7/21	OLYMP		BAM 11			
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 217. MUGGA					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	1			
50 – 79 cm		5			
30 – 49 cm		8			
20 – 29 cm					
10 – 19 cm			2		
5 – 9 cm		2		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.

[†]Record total number of stems by size class with hollows (including dead stems/trees)
^{*}includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	90	0	5	70	50	10	0	10	5	30	0	10	5	10	10	0	80	60	10	10
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			MUGGA RESERVE

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m ² plot: Sheet of				Survey Name	Plot Identifier	Recorders
Date	18	7	21	olymp	Bam II	SS / LS

[illegible]

GF Code: see Growth Form definitions in Appendix 1

N: native, **E:** exotic, **HTE:** high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m
Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form						Site Sheet no:	
Survey Name		Plot Identifier		Recorders			
Date	18/7/21	OLY mp		BAM 12		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					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	8	✓	3		
50 – 79 cm		✓	✓			
30 – 49 cm	✓	✓				
20 – 29 cm	1	✓				
10 – 19 cm	3	1				
5 – 9 cm	✓	✓	n/a			
< 5 cm	✓	1	n/a			
Length of logs (m) (≥10cm diameter, >50cm in length)				total 4		

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	10	20	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)			
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)

400 m ² plot: Sheet	of	Survey Name	Plot Identifier	Recorders
Date	18/12/21	OLY mp	BAM12	

[illegible]

N: native, **E:** exotic, **HTE:** high threat exotic

GF – circle code if 'top 3'

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); **Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Appendix E – Hollow-bearing tree data

Hollow-bearing trees identified for removal are highlighted in red text

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
1	Yes	-35.8886	146.9995	499951	6028412
2	Yes	-35.8673	146.9969	499724	6030774
3	Yes	-35.8526	146.9961	499646	6032397
4	Yes	-35.8460	146.9953	499574	6033137
5	No	-35.8248	146.9941	499466	6035488
6	Yes	-35.8231	146.9938	499436	6035668
7	Yes	-35.8193	146.9935	499412	6036094
8	Yes	-35.8132	146.9930	499368	6036772
9	No	-35.8018	146.9947	499525	6038039
10	Yes	-35.7945	146.9974	499765	6038849
11	Yes	-35.7913	146.9998	499983	6039202
12	No	-35.7691	147.0101	500915	6041666
13	Yes	-35.7638	147.0119	501073	6042251
14	No	-35.7637	147.0121	501093	6042260
15	Yes	-35.7632	147.0121	501089	6042317
16	No	-35.7607	147.0128	501159	6042593
17	No	-35.7605	147.0131	501185	6042611
18	No	-35.7594	147.0132	501193	6042733
19	No	-35.7583	147.0138	501252	6042862
20	No	-35.7574	147.0138	501248	6042955
21	No	-35.7563	147.0142	501283	6043084
22	Yes	-35.7525	147.0154	501396	6043507
23	No	-35.7471	147.0173	501562	6044101
24	No	-35.7467	147.0174	501575	6044143
25	No	-35.7464	147.0178	501605	6044180
26	No	-35.7453	147.0179	501617	6044298
27	No	-35.7450	147.0180	501628	6044337
28	No	-35.7451	147.0182	501644	6044320
29	No	-35.7448	147.0181	501634	6044357
30	No	-35.7447	147.0183	501657	6044365
31	No	-35.7438	147.0184	501660	6044465

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
32	No	-35.7438	147.0187	501691	6044473
33	No	-35.7436	147.0187	501688	6044490
34	No	-35.7434	147.0188	501696	6044515
35	No	-35.7429	147.0187	501689	6044570
36	No	-35.7427	147.0187	501693	6044594
37	No	-35.7419	147.0190	501720	6044675
38	No	-35.7416	147.0194	501752	6044717
39	No	-35.7415	147.0191	501731	6044726
40	No	-35.7414	147.0194	501756	6044736
41	No	-35.7407	147.0196	501776	6044811
42	No	-35.7400	147.0196	501775	6044891
43	No	-35.7397	147.0198	501786	6044927
44	No	-35.7382	147.0202	501828	6045088
45	No	-35.7378	147.0204	501840	6045130
46	No	-35.7375	147.0204	501845	6045169
47	No	-35.7371	147.0206	501864	6045208
48	No	-35.7370	147.0206	501867	6045220
49	No	-35.7364	147.0209	501886	6045291
50	No	-35.7362	147.0209	501889	6045310
51	No	-35.7361	147.0209	501893	6045326
52	No	-35.7355	147.0211	501911	6045390
53	No	-35.7352	147.0212	501919	6045423
54	No	-35.7351	147.0215	501942	6045427
55	No	-35.7337	147.0217	501965	6045583
56	No	-35.7314	147.0225	502033	6045841
57	No	-35.7310	147.0229	502067	6045891
58	No	-35.7303	147.0231	502087	6045962
59	No	-35.7295	147.0232	502094	6046056
60	No	-35.7289	147.0236	502134	6046125
61	No	-35.7283	147.0235	502126	6046189
62	No	-35.7282	147.0238	502154	6046196

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
63	No	-35.7276	147.0237	502146	6046261
64	No	-35.7274	147.0238	502149	6046289
65	No	-35.7271	147.0239	502160	6046315
66	No	-35.7270	147.0239	502162	6046327
67	No	-35.7270	147.0242	502190	6046334
68	No	-35.7266	147.0241	502175	6046373
69	No	-35.7262	147.0242	502187	6046417
70	No	-35.7239	147.0250	502258	6046676
71	No	-35.7210	147.0261	502364	6046991
72	No	-35.7185	147.0267	502416	6047271
73	No	-35.7178	147.0269	502437	6047346
74	No	-35.7175	147.0270	502444	6047380
75	No	-35.7162	147.0275	502487	6047530
76	No	-35.7158	147.0277	502501	6047569
77	No	-35.7156	147.0277	502506	6047600
78	No	-35.7149	147.0279	502521	6047667
79	No	-35.7146	147.0282	502549	6047711
80	No	-35.7139	147.0281	502540	6047778
81	No	-35.7135	147.0282	502547	6047827
82	No	-35.7117	147.0288	502602	6048032
83	No	-35.7086	147.0291	502633	6048366
84	No	-35.7077	147.0293	502650	6048474
85	No	-35.7071	147.0295	502664	6048542
86	No	-35.7069	147.0295	502666	6048556
87	Yes	-35.7055	147.0300	502713	6048715
88	Yes	-35.7055	147.0300	502714	6048719
89	Yes	-35.7055	147.0300	502715	6048716
90	No	-35.7035	147.0304	502750	6048941
91	No	-35.7034	147.0304	502752	6048951
92	No	-35.7029	147.0303	502738	6049000
93	No	-35.7030	147.0305	502758	6048993

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
94	No	-35.7028	147.0303	502741	6049010
95	No	-35.7025	147.0304	502746	6049042
96	No	-35.7026	147.0306	502770	6049040
97	No	-35.7023	147.0306	502770	6049068
98	No	-35.7022	147.0304	502753	6049080
99	No	-35.7014	147.0306	502766	6049167
100	No	-35.7011	147.0309	502795	6049205
101	No	-35.7011	147.0309	502797	6049202
102	No	-35.7010	147.0306	502773	6049213
103	No	-35.7003	147.0308	502787	6049295
104	No	-35.7001	147.0308	502790	6049310
105	No	-35.6998	147.0312	502819	6049345
106	No	-35.6989	147.0311	502809	6049447
107	No	-35.6988	147.0313	502836	6049458
108	No	-35.6967	147.0315	502849	6049686
109	Yes	-35.6967	147.0317	502872	6049690
110	Yes	-35.6954	147.0317	502872	6049831
111	No	-35.6921	147.0324	502930	6050195
112	No	-35.6917	147.0325	502941	6050245
113	No	-35.6917	147.0325	502941	6050241
114	No	-35.6901	147.0328	502969	6050420
115	No	-35.6902	147.0330	502988	6050411
116	No	-35.6897	147.0329	502981	6050472
117	No	-35.6897	147.0332	503001	6050468
118	No	-35.6890	147.0331	502990	6050545
119	No	-35.6882	147.0332	503005	6050631
120	No	-35.6879	147.0332	503008	6050670
121	No	-35.6875	147.0333	503016	6050709
122	No	-35.6867	147.0338	503057	6050796
123	No	-35.6867	147.0335	503027	6050802
124	No	-35.6862	147.0336	503040	6050858

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
125	No	-35.6557	147.0406	503677	6054237
126	No	-35.6556	147.0406	503676	6054253
127	No	-35.6549	147.0409	503706	6054324
128	No	-35.6547	147.0410	503713	6054347
129	Yes	-35.6537	147.0415	503758	6054458
130	No	-35.6534	147.0413	503738	6054492
131	No	-35.6512	147.0418	503780	6054742
132	Yes	-35.6509	147.0421	503810	6054771
133	No	-35.6504	147.0419	503796	6054824
134	No	-35.6468	147.0426	503855	6055228
135	No	-35.6425	147.0435	503937	6055697
136	Yes	-35.6415	147.0437	503958	6055813
137	Yes	-35.6413	147.0437	503957	6055834
138	No	-35.6381	147.0443	504008	6056186
139	Yes	-35.6345	147.0449	504069	6056583
140	No	-35.6343	147.0447	504044	6056611
141	Yes	-35.6257	147.0445	504028	6057564
142	Yes	-35.6245	147.0444	504021	6057703
143	Yes	-35.6242	147.0444	504018	6057730
144	No	-35.6000	147.0428	503878	6060411
145	No	-35.5996	147.0424	503844	6060458
146	No	-35.5934	147.0423	503828	6061148
147	No	-35.5865	147.0414	503752	6061916
148	No	-35.5858	147.0414	503750	6061986
149	No	-35.5854	147.0414	503746	6062035
150	No	-35.5831	147.0414	503754	6062288
151	No	-35.5799	147.0412	503731	6062643
152	No	-35.5771	147.0410	503711	6062959
153	No	-35.5771	147.0406	503681	6062955
154	No	-35.5768	147.0409	503707	6062990
155	No	-35.5761	147.0409	503702	6063063

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
156	No	-35.5760	147.0408	503699	6063077
157	No	-35.5756	147.0405	503669	6063124
158	No	-35.5751	147.0407	503691	6063181
159	No	-35.5747	147.0404	503665	6063224
160	No	-35.5743	147.0407	503686	6063270
161	No	-35.5742	147.0407	503685	6063277
162	No	-35.5740	147.0406	503682	6063294
163	No	-35.5739	147.0406	503680	6063314
164	No	-35.5738	147.0404	503657	6063318
165	No	-35.5736	147.0406	503681	6063342
166	No	-35.5732	147.0406	503675	6063383
167	No	-35.5728	147.0405	503673	6063432
168	No	-35.5724	147.0405	503669	6063478
169	No	-35.5716	147.0401	503637	6063560
170	No	-35.5716	147.0404	503662	6063566
171	No	-35.5714	147.0404	503660	6063592
172	No	-35.5713	147.0404	503660	6063599
173	No	-35.5712	147.0404	503658	6063609
174	No	-35.5710	147.0404	503658	6063632
175	No	-35.5705	147.0400	503625	6063681
162	No	-35.5680	147.0398	503604	6063967
177	No	-35.5673	147.0399	503620	6064046
178	No	-35.5673	147.0397	503598	6064046
179	No	-35.5669	147.0399	503619	6064084
180	No	-35.5661	147.0399	503613	6064178
181	No	-35.5652	147.0395	503579	6064275
182	No	-35.5649	147.0398	503605	6064303
183	No	-35.5650	147.0398	503607	6064294
184	No	-35.5649	147.0398	503604	6064310
185	No	-35.5644	147.0395	503579	6064361
186	No	-35.5643	147.0395	503577	6064376

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
187	No	-35.5637	147.0396	503593	6064437
188	No	-35.5636	147.0396	503592	6064453
189	No	-35.5632	147.0396	503590	6064500
190	No	-35.5630	147.0396	503589	6064515
191	No	-35.5629	147.0394	503567	6064535
192	No	-35.5627	147.0396	503585	6064557
193	No	-35.5609	147.0391	503547	6064750
194	No	-35.5607	147.0394	503570	6064778
195	No	-35.5598	147.0391	503542	6064876
196	No	-35.5593	147.0393	503560	6064924
197	No	-35.5580	147.0392	503550	6065072
198	No	-35.5579	147.0389	503529	6065085
199	No	-35.5578	147.0392	503548	6065093
200	No	-35.5568	147.0391	503543	6065204
201	No	-35.5569	147.0391	503543	6065194
202	No	-35.5551	147.0387	503508	6065395
203	No	-35.5542	147.0386	503498	6065492
204	No	-35.5541	147.0386	503498	6065509
205	No	-35.5534	147.0385	503490	6065582
206	No	-35.5524	147.0385	503486	6065692
207	No	-35.5523	147.0385	503487	6065702
208	No	-35.5511	147.0386	503497	6065843
209	No	-35.5493	147.0384	503483	6066037
210	No	-35.5486	147.0384	503478	6066113
211	No	-35.5459	147.0382	503461	6066419
212	No	-35.5456	147.0382	503459	6066449
213	No	-35.5455	147.0382	503458	6066456
214	No	-35.5454	147.0381	503457	6066469
215	No	-35.5451	147.0381	503455	6066505
216	No	-35.5450	147.0381	503454	6066510
217	No	-35.5448	147.0381	503452	6066539

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
218	No	-35.5438	147.0380	503443	6066654
219	No	-35.5436	147.0377	503421	6066673
220	No	-35.5428	147.0379	503437	6066763
221	No	-35.5424	147.0376	503411	6066808
222	No	-35.5415	147.0378	503427	6066903
223	No	-35.5409	147.0375	503403	6066973
224	No	-35.5366	147.0372	503373	6067443
225	No	-35.5359	147.0372	503369	6067526
226	No	-35.5342	147.0370	503356	6067717
227	No	-35.5303	147.0367	503327	6068146
228	No	-35.4945	147.0339	503072	6072114
229	No	-35.4937	147.0338	503066	6072205
230	No	-35.4929	147.0337	503060	6072290
231	No	-35.4925	147.0337	503058	6072339
232	No	-35.4923	147.0337	503055	6072359
233	No	-35.4919	147.0337	503052	6072403
234	No	-35.4915	147.0336	503048	6072443
235	No	-35.4898	147.0332	503016	6072633
236	No	-35.4894	147.0332	503013	6072687
237	No	-35.4893	147.0332	503011	6072697
238	No	-35.4883	147.0334	503028	6072802
239	No	-35.4883	147.0334	503028	6072799
240	No	-35.4871	147.0333	503017	6072939
241	No	-35.4808	147.0325	502948	6073636
242	No	-35.4727	147.0320	502904	6074537
243	No	-35.4715	147.0319	502898	6074667
244	Yes	-35.4656	147.0315	502854	6075323
245	Yes	-35.4617	147.0312	502828	6075755
246	Yes	-35.4611	147.0311	502824	6075816
247	Yes	-35.4610	147.0311	502824	6075831
248	Yes	-35.4609	147.0311	502822	6075845

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
249	Yes	-35.4612	147.0311	502823	6075810
250	Yes	-35.4576	147.0308	502797	6076209
251	No	-35.4568	147.0308	502796	6076298
252	No	-35.4565	147.0305	502771	6076334
253	Yes	-35.4564	147.0308	502793	6076336
254	No	-35.4489	147.0330	502994	6077174
255	No	-35.4475	147.0339	503075	6077324
256	No	-35.4455	147.0353	503201	6077548
257	No	-35.4440	147.0360	503269	6077717
258	No	-35.4417	147.0379	503442	6077975
259	No	-35.4409	147.0384	503488	6078059
260	No	-35.4374	147.0409	503711	6078453
261	No	-35.4371	147.0411	503728	6078483
262	No	-35.4369	147.0412	503743	6078507
263	No	-35.4366	147.0414	503756	6078534
264	No	-35.4365	147.0415	503763	6078544
265	No	-35.4360	147.0418	503797	6078604
266	No	-35.4355	147.0422	503826	6078661
267	No	-35.4350	147.0426	503862	6078719
268	No	-35.4345	147.0429	503891	6078766
269	No	-35.4321	147.0445	504036	6079032
270	No	-35.4316	147.0449	504073	6079094
271	No	-35.4306	147.0456	504137	6079205
272	No	-35.4301	147.0459	504163	6079258
273	No	-35.4296	147.0460	504175	6079315
274	No	-35.4296	147.0462	504197	6079317
275	No	-35.4290	147.0466	504231	6079377
276	No	-35.4290	147.0467	504235	6079385
277	No	-35.4289	147.0467	504239	6079394
278	No	-35.4269	147.0480	504357	6079608
279	No	-35.4233	147.0503	504568	6080009

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
280	No	-35.4224	147.0506	504597	6080107
281	No	-35.4221	147.0507	504604	6080141
282	No	-35.4219	147.0508	504611	6080171
283	No	-35.4216	147.0506	504596	6080198
284	No	-35.4215	147.0509	504624	6080213
285	No	-35.4213	147.0510	504626	6080236
286	No	-35.4212	147.0510	504630	6080249
287	No	-35.4210	147.0510	504633	6080262
288	No	-35.4205	147.0512	504645	6080324
289	No	-35.4193	147.0515	504674	6080457
290	No	-35.4188	147.0516	504688	6080506
291	No	-35.4170	147.0521	504733	6080709
292	No	-35.4169	147.0522	504735	6080720
293	No	-35.4165	147.0523	504745	6080765
294	No	-35.4151	147.0526	504777	6080922
295	No	-35.4148	147.0527	504785	6080954
296	No	-35.4147	147.0527	504788	6080961
297	No	-35.4140	147.0529	504803	6081038
298	No	-35.4140	147.0529	504803	6081045
299	No	-35.4129	147.0532	504832	6081166
300	No	-35.4115	147.0535	504862	6081316
301	No	-35.4108	147.0538	504881	6081398
302	Yes	-35.3676	147.0653	505929	6086191
303	Yes	-35.3641	147.0662	506010	6086579
304	Yes	-35.3625	147.0666	506052	6086756
305	Yes	-35.3620	147.0667	506064	6086808
306	Yes	-35.3618	147.0668	506071	6086836
307	Yes	-35.3605	147.0671	506099	6086972
308	Yes	-35.3597	147.0674	506120	6087061
309	No	-35.3557	147.0684	506211	6087503
310	Yes	-35.3558	147.0684	506212	6087493

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
311	Yes	-35.3547	147.0687	506238	6087623
312	Yes	-35.3535	147.0690	506268	6087756
313	No	-35.3420	147.0721	506549	6089026
314	No	-35.3404	147.0725	506590	6089202
315	No	-35.3401	147.0727	506603	6089237
316	No	-35.3391	147.0730	506633	6089345
317	No	-35.3392	147.0730	506630	6089333
318	No	-35.3387	147.0732	506648	6089392
319	No	-35.3383	147.0734	506667	6089440
320	No	-35.3380	147.0735	506680	6089472
321	No	-35.3332	147.0761	506914	6090007
322	No	-35.3320	147.0769	506985	6090139
323	No	-35.3290	147.0789	507172	6090469
324	No	-35.3275	147.0800	507267	6090636
325	No	-35.3272	147.0804	507303	6090671
326	No	-35.3269	147.0804	507310	6090699
327	No	-35.3267	147.0805	507318	6090725
328	No	-35.3267	147.0805	507313	6090719
329	No	-35.3263	147.0808	507340	6090763
330	No	-35.3226	147.0832	507559	6091173
331	No	-35.3209	147.0841	507645	6091365
332	No	-35.3190	147.0850	507727	6091580
333	No	-35.3131	147.0872	507922	6092226
334	No	-35.3043	147.0887	508065	6093211
335	No	-35.3037	147.0888	508071	6093269
336	No	-35.3023	147.0890	508090	6093433
337	No	-35.3001	147.0893	508115	6093672
338	No	-35.2974	147.0896	508147	6093974

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
339	No	-35.2967	147.0897	508156	6094047
340	No	-35.2962	147.0898	508162	6094101
341	No	-35.2947	147.0900	508180	6094273
342	No	-35.2922	147.0902	508205	6094548
343	No	-35.2921	147.0903	508207	6094558
344	No	-35.2912	147.0904	508217	6094658
345	No	-35.2892	147.0906	508241	6094885
346	No	-35.2751	147.1047	509526	6096439
347	No	-35.2706	147.1255	511413	6096939
348	No	-35.2640	147.1396	512702	6097676
349	No	-35.2618	147.1428	512990	6097909
350	No	-35.2604	147.1449	513181	6098066
351	No	-35.2599	147.1457	513258	6098129
352	No	-35.2532	147.1559	514185	6098870
353	No	-35.2525	147.1565	514236	6098939
354	No	-35.2518	147.1580	514374	6099024
355	No	-35.2512	147.1588	514442	6099082
356	No	-35.2459	147.1664	515139	6099669
357	No	-35.2452	147.1679	515274	6099756
358	No	-35.2428	147.1714	515595	6100022
359	No	-35.2424	147.1720	515651	6100064
360	No	-35.2422	147.1723	515674	6100081
361	No	-35.2421	147.1725	515692	6100096
362	No	-35.2419	147.1727	515709	6100113
363	No	-35.2415	147.1732	515762	6100157
364	No	-35.2411	147.1739	515826	6100204
365	No	-35.2406	147.1748	515901	6100266
366	No	-35.2404	147.1751	515930	6100288
367	No	-35.2397	147.1620	516013	6100359
368	No	-35.2390	147.1771	516114	6100440
369	No	-35.2381	147.1784	516236	6100540

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
370	No	-35.2374	147.1795	516335	6100620
371	No	-35.2359	147.1817	516533	6100786
372	No	-35.2357	147.1820	516556	6100801
373	No	-35.2357	147.1820	516561	6100806
374	No	-35.2356	147.1821	516566	6100809
375	No	-35.2356	147.1821	516570	6100813
376	No	-35.2356	147.1822	516576	6100817
377	No	-35.2355	147.1823	516589	6100828
378	No	-35.2350	147.1830	516653	6100882
379	No	-35.2348	147.1833	516680	6100903
380	No	-35.2346	147.1836	516706	6100924
381	No	-35.2335	147.1852	516856	6101046
382	No	-35.2328	147.1863	516951	6101124
383	No	-35.2319	147.1876	517074	6101223
384	No	-35.2298	147.1908	517361	6101460
385	Yes	-35.2205	147.2046	518618	6102482
386	Yes	-35.2189	147.2070	518842	6102665
387	Yes	-35.2175	147.2091	519028	6102818
388	Yes	-35.2168	147.2100	519117	6102889
389	Yes	-35.2160	147.2112	519225	6102979
390	Yes	-35.2155	147.2121	519303	6103039
391	No	-35.2110	147.2187	519907	6103530
392	No	-35.2110	147.2188	519916	6103540
393	No	-35.2074	147.2240	520392	6103930
394	Yes	-35.2036	147.2298	520916	6104356
395	No	-35.2033	147.2302	520950	6104388
396	No	-35.1964	147.2404	521888	6105155
397	No	-35.1708	147.2780	525313	6107975
398	No	-35.1711	147.2780	525317	6107949
399	No	-35.1698	147.2798	525483	6108087
400	Yes	-35.1383	147.3104	528278	6111571

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
401	Yes	-35.1375	147.3106	521625	6111667
402	No	-35.1372	147.3111	528337	6111694
403	No	-35.1366	147.3113	528362	6111626
404	No	-35.1367	147.3109	528324	6111752
405	No	-35.1353	147.3116	528388	6111907
406	No	-35.1341	147.3125	528474	6112039
407	No	-35.0483	147.4087	537277	6121525
408	No	-35.0480	147.4090	537300	6121553
409	No	-35.0440	147.4119	537563	6122001
410	No	-34.9991	147.4227	538569	6126972
411	No	-34.9974	147.4239	538683	6127162
412	Yes	-34.9945	147.4263	538901	6127485
413	No	-34.9942	147.4265	538924	6127518
414	No	-34.9944	147.4260	538873	6127498
415	No	-34.9821	147.4366	539851	6128859
416	No	-34.9735	147.4395	540123	6129806
417	No	-34.9465	147.4546	541510	6132796
418	No	-34.9465	147.4546	541512	6132800
419	No	-34.9434	147.4559	541633	6133140
420	Yes	-34.9412	147.4568	541717	6133380
421	Yes	-34.9396	147.4575	541781	6133561
422	Yes	-34.9395	147.4575	541783	6133570
423	Yes	-34.9396	147.4578	541804	6133562
424	Yes	-34.9394	147.4579	541811	6133580
425	Yes	-34.9392	147.4577	541795	6133601
426	Yes	-34.9391	147.4577	541796	6133614
427	Yes	-34.9390	147.4578	541804	6133631
428	Yes	-34.9386	147.4579	541818	6133667
429	Yes	-34.9385	147.4582	541846	6133682
430	Yes	-34.9380	147.4582	541846	6133742
431	No	-34.9362	147.4592	541938	6133935

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
432	No	-34.9361	147.4593	541942	6133949
433	No	-34.9359	147.4594	541952	6133974
434	No	-34.9350	147.4595	541960	6141159
435	No	-34.9303	147.4623	542217	6134584
436	No	-34.9299	147.4627	542254	6134630
437	No	-34.9298	147.4627	542260	6134639
438	No	-34.9294	147.4631	542299	6134689
439	No	-34.9254	147.4668	542639	6135130
440	Yes	-34.9239	147.4682	542767	6135302
441	Yes	-34.9233	147.4688	542814	6135359
442	Yes	-34.9227	147.4696	542894	6135426
443	Yes	-34.9222	147.4698	542908	6135480
444	No	-34.9188	147.4757	543456	6135855
445	No	-34.9063	147.4865	544447	6137240
446	No	-34.8996	147.4899	544761	6137979
447	No	-34.8943	147.4926	545012	6138566
448	No	-34.8906	147.4942	545160	6138974
449	No	-34.8883	147.4949	545218	6139235
450	No	-34.8868	147.4954	545270	6139397
451	No	-34.8866	147.4957	545298	6139417
452	No	-34.8864	147.4958	545308	6139446
453	No	-34.8815	147.4976	545476	6139981
454	No	-34.8803	147.4979	545501	6140116
455	No	-34.8802	147.4979	545502	6140127
456	No	-34.8774	147.4983	545542	6140443
457	No	-34.8752	147.4986	545565	6140683
458	No	-34.8650	147.5022	545904	6141813
459	Yes	-34.8651	147.5042	546082	6141806
460	Yes	-34.8658	147.5086	546484	6141724
461	Yes	-34.8658	147.5087	546496	6141722
462	Yes	-34.8656	147.5089	546517	6141738

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
463	Yes	-34.8665	147.5154	547106	6141642
464	No	-34.8666	147.5164	547202	6141629
465	Yes	-34.8673	147.5206	547581	6141548
466	Yes	-34.8671	147.5208	547599	6141566
467	No	-34.8679	147.5268	548146	6141479
468	No	-34.8681	147.5271	548177	6141453
469	Yes	-34.8680	147.5278	548240	6141465
470	Yes	-34.8684	147.5307	548508	6141422
471	No	-34.8687	147.5330	548717	6141389
472	Yes	-34.8688	147.5336	548768	6141382
473	Yes	-34.8688	147.5338	548784	6141377
474	Yes	-34.8694	147.5385	549214	6141310
475	No	-34.8695	147.5390	549263	6141300
476	No	-34.8697	147.5413	549470	6141269
477	No	-34.8699	147.5412	549468	6141250
478	Yes	-34.8698	147.5419	549531	6141262
479	Yes	-34.8702	147.5447	549784	6141220
480	No	-34.8708	147.5500	550268	6141144
481	No	-34.8715	147.5538	550612	6141068
482	No	-34.8715	147.5541	550643	6141063
483	No	-34.8717	147.5553	550753	6141046
484	No	-34.8717	147.5552	550745	6141046
485	No	-34.8718	147.5562	550831	6141034
486	No	-34.8718	147.5563	550838	6141033
487	No	-34.8720	147.5582	551015	6141006
488	Yes	-34.8522	147.5993	554784	6143187
489	No	-34.8526	147.6076	555545	6143136
490	Yes	-34.8486	147.6316	557743	6143570
491	Yes	-34.8485	147.6319	557770	6143572
492	Yes	-34.8485	147.6320	557781	6143573
493	Yes	-34.8485	147.6329	557857	6143577

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
494	Yes	-34.8484	147.6332	557883	6143582
495	Yes	-34.8483	147.6348	558034	6143596
496	No	-34.8483	147.6349	558047	6143592
497	Yes	-34.8451	147.6456	559021	6143942
498	No	-34.8450	147.6461	559067	6143959
499	Yes	-34.8449	147.6462	559079	6143968
500	No	-34.8437	147.6481	559248	6144102
501	Yes	-34.8432	147.6491	559344	6144158
502	Yes	-34.8429	147.6497	559398	6144188
503	Yes	-34.8422	147.6512	559541	6144268
504	Yes	-34.8418	147.6517	559581	6144307
505	Yes	-34.8371	147.6643	560742	6144819
506	Yes	-34.8362	147.6684	561110	6144915
507	Yes	-34.8350	147.6733	561561	6145043
508	Yes	-34.8349	147.6738	561608	6145057
509	Yes	-34.8348	147.6743	561659	6145072
510	No	-34.8347	147.6747	561689	6145078
511	No	-34.8347	147.6750	561722	6145086
512	Yes	-34.8346	147.6751	561729	6145088
513	Yes	-34.8346	147.6753	561744	6145094
514	Yes	-34.8346	147.6754	561756	6145096
515	Yes	-34.8345	147.6758	561793	6145106
516	No	-34.8345	147.6758	561788	6145103
517	No	-34.8343	147.6763	561838	6145118
518	Yes	-34.8342	147.6769	561895	6145134
519	Yes	-34.8341	147.6774	561940	6145147
520	Yes	-34.8338	147.6788	562065	6145180
521	No	-34.8337	147.6790	562081	6145184
522	No	-34.8329	147.6823	562392	6145271
523	No	-34.8315	147.6930	563366	6145420
524	No	-34.8315	147.6937	563427	6145420

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
525	No	-34.8316	147.6937	563432	6145417
526	No	-34.8316	147.6946	563510	6145414
527	Yes	-34.8316	147.6967	563710	6145405
528	No	-34.8317	147.6993	563939	6145392
529	No	-34.8319	147.7018	564169	6145378
530	Yes	-34.8319	147.7022	564213	6145378
531	No	-34.8319	147.7042	564393	6145368
532	No	-34.8319	147.7051	564471	6145369
533	No	-34.8319	147.7057	564531	6145368
534	No	-34.8319	147.7060	564553	6145373
535	No	-34.8318	147.7069	564642	6145386
536	No	-34.8317	147.7075	564690	6145397
537	Yes	-34.8316	147.7077	564715	6145404
538	No	-34.8312	147.7087	564805	6145446
539	No	-34.8307	147.7099	564917	6145505
540	No	-34.8306	147.7101	564930	6145513
541	No	-34.8303	147.7106	564976	6145551
542	Yes	-34.1622	147.7123	565132	6145666
543	Yes	-34.8283	147.7137	565266	6145770
544	Yes	-34.8278	147.7146	565342	6145825
545	Yes	-34.8276	147.7149	565371	6145846
546	Yes	-34.8275	147.7149	565376	6145851
547	Yes	-34.8274	147.7151	565391	6145862
548	Yes	-34.8270	147.7157	565450	6145908
549	Yes	-34.8265	147.7166	565526	6145966
550	No	-34.7946	147.7841	571728	6149457
551	No	-34.7628	147.8667	579314	6152916
552	No	-34.7632	147.8666	579306	6152873
553	No	-34.7384	147.8923	581682	6155609
554	No	-34.7379	147.8921	581665	6155665
555	No	-34.7358	147.8924	581696	6155894

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
556	No	-34.7356	147.8924	581699	6155916
557	No	-34.7359	147.8924	581697	6155876
558	No	-34.7350	147.8923	581684	6155984
559	No	-34.7347	147.8923	581683	6156014
560	Yes	-34.7325	147.8929	581746	6156257
561	No	-34.7244	147.8977	582194	6157153
562	No	-34.7219	147.9000	582405	6157429
563	Yes	-34.7079	147.9307	585232	6158955
564	No	-34.7042	147.9368	585795	6159354
565	No	-34.7026	147.9400	586086	6159534
566	No	-34.7028	147.9397	586055	6159513
567	No	-34.6782	147.9674	588624	6162221
568	No	-34.6654	147.9749	589323	6163624
569	No	-34.6604	147.9791	589718	6164183
570	No	-34.6595	147.9797	589772	6164284
571	No	-34.6595	147.9797	589769	6164281
572	No	-34.6592	147.9799	589787	6164311
573	No	-34.6582	147.9810	589890	6164427
574	No	-34.6577	147.9815	589938	6164476
575	No	-34.6579	147.9817	589954	6164457
576	No	-34.6568	147.9827	590047	6164578
577	No	-34.6487	148.0045	592055	6165454
578	No	-34.6485	148.0058	592174	6165477
579	No	-34.6488	148.0084	592408	6165442
580	No	-34.6492	148.0088	592444	6165400
581	Yes	-34.6164	148.0682	597932	6168982
582	Yes	-34.6155	148.0689	597994	6169073
583	Yes	-34.6045	148.0779	598832	6170286
584	Yes	-34.6044	148.0780	598840	6170299
585	Yes	-34.6027	148.0787	598906	6170485
586	Yes	-34.6013	148.0789	598931	6170639

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
587	Yes	-34.5961	148.0809	599118	6171221
588	Yes	-34.5906	148.0841	599418	6171819
589	No	-34.5908	148.0840	599409	6171805
590	Yes	-34.5869	148.0868	599669	6172235
591	Yes	-34.5870	148.0869	599683	6172219
592	No	-34.5865	148.0870	599689	6172272
593	Yes	-34.5844	148.0883	599814	6172506
594	Yes	-34.5830	148.0889	599870	6172662
595	Yes	-34.5817	148.0893	599909	6172802
596	Yes	-34.5816	148.0894	599914	6172819
597	Yes	-34.5810	148.0895	599929	6172878
598	No	-34.5717	148.0951	600454	6173913
599	No	-34.5715	148.0956	600493	6173933
600	No	-34.5714	148.0964	600567	6173943
601	No	-34.5691	148.1008	600972	6174189
602	No	-34.5668	148.1074	601581	6174440
603	No	-34.5670	148.1131	602104	6174408
604	No	-34.5670	148.1133	602129	6174413
605	No	-34.5669	148.1139	602162	6174424
606	No	-34.5667	148.1146	602249	6174443
607	No	-34.5629	148.1265	603338	6174847
608	No	-34.5613	148.1294	603606	6175022
609	No	-34.5610	148.1299	603660	6175058
610	No	-34.5576	148.1340	604040	6175433
611	No	-34.5578	148.1342	604053	6175410
612	No	-34.5559	148.1352	604148	6175616
613	No	-34.5541	148.1365	604269	6175822
614	No	-34.5532	148.1371	604321	6175916
615	No	-34.5484	148.1402	604618	6162450
616	Yes	-34.5476	148.1405	604643	6162532
617	Yes	-34.5475	148.1406	604650	6162543

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
618	Yes	-34.5477	148.1405	604640	6162525
619	Yes	-34.5469	148.1409	604684	6162608
620	Yes	-34.5457	148.1417	604759	6162740
621	No	-34.5456	148.1418	604764	6162749
622	No	-34.5450	148.1423	604809	6162823
623	Yes	-34.5441	148.1428	604861	6162915
624	No	-34.5439	148.1430	604875	6162941
625	No	-34.5413	148.1462	605174	6177225
626	No	-34.5400	148.1481	605352	6177365
627	No	-34.5341	148.1589	606346	6178008
628	No	-34.5121	148.1623	606688	6180444
629	No	-34.5043	148.1604	606526	6181311
630	No	-34.4987	148.1594	606444	6181936
631	No	-34.4978	148.1592	606420	6182032
632	No	-34.4976	148.1591	606417	6182059
633	No	-34.4976	148.1594	606440	6182055
634	No	-34.4966	148.1590	606411	6182169
635	No	-34.4972	148.1591	606415	6182102
636	No	-34.4949	148.1591	606420	6182363
637	No	-34.4937	148.1588	606390	6182497
638	No	-34.4926	148.1586	606377	6182618
639	No	-34.4917	148.1588	606392	6182714
640	No	-34.4913	148.1587	606387	6182754
641	No	-34.4912	148.1587	606388	6182774
642	No	-34.4891	148.1591	606421	6183000
643	No	-34.4875	148.1597	606483	6183182
644	No	-34.4873	148.1595	606464	6183199
645	No	-34.4868	148.1597	606482	6183256
646	No	-34.4862	148.1599	606502	6183317
647	No	-34.4852	148.1606	606564	6183435
648	No	-34.4849	148.1604	606549	6183464

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
649	No	-34.4843	148.1609	606602	6183535
650	No	-34.4830	148.1614	606642	6183673
651	No	-34.4823	148.1618	606681	6183750
652	No	-34.4824	148.1620	606697	6183739
653	No	-34.4802	148.1630	606795	6183980
654	No	-34.4799	148.1632	606813	6184019
655	No	-34.4785	148.1643	606912	6184172
656	No	-34.4779	148.1646	606947	6184241
657	No	-34.4774	148.1649	606971	6184292
658	No	-34.4771	148.1650	606986	6184327
659	No	-34.4741	148.1668	607150	6184660
660	No	-34.4729	148.1678	607244	6184790
661	No	-34.4725	148.1686	607320	6184832
662	No	-34.4714	148.1698	607433	6184948
663	No	-34.4706	148.1705	607497	6185045
664	No	-34.4686	148.1732	607747	6185261
665	No	-34.4672	148.1748	607899	6185414
666	No	-34.4663	148.1759	607993	6185507
667	No	-34.4650	148.1783	608215	6185650
668	No	-34.4643	148.1807	608437	6185734
669	No	-34.4635	148.1830	608651	6185812
670	No	-34.4630	148.1841	608759	6185874
671	No	-34.4628	148.1853	608863	6185891
672	No	-34.4624	148.1858	608911	6185937
673	No	-34.4616	148.1871	609036	6186021
674	No	-34.4616	148.1875	609071	6186018
675	No	-34.4612	148.1880	609113	6186063
676	No	-34.4611	148.1882	609133	6186073
677	No	-34.4610	148.1891	609221	6186086
678	No	-34.4606	148.1898	609279	6186130
679	No	-34.4605	148.1901	609309	6186143

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
680	No	-34.4604	148.1910	609388	6186153
681	No	-34.4604	148.1909	609382	6186152
682	No	-34.4595	148.1934	609617	6186247
683	No	-34.4592	148.1946	609722	6186280
684	No	-34.4591	148.1950	609759	6186290
685	No	-34.4585	148.1983	610065	6186354
686	No	-34.4583	148.1990	610134	6186373
687	No	-34.4578	148.2013	610345	6186432
688	No	-34.4560	148.2050	610688	6186619
689	No	-34.4553	148.2065	610825	6186701
690	No	-34.4549	148.2073	610895	6186747
691	No	-34.4545	148.2082	610977	6186791
692	No	-34.4543	148.2089	611046	6186805
693	No	-34.4508	148.2152	611632	6187189
694	Yes	-34.4501	148.2157	611672	6187267
695	Yes	-34.4491	148.2167	611626	6187380
696	Yes	-34.4472	148.2188	611959	6187587
697	Yes	-34.4390	148.2263	612659	6188490
698	No	-34.4384	148.2265	612681	6188550
699	No	-34.4378	148.2271	612742	6188621
700	No	-34.4374	148.2275	612774	6188661
701	No	-34.4371	148.2279	612809	6188697
702	Yes	-34.4357	148.2296	612973	6188850
703	No	-34.4348	148.2303	613035	6188950
704	Yes	-34.4347	148.2306	613065	6188953
705	Yes	-34.4339	148.2314	613141	6189044
706	No	-34.4330	148.2321	613200	6189144
707	No	-34.4279	148.2385	613802	6189697
708	No	-34.4272	148.2397	613907	6189784
709	No	-34.4263	148.2405	613989	6189874
710	No	-34.4185	148.2453	614438	6190732

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
711	No	-34.4178	148.2460	614506	6190811
712	No	-34.4161	148.2478	614665	6190998
713	No	-34.4158	148.2479	614683	6191035
714	No	-34.4092	148.2526	615124	6191624
715	No	-34.4091	148.2528	615141	6191773
716	No	-34.4080	148.2549	615331	6191892
717	No	-34.4077	148.2558	615414	6191927
718	No	-34.4076	148.2559	615422	6191935
719	No	-34.4027	148.2584	615661	6192474
720	No	-34.4026	148.2584	615662	6192486
721	No	-34.4022	148.2587	615687	6192532
722	No	-34.4021	148.2587	615688	6192545
723	No	-34.3988	148.2587	615694	6192902
724	No	-34.3983	148.2587	615697	6192959
725	No	-34.3979	148.2584	615674	6193003
726	Yes	-34.3969	148.2585	615677	6193118
727	Yes	-34.3959	148.2587	615700	6193223
728	No	-34.3941	148.2587	615705	6193429
729	No	-34.3917	148.2585	615690	6193692
730	No	-34.3916	148.2585	615690	6193706
731	No	-34.3909	148.2588	615713	6193779
732	No	-34.3907	148.2588	615714	6193802
733	No	-34.3802	148.2603	615868	6194972
734	No	-34.3756	148.2596	615809	6195481
735	No	-34.3720	148.2618	616017	6195877
736	No	-34.3688	148.2622	616058	6196226
737	No	-34.3606	148.2698	616768	6197125
738	No	-34.3608	148.2700	616783	6197112
739	No	-34.3503	148.2771	617452	6198262
740	No	-34.3497	148.2776	617499	6198327
741	No	-34.3494	148.2779	617529	6198364

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
742	No	-34.3495	148.2778	617519	6198355
743	No	-34.3488	148.2784	617574	6198433
744	No	-34.3485	148.2786	617598	6198466
745	No	-34.3440	148.2823	617937	6198961
746	No	-34.2957	148.3396	623286	6204244
747	No	-34.2956	148.3398	623298	6204251
748	No	-34.2948	148.3425	623550	6204345
749	No	-34.2950	148.3478	624042	6204314
750	No	-34.2949	148.3486	624108	6204324
751	No	-34.2902	148.3544	624657	6204841
752	No	-34.2889	148.3550	624715	6204984
753	No	-34.2868	148.3549	624707	6205217
754	No	-34.2861	148.3550	624713	6205288
755	No	-34.2856	148.3549	624705	6205346
756	No	-34.2839	148.3564	624850	6205529
757	No	-34.2832	148.3569	624895	6205604
758	No	-34.2822	148.3595	625130	6205713
759	No	-34.2816	148.3607	625248	6205783
760	No	-34.2811	148.3623	625395	6205837
761	No	-34.2811	148.3638	625536	6205835
762	No	-34.2799	148.3678	625903	6205963
763	No	-34.2743	148.3729	626380	6206575
764	No	-34.2723	148.3764	626703	6206799
765	No	-34.2714	148.3781	626864	6206891
766	No	-34.2712	148.3783	626878	6206919
767	No	-34.2710	148.3785	626897	6206933
768	No	-34.2708	148.3792	626967	6206959
769	No	-34.2705	148.3798	627021	6206994
770	No	-34.2702	148.3803	627071	6207025
771	No	-34.2702	148.3802	627059	6207019
772	No	-34.2690	148.3824	627260	6207154

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
773	Yes	-34.2677	148.3839	627398	6207290
774	Yes	-34.2677	148.3840	627409	6207300
775	No	-34.2559	148.3975	628673	6208589
776	No	-34.2448	148.4136	630175	6209795
777	No	-34.2434	148.4170	630490	6209943
778	No	-34.2356	148.4339	632055	6210789
779	No	-34.2329	148.4364	632286	6211086
780	No	-34.2320	148.4366	632310	6211183
781	No	-34.2280	148.4375	632404	6211632
782	Yes	-34.2273	148.4380	632450	6211705
783	No	-34.2266	148.4382	632467	6211781
784	Yes	-34.2265	148.4380	632450	6211792
785	No	-34.2257	148.4385	632494	6211878
786	No	-34.2246	148.4389	632534	6212008
787	No	-34.2216	148.4393	632576	6212338
788	Yes	-34.2204	148.4387	632520	6212470
789	Yes	-34.2197	148.4387	632519	6212545
790	Yes	-34.2195	148.4386	632513	6212565
791	No	-34.2183	148.4383	632484	6212701
792	No	-34.2175	148.4379	632455	6212788
793	No	-34.2162	148.4380	632460	6212935
794	No	-34.2133	148.4373	632400	6213256
795	No	-34.2134	148.4375	632420	6213253
796	No	-34.2129	148.4374	632415	6213300
797	No	-34.2111	148.4372	632403	6213501
798	No	-34.2099	148.4379	632467	6213640
799	No	-34.2081	148.4382	632495	6213830
800	No	-34.2079	148.4383	632507	6213862
801	No	-34.1993	148.4462	633249	6214802
802	No	-34.1879	148.4513	633732	6216061
803	No	-34.1692	148.4562	634213	6218126

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
804	No	-34.1676	148.4585	634432	6211629
805	No	-34.1674	148.4598	634549	6218321
806	No	-34.1674	148.4602	634587	6218324
807	No	-34.1675	148.4614	634696	6218312
808	No	-34.1673	148.4622	634770	6218324
809	No	-34.1669	148.4657	635090	6218372
810	No	-34.1664	148.4677	635280	6218423
811	No	-34.1650	148.4704	635530	6218570
812	No	-34.1648	148.4706	635553	6218592
813	No	-34.1646	148.4712	635604	6218619
814	No	-34.1635	148.4720	635677	6218741
815	No	-34.1627	148.4727	635746	6218826
816	No	-34.1596	148.4751	635971	6219165
817	No	-34.1591	148.4754	636002	6219216
818	No	-34.1582	148.4761	636071	6219318
819	No	-34.1579	148.4766	636115	6219347
820	No	-34.1578	148.4765	636104	6219368
821	No	-34.1576	148.4766	636116	6219388
822	No	-34.1577	148.4766	636112	6219377
823	No	-34.1573	148.4771	636160	6219420
824	No	-34.1570	148.4773	636183	6219455
825	No	-34.1555	148.4784	636284	6219617
826	No	-34.1554	148.4785	636288	6219626
827	No	-34.1489	148.4821	636636	6220347
828	No	-34.1487	148.4822	636648	6220367
162	No	-34.1486	148.4826	636678	6220380
830	No	-34.1483	148.4825	636669	6220406
831	No	-34.1478	148.4828	636698	6220460
832	No	-34.1474	148.4830	636725	6220511
833	No	-34.1459	148.4841	636162	6220671
834	No	-34.1458	148.4843	636843	6220685

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
835	No	-34.1457	148.4844	636856	6220698
836	No	-34.1455	148.4846	636868	6220711
837	No	-34.1439	148.4872	637116	6220891
838	No	-34.1438	148.4874	637134	6220904
839	No	-34.1390	148.4919	637557	6221424
840	No	-34.1380	148.4928	637637	6221534
841	No	-34.1374	148.4933	637689	6221600
842	No	-34.1359	148.4946	637813	6221624
843	No	-34.1352	148.4953	637879	6221844
844	No	-34.1346	148.4959	637935	6221915
845	No	-34.1341	148.4964	637974	6221965
846	No	-34.1258	148.5010	638416	6222881
847	No	-34.1255	148.5011	638426	6222915
848	No	-34.1248	148.5013	638444	6222986
849	No	-34.1240	148.5015	638464	6223077
850	No	-34.1231	148.5018	638490	6223173
851	No	-34.1232	148.5017	638487	6223160
852	No	-34.1216	148.5019	638502	6223344
853	No	-34.1209	148.5020	638513	6223416
854	No	-34.1200	148.5016	638480	6223521
855	No	-34.1197	148.5018	638496	6223555
856	No	-34.1195	148.5015	638471	6223576
857	No	-34.1172	148.5011	638437	6223827
858	No	-34.1110	148.5004	638386	6224522
859	No	-34.1107	148.5005	638394	6224549
860	No	-34.1104	148.5008	638421	6224586
861	No	-34.1096	148.5011	638453	6224672
862	No	-34.1092	148.5010	638446	6224721
863	No	-34.1015	148.5047	638800	6225562
864	No	-34.1006	148.5052	638840	6225665
865	No	-34.0994	148.5055	638870	6225796

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
866	No	-34.0993	148.5055	638878	6225813
867	No	-34.0988	148.5060	638919	6225863
868	No	-34.0986	148.5059	638911	6225888
869	No	-34.0956	148.5074	639058	6226216
870	No	-34.0948	148.5078	639095	6226307
871	No	-34.0946	148.5077	639080	6226326
872	No	-34.0945	148.5077	639086	6226337
873	No	-34.0942	148.5082	639127	6226376
874	No	-34.0927	148.5089	639199	6226539
875	No	-34.0920	148.5100	639300	6226618
876	No	-34.0903	148.5114	639433	6226796
877	No	-34.0842	148.5177	640025	6227466
878	No	-34.0833	148.5196	640198	6227569
879	No	-34.0816	148.5228	640497	6227752
880	No	-34.0811	148.5235	640563	6227800
881	No	-34.0808	148.5242	640626	6227842
882	No	-34.0784	148.5275	640935	6228101
883	No	-34.0771	148.5278	640969	6228244
884	Yes	-34.0753	148.5288	641060	6228437
885	Yes	-34.0750	148.5289	641075	6228474
886	Yes	-34.0748	148.5293	641108	6228491
887	Yes	-34.0745	148.5295	641125	6228524
888	Yes	-34.0744	148.5295	641133	6228537
889	No	-34.0743	148.5296	641137	6228547
890	Yes	-34.0742	148.5296	641142	6228557
891	Yes	-34.0741	148.5297	641148	6228567
892	Yes	-34.0729	148.5305	641221	6228704
893	No	-34.0701	148.5320	641364	6229010
894	No	-34.0693	148.5329	641450	6229105
895	No	-34.0690	148.5330	641462	6229130
896	No	-34.0683	148.5335	641512	6229209

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
897	No	-34.0660	148.5351	641661	6229459
898	No	-34.0655	148.5356	641703	6229523
899	No	-34.0652	148.5357	641716	6229547
900	No	-34.0651	148.5358	641722	6229559
901	No	-34.0644	148.5363	641772	6229635
902	No	-34.0617	148.5381	641948	6229935
903	No	-34.0586	148.5403	642156	6230274
904	No	-34.0565	148.5418	642295	6230505
905	No	-34.0550	148.5429	642397	6230667
906	No	-34.0537	148.5438	642484	6230810
907	No	-34.0532	148.5442	642517	6230868
908	No	-34.0530	148.5441	642511	6230893
909	No	-34.0519	148.5451	642605	6231008
910	No	-34.0518	148.5450	642593	6231027
911	No	-34.0515	148.5451	642609	6231052
912	No	-34.0500	148.5465	642742	6231222
913	No	-34.0499	148.5466	642748	6231236
914	No	-34.0486	148.5473	642816	6231381
915	Yes	-34.0473	148.5482	642900	6231518
916	Yes	-34.0474	148.5481	642889	6231503
917	Yes	-34.0470	148.5484	642922	6231554
918	Yes	-34.0466	148.5487	642945	6231598
919	Yes	-34.0468	148.5488	642954	6231571
920	No	-34.0451	148.5497	643038	6231758
921	No	-34.0450	148.5500	643072	6231774
922	No	-34.0446	148.5503	643103	6231820
923	No	-34.0440	148.5504	643113	6231880
924	No	-34.0423	148.5519	643250	6232068
925	No	-34.0327	148.5577	643805	6233120
926	No	-34.0293	148.5600	644019	6233495
927	No	-34.0149	148.5700	644963	6235081

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
928	No	-34.0149	148.5702	644990	6235079
929	No	-34.0134	148.5709	645053	6235241
930	No	-34.0136	148.5710	645063	6235222
931	No	-34.0133	148.5712	645082	6235252
932	No	-34.0128	148.5713	645091	6235307
933	No	-34.0105	148.5728	645238	6235563
934	No	-34.0101	148.5731	645262	6235610
935	No	-34.0048	148.5754	645483	6236188
936	No	-34.0042	148.5755	645495	6236262
937	No	-34.0005	148.5764	645584	6236666
938	No	-34.0003	148.5767	645613	6236689
939	No	-34.0000	148.5766	645599	6236723
940	No	-34.0000	148.5768	645621	6236728
941	No	-33.9997	148.5767	645608	6236753
942	No	-33.9995	148.5767	645615	6236775
943	No	-33.9991	148.5771	645649	6236827
944	No	-33.9979	148.5775	645686	6236954
945	No	-33.9977	148.5773	645668	6236975
946	No	-33.9974	148.5774	645680	6237015
947	No	-33.9965	148.5777	645707	6237111
948	No	-33.9962	148.5778	645716	6237149
949	No	-33.9961	148.5780	645738	6237152
950	No	-33.9959	148.5781	645748	6237174
951	No	-33.9958	148.5779	645727	6237190
952	No	-33.9955	148.5782	645757	6237221
953	No	-33.9952	148.5784	645773	6237259
954	No	-33.9944	148.5783	645769	6237348
955	No	-33.9937	148.5785	645786	6237416
956	No	-33.9932	148.5789	645827	6237470
957	No	-33.9925	148.5788	645822	6237552
958	No	-33.9911	148.5795	645887	6237704

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
959	No	-33.9908	148.5793	645864	6237742
960	No	-33.9901	148.5798	645917	6237822
961	No	-33.9889	148.5800	645932	6237953
962	No	-33.9884	148.5804	645970	6238004
963	No	-33.9878	148.5805	645983	6238068
964	No	-33.9876	148.5803	645967	6238096
965	No	-33.9862	148.5810	646029	6238245
966	No	-33.9832	148.5819	646117	6238577
967	No	-33.9823	148.5818	646113	6238682
968	No	-33.9807	148.5823	646158	6238855
969	Yes	-33.9796	148.5828	646212	6238975
970	No	-33.9788	148.5831	646238	6239066
971	No	-33.9780	148.5830	646233	6239152
972	No	-33.9775	148.5834	646271	6239211
973	No	-33.9764	148.5836	646290	6239327
974	No	-33.9752	148.5838	646311	6239462
975	No	-33.9735	148.5842	646347	6239652
976	No	-33.9720	148.5846	646387	6239812
977	No	-33.9662	148.5861	646537	6240456
978	No	-33.9657	148.5866	646581	6240516
979	No	-33.9649	148.5868	646607	6240605
980	Yes	-33.9630	148.5874	646665	6240815
981	Yes	-33.9622	148.5876	646687	6240899
982	Yes	-33.9616	148.5878	646703	6240963
983	Yes	-33.9614	148.5876	646686	6240993
984	No	-33.9577	148.5890	646824	6241392
985	No	-33.9573	148.5889	646810	6241442
986	No	-33.9563	148.5894	646864	6241550
987	No	-33.9541	148.5902	646935	6241793
988	No	-33.9540	148.5902	646941	6241807
989	No	-33.9530	148.5905	646968	6241918

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
990	No	-33.9499	148.5916	647070	6242258
991	No	-33.9495	148.5920	647110	6242301
992	No	-33.9493	148.5921	647120	6242320
993	No	-33.9488	148.5924	647146	6242377
994	No	-33.9479	148.5926	647168	6242481
995	No	-33.9477	148.5926	647174	6242496
996	No	-33.9474	148.5928	647190	6242530
997	No	-33.9469	148.5930	647207	6242586
998	Yes	-33.9435	148.5943	647335	6242967
999	No	-33.9408	148.5950	647406	6243261
1000	No	-33.9392	148.5952	647428	6243441
1001	No	-33.9388	148.5950	647410	6243484
1002	No	-33.9343	148.5961	647512	6243977
1003	No	-33.9326	148.5967	647577	6244167
1004	No	-33.9324	148.5968	647588	6244193
1005	No	-33.9323	148.5969	647592	6244202
1006	No	-33.9314	148.5973	647635	6244296
1007	No	-33.9311	148.5975	647656	6244339
1008	No	-33.9310	148.5976	647661	6244350
1009	No	-33.9304	148.5979	647692	6244415
1010	No	-33.9247	148.6008	647965	6245044
1011	No	-33.9235	148.6017	648049	6245170
1012	No	-33.9225	148.6022	648102	6245284
1013	No	-33.9214	148.6026	648138	6245405
1014	No	-33.9208	148.6029	648169	6245471
1015	No	-33.9209	148.6031	648188	6245456
1016	No	-33.9204	148.6031	648185	6245508
1017	No	-33.9193	148.6040	648269	6245638
1018	No	-33.9193	148.6037	648245	6245631
1019	No	-33.9189	148.6039	648265	6245681
1020	No	-33.9182	148.6044	648312	6245757

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
1021	No	-33.9179	148.6044	648317	6245784
1022	No	-33.9170	148.6044	648317	6245885
1023	No	-33.9162	148.6048	648350	6245977
1024	No	-33.9158	148.6049	648359	6246017
1025	No	-33.9154	148.6049	648364	6246061
1026	No	-33.9154	148.6047	648345	6246064
1027	No	-33.9147	148.6051	648387	6246145
1028	No	-33.9148	148.6051	648380	6246126
1029	No	-33.9143	148.6049	648365	6246182
1030	No	-33.9141	148.6052	648390	6246204
1031	No	-33.9140	148.6052	648394	6246217
1032	No	-33.9137	148.6052	648398	6246257
1033	No	-33.9139	148.6052	648398	6246233
1034	No	-33.9131	148.6053	648405	6246315
1035	No	-33.9131	148.6053	648407	6246324
1036	No	-33.9127	148.6054	648417	6246363
1037	No	-33.9124	148.6055	648424	6246392
1038	No	-33.9091	148.6073	648595	6246756
1039	No	-33.9090	148.6074	648609	6246768
1040	No	-33.9088	148.6076	648628	6246794
1041	No	-33.9086	148.6079	648649	6246815
1042	No	-33.9075	148.6093	648783	6246937
1043	No	-33.9072	148.6092	648772	6246962
1044	No	-33.9070	148.6099	648839	6246988
1045	No	-33.9070	148.6100	648849	6246993
1046	No	-33.9067	148.6100	648846	6247021
1047	No	-33.9066	148.6102	648867	6247034
1048	No	-33.9065	148.6107	648914	6247045
1049	No	-33.9052	148.6126	649095	6247186
1050	No	-33.9051	148.6127	649100	6247191
1051	No	-33.9047	148.6129	649123	6247236

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
1052	No	-33.9049	148.6131	649136	6247220
1053	No	-33.9048	148.6133	649158	6247232
1054	No	-33.9035	148.6152	649338	6247374
1055	No	-33.9028	148.6157	649384	6247446
1056	No	-33.9027	148.6159	649405	6247462
1057	No	-33.9025	148.6161	649422	6247474
1058	No	-33.9023	148.6165	649459	6247501
1059	No	-33.9024	148.6167	649474	6247484
1060	No	-33.9021	148.6168	649483	6247519
1061	No	-33.9019	148.6175	649550	6247546
1062	No	-33.9018	148.6162	649564	6247557
1063	No	-33.9013	148.6179	649589	6247609
1064	No	-33.9008	148.6187	649663	6247663
1065	No	-33.9008	148.6191	649698	6247662
1066	No	-33.9007	148.6192	649707	6247669
1067	No	-33.9000	148.6203	649816	6247754
1068	No	-33.8995	148.6210	649882	6247807
1069	No	-33.8989	148.6220	649971	6247871
1070	No	-33.8987	148.6222	649996	6247894
1071	No	-33.8986	148.6224	650009	6247906
1072	No	-33.8976	148.6238	650140	6248012
1073	No	-33.8973	148.6241	650168	6248039
1074	No	-33.8968	148.6245	650204	6248100
1075	No	-33.8969	148.6246	650220	6248090
1076	No	-33.8962	148.6251	650262	6248165
1077	No	-33.8962	148.6254	650292	6248163
1078	No	-33.8957	148.6257	650319	6248221
1079	No	-33.8956	148.6258	650326	6248234
1080	No	-33.8953	148.6264	650382	6248259
1081	No	-33.8949	148.6265	650394	6248311
1082	No	-33.8945	148.6273	650469	6248349

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
1083	No	-33.8938	148.6281	650547	6248428
1084	No	-33.8937	148.6283	650565	6248442
1085	No	-33.8926	148.6291	650638	6248555
1086	No	-33.8927	148.6294	650667	6248547
1087	No	-33.8919	148.6303	650755	6248636
1088	No	-33.8908	148.6315	650864	6248749
1089	No	-33.8903	148.6317	650881	6248805
1090	No	-33.8902	148.6321	650926	6248815
1091	No	-33.8896	148.6326	650968	6248887
1092	No	-33.8893	148.6332	651023	6248912
1093	No	-33.8891	148.6335	651051	6248936
1094	No	-33.8883	148.6345	651149	6249027
1095	No	-33.8880	148.6346	651154	6249061
1096	No	-33.8877	148.6349	651181	6249088
1097	No	-33.8878	148.6351	651204	6249079
1098	No	-33.8874	148.6356	651251	6249123
1099	No	-33.8871	148.6356	651251	6249158
1100	No	-33.8868	148.6361	651294	6249188
1101	No	-33.8866	148.6368	651360	6249215
1102	No	-33.8865	148.6369	651372	6249222
1103	No	-33.8863	148.6374	651420	6249243
1104	No	-33.8862	148.6376	651441	6249259
1105	No	-33.8861	148.6378	651458	6249264
1106	No	-33.8859	148.6377	651447	6249290
1107	No	-33.8855	148.6384	651518	6249327
1108	No	-33.8856	148.6383	651508	6249326
1109	No	-33.8853	148.6387	651544	6249349
1110	No	-33.8855	148.6390	651565	6249330
1111	No	-33.8842	148.6406	651719	6249476
1112	No	-33.8837	148.6408	651735	6249526
1113	No	-33.8824	148.6424	651885	6249671

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
1114	No	-33.8813	148.6436	652006	6249793
1115	No	-33.8810	148.6444	652073	6249826
1116	No	-33.8809	148.6444	652079	6249833
1117	No	-33.8806	148.6448	652112	6249868
1118	No	-33.8803	148.6449	652123	6249901
1119	No	-33.8801	148.6451	652143	6249923
1120	No	-33.8802	148.6453	652161	6249909
1121	No	-33.8799	148.6453	652165	6249945
1122	No	-33.8786	148.6468	652306	6250085
1123	No	-33.8781	148.6477	652388	6250139
1124	No	-33.8765	148.6491	652516	6250313
1125	No	-33.8764	148.6491	652520	6250325
1126	No	-33.8756	148.6497	652579	6250413
1127	No	-33.8748	148.6503	652633	6250495
1128	No	-33.8747	148.6504	652642	6250510
1129	No	-33.8746	148.6505	652650	6250523
1130	No	-33.8742	148.6504	652647	6250562
1131	No	-33.8738	148.6508	652677	6250611
1132	No	-33.8737	148.6511	652710	6250619
1133	No	-33.8734	148.6514	652736	6250659
1134	No	-33.8726	148.6520	652790	6250746
1135	No	-33.8725	148.6520	652795	6250755
1136	No	-33.8724	148.6521	652808	6250769
1137	No	-33.8720	148.6520	652791	6250810
1138	No	-33.8721	148.6523	652820	6250796
1139	No	-33.8720	148.6523	652821	6250804
1140	No	-33.8714	148.6524	652836	6250879
1141	No	-33.8709	148.6530	652891	6250930
1142	No	-33.8706	148.6532	652906	6250959
1143	No	-33.8704	148.6530	652891	6250990
1144	No	-33.8702	148.6531	652898	6251003

HBT ID	Impacted	Latitude	Longitude	Easting	Northing
1145	No	-33.8700	148.6535	652938	6251027
1146	No	-33.8698	148.6533	652922	6251049
1147	No	-33.8697	148.6534	652925	6251064
1148	No	-33.8697	148.6537	652953	6251060
1149	No	-33.8689	148.6540	652987	6251150
1150	No	-33.8678	148.6545	653036	6251267
1151	No	-33.8607	148.6571	653291	6252053
1152	No	-33.8603	148.6574	653317	6252095
1153	No	-33.8594	148.6582	653395	6252196
1154	No	-33.8592	148.6584	653412	6252222
1155	No	-33.8565	148.6600	653567	6252512
1156	No	-33.8563	148.6602	653581	6252538
1157	No	-33.8559	148.6605	653608	6252580
1158	No	-33.8558	148.6606	653617	6252597
1159	No	-33.8555	148.6605	653607	6252622
1160	No	-33.8553	148.6608	653641	6252647
1161	No	-33.8546	148.6613	653684	6252721
1162	No	-33.8544	148.6611	653668	6252748
1163	No	-33.8534	148.6622	653770	6252856
1164	No	-33.8523	148.6631	653860	6252974
1165	No	-33.8521	148.6630	653850	6253003
1166	No	-33.8522	148.6629	653834	6252986
1167	No	-33.8514	148.6642	653959	6253077
1168	No	-33.8490	148.6666	654184	6253336

