Department of Transport and Main Roads

Bruce Highway (Cooroy to Curra) Section D - Commonwealth Offset Delivery

Baseline Assessment Report - 2020

July 2021

Acknowledgments

GHD would like to acknowledge Red Ash Consulting (Peter Moonie) who holds technical authority for botany, weed identification and treatment. Peter undertook the baseline survey along with GHD's nominated Suitably Qualified Personnel and also assisted in the preparation of this Baseline Assessment Report.

Executive summary

Introduction

The Department of Transport and Main Roads (TMR) has received conditions of approval (EPBC 2017/7941) from the Commonwealth Department of Agriculture, Water and the Environment (DAWE) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the Bruce Highway Project: Cooroy to Curra Section D (Woondum to Curra) project ('the project').

A number of the conditions of approval relate to the delivery of specific offset requirements for ecological values. As a result, an Offset Management Plan (OMP) was prepared to guide the delivery and compliance of offset requirements specified in the approval conditions issued by DAWE for the project. The OMP is specific to the following matters of National environmental significance (MNES):

- Koala (*Phascolarctos cinereus*) – vulnerable under the EPBC Act and the Queensland *Nature Conservation Act 1992* (NC Act)
- Black-breasted button-quail (*Turnix melanogaster*) – vulnerable under the EPBC Act and the NC Act

This Baseline Assessment Report has been prepared in order to comply with Condition 11 while presenting results of surveys detailed in Condition 10 of the EPBC 2017/7941 approval requirements. This report will be provided to DAWE as part of Annual Compliance Reporting for 2020-21.

Offset areas

Offset areas occur within a total of 13 land parcels which have been legally secured in order to deliver the offset obligations for the project for the koala and/or black-breasted button-quail. To enable an efficient and effective field program for the baseline assessment, the offset areas have been divided into three separate groups; northern, central and southern based on their geographical locations.

Methods

Baseline field surveys were undertaken by two suitably qualified ecologists (Peter Moonie and Simon Hodgkison) over three survey events in September, October and November 2020. Surveys were undertaken in each offset area to document the following in accordance with Condition 10 of the EPBC Act approval:

- The quality of habitat for the koala and black-breasted button-quail
- Weed infestation
- Koala density
- Black-breasted button-quail presence

Within each AU and offset area in general, opportunistic observations were also made of general features that have potential implications for management of habitat for the koala and black-breasted button-quail.

Results

BioCondition plots and fauna species habitat index assessments were undertaken at the BioCondition sites for koala and for black-breasted button-quail, with results for each species provided in the Modified QLD Habitat Quality spreadsheet.

Habitat quality of the koala offset areas during the baseline survey event was scored as 6.07, and the habitat quality of the black-breasted button quail offset areas was scored as 6.92.

Koala presence surveys were recorded through both drone thermal imaging surveys and faecal pellet searches. It is estimated that approximately 14 individual koalas were detected within or immediately adjacent to the offset areas (within 500 m). However, two individuals were euthanised due to severe health conditions resulting in a total of 11 individual koalas recorded within or immediately adjacent to the offset areas. Koala densities at the north and central offset areas are consistent with low koala density populations, defined as < 0.1 koala/ha in Melzer et al (2000). While the southern offset area grouping was identified as a hotspot, with a total of 7 individual koalas detected, at a density of approximately 0.155 koalas/ha. This result is consistent with mid-level koala densities, with koala densities of >0.1 – 3 koalas/ha recorded in parts of southeast Queensland (Melzer et al 2000).

The black-breasted button-quail was confirmed present from four locations within the offset area through remote surveillance cameras, faecal traces and observations of feeding platelets.

A number of target weed species (16) were observed across the offset areas. Some species only had one occurrence recorded, while others, such as lantana and corky passion flower were recorded as abundant and widespread across the offset areas.

Management recommendations

In order to achieve the ecological outcomes as specified in Section 4.5.1 of the OMP, management of each offset area is required. This report has documented the baseline (current) status of the offset areas to provide a suitable offset and achieve ecological outcomes for the koala and black-breasted button-quail. The offset areas will be actively managed over the life of the EPBC Act approval conditions (until performance indicators and completion criteria have been met) to demonstrate achievement of the ecological outcomes through the following key management measures:

- Targeted and staged weed control
- Pest animal management
- Strategic replanting with koala food trees or replacement vine species that provide cover for the black-breasted button-quail
- Natural recruitment/regeneration of native vegetation
- Management of public access, grazing and fencing
- Management of fire risk
- Management of disease
- Waste removal
- Erosion and sediment control.

Abbreviations

Acronym	Abbreviation of
AUs	Assessment units
BBBQ	Black-breasted button-quail
DAF	Department of Agriculture and Fisheries
DAWE	Department of Agriculture, Water and the Environment
DES	Department of Environment and Science
DoE	Department of the Environment
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
GIS	Geographical Information Systems
GPS	Global Positioning System
GRC	Gympie Regional Council
KoRV	Koala Retrovirus
MNES	Matters of National Environmental Significance
NC Act	*Nature Conservation Act 1992*
OA	Offset Area
OMP	Offset Management Plan
RE	Regional ecosystem
SAT	Spot Assessment Technique
SQP	Suitably qualified person
TMR	Department of Transport and Main Roads
USC	University of the Sunshine Coast

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Figure index

Appendices

1. Introduction

The Department of Transport and Main Roads (TMR) has received conditions of approval (EPBC 2017/7941) from the former Commonwealth Department of Agriculture, Water and the Environment (DAWE) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the Bruce Highway Project: Cooroy to Curra Section D (Woondum to Curra) project ('the project'). The conditions were received on 24 September 2019, with a variation approved on 20 April 2020.

A number of the conditions of approval relate to the delivery of specific offset requirements for ecological values. As a result, an Offset Management Plan (OMP) was prepared to guide the delivery and compliance of offset requirements specified in the approval conditions issued by DAWE for the project. The OMP is specific to the following matters of National environmental significance (MNES):

- Koala (*Phascolarctos cinereus*) - vulnerable under the EPBC Act and the Queensland *Nature Conservation Act 1992* (NC Act).
- Black-breasted button-quail (*Turnix melanogaster*) – vulnerable under the EPBC Act and the NC Act.

Condition 10 and 11 are specific to the baseline survey and reporting of baseline survey results of each offset area. The details of Condition 10 and 11 and sections within this report where the conditions have been addressed are included in Table 1-1.

Table 1-1 Relevant EPBC 2017/7941 conditions

Condition No.	Condition	Section of report
Condition 10	*Within 6 months of legally securing the Koala offset areas and Black-breasted Button-quail offset area, the approval holder must complete baseline surveys of the entire Koala offset areas and Black-breasted Button-quail offset area. The baseline surveys must be conducted by a suitably qualified person in accordance with the most recently published version of the Department's survey guidelines and include details of:* a. *The quality of black-breasted button-quail habitat and koala habitat;* b. *Weed infestation;* c. *Koala density and black-breasted button-quail presence; and* d. *Pest abundance.*	Section 1.3 and Section 3.
Condition 11	*Within 1 year of legally securing the koala offset areas and black-breasted button-quail offset area, the approval holder must publish on the website and provide to DAWE a report detailing:*	Section 4, Section 5

Condition No.	Condition	Section of report
	• *The results of the baseline surveys required under Condition 10;* • *Management measures, prepared by a suitably qualified person and subsequently reviewed by an independent suitably qualified person, (including timing, frequency and longevity) that will be implemented to deliver the outcomes required by condition 12, including:* – *Performance and completion criteria for evaluating the success of the management measures and criteria for triggering remedial action (if necessary);* – *A program, including timelines, to monitor (capable of timely detection of triggers for corrective action) and report on the effectiveness of the management measures, and progress against the performance and completion criteria;* – *Remediation measures to be implemented where monitoring of the performance criteria indicate failure to achieve the outcomes of condition 12; and* – *A description of potential risks to the successful implementation of the management measures and a description of the control measures that would be implemented to mitigate against these risks and residual risk ratings.*	

1.1 Purpose of this report

This Baseline Assessment Report has been prepared in order to comply with Condition 11 while presenting results of surveys detailed in Condition 10 of the EPBC 2017/7941 approval requirements. This report will be provided to DAWE as part of Annual Compliance Reporting for 2020-21.

1.2 Scope and limitations

This report has been prepared by GHD for TMR and may only be used and relied on by TMR for the purpose agreed between GHD and the TMR as set out in Section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than TMR arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of vegetation, weeds or fauna. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

1.3 Suitably qualified personnel

Condition 10 of the EPBC 2017/7941 approval requirements requires the baseline surveys to be conducted by a suitably qualified person (SQP) in accordance with the following Commonwealth survey guidelines:

- Survey guidelines for Australia's threatened birds (DAWE 2017)
- Survey Guidelines for Australia's threatened mammals (DAWE, 2011)

Further information on the guidelines used to inform the methodology is detailed in Section 3.2.

Within the definitions of EPBC 2017/7941, a suitably qualified person for this project is defined as:

- A person who has professional qualifications, training, skills and at least three years of relevant experience specific to locating, identifying and conserving the black-breasted button-quail. The SQP must be able to give authoritative independent assessment, advice and analysis specific to the black-breasted button-quail using the relevant protocols, standards, methods and/or literature. Where the person does not have the appropriate professional qualifications, they must have at least five years of relevant experience specific to the black-breasted button-quail.
- A person who has professional qualifications, training, skills and at least three years of relevant experience specific to locating, identifying and conserving the koala. The SQP must be able to give authoritative independent assessment, advice and analysis specific to the koala using the relevant protocols, standards, methods and/or literature. Where the person does not have the appropriate professional qualifications, they must have at least five years of relevant experience specific to the koala**.**

In order to comply with Condition 10, Dr Simon Hodgkison designed, lead and provided technical input into this report. Dr Simon Hodgkinson's' qualifications and skills are presented below:

Dr Simon Hodgkison **SQP Senior Fauna Ecologist**

Simon is a fauna ecologist with more than 18 years' experience in ecological research and baseline ecological and impact assessment. Areas of special expertise include the survey and monitoring of birds, reptiles, mammals and frogs. Simon has a wealth of local fauna survey experience, having been the lead fauna ecologist for various targeted surveys, impact assessment, management and monitoring programs for the koala and black-breasted button-quail He has lead ecology teams for GHD projects across the Sunshine Coast, and TMR linear infrastructure projects.Simon has considerable experience in the design and monitoring of fauna crossing infrastructure on projects including the Cooroy to Curra Sections A, C and D, Darra to Springfield Transport Corridor, Mt Cotton Road Upgrade, Logan Enhancement Project and Yarrabilba Ecological Corridors Project.

2. Overview of offset areas

2.1 Offset areas summary

Offset areas occur within a total of 13 land parcels which have been legally secured in order to deliver the offset obligations for the project for the koala and/or black-breasted button-quail. Details of the property descriptions, ownership and areas for each of the MNES offset values are summarised in Table 2-1.

To enable an efficient and effective field program for the baseline assessment, the offset areas have been divided into three separate groups; northern, central and southern based on the geographical locations (Table 2-1).

The koala and black-breasted button-quail offset areas are described in Table 2-1 and shown in Figure 2-1 and Figure 2-2, respectively. Individual assessment units (AU's) are detailed for each offset area.

Table 2-1 Summary of offset areas

Group	AUs	Offset area name	Lot on plan* Address*	Owner	Tenure	Offset area (ha)	Total area secured (ha)	Total lot area (ha)*
Koala								
South	S2, S4, S6	K-OA1	Lot 2 SP302526 93 Woondum Rd, Kybong	TMR	Freehold	**11.43**	15.20	40.71
South	S2, S3, S4, S5, S6	K-OA2	Lot 3 SP302524 95 Woondum Rd, Kybong	TMR	Freehold	**21.37**	28.25	34.59
South	S1, S2, S7	K-OA3	Lot 102 SP297908 Cnr Keefton Rd and Bruce Highway	TMR	Freehold	**12.38**	12.65	13.77
North	N3	K-OA4	Lot 4 MPH23906 139 Brunjes Rd, Curra	TMR	Freehold	**3.46**	3.46	15.67
North	N1, N2, N3, N4, N5, N6	K-OA5	Lot 1 MPH23906 1434 Harvey Siding Rd, Curra	TMR	Freehold	**9.96**	27.69	32.32

Group	AUs	Offset area name	Lot on plan* Address*	Owner	Tenure	Offset area (ha)	Total area secured (ha)	Total lot area (ha)*
North	N1, N2, N7, N9	K-OA6	Lot 3 MPH23906 1434 Harvey Siding Rd, Curra	TMR	Freehold	**19.53**	22.97	22.99
North	N2, N3, N4, N5, N6, N7	K-OA7	Lot 878 MCH1061 62 Raspberry Lane, Curra	TMR	Freehold	**124.56**	144.56	198.09
North	N2, N4, N5, N8	K-OA8	Lot 889 CP864404 69 Booths Rd, Curra	TMR	Freehold	**33.09**	40.79	97.12
Central	C1, C2	K-OA9	Lot 1 MPH23904 Banks Pocket Rd, Araluen	GRC	Freehold	**5.86**	5.86	6.09
Central	C1, C2	K-OA10	Lot 1 MPH5670 Banks Pocket Rd, Araluen	GRC	Freehold	**2.02**	2.02	2.02
Central	C1	K-OA11	Lot 2 MPH14193 Banks Pocket Rd, Araluen	GRC	Freehold	**7.27**	7.27	7.32
Central	C1	K-OA12	Lot 763 MCH5342 Banks Pocket Rd, Araluen	GRC	Freehold	**3.58**	3.58	3.58
Central	C1, C2	K-OA13	Lot 19 SP299683 15 Belvedere Rd, Veteran	GRC	Freehold	**26.09**	26.87	33.66
					Koala offset area subtotals	**280.60**	341.17	507.93
TOTAL KOALA OFFSET AREA = Approx. 280.61 ha								
Black-breasted button-quail								
South	S2, S4, S6	BBBQ-OA1	Lot 2 SP302526	TMR	Freehold	**13.63**	15.20	40.71

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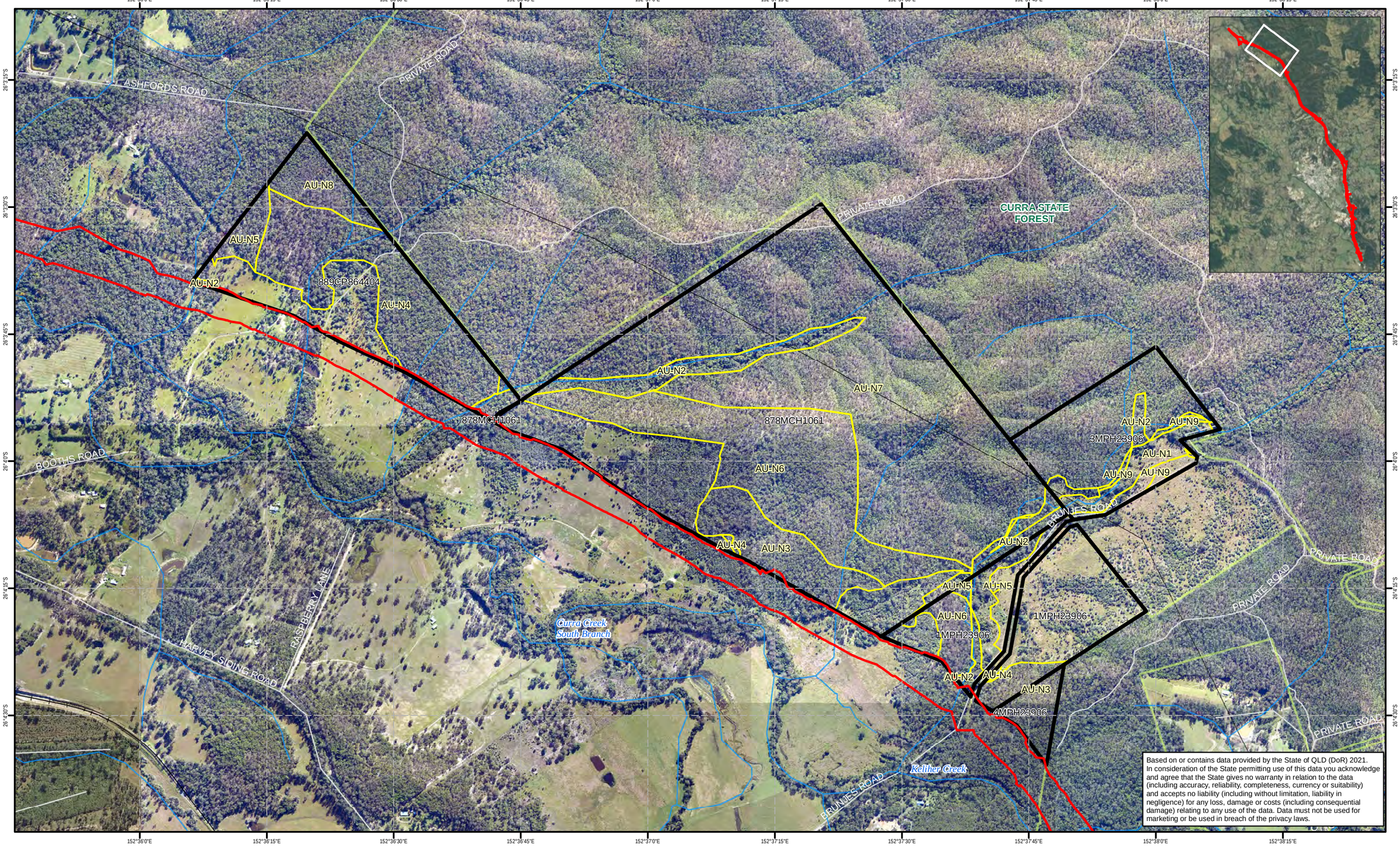
Group	AUs	Offset area name	Lot on plan* Address*	Owner	Tenure	Offset area (ha)	Total area secured (ha)	Total lot area (ha)*
			93 Woondum Rd, Kybong					
South	S4, S6	BBBQ-OA2	Lot 3 SP302524 95 Woondum Rd, Kybong	TMR	Freehold	**7.83**	28.25	34.59
South	S1, S2	BBBQ-OA3	Lot 102 SP297908 Cnr Keefton Rd and Bruce Highway, Kybong	TMR	Freehold	**11.22**	12.65	13.77
Black-breasted button-quail offset area subtotals						**32.68**	56.10	89.07
TOTAL BLACK-BREASTED BUTTON-QUAIL OFFSET AREA = Approx. 32.68 ha								

* Several addresses may change due to the intersection of the land parcel by the future road corridor; future resumptions may require new lot on plan numbers to be applied to these land parcels and total lot areas may change



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LEGEND

- Watercourses
- Railway
- Road/Track
- Project Footprint
- State Forest
- Offset Areas
- Koala Assessment Units

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woondum to Curra)

Koala Offset Areas Northern Group

Job Number 12534030
Revision A
Date 08 Apr 2021

Figure 2-1
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Data source: DoR: Watercourse (2010), Rail (2014), Roads (2016), Towns (2015); TMR: Imagery (2016-2019), Survey Area, Chainage, Areas Assessed (2021). GHD: Project Footprint (2020), Survey Site (2021), Offset Site (2021). Created by:ihamilton

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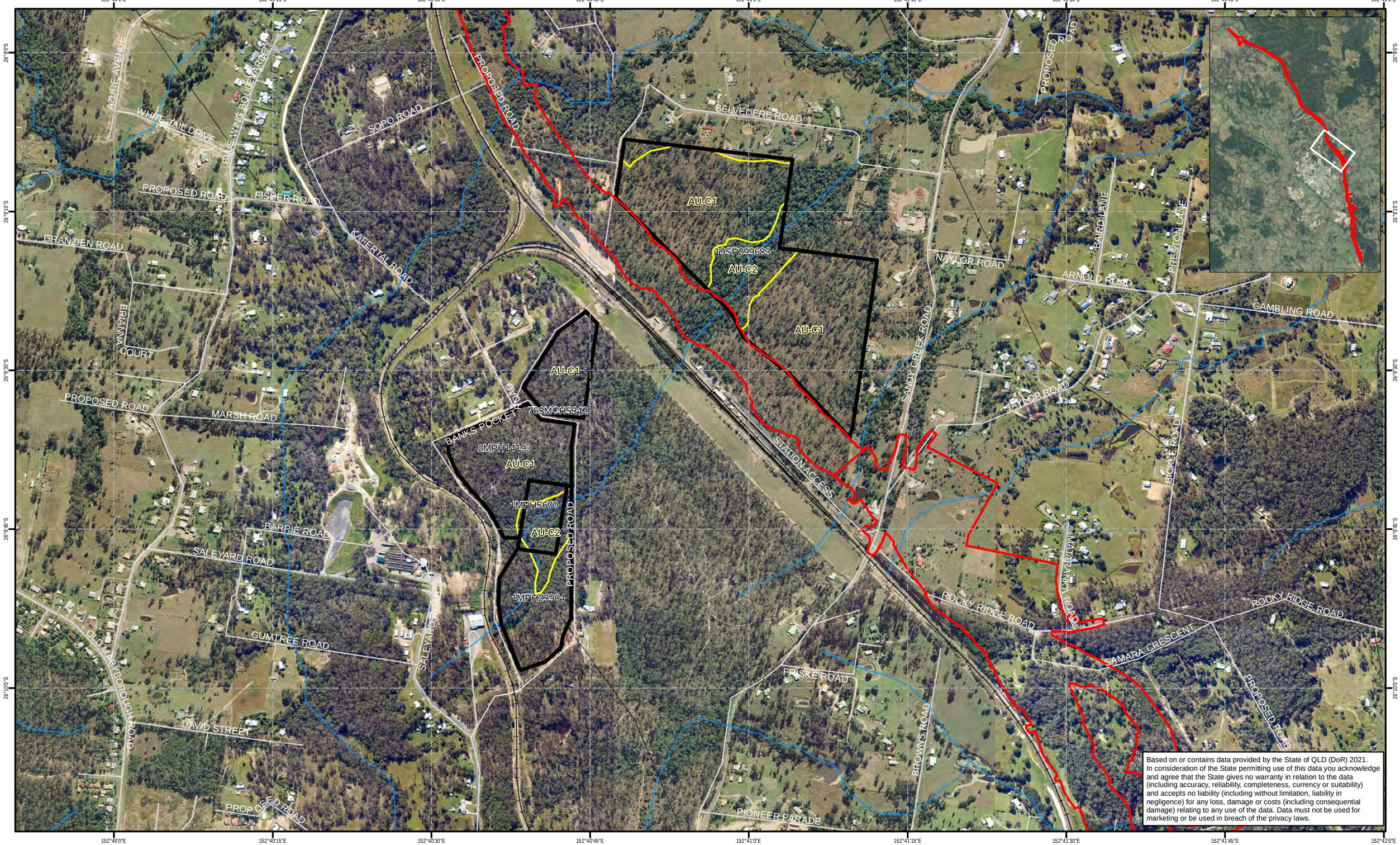

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LEGEND

- Watercourses
- Railway
- Road/Track
- Project Footprint
- State Forest
- Offset Areas
- Koala Assessment Units

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woondum to Curra)

Koala Offset Areas Central Group

Job Number 12534030
Revision A
Date 08 Apr 2021

Figure 2-1
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Data source: DoR: Watercourse (2010), Rail (2014), Roads (2016), Towns (2015); TMR: Imagery (2016-2019), Survey Area, Chainage, Areas Assessed (2021). GHD: Project Footprint (2020), Survey Site (2021), Offset Site (2021). Created by:ihamilton

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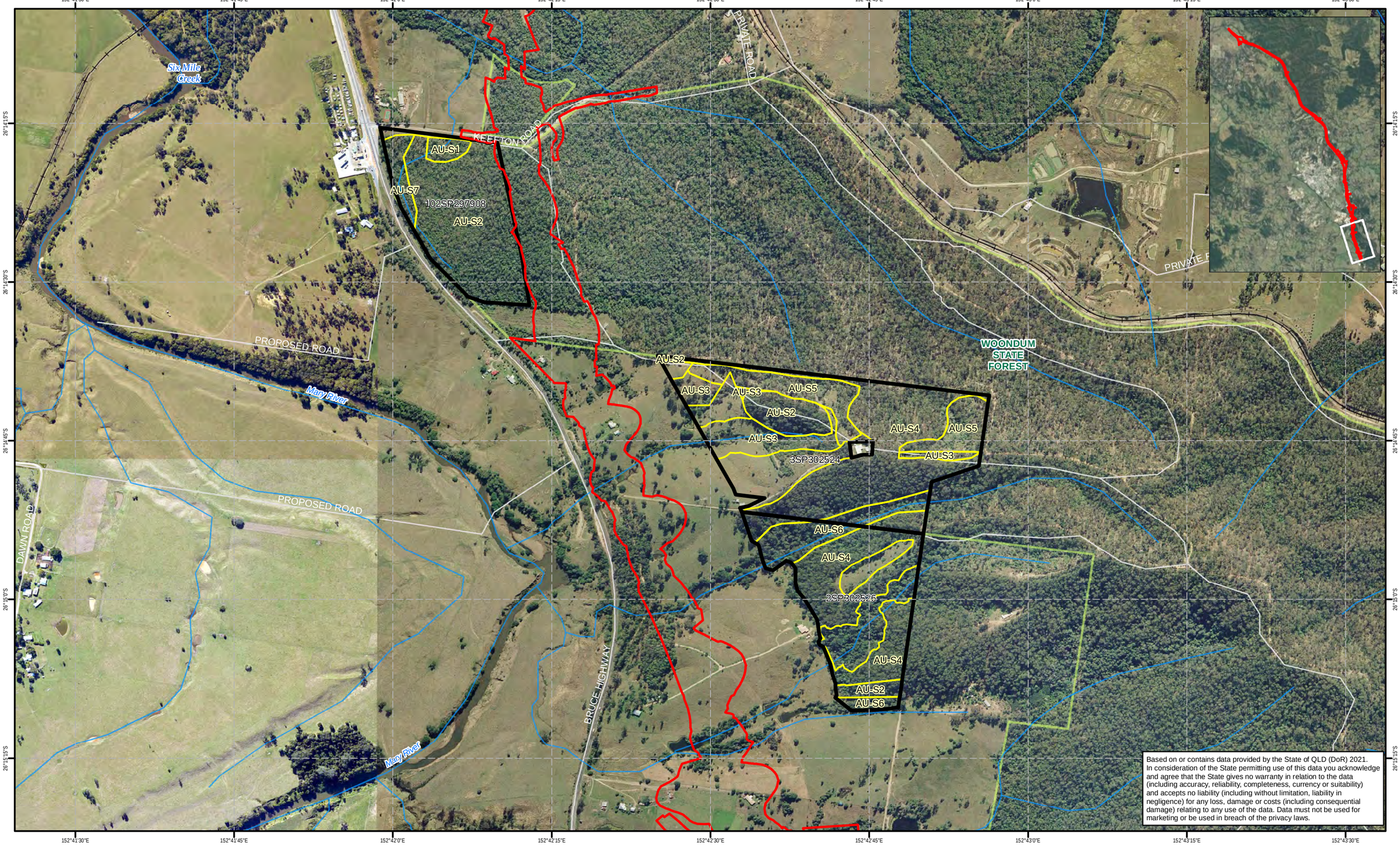

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- Road/Track
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- Offset Areas
- Koala Assessment Units

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
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Koala Offset Areas Southern Group

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Figure 2-1
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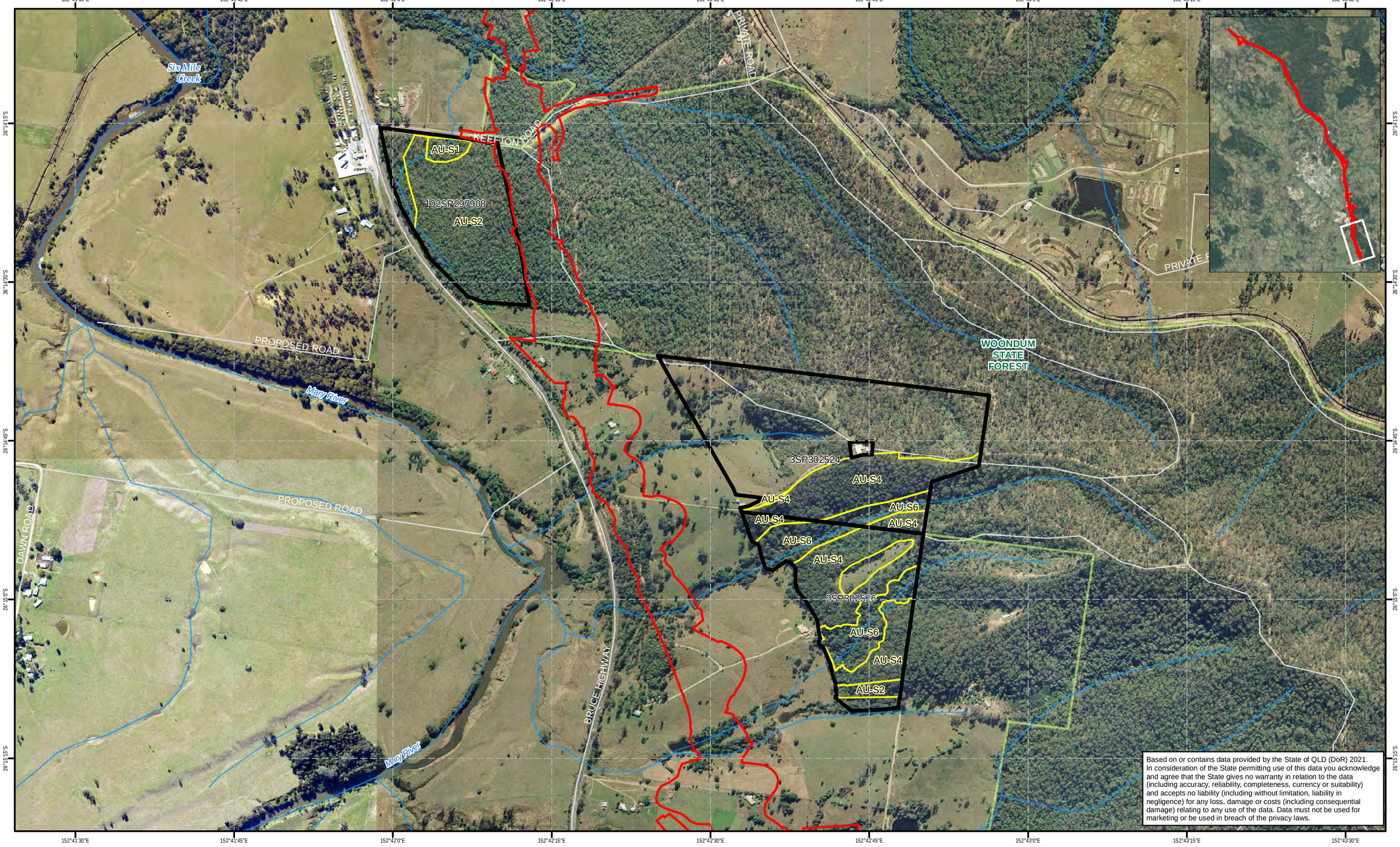

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LEGEND

- Watercourses
- Railway
- Road/Track
- Project Footprint
- State Forest
- Offset Areas
- BBBQ Assessment Units

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woondum to Curra)

Job Number	12534030
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Black-breasted button quail offset areas Southern Group

Figure 2-2

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Data source: DoR: Watercourse (2010), Rail (2014), Roads (2016), Towns (2015); TMR: Imagery (2016-2019), Survey Area, Chainage, Areas Assessed (2021). GHD: Project Footprint (2020), Survey Site (2021), Offset Site (2021). Created by:ihamilton

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3. Baseline survey methods

3.1 Baseline field surveys

Baseline field surveys were undertaken by two ecologists (Peter Moonie and Simon Hodgkison) over three survey events in September, October and November 2020. Surveys were undertaken in each offset area to document the following in accordance with Condition 10 of the EPBC Act approval:

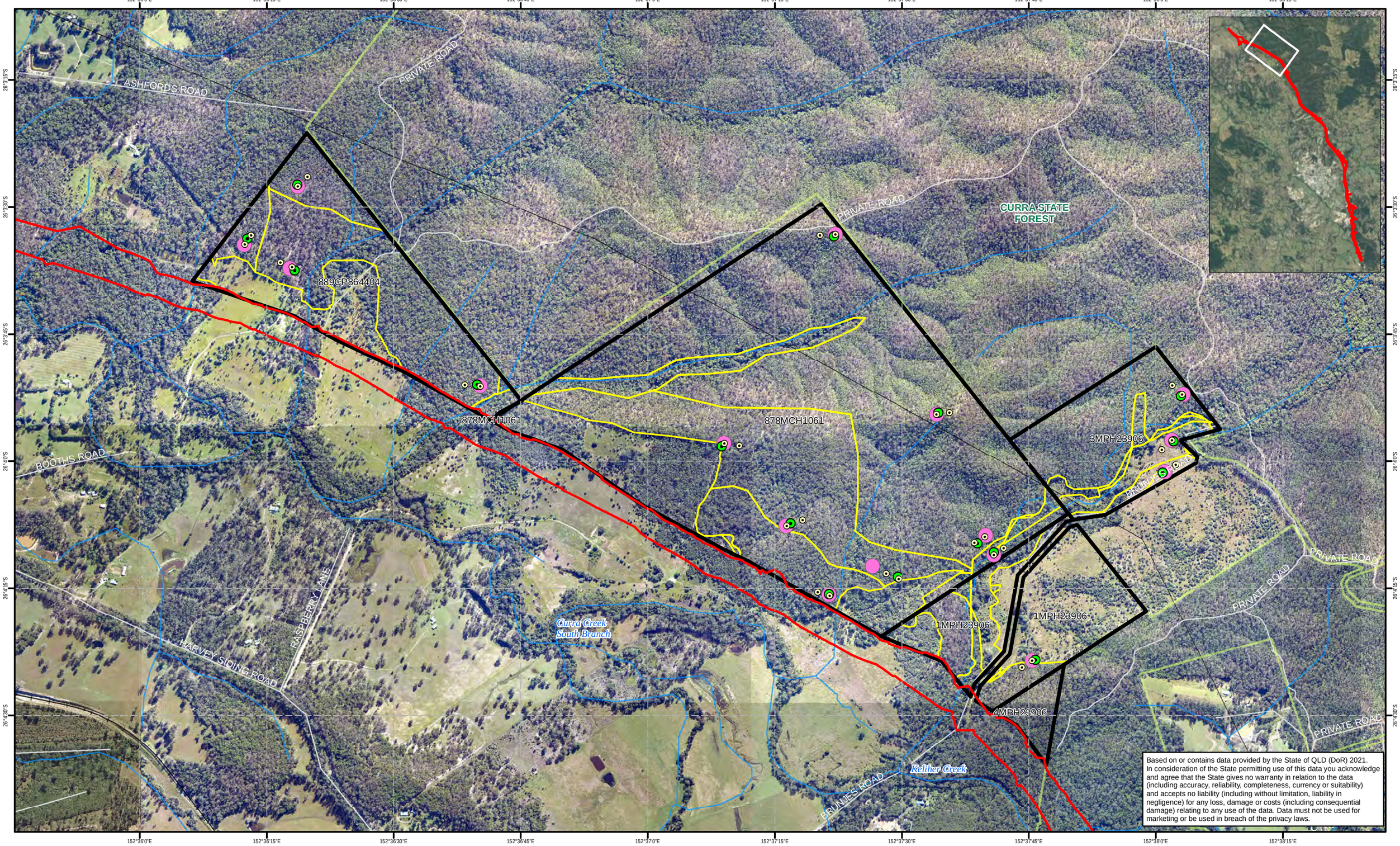
- The quality of habitat for the koala and black-breasted button-quail
- Weed infestation
- Koala density
- Black-breasted button-quail presence.

Further details on the requirements of each assessment category are provided throughout the following sections. The surveys undertaken in each survey event are detailed in Table 3-1.

The survey sites for koala are shown in Figure 3-1 and the survey sites for black-breasted button-quail are shown in Figure 3-2.

Table 3-1 Baseline field survey timing

Survey date	Activities undertaken
14 – 15 September 2020	Pre-survey Selecting BioCondition / Habitat quality assessment sites Setting remote surveillance cameras Targeted searches for black-breasted button-quail (4 person hours - 2 people x 2 hrs x 1 day)
5 – 11 October 2020	BioCondition / Habitat quality surveys Habitat surveys for koala and black-breasted button-quail Targeted searches for koala pellets and black-breasted button-quail (8 person hours – 2 people x 2 hours x 2 days)
18 – 19 November 2020	BioCondition / Habitat quality surveys Collecting remote surveillance cameras Targeted searches for black-breasted button-quail (4 person hours - 2 people x 2 hrs x 1 day)



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LEGEND

- Bio-condition Survey Point
- Transect Waypoint
- Kola Survey Site
- Watercourses
- Railway
- Road/Track
- Project Footprint
- State Forest
- Offset Lots
- Koala Assessment Units

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woondum to Curra)

Koala survey sites Northern Group

Job Number	12534030
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Figure 3-1
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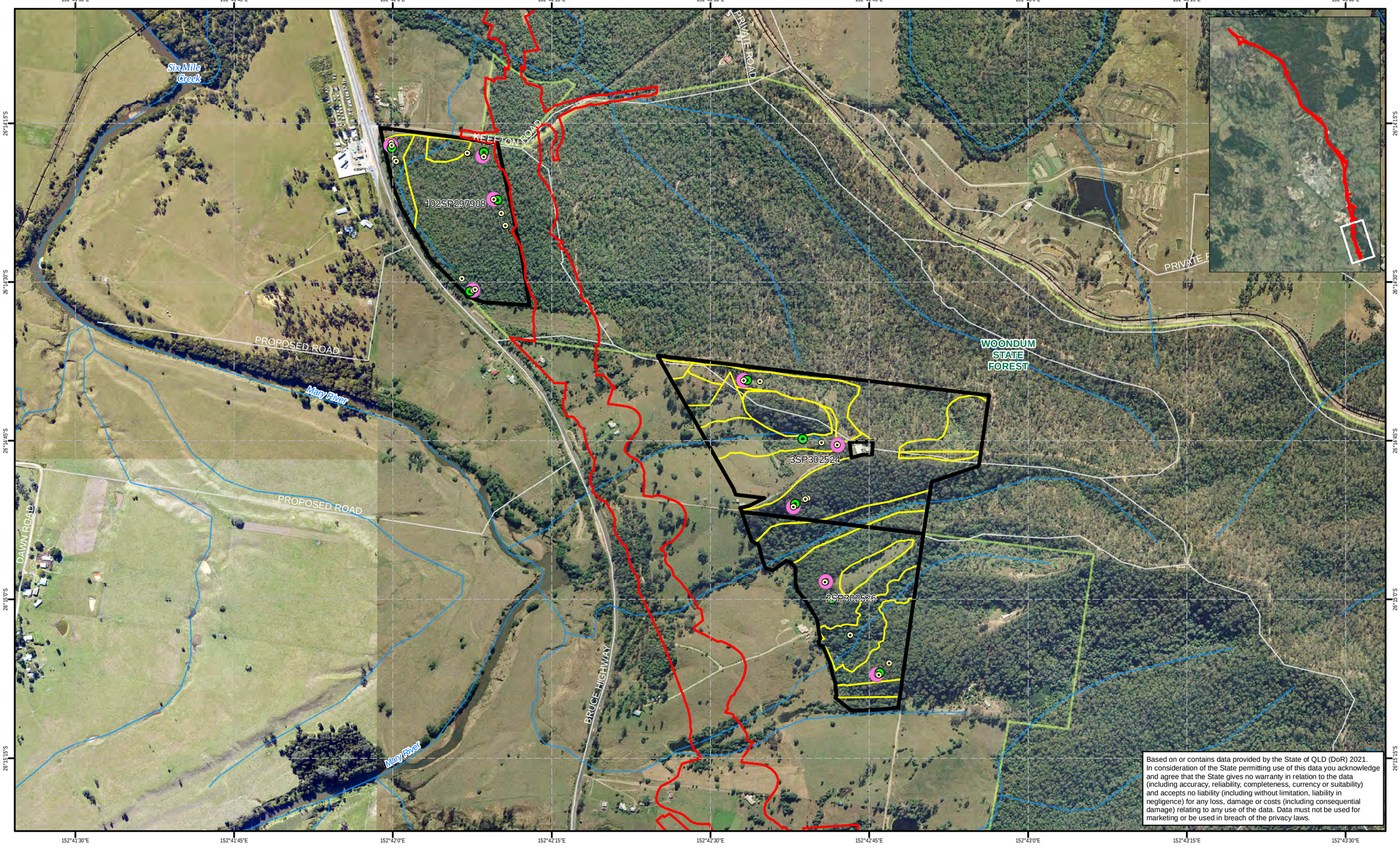

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Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woondum to Curra)

Koala survey sites Southern Group

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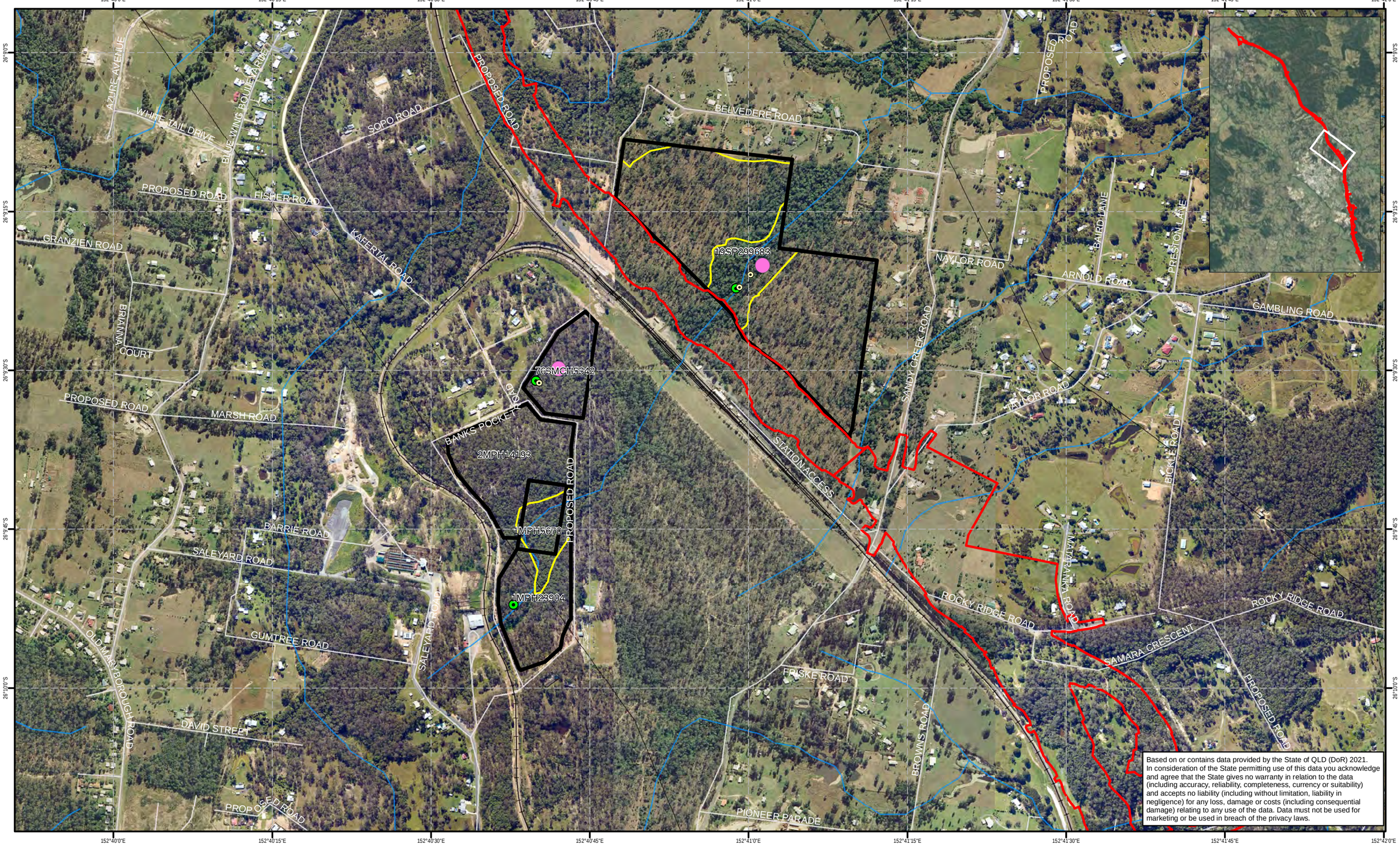

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Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woondum to Curra)

Koala survey sites
Central Group

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Figure 3-1
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Data source: DoR: Watercourse (2010), Rail (2014), Roads (2016), Towns (2015); TMR: Imagery (2016-2019), Survey Area, Chainage, Areas Assessed (2021). GHD: Project Footprint (2020), Survey Site (2021), Offset Sites (2021). Created by:ihamilton

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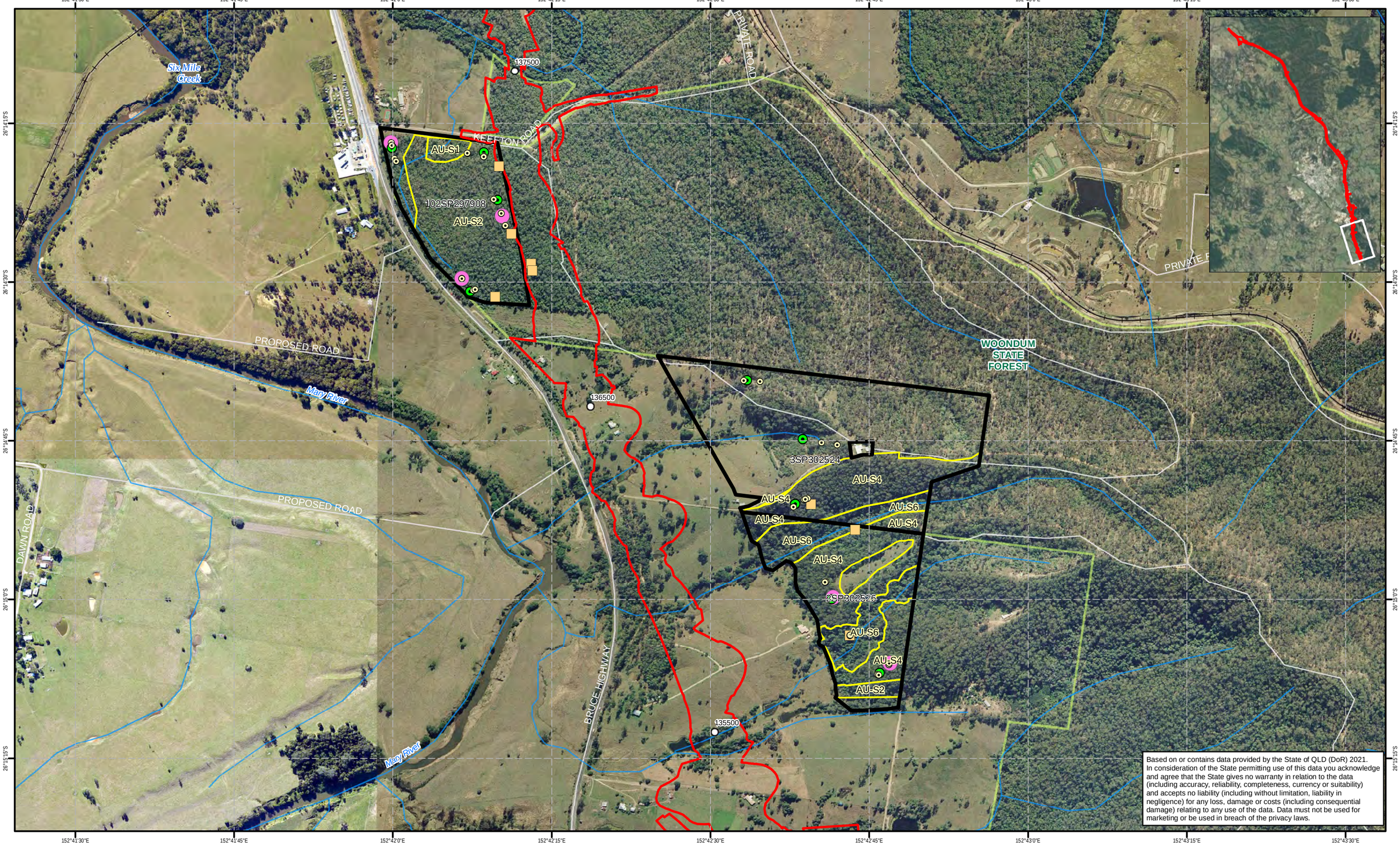

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Grid: GCS GDA 1994

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LEGEND

- Bio-condition Survey Point
- Transect Waypoint
- BBBQ Survey Site
- Remote Camera
- Watercourses
- Railway
- Road/Track
- Project Footprint
- State Forest
- Offset Areas
- BBBQ Assessment Units

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woondum to Curra)

Job Number	12534030
Revision	A
Date	08 Apr 2021

Black-breasted button quail survey sites Southern Group

Figure 3-2

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Data source: DoR: Watercourse (2010), Rail (2014), Roads (2016), Towns (2015); TMR: Imagery (2016-2019), Survey Area, Chainage, Areas Assessed (2021). GHD: Project Footprint (2020), Survey Site (2021), Offset Sites (2021). Created by:ihamilton

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3.2 Guidelines referenced

Methods for the baseline surveys are provided in the following sections. The habitat quality scoring assessments (site condition and site context) were completed in general accordance with the *Guide to Determining Terrestrial Habitat Quality* (DES, 2020) to demonstrate compliance with the OMP and EPBC Act approval requirements. The *How to use the Offset Assessment Guide* and the DAWE Modified QLD Habitat Quality template spreadsheet was referred to for assessing species stocking rates.

BioCondition site assessments and regional ecosystem verification has been undertaken in accordance with the *BioCondition Assessment Manual* (Eyre *et al.,* 2015) and Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland (Neldner *et al.,* 2020).

The method proposed for the baseline and biennial weed infestations surveys has been designed to be repeatable and consistent with the principles outlined in the *Field Manual for Surveying and Mapping Nationally Significant Weeds* (McNaught *et al.,* 2008).

Methods employed for the presence of koala include the *EPBC Act Referral Guidelines for the Vulnerable Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)* (DoE, 2014), the *Terrestrial Vertebrate Fauna Survey Assessment Guidelines for Queensland* (Eyre *et al.,* 2018), and the *Survey guidelines for Australia's threatened mammals: Guidelines for detecting mammals listed as threatened under the EPBC Act* (DSEWPaC, 2011). Koala utilisation from faecal pellet searches used the Spot Assessment Technique (SAT) (Phillips and Callaghan, 2011).

Methods employed for the presence of black-breasted button-quail have been developed in accordance with the *Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act* (DEWHA, 2017).

3.3 BioCondition / Habitat quality

In accordance with the EPBC Act approval condition requirements, the quality of habitat for the koala and black-breasted button-quail was assessed, based on the following criteria outlined in the EPBC Act Offsets Assessment Guide:

- Site condition
- Site context
- Species stocking rate

The offset area groups (Table 2-1) were delineated into a total of 18 AUs comprising similar vegetation (i.e. unique regional ecosystems) and condition states ('remnant' versus 'regrowth') to allow variation in habitat quality within and across groups to be adequately assessed. The establishment of AUs also assisted in determining the location and number of BioCondition plots required (refer to diagram in Figure 3-3). At least one BioCondition plot was established within each of the 18 AUs, with up to three plots established in the larger AUs. Fauna species habitat index assessments were also undertaken at the BioCondition sites.

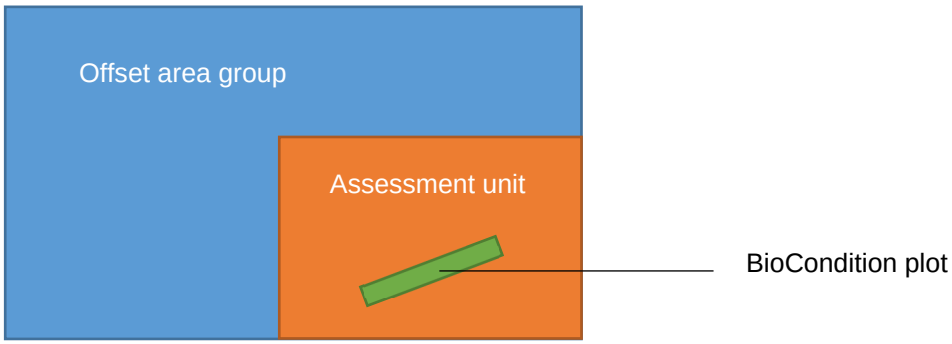


Figure 3-3 Relationship between offset area group, assessment unit and BioCondition plot

A uniform naming system has been applied throughout this report, whereby the AU prefix is followed by the offset group (i.e. N for north, C for central or S for south) then by the plot number if identifying specific plots. For example: AU N7-3 refers to Plot 3 within assessment unit 7 of the northern offset group. The site number is not provided if referring to the average scores across plots within the same AU (e.g. AU N7).

All AUs coincided with habitat for koala and, of those, four also coincided with habitat for black-breasted button-quail. Habitat designations were based on the following:

- **Koala habitat** was defined based on the coastal definition detailed in the *Referral Guidelines for the Vulnerable Koala* (DoE, 2014). Habitat includes forest and woodland dominated by Eucalypt species, Melaleuca and Casuarina woodlands with emergent food trees. Areas included remnant and regrowth vegetation (which may consist of remnant, mature regrowth or areas of less structure that contain some non-juvenile and juvenile koala habitat trees) and disturbed non-remnant areas that contain scattered and isolated koala food trees.
- **Black-breasted button-quail habitat** was defined based on the definition detailed in the Commonwealth listing advice (TSSC, 2015). Habitat included any areas of dry low-closed forest, particularly semi-evergreen vine thicket, low microphyll vine forest, araucarian microphyll vine forest and araucarian notophyll vine forest with dense shrub cover and an abundance of leaf litter and woody debris (Bennett, 1985; Hughes and Hughes, 1991; Marchant and Higgins, 1993).

3.3.1 Site condition

Site condition was calculated for each AU using the following criteria detailed in the DAWE Modified QLD Habitat Quality template:

- BioCondition data consistent with the *Guide to determining terrestrial habitat quality* (DES, 2020) and the *BioCondition Assessment Manual* (Eyre *et al.,* 2015)
- Quality and availability of food and foraging habitat
- Quality and availability of shelter.

BioCondition plots

For each AU, a series of replicate condition plots was established in accordance with the Queensland environmental offsets framework.

Each plot measured 100 m by 50 m and was established along the direction of the contour where practicable (i.e. along the slope rather than upslope or downslope). The precise location of the centre of each plot was marked with a GPS and representative photographs of the plot were taken in each aspect (i.e. north, east, south and west). This location will be utilised as a

permanent photo monitoring point during the biennial monitoring for a comparative assessment over time. Steel picquets/stakes were also installed at the 0 m, 50 m and 100 m mark of each plot transect to assist in relocating the site.

Each plot was divided into sub-plots, as illustrated by the plot layout diagram provided as Figure 3-4, and the following attributes recorded:

- 100 m transect
  - Tree canopy cover
  - Shrub canopy cover
- 100 m by 50 m plot
  - Total number of large eucalypt and non-eucalypt trees
  - Height of ecologically dominant layer and other canopy/sub-canopy/emergent layers
  - Tree species richness
  - Proportion of the dominant canopy species with evidence of recruitment
- 50 m by 20 m plot
  - Coarse woody debris
- 50 m by 10 m plot
  - Species richness of shrubs, grass, forbs and other native species
  - Weed cover
- Five 1 m by 1 m quadrats
  - Percent cover of native perennial grass
  - Percent cover of organic litter

Attributes were awarded scores based on comparative regional ecosystem (RE) benchmark data in accordance with the methodology prescribed in *BioCondition Assessment Manual* (Eyre *et al.* 2015).

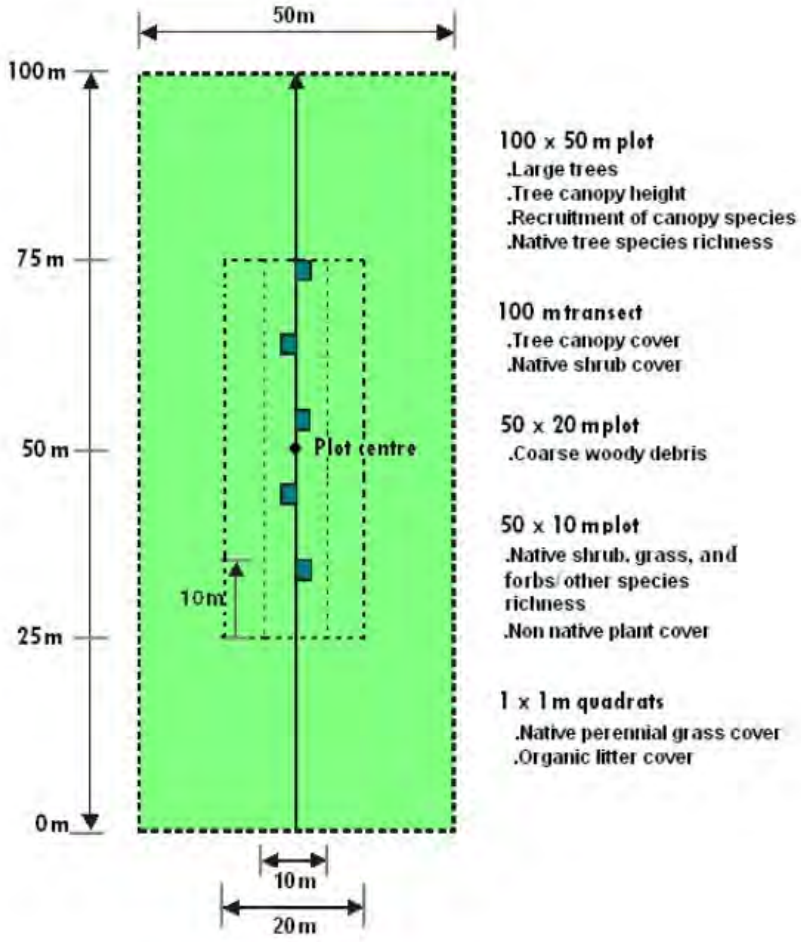


Figure 3-4 Layout of the condition plot

Source: Eyre *et al*. (2015) *BioCondition: A Condition Assessment Framework for Terrestrial Biodiversity in Queensland.* Version 2.2. Queensland Herbarium

Quality and availability of food and foraging habitat

The quality and availability of food and foraging habitat was determined for the koala and black-breasted button-quail using criteria detailed below. Food/food availability scores were calculated for each assessment unit based on the average of all plot scores.

Koala

The quality of food and foraging habitat for the koala was assigned a score out of 10, based on the average score from the following criteria:

- Relative abundance of food trees present – calculated by dividing the number of mature Eucalypt trees in the BioCondition plot by the number of mature Eucalypt trees detailed in the benchmark for that RE community (Queensland Herbarium, 2019), converted to a score out of 10.
- Relative diversity of food tree species present – calculated by dividing the number of koala food tree species in the BioCondition plot by the number of koala food tree species recorded in the technical description for the RE community (Ryan, 2012), converted to a score out of 10.
- Ease of movement – estimated based on the connectivity of vegetation and the physical and behavioural barriers to movement, assigning scores from 0 – 10 where 0 – 2 =

(movement totally restricted), 2 - 4 (substantial, frequent barrier), 4 - 6 (moderate, occasional barrier), 6 - 8 (negligible barrier), 8 - 10 (along a koala movement corridor).

Black-breasted button-quail

The quality of food and foraging habitat for the black-breasted button-quail was assigned a score out of 10, based on the average score from the following criteria:

- Leaf litter cover – calculated as the proportion of the BioCondition plot with leaf-litter cover to provide foraging habitat for the black-breasted button-quail, converted to a score out of 10.
- Leaf litter depth – average leaf-litter depth recorded from five randomly selected locations in areas where leaf litter was present. The scores were converted to a score out of 10, by comparing against a maximum leaf-litter depth of 5 cm.

Quality and availability of shelter

The quality and availability of shelter was determined for the koala and black-breasted button-quail using criteria detailed below. Shelter quality/availability scores were calculated for each assessment unit based on the average of all plot scores.

Koala

The quality and availability of shelter for the koala was assigned a score out of 10, based on an average of the following scores:

- Canopy cover – obtained from the tree canopy cover measured as a score out of 100 using the BioCondition plot methods detailed above
- Sub-canopy cover – obtained from the sub-canopy cover measured as a score out of 100 using the BioCondition plot methods detailed above
- Shrub cover – obtained from the shrub cover, measured as a score out of 100, using the BioCondition plot methods detailed above.

The total score was calculated as the total proportion converted to a score out of 10, comparing against a total score of 200 (instead of 300) given the low values in even mature woodland areas that had relatively high shelter availability.

Black-breasted button-quail

The quality and availability of shelter for the black-breasted button-quail was assigned a score out of 10, based on the average score from the following criteria:

- Canopy cover obtained from the tree canopy cover measured using the BioCondition plot methods detailed above and converted to a score out of 10.
- Sub-canopy cover obtained from the sub-canopy cover measured using the BioCondition plot methods detailed above and converted to a score out of 10.
- Shelter cover – an estimate of the proportion of the BioCondition plot with sufficient shelter cover (i.e. more than 30 percent cover) for the black-breasted button-quail, converted to a score out of 10.

3.3.2 Site context

For each AU, site context scores were assigned for following characteristics:

- Size of patch
- Connectedness

- Context
- Role of the site location to the overall population in the state
- Threats to the species
- Species mobility capacity.

The first three attributes of size of patch, connectedness, and context were calculated as part of the desktop analysis using Geographic Information System (GIS) modelling consistent with the *Guide to Determining Terrestrial Habitat Quality* (DES 2020) and *BioCondition Assessment Manual* (Eyre *et al.,* 2015). This analysis included both mapped remnant and regrowth vegetation, using field-verified REs mapped within the offset areas that was supplemented by the version 11 vegetation management REs mapping. Prior to undertaking the GIS analysis, the area of the approved road corridor for the Bruce Highway Project: Cooroy to Curra Section D (Woondum to Curra) was removed from the surrounding RE mapping due to the adjoining and nearby proximity to the offset areas and the resulting potential to reduce future attribute scores after the approved areas are cleared. The GIS analysis did not remove areas mapped as regrowth along watercourses even though they were 100 m wide due to the connectivity that such riparian corridors may provide for fauna species such as koala and black-breasted button-quail.

The site context scoring criteria are provided in Table 3-2.

The *Guide to Determining Terrestrial Habitat Quality* (DES 2020) has removed the requirement to assign a score based on the proximity of the AU to State-mapped ecological corridors, therefore this scoring has not been included in the offset area assessment method.

Table 3-2 Site context scoring criteria

Site context attribute	Criteria	Score
Size of patch	<5 ha remnant and/or regrowth	0
	≥5-25 ha remnant and/or regrowth	2
	≥25-100 ha remnant OR ≥25-200 ha remnant and regrowth OR ≥25-200 ha regrowth	5
	≥100-200 ha remnant OR >200 ha remnant and regrowth OR >200 ha regrowth	7
	≥200 ha remnant	10
Connectivity in the landscape (connectedness)	Low – AU is not connected using any of the below descriptions	0
	Medium – AU is connected with adjacent remnant vegetation along >10% to <50% of its perimeter OR remnant vegetation along <10% of its perimeter and with regrowth native vegetation >25% of its perimeter	2
	High – AU is connected with adjacent remnant vegetation along 50% to 75% of its perimeter	4
	Very High – AU is connected with adjacent remnant vegetation along >75% of its perimeter OR	5

Site context attribute	Criteria	Score
	includes >500 ha remnant vegetation	
Landscape context	Low - <10% remnant vegetation and <30% native non-remnant vegetation (regrowth)	0
	Medium - ≥10% to 30% remnant vegetation and <30% regrowth OR <10% remnant vegetation and ≥30% regrowth	2
	High - ≥30% to 75% remnant vegetation OR ≥10% to 30% remnant vegetation and ≥30% regrowth	4
	Very High - >75% remnant vegetation	5

Methods used to calculate the remaining criteria are detailed below.

Role of the site location to the overall population in the state

This value was assigned a score out of 10 for each AU adjusted from a total score out of 60 using the following criteria:

- Scoring framework used to calculate the role of the site used in the species stocking rate calculation scored for each site:
  - Key source population for breeding: No (0), Yes (10)
  - Key source population for dispersal: No (0), Yes (5)
  - Necessary for maintaining genetic diversity: No (0), Yes (15)
  - Near the limit of the species range: No (0), Yes (15)
- The usage of the site scored using the following criteria: Not present (0), Dispersal (5), Foraging (10), Breeding (15).

Threats to the species

At each AU, threats to the koala and black-breasted button-quail were assessed based on average of all plot scores using criteria detailed below. For both species, the absence of threats were calculated as a score out of 25 using the risk matrix provided in Table 3-3, derived from the *Guide to Determining Terrestrial Habitat Quality* (DES, 2020). The score was then adjusted to a score out of 10.

Note that threats did not include the results of pest abundance surveys being undertaken across the offset areas, which are separate to these habitat quality assessments.

Table 3-3 Threat matrix used to score absence of threats

Threat matrix			Severity				
			Very High	High	Medium	Low	Very Low
			1	2	3	4	5
Scope	Very High	1	1	2	3	4	5
	High	2	2	4	6	8	10
	Medium	3	3	6	9	12	15
	Low	4	4	8	12	16	20
	Very Low	5	5	10	15	20	25

Koala

Threats to the koala were calculated as an average of the threats posed by vehicles, wild and domestic dogs, and fire. These were scored out of 25 using the threat matrix detailed above. Threats to koalas from vehicles considered factors including the proximity to roads, volume and speed of traffic and the presence of exclusion fencing, signage and other controls to mitigate collision risk. Threats from dog attack considered factors including proximity to housing, tracks, the availability of refuges, and evidence of dogs seen during BioCondition assessments. Threats from fire considered the relative fuel load, level of public access and presence of fire breaks.

Black-breasted button-quail

Threats to the black-breasted button-quail considered the threats posed by cats and fire. Threats from cats considered factors including the proximity to housing, tracks, the abundance of ground-cover and evidence of cats during field surveys. Threats from fire considered the relative fuel load, level of public access and presence of fire breaks.

Species mobility capability

The species mobility capability was scored for the koala and black-breasted button-quail using criteria detailed below.

Koala

For each AU site, a species mobility capability score was assigned for the koala. This was a score out of 10, based on an average of the following scores:

- Habitat connectivity – score out of 10 from: 0 - 2 (totally isolated), 2 - 4 partially isolated, 4 - 6 (periodically isolated), 6 - 8 major connectivity, 8 - 10 (totally connected).
- Behavioral deterrents to movement – scored out of 10 considering the likely energetic cost and threat of exposure to predation by moving to that location from adjacent areas: 0 - 2 (extreme risk), 2 - 4 (high risk), 4 - 6 (moderate risk), 6 - 8 (low risk), 8 - 10 (zero risk).
- Physical deterrents to movement – scored out of 10 based on physical barriers: 0 - 2 (total barrier), 2 - 4 (substantial, frequent barrier), 4 - 6 (moderate, occasional barrier), 6 - 8 (negligible barrier), 8 - 10 (active movement pathway – i.e. watercourse or linear corridor).

Black-breasted button-quail

For each AU site, a species mobility capability score was assigned for the black-breasted button-quail. This was a score out of 10, based on an average of the following scores:

- Habitat connectivity – score out of 10 from: 0 - 2 (totally isolated), 2 - 4 partially isolated, 4 - 6 (periodically isolated), 6 - 8 major connectivity, 8 - 10 (totally connected).
- Physical deterrents to movement – scored out of 10: 0 - 2 (total barrier), 2 - 4 (substantial, frequent barrier), 4 - 6 (moderate, occasional barrier), 6 - 8 (negligible barrier), 8 - 10 (active movement pathway – i.e. watercourse or linear corridor).

3.3.3 Species stocking rate

For the offset areas as a whole, a single value of species stocking rate was calculated using the criteria detailed in Table 3-4, based on the scoring system in the DAWE Modified QLD Habitat Quality template.

Table 3-4 Criteria used to score species stocking rate

Criteria	Score			
Presence detected on or adjacent to the site	0	5		10
	No	Yes - adjacent		Yes – on site
Species usage of the site	0	5	10	15
	Not habitat	Dispersal	Foraging	Breeding
Approximate density	0	10	20	30
Koala	0	0.001 – 0.6	0.6 - 5	>5
Black-breasted button-quail	0	1 - 3	4 - 6	>6
Role/importance of species population on site	0	5	10	15
	0	5 - 15	20 - 35	40 - 45

Presence detected on or adjacent

Presence detected was based on past and present survey evidence, including remote surveillance cameras, aerial drone survey, faecal pellet searches, and other indirect trace searches. Presence surveys for koala and black-breasted button-quail are described in Sections 3.4 and 3.5, respectively.

Species usage

The usage of the offset area was assessed for both species, assigning it to one of the four following categories: not habitat (0), dispersal (5), foraging (10) or breeding (15) habitat. This was based on the general size and quality of habitats present and connectivity to other habitats in the surrounding landscape. Given the scale of the offset areas, the presence of individuals was considered evidence of breeding, particularly for the black-breasted button-quail, as the local population would be functionally isolated from other populations that could otherwise be a breeding source.

Approximate density

For koalas, the relative density was based on a multiplication of koala densities recorded by drone koala surveys and local koala utilisation from faecal pellet searches using the SAT (Phillips and Callaghan, 2011), as outlined in Table 3-5. The scoring framework for both koala density and utilisation was broadly consistent with that used in Phillips and Callaghan (2011). Drone koala density values were scored for the northern, central and southern offset areas and local koala utilisation values were scored for each AU based on the results of SAT searches undertaken at the same time as BioCondition surveys.

Table 3-5 Scoring framework for koala density

Density category	Drone density	SAT score	Multiplied density score
High (30)	>0.5 koala /ha	>10 (33%)	>5
Moderate (20)	0.1 – 0.5 koala/ha	6 – 10 (20 – 33%)	0.6 – 5
Low (10)	0.001 – 0.1 koala/ha	1 – 6 (3.33 – 20%)	0.001 – 0.6
Absent (0)	0	0	0

For the black-breasted button-quail, the relative density was based on an arbitrary index of activity, using the average number of platelets observed per 10 m x 10 m plot within areas where the species was detected using the following scoring framework: 0 = no platelets (absent), 10 = 1 – 3 platelets (low density), 20 = 4 – 6 platelets (medium density), 30 = > 6 platelets (high density).

Role / importance of the species population

For the offset areas as a whole, the role / importance of the species population on site was assessed using the criteria detailed in Table 3-6 based on the supplementary table to the Species Stocking Rate in the DAWE Modified QLD Habitat Quality template, out of a score of 45, which was then converted to a score out of 15. The scoring of these criteria were derived from available information about each species in general and in the region, considering the geographic location and connectivity of the local population in the context of the species' broader range. Large areas of contiguous habitat with confirmed records were considered source populations for breeding. Areas of high value habitat with high connectivity to external areas were considered source populations for dispersal. Populations that represent one of only few representatives of the species in a geographic area were considered important for maintaining genetic diversity. The distribution of the species, as mapped in the Commonwealth Species Profile and Threat Database for each species was used to determine whether the population was near the limits of the species' known range.

Table 3-6 Role/importance of the species population

Criteria	Score	
Key source population for breeding	0	10
	No	Yes/Possibly
Key source population for dispersal	0	5
	No	Yes/Possibly
Necessary for maintaining genetic diversity	0	15
	No	Yes/Possibly
Near the limit of the species range	0	15
	No	Yes

3.4 Koala presence

To comply with the EPBC Act approval conditions, targeted surveys were undertaken over three survey events to confirm the presence of the koala, using methods consistent with the *EPBC Act Referral Guidelines for the Vulnerable Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)* (DoE, 2014), the *Terrestrial Vertebrate Fauna Survey Assessment Guidelines for Queensland* (Eyre *et al.,* 2018), and the *Survey guidelines for Australia's threatened mammals: Guidelines for detecting mammals listed as threatened under the EPBC Act* (DSEWPaC, 2011). Surveys involved aerial drone surveys, faecal pellet searches, deployment of remote surveillance cameras, and targeted habitat assessments. Targeted survey methods used to detect the koala were employed at the koala offset areas outlined in Table 2-1 and shown in Figure 2-1. Survey site locations are shown in Figure 3-1.

3.4.1 Drone koala density surveys

Thermal drone operators and koala researchers from the University of Sunshine Coast (USC) undertook targeted drone surveys for koalas within the offset areas over 20 days between June 2020 and January 2021. The results of those surveys were used to calculate koala densities for the northern, central and southern offset areas. Methods are described in Appendix A and summarised in Table 3-7.

3.4.2 Localised koala utilisation (SAT) surveys

The local utilisation of koalas was assessed based on the results of targeted faecal pellet searches using SAT surveys (Phillips and Callaghan, 2011). The quality of habitat was assessed based on targeted habitat assessments. Methods used are described in Table 3-7.

Table 3-7 Survey methods used to detect koalas

Survey method	Details
Faecal pellet searches	Targeted faecal pellet searches were undertaken at each assessment unit site by GHD ecologists in October 2020 using the SAT search method - searching within 1 m of the base of 30 mature koala food trees for an average of 2 minutes per tree. Relative utilisation levels were scored based on the scoring framework detailed in Phillips and

Survey method	Details
	Callaghan (2011) for east coast medium - high density populations where: • Absent = koala scats absent • Low use = 1 – 22.52% trees with koala scats • Medium use = 22.52 – 32.84% trees with koala scats • High use = > 32.84% trees with koala scats.
Koala habitat assessments	Koala habitat assessments were undertaken by GHD ecologists in October 2020, recording the quality and availability of food and foraging habitat, the quality and availability of shelter and the absence of threats from vehicles, dogs and fire at each plot. Factors recorded including the number of large food trees (i.e. the number in the 100 m x 50 m plot that exceeded the large native tree size in the benchmark for that RE community (Queensland Herbarium, 2019)), the number of food tree species, canopy cover, sub-canopy cover, shrub cover, the relative abundance of woody weeds, presence of dog footprints or scats, proximity to tracks and housing, proximity to roads, road traffic volume and speed, presence of exclusion fencing, signage, lighting, speed mitigation measures, relative fuel load, level of public access and utilisation and presence of fire breaks. Scoring breakdowns for each are detailed in Section 3.3.
Aerial drone thermal imaging surveys	USC undertook aerial drone surveys across each of the offset areas. Drone flights were flown late at night or early morning to maximise temperature differential between koalas and the environment. Methods are described in Appendix A.

3.5 Black-breasted button-quail presence

To comply with the EPBC Act approval conditions, targeted surveys were undertaken over three survey events to confirm the presence of the black-breasted button-quail, using methods consistent with those detailed for the species in the *Survey Guidelines for Australia's Threatened Birds* (DEWHA, 2017). Surveys involved land-based area searches for birds, platelets and scats, deployment of remote surveillance cameras and targeted habitat assessments. Targeted survey methods used to detect the black-breasted button-quail, detailed in Table 3-8 were employed at each of the black-breasted button-quail offset sites outlined in Table 2-1 and shown in Figure 2-2. Survey site locations are shown in Figure 3-2.

Table 3-8 Black-breasted button quail survey methods

Survey method	Details
Active diurnal searches	Targeted searches were undertaken for bird and signs (i.e. feeding platelets and scats) within each of the BioCondition plots and surrounding areas to a distance of 200 m. Where platelets were detected, the number of platelets within a 50 m x 50 m plot was recorded. Any scats observed were photographed for identification. Targeted surveys of the potential habitat within the offset areas (32.68 ha) for the black-breasted button-quail included 16 person hours over four days as detailed in Table 3-1, exceeding the 15 hours recommended for areas less than 50 ha in *The Survey Guidelines for Australia's Threatened Birds* (DEWHA 2017).
Remote surveillance cameras	Where platelets were found, remote surveillance cameras were set and trained on areas of suitable foraging habitat. Each camera was attached to a tree at a height of approximately 20 – 30 cm, angled toward the ground at a 45-degree angle. A total of 8 cameras were set at locations mapped in Figure 3-2 Cameras were set on 15 September 2020 and left in situ for 65 days, collected on 19 November 2020.
Incidental records	Record the location and sound of any black-breasted button-quail calls heard.
Targeted habitat assessment	The nature and composition of vegetation was documented at canopy, shrub and ground levels. The following key habitat criteria for the BBBQ was assessed: • Presence and depth of leaf litter • Canopy cover • Density of understorey vegetation • Landscape context. In general, good quality habitats have broad coverage of deep leaf litter, good connectivity and high levels of canopy cover provided by canopy, sub-canopy and understorey vegetation.

3.6 Weed infestation

In accordance with the EPBC Act approval conditions, the level of weed infestation across the offset areas is required to be assessed, whereby weed infestation is defined in the approval decision notice as:

'*the abundance, composition and distribution of non-native flora species known to restrict the movement or adversely impact on available habitat of the koala or black-breasted button-quail across the landscape, as determined by a field survey over the entire koala or black-breasted button-quail offset areas undertaken by a suitably qualified person using a scientifically robust and repeatable methodology over a timeframe that serves as a sound basis for comparison to data acquired to demonstrate achievement of the milestones required under Condition 12.c*'.

In accordance with the OMP, the following weed species were targeted within the koala offset areas based on their potential impact on habitat quality and koala movement (based on potential weed threats described in the NSW Koala Recovery Plan (DECC, 2008), Gympie Regional Council's Koala Conservation Management Plan 2018 (GRC, 2018a) and Gympie Region Biosecurity Plan (GRC, 2018b):

- Camphor laurel (*Cinnamomum camphora*)
- Cat's claw creeper (*Dolichandra unguis-cati*)
- Chinese Celtis (*Celtis sinensis*)
- Climbing asparagus (*Asparagus plumosus*)
- Lantana (*Lantana camara*)
- Madeira vine (*Anredera cordifolia*)
- Morning glory (*Ipomoea spp*.)
- Prickly pears (*Opuntia spp*.)

The following weed species were targeted within the black-breasted button-quail offset areas, due to their impact on habitat quality for the black-breasted button-quail (based on potential weed threats described in the *National recovery plan for the black-breasted button-quail Turnix melanogaster* (Mathieson and Smith, 2009):

- Cat's claw creeper (*Dolichandra unguis-cati*)
- Lantana (*Lantana camara*)
- Madeira vine (*Anredera cordifolia*)

The above three weed species align with those targeted within the koala offset areas.

Any additional weeds observed that were considered to have potential to adversely impact on koala and black-breasted button quail habitats were also recorded during surveys.

3.6.1 Desktop survey

A desktop review of various government spatial mapping layers (regional ecosystems, geology, watercourses, contours, current and historical aerial imagery, etc) was undertaken prior to commencing the field survey to identify areas within AUs where infestations of target weed species are more likely to be present. Such areas included:

- Previously disturbed areas
- Bushland edges (adjacent to disturbed areas)

- Known habitat associations of target weed species (e.g. waterways, vegetation types, soil types, elevations, etc.)

Target sites within AUs were identified and loaded into the ArcCollector application for use in the field.

3.6.2 Field survey

Two ecologists experienced in weed surveys undertook walking transects within each AU, recording observations of target weed species and abundance. The length of transects varied depending on the size of the AU but approximately 60 minutes was spent searching for infestations within each AU (as a minimum). At each infestation, the ecologists stopped and recorded the following core attributes on a handheld device using ArcCollector:

- Target weed species present (as specified in Section 3.6)
- Weed density of each target weed species as per density classes specified in the *Field Manual for Surveying and Mapping Nationally Significant Weeds* (McNaught *et al*., 2008)
- Size of infestation
- Supporting habitat features
- GPS coordinate data and photographs.

Ecologists also surveyed additional locations identified during the September 2020 pre-survey as likely infestation locations. Target species and density data was collected at each additional location.

A total of 39 permanent quadrats (10 x 10 m) were also established across AUs to monitor the efficacy of weed control operations. Target species present and densities (covers) within each quadrat were recorded. Cover was recorded as percentage crown cover, except for ground layer species whereby cover was recorded as projective foliage cover. Possible constraints to the treatment and maintenance of weed infestations (access, stock presence, fencing, etc.) were also identified and locational data recorded.

Rather than produce a series of maps for each weed species, it was considered more appropriate to delineate the offset area into a series of ‘weed density polygons’, with each possessing a similar suite of weed species or where the dominant weed species occurred in similar densities across the polygon. Polygons often coincided with AUs, landform elements (e.g. flowlines, alluvial plains, gullies, hillslopes and crests) or levels of disturbance (current or historical). The weed density polygons are presented in Figure 5-1.

Each polygon was assigned one or more alphanumeric codes to indicate the weeds present and their respective densities, whereby the letters indicate the scientific name of the weed species and the numeral indicates the density class. For example, Lc 3 indicates that *Lantana camara* was present in the polygon with a recorded density class of 3, which is categorised as occasional and widespread with a recorded cover of 1 to 10%. Where a range of density classes were present within a polygon, the density classes are separated by a dash in the alphanumeric code (e.g. Lc 3-4). Where a weed does not appear in a label assigned to a polygon, it is assumed to have a density class of 1 (absent).

3.7 Pest abundance

Baseline pest abundance is being undertaken by Ecosure and will be reported separate to this report. Pest abundance is not referenced again within this document.

3.8 General site features

Within each AU and offset area in general, opportunistic observations were made of the following features that have potential implications for management of habitat for the koala and black-breasted button-quail:

- Location of fences or other infrastructure to be removed, replaced or repaired given the influence on movement or exposure to threats from predators and vehicles
- Cleared areas that could be used for replanting, including site characteristics such as soil type, landform, extent and cover of existing koala food tree species (species of the genera *Eucalyptus, Corymbia, Lophostemon, Angophora* and *Melaleuca* that are known to be consumed by the koala and are greater than 4 m height or with a trunk circumference greater than 31.5 cm at 1.3 m above the ground), mapped extent of areas, weed species, other existing disturbances
- Disturbed or regrowth areas that could be used for natural regeneration/recruitment, including type, extent and estimate of cover or abundance of koala food tree species (as per above definition) and heights/size ranges, mapped extent of areas, weed species, other existing disturbances
- Locations of access tracks
- Locations of fire breaks and evidence of past fires
- Presence of waste to be removed
- Evidence of erosion that requires remediation
- Evidence of past and current land use, access and other human activities (e.g. logging, recreational vehicle access, stock grazing)
- Natural disturbances such as tree falls, dieback due to drought, flood or other natural disaster
- Any other threats or degradation of the land and habitat
- Photos of recorded features and at permanent photo monitoring points
- Locations of permanent photo monitoring points

Features were georeferenced on ArcCollector and included where relevant on management maps.

4. Baseline survey results

4.1 Habitat quality

BioCondition plots and fauna species habitat index assessments were undertaken at the BioCondition sites shown in Figure 3-1 for koala and Figure 3-2 for black-breasted button-quail, with results for each species shown in the Modified QLD Habitat Quality spreadsheet in Appendix B. The following sections provide an overview of BioCondition and fauna species habitat survey results, with BioCondition attributes discussed by AU and species habitat attributes presented separately for koala and black-breasted button-quail.

4.1.1 BioCondition data

BioCondition field data collected for each site is provided at Appendix C with scores derived from field data shown in the Modified QLD Habitat Quality spreadsheet at Appendix B. A summary of total average scores and ranges recorded across the offset area for each attribute is provided in Table 4-1.

AU scores

Total average attribute scores for respective AUs ranged from 22.5 to 51.1 out of a possible 80, suggesting that all AUs have capacity for improvement (Table 4-1). All but two AUs had total scores of 40 or greater. The AUs N-9 and N-1 recorded the lowest total average scores of 22.5 and 25 respectively; both AUs were field-verified as comprising regrowth vegetation with a largely absent tree layer.

Attribute scores

A radar graph showing the total average scores for each attribute across the offset area relative to the maximum permissible score for each attribute (expressed as percentages) is presented in Figure 4-1.

As can be seen from Table 4-1 and Figure 4-1 the attribute with the lowest relative average score and therefore the greatest capacity for improvement was non-native plant cover. Other attributes such as the number of large native trees, native grass and shrub covers and native forb species richness were also low and possess considerable capacity for improvement.

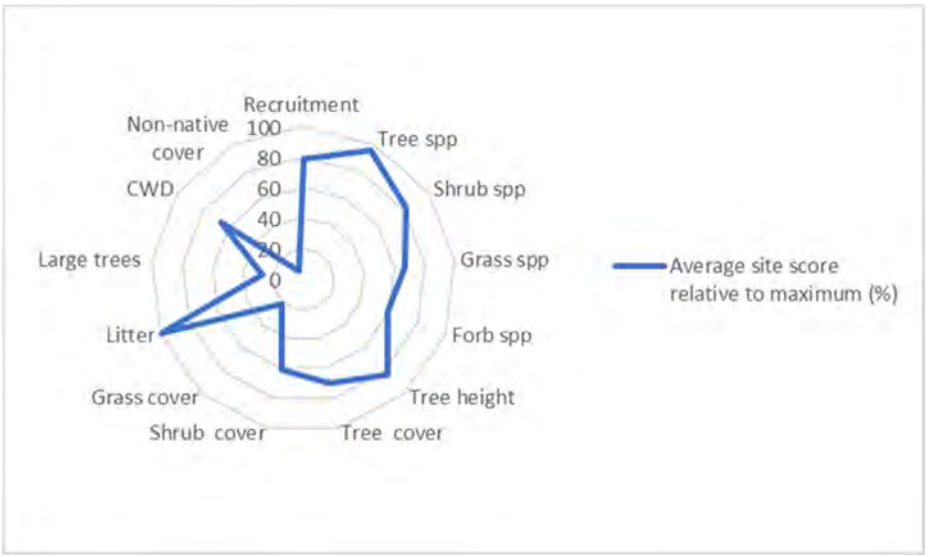


Figure 4-1 Average BioCondition scores across offset area relative to maximum possible scores (expressed as percentages)

Table 4-1 Average attribute scores for respective AUs

Attributes	Assessment Units (AUs)																		Max possible score	Range	Total average score
	N1	N2	N3	N4	N5	N6	N7	N8	N9	C1	C2	S1	S2	S3	S4	S5	S6	S7			
Ecological Dominant Layer (EDL) Recruitment	5	5	4	4	5	3	3.7	5	5	1.5	3	0	3	5	5	5	5	3	5	0 - 5	3.95
Native tree spp richness	5	5	5	5	5	5	5	5	3	5	5	5	5	5	5	5	3	5	5	3 - 5	4.76
Native shrub spp richness	3	5	5	5	5	5	3	3	2.5	3	5	5	5	3	4.3	5	3	5	5	2.5 - 5	4.11
Native grass spp richness	2.5	2.5	3	4	3	5	3	3	3	3	3	2.5	3	5	3.5	3	5	3	5	2.5 -5	3.35
Native forb spp richness	2.5	3	2.8	4	3	3	3.7	2.5	3	3	3	2.5	3	3	3	2.5	2.5	3	5	2.5 - 5	2.94
Tree height	0	5	4	5	5	4.5	5	5	0	5	5	5	5	5	4.4	5	3.3	5	5	0 - 5	4.19
Tree cover	1	4	5	4.3	3.5	4.3	4.2	1.5	0	5	5	4	4	4	3.8	2.5	3.3	4	5	0 - 5	3.49
Shrub cover	0	3	3	1.5	3	3	4.3	3	0	4	5	3	5	3	5	3	3	3	5	0 - 5	3.05
Grass cover	1	1	0.5	3	1	0.5	1.7	1	1	2	0	1	1	1	0.3	1	1	5	5	1 - 5	1.06
Litter	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	3 - 5	5.00
Large trees	0	5	5	5	0	5	5	5	0	5	5	5	5	5	5	5	5	5	15	0 - 5	4.12
Coarse woody debris	0	2	3.5	3.5	5	3.5	5	2	0	5	5	2	3.5	5	4	5	2	5	5	0 - 5	3.29
Non-native cover	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	10	0 - 5	0.59
TOTAL SCORE	25	45.5	45.8	49.3	43.5	46.8	48.6	41	22.5	46.5	49	40	47.5	49	48.3	47	51.1	51	80		43.9

=

Whilst total averages for each attribute provide a broad indication of condition and capacity for improvement across the broader offset area, considerable variation was recorded for most attributes across AUs (refer Figure 4-2 to Figure 4-5). For instance, non-native plant cover recorded nil scores for all AUs, with the exception of AU S6 where the BioCondition site plots recorded the maximum permissible average score of 10[1]. Consequently, weed control is likely to be an effective measure for improving condition in all AUs and from areas of AU S6 where there were higher weed cover densities than in the BioCondition plots. The least variability across AUs was recorded in relation to organic matter, whereby all AUs recorded the maximum permissible score of 5 (Figure 4-5); capacity for improvement in relation to this attribute is limited across all AUs.

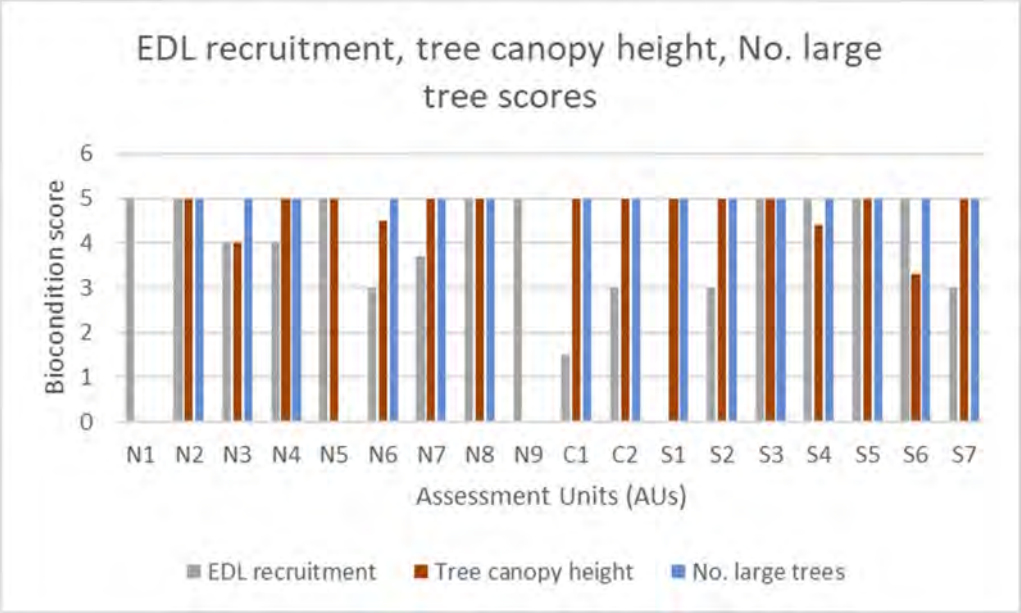


Figure 4-2 Average attribute scores for EDL recruitment, tree canopy height and number of large trees across AUs

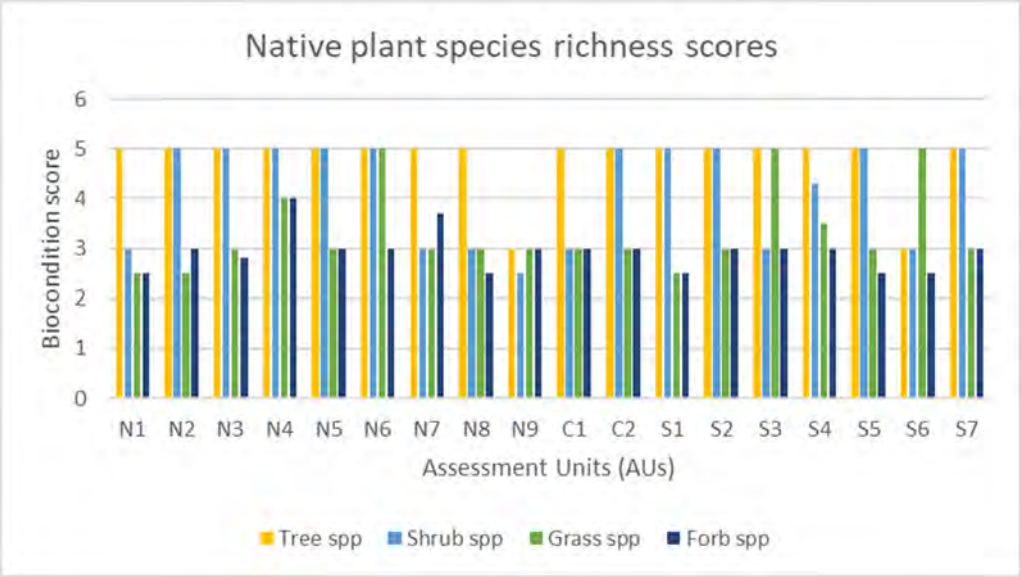


Figure 4-3 Average attribute scores for native plant species richness scores across AUs

[1] Non-native plant cover scores were not graphed as the attribute recorded a nil score at all AUs apart from from AU S6 whereby it received a score of 10.

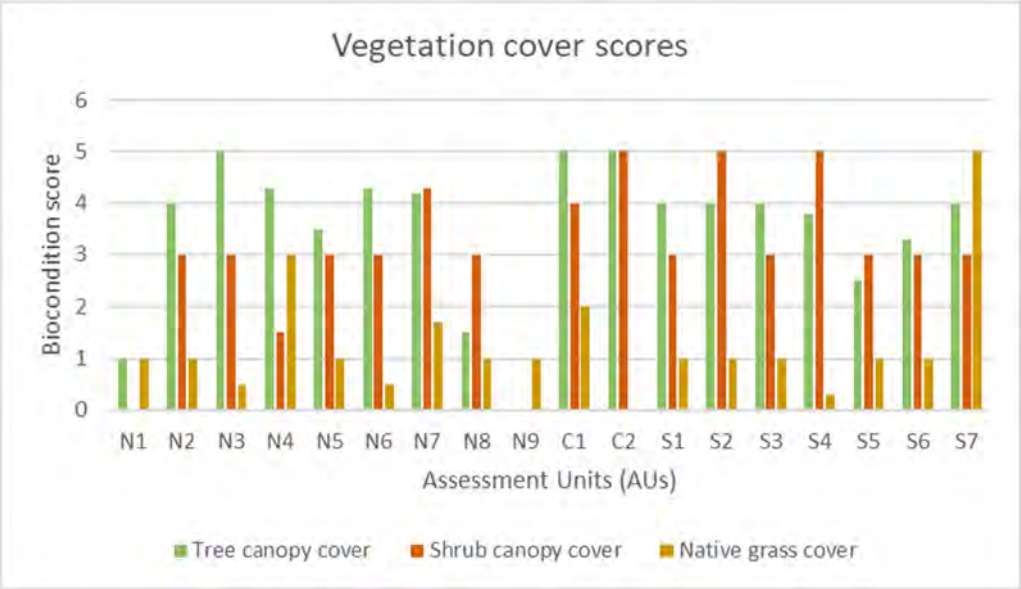


Figure 4-4 Average attribute scores for vegetation cover scores across AUs

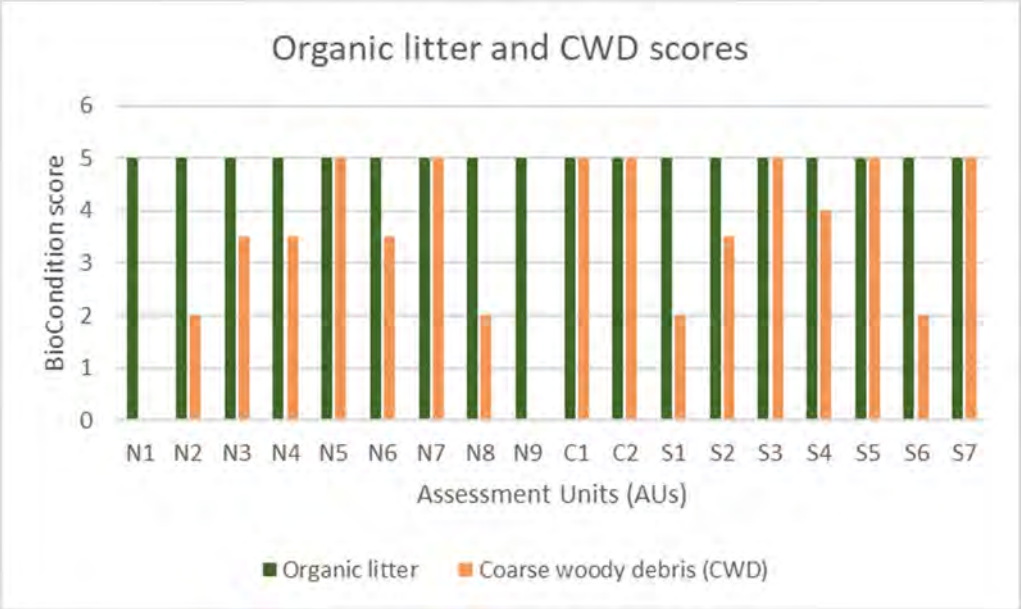


Figure 4-5 Average attribute scores for organic litter and coarse woody debris scores across AUs

4.1.2 Site context

The results of the GIS analysis for site context are presented in the following sections, including the scores attributed based on the criteria provided in Section 3.3.2.

Size of patch

The patch sizes relate to the network of connected remnant and regrowth mapped areas surrounding each AU. The inclusion of regrowth vegetation mapped along watercourses within the GIS analysis resulted in high patch sizes, with all of the northern and central offset group AUs scoring 10, and only two AUs in the southern group scoring less than 10. The results were the same for both the koala and the black-breasted button-quail AUs, as shown in Table 4-2.

Table 4-2 Size of patch results

Assessment unit	Size of patch (ha)	Score
N1	3928.42 remnant	10
N2	3928.42 remnant	10
N3	3928.42 remnant	10
N4	3928.42 remnant	10
N5	3928.42 remnant	10
N6	3928.42 remnant	10
N7	3928.42 remnant	10
N8	3928.42 remnant	10
N9	3928.42 remnant	10
C1	4027.32 remnant	10
C2	4027.31 remnant	10
S1*	12.81 remnant	2
S2*	998.85 remnant	10
S3	985.43 remnant	10
S4*	985.43 remnant	10
S5	985.43 remnant	10
S6*	986.04 remnant (985.43 remnant*)	10
S7	12.81 remnant	2

* Only these AUs also relate to black-breasted button-quail offset areas (with adjusted results marked with *)

Connectivity in the landscape

The connectedness results relate to the percentage of the boundary of each AU that connects directly to mapped remnant and regrowth vegetation, as an indication of the capacity for species to disperse through the landscape. There was some difference in results between the koala and the black-breasted button-quail AUs due to the black-breasted button-quail offset areas forming only part of the offset areas for koala, as shown in Table 4-3.

Table 4-3 Connectedness results

Assessment unit	Connectedness	Score
N1	24.80 % remnant	2
N2	73.47 % remnant	4
N3	71.51 % remnant	4
N4	45.08 % remnant	2
N5	35.75 % remnant	2
N6	66.00 % remnant	4
N7	91.94 % remnant	5
N8	99.11 % remnant	5
N9	18.29 % remnant	2
C1	87.13 % remnant	5
C2	92.02 % remnant	5
S1*	65.16 % remnant	4
S2*	62.02 % remnant (80.12 % remnant*)	4 (5*)
S3	31.26 % remnant	2
S4*	63.28 % remnant (70.24 % remnant*)	4
S5	54.78 % remnant	4
S6*	83.58 % remnant (92.83 % remnant*)	5
S7	86.28 % remnant	5

* Only these AUs also relate to black-breasted button-quail offset areas (with any differing results marked with *)

Landscape context

The landscape context scoring relates to the percentage of mapped vegetation within a 1 km radius surrounding the AU that is remnant and/or regrowth, as opposed to non-remnant areas. The scoring thresholds relate to a 10-30% threshold of habitat loss within a landscape, below which species may be lost. All of the northern offset group AUs scored 5, being greater than 75% remnant vegetation within the surrounding areas. The central offset group AUs scored 4, due to containing greater areas of developed and non-remnant land within a 1 km radius. The

southern offset group AUs were a mix of High or Very High categories, with the scores for koala and black-breasted button-quail AUs being the same. These results are shown in Table 4-4.

Table 4-4 Landscape context results

Assessment unit	Context	Score
N1	89.81 % remnant	5
N2	82.13 % remnant	5
N3	80.77 % remnant	5
N4	76.00 % remnant	5
N5	75.81 % remnant	5
N6	81.03 % remnant	5
N7	89.35 % remnant	5
N8	82.61 % remnant	5
N9	95.18 % remnant	5
C1	44.39 % remnant	4
C2	54.69 % remnant	4
S1*	69.97% remnant	4
S2*	67.65 % remnant (67.11 % remnant*)	4
S3	78.20 % remnant	5
S4*	74.46 % remnant (73.77 % remnant*)	4
S5	77.85 % remnant	5
S6*	74.80 % remnant (73.73 % remnant*)	4
S7	58.29 % remnant	4

* Only these AUs also relate to black-breasted button-quail offset areas (with any differing results marked with *)

4.1.3 Koala habitat scores

Quality of foraging habitat

Scores out of 10 for the quality of koala foraging habitat ranged between 0.7 and 8.3 with an average score of 4.17. Condition sites with low values for koala foraging habitat (i.e. AU N1-1, AU N9-1 and AU S5-1) were generally cleared and had a small number of regenerating juvenile koala food trees as shown in Plate 4-1. Condition sites with higher scores for koala foraging

habitat (i.e. AU S4-2, AU S7-1, AU N4-1 and AU N6-1) supported an increased number and diversity of koala food trees, as shown in Plate 4-2.

Plate 4-1 Low foraging habitat quality sites AU N9-1 (left) and AU N1-1 (right)

Plate 4-2 High quality foraging habitat sites AU S4-2 (left) and AU N4-1 (right)

Quality of shelter

Scores out of 10 for the quality of shelter for koalas ranged between 0 and 7.2 with an average score of 4.32. Condition sites with low scores for koala shelter (i.e. AU N1-1, AU N9-1) were cleared with shelter opportunities generally lacking or patchily distributed (Plate 4-1). Condition sites with higher scores for koala shelter (i.e. AU S1 and AU S2-2) had high levels of vegetation in the shrub and sub-canopy layers, as shown in Plate 4-3.

Plate 4-3 High quality shelter sites AUS1 (left) and AUS2-2 (right)

Threats to species

Koala offset areas generally had relatively low existing threats from dogs and vehicles. While scores ranged between 2 and 8, the average score was 6.04, indicating a low level of threat to koalas. Threats were particularly low in the northern AUs, which were large, interconnected and distant from roads and housing that would have high densities of dogs and vehicular traffic. Sites at the edges of the northern assessment unit (AU N9-1 and AU N1-1) had increased threats from dog attacks due to the absence of cover. The central AUs were considered to have increased threat levels due to their smaller size and relative proximity to roads and urban areas. Southern sites had intermediate threat levels due to proximity to rural residential housing and low-traffic volume roads.

Species mobility

Scores out of 10 for koala mobility ranged between 1.3 and 8, with an average score of 6.16. The two sites generally lacking any canopy trees (AU N1-1 and AUN9-1) had low mobility scores, as koalas would need to walk at ground level through those areas, increasing the energetic cost of movement and susceptibility to dog attack. Areas with high densities of *Lantana camara* (i.e. AU N6-2, AU N7-3, AU C2-1 and AU S3-1), as shown in Plate 4-4, also had reduced mobility scores due to the physical barrier posed. No sites had physical barriers that would entirely restrict mobility. Koala-exclusion fencing limits westerly movement of koalas at sites in Woondum State Forest, however these sites were well-connected to larger areas of habitat to the east. While areas with high densities of woody weeds would not present a barrier to koala movement, they are likely to increase the energetic costs associated with moving through those areas and were scored down accordingly.

Plate 4-4 Low mobility sites for koala AU N6-2 (left) and AU C2-1 (right)

Species stocking rate

Koalas were assigned a species stocking rate score of 40 out of 70 for all AUs combined to represent the local population as a whole. Scoring for each criterion is shown in Table 4-5 below. Presence and density data is further discussed in Section 4.2.

Table 4-5 Scores for koala species stocking rate

Criteria	Score			
Presence detected on or adjacent to the site	0	5		10
	No	Yes - adjacent		Yes – on site
Species usage of the site	0	5	10	15
	Not habitat	Dispersal	Foraging	Breeding
Approximate density score*	0	10	20	30
	0	0 – 0.06	0.6 - 5	>5
Role/importance of species population on site	0	5	10	15
	0	5 - 15	20 - 35	40 - 45

*Note: this is multiplication of the estimated density from drone survey and localised utilisation from SAT scores and does not represent a density per ha score.

Role/importance of the site to the species population

The offset areas as a whole were assigned a score of 15 out of 45 for their importance to the species population using the criteria detailed in Table 4-6. The offset areas were considered key source populations for breeding and dispersal but were not near the limit of the species range and were not considered necessary for maintaining genetic diversity given they are connected to large areas of woodland that would otherwise support koalas from genetically similar populations.

Table 4-6 Role/importance of the species population

Criteria	Score	
Key source population for breeding	0	10
	No	Yes/Possibly
Key source population for dispersal	0	5
	No	Yes/Possibly
Necessary for maintaining genetic diversity	0	15
	No	Yes/Possibly
Near the limit of the species range	0	15
	No	Yes

4.1.4 Black-breasted button-quail habitat scores

Quality of foraging habitat

Scores out of 10 for the quality of foraging habitat ranged between 2.50 and 5.75 with an average score of 4.48. Condition sites with low foraging habitat values (i.e. AU S7-1 and AU S4-1) had low levels of shrub and sub-canopy vegetation cover and low levels of leaf litter as

shown in Plate 4-5. Sites with slightly higher foraging habitat quality scores (i.e. AU S2-1 and AU S2-2) had a larger area with high shrub and sub-canopy cover and dense leaf litter. Representative photos of those AUs are shown in Plate 4-6.

Plate 4-5 Low foraging habitat quality sites AU S7-1 (left) and AU S4-1 (right)

Plate 4-6 High quality foraging habitat sites AU S2-1 (left) and AU S2-2 (right)

Quality of shelter

Scores out of 10 for the quality of shelter for black-breasted button-quails ranged between 3 and 6.1 with an average score of 4.36. Condition sites with low shelter values (i.e. AU S4-3, AU S5-1) generally had patchily distributed shrub and sub-canopy cover (Plate 4-7). Condition sites with higher shelter scores (i.e. AU S2-1 and AU S2-2) had high levels of vegetation in the shrub and sub-canopy layers, as shown in Plate 4-6.

Plate 4-7 Low quality shelter sites AU S4-3 (left) and AU S5-1 (right)

Threats to species

Offset areas generally had relatively moderate-high existing threats, ranging from 2 to 5 with an average threat score of 3.25 out of 10 (where 10 is a low-threat site). Existing threats were attributed to the relatively small size of patches and proximity to urban areas which would increase threats to the local population from cat predation and bushfire. Threats from motor vehicle movements were generally considered low.

Species mobility

Scores out of 10 for species mobility ranged between 2 and 6, with an average score of 4.38. Sites with high levels of localised connectivity, afforded by consistent shrub and sub-canopy cover (AU S2-1 and AU S2-2) (Plate 4-8) had increased mobility scores, providing increased opportunities for localised movement. Site AU S7-1 had a reduced mobility score due to patchily distributed microhabitat and a relative lack of sub-canopy cover, which would deter local movement by increasing the level of exposure to predation, and proximity to the existing highway which would limit westerly movement (Plate 4-9).

Plate 4-8 High mobility sites for black-breasted button-quail AU S2-1 (left) and AU S2-2 (right)

Plate 4-9 Low mobility sites for black-breasted button quail AU S7-1

Species stocking rate

Black-breasted button-quails were assigned a species stocking rate score of 55 out of 70 for all AUs. Scoring for each criterion is shown in Table 4-7 below. Presence and density data is further discussed in Section 4.3.

Table 4-7 Scores for black-breasted button-quail species stocking rate

Criteria	Score			
Presence detected on or adjacent to the site	0	5		10
	No	Yes - adjacent		Yes – on site
Species usage of the site	0	5	10	15
	Not habitat	Dispersal	Foraging	Breeding
Approximate density score*	0	10	20	30
	Absent	Low (0 – 3 platelets / 50 m plot)	Medium (3 – 6 platelets / 50 m plot)	High (> 6 platelets / 50 m plot)
Role/importance of species population on site*	0	5	10	15
	0	5 - 15	20 - 35	40 - 45

*Note: this represents an indirect index of activity based on the number of platelets found per 50 m BioCondition plot and does not represent a density per ha score.

Role/importance of the site to the species population

The offset areas as a whole were assigned a score of 30 out of 45 for their importance in the population of the species using the criteria detailed in Table 4-8. As the offset areas are part of a broader population in Woondum State Forest that is isolated from other areas of suitable habitat, it was considered likely to be part of a key source population for breeding and dispersal and necessary for maintaining genetic diversity in the species.

Table 4-8 Role/importance of the species population on the offset areas

Criteria	Score	
Key source population for breeding	0	10
	No	Yes/Possibly
Key source population for dispersal	0	5
	No	Yes/Possibly
Necessary for maintaining genetic diversity	0	15
	No	Yes/Possibly
Near the limit of the species range	0	15
	No	Yes

4.1.5 Habitat quality scores

The habitat quality scores (weighted by area) resulting from the baseline survey have been calculated as:

- Koala offset areas scored 6.07
- Black-breasted button-quail offset areas scored 6.92

The results for each species are shown in the Modified QLD Habitat Quality spreadsheet in Appendix A.

It is noted that the required legally secured koala offset area in the approval conditions (post-approval variation notice) is 280.36 ha, while the total area assessed for habitat quality in the designated assessment units during the baseline surveys was 287.23 ha. The required black-breasted button-quail offset area in the approval conditions is 32.15 ha, while the total area assessed for habitat quality in the designated assessment units during the baseline surveys was 32.65 ha.

4.2 Koala presence

4.2.1 Drone surveys of koala density

The USC thermal drone surveys were effective in detecting koalas within and in bushland adjacent to the offset areas, on 17 occasions (Figure 4-6). These 17 detections occurred over eight separate drone flights/dates and therefore multiple records of the same individuals may have occurred during these flights. To avoid multiple counts of the same individual, the likelihood of each record being a duplicate was assessed based on the spatial and temporal proximity of nearby records on subsequent dates. Based on this assessment, it is estimated that approximately 14 individual koalas were detected within the offset areas or immediately adjacent bushland (within 500 m), with the other three detections considered to be duplicates. The highest abundance of koalas was recorded on the 22 June 2020 with eight koalas being detected within or immediately adjacent to K-OA3 / BBBQ-OA3.

It is noted that TMR have been undertaking a separate koala monitoring program which included radio collaring program, capture and health assessments for koalas within the southern offset areas. As a result of health assessments, two koalas were euthanized due to severe health issues including severe chronic cystitis. As a result of these two euthanasians, the total number of individual koalas within or adjacent to the offset areas has been reduced to 11 individual koalas.

Density estimates for the northern, central and southern offset areas are detailed in Table 4-9 based on total areas for each group of offset areas. Koala densities at the northern and central offset areas are consistent with low koala density populations, defined as < 0.1 koala/ha in Phillips and Callaghan (2011). The southern area was identified as a hotspot, with a total of a minimum of seven individual koalas detected (post euthanasia of two individuals), at a density of approximately 0.155 koalas/ha. This result is consistent with mid-level koala densities, with koala densities of >0.1 – 3 koalas/ha recorded in parts of southeast Queensland (Melzer et al 2000).

Table 4-9 Koala densities in each offset area group

Offset area group	Number of koalas	Area (ha)	Density (koala/ha)
North	3	190.6	0.016
Central	2	44.2	0.045

Offset area group	Number of koalas	Area (ha)	Density (koala/ha)
South	7	45.18	0.155

4.2.2 SAT surveys of local koala utilisation

Searches for koala faecal pellets using SAT surveys detected koalas from 11 of the 26 assessment unit sites. Based on the framework for koala utilisation provided for east coast 'medium – high' density koala populations in Phillips and Callaghan (2011), all but two SAT search results were consistent with 'low' levels of koala utilisation, with koala scats detected under 1 – 22.52% of trees searched in SAT surveys. Two sites AU S1-1 and AU S2-2 recorded medium levels of utilisation with koala pellets recorded beneath 23.3% of trees searched. The utilisation levels as per the definitions provided by Phillips and Callaghan (2011) are replicated below for reference:

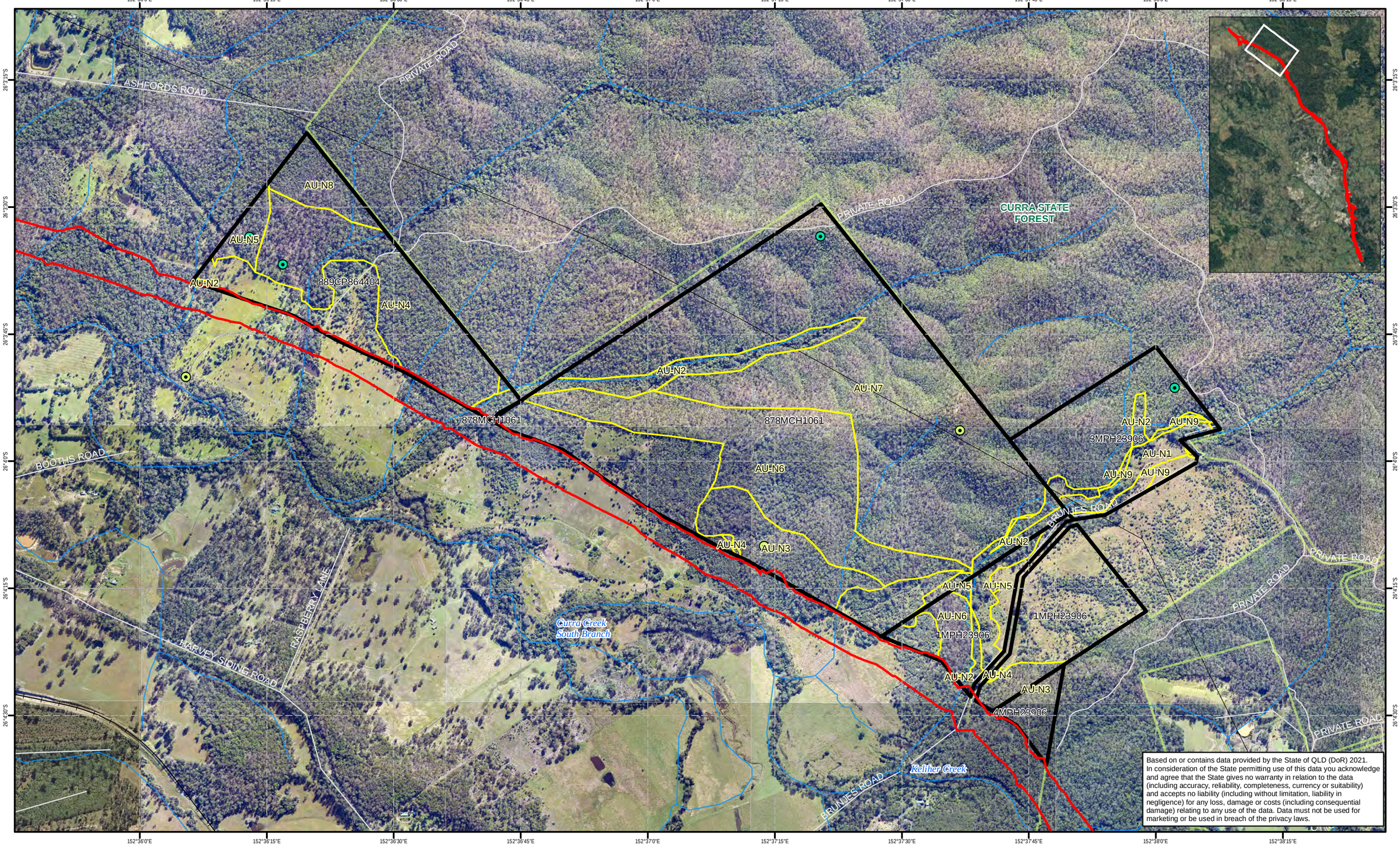
- Low use: <22.52%
- Medium (normal) use: >22.52 % but < 32.84%
- High use: >32.84%

The results of SAT searches are detailed in Table 4-10 and shown in Figure 4-6 as evidence of koalas. Koalas were detected on remote surveillance cameras at three locations (AU S1-1, AU S2-1 and AU S2-2) as shown in Plate 4-10 and mapped in Figure 4-6.

Table 4-10 Koala utilisation levels based on SAT search results

Assessment unit	SAT search results	Proportion	Utilisation level
AU N4-1	1/30	3.3%	Low
AU N5-1	1/30	3.3%	Low
AU N7-1	2/30	6.7%	Low
AU N7-3	1/30	3.3%	Low
AU C1-1	1/30	3.3%	Low
AU C1-2	2/30	6.7%	Low
AU S1-1	7/30	23.3%	Medium
AU S2-1	5/30	16.7%	Low
AU S2-2	7/30	23.3%	Medium
AU S4-2	1/30	3.3%	Low
AU S7-1	2/30	6.7%	Low

Plate 4-10 Koalas detected on surveillance cameras in AU S1 and AU S2



Paper Size A3

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Metres

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

N

LEGEND

- Drone Detected Koala
- Remote Camera
- Koala on Remote Camera
- Koala Scat
- Watercourses
- Railway
- Road/Track
- Project Footprint
- State Forest
- Offset Areas
- Koala Assessment Units

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woondum to Curra)

Distribution of koalas recorded in field surveys Northern Group

Job Number	12534030
Revision	A
Date	28 Jul 2021

Figure 4-6

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Data source: DoR: Watercourse (2010), Rail (2014), Roads (2016), Towns (2015); TMR: Imagery (2016-2019), Survey Area, Chainage, Areas Assessed (2021). GHD: Project Footprint (2020), Survey Site (2021), Offset Sites (2021). Created by:schadwick

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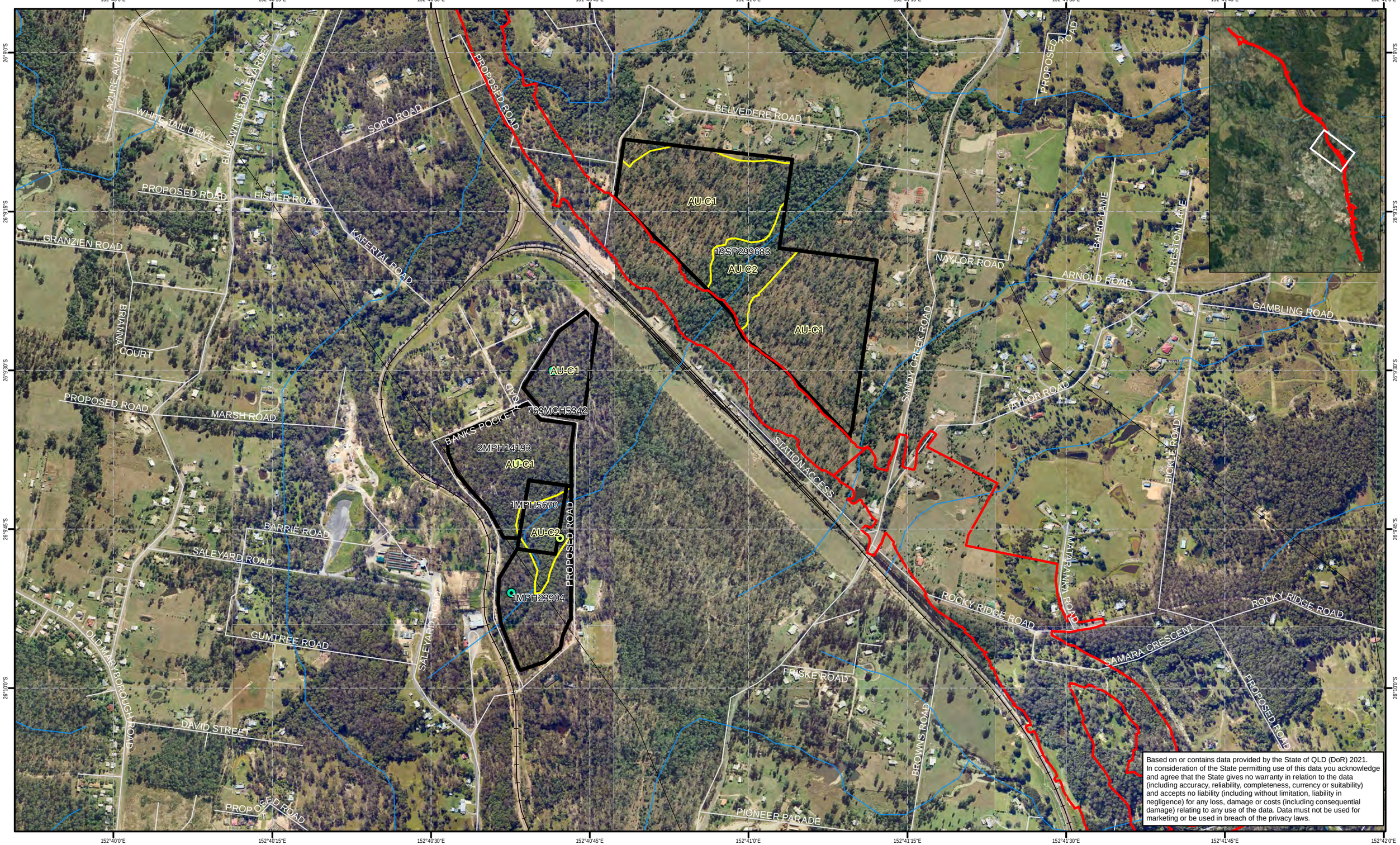

Based on or contains data provided by the State of QLD (DoR) 2021. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for marketing or be used in breach of the privacy laws.

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Metres

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

N

LEGEND

- Drone Detected Koala
- Remote Camera
- Koala on Remote Camera
- Koala Scat
- Watercourses
- Railway
- Road/Track
- Project Footprint
- State Forest
- Offset Areas
- Koala Assessment Units

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woondum to Curra)

Distribution of koalas recorded in field surveys Central Group

Job Number	12534030
Revision	A
Date	28 Jul 2021

Figure 4-6
Page 2 of 3

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Data source: DoR: Watercourse (2010), Rail (2014), Roads (2016), Towns (2015); TMR: Imagery (2016-2019), Survey Area, Chainage, Areas Assessed (2021). GHD: Project Footprint (2020), Survey Site (2021), Offset Sites (2021). Created by:schadwick

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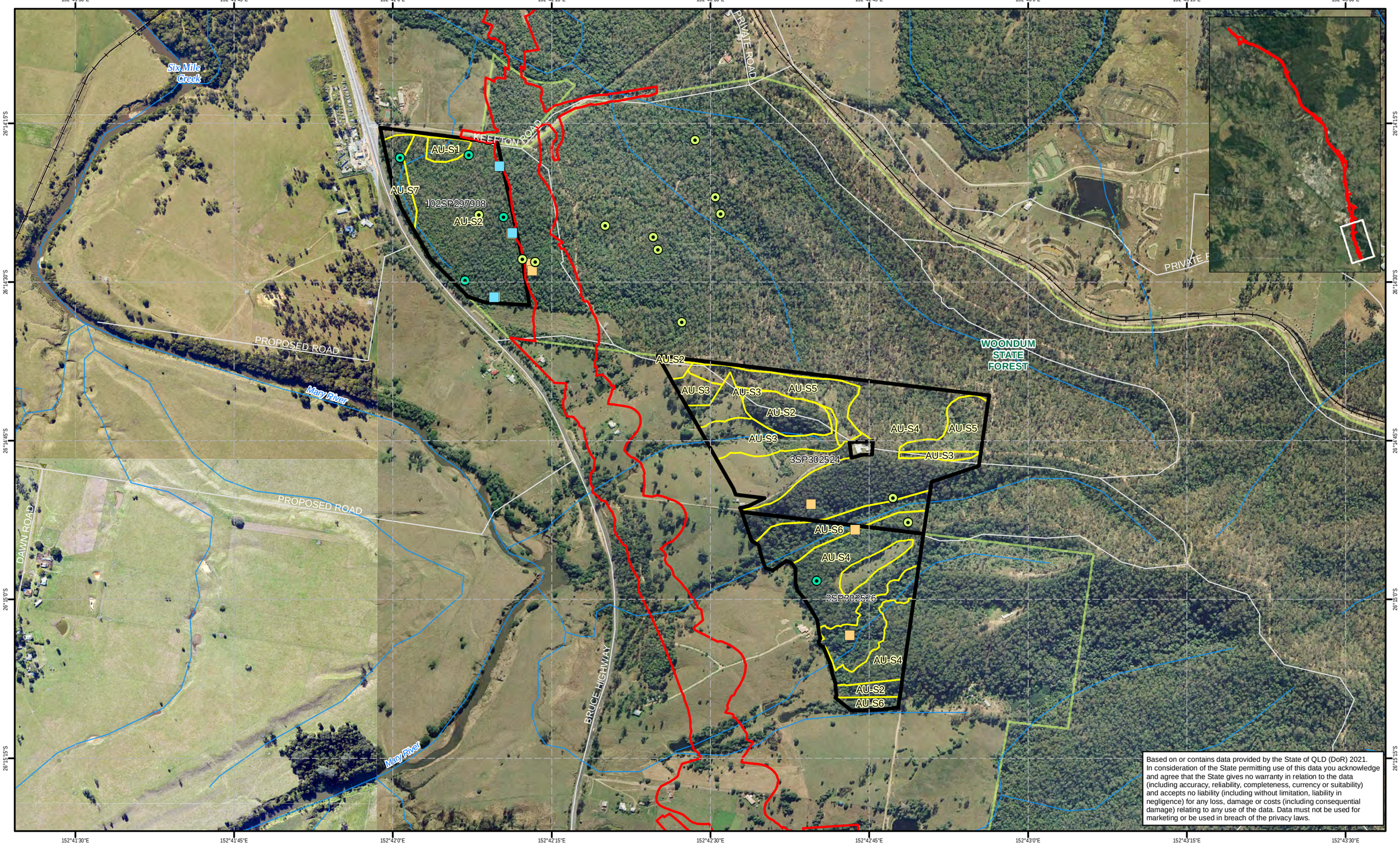

Paper Size A3

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Metres

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

N

LEGEND

- Drone Detected Koala
- Remote Camera
- Koala on Remote Camera
- Koala Scat
- Watercourses
- Railway
- Road/Track
- Project Footprint
- State Forest
- Offset Areas
- Koala Assessment Units

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woondum to Curra)

Distribution of koalas recorded in field surveys Southern Group

Job Number	12534030
Revision	A
Date	28 Jul 2021

Figure 4-6
Page 3 of 3

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Data source: DoR: Watercourse (2010), Rail (2014), Roads (2016), Towns (2015); TMR: Imagery (2016-2019), Survey Area, Chainage, Areas Assessed (2021). GHD: Project Footprint (2020), Survey Site (2021), Offset Sites (2021). Created by:schadwick

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4.3 Black-breasted button-quail presence

The black-breasted button-quail was confirmed present from four locations within the offset area. These were located in assessment unit AU S1, AU S2 and AUS4. The species was positively identified from characteristic scats (Plate 4-11) observed adjacent to platelets (Plate 4-12) in three locations mapped in Figure 4-7, and from photos captured on four remote surveillance cameras, as shown in Figure 4-7. Images of black-breasted button-quails were captured on remote surveillance cameras on 32 separate occasions as summarised in Table 4-11. Female black-breasted button-quails (Plate 4-13) accounted for 14.3% of birds captured on remote cameras. While male black-breasted button quails (Plate 4-14) accounted for 85.7%. Birds were typically observed alone, with groups of up to 2 – 3 birds occasionally recorded (Plate 4-15). Platelet counts were used as the basis for estimating the relative densities of black-breasted button-quails at each assessment site.

Plate 4-11 Black-breasted button quail scats detected at AUs S1, S2 and S4

Plate 4-12 Black-breasted button quail platelets in AUs S1, S2 and S4

Table 4-11 Summary of remote cameras

Assessment unit and site	Number of days BBBQ detected	Number of birds photographed	Sex ratio of birds photographed
AU S2-2	9	15	2 female, 13 male/immature
AU S1-1	7	10	10 male/immature
AU S2-1	14	15	3 female, 12 male/immature
AU S4-1	2	2	1 female, 1 male/immature

Plate 4-13 Female black-breasted button quails recorded in the offset area

Plate 4-14 Male black-breasted button quails recorded in the offset area

Plate 4-15 A group of three black-breasted button quails forming platelets

152°41'30"E 152°41'45"E 152°42'0"E 152°42'15"E 152°42'30"E 152°42'45"E 152°43'0"E 152°43'15"E 152°43'30"E

26°14'15"S 26°14'30"S 26°14'45"S 26°15'0"S 26°15'15"S

Six Mile Creek

KEEFTON ROAD

PRIVATE ROAD

AU-S1

102SP297908

AU-S2

PROPOSED ROAD

Mary River

WOONDUM STATE FOREST

3SP302524

AU-S4

AU-S6

2SP302526

DAWN ROAD

BRUCE HIGHWAY

Paper Size A3

0 250 500

Metres

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

N

LEGEND

- BBBQ Platelets
- BBBQ Scat
- BBBQ on Remote Camera
- Watercourses
- Railway
- Road/Track
- Project Footprint
- State Forest
- Offset Areas
- BBBQ Assessment Units

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woondum to Curra)

Job Number	12534030
Revision	A
Date	09 Apr 2021

Distribution of black-breastedbutton-quails recorded in field surveys Southern Group

Figure 4-7

\\ghdnet\ghd\AU\Birtinya\Projects\41\12534030\GIS\Maps\MXD\12534030_017_Dist_of_BBBQ_Recorded_in_Field_Studies_Baseline_Survey_Report_revA.mxd

Data source: DoR: Watercourse (2010), Rail (2014), Roads (2016), Towns (2015); TMR: Imagery (2016-2019), Survey Area, Chainage, Areas Assessed (2021). GHD: Project Footprint (2020), Survey Site (2021), Offset Sites (2021). Created by:ihamilton

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4.4 General site features

A number of observations on general site features were made during the baseline surveys, including:

- Numerous locations along access tracks that feature erosion and require remediation
- Issues with access, such as locked gates that will limit access for maintenance works, unfenced areas that allowed unrestricted access to the public and potential harm to koalas and black-breasted button-quail due to accessing the rail corridor or roadway
- Past land uses such as logging and grazing. Stock were observed in some of the offset areas. Evidence of historic logging was recorded in the northern, central and southern offset areas. Given the TMR are now the land owner of all the offset areas, logging will no longer be a risk to the environmental value of the offset areas and therefore does not require management.
- Evidence of historical or recent fire
- All areas had featured localised rubbish deposition, including some potential asbestos waste and contaminated drums
- Presence of threatened flora species

The site features recorded and noted as part of recommended management measures are further described in Section 6.

5. Weed infestation

5.1 Densities and distribution

Weed species recorded in the offset area that have potential to adversely impact on koala and black-breasted button-quail habitats, together with the range of density classes recorded in various weed polygons for each species, are provided in Table 5-1. Weed polygon maps are presented in Figure 5-1.

Table 5-1 Weed species, map codes and density classes

Scientific name	Common name	Map code	Density classes# present across offset areas
Aristolochia elegans	Dutchman's pipe	Ae	2
Asparagus aethiopicus	Ground asparagus	Aa	2
Asparagus plumosus	Climbing asparagus	Ap	2
Asparagus virgatus	Asparagus fern	Av	2
Baccharis halimifolia	Groundsel bush	Bh	2
Cinnamomum camphora	Camphor laurel	Cc	2, 3
Celtis sinensis	Chinese elm	Cs	2
Dolichandra unguis-cati	Cat's claw creeper	Du	2, 3, 4, 5, 2-4, 4-5
Eugenia uniflora	Brazilian cherry tree	Eu	2
Ipomoea cairica	Coastal morning glory	Ic	2
Lantana camara	Lantana	Lc	1, 2, 3, 4, 5, 1-2, 2-3, 2-4, 3-4, 4-5
Ligustrum sinense	Small leaf privet	Ls	2
Ochna serrulata	Ochna	Os	2, 3
Passiflora suberosa	Corky passion flower	Ps	1,2, 3,4, 1-2, 2-3, 2-4, 3-4
Senna occidentalis	Coffee senna	So	2
Senna pendula	Easter cassia	Spe	4

Assigned density classes: 1 (absent); 2 (<1% cover - occasional and localised); 3 (1-10% cover - occasional and widespread); 4 (11-50% cover - common and localised or common and widespread); 5 (>50% cover - abundant and localised or abundant and widespread)

A total of 16 species of weeds were recorded in the offset area that have the potential to adversely impact on koala and/or black-breasted button quail habitats. The most prevalent weeds recorded were lantana and corky passion flower. Both species were recorded across a range of habitats but tended to be more prevalent in wetter areas (e.g. drainage lines or riparian corridors) and/or previously disturbed areas, particularly where the substrate and/or ground

layer has been previously impacted by forestry or pastoral activities. More generally, lowland areas such as drainage lines and adjacent alluvial plains supported a much higher diversity of weed species than elevated areas. Several species (*Aristolochia elegans, Asparagus virgatus, Eugenia uniflora, Ipomoea cairica, Sporobolus africanus and Sphagneticola trilobata*) were restricted to only one occurrence.

5.2 Permanent plot weed cover

Of the 16 species recorded during the density and distribution transects, 12 were recorded within the 10 x 10 m permanent plots established to monitor weed cover data over time. The percentage cover data is presented in Table 5-2 through to Table 5-5 and have been divided into southern, central and northern groupings. The total percentage cover of target weed species is given for each plot site in Table 5-6. The plot locations are shown on Figure 5-1.

Table 5-2 Weed cover data southern group AU S1-7

Plot ID		AUS1-1	AUS2-1	AUS2-2	AUS2-3	AUS3-1	AUS4-1	AUS4-2	AUS5-1	AUS6-1	AUS7-1
Year		2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Scientific name	**Common name**	**Percentage cover**									
Lantana camara	Lantana	5	3	4	9	0	30	4	0	38	5
Passiflora suberosa	Corky passion fruit vine	0	5	2	10	2	15	25	8	0	1
Dolichandra unguis-cati	Cat's claw creeper	2	0	20	0	6	2	60	0	8	0
Celtis sinensis	Chinese Celtis	7	0	0	0	0	0	0	0	0	35
Senna pendula	Cassia	1	60	0	0	0	0	0	0	0	13
Cinnamomum camphora	Camphor laurel	1	0	0	0	16	0	0	0	0	0
Ochna serrulata	Mickey mouse plant	1	1	0	0	0	0	0	0	0	0
Asparagus plumosus	Climbing asparagus	1	0	0	0	0	0	0	0	0	0
Sporobolus pyramidalis	Giant rats tail grass	0	0	0	0	0	0	0	0	0	0
Other	n/a	0	0	8	0	0	0	0	0	0	0
Senna occidentalis	Coffee senna	0	0	0	0	0	0	0	0	0	0
Baccharis halimifolia	Groundsel bush	0	0	0	0	0	0	0	0	0	0
Asparagus aethiopicus	Ground asparagus	1	0	0	0	0	0	0	0	0	1
Senna pendula	Easter cassia	0	0	0	0	0	0	0	0	0	0
Eugenia uniflora	Brazilian cherry tree	0	0	0	0	0	0	0	0	0	1

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Table 5-3 Weed cover data central group AU C1-2

Plot ID		Plot ID	AUC1-2	AUC1-3	AUC1-4	AUC2-1	AUC2-2
Year		Year	2020	2020	2020	2020	2020
Scientific name	**Common name**	**Percentage cover**					
Lantana camara	Lantana	0	35	30	0	25	65
Passiflora suberosa	Corky passion fruit vine	0	2	5	4	0	0
Dolichandra unguis-cati	Cat's claw creeper	0	0	10	2	30	0
Celtis sinensis	Chinese Celtis	0	0	0	0	0	0
Senna pendula	Cassia	0	0	0	0	0	0
Cinnamomum camphora	Camphor laurel	0	0	0	0	0	0
Ochna serrulata	Mickey mouse plant	0	0	2	40	0	8
Asparagus plumosus	Climbing asparagus	0	0	0	0	4	0
Sporobolus pyramidalis	Giant rats tail grass	0	0	0	0	0	0
Other	n/a	70	0	0	0	0	3
Senna occidentalis	Coffee senna	0	0	0	0	0	0
Baccharis halimifolia	Groundsel bush	0	0	0	0	0	0
Asparagus aethiopicus	Ground asparagus	0	0	0	0	0	0
Senna pendula	Easter cassia	0	0	0	0	0	4
Eugenia uniflora	Brazilian cherry tree	0	0	0	0	0	0

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Table 5-4 Weed cover data northern group AU N1 - 6

Plot ID		Plot ID	AUN2-1	AUN3-1	AUN3-2	AUN4-1	AUN4-2	AUN4-3	AUN5-1	AUN6-1	AUN6-2	AUN6-3	AUN6-4
Year		Year	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Scientific name	**Common name**	**Percentage cover**											
Lantana camara	Lantana	20	35	50	45	35	35	25	30	25	30	60	0
Passiflora suberosa	Corky passion fruit vine	7	15	4	2	5	3	0	0	5	5	10	0
Dolichandra unguis-cati	Cat's claw creeper	0	0	0	0	0	2	0	0	0	0	0	0
Celtis sinensis	Chinese Celtis	0	0	0	0	0	0	0	0	0	0	0	0
Senna pendula	Cassia	0	0	0	0	0	0	0	0	0	0	0	0
Cinnamomum camphora	Camphor laurel	0	0	0	0	0	0	0	0	0	0	0	0
Ochna serrulata	Mickey mouse plant	0	0	0	0	0	0	0	0	0	0	0	0
Asparagus plumosus	Climbing asparagus	0	0	0	0	0	0	0	0	0	0	0	0
Sporobolus pyramidalis	Giant rats tail grass	0	0	0	0	0	0	0	0	0	0	0	0
Other	n/a	0	0	20	0	0	3	5	0	0	70	0	0
Senna occidentalis	Coffee senna	0	0	0	0	0	2	0	0	0	0	0	3
Baccharis halimifolia	Groundsel bush	1	0	0	0	0	0	0	0	0	0	0	0
Asparagus aethiopicus	Ground asparagus	0	0	0	0	0	0	0	0	0	0	0	0
Senna pendula	Easter cassia	0	0	0	0	0	0	0	0	0	0	0	0
Eugenia uniflora	Brazilian cherry tree	0	0	0	0	0	0	0	0	0	0	0	0

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Table 5-5 Weed cover data northern group AU N7 – 9

Plot ID		Plot ID	AUN7-2	AUN7-3	AUN7-4	AUN7-5	AUN7-6	AUN7-7	AUN7-8	AUN7-9	AUN7-10	AUN8-1	AUN9-1
Year		Year	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020
Scientific name	**Common name**	**Percentage cover**											
Lantana camara	Lantana	33	40	45	20	50	55	0	0	75	20	50	45
Passiflora suberosa	Corky passion fruit vine	5	5	3	1	5	4	2	5	0	2	1	0
Dolichandra unguis-cati	Cat's claw creeper	0	0	0	0	0	0	0	0	0	0	0	0
Celtis sinensis	Chinese Celtis	0	0	0	0	0	0	0	0	0	0	0	0
Senna pendula	Cassia	0	0	0	0	0	0	0	0	0	0	0	0
Cinnamomum camphora	Camphor laurel	0	0	0	0	0	0	4	0	0	0	0	0
Ochna serrulata	Mickey mouse plant	0	0	0	0	0	0	0	0	0	0	0	0
Asparagus plumosus	Climbing asparagus	0	0	0	0	0	0	0	0	0	0	0	0
Sporobolus pyramidalis	Giant rats tail grass	0	0	0	0	0	0	0	0	0	0	0	3
Other	n/a	0	0	0	0	0	0	0	0	0	0	0	0
Senna occidentalis	Coffee senna	0	0	0	0	0	0	0	0	0	0	0	0
Baccharis halimifolia	Groundsel bush	0	0	0	0	0	0	0	0	0	0	0	0
Asparagus aethiopicus	Ground asparagus	0	0	0	0	0	0	0	0	0	0	0	0
Senna pendula	Easter cassia	0	0	0	0	0	0	0	0	0	0	0	0
Eugenia uniflora	Brazilian cherry tree	0	0	0	0	0	0	0	0	0	0	0	0

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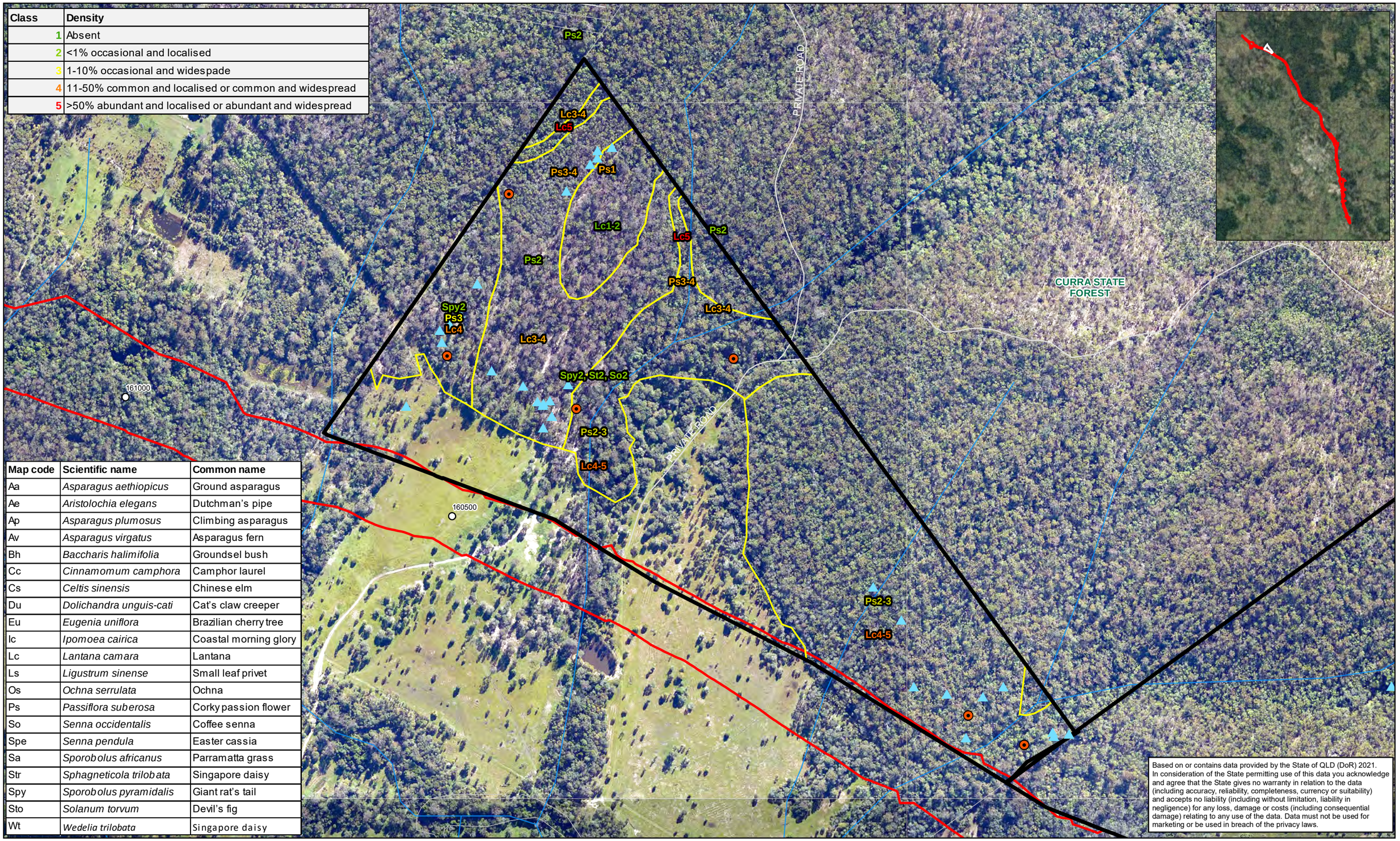
Table 5-6 Total weed cover factor for all AUs

Plot ID	Year	Total cover factor (%)
AUC1-1	2020	70
AUC1-2	2020	37
AUC1-3	2020	47
AUC1-4	2020	46
AUC2-1	2020	59
AUC2-2	2020	80
AUN1-1	2020	28
AUN2-1	2020	50
AUN3-1	2020	74
AUN3-2	2020	47
AUN4-1	2020	40
AUN4-2	2020	45
AUN4-3	2020	30
AUN5-1	2020	30
AUN6-1	2020	30
AUN6-2	2020	105
AUN6-3	2020	70
AUN6-4	2020	3
AUN7-1	2020	38
AUN7-2	2020	45
AUN7-3	2020	48
AUN7-4	2020	21
AUN7-5	2020	55
AUN7-6	2020	59
AUN7-7	2020	6
AUN7-8	2020	5
AUN7-9	2020	75
AUN7-10	2020	22
AUN8-1	2020	51
AUN9-1	2020	48
AUS1-1	2020	19
AUS2-1	2020	69
AUS2-2	2020	34
AUS2-3	2020	19
AUS3-1	2020	24
AUS4-1	2020	47
AUS4-2	2020	89
AUS5-1	2020	8
AUS6-1	2020	46
AUS7-1	2020	56

Class	Density
1	Absent
2	<1% occasional and localised
3	1-10% occasional and widespade
4	11-50% common and localised or common and widespread
5	>50% abundant and localised or abundant and widespread

Map code	Scientific name	Common name
Aa	*Asparagus aethiopicus*	Ground asparagus
Ae	*Aristolochia elegans*	Dutchman's pipe
Ap	*Asparagus plumosus*	Climbing asparagus
Av	*Asparagus virgatus*	Asparagus fern
Bh	*Baccharis halimifolia*	Groundsel bush
Cc	*Cinnamomum camphora*	Camphor laurel
Cs	*Celtis sinensis*	Chinese elm
Du	*Dolichandra unguis-cati*	Cat's claw creeper
Eu	*Eugenia uniflora*	Brazilian cherry tree
Ic	*Ipomoea cairica*	Coastal morning glory
Lc	*Lantana camara*	Lantana
Ls	*Ligustrum sinense*	Small leaf privet
Os	*Ochna serrulata*	Ochna
Ps	*Passiflora suberosa*	Corky passion flower
So	*Senna occidentalis*	Coffee senna
Spe	*Senna pendula*	Easter cassia
Sa	*Sporobolus africanus*	Parramatta grass
Str	*Sphagneticola trilobata*	Singapore daisy
Spy	*Sporobolus pyramidalis*	Giant rat's tail
Sto	*Solanum torvum*	Devil's fig
Wt	*Wedelia trilobata*	Singapore daisy



Paper Size A3

0 25 50 100 150

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

LEGEND

- 1km Chainage
- Photo Point
- Weed Survey Plots
- Watercourses
- Road/Track
- Project Footprint
- Offset Sites
- Weed Density Class
- Property Boundary

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woodnum to Curra)

Weed density classes and BioCondition sites

Job Number	12534030
Revision	A
Date	02 Jun 2021

Figure 5-1

C:\Users\SCHADW~1\AppData\Local\Temp\arcFD69\12534030_010_Weed_Density_Classes_and_ BioCondition_Sites_Baseline_Survey_Report_revA.mxd

Data source: DoR: Watercourse (2010), Cadastre (2019), Rail (2014), Roads (2016), Towns (2015); TMR: Imagery (2019). GHD: Project Footprint (2020), Offset Sites (2021), Weed Density Class (2021). Created by:schadwick

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Class	Density
1	Absent
2	<1% occasional and localised
3	1-10% occasional and widespade
4	11-50% common and localised or common and widespread
5	>50% abundant and localised or abundant and widespread

Map code	Scientific name	Common name
Aa	*Asparagus aethiopicus*	Ground asparagus
Ae	*Aristolochia elegans*	Dutchman's pipe
Ap	*Asparagus plumosus*	Climbing asparagus
Av	*Asparagus virgatus*	Asparagus fern
Bh	*Baccharis halimifolia*	Groundsel bush
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Sa	*Sporobolus africanus*	Parramatta grass
Str	*Sphagneticola trilobata*	Singapore daisy
Spy	*Sporobolus pyramidalis*	Giant rat's tail
Sto	*Solanum torvum*	Devil's fig
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Paper Size A3

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Metres

Map Projection: Universal Transverse Mercator
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LEGEND

- 1km Chainage
- Photo Point
- Weed Survey Plots
- Watercourses
- Road/Track
- Project Footprint
- Offset Sites
- Weed Density Class
- Property Boundary

Department of Transport and Main Roads
Bruce Highway Cooroy to Curra
(Section D: Woodnum to Curra)

Job Number 12534030
Revision A
Date 02 Jun 2021

Figure 5-1
Weed density classes and BioCondition sites

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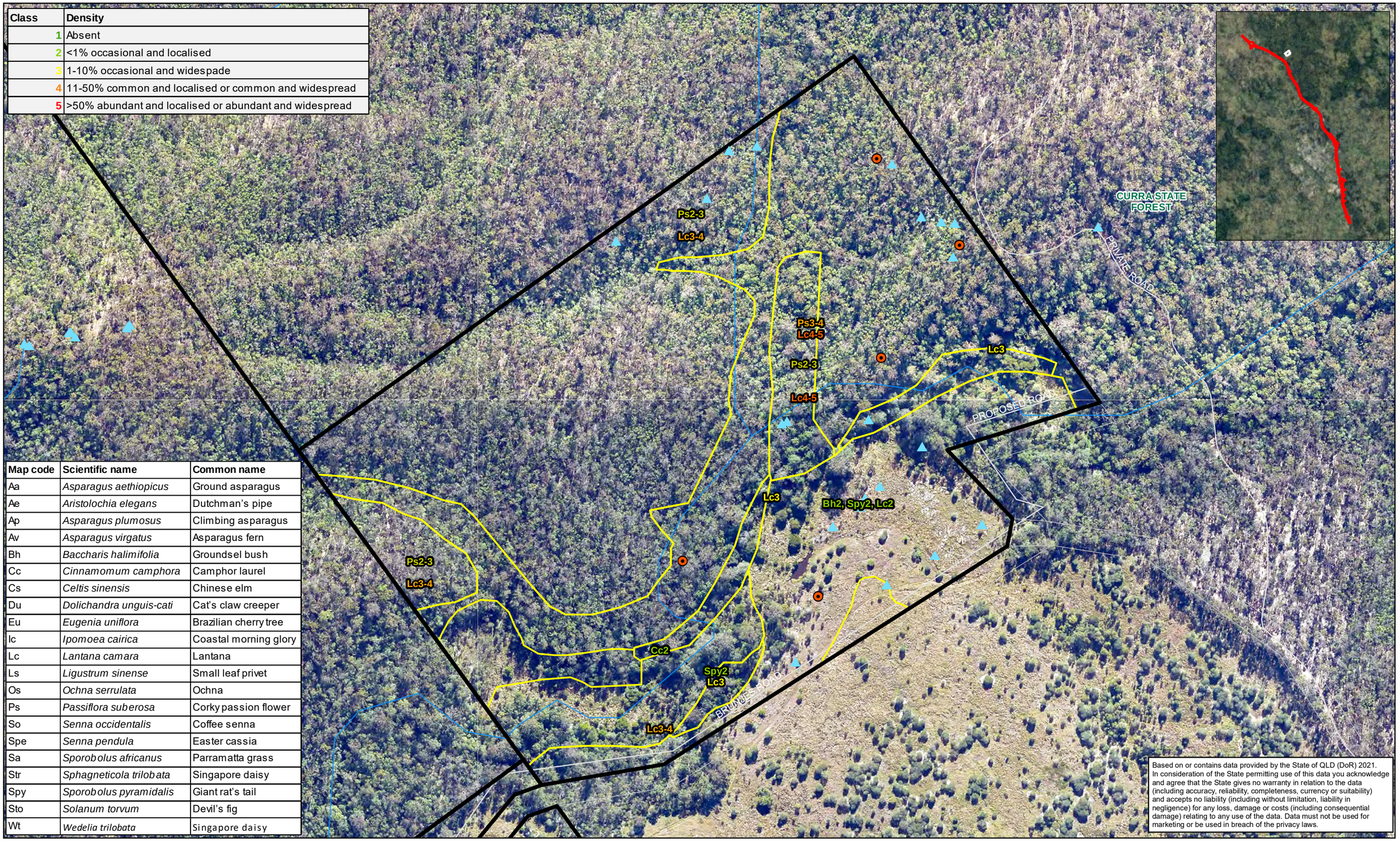

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Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
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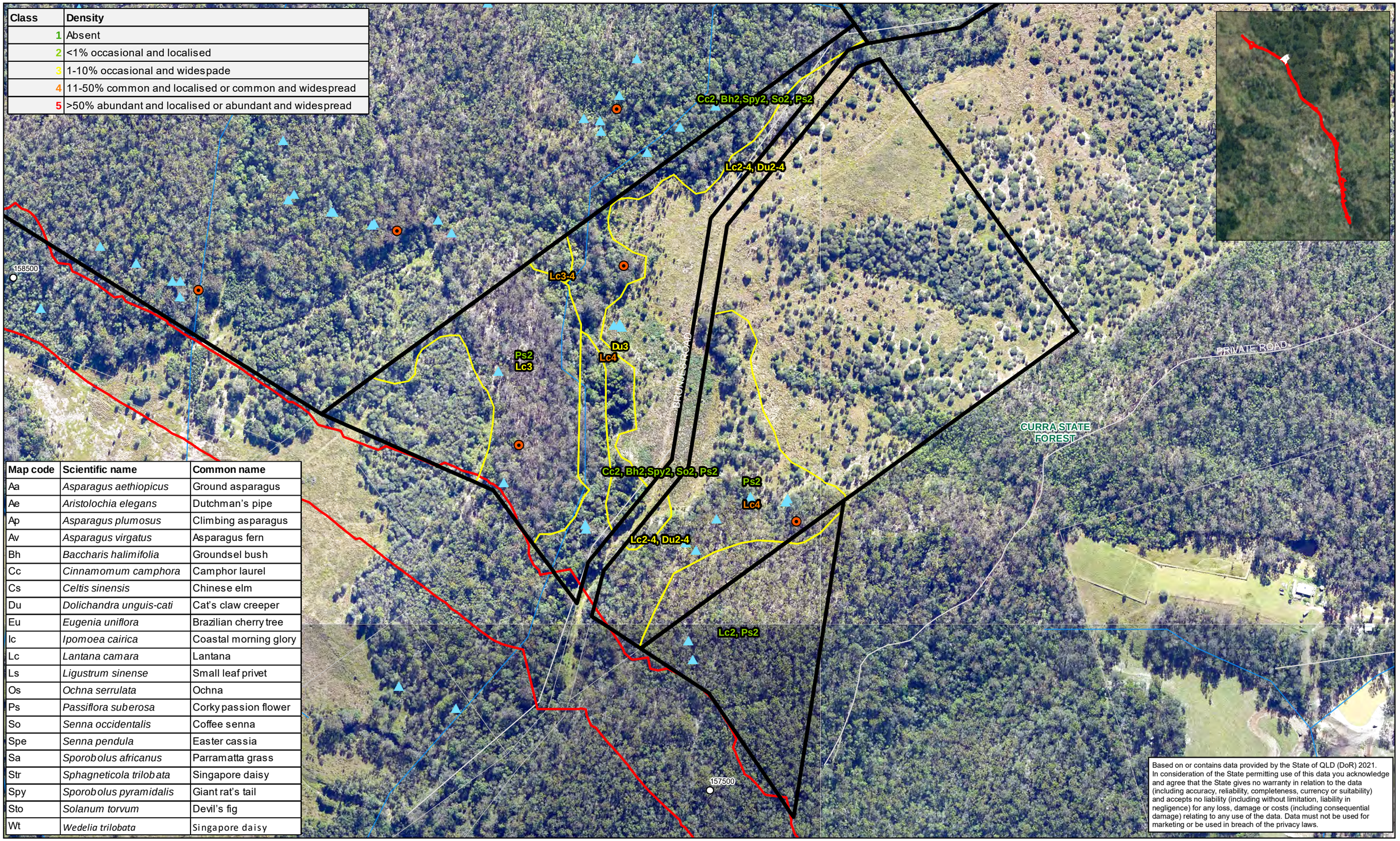

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Bruce Highway Cooroy to Curra
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Figure 5-1
Page 4 of 9

Weed density classes and BioCondition sites

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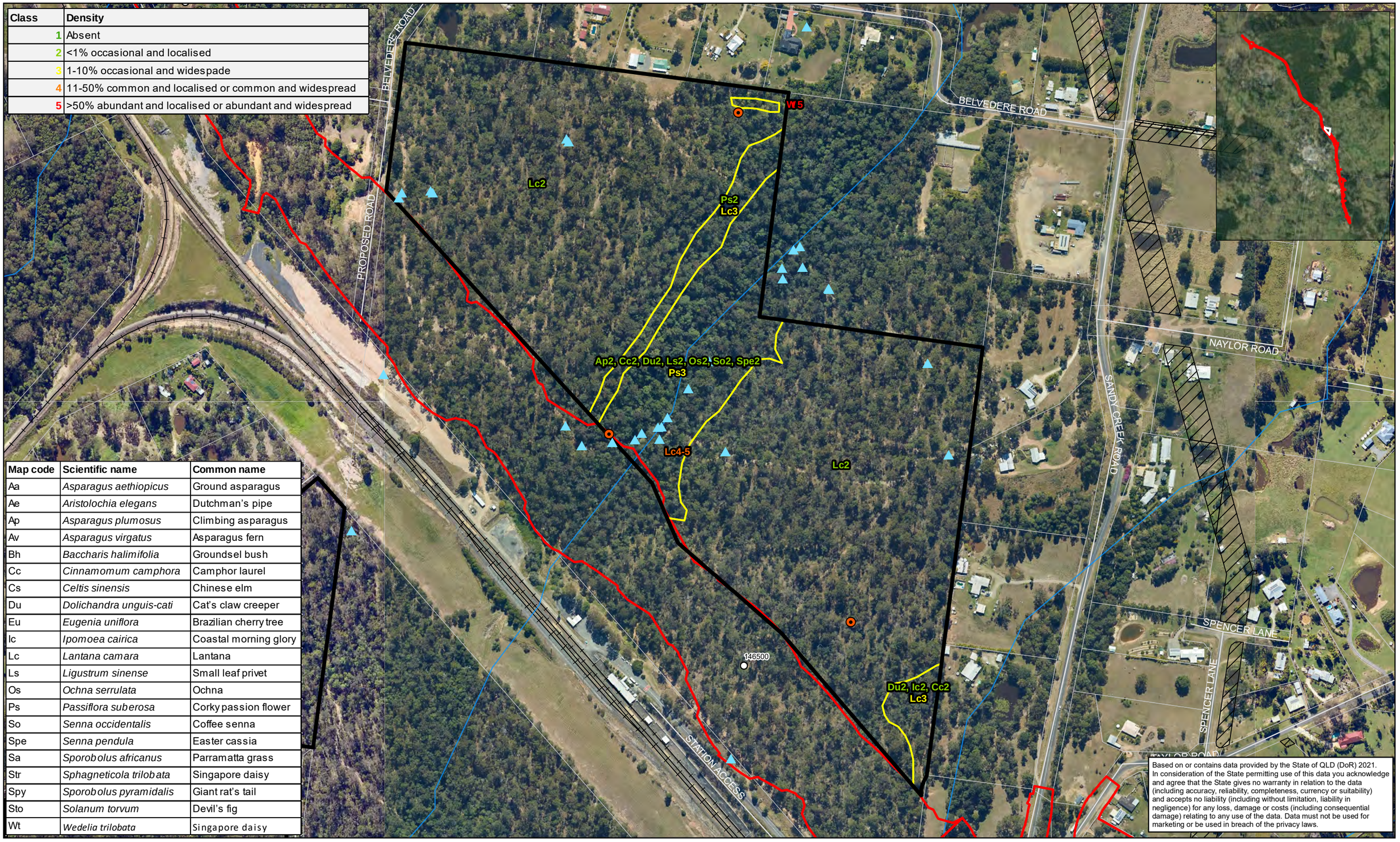

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Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
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Weed density classes and BioCondition sites

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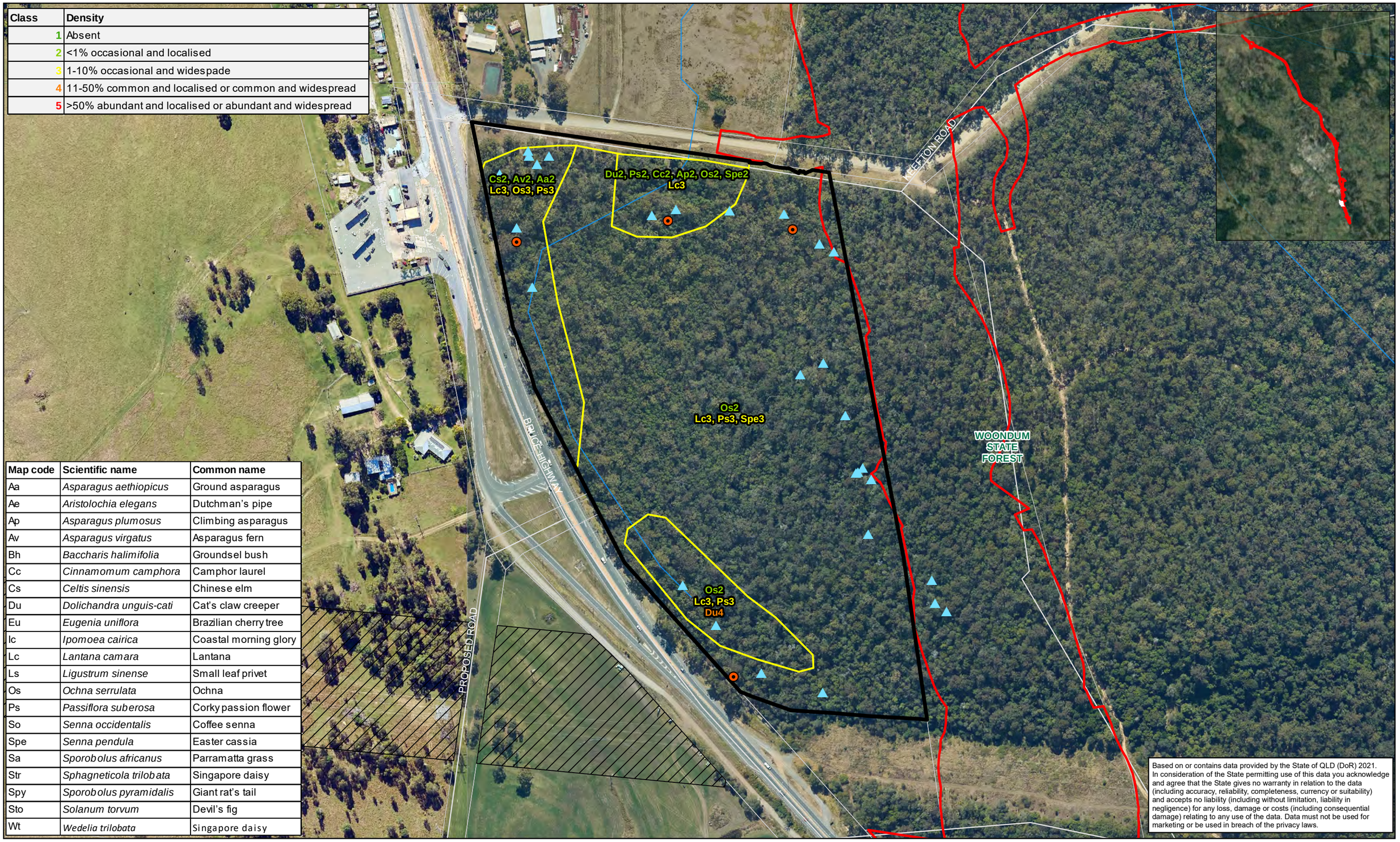

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Department of Transport and Main Roads
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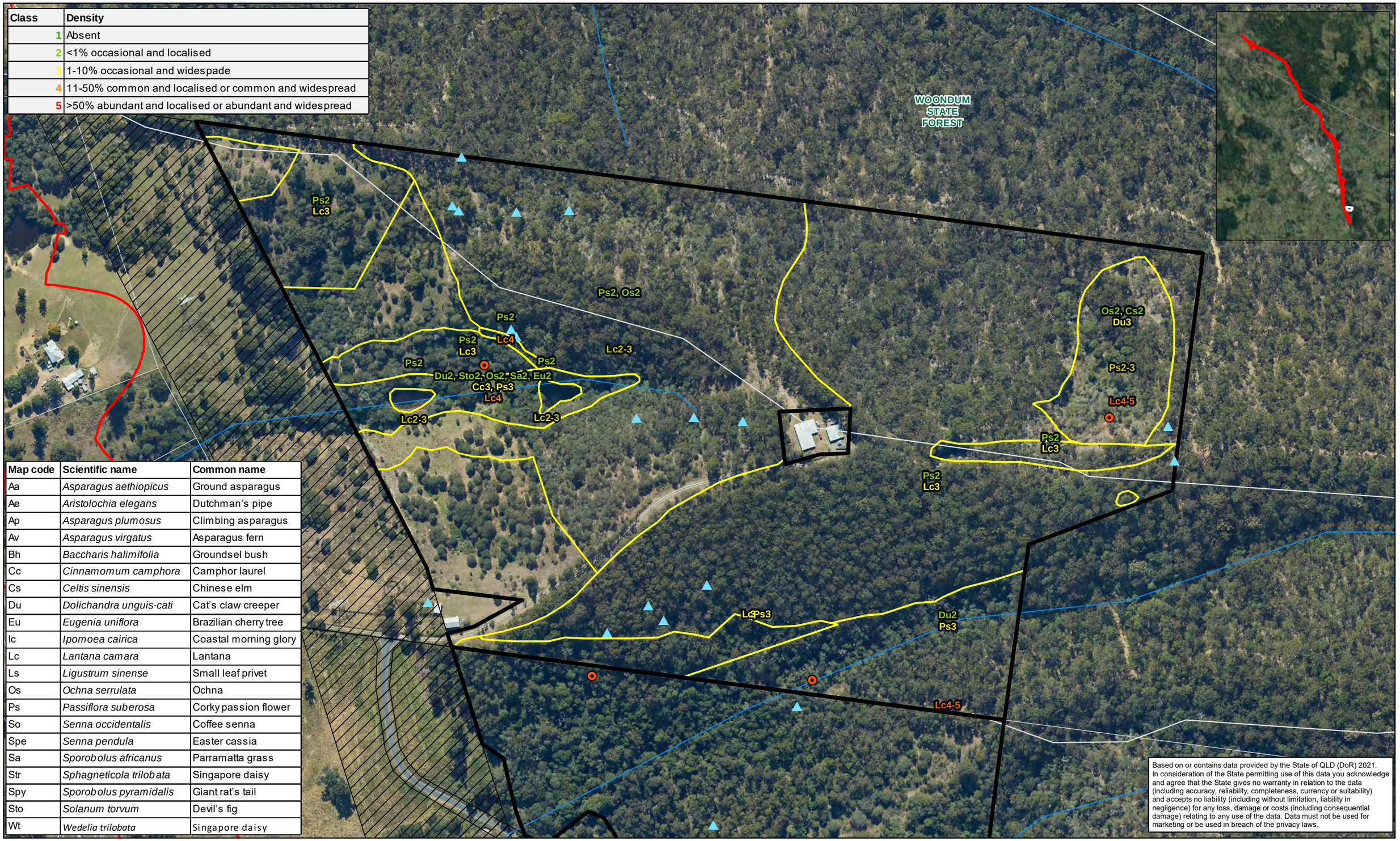

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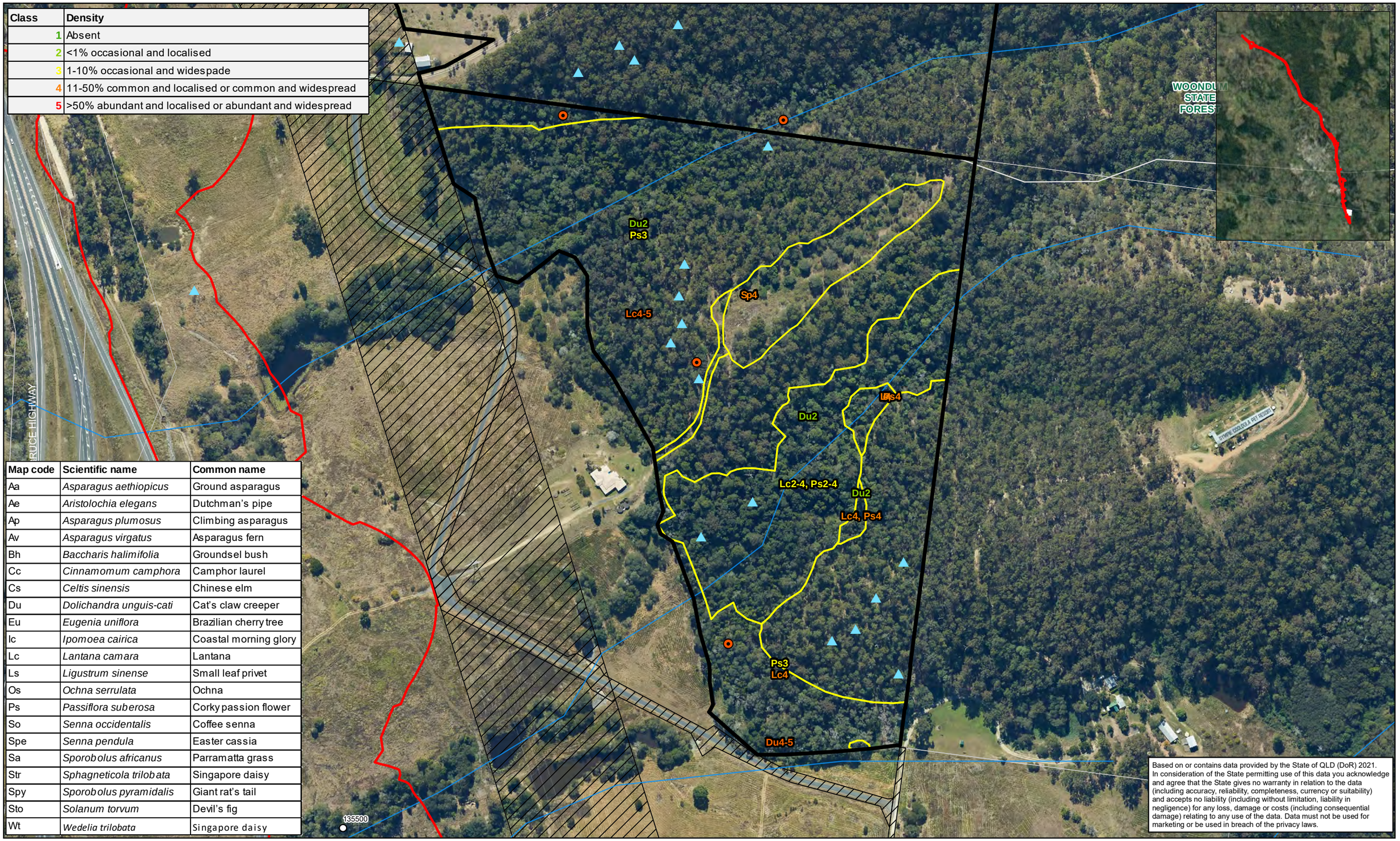

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6. Management recommendations

6.1 Overview

In order to achieve the ecological outcomes as specified in Section 4.5.1 of the OMP, management of each offset area is required. This report has documented the baseline (current) status of the offset areas to provide suitable habitat conditions and demonstrate the achievement of ecological outcomes and performance criteria over time. The offset areas will be actively managed over the life of the EPBC Act approval conditions (until performance indicators and completion criteria have been met) to demonstrate achievement of the ecological outcomes through the following key management measures:

- Targeted and staged weed control
- Natural recruitment/regeneration of native vegetation including strategic replanting with koala food trees or replacement vine species that provide cover for the black-breasted button-quail
- Management of fire risk
- Disease management
- Pest animal management which will be completed by a separate Contractor
- Waste removal
- Erosion and sediment control
- Erection and removal of fencing including management of public access.

Locations where specific management issues or general site features were recorded during the baseline survey are shown on Figure 6-1. Figure 6-1 includes spatial data for all historical records of threatened plants recorded throughout the offset areas. All Contractors engaged on the project should be made aware of the presence of these individuals to ensure their protection

Recommended management measures are detailed in the following sections. Performance outcomes are provided for each species in Section 6.2 and Table 6-1. Detail on management measures are presented per offset area in Table 6-5.

6.2 Ecological outcomes and performance indicators

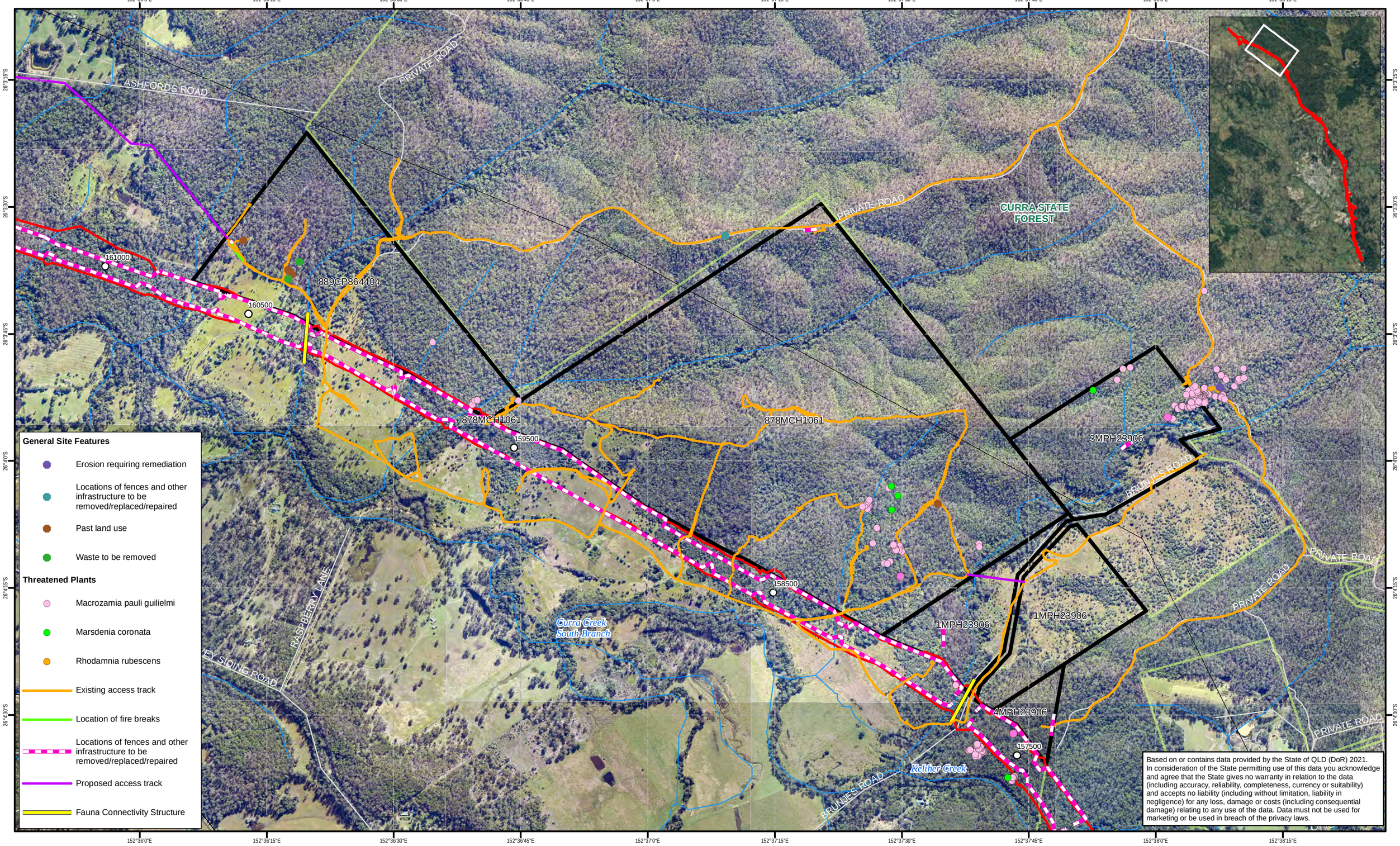
Table 4-4 and Table 5-3 of the OMP outline ecological outcomes and performance indicators for management of offsets for the koala and black-breasted button-quail respectively. These outline performance indicators for the duration of the EPBC Act approval. For the purposes of this report, performance indictors relevant to the first 12 months of the project (performance indicator 1) have been provided for each species in Table 6-1 below (excluding pest abundance outcomes and indicators).

Table 6-1 Performance indicators and completion criteria for offset areas

Ecological outcome	Performance Indicator 1
Koala offset areas	
No net loss in the quality and extent of koala habitat	Within 12 months of baseline survey, implement monitoring program to monitor habitat quality and extent
Demonstrate a 20% increase in koala food tree recruitment over the entire koala offset areas	Within 12 months of baseline survey, develop and implement an ongoing koala food tree replanting program AND identify areas suitable for natural recruitment of koala food trees, over a minimum of 57 ha
Targeted weed infestations have been reduced	Within 3 years of baseline survey, demonstrate a 50% reduction in targeted weed infestations
Demonstrate an increase of at least 50% of koala density/ utilisation	Within six months of legally securing, undertake a koala presence survey to indicate baseline koala density/utilisation
Black-breasted button-quail offset areas	
No net loss in the quality and extent of black-breasted button-quail habitat	Within 12 months of baseline survey, implement monitoring program to monitor habitat quality and extent
Targeted weed infestations have been reduced	Within 3 years of baseline survey, demonstrate a 50% reduction in targeted weed infestations

6.3 Timing and frequency

The timing, frequency, monitoring, trigger for remedial activities and potential remedial activities are detailed within the relevant sections of Section 4.5 of the OMP for natural regeneration and revegetation, weed management, land use and access which includes access and fencing. These are to be applied for the first year of monitoring (2021/2022) which consideration of revision following this first monitoring event.



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LEGEND

- 1km Chainage (m)
- Watercourses
- Railway
- Road/Track
- Project Footprint
- State Forest
- Offset Lots

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woondum to Curra)

Locations of site features and management activities

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Figure 6-1
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Data source: DoR: Watercourse (2010), Rail (2014), Roads (2016), Towns (2015); TMR: Imagery (2016-2019), Survey Area, Chainage, Areas Assessed (2021). GHD: Project Footprint (2020), Survey Site (2021), Offset Sites (2021). Created by:schadwick

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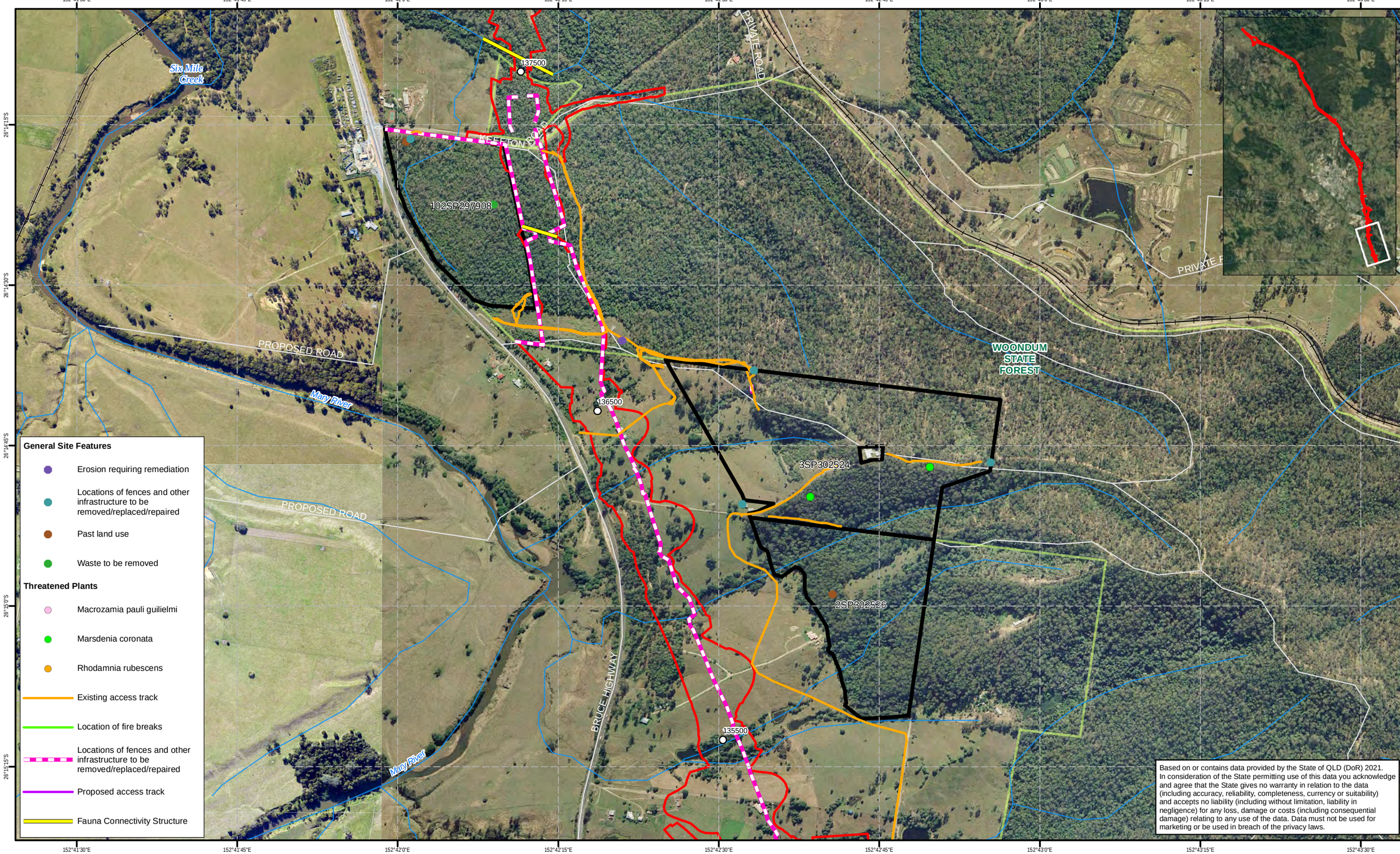

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LEGEND

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Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woondum to Curra)

Locations of site features and management activities

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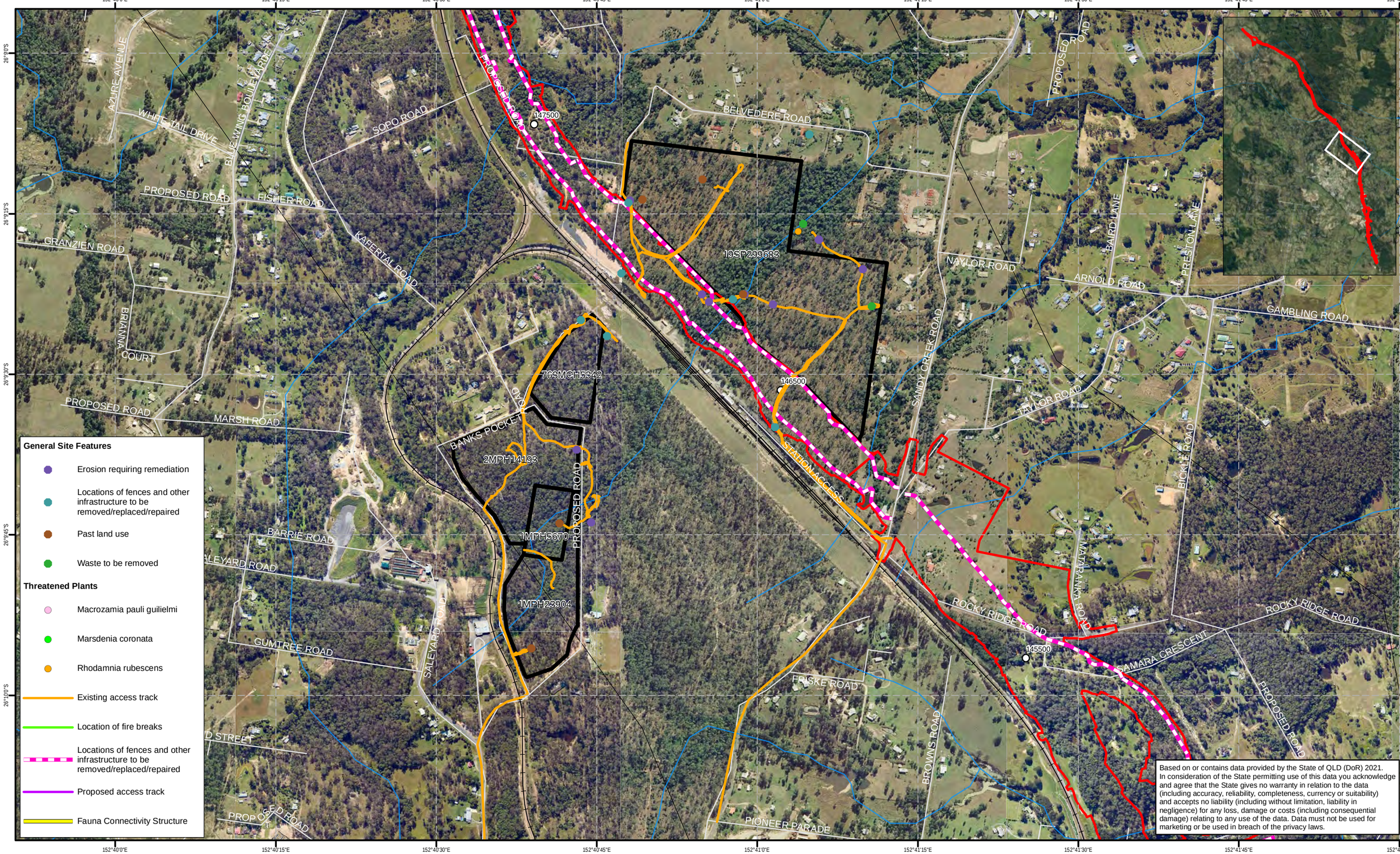

General Site Features

- Erosion requiring remediation
- Locations of fences and other infrastructure to be removed/replaced/repaired
- Past land use
- Waste to be removed

Threatened Plants

- Macrozamia pauli guilielmi
- Marsdenia coronata
- Rhodamnia rubescens
- Existing access track
- Location of fire breaks
- Locations of fences and other infrastructure to be removed/replaced/repaired
- Proposed access track
- Fauna Connectivity Structure

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LEGEND

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Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woondum to Curra)

Locations of site features and management activities

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6.4 Weed management

As indicated in Section 5, 16 species of weeds were recorded in the offset areas that have the potential to adversely impact on koala and/or black-breasted button-quail habitats. While most of those species occurred in low densities, two species, *Lantana camara* and *Passiflora suberosa,* were abundant and widespread. The BioCondition attribute with the lowest relative average score and therefore the greatest capacity for improvement was non-native plant cover. An opportunity therefore exists to improve the condition of koala and black-breasted button-quail habitats by reducing the abundance and/or extent of invasive weeds.

Potential impacts of weed invasion include:

- Direct loss of habitat quality
- Competition with native species for space, nutrients and water
- Altered habitat and removal of food resources
- Restricted koala and black-breasted button-quail movement
- Altered fire regimes
- Changes in geophysical processes such as erosion, hydrology, nutrient cycling

A weed control program is required to be developed and implemented by an experienced and qualified weed control specialist contractor in accordance with Section 4.5.4 and Section 5.5.4 of the OMP. The OMP also identifies the management actions, monitoring, triggers for remedial action, compliance criteria and reporting requirements to assist in achieving the ecological outcome *'Targeted weed infestations have been reduced'* and Performance Indicator 1 *'Within 3 years of baseline survey, demonstrate a 50% reduction in targeted weed infestations'.*

Given the considerable size of the offset areas, blanket weed control across each offset area is considered impractical and cost prohibitive. Rather, it is intended that areas of denser infestations of lantana and corky passion flower are targeted as well as areas that possess one or more weed species that are known to be highly invasive with potential to substantially impact on koala or black-breasted button-quail habitats within the next 5 to 10 years. It is also intended to target small, isolated infestations that can be easily controlled before expanding beyond the footprint of their local occurrence.

The following general weed management measures are also applicable to all offset areas:

- Map any new populations of weeds that have the potential to adversely impact on koala and/or black-breasted button-quail habitats.
- Access within offset areas should be limited and hygiene controls should be implemented by all contractors. Vehicles should remain on existing tracks and should be free of weeds before entering an offset area.
- Control of weed infestations is to be implemented without the use of heavy machinery to avoid disturbance to surrounding areas.
- Where chemical control is applied, herbicide selection should take into account registered uses under Queensland legislation and any potential off-target impacts to flora and fauna and aquatic habitat. Recommended control measures are provided by Department of Agriculture and Fisheries (DAF) at their website http://www.daff.qld.gov.au/plants/weeds-pest-animals-ants/weeds/a-z-listing-of-weeds. Where herbicide control is required in such areas, it should be carefully targeted and the product should be specifically manufactured for low aquatic toxicity.

- Ensure use of pesticides is undertaken by appropriately licenced contractors and in accordance with the label and retain records of spray activities.
- Require all contractors to implement best practise hygiene control.
- Obtain biosecurity certificates certifying that all imported topsoils and/or mulches are free of prohibited or restricted biosecurity matters.
- Ensure construction plant and vehicles operating in the offset areas undergo a clean down in accordance with *DAF Vehicle and machinery cleandown procedures* prior to movement out of the biosecurity-contaminated area.

6.5 Natural regeneration and revegetation

The management of areas identified for natural regeneration and revegetation should be managed in accordance with Table 4-5 of the OMP, as appropriate. Table 4-5 of the OMP also identifies the management actions, monitoring, triggers for remedial action, compliance criteria and reporting requirements to assist in achieving the ecological outcome *'Demonstrate a 20% increase in koala food tree recruitment over the entire koala offset areas'* and Performance Indicator 1 '*Within 12 months of baseline survey, develop and implement an ongoing koala food tree replanting program AND identify areas suitable for natural recruitment of koala food trees, over a minimum of 57 ha*'.

Areas identified for natural recruitment and replanting are shown in Figure 6-2 with the approximate areas identified provided in Table 6-2 and Table 6-3, mapped at approximately 57.4 ha in total area. The areas given are approximate only. Due to the Performance Indicator 1 stating a minimum requirement of 57 ha, it is recommended that the replanting program and natural recruitment management is undertaken across the maximum available areas on the lots as per Table 6-2 and Table 6-3.

6.5.1 Natural regeneration

During the baseline surveys, areas located within the offset areas that are considered suitable for natural regeneration were identified, typically areas containing mapped high value regrowth or field-verified as currently supporting juvenile Eucalypt food tree individuals. Areas for natural recruitment were identified across five of the 13 offset lots as described in Table 6-2 and shown in Figure 6-2. Notably, no areas for natural regeneration have been specifically targeted within the central offset areas as these properties currently include remnant bushland with less capacity for improvement through natural recruitment.

Table 6-2 Natural regeneration areas

Group	Offset area name	Offset area (lot on plan)	Approximate area (ha)
South	K-OA2 / BBBQ-OA2	3SP302524	4.8
North	K-OA5	1MPH23906	6.2
North	K-OA6	3MPH23906	0.6
North	K-OA7	878MCH1061	15.6
North	K-OA8	889CP864404	0.5
		Total area for natural recruitment	**27.7 ha**

6.5.2 Revegetation areas

Potential areas for revegetation via replanting have been identified on seven of the 13 offset lots within the northern and southern groupings, as shown in Figure 6-2. These areas typically contain cleared, non-remnant land and some areas of regrowth vegetation. Notably, no areas for revegetation have been identified on the central offset areas as these properties currently include remnant bushland with fewer areas available for replanting. Areas for replanting with koala food trees are as described in Table 6-3.

Rehabilitation plans will be required to be prepared for each replanting site to outline objectives, constraints and methods (i.e. site preparation, revegetation works, including species selection and densities) and ongoing maintenance in order to achieve the ecological outcomes as identified in Section 4.5.3 and Section 5.3.3 of the OMP.

Table 6-3 Revegetation areas

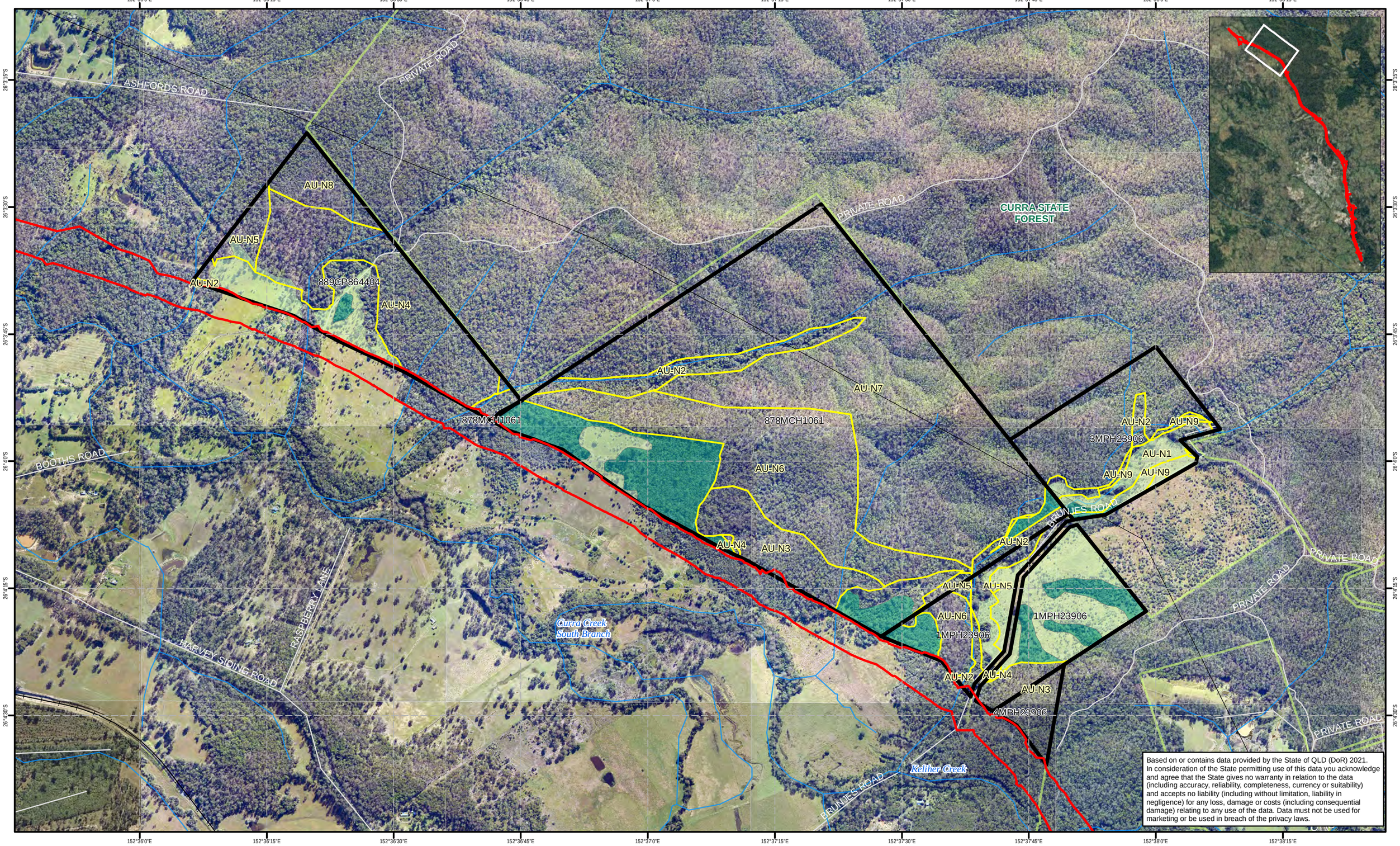
Group	Offset area name	Offset site (lot on plan)	Approximate area (ha)
North	K-OA5	1MPH23906	12.1
North	K-OA6	3MPH23906	4.6
North	K-OA7	878MCH1061	2.5
North	K-OA8	889CP864404	6.9
South	K-OA1 / BBBQ-OA1	2SP302526	1.1
South	K-OA2 / BBBQ-OA2	3SP302524	2.2
South	K-OA3 / BBBQ-OA3	102SP297908	0.3
Total area for revegetation			**29.7 ha**

Vine replacement

In addition, a staged native vine replacement program is required to be undertaken on the three southern offset sites (Table 6-4), as identified as BBBQ-OA on Figure 6-2. As stated in Table 6-4 the total area requiring staged vine replacement is approximately 24 ha which will be staged to occur based on the weed staging program developed by the Revegetation Contractor. Vine replacement is required to occur as soon as practicable following treatment of lantana in accordance with Table 5-4 of the OMP to provide compensatory habitat for the black-breasted button-quail habitat.

Table 6-4 Offset area identified for staged vine replacement

Group	Offset area label and grouping	Offset site (lot on plan)	Vine replacement (ha)
South	BBBQ-OA1	2SP302526	12.8 ha
South	BBBQ-OA2	3SP302524	Nil.
South	BBBQ-OA3	102SP297908	11.2 ha
Total area for vine replacement			**24 ha**



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LEGEND

- Watercourses
- Railway
- Road/Track
- Project Footprint
- State Forest
- Offset Areas
- Koala Assessment Units
- Natural Recruitment
- Planting

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woondum to Curra)

Rehabilitation and revegetation areas Northern Group

Job Number	12534030
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Figure 6-2
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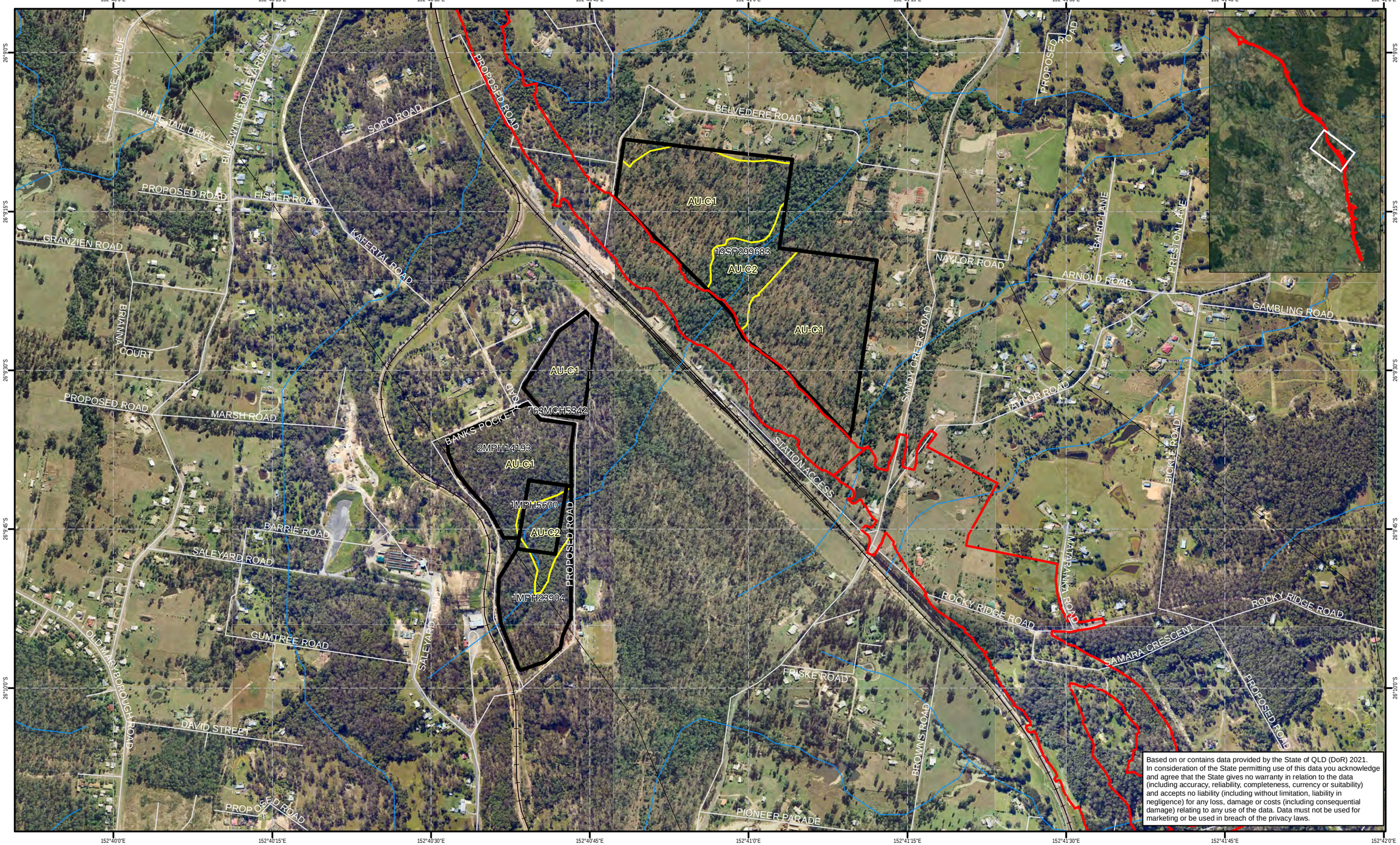

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Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woondum to Curra)

Rehabilitation and revegetation areas Central Group

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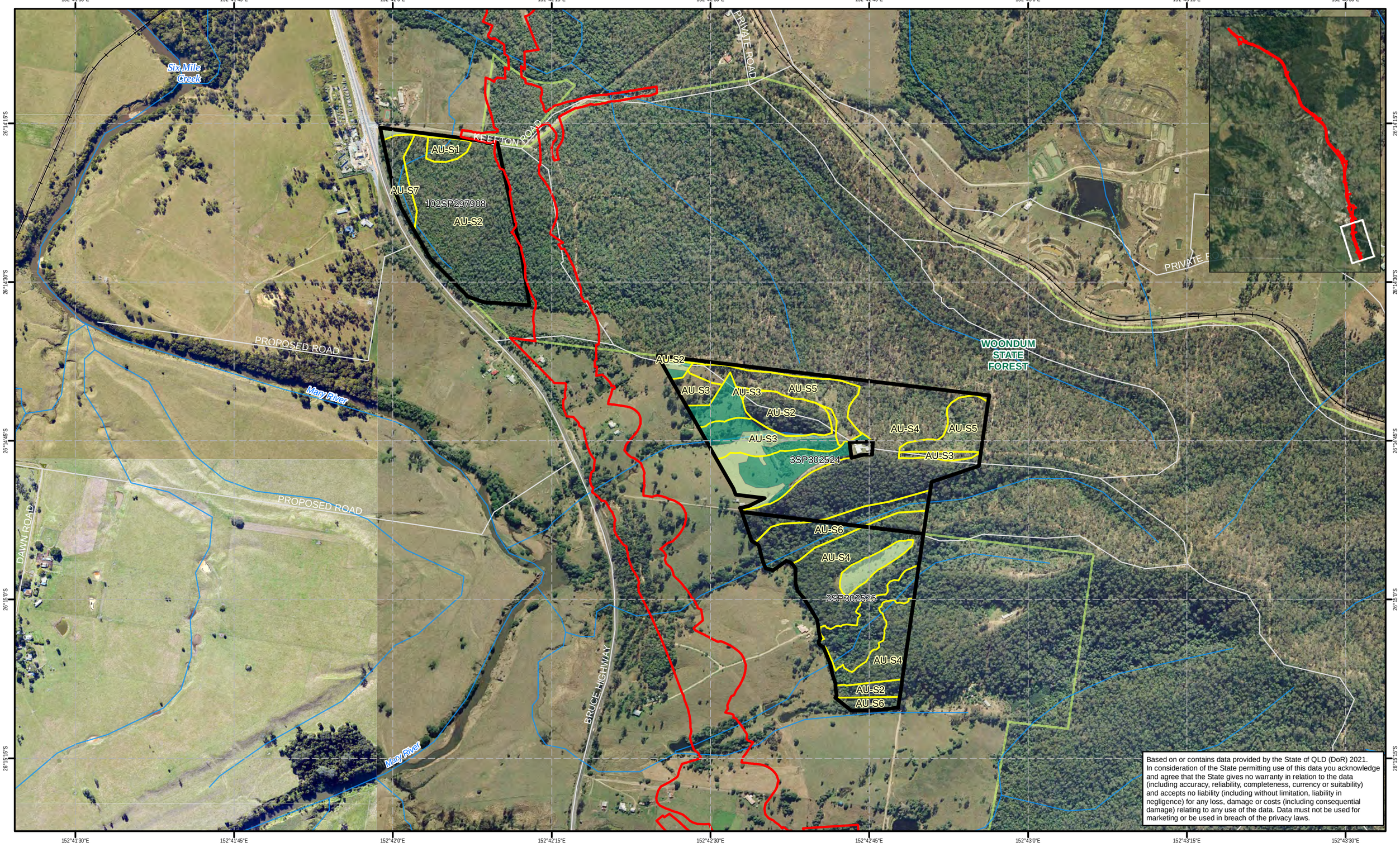

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- Koala Assessment Units
- Natural Recruitment
- Planting

Department of Transport and Main Roads

Bruce Highway Cooroy to Curra
(Section D: Woondum to Curra)

Rehabilitation and revegetation areas Southern Group

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Figure 6-2
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6.6 Fire management

6.6.1 Fire risk reduction

Fire evidence was recorded on majority of the northern and central offset areas, albeit old evidence. However, a recent fire was recorded on one of the northern offset areas (K-OA8 Lot 889 on CP864404). The fire took place in the south western corner of the property and as a result Qld Fire Services did undertake some vegetation clearing to accommodate for control lines, these have occurred along the ridgeline in the south-western corner.

Both koalas and black-breasted button-quail face significant threats from fire. Black-breasted button-quail are reliant on ground-level microhabitats including leaf litter and sub-canopy cover that are typically removed by fire. Fire can reduce the area and quality of habitat locally available for the black-breasted button-quail if fire events are too frequent or extensive (Hughes and Hughes 1991; Garnett and Crowley 2000). Similarly, koalas face significant threats from fire through mortality and loss of habitat where fire events are extensive (DAWE 2020).

The following measures should be undertaken to control the risks of wildfire events:

- Clearing or maintaining existing firebreaks up to 10 m along existing fencelines and tracks within large patches of woodland to encourage mosaic burns
- Undertaking weed control within the offset areas which reduces the hazardous fuel load
- Reduced public access to offset areas
- Constructing and / or re-instating fire access tracks to provide comprehensive coverage for fire management and emergency response.
- Monitoring and maintaining fire access tracks and firebreaks. A number of existing access tracks have significant localised erosion that would prohibit fire response in an emergency.
- Reducing hazardous fuel loads by undertaking scheduled controlled burns. These should be consistent with fire management guidelines for the RE communities (i.e. generally low intensity, mosaic burns at various mid-range intervals). Controlled burns should be undertaken in consultation with DES, Local Council and Queensland Fire Services.

6.6.2 Management of fire benefits

Fire provides an opportunity to maximise the regeneration potential of degraded patches within broader offset areas, by establishing native canopy species within a fertile ashbed in an environment of reduced competition. Should a fire occur within a degraded patch, it is recommended that emerging weeds be controlled through spot spraying operations and direct seeding or planting of native species be undertaken in late spring/early summer in accordance with the following:

- Planting of canopy species should occur at a density of 1 - 2 plants per 100 m^2.
- Direct seeding of canopy species should occur at a rate of 1 kg per hectare.
- Direct seeding of native grasses at a rate of 10 kg/ha should also be considered to supplement recruitment of grasses from the native seed bank.
- Thinning of fire responsive species such as Acacias may also be necessary within the immediate vicinity of emerging canopy species and/or planted greenstock.

Mosaic burns also encourage localised regeneration of habitat, enhancing resource availability for koalas and black-breasted button-quails and other fauna species within established woodland areas. Controlled burns are recommended, as detailed in Section 6.6.1 to reduce the risk of extensive fire and encourage more mosaic burns that promote landscape heterogeneity.

6.7 Disease management

Koala populations experience negative pressures from diseases including chlamydia and Koala Retrovirus (KoRV). Chlamydia often results in reduced fertility (NRMMC 2010) and KoRV is a significant source and contributor of mortality in koalas in south-east Queensland (Hangar and Loader 2009; DERM 2011). Chlamydia is sexually transmitted and KoRV is a genetically inherited disease. While some researchers have suggested chlamydia expression is exacerbated by stress induced by habitat fragmentation and encroachment of urban pressures (Melzer et al 2000), others dispute this (Hangar and Loader 2009).

Koala habitat may also be degraded by disease that affects the quality and diversity of available food trees. Myrtle rust has emerged as a relatively recent fungal disease affecting plants on the east coast of Australia. While myrtle rust has infected a number of koala food tree species, it is not currently considered a significant threat to koala habitat (TSSC 2012). *Phytophthora cinnamomi (*phytophthora) is disease that has caused significant localised die-back of forests and woodland communities in specific climatic zones throughout Australia (DoEE 2018). In Queensland, most impacts have been reported from communities with acidic soils including notophyll forests in north Queensland and wallum habitats in south-east Queensland. Sclerophyll woodlands in south-east Queensland have not experienced substantial phytophthora induced dieback. While neither disease is considered a significant threat to the koala, they represent an issue that requires ongoing monitoring.

However, the following management measures are recommended to prevent the potential of an introduction of diseases into the offset areas:

- Monitoring of disease in koalas within the offset areas. This includes:
  - Assessment and treatment (if necessary) of any koalas actively handled during clearing or monitoring activities (i.e. any koalas subject to radiotracking or relocation)
  - Assessment and recording of the incidence of disease in monitoring via remote surveillance cameras and visual assessments
- Implementing biosecurity hygiene protocols in any active land management including weed control, movement of soil, planting that could introduce or spread disease. This includes:
  - Import only certified clean materials (e.g. vegetative)
  - Minimise root damage during weed management, revegetation and rehabilitation activities
  - Educate and brief all workers on hygiene controls.
- Ongoing monitoring of evidence of myrtle rust and phytophthora in BioCondition assessments.

6.8 Grazing

Northern offset areas border directly onto land that has been used for grazing of stock, predominantly cattle and horses. Stock were still observed in these areas during the baseline surveys. Offset areas are not extensively fenced. Stock incursions into offset areas are likely and have the potential to restrict the establishment and development of natural regeneration and replanting areas through trampling and direct grazing pressures. Areas immediately adjacent to grazing areas have edge effects that will also limit the growth and development of vegetation in offset areas. The following measures should be implemented to restrict grazing pressures:

- De-stocking resumed properties adjacent to the offset areas.
- Installation of stock fences adjacent in select properties in northern offset areas.

- Allowing areas adjacent to cleared land to regenerate to reduce the edge effects on BioCondition plots.

Properties with grazing management priorities have been detailed in Table 6-5.

6.9 Access

Human access and associated impacts including rubbish deposition, erosion, track damage, and increased fire risk through arson or accidental fire events have the potential to inhibit the success of natural regeneration and native planting in offset areas. A number of properties are publicly accessible by vehicles, causing existing sources of disturbance. Northern offset properties are accessible via Curra State Forest. Central offset areas have existing bollards or gates (to exclude vehicle access) that have been compromised and by-passed by members of the public. Woondum State Forest in the south is subject to human visitation on foot, with evidence of squatting and some criminal activity. All areas had problems with localised rubbish deposition and would experience increased fire risk.

While public access has the potential to inhibit the improvement of offset areas, access limitations also have the potential to restrict management actions and emergency control measures such as fire-fighting abilities. Existing access to northern offset areas will be severed by construction of the new highway. However, access is still achievable through Curra State Forest from the east as shown on Figure 6-1. Alternatively, a shorter access route could be utilised through a property adjacent to Lot 889 on CP864404 (K-OA06) through use of an existing electrical easement (Figure 6-1). One new access track is proposed to connect Lot 889 on CP864404 (K-OA8) to Lot 1 on MPH23906 (K-OA05) (Figure 6-1). An overgrown access track was found to be present and included a waterway crossing over the tributary of Keliher Creek. The use of this existing track enables access to Lot 889 on CP864404 (K-OA8) without the requirement to clear additional native vegetation. Minor weed management of overgrown lantana will be required to be undertake to allow vehicles to access.

Tracks in all offset areas were subject to localised erosion that would limit accessibility over time, continual monitoring of track condition should occur during the biennial monitoring program. The following measures are recommended to manage access risks and opportunities:

- Construct new access tracks as shown on Figure 6-1.
- Install new exclusion bollards at all offset areas currently subject to public vehicle access.
- Removal of localised rubbish dumps that pose an injury hazard to koalas and other animals.
- Construct and / or maintain access tracks for ongoing fire, weed and pest management.
- Ongoing track maintenance as required.

6.10 Fencing

Most offset areas have some form of existing fencing being either rural fencing, stock exclusion fencing or fauna exclusion fencing. The northern offset areas back directly onto grazing properties and have existing stock fences that are in a state of disrepair. Wherever grazing will continue on adjacent properties, fencing needs to be re-established to prevent stock incursions into the offset areas. Fauna exclusion fencing will be erected along the southern boundaries of K-OA5, K-OA7 and K-OA8 as part of the adjacent project (Figure 6-1). In addition, the adjacent project will include directive fencing towards a fauna connectivity structure to be constructed underneath the new highway which will maintain connectivity for koalas to traverse east/west following the construction of the project (Figure 6-1).

Central offset areas are located close to housing, with bushland areas utilised for bushwalking and other public amenities. While formalisation of the existing fencing is required in places, the main priority in central offset areas will be the installation of bollards or gates to exclude public vehicle access. Fauna exclusion fencing will be erected along the southern boundary of K-OA13 as part of the adjacent project (Figure 6-1).

The western boundary of K-OA3/BBBQ-OA3 which is one of the southern offset areas currently includes fauna exclusion fencing along the western boundary adjacent to the Old Bruce Highway (Figure 6-1). New fauna exclusion fencing will be erected along eastern boundary following construction of adjacent project which will include directional fencing towards a fauna underpass. The direction fencing and underpass will maintain connectivity between K-OA3/BBBQ-OA3 and Woondum State Forest further to the east (Figure 6-1). K-OA1/BBBQ-OA1 may require localised stock fencing to demarcate boundaries of the areas under offset management without restricting movement of koalas or black-breasted button-quails to keep stock from trampling these areas. However, it is recommended that no property boundary fencing should be established on either K-OA1/BBBQ-OA1 or K-OA2/BBBQ-OA2 due to connection with Woondum State Forest to the east.

A summary of fencing and other management recommendations is outlined in Table 6-5. These recommendations will be required to be revisited during the first biennial monitoring vent in late 2021.

Table 6-5 Summary of management actions on each offset area

Group	Offset areas	Offset management goals*	Weed infestation	Vegetation management	Access	Human trespass	Waste removal	Bushfire	Grazing / fencing
North	K-OA5 Lot 1 MPH23906	• Areas of regrowth and non-remnant to be rehabilitated • Control weed infestations • Pest fauna control program • Prevent access to adjacent road corridor • Improve connectivity to adjacent habitat areas	Staged control of weeds *Lantana camara* *Passiflora suberosa* *Sporobolus pyramidalis* *Senna occidentalis* *Dolichandra unguis-cati* *Cinnamomum camphora* *Baccharis halimifolia*	Strategic replanting and natural regeneration, refer Figure 6-3.	Track maintenance/ erosion control Construction of a new access track along eastern boundary of construction project to connect to K-OA07.	Nil.	Nil.	Firebreaks required and construction/ maintenance of access trails	Fencing/stock exclusion unlikely to be required where areas identified for strategic replanting and natural regeneration are established. Fauna exclusion fencing will be erected along south-western boundary following construction of the project. Directional fencing will be constructed to direct fauna to the use of a fauna crossing structure being constructed underneath the new highway to allow for east/west connectivity.
North	K-OA6 Lot 3 MPH23906	• Areas of regrowth and non-remnant to be rehabilitated • Control weed infestations • Pest fauna control programs	Staged control of weeds *Lantana camara* *Passiflora suberosa* *Sporobolus pyramidalis* *Cinnamomum camphora* *Baccharis halimifolia*	Strategic replanting and natural regeneration, refer Figure 6-3.	Track maintenance/ erosion control	Nil.	Nil.	Firebreaks required and construction/ maintenance of access trails	Fencing/stock exclusion on south-western boundary where adjacent land owner is keeping stock.
North	K-OA7 Lot 878 MCH1061	• Areas of regrowth and non-remnant to be rehabilitated • Control weed infestations • Pest fauna control program	Staged control of weeds *Lantana camara* *Passiflora suberosa*	Strategic replanting and natural regeneration, refer Figure 6-3.	Formalisation of overgrown existing access track to connect to Lot 1 on MPH23906 (K-OA5). Weed management required along unused track.	Nil.	Nil.	Firebreaks required and construction/ maintenance of access trails	De-stocking and fencing to exclude stock. Fauna exclusion fencing will be erected along south-western boundary following construction of the project.
North	K-OA8 Lot 889 CP864404	• Areas of regrowth and non-remnant to be rehabilitated • Control weed infestations • Pest fauna control program • Prevent access to adjacent road corridor • Improve connectivity to adjacent habitat areas	Staged control of weeds *Lantana camara* *Passiflora suberosa* *Sporobolus pyramidalis* *Sphagneticola trilobata* *Senna occidentalis*	Strategic replanting and natural regeneration, refer Figure 6-3.	New access track is required – existing access track will be cut by project. Consideration of utilising access from Ashfords Road through existing electrical easement.	Nil.	Localised waste piles to be removed Small rubbish pile present possibly asbestos refer Figure 6-1.	Firebreaks required and construction/ maintenance of access trails	De-stocking and fencing to exclude stock which may occur due to construction of project. Fauna exclusion fencing will be erected along south-western boundary following construction of the project. Directional fencing will be

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Group	Offset areas	Offset management goals*	Weed infestation	Vegetation management	Access	Human trespass	Waste removal	Bushfire	Grazing / fencing
									constructed to direct fauna to the use of a fauna crossing structure being constructed underneath the new highway to allow for east/west connectivity.
Central	K-OA9 Lot 1 MPH23904	• Control weed infestations • Pest fauna control program • Restrict vehicle access	Staged control of weeds *Lantana camara* *Passiflora suberosa* *Senna pendula* *Dolichandra unguis-cati* *Ochna serrulata* *Solanum torvum* *Spagneticola trilobata* *Wedelia trilobata*	Nil.	Track maintenance/ erosion control	Access restriction required – existing track bollards ineffective	Nil.	Firebreaks required and construction/ maintenance of access trails	Offset area close to housing, with bushland areas utilised for bushwalking and other public amenities. While formalisation of the existing fencing is required in places, the main priority in central offset areas will be the installation of bollards or gates to exclude public vehicle access.
Central	K-OA10 Lot 1 MPH5670	• Control weed infestations • Pest fauna control program • Restrict vehicle access	Staged control of weeds *Passiflora suberosa* *Senna pendula* *Dolichandra unguis-cati* *Ochna serrulata* *Solanum torvum* *Spagneticola trilobata* *Wedelia trilobata*	Nil.	Track maintenance/ erosion control	Access restriction required – existing track bollards ineffective	Nil.	Firebreaks required and construction/ maintenance of access trails	
Central	K-OA11 Lot 2 MPH14193	• Control weed infestations • Pest fauna control program • Restrict vehicle access	Staged control of weeds *Lantana camara*	Nil.	Track maintenance/ erosion control	Access restriction required – existing track bollards ineffective	Nil.	Firebreaks required and construction/ maintenance of access trails	
Central	K-OA12 Lot 763 MCH5342	• Control weed infestations • Pest fauna control programs • Prevent access to adjacent railway corridor • Restrict vehicle access	Staged control of weeds *Lantana camara*	Nil.	Track maintenance/ erosion control	Access restriction required – existing track bollards ineffective	Nil.	Firebreaks required and construction/ maintenance of access trails	
Central	K-OA13 Lot 19 SP299683	• Control weed infestations • Pest fauna control program • Prevent access to adjacent road and railway corridors	Staged control of weeds *Asparagus aethiopicus* *Lantana camara* *Ligustrum sinense* *Passiflora suberosa* *Senna occidentalis* *Senna pendula* *Dolichandra unguis-*	Nil.	Track maintenance/ erosion control	Access restriction required – existing track bollards ineffective	Waste present – old equipment and machinery refer Figure 6-1. Small rubbish pile present immediately adjacent to offset area, possibly	Firebreaks required and construction/ maintenance of access trails	Fauna exclusion fencing will be erected along southern boundary following construction of the project.

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Group	Offset areas	Offset management goals*	Weed infestation	Vegetation management	Access	Human trespass	Waste removal	Bushfire	Grazing / fencing
		• Improve connectivity to adjacent habitat areas • Restrict vehicle access	*cati* *Cinnamomum camphora* *Ochna serrulata* *Wedelia trilobata*				asbestos. Refer Figure 6-1.		
South	K-OA1 BBBQ-OA1 Lot 2 SP302526	• Area of non-remnant to be revegetated • Controlled Weed infestations • Pest Fauna Control Program • Protect from adjacent rural residential use	Staged control of weeds *Aristolochia elegans* *Lantana camara* *Passiflora suberosa* *Dolichandra unguis-cati*	Strategic replanting of koala food trees. Includes an offset area for the threatened ecological community (TEC), refer Figure 6-3. Vine replacement during staged weed control, refer Figure 6-2.	Track maintenance/ erosion control	Nil.	Nil.	Firebreaks required and construction/ maintenance of access trails	Where property owner decides to graze stock on the western cleared section of the property stock exclusion fencing will be required on western boundary of offset area.
South	K-OA2 BBBQ-OA2 Lot 3 SP302524	• Areas of regrowth and non-remanent to be rehabilitated • Control weed infestations • Pest fauna control programs • Protect from adjacent rural residential use	Staged control of weeds *Asparagus plumosus* *Cinnamomum camphora* *Lantana camara* *Passiflora suberosa* *Dolichandra unguis-cati* *Ochna serrulata* *Solanum torvum* *Sporobolus africanus* *Eugenia uniflora*	Strategic replanting of koala food trees and areas of natural regeneration, refer Figure 6-3.	Track maintenance/ erosion control	Nil.	Nil.	Firebreaks required and construction/ maintenance of access trails	Nil No property boundary fencing should be established due to connection with adjacent State Forest.
South	K-OA3 BBBQ-OA3 Lot 102 SP297908	• Area of non-remnant to be rehabilitated • Control weed infestations Pest Fauna Control Programs • Public access restrictions • Prevent access to adjacent road corridors • Provide connectivity to other habitat areas	Staged control of weeds *Asparagus aethiopicus* *Asparagus plumosus* *Asparagus virgatus* *Cinnamomum camphora* *Lantana camara* *Passiflora suberosa* *Senna pendula* *Dolichandra unguis-cati* *Ochna serrulata* *Celtis sinensis*	Strategic replanting of koala food trees, refer Figure 6-3. Significant area of vine replacement during staged weed control, refer Figure 6-2.	New track required for fire control along eastern boundary however track will occur due to construction of adjacent construction project.	Human trespass / criminal activity / increased security lighting / CC tv	Old squatters camp present with large amounts of rubbish present, refer Figure 6-1.	Firebreaks required and construction/ maintenance of access trails	Western boundary currently includes wildlife exclusion fencing. New wildlife exclusion fencing will be erected along eastern boundary following construction of adjacent project which will include fencing to direct fauna to a fauna underpass which will adjoin the offset area and Woondum State Forest further to the east.

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7. Summary

Baseline surveys of proposed offset sites for the koala and black-breasted button-quail were undertaken between September and November 2020 to fulfil the requirements of Commonwealth approval (EPBC 2017/7941) for the Bruce Highway Cooroy to Curra Section D (Woondum to Curra) project. These implemented monitoring and management obligations outlined in the existing Offset Management Plan (OMP) for the project. Habitat quality was assessed at 40 AU's in three broad offset areas (i.e. northern, central and southern groups) using the framework outlined in the *Guide to determining terrestrial habitat quality* (DES 2020). Targeted surveys were undertaken to provide information on the presence and utilisation of habitat by the koala and black-breasted button-quail using a combination of methods. Management measures were assessed and identified to improve the value of habitats over time in accordance with the objectives of the OMP.

Surveys confirmed the presence of the black-breasted button-quail in all three offset areas within the southern group, with individuals observed on remote surveillance cameras and confirmed from characteristic scats and platelets. Koalas were confirmed present on three of the four northern offset areas, two of the five central offset areas and all three of the southern offset areas. Records were recorded either via drone, SAT searches and remote surveillance cameras. Koalas occurred in highest densities at the southern offset areas. It is estimated that approximately 14 individual koalas were detected within the offset areas or immediately adjacent bushland (within 500 m).

Habitat quality of the koala offset areas at the baseline survey event was scored as 6.07, and the habitat quality of the black-breasted button quail offset areas was scored as 6.92. Habitat condition varied across the offset areas. Koala habitat values varied with the density of weeds, connectivity to habitat, abundance and diversity of foraging habitat and the level of exposure to threats from predation and vehicle strike. Areas at the north had high connectivity to habitat, but localised densities of weeds and patches with very immature vegetation with low food availability and high predation threats. Central koala offset areas had elevated threats due to proximity to urban housing and low levels of connectivity. The southern koala offset areas, particularly the Woondum State Forest Area had high local koala densities and moderate – high habitat quality. Black-breasted button-quail habitats varied locally in response to the abundance and complexity of shelter and foraging habitat availability.

Management measures identified priorities for ongoing management including strategic weed control, localised regeneration of vegetation, pest fauna management and fire management. A number of target weed species (16) were observed across the offset areas. Some species only had one occurrence recorded, while others, such as lantana and corky passion flower were recorded as abundant and widespread across the offset areas. In order to achieve the ecological outcomes as specified in Section 4.5.1 of the OMP, management of each offset area is required. This report has documented the baseline (current) status of the offset areas to provide a suitable offset and achieve ecological outcomes for the koala and black-breasted button-quail. The offset areas will be actively managed over the life of the EPBC Act approval conditions (until performance indicators and completion criteria have been met) to demonstrate achievement of the ecological outcomes through the following key management measures:

- Targeted and staged weed control
- Pest animal management
- Strategic replanting with koala food trees or replacement vine species that provide cover for the black-breasted button-quail

- Natural recruitment/regeneration of native vegetation
- Management of public access, grazing and fencing
- Management of fire risk
- Management of disease
- Waste removal
- Erosion and sediment control.

This Baseline Assessment Report meets Condition 10 of the EPBC 2017/7941 and as per Condition 11 of the approval is required to be published on the website and provided to DAWE within 1 year of legally securing the offset areas.

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Appendices

Appendix A – Koala aerial drone survey methods

Drone surveys

Pre-dawn thermal imaging drone surveys were undertaken in the pre-construction phase using a drone and thermal camera. This provides a real-time high resolution thermal video stream to maximize koala detection rates.

The drone was flown in a slow and steady speed at a height of approximately 30 metres above the tallest tree canopy (altitude adjusted with terrain). The search grid was spaced with a minimum 50% overlap between passes (at canopy level) meaning any given tree canopy is systematically viewed from multiple angles to maximise koala detection.

The accuracy of thermal drone koala surveys performed by drone operators varied with:

- Drone and thermal camera equipment
- Pilot experience
- Speed at which the drone flies (as reflected in the area covered/hr of flight), and
- Overlap between drone transects.

Once a koala was detected, a thermal video was captured (for verification), then the drone was flown directly overhead and accurate GPS coordinates recorded.

Drone surveys were undertaken in the following locations in the pre-construction phase:

- Project Area
- Buffer Area
- In each of the koala offset sites

Field verification

Following the pre-dawn thermal drone koala surveys, two USC ecologists undertook field verification surveys (FVS) to visually confirm the location of any koalas detected by the drone. Visual observation was undertaken to assess koalas for external signs of illness or injury.

The field verification team navigated to the position of each detected koala GPS location and performed a search for the koala. On locating the koala, the GPS coordinates were confirmed or updated, and a visual assessment of each koala conducted. Visual assessment included observation with binoculars or a camera with zoom lens, and digital photos were taken.

Additional data collected during each FVS included the following:

- Koala health (especially external signs for chlamydial disease) and demeanour as assessed by visual observation
- Koala and tree metrics (species, diameter at breast height (DBH), koala height in tree, estimated tree height)
- Koala outcome (healthy and left on site, sick/injured and caught, sick/injured and left on site if ground-based capture was not possible or unsuccessful).

If koalas were deemed to be potentially sick or injured, the field verification team marked the tree with flagging tape and notified the koala capture team to attend and attempt capture.

Appendix B - Modified QLD Habitat Quality spreadsheet

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Bruce Highway Cooroy to Curra

Commonwealth Offset Areas - Koala

Assessment Unit - Regional Ecosystem	AU N1 - RE 12.3.11 Regrowth						AU N2 - RE 12.3.11 Remnant						AU N3 - RE 12.9-10.17b Remnant								
Site Reference	Benchmar	Site 1			Average	Average	Benchmar	Site 1			Average	Average	Benchmar	Site 1			Site 2			Average	Average
	12.3.11	Raw Data	% Benchm	Score	%	Score	12.3.11	Raw Data	% Benchm	Score	%	Score	12.9-10.17	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	%	Score
Site Condition																					
Recruitment of woody perennial species in EDL	100	100	100.0	5	100	5	100	100	100.0	5	100	5	100	100	100.0	5	50	50.0	3	75	4
Native plant species richness - trees	7	10	142.9	5	142.9	5	7	14	200.0	5	200	5	10	18	180.0	5	14	140.0	5	160	5
Native plant species richness - shrubs	7	4	57.1	3	57.1	3	7	7	100.0	5	100	5	5	5	100.0	5	5	100.0	5	100	5
Native plant species richness - grasses	12	1	8.3	2.5	8.3	2.5	12	2	16.7	2.5	16.7	2.5	6	2	33.3	3	4	66.7	3	50	3
Native plant species richness - forbes	25	4	16.0	2.5	16	2.5	25	8	32.0	3	32	3	17	9	52.9	3	4	23.5	2.5	38.2	2.8
Tree canopy height (average of emergent, canopy, sub-canopy)	0			0	8.7	0	0			5	120.9	5	0			4			4	71.7	4
Tree canopy cover (average of emergent, canopy, sub-canopy)	0			1	14.3	1	0			4	141.7	4	0			5			5	101.6	5
Shrub canopy cover	20	0.5	2.5	0	2.5	0	20	5	25.0	3	25	3	27	5	18.5	3	13	48.1	3	33.3	3
Native grass cover	44	12	27.3	1	27.3	1	44	19	43.2	1	43.2	1	35	3	8.6	0	7	20.0	1	14.3	0.5
Organic litter	37	71	191.9	5	191.9	5	37	58.6	158.4	5	158.4	5	55	57	103.6	5	67	121.8	5	112.7	5
Large trees (euc plus non-euc)	30	0	0.0	0	0	0	30	1	3.3	5	3.3	5	30	6	20.0	5	8	26.7	5	23.4	5
Coarse woody debris	555	0	0.0	0	0	0	555	100	18.0	2	18	2	401	700	174.6	5	960	239.4	2	207	3.5
Non-native plant cover	0	21	2100.0	0	2100	0	0	81	8100.0	0	8100	0	0	67	6700.0	0	51	5100.0	0	5900	0
Quality and availability of food and foraging habitat				1.3		1.3				3.5		3.5				5			4.6		4.8
Quality and availability of shelter				0.8		0.8				5.7		5.7				4			5.6		4.8
Site Condition Score				27.1		27.1				54.7		54.7				57			53.7		55.4
MAX Site Condition Score				*100*		*100*				*100*		*100*				*100*			*100*		*100*
Site Condition Score - out of 3						**0.81**						**1.64**									**1.66**
Site Context																					
Size of patch				10		10				10		10				10			10		10
Connectedness				2		2				4		4				4			4		4
Context				5		5				5		5				5			5		5
Role of site location to species overall population in the state				0.8		0.8				2.5		2.5				4.1			4.1		4.1
Threats to the species				2		2				6		6				6			6		6
Species mobility capacity				2.7		2.7				7.7		7.7				7			6		6.5
Site Context Score				22.5		22.5				35.2		35.2				36.1			35.1		35.6
MAX Site Context Score				*50*		*50*				*50*		*50*				*50*			*50*		*50*
Site Context Score - out of 3						**1.35**						**2.11**									**2.14**

AU N4 - RE 12.9-10.17b Remnant									AU N5 - RE 12.9-10.17b Regrowth						AU N6 - RE 12.9-10.17b Remnant								
Benchmark	Site 1				Site 2			Average	Average	Benchmar	Site 1			Average	Average	Benchmar	Site 1a			Site 2			Average	Average
12.9-10.17b	Raw Data	% Benchm	Score		Raw Data	% Benchm	Score	%	Score	12.9-10.17	Raw Data	% Benchm	Score	%	Score	12.9-10.17	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	%	Score
100	100	100.0	5		75	75.0	3	87.5	4	100	100	100.0	5	100	5	100	60	60.0	3	75	75.0	3	67.5	3
10	10	100.0	5		13	130.0	5	115	5	10	10	100.0	5	100	5	10	14	140.0	5	15	150.0	5	145	5
5	6	120.0	5		6	120.0	5	120	5	5	10	200.0	5	200	5	5	6	120.0	5	8	160.0	5	140	5
6	6	100.0	5		4	66.7	3	83.4	4	6	5	83.3	3	83.3	3	6	6	100.0	5	6	100.0	5	100	5
17	16	94.1	5		6	35.3	3	64.7	4	17	9	52.9	3	52.9	3	17	13	76.5	3	10	58.8	3	67.7	3
0			5				5	86.8	5	0			5	87.8	5	0			4			5	71.3	4.5
0			3.5				5	72.5	4.3	0			3.5	95.7	3.5	0			5			3.5	82.8	4.3
27	2	7.4	0		5	18.5	3	13	1.5	27	5	18.5	3	18.5	3	27	10	37.0	3	5	18.5	3	27.8	3
35	46	131.4	5		17	48.6	1	90	3	35	11	31.4	1	31.4	1	35	9	25.7	1	2.4	6.9	0	16.3	0.5
55	34.6	62.9	5		58	105.5	5	84.2	5	55	70	127.3	5	127.3	5	55	58	105.5	5	55.6	101.1	5	103.3	5
30	11	36.7	5		5	16.7	5	26.7	5	30	0	0.0	0	0	0	30	6	20.0	5	6	20.0	5	20	5
401	130	32.4	2		600	149.6	5	91	3.5	401	550	137.2	5	137.2	5	401	1150	286.8	2	220	54.9	5	170.9	3.5
0	11	1100.0	0		48	4800.0	0	2950	0	0	26	2600.0	0	2600	0	0	11	1100.0	0	62	6200.0	0	3650	0
			6.7				4.7		5.7				5.7		5.7				6.1			4.8		5.5
			2.2				3.9		3.1				3.7		3.7				4.1			3.9		4
			59.4				56.6		58.1				52.9		52.9				56.2			56.2		56.3
			100				*100*		*100*				*100*		*100*				*100*			*100*		*100*
									1.74						**1.59**									**1.69**
			10				10		10				10		10				10			10		10
			2				2		2				2		2				4			4		4
			5				5		5				5		5				5			5		5
			4.1				3.3		3.7				4.1		4.1				4.1			3.3		3.7
			4				7		5.5				6		6				7			8		7.5
			6.7				6.2		6.5				7		7				7			5.3		6.2
			31.8				33.5		32.7				34.1		34.1				37.1			35.6		36.4
			50				*50*		*50*				*50*		*50*				*50*			*50*		*50*
									1.96						**2.05**									**2.18**

AU N7 - RE 12.11.5 Remnant												AU N8 - RE 12.11.5 Remnant						AU N9 - RE 12.11.5 Regrowth					
Benchmark	Site 1			Site 2a			Site 3			Average	Average	**Benchmar**	Site 1			Average	Average	**Benchmar**	Site 1			Average	Average
12.11.5	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	%	Score	**12.11.5**	Raw Data	% Benchm	Score	%	Score	**12.11.5**	Raw Data	% Benchm	Score	%	Score
100	100	100.0	5	50	50.0	3	75	75.0	3	75	3.7	100	100	100.0	5	100	5	100	100	100.0	5	100	5
7	10	142.9	5	12	171.4	5	12	171.4	5	161.9	5	7	10	142.9	5	142.9	5	7	5	71.4	3	71.4	3
11	9	81.8	3	8	72.7	3	9	81.8	3	78.8	3	11	9	81.8	3	81.8	3	11	1	9.1	2.5	9.1	2.5
8	6	75.0	3	6	75.0	3	5	62.5	3	70.8	3	8	5	62.5	3	62.5	3	8	3	37.5	3	37.5	3
17	11	64.7	3	19	111.8	5	7	41.2	3	72.6	3.7	17	3	17.6	2.5	17.6	2.5	17	11	64.7	3	64.7	3
0			5			5			5	87	5	0			5	113.4	5	0			0	12.5	0
0			5			4			3.5	129.1	4.2	0			1.5	185	1.5	0			0	0	0
14	5	35.7	3	21	150.0	5	12.5	89.3	5	91.7	4.3	14	2	14.3	3	14.3	3	14	0	0.0	0	0	0
30	6	20.0	1	19	63.3	3	11	36.7	1	40	1.7	30	12	40.0	1	40	1	30	15	50.0	1	50	1
50	72	144.0	5	45	90.0	5	47	94.0	5	109.3	5	50	66	132.0	5	132	5	50	39	78.0	5	78	5
26	2	7.7	5	4	15.4	5	2	7.7	5	10.3	5	26	4	15.4	5	15.4	5	26	0	0.0	0	0	0
457	810	177.2	5	480	105.0	5	680	148.8	5	143.7	5	457	80	17.5	2	17.5	2	457	0	0.0	0	0	0
0	30	3000.0	0	42	4200.0	0	68	6800.0	0	4666.7	0	0	10	1000.0	0	1000	0	0	57	5700.0	0	5700	0
			3.9			4.4			3.3		3.9				4.1		4.1				0.7		0.7
			3.5			4.7			3.2		3.8				2.7		2.7				0		0
			55.4			60.1			53		56.3				47.8		47.8				23.2		23.2
			100			*100*			*100*		*100*				*100*		*100*				*100*		*100*
											1.69						**1.43**						**0.70**
			10			10			10		10				10		10				10		10
			5			5			5		5				5		5				2		2
			5			5			5		5				5		5				5		5
			5			4.1			4.1		4.4				3.3		3.3				0.8		0.8
			8			7			7		7.3				6		6				2		2
			8			7.3			5.7		7				7.7		7.7				1.3		1.3
			41			38.4			36.8		38.7				37		37				21.1		21.1
			50			*50*			*50*		*50*				*50*		*50*				*50*		*50*
											2.32						**2.22**						**1.27**

AU C1 - RE 12.11.5 Remnant									AU C2 - RE 12.3.11 Remnant						AU S1 - RE 12.3.11 Remnant					
Benchmark	Site 1			Site 2			Average	Average	**Benchmar**	Site 1			Average	Average	**Benchmar**	Site 1			Average	Average
12.11.5	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	%	Score	**12.3.11**	Raw Data	% Benchm	Score	%	Score	**12.3.11**	Raw Data	% Benchm	Score	%	Score
100	50	50.0	3	0	0.0	0	25	1.5	100	66.7	66.7	3	66.7	3	100	0	0.0	0	0	0
7	11	157.1	5	12	171.4	5	164.3	5	7	22	314.3	5	314.3	5	7	13	185.7	5	185.7	5
11	4	36.4	3	8	72.7	3	54.6	3	7	23	328.6	5	328.6	5	7	16	228.6	5	228.6	5
8	3	37.5	3	6	75.0	3	56.3	3	12	4	33.3	3	33.3	3	12	1	8.3	2.5	8.3	2.5
17	5	29.4	3	8	47.1	3	38.3	3	25	11	44.0	3	44	3	25	6	24.0	2.5	24	2.5
0			5			5	102.5	5	0			5	110.4	5	0			5	125.3	5
0			5			5	112.4	5	0			5	130.1	5	0			4	165.9	4
14	6	42.9	3	11.5	82.1	5	62.5	4	20	21.5	107.5	5	107.5	5	20	7.5	37.5	3	37.5	3
30	5	16.7	1	24	80.0	3	48.4	2	44	1.2	2.7	0	2.7	0	44	12	27.3	1	27.3	1
50	47	94.0	5	62	124.0	5	109	5	37	69.2	187.0	5	187	5	37	72	194.6	5	194.6	5
26	6	23.1	5	8	30.8	5	27	5	30	4	13.3	5	13.3	5	30	3	10.0	5	10	5
457	510	111.6	5	720	157.5	5	134.6	5	555	720	129.7	5	129.7	5	555	110	19.8	2	19.8	2
0	46	4600.0	0	1	100.0	0	2350	0	0	22	2200.0	0	2200	0	0	10	1000.0	0	1000	0
			3.9			4.5		4.2				3.9		3.9				3.5		3.5
			4.6			3.7		4.2				6.7		6.7				7		7
			54.5			55.2		54.9				59.6		59.6				50.5		50.5
			100			*100*		*100*				*100*		*100*				*100*		*100*
								1.65						**1.79**						**1.52**
			10			10		10				10		10				2		2
			5			5		5				5		5				4		4
			4			4		4				4		4				4		4
			4.1			5		4.6				3.3		3.3				5		5
			3			5		4				7		7				6		6
			6.3			6.3		6.3				5.3		5.3				7		7
			32.4			35.3		33.9				34.6		34.6				28		28
			50			*50*		*50*				*50*		*50*				*50*		*50*
								2.03						**2.08**						**1.68**

AU S2 - RE 12.11.3 Remnant									AU S3 - RE 12.11.3 Regrowth						AU S4 - RE 12.11.5 Remnant									
Benchmark	Site 1			Site 2			Average	Average	**Benchmar**	Site 1			Average	Average	**Benchmar**	Site 1			Site 2			Site 3			Average	Average
12.11.3	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	%	Score	**12.11.3**	Raw Data	% Benchm	Score	%	Score	**12.11.5**	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	Raw Data	% Benchm	Score	%	Score
100	66.7	66.7	3	50	50.0	3	58.4	3	100	100	100.0	5	100	5	100	100	100.0	5	100	100.0	5	100	100.0	5	100	5
6	28	466.7	5	30	500.0	5	483.4	5	6	14	233.3	5	233.3	5	7	20	285.7	5	31	124.0	5	28	400.0	5	269.9	5
12	17	141.7	5	19	158.3	5	150	5	12	7	58.3	3	58.3	3	11	17	154.5	5	19	82.6	3	12	109.1	5	115.4	4.3
4	2	50.0	3	2	50.0	3	50	3	4	5	125.0	5	125	5	8	1	12.5	2.5	2	200.0	5	3	37.5	3	83.3	3.5
21	7	33.3	3	11	52.4	3	42.9	3	21	6	28.6	3	28.6	3	17	11	64.7	3	10	28.6	3	6	35.3	3	42.9	3
0			5			5	97.5	5	0			5	111	5	0			5			3.3			5	88.6	4.4
0			4			4	223.5	4	0			4	179.9	4	0			4			3.3			4	111	3.8
21	17	81.0	5	22	104.8	5	92.9	5	21	3	14.3	3	14.3	3	14	12	85.7	5	16	55.2	5	8.5	60.7	5	67.2	5
16	5	31.3	1	3.4	21.3	1	26.3	1	16	4.4	27.5	1	27.5	1	30	1.4	4.7	0	0.4	2.7	0	5.4	18.0	1	8.5	0.3
76	54	71.1	5	76.6	100.8	5	86	5	76	58.6	77.1	5	77.1	5	50	80.6	161.2	5	75.6	140.0	5	74.6	149.2	5	150.1	5
63	2	3.2	5	6	9.5	5	6.4	5	63	3	4.8	5	4.8	5	26	7	26.9	5	2	2.3	5	4	15.4	5	14.9	5
370	1150	310.8	2	680	183.8	5	247.3	3.5	370	230	62.2	5	62.2	5	457	490	107.2	5	1080	153.2	5	1400	306.3	2	188.9	4
0	27	2700.0	0	20	2000.0	0	2350	0	0	15	1500.0	0	1500	0	0	20	2000.0	0	20	2000.0	0	43	4300.0	0	2766.7	0
			2.9			3.7		3.3				2.6		2.6				4.2			8.3			3.3		5.3
			6.7			7.2		7				5		5				5.6			4.7			4		4.8
			55.6			59.9		57.8				56.6		56.6				59.3			60.6			55.3		58.4
			100			*100*		*100*				*100*		*100*				*100*			*100*			*100*		*100*
								1.73						**1.70**												**1.75**
			10			10		10				10		10				10			10			10		10
			4			4		4				2		2				4			4			4		4
			4			4		4				5		5				4			4			4		4
			5			5		5				3.3		3.3				4.1			3.3			3.3		3.6
			8			8		8				5		5				5			7			8		6.7
			6.3			6.3		6.3				5.3		5.3				6.3			6.3			6		6.2
			37.3			37.3		37.3				30.6		30.6				33.4			34.6			35.3		34.5
			50			*50*		*50*				*50*		*50*				*50*			*50*			*50*		*50*
								2.24						**1.84**												**2.07**

AU S5 - RE 12.11.5 Regrowth						AU S6 - RE 12.11.10 Remnant						AU S7 - RE 12.11.3 Remnant						**Total**	**Total**
Benchmark	Site 1			Average	Average	**Benchmar**	Site 1			Average	Average	**Benchmar**	Site 1			Average	Average	**average**	**average**
12.11.5	Raw Data	% Benchm	Score	%	Score	**12.11.10**	Raw Data	% Benchm	Score	%	Score	**12.11.3**	Raw Data	% Benchm	Score	%	Score	**%**	**score**
100	100	100.0	5	100	5	100	94	94.0	5	94	5	100	50	50.0	3	50	3	79.36	3.95
7	13	185.7	5	185.7	5	25	15	60.0	3	60	3	6	21	350.0	5	350	5	184.45	4.76
11	10	90.9	5	90.9	5	23	7	30.4	3	30.4	3	12	19	158.3	5	158.3	5	114.33	4.11
8	5	62.5	3	62.5	3	1	1	100.0	5	100	5	4	2	50.0	3	50	3	60.66	3.35
17	4	23.5	2.5	23.5	2.5	35	8	22.9	2.5	22.9	2.5	21	8	38.1	3	38.1	3	40.79	2.94
0			5	96.7	5	0			3.3	78	3.3	0			5	89	5	86.48	4.19
0			2.5	148.6	2.5	0			3.3	95.2	3.3	0			4	218.4	4	117.02	3.49
14	2	14.3	3	14.3	3	29	8	27.6	3	27.6	3	21	6	28.6	3	28.6	3	38.23	3.05
30	4	13.3	1	13.3	1	15	2	13.3	1	13.3	1	16	19.4	121.3	5	121.3	5	30.58	1.06
50	77	154.0	5	154	5	54	83	153.7	5	153.7	5	76	58.4	76.8	5	76.8	5	129.92	5
26	2	7.7	5	7.7	5	88	30	34.1	5	34.1	5	63	7	11.1	5	11.1	5	12.78	4.12
457	250	54.7	5	54.7	5	705	13900	1971.6	2	1971.6	2	370	290	78.4	5	78.4	5	211.42	3.29
0	1	100.0	0	100	0	0	0	0.0	10	0	10	0	25	2500.0	0	2500	0	2878.44	0.59
			2.8		2.8				0.3		0.3				6.1		6.1		3.59
			3.3		3.3				4.5		4.5				5.8		5.8		4.18
			53.1		53.1				55.9		55.9				62.9		62.9		51.68
			100		*100*				*100*		*100*				*100*		*100*		*100*
					1.59						**1.68**						**1.89**		**1.55**
			10		10				10		10				2		2		9.53
			4		4				5		5				5		5		3.71
			5		5				4		4				4		4		4.65
			3.3		3.3				1.6		1.6				5		5		3.36
			7		7				7		7				6		6		5.82
			7		7				5.5		5.5				6		6		5.97
			36.3		36.3				33.1		33.1				28		28		33.04
			50		*50*				*50*		*50*				*50*		*50*		*50*
					2.18						**1.99**						**1.68**		**1.98**

Species Stocking Rate (SSR)						
Presence detected on or adjacent to site (neighbouring property with connecting habitat)	Score				10	
		No	Yes - adjacent		Yes - on site	
Species usage of the site (habitat type & evidenced usage)	Score				15	
		Not habitat	Dispersal	Foraging	Breeding	
Approximate density (per ha)	Score		10			
		0%				
Role/importance of species population on site*	Score (*Total*		5			
		0	5 - 15	20 - 35		40 - 45
Total SRR score (out of 70)		40				
SRR Score (out of 4)		**2.29**				

*SSR Supplementary Table			
*Key source population for breeding	Score		10
		No	Yes/ Possibly
*Key source population for dispersal	Score		5
		No	Yes/ Possibly
*Necessary for maintaining genetic diversity	Score	0	
		No	Yes/ Possibly
*Near the limit of the species range	Score	0	
		No	Yes

Final habitat quality score (weighted)	AU N1	AU N2	AU N3	AU N4	AU N5	AU N6	AU N7	AU N8	AU N9	AU C1	AU C2	AU S1	AU S2	AU S3	AU S4	AU S5	AU S6	AU S7	Final (Average)
Site Condition score (out of 3)	0.81	1.64	1.66	1.74	1.59	1.69	1.69	1.43	0.70	1.65	1.79	1.52	1.73	1.70	1.75	1.59	1.68	1.89	1.55
Site Context Score (out of 3)	1.35	2.11	2.14	1.96	2.05	2.18	2.32	2.22	1.27	2.03	2.08	1.68	2.24	1.84	2.07	2.18	1.99	1.68	1.98
Species Stocking Rate Score (out of 4)	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29	2.29
Habitat Quality score (out of 10)	*4.45*	*6.04*	*6.09*	*5.99*	*5.93*	*6.16*	*6.30*	*5.94*	*4.26*	*5.97*	*6.16*	*5.49*	*6.26*	*5.83*	*6.11*	*6.06*	*5.96*	*5.86*	*5.82*
Assessment Unit area (ha)	6.93	10.06	15.46	22.29	3.55	33.19	91.72	5.14	2.24	41.27	8	0.66	14.21	3.88	20.82	4.96	1.69	1.16	16.83
Total ASSESSMENT area (ha) for this MNES (Koala)	287.23	287.23	287.23	287.23	287.23	287.23	287.23	287.23	287.23	287.23	287.23	287.23	287.23	287.23	287.23	287.23	287.23	287.23	287.23
Size Weighting	0.02	0.04	0.05	0.08	0.01	0.12	0.32	0.02	0.01	0.14	0.03	0.00	0.05	0.01	0.07	0.02	0.01	0.00	1
Weighted Habitat Quality Score	***0.11***	***0.21***	***0.33***	***0.46***	***0.07***	***0.71***	***2.01***	***0.11***	***0.03***	***0.86***	***0.17***	***0.01***	***0.31***	***0.08***	***0.44***	***0.10***	***0.04***	***0.02***	***6.07***

Appendix C - BioCondition field data

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Site: N1 - 1	**Date**: 08/10/20 01:00PM (09:33)	**Recorder**: Peter Moonie None	
Locality/Land parcel: 3MPH23906		**UIN**: 201008093312	
GTRE: HVR 12.3.11 - Eucalyptus tereticornis +/- Eucalyptus siderophloia, Corymbia intermedia open forest on alluvial plains usually near coast			
Median tree canopy heights (m): **Emergent:** None **Canopy:** 4 **Sub-canopy:** None			
EDL:	**No. of dominant species in the EDL**: 5	**No. of dominant species in the EDL recruiting:** 5	**Percentage recruiting:** 100
Number of large trees (100x50 m): 0			
Large eucalypt benchmark (DBH) value: 49		**Large non-eucalypt benchmark (DBH) value:** None	
Number of large eucalypt: 0		**Number of large non-eucalypt:** 0	
Native tree species richness (100x50 m) 10			
Acacia disparrima subsp. disparrima, Angophora floribunda (rough-barked apple), Lophostemon confertus (brush box), Acacia leiocalyx, Eucalyptus tereticornis, Lophostemon suaveolens (swamp box), Acacia penninervis, Melaleuca salicina, Acacia maidenii (Maiden's wattle), Glochidion ferdinandi			
Native shrub species richness (50x10 m) 3			
Acacia disparrima subsp. disparrima, Melaleuca salicina, Eucalyptus tereticornis, Dodonaea viscosa			
Native grass species richness (50x10 m) 1			
Imperata cylindrica (blady grass)			
Native forbs/others species richness (50x10 m) 4			
Centella asiatica, Dichondra repens (kidney weed), Dianella caerulea, Polymeria calycina (pink bindweed)			
Non-native plant cover (50x10 m): 20			
Baccharis halimifolia (groundsel bush) (5%), Conyza sp. (1%), Stenotaphrum secundatum (1%), Sonchus oleraceus (common sowthistle) (1%), Gomphocarpus physocarpus (balloon cottonbush) (1%), Cyclospermum leptophyllum (1%), Cirsium vulgare (spear thistle) (1%), Praxelis clematidea (1%), Oxalis corniculata (1%), Verbena rigida (1%), Lysimachia arvensis (1%), Setaria sphacelata (5%), Senna septemtrionalis (1%)			
Coarse woody debris (50x20 m): 0			
Coarse woody debris lengths (m): 0			
Quadrat 1			
Native perennial grass cover: 30		**Organic litter cover:** 70	
Native other grass: None		Native forbs: None	
Native shrubs (less than 1 m): None		Non-native grass: None	
Non-native forbs and shrubs: None		Rock: None	
Bare Ground: None		Cryptograms: None	
Total cover: None			
Quadrat 2			
Native perennial grass cover: 30		**Organic litter cover:** 60	
Native other grass: None		Native forbs: None	
Native shrubs (less than 1 m): None		Non-native grass: None	
Non-native forbs and shrubs: None		Rock: None	
Bare Ground: None		Cryptograms: None	
Total cover: None			
Quadrat 3			
Native perennial grass cover: 0		**Organic litter cover:** 90	

Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 0	**Organic litter cover:** 80
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 0	**Organic litter cover:** 55
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: South West	**Transect length:** 100mNone
Notes: All canopy trees less than 6m. Check if need to include/exclude	
Canopy: 16 m Details: 1-7 (6), 7.5-10 (2.5), 17.5-19 (1.5), 21-24 (3), 35-36 (1), 65-65.5 (0.5), 74-74.5 (0.5), 92-93 (1),	
Sub-canopy: None m Details:	
Shrub: 0.5 m Details: 1-1.5 (0.5),	
Photos	
Point: 152.63384974758807, -26.06598916103591	
Photo North: 	
Photo East:	

Photo South:

Photo West:

Transect Start:

Note: None

Site: N2 - 1	**Date**: 08/10/20 01:00PM (13:09)	**Recorder**: Peter Moonie None	
Locality/Land parcel: 878MCH1061		**UIN**: 201008130959	
GTRE: 12.3.11 - Eucalyptus tereticornis +/- Eucalyptus siderophloia, Corymbia intermedia open forest on alluvial plains usually near coast			
Median tree canopy heights (m): **Emergent:** None **Canopy:** 24 **Sub-canopy:** 11			
EDL:	**No. of dominant species in the EDL**: 3	**No. of dominant species in the EDL recruiting:** 3	**Percentage recruiting:** 100
Number of large trees (100x50 m): 1			
Large eucalypt benchmark (DBH) value: 49		**Large non-eucalypt benchmark (DBH) value:** 36	
Number of large eucalypt: 1		**Number of large non-eucalypt:** 0	
Native tree species richness (100x50 m) 14			
Lophostemon suaveolens (swamp box), Acacia disparrima subsp. disparrima, Acacia fimbriata (Brisbane golden wattle), Acacia maidenii (Maiden's wattle), Eucalyptus tereticornis, Melaleuca salicina, Ficus coronata (creek sandpaper fig), Dodonaea viscosa subsp. cuneata, Polyscias elegans (celery wood), Angophora floribunda (rough-barked apple), Cryptocarya triplinervis, Lophostemon confertus (brush box), Allocasuarina torulosa, Cupaniopsis parvifolia (small-leaved tuckeroo),			
Native shrub species richness (50x10 m) 7			
Melaleuca salicina, Xanthorrhoea latifolia, Acacia maidenii (Maiden's wattle), Acacia fimbriata (Brisbane golden wattle), Glochidion ferdinandi, Mallotus philippensis (red kamala), Lomandra multiflora			
Native grass species richness (50x10 m) 2			
Ottochloa gracillima (pademelon grass), Oplismenus aemulus			
Native forbs/others species richness (50x10 m) 8			
Eustrephus latifolius (wombat berry), Dianella caerulea, Legnephora moorei, Lomandra longifolia, Pteridium esculentum (common bracken), ? Doodia caudata, Passiflora aurantia, Lobelia purpurascens (white root)			
Non-native plant cover (50x10 m): 82			
Lantana camara (lantana) (60%), Ageratum houstonianum (1%), Passiflora suberosa (corky passion flower) (10%), Solanum seaforthianum (Brazilian nightshade) (1%), Megathyrsus maximus var.			

maximus (1%), Dolichandra unguis-cati (cat's claw creeper) (5%), Cinnamomum camphora (camphor laurel) (2%), Senna septemtrionalis (1%)	
Coarse woody debris (50x20 m): 10	
Coarse woody debris lengths (m): 10,	
Quadrat 1	
Native perennial grass cover: 0	**Organic litter cover:** 95
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 2	
Native perennial grass cover: 5	**Organic litter cover:** 60
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 3	
Native perennial grass cover: 10	**Organic litter cover:** 50
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 45	**Organic litter cover:** 49
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 35	**Organic litter cover:** 39
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: North East	**Transect length:** 100mNone
Notes: EDL is subcanopy layer and includes trees greater than 9m but not above 15	
Canopy: 38.5 m Details: 27-40 (13), 50.5-53 (2.5), 59-68 (9), 72-86 (14),	
Sub-canopy: 70.8 m Details: 1-4 (3), 6.6-12.2 (5.6), 14.8-28 (13.2), 36-38 (2), 44-59 (15), 68-100 (32),	
Shrub: 5 m Details: 10.5-11 (0.5), 13-14 (1), 62-63 (1), 64.5-65 (0.5), 78-79 (1), 79-79.5 (0.5), 98.5-99 (0.5),	
Photos	

Point: 152.62838810554535, -26.06946420504439

Photo North:

Photo East:

Photo South:

Photo West:

Transect Start:

Transect End:

Note: None

Site: N3 - 1	**Date**: 07/10/20 01:00PM (11:21)	**Recorder**: Peter Moonie	
Locality/Land parcel: 878MCH1061		**UIN**: 201007112113	
GTRE: 12.9-10.17b - Corymbia citriodora subsp. variegata mixed open forest to woodland. Other commonly occurring canopy trees include Eucalyptus acmenoides, Angophora leiocarpa, E. siderophloia, E. carnea, E. longirostrata and C. intermedia.			
Median tree canopy heights (m): **Emergent:** None **Canopy:** 24 **Sub-canopy:** 8			
EDL:	**No. of dominant species in the EDL**: 4	**No. of dominant species in the EDL recruiting:** 4	**Percentage recruiting:** 100
Number of large trees (100x50 m): 6			
Large eucalypt benchmark (DBH) value: 46		**Large non-eucalypt benchmark (DBH) value:** None	
Number of large eucalypt: 6		**Number of large non-eucalypt:** 0	
Native tree species richness (100x50 m) 19			
Eucalyptus racemosa subsp. racemosa (scribbly gum), Corymbia intermedia (pink bloodwood), Acacia disparrima subsp. disparrima, Angophora leiocarpa (rusty gum), Eucalyptus acmenoides, Alphitonia excelsa (soap tree), Lophostemon confertus (brush box), Acacia oshanesii, Eucalyptus propinqua (small-fruited grey gum), Cupaniopsis parvifolia (small-leaved tuckeroo), Petalostigma pubescens (quinine tree), Acacia leiocalyx, Allocasuarina torulosa, Acacia maidenii (Maiden's wattle), Araucaria cunninghamii (hoop pine), Jagera pseudorhus var. pseudorhus, Clerodendrum floribundum, Cyclophyllum coprosmoides			
Native shrub species richness (50x10 m) 5			
Acacia disparrima subsp. disparrima, Lophostemon confertus (brush box), Cupaniopsis parvifolia (small-leaved tuckeroo), Leucopogon juniperinus (prickly heath), Eucalyptus sp1 (seedling)			
Native grass species richness (50x10 m) 2			
Entolasia stricta (wiry panic), Imperata cylindrica (blady grass)			
Native forbs/others species richness (50x10 m)			
Eustrephus latifolius (wombat berry), Lomandra longifolia, other, other, Poranthera microphylla (small poranthera), Desmodium rhytidophyllum, Dianella caerulea, Lomandra multiflora, other,			
Non-native plant cover (50x10 m): 67			
Passiflora suberosa (corky passion flower) (10%), Megathyrsus maximus var. maximus (15%), Praxelis clematidea (1%), Glandularia aristigera (1%), Lantana camara (lantana) (40%),			
Coarse woody debris (50x20 m): 70			
Coarse woody debris lengths (m): 70			
Quadrat 1			
Native perennial grass cover: 0		**Organic litter cover:** 60	
Native other grass: None		Native forbs: None	
Native shrubs (less than 1 m): None		Non-native grass: None	
Non-native forbs and shrubs: None		Rock: None	
Bare Ground: None		Cryptograms: None	
Total cover: None			
Quadrat 2			
Native perennial grass cover: 0		**Organic litter cover:** 50	
Native other grass: None		Native forbs: None	
Native shrubs (less than 1 m): None		Non-native grass: None	
Non-native forbs and shrubs: None		Rock: None	
Bare Ground: None		Cryptograms: None	

Total cover: None	
Quadrat 3	
Native perennial grass cover: 0	**Organic litter cover:** 50
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 15	**Organic litter cover:** 75
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 0	**Organic litter cover:** 50
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: South West	**Transect length:** 100mNone
Notes: 12.9-10.17b, include trees above 7m in sibcanopy	
Canopy: 48.8 m Details: 15-22.5 (7.5), 34-42 (8), 45.8-54.1 (8.3), 68-79 (11), 86-100 (14),	
Sub-canopy: 26.8 m Details: 8-9.3 (1.3), 29-31 (2), 45.8-51.7 (5.90000000000001), 57.5-61.8 (4.3), 64.7-67.8 (3.09999999999999), 72.8-79 (6.2), 84-88 (4),	
Shrub: 5 m Details:	
Photos	
Point: 152.62172222826018, -26.070715336775695	
Photo North:	

Photo East:

Photo South:

Photo West:

Transect Start:

Transect End:

Note: None

Site: N3 - 2	**Date**: 08/10/20 01:00PM (15:30)	**Recorder**: Peter Moonie None	
Locality/Land parcel: 1MPH23906		**UIN**: 201008153033	
GTRE: 12.9-10.4 - Eucalyptus racemosa subsp. racemosa woodland on sedimentary rocks. Note: DNRME mapped as 12.9-10.17b. RE at location of plot is a mix of both.			
Median tree canopy heights (m): **Emergent:** None **Canopy:** 21 **Sub-canopy:** 10			
EDL:	**No. of dominant species in the EDL**: 4	**No. of dominant species in the EDL recruiting:** 2	**Percentage recruiting:** 50
Number of large trees (100x50 m): 8			
Large eucalypt benchmark (DBH) value: 46		**Large non-eucalypt benchmark (DBH) value:** None	
Number of large eucalypt: 8		**Number of large non-eucalypt:** 0	
Native tree species richness (100x50 m) 14			
Eucalyptus siderophloia, Acacia disparrima subsp. disparrima, Eucalyptus propinqua (small-fruited grey gum), Corymbia intermedia (pink bloodwood), Alphitonia excelsa (soap tree), Eucalyptus acmenoides, Alstonia constricta (bitterbark), Corymbia tessellaris (Moreton Bay ash), Acacia maidenii (Maiden's wattle), Allocasuarina, Angophora leiocarpa (rusty gum), Lophostemon suaveolens (swamp box), Acacia leiocalyx, Eucalyptus racemosa subsp. racemosa (scribbly gum),			
Native shrub species richness (50x10 m) 5			
Eucalyptus sp.1 (seedling), Alphitonia excelsa (soap tree), Alstonia constricta (bitterbark), Eucalyptus sp.2 (seedling), Acacia maidenii (Maiden's wattle)			
Native grass species richness (50x10 m) 4			
Entolasia stricta (wiry panic), Imperata cylindrica (blady grass), Ottochloa gracillima (pademelon grass), Aristida sp.1			
Native forbs/others species richness (50x10 m) 4			
Lomandra multiflora, Lomandra confertifolia subsp. pallida, Eustrephus latifolius (wombat berry), Desmodium rhytidophyllum			
Non-native plant cover (50x10 m): 51			
Passiflora suberosa (corky passion flower) (7%), Dolichandra unguis-cati (cat's claw creeper) (3%), Lantana camara (lantana) (40%), Megathyrus maximus (1%)			
Coarse woody debris (50x20 m): 96			
Coarse woody debris lengths (m): 96,			
Quadrat 1			
Native perennial grass cover: 0		**Organic litter cover:** 50	
Native other grass: None		Native forbs: None	
Native shrubs (less than 1 m): None		Non-native grass: None	
Non-native forbs and shrubs: None		Rock: None	
Bare Ground: None		Cryptograms: None	
Total cover: None			
Quadrat 2			
Native perennial grass cover: 15		**Organic litter cover:** 75	
Native other grass: None		Native forbs: None	
Native shrubs (less than 1 m): None		Non-native grass: None	
Non-native forbs and shrubs: None		Rock: None	
Bare Ground: None		Cryptograms: None	
Total cover: None			
Quadrat 3			
Native perennial grass cover: 5		**Organic litter cover:** 60	
Native other grass: None		Native forbs: None	

Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 10	**Organic litter cover:** 70
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 5	**Organic litter cover:** 80
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: South West	**Transect length:** 100mNone
Notes: Trees below 7 m not included in the sub canopy, shrub intervals not recorded but total cover was 13 m	
Canopy: 71.1 m Details: 2.6-14.5 (11.9), 18.8-64 (45.2), 71-73.5 (2.5), 76-82 (6), 85-90.5 (5.5),	
Sub-canopy: 27.7 m Details: 1-4 (3), 19-28.3 (9.3), 30.6-36 (5.4), 47-50 (3), 65-67 (2), 83.2-88.2 (5),	
Shrub: 13 m Details: 1-14 (13),	
Photos	
Point: 152.6285091525296, -26.07377064930418	
Photo North: 	
Photo East:	

Photo South:

Photo West:

Transect Start:

Transect End:

Note: None

Site: N4 - 1	**Date**: 06/10/20 01:00PM (08:36)		**Recorder**: Peter Moonie None
Locality/Land parcel: 889CP864404			**UIN**: 201006083637
GTRE: 12.9-10.17b			
Median tree canopy heights (m): **Emergent:** None		**Canopy:** 27.5	**Sub-canopy:** 12
EDL:	**No. of dominant species in the EDL**: 4	**No. of dominant species in the EDL recruiting:** 4	**Percentage recruiting:** 100
Number of large trees (100x50 m): 11			
Large eucalypt benchmark (DBH) value: 46		**Large non-eucalypt benchmark (DBH) value:** None	
Number of large eucalypt: 11		**Number of large non-eucalypt:** 0	
Native tree species richness (100x50 m) 10			
Eucalyptus tereticornis, Corymbia citriodora (spotted gum), Eucalyptus siderophloia, Eucalyptus exserta (Queensland peppermint), Corymbia tessellaris (Moreton Bay ash), Corymbia intermedia			

(pink bloodwood), Acacia disparrima subsp. disparrima, Eucalyptus propinqua (small-fruited grey gum), Lophostemon suaveolens (swamp box), Alstonia constricta (bitterbark)	
Native shrub species richness (50x10 m) 6	
Acacia disparrima subsp. disparrima, Eucalyptus siderophloia, Alphitonia excelsa (soap tree), Acacia leiocalyx, Corymbia intermedia (pink bloodwood), Corymbia citriodora (spotted gum)	
Native grass species richness (50x10 m) 6	
Cymbopogon refractus (barbed-wire grass), Entolasia stricta (wiry panic), Heteropogon contortus, Panicum effusum, Themeda triandra, Eragrostis brached	
Native forbs/others species richness (50x10 m) 16	
Sphaeromorphaea australis, Sedge (tiny), Portulaca pilosa, Dianella revoluta var. revoluta, Phyllanthus (purple), Cyanthillium cinereum, Cheilanthes distans (bristly cloak fern), Laxmannia gracilis (slender wire lily), Lobelia purpurascens (white root), Lomandra longifolia, Lomandra multiflora, Goodenia rotundifolia, Dianella caerulea, Ghania aspera, Parsonsia sp., Sida sp.	
Non-native plant cover (50x10 m): 9	
Lantana camara (lantana) (2%), Praxelis clematidea (1%), Paspalum conjugatum (sourgrass) (5%), Melinis minutiflora (molasses grass) (1%) Megathyrus maximus (2%)	
Coarse woody debris (50x20 m): 13	
Coarse woody debris lengths (m): 13,	
Quadrat 1	
Native perennial grass cover: 5	**Organic litter cover:** 30
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 2	
Native perennial grass cover: 60	**Organic litter cover:** 40
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 3	
Native perennial grass cover: 70	**Organic litter cover:** 18
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 35	**Organic litter cover:** 55
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 60	**Organic litter cover:** 30
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None

Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: West	**Transect length:** 100mNone
Notes: None	
Canopy: 19.6 m Details: 7.3-11.4 (4.1), 34.2-42.7 (8.5), 69.7-73.7 (4), 78-81 (3),	
Sub-canopy: 22.3 m Details: 12.2-17.5 (5.3), 47-53 (6), 61-65 (4), 66.7-69.7 (3), 83.6-87.6 (4),	
Shrub: 2%	
Photos	
Point: 152.60420494312442, -26.05994206412189	
Photo North: 	
Photo East: 	
Photo South:	

Photo West:

Transect Start:

Transect End:

Note: None

Site: N4 - 2	**Date**: 06/10/20 01:00PM (15:59)	**Recorder**: Peter Moonie	
Locality/Land parcel: 889CP864404		**UIN**: 201006155952	
GTRE: 12.9-10.17b - Eucalyptus acmenoides, E. major, E. siderophloia +/- Corymbia citriodora subsp. variegata open fores on sedimentary rocks			
Median tree canopy heights (m): **Emergent:** None **Canopy:** 23 **Sub-canopy:** 12			
EDL:	**No. of dominant species in the EDL**: 4	**No. of dominant species in the EDL recruiting:** 3	**Percentage recruiting:** 75
Number of large trees (100x50 m): 5			
Large eucalypt benchmark (DBH) value: 46		**Large non-eucalypt benchmark (DBH) value:** None	
Number of large eucalypt: 5		**Number of large non-eucalypt:** 0	
Native tree species richness (100x50 m) 13			
Lophostemon confertus (brush box), Eucalyptus propinqua (small-fruited grey gum), Corymbia intermedia (pink bloodwood), Angophora leiocarpa (rusty gum), Eucalyptus acmenoides, Eucalyptus siderophloia, Acacia disparrima subsp. disparrima, Jagera pseudorhus var. pseudorhus, Alphitonia excelsa (soap tree), Lophostemon suaveolens (swamp box), Cyclophyllum coprosmoides, ,Allocasuarina ?littoralis, Flindersia sp.			
Native shrub species richness (50x10 m) 6			
Acacia leiocalyx, Lophostemon suaveolens (swamp box), Lophostemon confertus (brush box), Alphitonia excelsa (soap tree), Glochidion ferdinandi, Acacia disparrima subsp. disparrima			
Native grass species richness (50x10 m) 4			
Imperata cylindrica (blady grass), Entolasia stricta (wiry panic), ?Eragrostis spartinoides, Cymbopogon refractus (barbed-wire grass)			
Native forbs/others species richness (50x10 m) 6			
Lomandra confertifolia subsp. pallida, Eustrephus latifolius (wombat berry), Laxmannia gracilis (slender wire lily), Dianella caerulea, Lobelia purpurascens (white root), Geitonoplesium cymosum (scrambling lily)			
Non-native plant cover (50x10 m): 48			
Passiflora suberosa (corky passion flower) (3%), Lantana camara (lantana) (42%), Praxelis clematidea (1%), Megathyrsus maximus var. maximus (2%),			

Coarse woody debris (50x20 m): 60	
Coarse woody debris lengths (m): 60,	
Quadrat 1	
Native perennial grass cover: 0	**Organic litter cover:** 80
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 2	
Native perennial grass cover: 60	**Organic litter cover:** 20
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 3	
Native perennial grass cover: 10	**Organic litter cover:** 75
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 10	**Organic litter cover:** 50
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 5	**Organic litter cover:** 65
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: West	**Transect length:** 100mNone
Notes: None	
Canopy: 41.8 m Details: 2.5-8.2 (5.7), 11.2-16.6 (5.4), 17.7-22 (4.3), 30-36.5 (6.5), 48-55 (7), 59.1-65 (5.9), 69-74 (5), 81-83 (2),	
Sub-canopy: 31 m Details: 9.3-16 (6.7), 38-41.1 (3.1), 51.8-55 (3.2), 69-74 (5), 79-92 (13),	
Shrub: 5 m	
Photos	
Point: 152.61074424324508, -26.06417295627528	
Photo North:	

Photo East:

Photo South:

Photo West:

Transect Start:

Transect End:

Note: excluded trees <7m in sub-canopy cover calculations.

Site: N5 - 1	**Date**: 06/10/20 01:00PM (11:10)	**Recorder**: Peter Moonie None	
Locality/Land parcel: 889CP864404		**UIN**: 201006111047	
GTRE: HVR 12.9-10.17b - Eucalyptus acmenoides, E. major, E. siderophloia +/- Corymbia citriodora subsp. variegata open fores on sedimentary rocks			
Median tree canopy heights (m): **Emergent:** None **Canopy:** 24 **Sub-canopy:** 13			
EDL:	**No. of dominant species in the EDL**: 3	**No. of dominant species in the EDL recruiting:** 3	**Percentage recruiting:** 100
Number of large trees (100x50 m): None			
Large eucalypt benchmark (DBH) value: 46		**Large non-eucalypt benchmark (DBH) value:** None	
Number of large eucalypt: 4		**Number of large non-eucalypt:** None	
Native tree species richness (100x50 m) 10			
Acacia disparrima subsp. disparrima, Lophostemon suaveolens (swamp box), Eucalyptus exserta (Queensland peppermint), Eucalyptus tereticornis, Corymbia citriodora (spotted gum), Corymbia intermedia (pink bloodwood), Eucalyptus siderophloia, Alphitonia excelsa (soap tree), Corymbia tessellaris (Moreton Bay ash), Acacia leiocalyx,			
Native shrub species richness (50x10 m) 10			
Acacia disparrima subsp. disparrima, Eucalyptus sp 1(narrow leaf), Cyclophyllum coprosmoides, Acacia leiocalyx, Sp. alternate lime, Alphitonia excelsa (soap tree), Corymbia citriodora (spotted gum), Cupaniopsis parvifolia (small-leaved tuckeroo), Solanum ?ellipticum, Breynia oblongifolia,			
Native grass species richness (50x10 m) 5			
?Panicum effusum (insufficient material), Cymbopogon refractus (barbed-wire grass), Entolasia stricta (wiry panic), Eragrostis brached, Imperata cylindrica (blady grass)			
Native forbs/others species richness (50x10 m) 9			
Dianella caerulea, Lomandra confertifolia subsp. pallida, Dianella revoluta var. revoluta, Cheilanthes distans (bristly cloak fern), Goodenia rotundifolia, Cyanthillium cinereum, Gahnia aspera, Lobelia purpurascens (white root), Lomandra multiflora			
Non-native plant cover (50x10 m): 26			
Lantana camara (lantana) (20%), Paspalum conjugatum (sourgrass) (3%), Ageratum/Praxelis (1%), Passiflora suberosa (corky passion flower) (1%),?Megathyrus max (insufficient material) (1%)			
Coarse woody debris (50x20 m): 55			
Coarse woody debris lengths (m): 55,			
Quadrat 1			
Native perennial grass cover: 15		**Organic litter cover:** 65	
Native other grass: None		Native forbs: None	
Native shrubs (less than 1 m): None		Non-native grass: None	
Non-native forbs and shrubs: None		Rock: None	
Bare Ground: None		Cryptograms: None	
Total cover: None			
Quadrat 2			
Native perennial grass cover: 10		**Organic litter cover:** 70	
Native other grass: None		Native forbs: None	
Native shrubs (less than 1 m): None		Non-native grass: None	
Non-native forbs and shrubs: None		Rock: None	
Bare Ground: None		Cryptograms: None	
Total cover: None			
Quadrat 3			
Native perennial grass cover: 15		**Organic litter cover:** 75	

Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 5	**Organic litter cover:** 85
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 10	**Organic litter cover:** 55
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: North	**Transect length:** 100m
Notes: None	
Canopy: 25.4 m Details: 58.6-70.5 (11.9), 73.5-87 (13.5),	
Sub-canopy: 44.2 m Details: 1-8.4 (7.4), 19.1-34 (14.9), 40.5-46.3 (5.8), 47.9- 50.5(2.6), 73.5-87 (13.5),	
Shrub: 5	
Photos	
Point: 152.603681009583, -26.05918988202735	
Photo North: 	
Photo East:	

Photo South:

Photo West:

Transect Start:

Transect End:

Note: None

Site: N6 - 1a	**Date**: 18/11/20 01:00PM (12:48)		**Recorder**: Peter Moonie
Locality/Land parcel: 878MCH1061			**UIN**: 201118124819
GTRE: 12.9-10.17b/12.9-10.4. 12.9-10.17b - Eucalyptus acmenoides, E. major, E. siderophloia +/- Corymbia citriodora subsp. variegata open forest on sedimentary rocks. 12.9-10.4 - Eucalyptus racemosa subsp. racemosa woodland on sedimentary rocks			
Median tree canopy heights (m): **Emergent:** None	**Canopy:** 19	**Sub-canopy:** 9	
EDL:	**No. of dominant species in the EDL**: 5	**No. of dominant species in the EDL recruiting:** 3	**Percentage recruiting:** 60
Number of large trees (100x50 m): 6			
Large eucalypt benchmark (DBH) value: 46		**Large non-eucalypt benchmark (DBH) value:** None	
Number of large eucalypt: 6		**Number of large non-eucalypt:** 0	
Native tree species richness (100x50 m) 14			

Corymbia intermedia (pink bloodwood), Eucalyptus acmenoides, Eucalyptus propinqua (small-fruited grey gum), Angophora leiocarpa (rusty gum), Eucalyptus siderophloia, Alphitonia excelsa (soap tree), Acacia disparrima subsp. disparrima, Acacia leiocalyx, Lophostemon confertus (brush box), Corymbia citriodora (spotted gum), Brachychiton populneus, Jacksonia scoparia, Allocasuarina littoralis, Jagera pseudorhus	
Native shrub species richness (50x10 m) 6	
Alphitonia excelsa (soap tree), Eucalyptus sp. 1(seedling), Acacia disparrima, Corymbia citriodora (spotted gum), Xanthorrhoea latifolia, Eucalyptus acmenoides	
Native grass species richness (50x10 m) 6	
Panicum effusum, Imperata cylindrica (blady grass), Cymbopogon refractus (barbed-wire grass), Entolasia stricta (wiry panic), Eriachne sp., Themeda triandra	
Native forbs/others species richness (50x10 m) 13	
Dianella brevipedunculata, Lomandra longifolia, Lomandra multiflora, Cyanthillium cinereum, Stephania japonica, Glycine clandestina var. clandestina, Eustrephus latifolius (wombat berry), Brunoniella australis, Desmodium rhytidophyllum, Gahnia aspera, Lomandra filiformis, Commelina diffusa (wandering jew), Dianella revoluta var. revoluta,	
Non-native plant cover (50x10 m): 11	
Praxelis clematidea (2%), Passiflora suberosa (corky passion flower) (3%), Emilia sonchifolia (1%), Lantana camara (lantana) (5%),	
Coarse woody debris (50x20 m): 115	
Coarse woody debris lengths (m): 115	
Quadrat 1	
Native perennial grass cover: 0	**Organic litter cover:** 60
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 2	
Native perennial grass cover: 0	**Organic litter cover:** 80
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 3	
Native perennial grass cover: 20	**Organic litter cover:** 40
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 20	**Organic litter cover:** 40
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	

Native perennial grass cover: 5	**Organic litter cover:** 70
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: North East	**Transect length:** 100mNone
Notes: Did not include trees <7m in sub canopy covers	
Canopy: 48.9 m Details: 22.4-27 (4.6), 31.5-41 (9.5), 54.5-58.8 (4.3), 63-66.9 (3.90000000000001), 68.5-89.4 (20.9), 94.3-100 (5.7),	
Sub-canopy: 23.6 m Details: 1-2 (1), 3-6 (3), 10-18 (8), 22.4-29 (6.6), 63-64 (1), 80.4-84.4 (4),	
Shrub: 10 m Details: 1-11 (10),	
Photos	
Point: 152.6216846189632, -26.068683420836734	
Photo North: 	
Photo East:	

Photo South:

Photo West:

Transect End:

Note: None

Site: N6 - 2	**Date**: 07/10/20 01:00PM (14:10)	**Recorder**: Peter Moonie	
Locality/Land parcel: 878MCH1061		**UIN**: 201007141000	
GTRE: 12.9-10.17b/12.9-10.4. 12.9-10.17b - Corymbia citriodora subsp. variegata mixed open forest to woodland. Other commonly occurring canopy trees include Eucalyptus acmenoides, Angophora leiocarpa, E. siderophloia, E. carnea, E. longirostrata and C. intermedia. 12.9-10.4- Eucalyptus racemosa subsp. racemosa woodland on sedimentary rocks			
Median tree canopy heights (m): **Emergent:** None **Canopy:** 22 **Sub-canopy:** 11			
EDL:	**No. of dominant species in the EDL**: 4	**No. of dominant species in the EDL recruiting:** 3	**Percentage recruiting:** 75
Number of large trees (100x50 m): 6			
Large eucalypt benchmark (DBH) value: 46		**Large non-eucalypt benchmark (DBH) value:** None	
Number of large eucalypt: 6		**Number of large non-eucalypt:** 0	
Native tree species richness (100x50 m) 15			
Corymbia intermedia (pink bloodwood), Eucalyptus racemosa subsp. racemosa (scribbly gum), Acacia disparrima subsp. disparrima, Angophora leiocarpa (rusty gum), Lophostemon suaveolens (swamp box), Alphitonia excelsa (soap tree), Eucalyptus acmenoides, Acacia leiocalyx, Eucalyptus propinqua (small-fruited grey gum), Lophostemon confertus (brush box), ?Elaeodendron australe, Petalostigma pubescens (quinine tree), Banksia integrifolia, Acacia maidenii (Maiden's wattle), Clerodendrum floribundum			
Native shrub species richness (50x10 m) 8			
Angophora leiocarpa (rusty gum), Acacia disparrima, Xanthorrhoea latifolia, Eucalyptus sp 1, Pimelia linifolia, Acacia leiocalyx, Leucopogon juniperinus (prickly heath), Acacia maidenii (Maiden's wattle),			
Native grass species richness (50x10 m) 6			
Entolasia stricta (wiry panic), Imperata cylindrica (blady grass), Poaceae indet (curly), Eriachne sp., Cymbopogon refractus (barbed-wire grass), Oplismenus aemulus (creeping shade grass),			
Native forbs/others species richness (50x10 m) 10			

Lomandra longifolia, Lomandra multiflora, ?Phyllanthus sp., Laxmannia gracilis (slender wire lily), Dianella revoluta var. revoluta, Dianella caerulea, Cyanthillium cinereum, Eustrephus latifolius (wombat berry), Dianella brevipedunculata, Poranthera microphylla (small poranthera),	
Non-native plant cover (50x10 m): 62	
Passiflora suberosa (corky passion flower) (7%), Lantana camara (lantana) (54%), Praxelis clematidea (1%),	
Coarse woody debris (50x20 m): 22	
Coarse woody debris lengths (m): 22,	
Quadrat 1	
Native perennial grass cover: 2	**Organic litter cover:** 68
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 2	
Native perennial grass cover: 5	**Organic litter cover:** 55
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 3	
Native perennial grass cover: 0	**Organic litter cover:** 70
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 0	**Organic litter cover:** 50
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 5	**Organic litter cover:** 35
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: North West	**Transect length:** 100mNone
Notes: Did not count T3((<8m)	
Canopy: 58 m Details: 8-11 (3), 13-18 (5), 20.5-33.5 (13), 41-43 (2), 50-56 (6), 59-72 (13), 74-83 (9), 93-100 (7),	
Sub-canopy: 15.3 m	

Details: 16-18.5 (2.5), 24-27 (3), 33.5-36 (2.5), 41-46.3 (5.3), 50-52 (2),

Shrub: 5 m

Details:

Photos

Point: 152.62400063908188, -26.070217738061817

Photo North:

Photo East:

Photo South:

Photo West:

Transect Start:

Transect End:

Note: None

Site: 7 - 1	**Date**: 07/10/20 01:00PM (09:21)	**Recorder**: Peter Moonie	
Locality/Land parcel: 878MCH1061		**UIN**: 201007092108	
GTRE: 12.11.5 - Corymbia citriodora subsp. variegata woodland to open forest +/- Eucalyptus siderophloia/E. crebra, E. carnea, E. acmenoides, E. propinqua on metamorphics +/- interbedded volcanics			
Median tree canopy heights (m): **Emergent:** None **Canopy:** 21 **Sub-canopy:** 9			
EDL:	**No. of dominant species in the EDL**: 4	**No. of dominant species in the EDL recruiting:** 4	**Percentage recruiting:** 100
Number of large trees (100x50 m): 2			
Large eucalypt benchmark (DBH) value: 43		**Large non-eucalypt benchmark (DBH) value:** None	
Number of large eucalypt: 2		**Number of large non-eucalypt:** 0	
Native tree species richness (100x50 m) 10			
Eucalyptus acmenoides, Eucalyptus siderophloia, Lophostemon confertus (brush box), Corymbia citriodora (spotted gum), Acacia fimbriata (Brisbane golden wattle), Eucalyptus propinqua (small-fruited grey gum), Acacia disparrima subsp. disparrima, Acacia penninervis var. penninervis, Acacia leiocalyx, Alphitonia excelsa (soap tree)			
Native shrub species richness (50x10 m) 9			
Acacia leiocalyx, Acacia fimbriata (Brisbane golden wattle), Lophostemon confertus (brush box), Acacia disparrima subsp. disparrima, Xanthorrhoea latifolia, Leucopogon juniperinus (prickly heath), Alphitonia excelsa (soap tree), Jacksonia scoparia, Myoporum acuminatum			
Native grass species richness (50x10 m) 6			
Imperata cylindrica (blady grass), Oplismenus aemulus (creeping shade grass), Cymbopogon refractus (barbed-wire grass), Entolasia stricta (wiry panic), Aristida sp, Poaceae indet.			
Native forbs/others species richness (50x10 m) 11			
Desmodium rhytidophyllum, Dianella caerulea, Cyanthillium cinereum, Glycine sp, Lomandra confertifolia subsp. pallida, Lepidosperma laterale, Dianella revoluta var. revoluta, Parsonsia straminea (monkey rope), Goodenia rotundifolia, Eustrephus latifolius (wombat berry), Secamone elliptica			
Non-native plant cover (50x10 m): 30			

Lantana camara (lantana) (25%), Passiflora suberosa (corky passion flower) (2%), Praxelis clematidea (1%), Megathyrus maximus (2%)	
Coarse woody debris (50x20 m): 81	
Coarse woody debris lengths (m): 81,	
Quadrat 1	
Native perennial grass cover: 0	**Organic litter cover:** 65
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 2	
Native perennial grass cover: 5	**Organic litter cover:** 75
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 3	
Native perennial grass cover: 10	**Organic litter cover:** 50
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 10	**Organic litter cover:** 80
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 5	**Organic litter cover:** 90
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: West	**Transect length:** 100mNone
Notes: 12.11.5e; did not include T3 2-6m in subcanopy	
Canopy: 40.2 m Details: 3.5-10 (6.5), 12-13 (1), 16-20 (4), 51-61 (10), 69.8-76.5 (6.7), 85-97 (12),	
Sub-canopy: 25.2 m Details: 11-17 (6), 35-37 (2), 47-50 (3), 62.7-65.2 (2.5), 76.8-83 (6.2), 85-87.5 (2.5), 97-100 (3),	
Shrub: 5 m Details:	
Photos	
Point: 152.6219363694197, -26.059450867144868	

Photo North:

Photo East:

Photo South:

Photo West:

Transect Start:

Transect End:

Note: None

Site: N7 - 2a	**Date**: 18/11/20 01:00PM (15:00)	**Recorder**: Peter Moonie None
Locality/Land parcel: 878MCH1061		**UIN**: 201118150034
GTRE: 12.11.5 - Corymbia citriodora subsp. variegata woodland to open forest +/- Eucalyptus siderophloia/E. crebra, E. carnea, E. acmenoides, E. propinqua on metamorphics +/- interbedded volcanics		
Median tree canopy heights (m): **Emergent:** None **Canopy:** 18 **Sub-canopy:** 9		

EDL:	**No. of dominant species in the EDL**: 4	**No. of dominant species in the EDL recruiting:** 2	**Percentage recruiting:** 50

Number of large trees (100x50 m): 4	
Large eucalypt benchmark (DBH) value: 43	**Large non-eucalypt benchmark (DBH) value:** None
Number of large eucalypt: 4	**Number of large non-eucalypt:** 0
Native tree species richness (100x50 m) 14	
Corymbia citriodora (spotted gum), Eucalyptus acmenoides, Lophostemon confertus (brush box), Acacia disparrima, Polyscias elegans (celery wood), Eucalyptus propinqua (small-fruited grey gum), Eucalyptus siderophloia, Eucalyptus exserta (Queensland peppermint), Angophora leiocarpa (rusty gum), Acacia leiocalyx, Corymbia intermedia (pink bloodwood), Melaleuca salicina	
Native shrub species richness (50x10 m) 8	
Lophostemon confertus (brush box), Acacia disparrima, Acacia maidenii (Maiden's wattle), Pandorea pandorana (wonga vine), Leucopogon juniperinus (prickly heath), Alphitonia excelsa (soap tree), ?Solanum sp.(seedling), Maclura cochinchinensis (cockspur thorn),	
Native grass species richness (50x10 m) 6	
Oplismenus aemulus (creeping shade grass), Ottochloa gracillima (pademelon grass), Entolasia stricta (wiry panic), Imperata cylindrica (blady grass), Cymbopogon refractus (barbed-wire grass), Themeda triandra (kangaroo grass)	
Native forbs/others species richness (50x10 m) 19	
Eustrephus latifolius (wombat berry), Lobelia purpurascens (white root), Cheilanthes sieberi, Desmodium rhytidophyllum, Lomandra multiflora, Cyperus indet, Eremophila debilis (winter apple), Sigesbeckia orientalis (Indian weed), Glycine clandestina, Goodenia rotundifolia, Passiflora aurantia, Dianella caerulea, Eustrephus latifolius (wombat berry), Lomandra filiformis, Doodia caudata, Ajuga australis (Australian bugle), Lomandra confertifolia subsp. pallida, Lomandra longifolia, Hardenbergia violacea	
Non-native plant cover (50x10 m): 39	
Lantana camara (lantana) (25%), Praxelis clematidea (2%), Bidens pilosa (1%), Emilia sonchifolia (4%), Sonchus oleraceus (common sowthistle) (1%), Passiflora suberosa (corky passion flower) (3%), Gomphocarpus physocarpus (balloon cottonbush) (1%), Lantana montevidensis (creeping lantana) (4%), other (1%),	
Coarse woody debris (50x20 m): 48	
Coarse woody debris lengths (m): 48,	
Quadrat 1	
Native perennial grass cover: 5	**Organic litter cover:** 75
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 2	
Native perennial grass cover: 0	**Organic litter cover:** 30

Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 3	
Native perennial grass cover: 30	**Organic litter cover:** 40
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 20	**Organic litter cover:** 50
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 40	**Organic litter cover:** 30
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: South West	**Transect length:** 100mNone
Notes: Did not include trees under 7 m in the sub canopy	
Canopy: 41.8 m Details: 18.5-23 (4.5), 40-51 (11), 56.7-61 (4.3), 70-84 (14), 91-99 (8),	
Sub-canopy: 31.8 m Details: 1-9 (8), 12.5-14.5 (2), 21-26.6 (5.6), 29-30.7 (1.7), 33-36 (3), 39.5-42 (2.5), 58.8-65 (6.2), 69-71.8 (2.8),	
Shrub: 21 m Details: 1-22 (21),	
Photos	
Point: 152.6273964984509, -26.069369961579913	
Photo North:	

Photo East:

Photo South:

Photo West:

Transect Start:

Transect End:

Note: None

Site: N7 - 3	**Date**: 08/10/20 01:00PM (07:10)	**Recorder**: Peter Moonie None
Locality/Land parcel: 3MPH23906		**UIN**: 201008071031

GTRE: 12.11.5 - Corymbia citriodora subsp. variegata woodland to open forest +/- Eucalyptus siderophloia/E. crebra, E. carnea, E. acmenoides, E. propinqua on metamorphics +/- interbedded volcanics

Median tree canopy heights (m):
Emergent: None **Canopy:** 19 **Sub-canopy:** 10

EDL:	**No. of dominant species in the EDL**: 4	**No. of dominant species in the EDL recruiting:** 3	**Percentage recruiting:** 75

Number of large trees (100x50 m): 2

Large eucalypt benchmark (DBH) value: 43	**Large non-eucalypt benchmark (DBH) value:** None
Number of large eucalypt: 2	**Number of large non-eucalypt:** 0

Native tree species richness (100x50 m) 12

Eucalyptus acmenoides, Lophostemon confertus (brush box), Corymbia citriodora (spotted gum), Eucalyptus propinqua (small-fruited grey gum), Eucalyptus siderophloia, Acacia fimbriata (Brisbane golden wattle), Lophostemon suaveolens (swamp box), Acacia disparrima subsp. disparrima, Acacia leiocalyx, Jagera pseudorhus var. pseudorhus, Alphitonia excelsa (soap tree), Eucalyptus moluccana (gum-topped box),

Native shrub species richness (50x10 m) 9

Acacia leiocalyx, Alphitonia excelsa (soap tree), Leucopogon juniperinus (prickly heath), Acacia disparrima subsp. disparrima, Eucalyptus sp 1. (seedling), Acacia fimbriata (Brisbane golden wattle), Eucalyptus sp 2. (seedling), Alphitonia excelsa (soap tree), Lophostemon suaveolens (swamp box)

Native grass species richness (50x10 m) 5

Cymbopogon refractus (barbed-wire grass), Entolasia stricta (wiry panic), ? Paspalidium distans, Enteropogon acicularis, Oplismenus aemulus (creeping shade grass),

Native forbs/others species richness (50x10 m) 7

Lomandra confertifolia subsp. pallida, Lomandra multiflora, Cyanthillium cinereum, Desmodium rhytidophyllum, Glycine sp, Dianella caerulea, Eustrephus latifolius (wombat berry)

Non-native plant cover (50x10 m): 68

Lantana camara (lantana) (65%), Passiflora suberosa (corky passion flower) (2%), Megathyrus maximus (1%)

Coarse woody debris (50x20 m): 68

Coarse woody debris lengths (m): 68,

Quadrat 1

Native perennial grass cover: 5	**Organic litter cover:** 55
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None

Total cover: None

Quadrat 2

Native perennial grass cover: 10	**Organic litter cover:** 60
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None

Total cover: None

Quadrat 3	
Native perennial grass cover: 15	**Organic litter cover:** 30
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 10	**Organic litter cover:** 50
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 15	**Organic litter cover:** 40
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: North West	**Transect length:** 100mNone
Notes: 12.11.5e, trees < 9m not included in subcanopy	
Canopy: 25.2 m Details: 1-6 (5), 8.6-12.3 (3.7), 19-24.5 (5.5), 75-86 (11),	
Sub-canopy: 26.4 m Details: 6-8.6 (2.6), 19-24.5 (5.5), 25.7-32 (6.3), 58-68 (10), 97-99 (2),	
Shrub: 12.5 m Details: None-None (12.5),	
Photos	
Point: 152.63414383799764, -26.064502149600205	
Photo North: 	
Photo East:	

Photo South:

Photo West:

Transect Start:

Transect End:

Note: Dry as a chip at all sites except riparian

Site: N8 - 1	**Date**: 06/10/20 01:00PM (13:49)		**Recorder**: Peter Moonie
Locality/Land parcel: 889CP864404			**UIN**: 201006134940
GTRE: 12.11.5e - Corymbia citriodora subsp. variegata woodland to open forest +/- Eucalyptus siderophloia/E. crebra, E. carnea, E. acmenoides, E. propinqua on metamorphics +/- interbedded volcanics			
Median tree canopy heights (m): **Emergent:** None **Canopy:** 28 **Sub-canopy:** 11			
EDL:	**No. of dominant species in the EDL**: 3	**No. of dominant species in the EDL recruiting:** 3	**Percentage recruiting:** 100
Number of large trees (100x50 m): 4			
Large eucalypt benchmark (DBH) value: 43		**Large non-eucalypt benchmark (DBH) value:** None	
Number of large eucalypt: 4		**Number of large non-eucalypt:** 0	
Native tree species richness (100x50 m) 10			

Eucalyptus acmenoides, Corymbia citriodora (spotted gum), Eucalyptus propinqua (small-fruited grey gum), Acacia disparrima subsp. disparrima, Eucalyptus siderophloia, Corymbia intermedia (pink bloodwood), Lophostemon suaveolens (swamp box), Alphitonia excelsa (soap tree), Lophostemon confertus (brush box), Angophora leiocarpa (rusty gum)	
Native shrub species richness (50x10 m) 9	
Acacia disparrima subsp. disparrima, Corymbia citriodora, Daviesia ulicifolia, Persoonia ? sericea, Xanthorrhoea johnsonii, Acacia leiocalyx, Leucopogon juniperinus, Alphitonia excelsa (soap tree), Jacksonia scoparia	
Native grass species richness (50x10 m) 5	
Panicum effusum, Entolasia stricta (wiry panic), Cymbopogon refractus (barbed-wire grass), Aristida sp., Themeda triandra (kangaroo grass),	
Native forbs/others species richness (50x10 m) 3	
Lomandra confertifolia subsp. pallida, Lomandra multiflora, Dianella caerulea,	
Non-native plant cover (50x10 m): 10	
Lantana camara (lantana) (8%) Megathyrus maximus (2%)	
Coarse woody debris (50x20 m): 8	
Coarse woody debris lengths (m): 8,	
Quadrat 1	
Native perennial grass cover: 20	**Organic litter cover:** 80
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 2	
Native perennial grass cover: 10	**Organic litter cover:** 50
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 3	
Native perennial grass cover: 5	**Organic litter cover:** 65
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 20	**Organic litter cover:** 60
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 5	**Organic litter cover:** 75
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None

Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: North East	**Transect length:** 100mNone
Notes: Used 12.11.5	
Canopy: Not present Details:	
Sub-canopy: 51.8 m Details: 1-6.6 (5.6), 16-23 (7), 26.6-37 (10.4), 38.6-41.7 (3.1), 45.8-51.2 (5.40000000000001), 53.5-56.1 (2.6), 58.6-61.6 (3), 71.6-77.3 (5.7), 81.2-85 (3.8), 90.4-95.6 (5.19999999999999),	
Shrub: 2 m	
Photos	
Point: 152.60552205588513, -26.05730263466647	
Photo North: 	
Photo East: 	
Photo South:	

Photo West:

Transect Start:

Transect End:

Note: None

Site: N9 - 1	**Date**: 08/10/20 01:00PM (10:58)	**Recorder**: Peter Moonie	
Locality/Land parcel: 3MPH23906		**UIN**: 201008105805	
GTRE: 12.11.5/12.11.3a. 12.11.5 - Corymbia citriodora subsp. variegata woodland to open forest +/- Eucalyptus siderophloia/E. crebra, E. carnea, E. acmenoides, E. propinqua on metamorphics +/- interbedded volcanics. 12.11.3a - Lophostemon confertus +/- Eucalyptus microcorys, E. carnea, E. propinqua, E. major, E. siderophloia woodland. Note: RE more closely aligned to 12.3.11			
Median tree canopy heights (m): **Emergent:** None **Canopy:** 6 **Sub-canopy:** 0			
EDL:	**No. of dominant species in the EDL**: 4	**No. of dominant species in the EDL recruiting:** 4	**Percentage recruiting:** 100
Number of large trees (100x50 m): 0			
Large eucalypt benchmark (DBH) value: 49		**Large non-eucalypt benchmark (DBH) value:** None	
Number of large eucalypt: 0		**Number of large non-eucalypt:** 0	
Native tree species richness (100x50 m) 5			
Acacia leiocalyx, Acacia disparrima, Melaleuca salicina, Lophostemon suaveolens (swamp box), Eucalyptus tereticornis			
Native shrub species richness (50x10 m) 1			
Eucalyptus tereticornis			
Native grass species richness (50x10 m) 3			
Imperata cylindrica (blady grass), Austrostipa ramosissima, Aristida sp.			
Native forbs/others species richness (50x10 m) 10			
Centella asiatica, Dichondra repens (kidney weed), Polymeria calycina (pink bindweed), Lobelia purpurascens (white root), Wahlenbergia gracilis, Philydrum lanuginosum (frogsmouth), Juncus continuus, Sphaeromorphaea australis, Sida sp. 1, Sp. other – serrated leaf, pink flower,			
Non-native plant cover (50x10 m): 57			
Conyza sp. (1%), Cirsium vulgare (spear thistle) (2%), Verbena rigida (2%), Oxalis corniculata (2%), Gomphocarpus physocarpus (balloon cottonbush) (1%), Setaria sphacelata (40%), Baccharis halimifolia (groundsel bush) (4%), Sonchus oleraceus (common sowthistle) (1%), Praxelis			

clematidea (1%), Richardia brasiliensis (white eye) (1%), schenkia australis (1%), Cyclospermum leptophyllum (1%),	
Coarse woody debris (50x20 m): 0	
Coarse woody debris lengths (m): 0	
Quadrat 1	
Native perennial grass cover: 0	**Organic litter cover:** 25
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 2	
Native perennial grass cover: 0	**Organic litter cover:** 50
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 3	
Native perennial grass cover: 0	**Organic litter cover:** 40
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 40	**Organic litter cover:** 50
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 35	**Organic litter cover:** 30
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: South West	**Transect length:** 100mNone
Notes: No canopy or subcanopy present as regrowth	
Canopy: 0 m Details:	
Sub-canopy: 0 m Details:	
Shrub: 0 m Details:	
Photos	
Point: 152.6335733283184, -26.06704200584743	

Photo North:

Photo East:

Photo South:

Photo West:

Transect Start:

Transect End:

Note: RE in quadrat more closely aligned to 12.3.11 and this should be reflected in planting list. Revel program required to improve biocondition score. Stop slashing blade grass. Have not included Lower tree layer in canopy cover as it is not reflective of the benchmark canopy layer.

Site: C1 - 1	**Date**: 09/10/20 01:00PM (11:02)	**Recorder**: Peter Moonie None	
Locality/Land parcel: 1MPH23904		**UIN**: 201009110257	
GTRE: 12.11.5 - Corymbia citriodora subsp. variegata woodland to open forest +/- Eucalyptus siderophloia/E. crebra, E. carnea, E. acmenoides, E. propinqua on metamorphics +/- interbedded volcanics			
Median tree canopy heights (m): **Emergent:** None **Canopy:** 25 **Sub-canopy:** 10			
EDL:	**No. of dominant species in the EDL**: 4	**No. of dominant species in the EDL recruiting:** 2	**Percentage recruiting:** 50
Number of large trees (100x50 m): 6			
Large eucalypt benchmark (DBH) value: 43		**Large non-eucalypt benchmark (DBH) value:** None	
Number of large eucalypt: 6		**Number of large non-eucalypt:** 0	
Native tree species richness (100x50 m) 11			
Eucalyptus acmenoides, Corymbia citriodora (spotted gum), Lophostemon suaveolens (swamp box), Syncarpia glomulifera, Eucalyptus siderophloia, Polyscias elegans (celery wood), Eucalyptus moluccana (gum-topped box), Flindersia australis (crow's ash), Acacia disparrima, Alphitonia excelsa (soap tree), Eucalyptus propinqua (small-fruited grey gum),			
Native shrub species richness (50x10 m) 4			
Lophostemon confertus (brush box), Acacia leiocalyx, Acacia disparrima, Alphitonia excelsa (soap tree)			
Native grass species richness (50x10 m) 3			
Entolasia stricta (wiry panic), Themeda triandra (kangaroo grass), Cymbopogon refractus (barbed-wire grass)			
Native forbs/others species richness (50x10 m) 5			
Dianella revoluta var. revoluta, Lomandra confertifolia subsp. pallida, Dianella caerulea, Lomandra filiformis, Eustrephus latifolius (wombat berry),			
Non-native plant cover (50x10 m): 46			
Lantana camara (lantana) (30%), Passiflora suberosa (corky passion flower) (2%), Setaria sphacelata (10%), Amaranthus viridis (green amaranth) (1%), Solanum nigrum (1%), Ageratum houstonianum (blue billygoat weed) (1%), Megathyrus maximus (1%)			
Coarse woody debris (50x20 m): 51			
Coarse woody debris lengths (m): 51,			
Quadrat 1			
Native perennial grass cover: 5		**Organic litter cover:** 55	
Native other grass: None		Native forbs: None	
Native shrubs (less than 1 m): None		Non-native grass: None	
Non-native forbs and shrubs: None		Rock: None	
Bare Ground: None		Cryptograms: None	
Total cover: None			
Quadrat 2			
Native perennial grass cover: 0		**Organic litter cover:** 10	
Native other grass: None		Native forbs: None	
Native shrubs (less than 1 m): None		Non-native grass: None	

Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 3	
Native perennial grass cover: 10	**Organic litter cover:** 35
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 5	**Organic litter cover:** 40
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 5	**Organic litter cover:** 95
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: North West	**Transect length:** 100mNone
Notes: 12.11.5e, The 80 EDL is the canopy, Trees below 7 m were not included in the sub canopy	
Canopy: -63 m Details: 100-97 (-3), 96-83 (-13), 79-70 (-9), 66-58 (-8), 36-6 (-30),	
Sub-canopy: -23 m Details: 93-90 (-3), 80-79 (-1), 48-46 (-2), 38-32 (-6), 25-14 (-11),	
Shrub: 6 m Details: 1-7 (6),	
Photos	
Point: 152.677082740755, -26.1641134773285	
Photo North:	

Photo East:

Photo South:

Photo West:

Transect Start:

Transect End:

Note: None

Site: C1 - 2	**Date**: 09/10/20 01:00PM (13:20)	**Recorder**: Peter Moonie
Locality/Land parcel: 763MCH5342		**UIN**: 201009132036

GTRE: 12.11.5 - Corymbia citriodora subsp. variegata woodland to open forest +/- Eucalyptus siderophloia/E. crebra, E. carnea, E. acmenoides, E. propinqua on metamorphics +/- interbedded volcanics

Median tree canopy heights (m):
Emergent: None **Canopy:** 23 **Sub-canopy:** 11

EDL:	**No. of dominant species in the EDL**: None	**No. of dominant species in the EDL recruiting:** None	**Percentage recruiting:** None

Number of large trees (100x50 m): 8

Large eucalypt benchmark (DBH) value: 43	**Large non-eucalypt benchmark (DBH) value:** None
Number of large eucalypt: 8	**Number of large non-eucalypt:** 0

Native tree species richness (100x50 m) 12

Eucalyptus acmenoides, Lophostemon suaveolens (swamp box), Corymbia citriodora (spotted gum), Lophostemon confertus (brush box), Acacia disparrima, Allocasuarina torulosa, Eucalyptus siderophloia, Acacia leiocalyx, Eucalyptus propinqua (small-fruited grey gum), Petalostigma triloculare (forest quinine), Melaleuca salicina, Eucalyptus moluccana (gum-topped box),

Native shrub species richness (50x10 m) 8

Acacia disparrima, Acacia leiocalyx, Lophostemon suaveolens (swamp box), Corymbia citriodora (seedling), Lophostemon confertus (seedling), Myrsine angusta, Carissa ovata (currantbush), Acacia maidenii (Maiden's wattle),

Native grass species richness (50x10 m) 6

Entolasia stricta (wiry panic), Themeda triandra (kangaroo grass), Eragrostis sp., Panicum effusum, Cymbopogon refractus (barbed-wire grass), Aristida sp.

Native forbs/others species richness (50x10 m) 8

Lomandra confertifolia subsp. pallida, Dianella caerulea, Purple Phyllanthus/pimelea, Goodenia rotundifolia, Dianella brevipedunculata, Lomandra longifolia, Lomandra multiflora, Eustrephus latifolius (wombat berry)

Non-native plant cover (50x10 m): 2

Megathyrus maximus (1%),

Coarse woody debris (50x20 m): 72

Coarse woody debris lengths (m): 72

Quadrat 1

Native perennial grass cover: 20	**Organic litter cover:** 75
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None

Total cover: None

Quadrat 2

Native perennial grass cover: 30	**Organic litter cover:** 55
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None

Total cover: None

Quadrat 3

Native perennial grass cover: 40	**Organic litter cover:** 60
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 25	**Organic litter cover:** 65
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 5	**Organic litter cover:** 55
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: South East	**Transect length:** 100mNone
Notes: Did not count trees less than 8 m in the sub canopy	
Canopy: 48.6 m Details: 2-12 (10), 17.7-35 (17.3), 59-67 (8), 70-81.3 (11.3), 98-100 (2),	
Sub-canopy: 13.9 m Details: 26-28 (2), 33.4-37.4 (4), 40.5-48.4 (7.9),	
Shrub: 11.5 m Details: 1-12.5 (11.5),	
Photos	
Point: 152.67782303448809, -26.15863571986914	
Photo North: 	
Photo East:	

Photo South:

Photo West:

Transect Start:

Transect End:

Note: Vegetation dry as a chip

Site: C2 - 1	**Date**: 09/10/20 01:00PM (07:30)	**Recorder**: Peter Moonie	
Locality/Land parcel: 19SP299683		**UIN**: 201009073035	
GTRE: 12.3.11 - Eucalyptus tereticornis +/- Eucalyptus siderophloia, Corymbia intermedia open forest on alluvial plains usually near coast			
Median tree canopy heights (m): **Emergent:** None **Canopy:** 22 **Sub-canopy:** 10			
EDL:	**No. of dominant species in the EDL**: 3	**No. of dominant species in the EDL recruiting:** 2	**Percentage recruiting:** 66.6666666666667
Number of large trees (100x50 m): 4			
Large eucalypt benchmark (DBH) value: 49		**Large non-eucalypt benchmark (DBH) value:** 36	
Number of large eucalypt: 4		**Number of large non-eucalypt:** 0	
Native tree species richness (100x50 m) 22			

Acacia disparrima, Eucalyptus propinqua (small-fruited grey gum), Eucalyptus siderophloia, Corymbia intermedia (pink bloodwood), Eucalyptus acmenoides, Lophostemon suaveolens (swamp box), Polyscias elegans (celery wood), Astrotricha latifolia, Melaleuca salicina, Acacia oshanesii, Lophostemon confertus (brush box), Psychotria daphnoides, Alchornea ilicifolia (native holly), Elaeodendron australe, Diospyros germinata, Croton insularis, Jagera pseudorhus var. pseudorhus, Cyclophyllum coprosmoides, Flindersia schottiana, Pilidiostigma rhytispermum, Syncarpia glomulifera, Petalostigma triloculare	
Native shrub species richness (50x10 m) 23	
Melaleuca salicina, Acacia disparrima subsp. disparrima, Astrotricha latifolia, Carissa ovata (currantbush), Leucopogon juniperinus (prickly heath), Alphitonia excelsa (soap tree), Diospyros germinata, Polyscias elegans (celery wood), Psychotria daphnoides, Alchornea ilicifolia (native holly), Acalypha nemorum (hairy acalypha), Jagera pseudorhus, Cupaniopsis parvifolia (small-leaved tuckeroo), Myrsine angusta, Elaeodendron australe, Pilidiostigma rhytispermum, Alyxia ruscifolia, Brachychiton discolor, Mallotus philippensis (red kamala), Cyclophyllum coprosmoides, Croton verreaux, Backhousia myrtifolia, Acronychia laevis	
Native grass species richness (50x10 m) 4	
Themeda triandra (kangaroo grass), Ottochloa gracillima (pademelon grass), Oplismenus aemulus (creeping shade grass), Entolasia stricta (wiry panic),	
Native forbs/others species richness (50x10 m) 11	
Lomandra confertifolia subsp. pallida, Dianella caerulea, Lomandra longifolia, Cissus antarctica, Smilax australis (barbed-wire vine), Stephania japonica, Geitonoplesium cymosum (scrambling lily), Cyanthillium cinereum, Lepidosperma laterale, Eustrephus latifolius (wombat berry), Gymnostachys anceps (settler's flax)	
Non-native plant cover (50x10 m): 22	
Passiflora suberosa (corky passion flower) (5%), Lantana camara (lantana) (15%), Solanum seaforthianum (Brazilian nightshade) (1%), Ochna serrulata (ochna) (1%)	
Coarse woody debris (50x20 m): 72	
Coarse woody debris lengths (m): 72	
Quadrat 1	
Native perennial grass cover: 0	**Organic litter cover:** 50
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 2	
Native perennial grass cover: 0	**Organic litter cover:** 602
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 3	
Native perennial grass cover: 2	**Organic litter cover:** 68
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	

Native perennial grass cover: 2	**Organic litter cover:** 88
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 2	**Organic litter cover:** 78
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: North East	**Transect length:** 100mNone
Notes: 12.3.11, exclude cheese below 7m in the sub canopy calculations Did not record intervals for shrubs so the first interval and represents the title across the whole transect I'm done so then I just got a take my photos	
Canopy: 67 m Details: 7-19 (12), 27-40.5 (13.5), 44.5-75 (30.5), 88-99 (11),	
Sub-canopy: 46.4 m Details: 1-8 (7), 14-16.4 (2.4), 62-99 (37),	
Shrub: 21.5 m Details: 1-22.5 (21.5),	
Photos	
Point: 152.6829905103608, -26.156238188951676	
Transect Start: 	
Note: None	
Point: 152.68337218348276, -26.155875962085503	
Photo North:	

Photo East:

Photo South:

Photo West:

Transect Start:

Transect End:

Note: None

Site: S1 - 1	**Date**: 11/10/20 01:00PM (09:41)	**Recorder**: Peter Moonie
Locality/Land parcel: 102SP297908		**UIN**: 201011094140

GTRE: 12.3.11. Eucalyptus tereticornis +/- Eucalyptus siderophloia, Corymbia intermedia open forest on alluvial plains usually near coast
Note: Partially within 12.11.3 but still representative of 12.3.11 at location of plot.

Median tree canopy heights (m):
Emergent: None **Canopy:** 26 **Sub-canopy:** 11

EDL:	**No. of dominant species in the EDL**: 1	**No. of dominant species in the EDL recruiting:** 0	**Percentage recruiting:** 0

Number of large trees (100x50 m): 3

Large eucalypt benchmark (DBH) value: 49	**Large non-eucalypt benchmark (DBH) value:** 39
Number of large eucalypt: 3	**Number of large non-eucalypt:** 0

Native tree species richness (100x50 m) 13

Eucalyptus tereticornis, Lophostemon suaveolens (swamp box), Alphitonia excelsa (soap tree), Acacia disparrima, Mallotus philippensis (red kamala), Jagera pseudorhus, Aphananthe philippinensis, Cryptocarya triplinervis, Pittosporum revolutum, Melaleuca salicina, Streblus brunonianus (whalebone tree), Acacia maidenii (Maiden's wattle), Cupaniopsis parvifolia (small-leaved tuckeroo),

Native shrub species richness (50x10 m) 15

Denhamia bilocularis, Cyclophyllum coprosmoides, Acacia disparrima, Cryptocarya triplinervis, Alphitonia excelsa (soap tree), Psychotria daphnoides, Sp.1, Lophostemon suaveolens (swamp box), Maclura cochinchinensis (cockspur thorn), Diospyros germinata, Cupaniopsis parvifolia (small-leaved tuckeroo), Elaedendron australe, Streblus brunonianus (whalebone tree), Aphananthe philippinensis, Carissa ovata (currantbush), Alyxia ruscifolia

Native grass species richness (50x10 m) 1

Imperata cylindrica (blady grass)

Native forbs/others species richness (50x10 m) 6

Lomandra filiformis, Lomandra longifolia, Dianella caerulea, Smilax australis (barbed-wire vine), Sp1. (vine), Eustrephus latifolius (wombat berry),

Non-native plant cover (50x10 m): 11

Lantana camara (lantana) (2%), Ochna serrulata (ochna) (1%), Passiflora suberosa (corky passion flower) (5%), Solanum seaforthianum (Brazilian nightshade) (1%), ?Aster subulatus (1%)

Coarse woody debris (50x20 m): 11

Coarse woody debris lengths (m): 11,

Quadrat 1

Native perennial grass cover: 0	**Organic litter cover:** 70
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	

Quadrat 2

Native perennial grass cover: 10	**Organic litter cover:** 70
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	

Quadrat 3	
Native perennial grass cover: 40	**Organic litter cover:** 50
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 5	**Organic litter cover:** 95
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 5	**Organic litter cover:** 75
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: West	**Transect length:** 100mNone
Notes: Please less than 7 m in height not included in the sub canopy cover calculations. The dominant layer was The upper canopy	
Canopy: 53.9 m Details: 3.5-11 (7.5), 16.5-26.3 (9.8), 34.4-44 (9.6), 50-72 (22), 95-100 (5),	
Sub-canopy: 77.7 m Details: 1-3 (2), 13.7-34.4 (20.7), 45-100 (55),	
Shrub: 7.5 m Details: 1-8.5 (7.5),	
Photos	
Point: 152.70189262021674, -26.23822312068297	
Photo North: 	

Photo East:

Photo South:

Photo West:

Transect Start:

Transect End:

Note: Transex started outside of mapped are you but considered okay as mapping Boundry was slightly in accurate and tear to corners was the dominant tree in the ATL at this location

Site: S2 - 1	**Date**: 11/10/20 01:00PM (12:26)	**Recorder**: Peter Moonie	
Locality/Land parcel: 102SP297908		**UIN**: 201011122619	
GTRE: 12.11.3 - Eucalyptus siderophloia, E. propinqua +/- E. microcorys, Lophostemon confertus, Corymbia intermedia, E. acmenoides open forest on metamorphics +/- interbedded volcanics			
Median tree canopy heights (m): **Emergent:** None **Canopy:** 23 **Sub-canopy:** 11			
EDL:	**No. of dominant species in the EDL**: 3	**No. of dominant species in the EDL recruiting:** 2	**Percentage recruiting:** 66.6666666666667
Number of large trees (100x50 m): 2			
Large eucalypt benchmark (DBH) value: 45		**Large non-eucalypt benchmark (DBH) value:** None	
Number of large eucalypt: 2		**Number of large non-eucalypt:** 0	
Native tree species richness (100x50 m) 28			

Lophostemon suaveolens (swamp box), Acacia disparrima, Eucalyptus propinqua (small-fruited grey gum), Eucalyptus siderophloia, Cupaniopsis anacardioides (tuckeroo), Rhodosphaera rhodanthema (tulip satinwood), Cupaniopsis parvifolia (small-leaved tuckeroo), Meliocope micrococca, Eucalyptus tereticornis, Planchonella pohlmaniana, Sp2, Alyxia ruscifolia, Leucopogon juniperinus (prickly heath), Denhamia bilocularis, Myrsine variabilis, Alectryon reticulatis, Jagera pseudorhus, Sp3, Polyscias elegans (celery wood), Petalostigma triloculare (forest quinine), Lophostemon confertus (brush box), Everistia vacciniifolia, Pilidiostigma rhytispermum, Alchornea ilicifolia (native holly), Carissa ovata (currantbush), Pittosporum undulatum (sweet pittosporum), ?Flindersia schottiana, Acacia leiocalyx	
Native shrub species richness (50x10 m) 17	
Alyxia ruscifolia, Acacia disparrima subsp. disparrima, Denhamia bilocularis, Acacia complanata (flatstem wattle), Cyclophyllum coprosmoides, Carissa ovata (currantbush), Tabernaemontana pandacaqui (banana bush), Cyclophyllum coprosmoides, Solanum stelligerum (devil's needles), Cupaniopsis parvifolia (small-leaved tuckeroo), Myrsine variabilis, Leucopogon juniperinus (prickly heath), Diospyros germinata, ?Diospyros fasciculosa, Petalostigma triloculare, Alectryon reticulatis, Acronychia pauciflora	
Native grass species richness (50x10 m) 2	
Eneteropogon sp., Aristida sp,	
Native forbs/others species richness (50x10 m) 7	
Dianella caerulea, Lomandra filiformis, Lomandra multiflora, Lomandra confertifolia subsp. pallida, Dianella caerulea, Amyema conspicua, Smilax australis (barbed-wire vine),	
Non-native plant cover (50x10 m): 27	
Passiflora suberosa (corky passion flower) (5%), Lantana camara (lantana) (20%), Ochna serrulata (ochna) (2%),	
Coarse woody debris (50x20 m): 115	
Coarse woody debris lengths (m): 115,	
Quadrat 1	
Native perennial grass cover: 5	**Organic litter cover:** 40
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 2	
Native perennial grass cover: 15	**Organic litter cover:** 50
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 3	
Native perennial grass cover: 0	**Organic litter cover:** 40
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 5	**Organic litter cover:** 60
Native other grass: None	Native forbs: None

Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 0	**Organic litter cover:** 80
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: North East	**Transect length:** 100mNone
Notes: Trees below 7 m not included in sub canopy cover calculations	
Canopy: 57 m Details: 5-15 (10), 31-44 (13), 55-60 (5), 65-94 (29),	
Sub-canopy: 60.8 m Details: 16.6-19 (2.4), 21.6-26 (4.4), 31-42 (11), 44-62 (18), 63-70 (7), 72-82 (10), 83-88 (5), 97-100 (3),	
Shrub: 17 m Details: None-18 (None), 1-18 (17),	
Photos	
Point: 152.70305455220608, -26.24031949056037	
Transect End: 	
Note: None	

Site: S2 - 2	**Date**: 13/10/20 01:00PM (08:41)	**Recorder**: Peter Moonie
Locality/Land parcel: 102SP297908		**UIN**: 201013084125
GTRE: 12.11.3 - Eucalyptus siderophloia, E. propinqua +/- E. microcorys, Lophostemon confertus, Corymbia intermedia, E. acmenoides open forest on metamorphics +/- interbedded volcanics		
Median tree canopy heights (m): **Emergent:** None **Canopy:** 22 **Sub-canopy:** 10		

EDL:	**No. of dominant species in the EDL**: 2	**No. of dominant species in the EDL recruiting:** 1	**Percentage recruiting:** 50
Number of large trees (100x50 m): 6			
Large eucalypt benchmark (DBH) value: 45		**Large non-eucalypt benchmark (DBH) value:** None	
Number of large eucalypt: 6		**Number of large non-eucalypt:** 0	
Native tree species richness (100x50 m) 30			
Eucalyptus siderophloia, Eucalyptus propinqua (small-fruited grey gum), Melaleuca salicina, Sp. 1, Elaedendron australe, Elattostachys bidwillii, Acacia disparrima, Polyscias elegans (celery wood), Corymbia intermedia (pink bloodwood), Alphitonia excelsa (soap tree), Aphananthe philippinensis, Cyclophyllum coprosmoides, Lophostemon suaveolens (swamp box), Alyxia ruscifolia, Acacia complanata (flatstem wattle), Mallotus philippensis (red kamala), Jagera pseudorhus, Eucalyptus tereticornis, Diospyros fasiculosa, Elattostachys nervosa, Alchornea ilicifolia (native holly), Actephila lindleyi, Diospyros germinata, Cryptocarya triplinervis, Cupaniopsis parvifolia (small-leaved tuckeroo), Lophostemon confertus (brush box), Pittosporum revolutum (yellow pittosporum), Melicope micrococca (white evodia), ?Castanospermum australe, Grevillea robusta			
Native shrub species richness (50x10 m) 19			
Alyxia ruscifolia, Denhamia bilocularis, Carissa ovata (currantbush), Cupaniopsis parvifolia (small-leaved tuckeroo), Elaedendron australe, Myrsine variabilis, Acacia disparrima, Mallotus philippensis (red kamala), Cryptocarya triplinervis, Tabernaemontana pandacaqui (banana bush), Polyscias elegans (celery wood), Cyclophyllum coprosmoides, Flindersia sp., Alphitonia excelsa (soap tree), Lophostemon suaveolens (swamp box), Myrsine angusta, Clerodendrum floribundum, Eucalyptus sp., Aphananthe philippinensis			
Native grass species richness (50x10 m) 2			
Enteropogon sp., Entolasia stricta (wiry panic),			
Native forbs/others species richness (50x10 m) 11			
Smilax australis (barbed-wire vine), Gahnia aspera, Geitonoplesium cymosum (scrambling lily), Dianella caerulea, Lomandra multiflora, Gymnostachys anceps (settler's flax), Lomandra filiformis, Lepidosperma laterale, Pleogyne australis, Eustrephus latifolius (wombat berry), Trophis scandens			
Non-native plant cover (50x10 m): 21			
Passiflora suberosa (corky passion flower) (4%), Dolichandra unguis-cati (cat's claw creeper) (6%), Lantana camara (lantana) (5%), Ochna serrulata (ochna) (5%)			
Coarse woody debris (50x20 m): 68			
Coarse woody debris lengths (m): 68,			
Quadrat 1			
Native perennial grass cover: 2		**Organic litter cover:** 78	
Native other grass: None		Native forbs: None	
Native shrubs (less than 1 m): None		Non-native grass: None	
Non-native forbs and shrubs: None		Rock: None	
Bare Ground: None		Cryptograms: None	
Total cover: None			
Quadrat 2			
Native perennial grass cover: 5		**Organic litter cover:** 805	
Native other grass: None		Native forbs: None	
Native shrubs (less than 1 m): None		Non-native grass: None	
Non-native forbs and shrubs: None		Rock: None	
Bare Ground: None		Cryptograms: None	
Total cover: None			
Quadrat 3			

Native perennial grass cover: 5	**Organic litter cover:** 55
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 5	**Organic litter cover:** 85
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 0	**Organic litter cover:** 80
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: North West	**Transect length:** 100mNone
Notes: Trees less than 7 m in height not included in sub canopy calculations	
Canopy: 58 m Details: 2-10 (8), 13-24 (11), 45-50 (5), 62-78 (16), 82-100 (18),	
Sub-canopy: 64 m Details: 1-15 (14), 23-30 (7), 33-56 (23), 59-64.5 (5.5), 68-78.5 (10.5), 89-91 (2), 98-100 (2),	
Shrub: 22 m Details: 1-14 (22),	
Photos	
Point: 152.7017619512238, -26.241598040828517	
Photo North: 	
Photo East:	

Photo South:

Photo West:

Transect End:

Note: None

Site: S3 - 1	**Date**: 10/10/20 01:00PM (10:45)	**Recorder**: Peter Moonie	
Locality/Land parcel: 3SP302524		**UIN**: 201010104514	
GTRE: 12.11.3 - Eucalyptus siderophloia, E. propinqua +/- E. microcorys, Lophostemon confertus, Corymbia intermedia, E. acmenoides open forest on metamorphics +/- interbedded volcanics			
Median tree canopy heights (m): **Emergent:** None **Canopy:** 23 **Sub-canopy:** 13			
EDL:	**No. of dominant species in the EDL**: 4	**No. of dominant species in the EDL recruiting:** 4	**Percentage recruiting:** 100
Number of large trees (100x50 m): 3			
Large eucalypt benchmark (DBH) value: 45		**Large non-eucalypt benchmark (DBH) value:** None	
Number of large eucalypt: 3		**Number of large non-eucalypt:** 0	
Native tree species richness (100x50 m) 14			
Corymbia citriodora (spotted gum), Acacia disparrima, Eucalyptus propinqua (small-fruited grey gum), Lophostemon confertus (brush box), Alphitonia excelsa (soap tree), Clerodendrum floribundum, Polyscias elegans (celery wood), Cyclophyllum coprosmoides, Jagera pseudorhus, Acacia complanata (flatstem wattle), Araucaria cunninghamii (hoop pine), Eucalyptus acmenoides, Alyxia ruscifolia, Acacia oshanesii,			
Native shrub species richness (50x10 m) 7			
Acacia disparrima, Carissa ovata (currantbush), Corymbia citriodora (seedling), Leucopogon juniperinus (prickly heath), Acacia maidenii (Maiden's wattle), Cyclophyllum coprosmoides, Alphitonia excelsa (soap tree)			
Native grass species richness (50x10 m) 5			
Themeda triandra (kangaroo grass), Aristida sp.1, Entolasia stricta (wiry panic), Enteropogon sp., Cymbopogon refractus (barbed-wire grass),			
Native forbs/others species richness (50x10 m) 6			
Dianella caerulea, Lomandra filiformis, Desmodium rhytidophyllum, Gahnia aspera, Cyanthillium cinereum, Lepidosperma laterale,			
Non-native plant cover (50x10 m): 13			
Ochna serrulata (ochna) (1%), Lantana camara (lantana) (10%), Passiflora suberosa (corky passion flower) (2%) Megathyrus maximum (2%)			

Coarse woody debris (50x20 m): 23	
Coarse woody debris lengths (m): 23,	
Quadrat 1	
Native perennial grass cover: 0	**Organic litter cover:** 85
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 2	
Native perennial grass cover: 5	**Organic litter cover:** 40
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 3	
Native perennial grass cover: 5	**Organic litter cover:** 50
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 2	**Organic litter cover:** 38
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 10	**Organic litter cover:** 80
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: West	**Transect length:** 100mNone
Notes: The sub canopy is that ecologically dominant layer and it varies in height from 8 to 16m. The site is on a very steep slope approximately 20%	
Canopy: -45.9 m Details: 80.5-71.6 (-8.90000000000001), 59-46 (-13), 31-7 (-24),	
Sub-canopy: -50.3 m Details: 100-88 (-12), 89-80 (-9), 68.5-54 (-14.5), 46-40 (-6), 38.3-32.5 (-5.8), 29-26 (-3),	
Shrub: 3 m Details: 1-4 (3),	
Photos	
Point: 152.71119129711295, -26.245811893941255	
Photo North:	

Photo East:

Photo South:

Photo West:

Transect End:

Note: Site is mapped 12.11.3 but also has sedimentary geology mixed with metamorphics

Site: S4 - 1	**Date**: 10/10/20 01:00PM (12:56)		**Recorder**: Peter Moonie
Locality/Land parcel: 3SP302524			**UIN**: 201010125635
GTRE: 12.11.5 - Corymbia citriodora subsp. variegata woodland to open forest +/- Eucalyptus siderophloia/E. crebra, E. carnea, E. acmenoides, E. propinqua on metamorphics +/- interbedded volcanics			
Median tree canopy heights (m): **Emergent:** None **Canopy:** 24 **Sub-canopy:** 10			
EDL:	**No. of dominant species in the EDL**: 1	**No. of dominant species in the EDL recruiting:** 1	**Percentage recruiting:** 100
Number of large trees (100x50 m): 7			
Large eucalypt benchmark (DBH) value: 43		**Large non-eucalypt benchmark (DBH) value:** None	
Number of large eucalypt: 7		**Number of large non-eucalypt:** 0	
Native tree species richness (100x50 m) 20			

Lophostemon confertus (brush box), Corymbia citriodora (spotted gum), Petalostigma triloculare (forest quinine), Acacia complanata (flatstem wattle), Acacia disparrima, Eucalyptus acmenoides, Acacia fimbriata (Brisbane golden wattle), Diospyros germinata, Eucalyptus propinqua (small-fruited grey gum), ?Flindersia australis, Acronychia laevis, Eucalyptus siderophloia, Rhodosphaera rhodanthema, Polyscias elegans (celery wood), Leucopogon juniperinus (prickly heath), Cupaniopsis parvifolia (small-leaved tuckeroo), Bridelia leichhardtii, Mallotus philippensis (red kamala), Acacia maidenii (Maiden's wattle), Cyclophyllum coprosmoides	
Native shrub species richness (50x10 m) 17	
Acacia complanata (flatstem wattle), Bridelia leichhardtii, Carissa ovata (currantbush), Acacia disparrima, Alphitonia excelsa (soap tree), Myrsine variabilis, Zieria minutiflora, Acronychia laevis, Polyscias elegans (celery wood), Acacia fimbriata (Brisbane golden wattle), Alyxia ruscifolia, Petalostigma triloculare (forest quinine), Cupaniopsis parvifolia (small-leaved tuckeroo), Denhamia bilocularis, Hovea acutifolia, Leucopogon juniperinus (prickly heath), Denhamia pittosporoides subsp. pittosporoides	
Native grass species richness (50x10 m) 1	
Entolasia stricta (wiry panic)	
Native forbs/others species richness (50x10 m) 11	
Dianella caerulea, Lomandra confertifolia subsp. pallida, Lomandra filiformis, Lepidosperma laterale, Solanum gympiense, Marsdenia coronata (slender milkvine), Eustrephus latifolius (wombat berry), Lomandra multiflora subsp. multiflora, Smilax australis (barbed-wire vine), Lomandra longifolia, Gahnia aspera,	
Non-native plant cover (50x10 m): 21	
Lantana camara (lantana) (15%), Passiflora suberosa (corky passion flower) (5%)	
Coarse woody debris (50x20 m): 49	
Coarse woody debris lengths (m): 49,	
Quadrat 1	
Native perennial grass cover: 2	**Organic litter cover:** 88
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 2	
Native perennial grass cover: 0	**Organic litter cover:** 85
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 3	
Native perennial grass cover: 5	**Organic litter cover:** 90
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 0	**Organic litter cover:** 50
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None

Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 0	**Organic litter cover:** 90
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: North East	**Transect length:** 100mNone
Notes: Did not include trays under 7 m in the side canopy cover totals	
Canopy: 67.5 m Details: 8-35 (27), 44-50.5 (6.5), 54-74 (20), 79-83 (4), 90-100 (10),	
Sub-canopy: 31.5 m Details: 1-11 (10), 16-19 (3), 66.5-71 (4.5), 75-83 (8), 87-93 (6),	
Shrub: 12 m Details: 1-13 (12),	
Photos	
Point: 152.7109043409516, -26.24734729848676	
Photo North: 	
Photo East:	

Photo South:

Photo West:

Transect Start:

Transect End:

Note: Located immediately adjacent to bottom of translocation site so important not to disturb any of the translocated plants which are marked by blue flags

Site: S4 - 2	**Date**: 13/10/20 01:00PM (11:57)	**Recorder**: Peter Moonie None
Locality/Land parcel: 2SP302526		**UIN**: 201013115755

GTRE: 12.11.10 - Corymbia citriodora subsp. variegata woodland to open forest +/- Eucalyptus siderophloia/E. crebra, E. carnea, E. acmenoides, E. propinqua on metamorphics +/- interbedded volcanics
Note: Polygon more accurately mapped as 12.11.5a/12.11.3a

Median tree canopy heights (m):
Emergent: None **Canopy:** 21 **Sub-canopy:** 10

EDL:	**No. of dominant species in the EDL**: 2	**No. of dominant species in the EDL recruiting:** 2	**Percentage recruiting:** 100

Number of large trees (100x50 m): 2

Large eucalypt benchmark (DBH) value: 43	**Large non-eucalypt benchmark (DBH) value:** None

Number of large eucalypt: 2	**Number of large non-eucalypt:** 0
Native tree species richness (100x50 m) 30	
Polyalthia nitidissima, Corymbia citriodora (spotted gum), Alphitonia excelsa (soap tree), Lophostemon confertus (brush box), Acacia disparrima, Cupaniopsis parvifolia (small-leaved tuckeroo), Diospyros geminata (scaly ebony), Polyscias elegans (celery wood), Acacia fimbriata (Brisbane golden wattle), Pittosporum revolutum, Cyclophyllum coprosmoides, Acacia maidenii (Maiden's wattle), Eucalyptus propinqua (small-fruited grey gum), Acacia leiocalyx, Acacia oshanesii, Jagera pseudorhus, Eucalyptus acmenoides, Bursaria spinosa subsp. spinosa, other, Mallotus philippensis (red kamala), Petalostigma triloculare (forest quinine), Alyxia ruscifolia, Planchonella cotinifolia/Denhamia disperma, Eucalyptus siderophloia, Hibiscus heterophyllus, Atalaya multiflora, Acronychia laevis, Flindersia australis, Citrus australis, Rhodosphaera rhodanthema, Diospyros fasciculosa	
Native shrub species richness (50x10 m) 19	
Acacia disparrima, Acacia oshanesii, Solanum sp.1, Carissa ovata (currantbush), Alyxia ruscifolia, Denhamia bilocularis, Alphitonia excelsa (soap tree), Cyclophyllum coprosmoides, Citrus australis, Atalaya multiflora, Diospyros australis (black plum), Sp 1., Polyscias elegans (celery wood), Cupaniopsis parvifolia (small-leaved tuckeroo), Jagera pseudorhus, Sapindaceae sp. (angled grey stem), ?Myrsine sp., Solanum stelligerum, Ziera sp.	
Native grass species richness (50x10 m) 2	
Ottochloa sp (indet), Entolasia stricta (wiry panic),	
Native forbs/others species richness (50x10 m) 10	
Dianella caerulea, Gahnia aspera, Eustrephus latifolius (wombat berry), Tabernaemontana pandacaqui (banana bush), Marsdenia lloydii, Smilax australis (barbed-wire vine), Clematicissus opaca, Pleogyne australis, Cyanthillium cinereum, Geitonoplesium cymosum (scrambling lily),	
Non-native plant cover (50x10 m): 21	
Passiflora suberosa (corky passion flower) 7(%), Lantana camara (lantana) (10%), Ochna serrulata (ochna) (2%), Solanum seaforthianum (Brazilian nightshade) (1%)	
Coarse woody debris (50x20 m): 108	
Coarse woody debris lengths (m): 108,	
Quadrat 1	
Native perennial grass cover: 0	**Organic litter cover:** 95
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 2	
Native perennial grass cover: 0	**Organic litter cover:** 90
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 3	
Native perennial grass cover: 0	**Organic litter cover:** 50
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	

Quadrat 4	
Native perennial grass cover: 0	**Organic litter cover:** 95
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 2	**Organic litter cover:** 48
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: North West	**Transect length:** 100mNone
Notes: Excluded trees below 7 m when measuring sub canopy cover	
Canopy: 45 m Details: 1-10 (9), 21-27 (6), 29-41 (12), 48.5-51 (2.5), 77-87.5 (10.5), 95-100 (5),	
Sub-canopy: 33 m Details: 5-8 (3), 27.5-32 (4.5), 44-47 (3), 48.5-51 (2.5), 53-68 (15), 85.5-90.5 (5),	
Shrub: 16 m Details: 1-17 (16),	
Photos	
Point: 152.71137124326978, -26.249486009937343	
Photo North: 	
Photo East:	

Photo South:

Photo West:

Transect Start:

Transect End:

Note: Lantana was prevalent at site but had been treated and most was dead l. Polygon was mix of 12.11.5 and 12.11.3a

Site: S4 - 3	**Date**: 13/10/20 01:00PM (14:40)	**Recorder**: Peter Moonie None	
Locality/Land parcel: 2SP302526		**UIN**: 201013144009	
GTRE: 12.11.5 - Corymbia citriodora subsp. variegata woodland to open forest +/- Eucalyptus siderophloia/E. crebra, E. carnea, E. acmenoides, E. propinqua on metamorphics +/- interbedded volcanics			
Median tree canopy heights (m): **Emergent:** None **Canopy:** 24 **Sub-canopy:** 10			
EDL:	**No. of dominant species in the EDL**: 1	**No. of dominant species in the EDL recruiting:** 1	**Percentage recruiting:** 100
Number of large trees (100x50 m): 4			
Large eucalypt benchmark (DBH) value: 43		**Large non-eucalypt benchmark (DBH) value:** None	
Number of large eucalypt: 4		**Number of large non-eucalypt:** 0	

Native tree species richness (100x50 m) 28	
Lophostemon confertus (brush box), Corymbia citriodora (spotted gum), Polyscias elegans (celery wood), Jagera pseudorhus, Alphitonia excelsa (soap tree), Acacia oshanesii, Acacia disparrima, Eucalyptus propinqua (small-fruited grey gum), Acacia fimbriata (Brisbane golden wattle), Denhamia bilocularis, Cupaniopsis parvifolia (small-leaved tuckeroo), Polyalthia nitidissima, Acronychia laevis, Cyclophyllum coprosmoides, ?Guioa semiglauca, Flindersia sp, Eleocarpus sp., Atalaya multiflora, Diospyros deplanchii, Rhodosphaera rhodanthema (tulip satinwood), Diospyros geminata (scaly ebony), Jagera pseudorhus, Sapindaceae sp. (swollen petiole), Mallotus philippensis (red kamala), Pentaceras australis, Eucalyptus siderophloia, Acacia maidenii (Maiden's wattle), Astrotricha latifolia,	
Native shrub species richness (50x10 m) 12	
Polyalthia nitidissima, Diospyros geminata (scaly ebony), Carissa ovata (currantbush), Acacia disparrima, Rhodosphaera rhodanthema (tulip satinwood), Cyclophyllum coprosmoides, Alyxia ruscifolia, Cupaniopsis parvifolia (small-leaved tuckeroo), Clerodendrum floribundum, ? Atalaya multiflora, Cupaniopsis serrata, Acacia fimbriata (Brisbane golden wattle),	
Native grass species richness (50x10 m) 3	
Cymbopogon refractus (barbed-wire grass), Imperata cylindrica (blady grass), Entolasia stricta (wiry panic)	
Native forbs/others species richness (50x10 m) 6	
Smilax australis (barbed-wire vine), Lomandra longifolia, Secamone elliptica, Gahnia aspera, Dianella caerulea, Clematicissus opaca,	
Non-native plant cover (50x10 m): 43	
Dolichandra unguis-cati (cat's claw creeper) (1%), Passiflora suberosa (corky passion flower) (20%), Lantana camara (lantana) (20%), Sida cordifolia (1%), Ageratum houstonianum (blue billygoat weed) (1%),	
Coarse woody debris (50x20 m): 140	
Coarse woody debris lengths (m): 140,	
Quadrat 1	
Native perennial grass cover: 0	**Organic litter cover:** 95
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 2	
Native perennial grass cover: 0	**Organic litter cover:** 80
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 3	
Native perennial grass cover: 5	**Organic litter cover:** 90
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 2	**Organic litter cover:** 78

Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 20	**Organic litter cover:** 30
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: North East	**Transect length:** 100mNone
Notes: Have not included trees below 7 m in the sub canopy cover calculations	
Canopy: 38.1 m Details: 1-7.6 (6.6), 15-22 (7), 36-41 (5), 52.5-58 (5.5), 60.6-65 (4.4), 69-74 (5), 95.4-100 (4.59999999999999),	
Sub-canopy: 33 m Details: 1-7.6 (6.6), 15-22 (7), 34-37 (3), 60.6-68 (7.4), 77-86 (9),	
Shrub: 8.5 m Details: 1-9.5 (8.5),	
Photos	
Point: 152.71301166997873, -26.25167578045187	
Photo North: 	
Photo East:	

Photo South:

Photo West:

Transect Start:

Transect End:

Note: None

Site: S5 - 1	**Date**: 10/10/20 01:00PM (07:22)		**Recorder**: Peter Moonie
Locality/Land parcel: 3SP302524			**UIN**: 201010072247
GTRE: 12.11.5 - Corymbia citriodora subsp. variegata woodland to open forest +/- Eucalyptus siderophloia/E. crebra, E. carnea, E. acmenoides, E. propinqua on metamorphics +/- interbedded volcanics			
Median tree canopy heights (m): **Emergent:** None **Canopy:** 20 **Sub-canopy:** 11			
EDL:	**No. of dominant species in the EDL**: 2	**No. of dominant species in the EDL recruiting:** 2	**Percentage recruiting:** 100
Number of large trees (100x50 m): 2			
Large eucalypt benchmark (DBH) value: 43		**Large non-eucalypt benchmark (DBH) value:** None	
Number of large eucalypt: 2		**Number of large non-eucalypt:** 0	
Native tree species richness (100x50 m) 13			

Corymbia citriodora (spotted gum), Acacia disparrima subsp. disparrima, Eucalyptus acmenoides, Jacksonia scoparia, Acacia leiocalyx, Corymbia intermedia (pink bloodwood), Eucalyptus propinqua (small-fruited grey gum), Eucalyptus siderophloia, Bursaria incana, Alphitonia excelsa (soap tree), Polyscias elegans (celery wood), Lophostemon confertus (brush box), Cyclophyllum coprosmoides	
Native shrub species richness (50x10 m) 10	
Acacia disparrima, Grewia latifolia (dysentery plant), Leucopogon juniperinus (prickly heath), Eucalyptus sp1. (seedling), Alphitonia excelsa (soap tree), Acacia leiocalyx, Solanum gympiense, Myrsine variabilis, Cupaniopsis parvifolia (small-leaved tuckeroo), ? Flindersia australis (seedling)	
Native grass species richness (50x10 m) 5	
Cymbopogon refractus (barbed-wire grass), Aristida sp1., Eragrostis tenuifolia, Aristida sp. 2, Entolasia stricta (wiry panic),	
Native forbs/others species richness (50x10 m) 4	
Smilax australis (barbed-wire vine), Sida hackettiana, Dianella caerulea, Lomandra confertifolia subsp. pallida,	
Non-native plant cover (50x10 m): 50	
Lantana camara (lantana) (%), Passiflora suberosa (corky passion flower) (%), other (%), Solanum seaforthianum (Brazilian nightshade) (%), Ochna serrulata (ochna) (%), Ageratum houstonianum (blue billygoat weed) (%), Megathyrus maximus (1%)	
Coarse woody debris (50x20 m): 25	
Coarse woody debris lengths (m): 25,	
Quadrat 1	
Native perennial grass cover: 10	**Organic litter cover:** 85
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 2	
Native perennial grass cover: 0	**Organic litter cover:** 60
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 3	
Native perennial grass cover: 0	**Organic litter cover:** 60
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 5	**Organic litter cover:** 95
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	

Native perennial grass cover: 5	**Organic litter cover:** 85
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: East	**Transect length:** 100mNone
Notes: Trees under 7 m not included in the sub canopy cover calculations	
Canopy: -28.7 m Details: 82-77 (-5), 55-50 (-5), 19.7-1 (-18.7),	
Sub-canopy: -34.9 m Details: 89-84 (-5), 79.7-73 (-6.7), 63-55 (-8), 45.5-39.5 (-6), 31.5-28 (-3.5), 18.2-12.5 (-5.7),	
Shrub: 2 m Details: 1-3 (2),	
Photos	
Point: 152.71017906569563, -26.244336692029147	
Photo North: 	
Photo East: 	

Photo South:

Photo West:

Transect Start:

Transect End:

Note: Chose canopy layer as the ecologically dominant layer . Site is very dry and Forbes and grass is likely to be under represented, weeds are also likely to be under represented,

Site: S7 - 1	**Date**: 11/10/20 01:00PM (07:06)	**Recorder**: Peter Moonie None
Note: Transect size reduced to 100m x 30 m - adjust calculations accordingly		
Locality/Land parcel: 102SP297908		**UIN**: 201011070651
GTRE: 12.5.2 - Corymbia intermedia, Eucalyptus tereticornis open forest on remnant Tertiary surfaces, usually near coast. Usually deep red soils		
Median tree canopy heights (m): **Emergent:** None	**Canopy:** 22	**Sub-canopy:** 9

EDL:	**No. of dominant species in the EDL**: 2	**No. of dominant species in the EDL recruiting:** 1	**Percentage recruiting:** 50

Number of large trees (100x50 m): 7	
Large eucalypt benchmark (DBH) value: 41	**Large non-eucalypt benchmark (DBH) value:** 22
Number of large eucalypt: 7	**Number of large non-eucalypt:** 0

Native tree species richness (100x50 m) 20

Corymbia intermedia (pink bloodwood), Eucalyptus tereticornis, Lophostemon suaveolens (swamp box), Alphitonia excelsa (soap tree), Acacia disparrima, Cyclophyllum coprosmoides, Acacia leiocalyx, Jagera pseudorhus, Angophora subvelutina, Polyscias elegans (celery wood), Cryptocarya triplinervis, Maclura cochinchinensis (cockspur thorn), Sp.(large stiff leaf, discolourous), Ficus watkinsiana, Mallotus philippensis (red kamala), Aphananthe philippinensis, Eucalyptus siderophloia, Clerodendrum floribundum, Pilidiostigma rhytispermum, Jagera pseudorhus,

Native shrub species richness (50x10 m) 19

Lophostemon suaveolens (swamp box), Acacia leiocalyx, Maclura cochinchinensis (cockspur thorn), Cupaniopsis parvifolia (small-leaved tuckeroo), Diospyros germinata, Carissa ovata (currantbush), Eucalyptus sp.1 (seedling), Alphitonia excelsa (soap tree), ? Psychotria daphnoides, Aphananthe philippinensis, Alyxia ruscifolia, Cryptocarya triplinervis, Acacia disparrima, Cyclophyllum coprosmoides, Myrsine variabilis, Grewia latifolia (dysentery plant), Polyscias elegans (celery wood), Everistia vacciniifolia, Grevillea robusta

Native grass species richness (50x10 m) 2

Imperata cylindrica (blady grass), Ottochloa sp.

Native forbs/others species richness (50x10 m) 8	
Dianella caerulea, Lomandra longifolia, Eustrephus latifolius (wombat berry), Smilax australis (barbed-wire vine), Parsonsia straminea (monkey rope), Geitonoplesium cymosum (scrambling lily), Lomandra confertifolia subsp. pallida, Legnephora moorei	
Non-native plant cover (50x10 m): 25	
Passiflora suberosa (corky passion flower) (2%), Ochna serrulata (ochna) (5%), Lantana camara (lantana) (10%), Asparagus aethiopicus (ground asparagus) (1%), Celtis sinensis (Chinese elm) (3%), Corymbia torelliana (cadaghi) (1%), Solanum seaforthianum (Brazilian nightshade) (1%), Syagrus romanzoffiana (2%),	
Coarse woody debris (50x20 m): 29	
Coarse woody debris lengths (m): 29,	
Quadrat 1	
Native perennial grass cover: 0	**Organic litter cover:** 450
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 2	
Native perennial grass cover: 0	**Organic litter cover:** 80
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 3	
Native perennial grass cover: 70	**Organic litter cover:** 30
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Quadrat 4	
Native perennial grass cover: 25	**Organic litter cover:** 55
Native other grass: None	Native forbs: None
Native shrubs (less than 1 m): None	Non-native grass: None
Non-native forbs and shrubs: None	Rock: None
Bare Ground: None	Cryptograms: None
Total cover: None	
Quadrat 5	
Native perennial grass cover: 2	**Organic litter cover:** 82
Native other grass: None	**Native forbs:** None
Native shrubs (less than 1 m): None	**Non-native grass:** None
Non-native forbs and shrubs: None	**Rock:** None
Bare Ground: None	**Cryptograms:** None
Total cover: None	
Transect	
Plot bearing: South East	**Transect length:** Other100x30
Notes: Trees below 7 m not included in the sub canopy layer	
Canopy: 46 m	

Details: 1-35 (34), 39-51 (12),

Sub-canopy: 63.4 m
Details: 5-9 (4), 15-23 (8), 30-32.5 (2.5), 35-37 (2), 44-67 (23), 70.6-89.5 (18.9), 95-100 (5),

Shrub: 6 m
Details: 1-7 (6),

Photos

Point: 152.70011386332777, -26.238455198703974

Photo North:

Photo East:

Photo South:

Photo West:

Transect Start:

Transect End:

Note: Transect size 100 m x 30 m, transect was reduced due to the limited width of the assessment unit, will need to adjust calculations. Upper canopy was the ecologically dominant lAyer.

GHD

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12534030-67793-26/https://projectsportal.ghd.com/sites/pp14_01/brucehighwaycooroyto/ProjectDocs/12534030_REP_Baseline Assessment Report MASTER_revB.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A	S. Hodgkison P. Moonie	S. Potts	DRAFT	N. Clark	DRAFT	14/04/2021
B	S. Chadwick	N. Clark		N. Clark		03/06/2021
0	S. Chadwick	N. Clark		N. Clark		29/07/2021

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