



TARGETED FAUNA SURVEY REPORT

Killara Offset Area

FINAL

December 2020



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Prepared by
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on behalf of
Earthtrade

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1.0 Introduction

Umwelt (Australia) Pty Ltd (Umwelt) has been commissioned by Earthtrade Pty Ltd (Earthtrade) to undertake a targeted assessment of threatened fauna species potentially occurring within four land parcels located near Durong, Queensland (QLD) approximately 50 kilometres (km) north west of Kingaroy, Qld. This assessment seeks to support the identification of potentially suitable habitat for threatened fauna to be used for offsets. The species targeted in this assessment along with their relevant *Nature Conservation Act 1994* (NC Act) and *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listing status are provided in **Table 1.1**.

Table 1.1 Target Threatened Species

Common Name	Scientific Name	NC Act Status	EPBC Act Status
Brigalow woodland snail	<i>Adclarkia cameroni</i>	Vulnerable	Endangered
Dunmall's snake	<i>Furina dunmalli</i>	Vulnerable	Vulnerable
Painted honeyeater	<i>Grantiella picta</i>	Vulnerable	Vulnerable
South-eastern long-eared bat	<i>Nyctophilus corbeni</i>	Vulnerable	Vulnerable
Koala	<i>Phascolarctos cinereus</i>	Vulnerable	Vulnerable
Greater Glider	<i>Petauroides volans</i>	Vulnerable	Vulnerable

1.1 Study Area

The targeted assessment was conducted across four land parcels which have been provisionally identified by Earthtrade as being suitable for biodiversity offsets. The four land parcels are collectively known as 'Killara'. Two of these land parcels (15 BO94 and 16 BO94) are connected north to south while the remaining two are separated by approximately 25 km with the most western (36 BO175) bordering the Barakula State Forest and the Allies Creek State Forest.

Because of the geographical separation between the land parcels, two Study Areas are discussed herein as Study Area 1 and Study Area 2. The relevant Lot and Plan code for each Study Area is provided in **Table 1.2** below. The location of the Study Areas is provided in **Figure 1.1**.

Table 1.2 Study Area

Study Area 1	Study Area 2
Land Parcels: 36BO175	Land Parcels: 15BO94, 16BO94, 19BO94

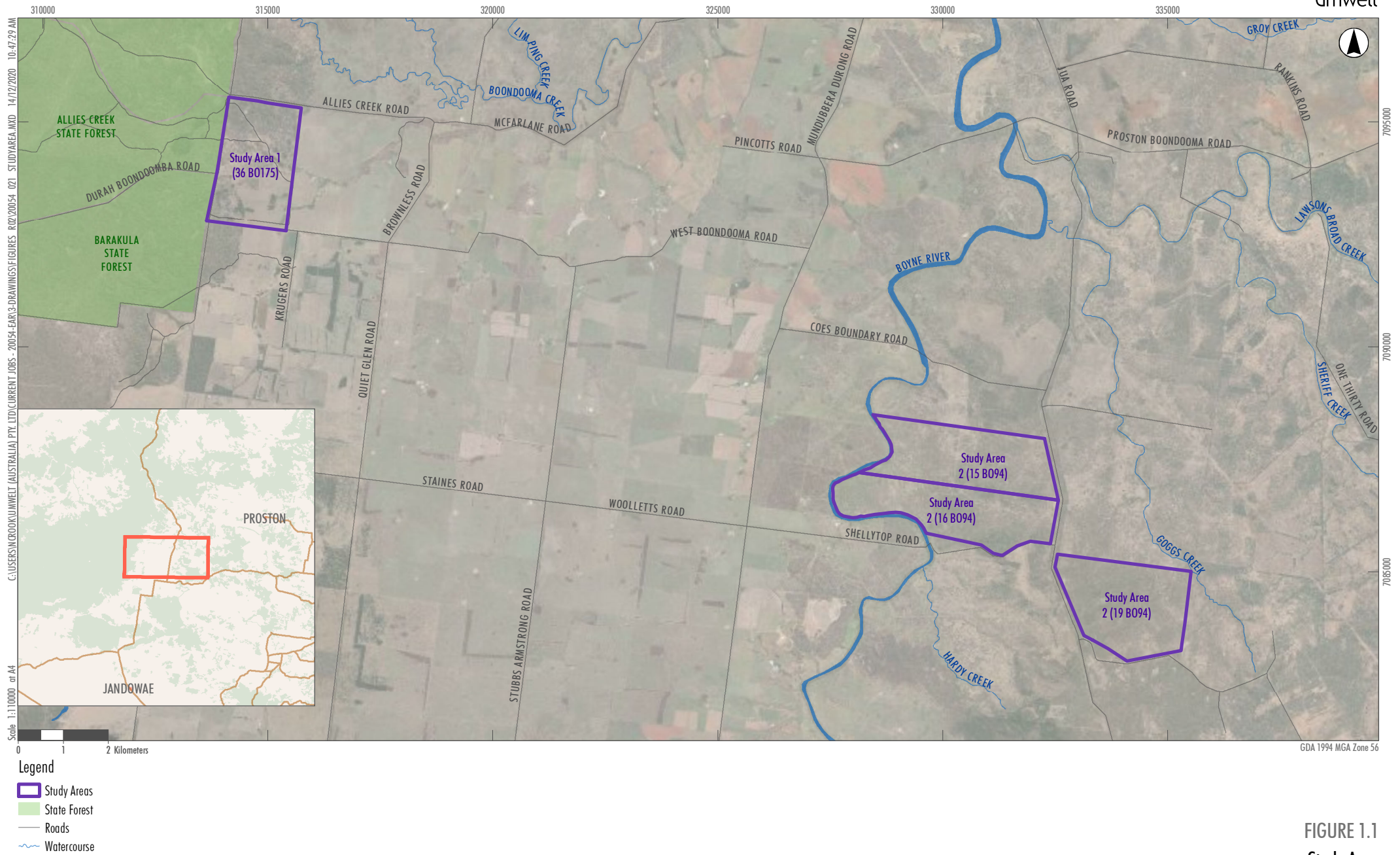


FIGURE 1.1
Study Area

1.2 Scope of Works

The aim of the survey was to determine the status and extent of threatened species (including habitat) within the Study Areas. In achieving this aim, the following scope of works was undertaken:

- A desktop assessment, including an analysis of threatened fauna species records within the region
- Targeted surveys in accordance with the EPBC Survey Guidelines for Australia's Threatened Mammals (DSEWPaC, 2011) and the EPBC Act referral guidelines for the vulnerable koala (Department of the Environment, 2014) to determine the potential use of the Study Areas for offsets for these species
- Validation of fauna species habitat criteria outlined by AECOM (2018) and Habitat Quality Assessment (Umwelt 2020).

1.2.1 Offset Suitability Assessment

An Offset Suitability Assessment was completed within the Study Areas by AECOM in October, 2018 (AECOM, 2018). The findings of this assessment relevant to this study are summarised below.

- One koala scat was recorded within *Eucalyptus crebra* (narrow-leaved ironbark) woodland (11.12.1a) at the base of a *Corymbia citriodora* (spotted gum) within land parcel Study Area 2
- Based on fauna habitat criteria and vegetation community mapping, habitat area for the koala and greater glider was found to be 1310.8 ha with a habitat quality score for each species of 6 (**Table 1.3**). Following the revision of vegetation mapping

Table 1.3 Fauna Habitat Criteria (AECOM, 2018)

Species	Habitat Criteria
Koala (<i>Phascolarctos cinereus</i>)	11.3.2, 11.3.25, 11.5.1, 11.5.1a, 11.5.20, 11.7.6, 11.12.1a, 11.12.3
Greater glider (<i>Petauroides volans</i>)	11.3.2, 11.3.25, 11.5.1, 11.5.1a, 11.5.20, 11.7.6, 11.12.1a, 11.12.3
Brigalow woodland snail (<i>Adclarkia cameroni</i>)	11.3.1, 11.4.3
Dunmall's snake (<i>Furina dunmalli</i>)	11.3.1, 11.4.3, 11.5.1, 11.5.1a, 11.5.20, 11.7.6
Painted honeyeater (<i>Grantiella picta</i>)	11.4.3, 11.5.1, 11.5.1a, 11.7.6, 11.12.1a, 11.12.3, 11.12.6b
South-eastern long-eared bat (<i>Nyctophilus corbeni</i>)	11.3.2, 11.3.25, 11.4.3, 11.5.1, 11.5.1a, 11.5.20, 11.7.6, 11.12.1a, 11.12.3, 11.12.6b

2.0 Methodology

2.1 Desktop Assessment

Existing ecological data within the Study Areas was compiled through a review of the following key references:

- DAWE EPBC Protected Matters Search Tool
- DES Wildlife Online database
- Department of Natural Resource, Mines and Energy (DNRME) Vegetation Management Supporting Map including Essential Habitat mapping
- The Queensland Herbarium Regional Ecosystem Description Database (REDD) (Version 11.1)
- Atlas of Living Australia (ALA) database
- Existing literature and ecological reports.

2.2 Field Survey

2.2.1 Timing

The fauna assessment was conducted over 12 days across two field surveys, being 16-19 June 2020 (inclusive) and 13-20 October 2020 (inclusive). The focus of the June 2020 survey was to undertake targeted assessment for koala and greater glider, focussing on koala scat detection, habitat assessment and spotlighting. The October 2020 survey characterised baseline fauna values and completed the targeted assessment of all threatened fauna listed in **Table 1.1**.

2.2.2 Approach

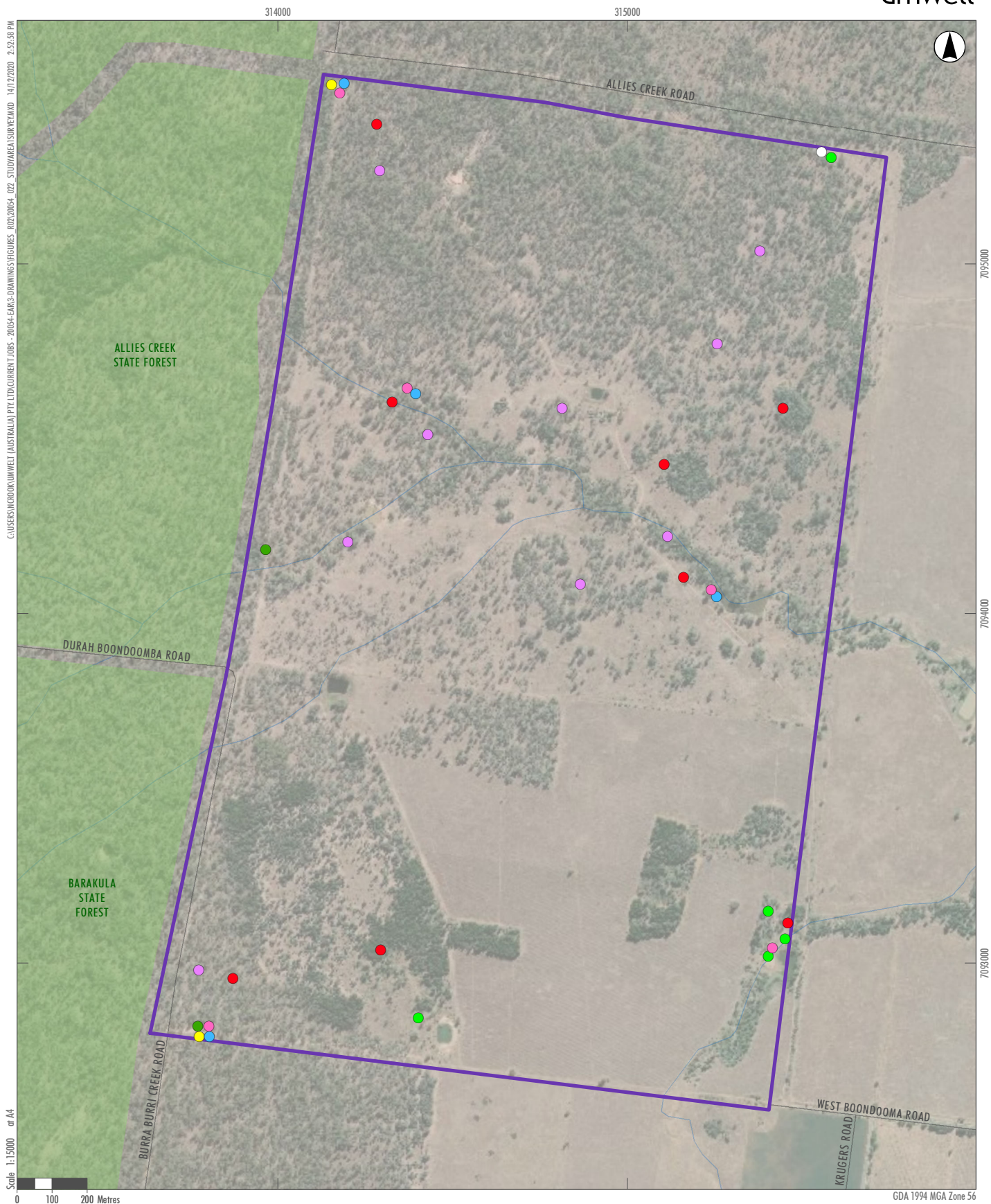
Targeted fauna methodologies were employed to detect the presence of targeted fauna species potentially occurring within the Study Areas. These methodologies were conducted in accordance with the following Commonwealth documents and guidelines.

- Draft Referral guidelines for the nationally listed Brigalow Belt Reptiles (DSEWPac, 2011)
- Conservation Advice *Adclarkia cameroni* brigalow woodland snail (TSSC, 2016)
- Survey Guidelines for Australia's Threatened Reptiles (DSEWPac, 2011b)
- Survey Guidelines for Australia's Threatened Bats (DEWHA, 2010a)
- Survey Guidelines for Australia's Threatened Birds (DEWHA, 200b)
- Survey Guidelines for Australia's Threatened Mammals (DSEWPac, 2011)

Survey techniques and effort are described in **Table 2.1** below, while survey locations at each of the Study Areas are presented as **Figure 2.1** and **Figure 2.2**

Table 2.1 Survey Methods and Effort

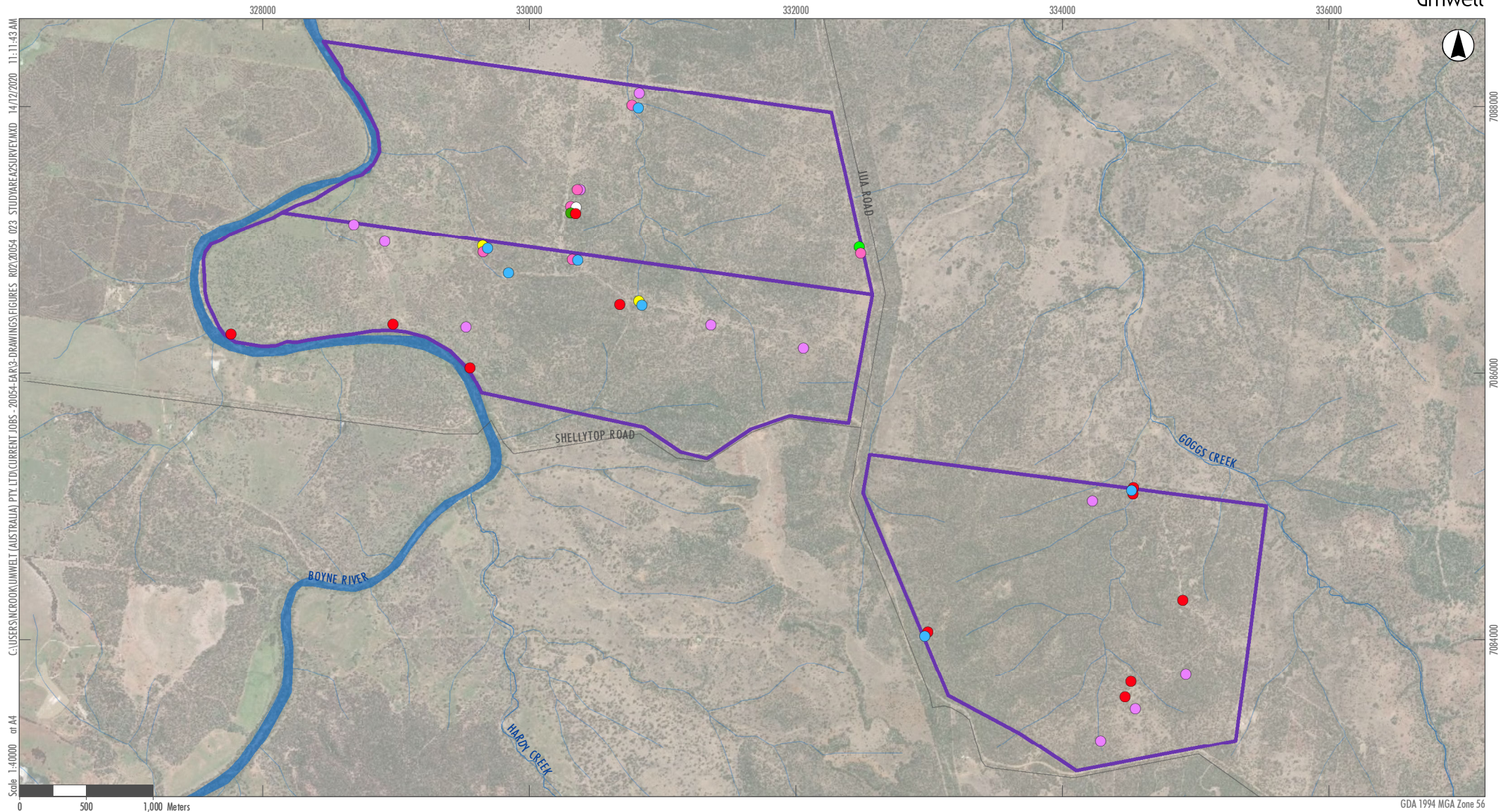
Technique	Description	Survey Effort
Bird Survey	Diurnal birds were sampled using an area census method, supplemented by broad observational surveys throughout the Study Areas. This involved actively identifying birds both visually and aurally at a given location for a period of approximately 30 minutes. Bird surveys were generally conducted early in the morning or late in the afternoon when bird activity is greatest.	12 hours
Spotlighting	Spotlighting was undertaken on foot using head torches and hand-held spotlights within areas of suitable and representative habitat for targeted species. Spotlighting was also undertaken from the passenger window of a slow-moving vehicle while travelling between spotlight sites. Animals are readily detected from eyeshine reflected from the torch light beam.	40 hours (18 hours in July and 22 hours in October)
Active Searches	Active diurnal searches were undertaken within suitable microhabitats across the board ranges of habitat types for targeted species. This involved searching beneath microhabitat such as rocks and fallen timber, digging through leaf litter and soil at tree bases. Identifying tracks and traces such as scats and tree scratches.	4 hours
Spot Assessment Technique	Koala presence was assessed throughout the Study Areas using the Spot Assessment Technique (SAT) (Phillips and Callaghan, 2011). This assessment technique relies on the detection of koala faecal pellets (scats) to confirm the presence or absence of koala at a given location. Across the Study Areas, 20 koala SAT assessments were conducted, across seven regional ecosystems.	20 SAT assessments
Pitfall Trapping	Pitfall trapping was undertaken using 20 L buckets dug into the ground until the top of the buckets is flush with the surface of the ground. Three buckets are used at each site separated by approximately 10 m. Between each bucket is a drift fence approximately 30 cm high used to direct small animals towards the pitfall traps	52 pitfall bucket nights (3 traplines)
Harp trapping	Two-bank harp traps were positioned in natural flyways and checked each morning to identify and release capture fauna.	20 trap nights
Acoustic Bat Call Detection	Anabat Swift units were deployed in representative habitats to record microchiropteran calls. These calls were later analysed by Balance! Environmental for species identification purposes. Detection was conducted across all habitat types. Where possible, detection units were positioned in natural flyways.	10 trap nights
Incidental Observations	All fauna observed incidentally throughout the Study Area were recorded. Observations of wildlife recorded outside of the main sampling sites were noted according to the habitat in which they were observed.	60 hours
Habitat Assessment	Detailed descriptions of the habitat values present within the Study Area were recorded using the fauna habitat assessment methodology. Micro-habitat was described at each location including abundance of tree hollows, fallen logs, exfoliating bark, leaf litter, native grass, rocks and boulders; disturbance present; distance to water sources; and any other vegetation values present.	39 locations
Habitat Assessment including hollow counts	Hollow density counts were conducted at 18 of the 20 koala SAT survey location to assess the suitability of the habitat for this species. Along a 50 meter (m) transect, trees less than 10 m on each side of the transect were visually inspected for hollows. The number of large and small hollows within each 50 m x 10 m transect was recorded	18 locations



- Legend**
- Study Area
 - State Forest
 - Roads
 - Watercourse
- Survey Type**
- Anabat
 - Bird Survey
 - Habitat Assessment
 - Habitat Search
 - Harp Trap
 - Pitfall Trap
 - Spotlight
 - Koala SAT Sites

FIGURE 2.1

Study Area 1 Survey Locations



Legend

- | | | |
|--|--|--|
| Study Areas | Survey Type | Habitat Search |
| Roads | ● Anabat | ● Harp Trap |
| ~ Watercourse | ● Bird Survey | ● Pitfall Trap |
| | ● Habitat Assessment | ● Spotlight |
| | ● Koala SAT Sites | |

FIGURE 2.2
Study Area 2 Survey Locations

3.0 Results

3.1 Desktop Assessment

3.1.1 Search Results and Historical Records

All target species were identified in the desktop searches, indicating their potential occurrence where suitable habitat exists within the Study Areas. A review of historical records for the targeted threatened fauna indicates that most species are known to be present or known from the broader regions (i.e. within 50 km of the Study Areas).

- Painted honeyeater records from the Project region are common, occurring within the Allies Creek State Forest and within roadside patches of vegetation between 6-11 km southwest of the Study Areas.
- Dunmall's snake records from the region are rare, with no occurrences within 50 km of the Study Areas. The closest records are approximately 60 km south east of the Study Area near Tarong, Queensland.
- Brigalow woodland snail records exist 40 km west from the Study Areas in the Barakula State Forest. No other records of this species occur within 50 km of the Study Areas.
- Numerous records of the greater glider exist within 20 km of the Study Areas. Numerous records are contained in the Barakula State Forest, west of Study Area 1.
- Koala records exists throughout the region including within the Barakula State Forest and near tributaries of the Boyne River.

The locations of these records in the context of the Study Areas is provided in **Figure 3.1**.

3.1.2 Home Range and Habitat Use of Greater Gliders in the Barakula State Forest

Smith et al. (2007) investigate the home range extent and habitat use of greater glider within Barakula State Forest, situated immediately west of Study Area 1 and approximately 17 km west of Study Area 2. In this study, the following key results relevant to this assessment was noted:

- Greater gliders were seen foraging and denning in myrtaceous tree species only, using mostly *Eucalyptus moluccana* (grey box), *Eucalyptus fibrosa* (red ironbark) and *Corymbia citriodora* (lemon-scented gum).
- Greater gliders preferred larger (>50 cm DBH) and older trees as denning sites
- Dead trees made up 16% of denning trees used by this population
- The density of stems containing hollows was less than one stem per hectare in some areas
- The study summarised that the Barakula state forest study area has a low availability of den sites potentially contributing to larger home ranges and low population density of the greater glider.

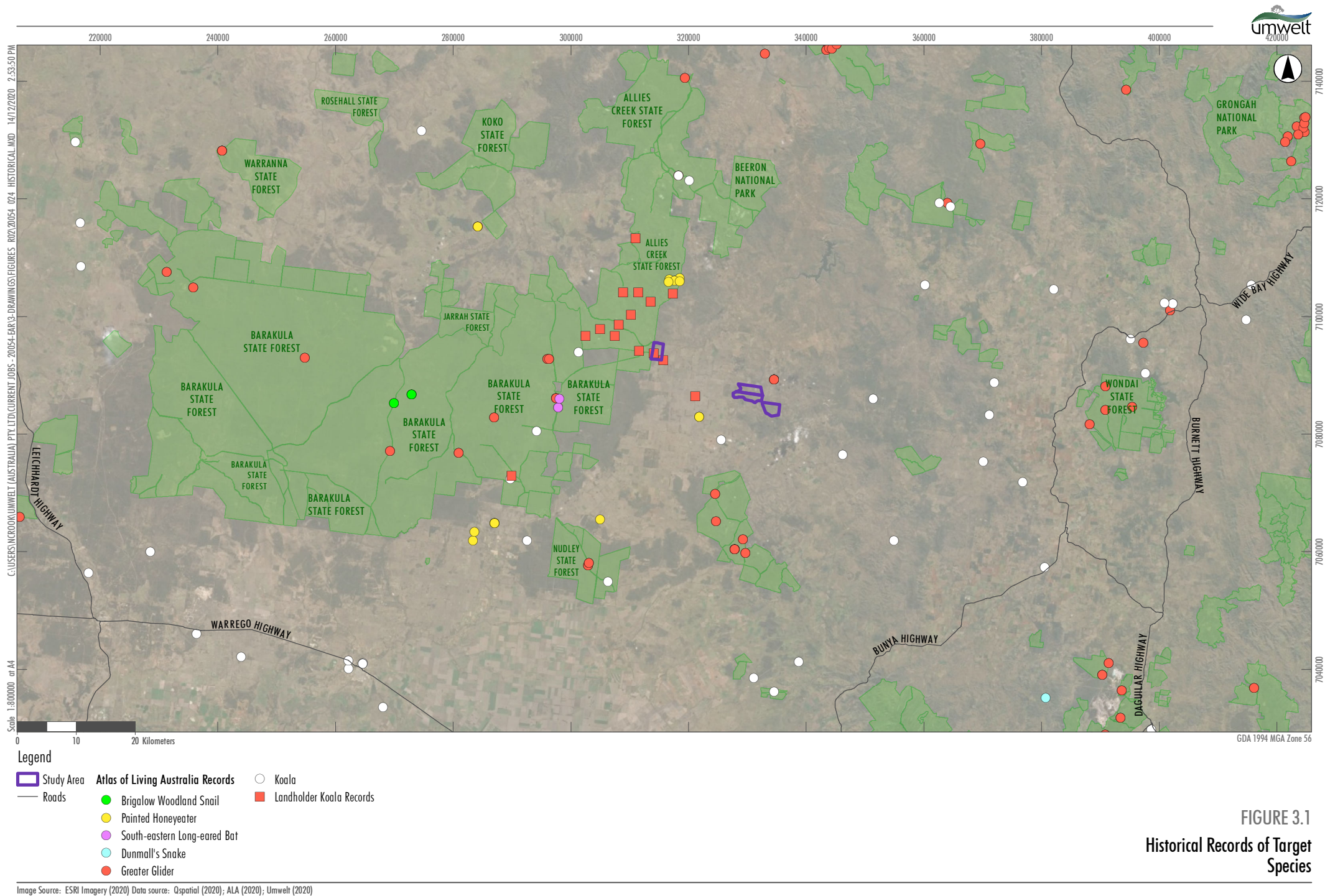


FIGURE 3.1
Historical Records of Target Species

3.2 Field Survey Results

3.2.1 Fauna Diversity

Across both field surveys, 119 fauna species were recorded, comprising of 75 birds, 27 mammals, 14 reptiles and 6 amphibians. Considering all species recorded, 74% are represented within Study area 1, 42% in Study area 2, whilst 8.4% were incidentally recorded near Study area 1 (within Barakula State Forest or along immediate access roads).

Two threatened fauna which were actively targeted during this fauna assessment were confirmed:

- Greater glider
- Koala (**Plate 3.1**).

One threatened reptile, golden-tailed gecko (*Strophurus taenicauda*) listed as Near Threatened under the NC Act, was also recorded from Study Area 1, within *Acacia harpophylla* (brigalow) regrowth (**Plate 3.2**).

Both Study Areas were found to support introduced fauna, including cane toad (*Bufo marinus*) and house mouse (*Mus musculus*).



Plate 3.1 Koala (*Phascolarctos cinereus*) foraging within *Eucalyptus crebra* (narrow-leaved ironbark)

© Umwelt, 2020



Plate 3.2 Golden-tailed gecko (*Strophurus taenicauda*) within *Acacia harpophylla* (brigalow) regrowth woodland

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3.2.1.1 Microbat call analysis and Harp Trapping

Two microbat species were recorded from harp traps: little pied bat (*Chalinolobus picatus*) and Gould's long-eared bat (*Nyctophilus gouldi*). Little pied bat was recorded twice; one record within *Eucalyptus crebra* (narrow-leaved ironbark) and *Eucalyptus melanophloia* (silver-leaved ironbark) mature regrowth woodland in the norther portions of Study Area 2. The second record was from a harp trap situated on track within *Eucalyptus crebra* (narrow-leaved ironbark) mature regrowth woodland, from the central portion of the Study Area 2. Gould's long-eared bat (*Nyctophilus gouldi*). was also recorded from this harp trap (**Plate 3.3**).

The analysis of acoustic data was completed by Balance! Environmental. At least 13 species were recorded with 11 call types being positively identified to unique species. Whereas the remaining calls were associated with two undifferentiated sets of related species the *Nyctophilus sp.* and *Scotorepens greyii/ Scotorepens sp.*

None of the positively identified species are listed under the NC Act or EPBC Act.



Plate 3.3 Gould's Long-eared Bat (*Nyctophilus gouldi*)

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3.2.2 Fauna Habitat

The Study Areas support both remnant and mature regrowth woodlands, with dominant canopy species including *Eucalyptus crebra* (narrow-leaved ironbark), *Eucalyptus moluccana* (grey box) and *Eucalyptus tereticornis* (forest red gum). Fauna habitat within the Study Area can be broadly characterised into six habitat types as detailed in **Table 3.1**.

Table 3.1 Fauna Habitat Types

Habitat Description	RE ID	Short Description
Eucalyptus and/or Corymbia woodland on igneous rocks	11.12.1a	<i>Eucalyptus crebra</i> +/- <i>E. exserta</i> woodland. Occurs on undulating rises.
	11.12.3	<i>Eucalyptus crebra</i> , <i>E. tereticornis</i> , <i>Angophora leiocarpa</i> woodland on igneous rocks especially granite
<i>Callitris glaucophylla</i> woodland on igneous rocks (granite)	11.12.6	<i>Callitris glaucophylla</i> +/- <i>Eucalyptus</i> spp. woodland
Eucalyptus woodland on Cainozoic plains/ lateritic duricrust	11.5.1	<i>Eucalyptus crebra</i> and/or <i>E. populnea</i> , <i>Callitris glaucophylla</i> , <i>Angophora leiocarpa</i> , <i>Allocasuarina luehmannii</i> woodland on Cainozoic sand plains and/or remnant surfaces
	11.5.1a	<i>Eucalyptus populnea</i> woodland with <i>Allocasuarina luehmannii</i> low tree layer
	11.5.20	<i>Eucalyptus moluccana</i> woodland on Cainozoic sand plains
	11.7.6	<i>Corymbia citriodora</i> or <i>Eucalyptus crebra</i> woodland on Cainozoic lateritic duricrust

Habitat Description	RE ID	Short Description
Eucalyptus woodland on alluvial plains	11.3.2	<i>Eucalyptus populnea</i> woodland on alluvial plains
Eucalyptus woodland fringing drainage lines	11.3.25	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines
<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest	11.3.1	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on alluvial plains
	11.4.3	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> shrubby open forest on Cainozoic clay plains

3.3 Connectivity

Large tracts of vegetation and habitat exist to the west of Study Area 1 (Barakula and Allies Creek State Forest), with connection into these areas (from the Study Area) afforded via regrowth and remnant vegetation. To the immediate east of Study Area 1, connectivity is limited to regrowth woodlands of *Acacia harpophylla* (brigalow) which predominately exists within the verge of local road corridors, often supporting gilgai formations.

Fauna movement within Study Area 2 is afforded by regrowth and remnant vegetation, predominately *Eucalyptus crebra* (narrow-leaved ironbark) woodlands. Fauna movement beyond the Study Area is likely to be concentrated along the Boyne River (State Significant Corridor) and Jua Road (Regional Significant Corridor). Both corridors provide north south movement opportunities for fauna, including hollow dependent fauna such as greater glider.

Mapped biodiversity corridors are depicted on **Figure 3.2**.



FIGURE 3.2
State Biodiversity Corridors

3.4 Potential Habitat for Threatened Species

3.4.1 Koala

3.4.1.1 Spot Assessment Technique

The Spot Assessment Technique was completed at 20 sites, targeting koala scats throughout the Study Areas. In total of 600 trees were searched as per the SAT methodology provided in **Section 2.2**. Of these trees, koala scats were recorded from 24 trees within four vegetation communities, collected under five different tree species and one hybrid tree. The results of this assessment are broken down in the following sections.

Vegetation Communities

The Study Areas support both remnant and regrowth woodlands, with the dominant canopy species including *Eucalyptus crebra* (narrow-leaved ironbark), *Eucalyptus moluccana* (grey box) and *Eucalyptus tereticornis* (forest red gum). Regrowth across the Study Areas was typically mature regrowth and generally supported Eucalypt trees with a DBH >10 cm. Koala scats were recorded within three regrowth and one remnant vegetation community. **Table 3.2** provides a summary of these results including the number of SAT sites completed within each vegetation community.

Table 3.2 SAT Results by Vegetation Community

RE ID	Remnant Status	Short Description	Sites	Sites with Scats
11.3.25	Regrowth	<i>Eucalyptus tereticornis</i> or <i>Eucalyptus camaldulensis</i> woodland fringing drainage lines	3	0
11.5.1	Regrowth	<i>Eucalyptus crebra</i> and/or <i>Eucalyptus populnea</i> , <i>Callitris glaucophylla</i> , <i>Angophora leiocarpa</i> , <i>Allocasuarina luehmannii</i> woodland on Cainozoic sand plains and/or remnant surfaces	1	0
11.5.1a	Regrowth	<i>Eucalyptus populnea</i> woodland with <i>Allocasuarina luehmannii</i> low tree layer	2	2
11.5.20	Regrowth	<i>Eucalyptus moluccana</i> and/or <i>Eucalyptus crebra</i> woodland on Cainozoic sand plains	2	0
11.7.6	Remnant	<i>Corymbia citriodora</i> or <i>Eucalyptus crebra</i> woodland on Cainozoic lateritic duricrust	1	0
11.7.6	Regrowth	<i>Corymbia citriodora</i> or <i>Eucalyptus crebra</i> woodland on Cainozoic lateritic duricrust	2	0
11.12.1a	Remnant	<i>Eucalyptus crebra</i> +/- <i>Eucalyptus exserta</i> woodland. Occurs on undulating rises.	1	1
11.12.1a	Regrowth	<i>Eucalyptus crebra</i> +/- <i>Eucalyptus exserta</i> woodland. Occurs on undulating rises.	5	2
11.12.3	Remnant	<i>Eucalyptus crebra</i> , <i>Eucalyptus tereticornis</i> , <i>Angophora leiocarpa</i> woodland on igneous rocks especially granite	1	0
11.12.3	Regrowth	<i>Eucalyptus crebra</i> , <i>Eucalyptus tereticornis</i> , <i>Angophora leiocarpa</i> woodland on igneous rocks especially granite	2	1
Total			20	6

Tree Species Use

The 24 scat trees recorded during the study belong to five different tree species and one hybrid species (*Eucalyptus melanophloia*/*Eucalyptus crebra*). The species with the highest number of scat trees was *Eucalyptus tereticornis* (forest red gum), followed by *Eucalyptus crebra* (narrow-leaved ironbark). These two species are dominant across the landscape within both Study Areas. **Table 3.3** below details the number of each tree species where koala scats were identified from the 600 trees searched during the assessment.

Table 3.3 Scat Occurrences per Tree Species

Tree Species	Common Name	Number of Trees with Scats
<i>Angophora leiocarpa</i>	smooth-barked apple	1
<i>Eucalyptus crebra</i>	narrow-leaved ironbark	7
<i>Eucalyptus melanophloia</i>	silver-leaved ironbark	1
<i>Eucalyptus melanophloia</i> x <i>Eucalyptus crebra</i>	n/a	1
<i>Eucalyptus populnea</i>	poplar box	3
<i>Eucalyptus tereticornis</i>	Forest red gum	11
Total		24

Koala Activity Levels

The SAT methodology (Phillips and Callaghan, 2011) uses activity levels to quantify the use of an area by koalas. This is done by calculating the percentage of scat trees relative to the total number of trees searched per site. For example, at C3, three trees with scats were recorded out of 30 trees searched, so the activity level percentage is 10%.

The categorisation of this data into activity bands (as per Phillips and Callaghan, 2011) has not been undertaken given the variability in recorded activity levels and relatively low sample set. The activity levels calculated for each site are provided in **Table 3.4** below.

Table 3.4 Koala SAT Site Activity Levels

Site Name	Remnant Status	Study Area	Trees with Scats	Activity Level %
NW1	Regrowth	Study Area 1	0	0.0
NW2	Regrowth	Study Area 1	0	0.0
NW3	Regrowth	Study Area 1	0	0.0
NW4	Regrowth	Study Area 1	0	0.0
NW5	Regrowth	Study Area 1	0	0.0
NW6	Regrowth	Study Area 1	0	0.0
NW7	Regrowth	Study Area 1	0	0.0
NW8	Regrowth	Study Area 1	0	0.0
NW9	Remnant	Study Area 1	0	0.0
C1	Regrowth	Study Area 2	4	13.3
C2	Regrowth	Study Area 2	9	30.0

Site Name	Remnant Status	Study Area	Trees with Scats	Activity Level %
C3	Regrowth	Study Area 2	3	10.0
C4	Regrowth	Study Area 2	0	0.0
C5	Regrowth	Study Area 2	2	6.7
C6	Regrowth	Study Area 2	4	13.3
C7	Regrowth	Study Area 2	0	0.0
SE1	Regrowth	Study Area 2	0	0.0
SE2	Regrowth	Study Area 2	0	0.0
SE3	Remnant	Study Area 2	0	0.0
SE4	Remnant	Study Area 2	2	6.7

3.4.1.2 Potential Habitat

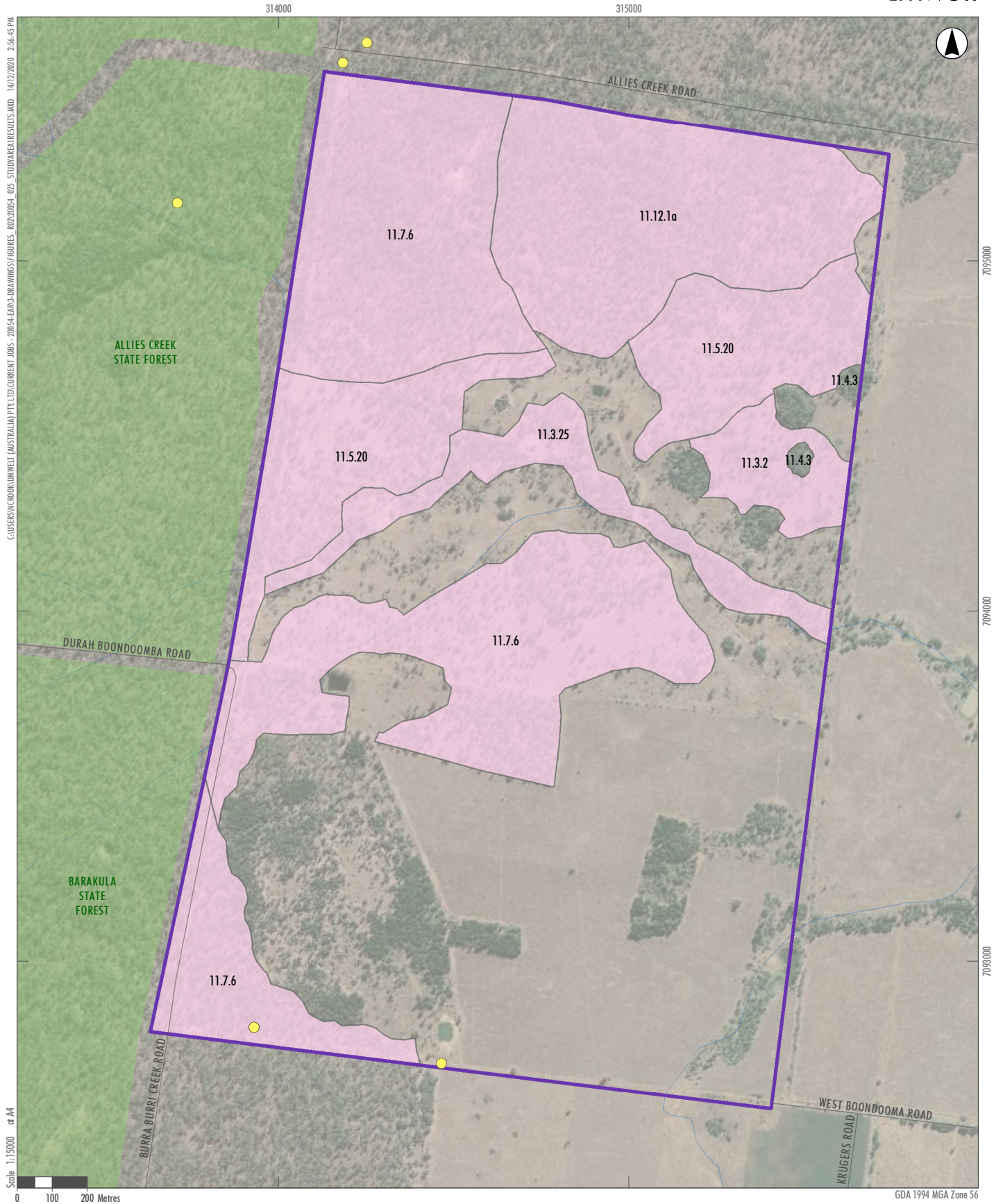
Eight vegetation communities are identified in the Offset Suitability Assessment (AECOM, 2018) as providing suitable habitat for koala. Data collected during this field survey confirmed the presence of the koala within five of these vegetation communities (**Table 3.2**). Habitat assessments conducted as part of this assessment confirmed suitable resources available within the remaining three REs.

Given the above, this Study confirms the habitat criteria for koala within the Study Areas defined by AECOM (2018). Mapping of koala habitat using suitable REs has determined that the total area of koala habitat within the Study Areas is 1,699 ha totalling 95% of the total Study Areas.

A breakdown of this area for each of the land parcels which make up the Study Areas is provided in **Table 3.5** below. Mapping of koala habitat within the Study Areas is provided in **Figure 3.3** and **Figure 3.4**

Table 3.5 Koala Habitat Area

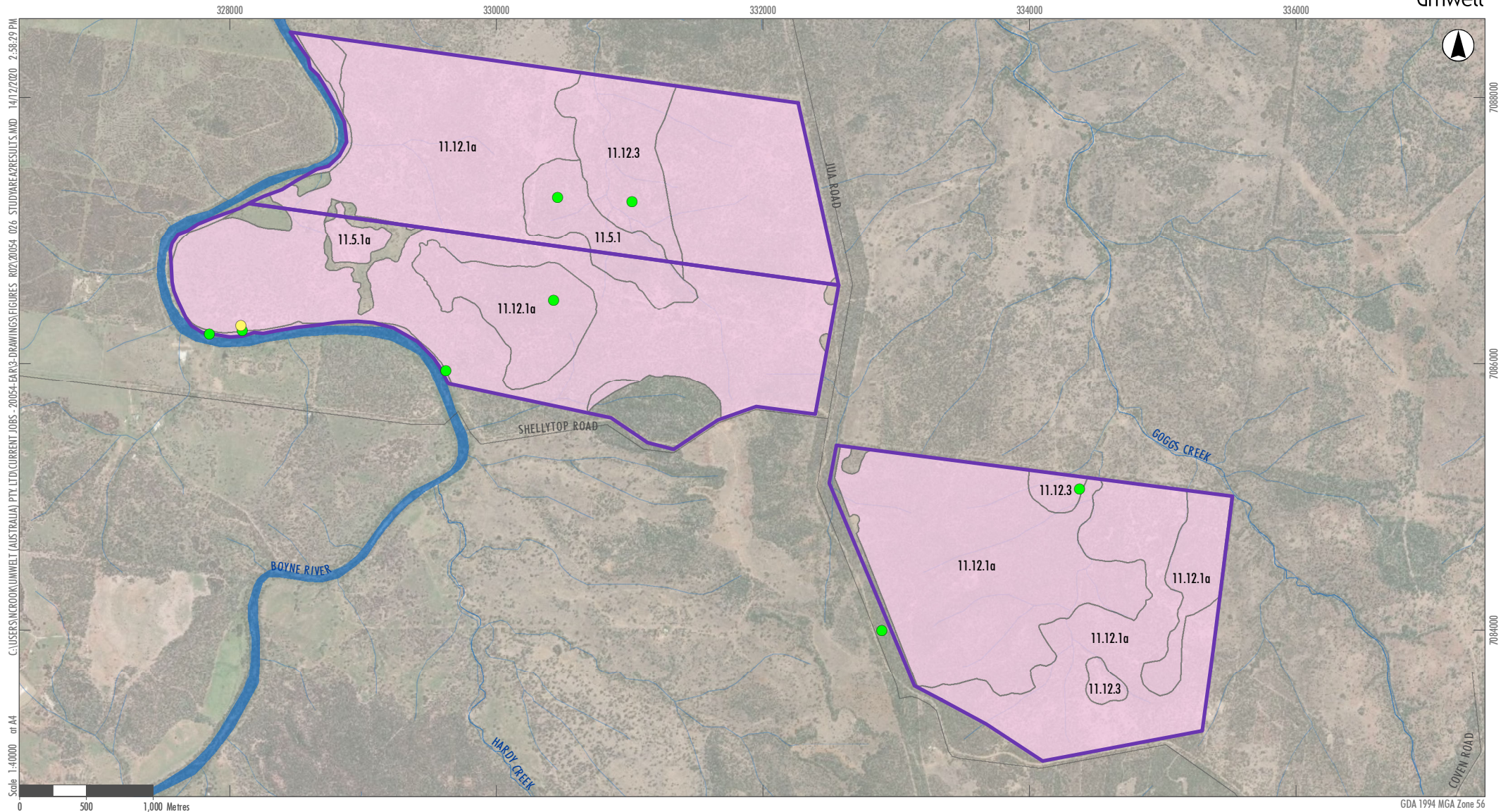
Koala Habitat RE	Study Area 1 (ha)	Study Area 2 (ha)
11.3.2	10.3	0
11.3.25	17.5	10.6
11.5.1	0	54.3
11.5.1a	0	12.2
11.5.20	49.1	0
11.7.6	120.5	0
11.12.1a	54.2	1228
11.12.3	0	142.7
Total	251.6	1447.8



- Legend**
- Study Area
 - State Forest
 - Watercourse
 - Roads
 - Threatened Species Records**
 - Greater Glider (*Petauroides volans*)
 - Greater Glider and Koala RE

FIGURE 3.3

Study Area 1, Greater Glider and Koala Habitat



Legend

- Study Area
- ~ Watercourse
- Roads
- Threatened Species Records
- Koala (*Phascolarctos cinereus*)
- Greater Glider (*Petaurides volans*)
- Greater Glider and Koala RE

FIGURE 3.4
Study Area 2, Greater Glider
and Koala Habitat

3.4.2 Greater Glider

3.4.2.1 Hollow Density Count

Hollow density counts were completed at 18 SAT sites during the field survey. These surveys collected hollow density information from a 50 m by 20 m transect. The total number of hollows within the site was multiplied to achieve an estimated hollow density per hectare.

The results of the hollow density count identified that:

- Hollows were recorded from three out of 18 sites during the assessment
- Each site containing hollows was within an individual regrowth vegetation community. No hollows were recorded in remnant woodland
- The greatest number of hollows was identified from a site located in regrowth *Eucalyptus tereticornis* (forest red gum) along a watercourse (RE 11.3.25). At this location, a density of 50 hollows per hectare was estimated
- The remaining hollows identified were recorded from *Eucalyptus crebra* (narrow-leaved ironbark) or *Eucalyptus populnea* (poplar box) regrowth woodland. These sites received an estimated hollow density of 10 hollows and 15 hollows per hectare, respectively.

These results indicate a low density of hollows throughout the vegetation communities of both Study Areas. This assessment is consistent with what was found in a study of habitat use of greater gliders in the Barakula State Forest (Smith, Mathieson and Hogan, 2007) (**Section 3.1.1**).

3.4.2.2 Potential Habitat

Greater gliders favour habitat which offers old or dead trees with large hollows (Lindenmayer et al., 1991), which provide necessary day-time denning sites. Within the Study Areas, suitable hollow-bearing trees were mostly contained to remnant Eucalypt dominated communities, with regrowth vegetation generally found to support a low abundance of hollows or hollows were absent.

The assessment confirms the habitat mapping criteria for greater glider as defined by AECOM (2018). It is noted that existing habitat within Killara is currently afforded by remnant and regrowth woodlands dominated by Myrtaceous vegetation offering or with the future potential to offer hollow bearing trees.

Inclusive of the vegetation communities detailed in **Table 3.6**, the total area of potential greater glider habitat within the Study Areas is 1699 ha totalling 95% of the total areas. A breakdown of this area for each of the land parcels which make up the Study Areas is provided in below.

Mapping of greater glider habitat as within the Study Areas is provided in **Figure 3.3** and **Figure 3.4**.

Table 3.6 Greater Glider Habitat

Greater Glider Habitat RE	Study Area 1 (ha)	Study Area 2 (ha)
11.3.2	10.3	0
11.3.25	17.5	10.6
11.5.1	0	54.3
11.5.1a	0	12.2
11.5.20	49.1	0

Greater Glider Habitat RE	Study Area 1 (ha)	Study Area 2 (ha)
11.7.6	120.5	0
11.12.1a	54.2	1228
11.12.3	0	142.7
Total	251.6	1447.8

3.4.3 Brigalow Woodland Snail

The presence of Brigalow woodland snail was not confirmed during field surveys. Although, the habitat assessments did confirm suitable resources available within *Acacia harpophylla* woodlands situated on Study Area 1. The Study Area is situated immediately north of the Condamine River floodplain, where this species is known. For this reason, habitat within the property is considered sub-optimal based on the recognised distribution of the species.

Noting the above, this assessment confirms the habitat mapping criteria as defined by AECOM (2018). Based on the above, potential habitat mapping within Study area 1 has determined that there is 60.9 ha of suitable habitat, comprising 3% of the total area. A breakdown of this area is provided in **Table 3.7**, while mapping is presented in **Figure 3.5**.

Table 3.7 Brigalow Woodland Snail Habitat

Brigalow Woodland Snail Habitat RE	Study Area 1 (ha)	Study Area 2 (ha)
11.3.1	12.8	0
11.4.3	48.1	0
Total	60.9	0

3.4.4 Dunmall's Snake

The Study Areas are situated within the DAWE mapped distribution of the species, although the nearest record is approximately 60 km to the south east. The species was not confirmed during field surveys, despite extensive spotlighting effort, active searches and pitfall trapping. Habitat assessments have confirmed that suitable resources for the species are available within seven REs. Suitable habitat includes *Acacia harpophylla* (brigalow) woodlands and Eucalypt woodland. Micro-habitat for the species includes ground timber, gilgai and cracking clay soils. The Study Areas were found to have suitable foraging potential, with numerous skinks and geckos recorded.

The assessment confirms the habitat mapping criteria as defined by AECOM (2018). Potential habitat mapping identifies 297 ha of suitable habitat within the Study Areas, comprising 15% of the total area. A breakdown of this area is provided in **Table 3.8**, while mapping is presented in **Figure 3.5** and **Figure 3.6**.

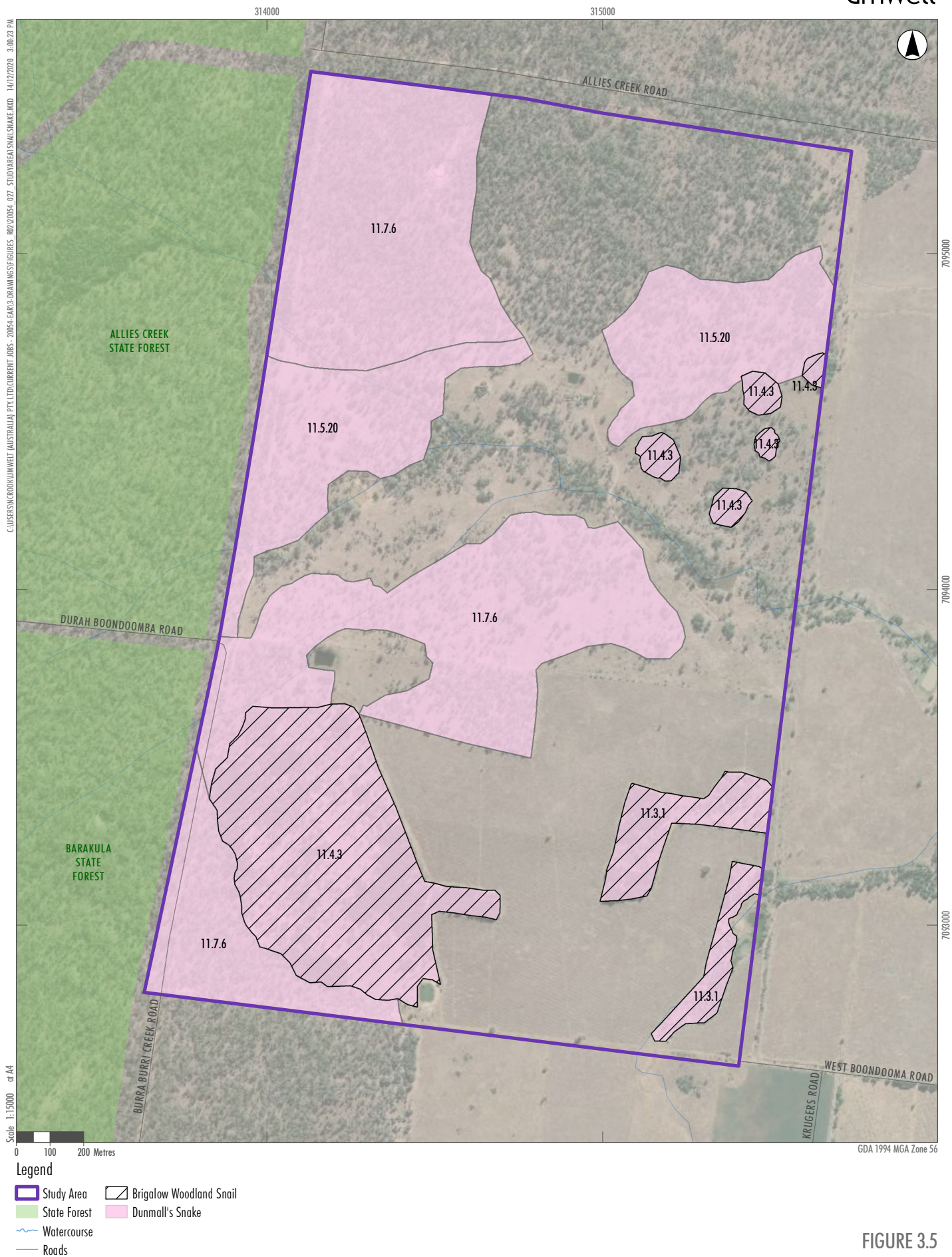


FIGURE 3.5

Study Area 1, Brigalow Woodland Snail and Dunmall's Snake Habitat

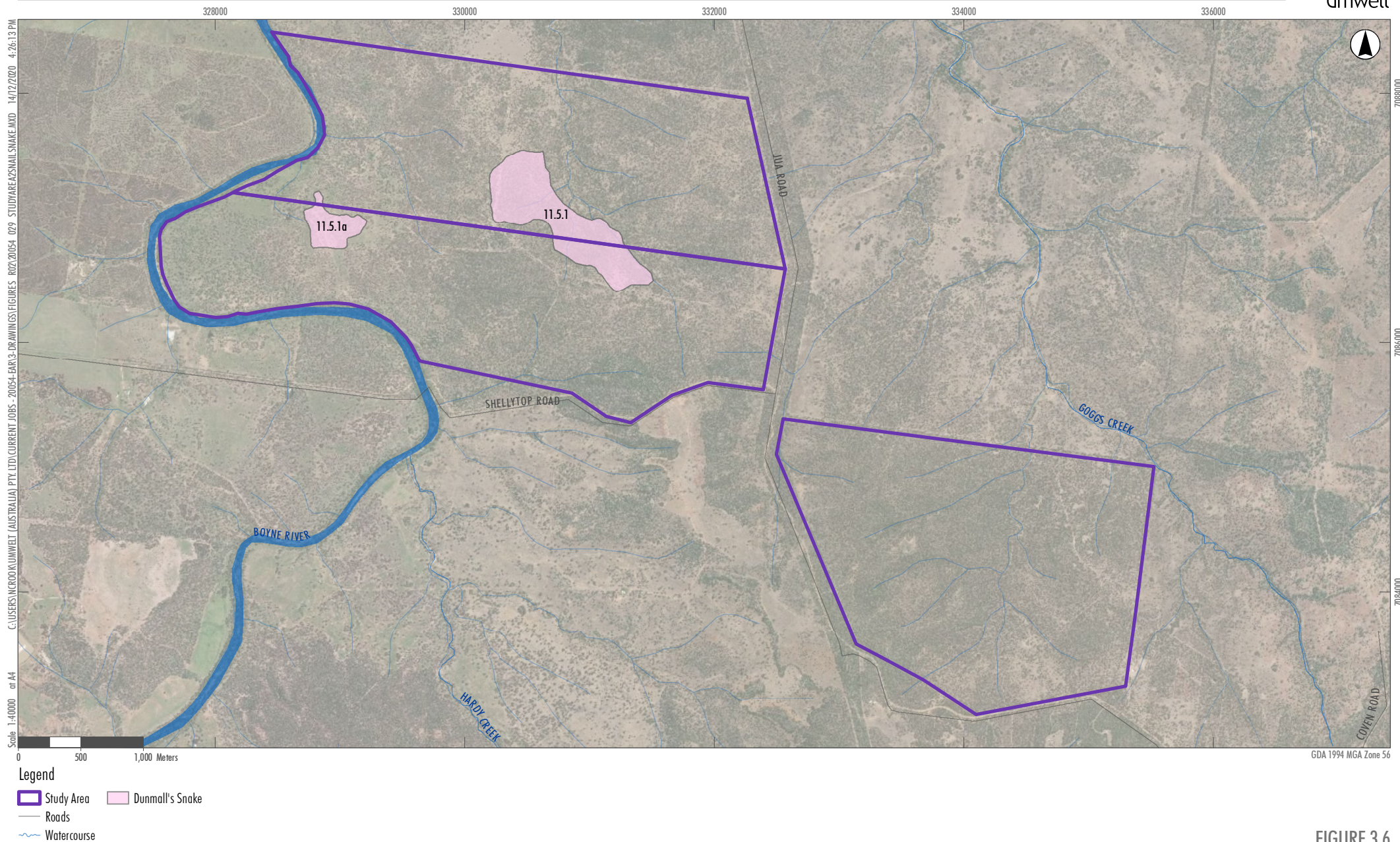


FIGURE 3.6
Study Area 2, Dunmall's Snake Habitat

Table 3.8 Dunmall's Snake Habitat

Dunmall's Snake Habitat RE	Study Area 1 (ha)	Study Area 2 (ha)
11.3.1	12.8	-
11.4.3	48.1	-
11.5.1	-	54.3
11.5.1a	-	12.2
11.5.20	49.1	-
11.7.6	120.5	-
Total	230.5	66.5

3.4.5 Painted Honeyeater

The Study Areas are situated within areas identified by DAWE as 'species or species habitat likely to occur'. This is supported by historical records for the species (**Figure 3.1**). Painted honeyeater was not confirmed during field surveys, however habitat assessments confirmed suitable resources are available, including abundant mistletoe within Acacia and Eucalypt dominated woodlands.

This assessment confirms the habitat mapping criteria as defined by AECOM (2018). Mapping has determined that there is 1694.2° ha of suitable habitat within the Study Areas, comprising 85% of the total area. A breakdown of this area is provided in **Table 3.9** below, while mapping is presented in **Figure 3.7** and **Figure 3.8**.

Table 3.9 Painted Honeyeater Habitat

Painted Honeyeater Habitat RE	Study Area 1 (ha)	Study Area 2 (ha)
11.4.3	48.1	-
11.5.1	-	54.3
11.5.1a	-	12.2
11.7.6	120.5	-
1.12.1a	54.2	1,227.8
11.12.3	-	142.7
11.12.6b	-	34.4
Subtotal	222.8	1471.4

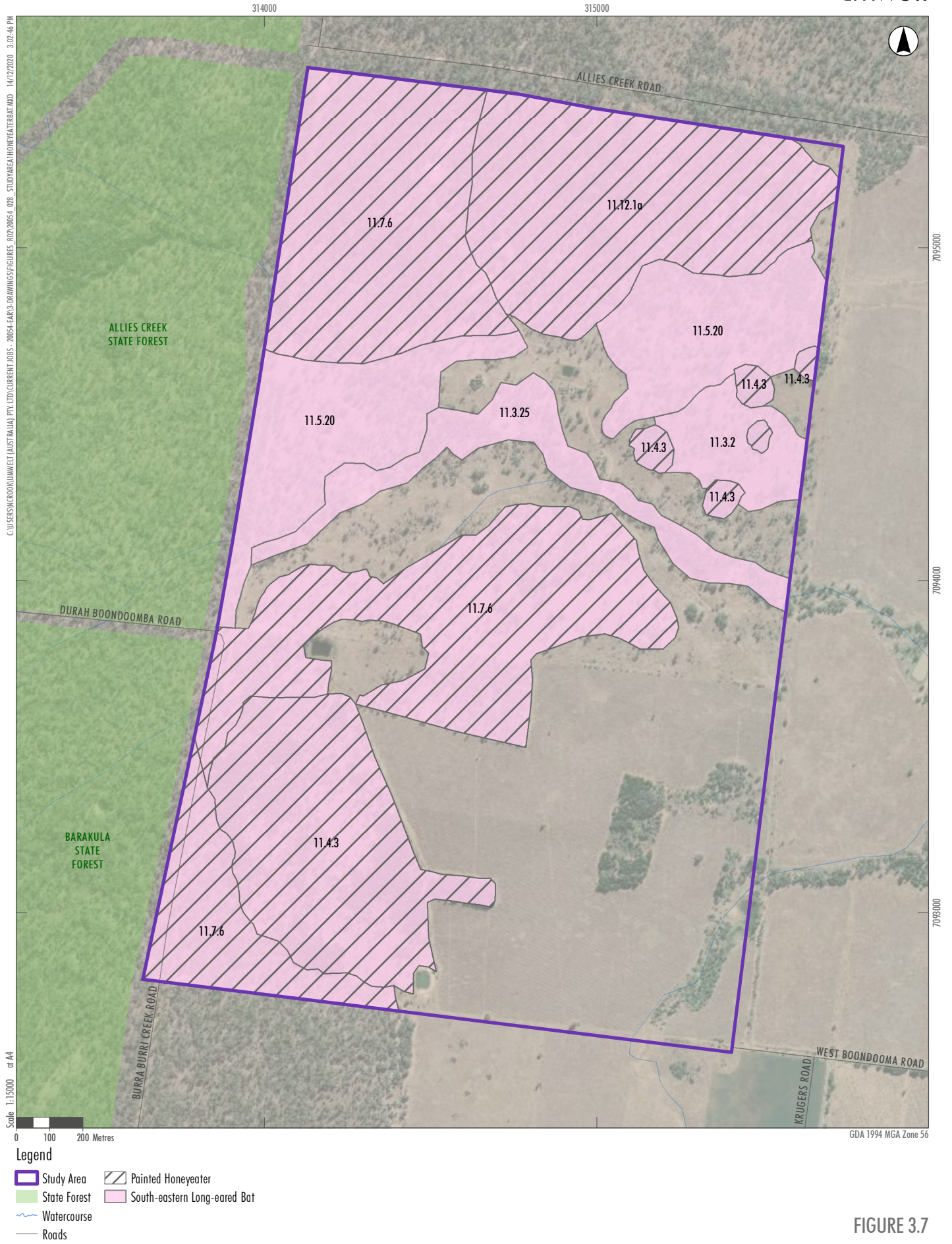


FIGURE 3.7

Study Area 1, Painted Honeyeater and South-Eastern Long-Eared Bat Habitat

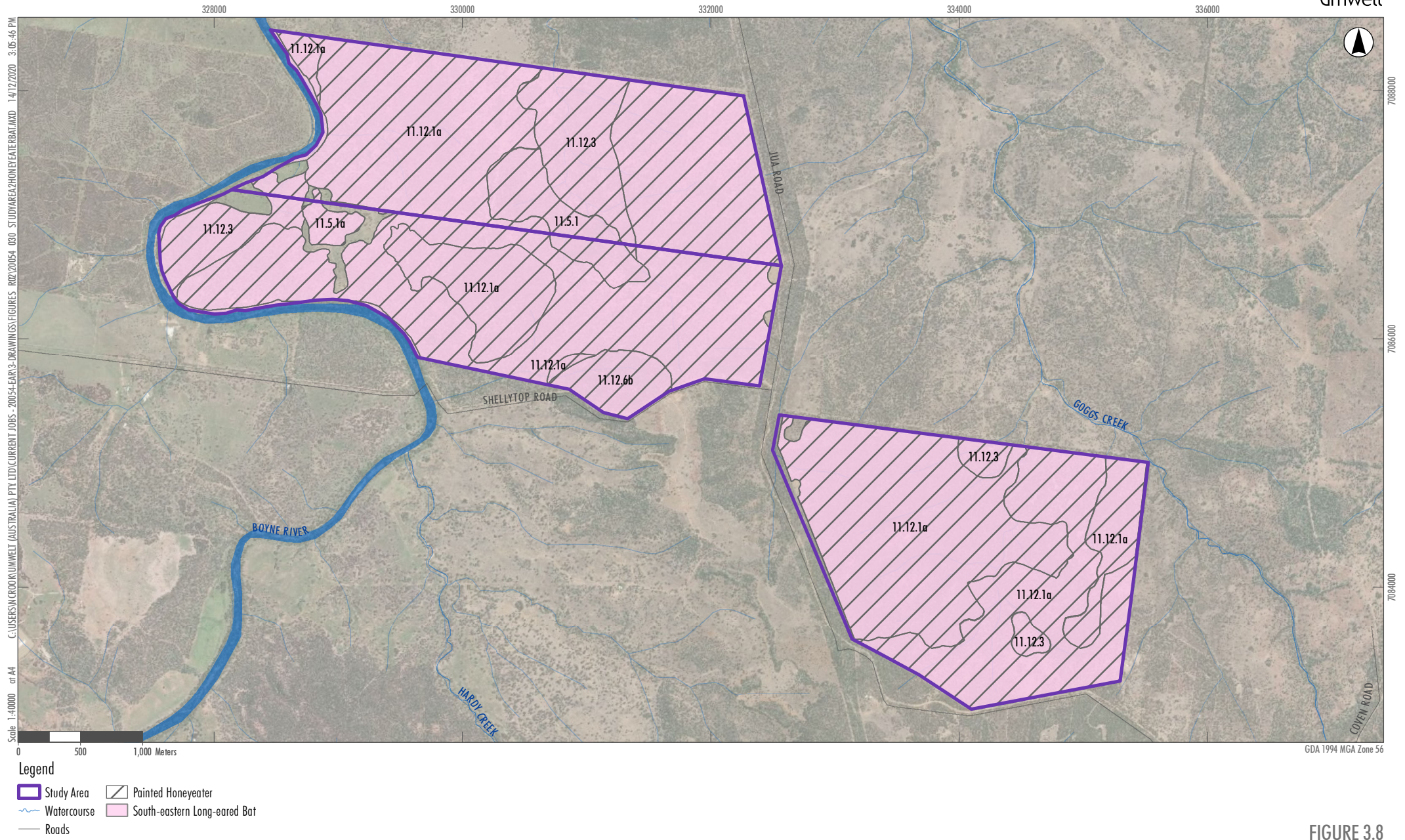


FIGURE 3.8

Study Area 2, Painted Honeyeater and South-Eastern Long-Eared Bat Habitat

3.4.6 South-eastern Long-eared Bat

The Study Areas are situated within areas identified by DAWE as 'species or species habitat may occur'. Records for the species are mapped within the Barakula State Forest (**Figure 3.1**). The south-eastern long-eared bat was not confirmed during field survey, although calls *Nyctophilus sp.* were recorded on anabat units.

This assessment confirms the habitat mapping criteria as defined by AECOM (2018). Potential habitat for the species includes Eucalypt woodland, particularly where extensive stands of vegetation occur. Habitat assessments and mapping of the Study Areas has identified 1781.7 ha of suitable habitat, comprising 90% of the total area. A breakdown of this area is provided in **Table 3.10**, while mapping is presented in **Figure 3.7** and **Figure 3.8**.

Table 3.10 South-eastern Long-eared Bat Habitat

South-eastern Long-eared bat Habitat RE	Study Area 1 (ha)	Study Area 2 (ha)
11.3.2	10.3	-
11.3.25	17.5	10.6
11.4.3	48.1	-
11.5.1	-	54.3
11.5.1a	-	12.2
11.5.20	49.1	-
11.7.6	120.5	-
11.12.1a	54.2	1,227.8
11.12.3	-	142.7
11.12.6b	-	34.4
Subtotal	299.7	1482

4.0 Conclusion

Umwelt was commissioned by Earthtrade to undertake a targeted fauna assessment to determine the status and extent of threatened species (including habitat) within the Study Areas. Threatened fauna species which were targeted during this assessment include:

- Koala (*Phascolarctos cinereus*)
- Greater glider (*Petauroides Volans*)
- Brigalow woodland snail (*Adclarkia cameroni*)
- Dunmall's snake (*Furina dunmalli*)
- Painted Honeyeater (*Grantiella picta*)
- South-eastern long-eared bat (*Nyctophilus corbeni*).

The fauna survey implemented multiple survey techniques and recorded a total of 119 fauna species, including 75 birds, 27 mammals, 14 reptiles and 6 amphibians. Only two of the targeted threatened species were confirmed - koala and greater glider. Habitat for the remaining values were confirmed, although it is noted that the Study Areas is situated outside of the recently revised, DAWE accepted distribution for brigalow woodland snail (*Adclarkia cameroni*).

The survey confirmed large areas of koala and greater glider habitat are available for use as an offset. In addition, large areas of suitable habitat for the other targeted threatened species were confirmed within the Study Area, providing outlooks that these threatened species may be present but were undetected during this survey.

Overall, there are various sections of the Study Areas which offer greater application for use by threatened species by providing:

- Increased connectivity through the landscape to other tracts of suitable habitat
- Increased availability of recourse such as improved abundance or quality of food trees and microhabitats
- Decreased risk of negative interactions with humans such as vehicles strikes
- Increased availability of water sources.

5.0 References

AECOM (2018) 'Offset Suitability Assessment', 1(Final).

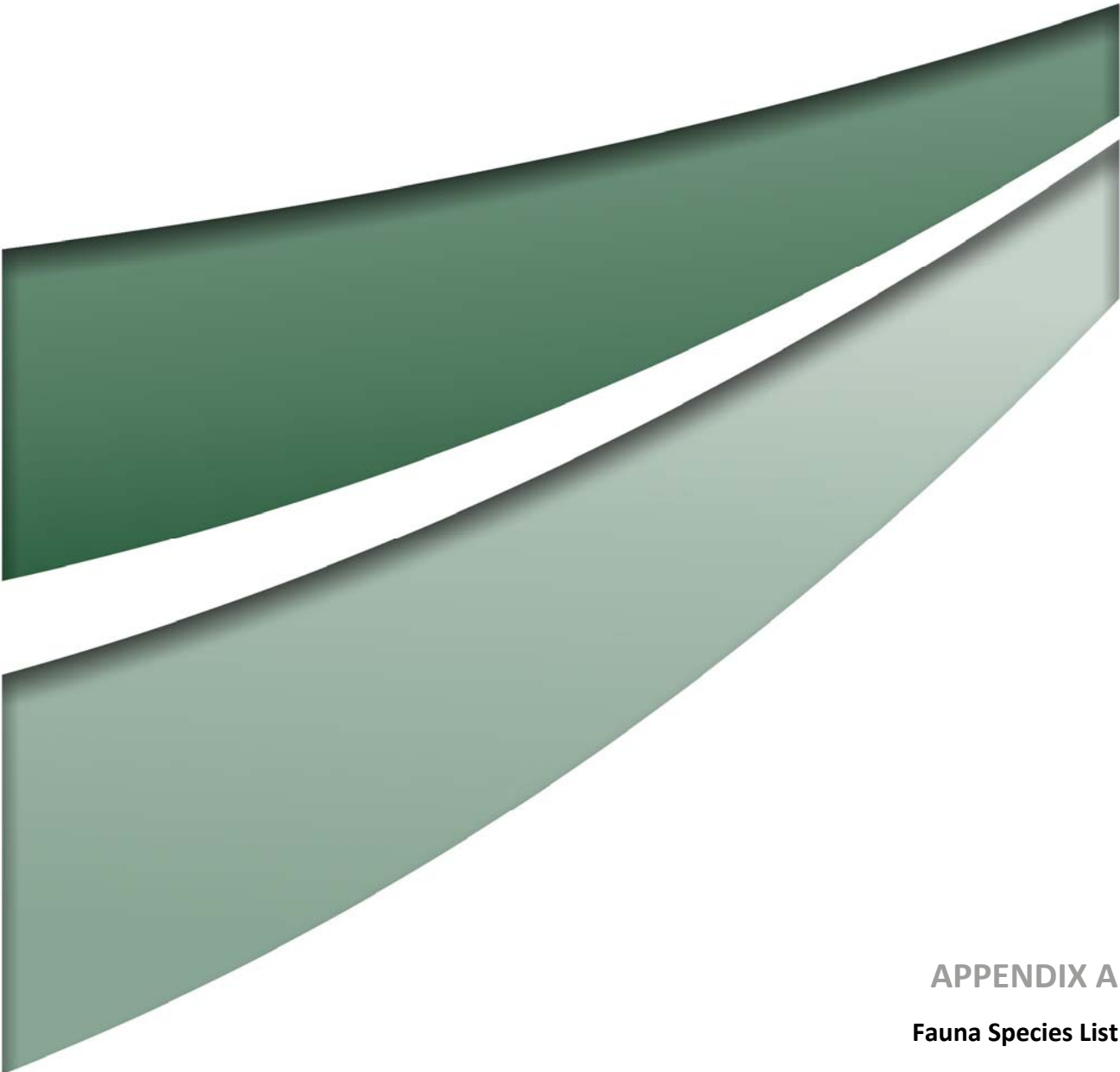
Department of the Environment (2014) EPBC Act Referral Guidelines for the Vulnerable Koala. Commonwealth of Australia.

DSEWPac (2011) Survey Guidelines for Australia's Threatened Mammals. Canberra, ACT.

Lindenmayer, D. B. et al. (1991) 'Characteristics of hollow-bearing trees occupied by arboreal marsupials in the montane ash forests of the Central Highlands of Victoria, south-east Australia', *Forest Ecology and Management*, 40(3), pp. 289–308. doi: [https://doi.org/10.1016/0378-1127\(91\)90047-Y](https://doi.org/10.1016/0378-1127(91)90047-Y).

Phillips, S. and Callaghan, J. (2011) 'The Spot Assessment Technique: A tool for determining localised levels of habitat use by Koalas *Phascolarctos cinereus*', *Australian Zoologist*, 35(3), pp. 774–779. doi: 10.7882/az.2011.029.

Smith, G. C., Mathieson, M. and Hogan, L. (2007) 'Home range and habitat use of a low-density population of greater gliders, *Petauroides volans* (Pseudocheiridae: Marsupialia), in a hollow-limiting environment', *Wildlife Research*, 34(6), pp. 472–483. doi: 10.1071/WR06063.



APPENDIX A
Fauna Species List

Common Name	Scientific Name	Study Area 1	Study Area 2	Incidental
Amphibian				
striped snake-eyed skink	<i>Cryptoblepharus virgatus</i>	x		x
common green treefrog	<i>Litoria caerulea</i>	x	x	
broad palmed rocketfrog	<i>Litoria latopalmata</i>	x		
striped rocketfrog	<i>Litoria nasuta</i>	x		
ruddy treefrog	<i>Litoria rubella</i>	x		
cane toad	<i>Bufo marinus</i>	x		
Reptile				
wood gecko	<i>Diplodactylus vittatus</i>	x	x	x
dubious dtella	<i>Gehyra dubia</i>	x	x	
timid slider	<i>Lerista timida</i>	x		
Steindachner's gecko	<i>Lucasium steindachneri</i>		x	
common dwarf skink	<i>Menetia greyii</i>	x		
carpet python	<i>Morelia spilota</i>	x		
southern spotted velvet gecko	<i>Oedura tryoni</i>	x		
bearded dragon	<i>Pogona barbata</i>		x	
red-bellied black snake	<i>Pseudechis porphyriacus</i>			x
eastern brown snake	<i>Pseudonaja textilis</i>	x		
dwarf litter-skink	<i>Pygmaeascincus timlowi</i>	x	x	
golden-tailed gecko	<i>Strophurus taenicauda</i>	x		
eastern blue-tongued lizard	<i>Tiliqua scincoides</i>		x	
lace monitor	<i>Varanus varius</i>	x		
Mammal				
rufous bettong	<i>Aepyprymnus rufescens</i>	x		
White-striped Free-tailed Bat	<i>Austronomus australis</i>	x	x	
dingo	<i>Canis familiaris dingo</i>	x		
Greater Northern Freetail-Bat	<i>Chaerephon jobensis</i>	x	x	
little pied bat	<i>Chalinolobus picatus</i>		x	
black-striped wallaby	<i>Macropus dorsalis</i>		x	
eastern grey kangaroo	<i>Macropus giganteus</i>	x	x	
whiptail wallaby	<i>Macropus parryi</i>		x	
red-necked wallaby	<i>Macropus rufogriseus</i>	x	x	
house mouse	<i>Mus musculus</i>	x	x	
Gould's long-eared bat	<i>Nyctophilus gouldi</i>		x	
	<i>Nyctophilus sp. *</i>	x	x	x
rabbit	<i>Oryctolagus cuniculus</i>	x		

Common Name	Scientific Name	Study Area 1	Study Area 2	Incidental
Northern Free-tail Bat	<i>Ozimops lumsdenae</i>	x	x	
Ride's Free-tailed Bat	<i>Ozimops ridei</i>	x	x	
Yellow-Bellied Sheathtail-Bat	<i>Saccolaimus flaviventris</i>	x	x	
Inland Broad-Nosed Bat	<i>Scotorepens balstoni</i>	x		
Little Broad-Nosed Bat	<i>Scotorepens greyii/</i> <i>Scotorepens sp.</i>	x	x	
greater glider	<i>Petauroides volans</i>	x		
squirrel glider	<i>Petaurus norfolcensis</i>		x	
koala	<i>Phascolarctos cinereus</i>		x	
short-beaked echidna	<i>Tachyglossus aculeatus</i>	x	x	x
common brushtail possum	<i>Trichosurus vulpecula</i>	x	x	
Inland Forest Bat	<i>Vespadelus baverstocki</i>	x	x	
Eastern Cave Bat	<i>Vespadelus troughtoni</i>		x	
Little Forest Bat	<i>Vespadelus vulturnus</i>	x	x	
swamp wallaby	<i>Wallabia bicolor</i>	x		
Bird				
spiny-cheeked honeyeater	<i>Acanthagenys rufogularis</i>	x		
yellow-rumped thornbill	<i>Acanthiza chrysorrhoa</i>	x		
yellow thornbill	<i>Acanthiza nana</i>	x	x	
Australian reed-warbler	<i>Acrocephalus australis</i>	x		
Australian owlet-nightjar	<i>Aegotheles cristatus</i>		x	
Australian king-parrot	<i>Alisterus scapularis</i>	x		
Pacific black duck	<i>Anas superciliosa</i>	x	x	
red-winged parrot	<i>Aprosmictus erythropterus</i>	x		
wedge-tailed eagle	<i>Aquila audax</i>		x	
white-necked heron	<i>Ardea pacifica</i>	x		
sulphur-crested cockatoo	<i>Cacatua galerita</i>	x	x	
pheasant coucal	<i>Centropus phasianinus</i>	x		
black-eared cuckoo	<i>Chalcites osculans</i>	x		
rufous songlark	<i>Cincloramphus mathewsi</i>	x		
grey shrike-thrush	<i>Colluricincla harmonica</i>	x	x	
black-faced cuckoo-shrike	<i>Coracina novaehollandiae</i>	x	x	
white-winged chough	<i>Corcorax melanorhamphos</i>		x	x
Torresian crow	<i>Corvus orru</i>	x	x	
pied butcherbird	<i>Cracticus nigrogularis</i>	x		
grey butcherbird	<i>Cracticus torquatus</i>		x	

Common Name	Scientific Name	Study Area 1	Study Area 2	Incidental
laughing kookaburra	<i>Dacelo novaeguineae</i>		x	
mistletoebird	<i>Dicaeum hirundinaceum</i>	x		
white-faced heron	<i>Egretta novaehollandiae</i>	x		
galah	<i>Eolophus roseicapilla</i>	x		
eastern yellow robin	<i>Eopsaltria australis</i>	x		
white-throated nightjar	<i>Eurostopodus mystacalis</i>	x	x	
dollarbird	<i>Eurystomus orientalis</i>	x		
brown falcon	<i>Falco berigora</i>	x		x
nankeen kestrel	<i>Falco cenchroides</i>	x		
Australian hobby	<i>Falco longipennis</i>	x		
bar-shouldered dove	<i>Geopelia humeralis</i>	x	x	
peaceful dove	<i>Geopelia striata</i>	x	x	
white-throated gerygone	<i>Gerygone olivacea</i>	x		
magpie-lark	<i>Grallina cyanoleuca</i>	x		
Australian magpie	<i>Gymnorhina tibicen</i>	x	x	
whistling kite	<i>Haliastur sphenurus</i>	x		
brown honeyeater	<i>Lichmera indistincta</i>	x		
brown cuckoo-dove	<i>Macropygia amboinensis</i>		x	
superb fairy-wren	<i>Malurus cyaneus</i>	x		x
variegated fairy-wren	<i>Malurus lamberti</i>	x		
red-backed fairy-wren	<i>Malurus melanocephalus</i>	x		
noisy miner	<i>Manorina melanocephala</i>		x	
white-throated honeyeater	<i>Melithreptus albogularis</i>		x	
rainbow bee-eater	<i>Merops ornatus</i>		x	
jacky winter	<i>Microeca fascians</i>	x		
leaden flycatcher	<i>Myiagra rubecula</i>	x		
scarlet honeyeater	<i>Myzomela sanguinolenta</i>	x		
plum-headed finch	<i>Neochmia modesta</i>	x		
white-eared honeyeater	<i>Nesoptilotis leucotis</i>	x	x	
southern boobook	<i>Ninox boobook</i>	x		
cockatiel	<i>Nymphicus hollandicus</i>	x	x	
crested pigeon	<i>Ocyphaps lophotes</i>	x		
olive-backed oriole	<i>Oriolus sagittatus</i>	x		
rufous whistler	<i>Pachycephala rufiventris</i>	x	x	x
striated pardalote	<i>Pardalotus striatus</i>		x	
common bronzewing	<i>Phaps chalcoptera</i>	x	x	

Common Name	Scientific Name	Study Area 1	Study Area 2	Incidental
little friarbird	<i>Philemon citreogularis</i>	x		
noisy friarbird	<i>Philemon corniculatus</i>	x	x	
striped honeyeater	<i>Plectorhyncha lanceolata</i>	x		
tawny frogmouth	<i>Podargus strigoides</i>	x	x	
grey-crowned babbler	<i>Pomatostomus temporalis</i>	x	x	
red-rumped parrot	<i>Psephotus haematonotus</i>	x		
speckled warbler	<i>Pyrrholaemus sagittatus</i>	x		
grey fantail	<i>Rhipidura albiscapa</i>	x	x	x
rufous fantail	<i>Rhipidura rufifrons</i>			x
weebill	<i>Smicrornis brevirostris</i>	x	x	
pied currawong	<i>Strepera graculina</i>	x	x	
apostlebird	<i>Struthidea cinerea</i>	x		
Australasian grebe	<i>Tachybaptus novaehollandiae</i>	x		
double-barred finch	<i>Taeniopygia bichenovii</i>	x	x	
zebra finch	<i>Taeniopygia guttata</i>	x		
scaly-breasted lorikeet	<i>Trichoglossus chlorolepidotus</i>	x		
rainbow lorikeet	<i>Trichoglossus haematodus</i>	x	x	
painted button-quail	<i>Turnix varius</i>		x	
silveryeye	<i>Zosterops lateralis</i>	x		

NB - * Three *Nyctophilus* species potentially occur in the Study Areas, including the threatened *N. corbeni* and two widespread species, *N. geoffroyi* and *N. gouldi*.

