



Biodiversity Development Assessment Report Anambah Road Manufactured Home Estate

Prepared for

## Third.i Anambah Pty Ltd

Final / January 2025

#### **DOCUMENT CONTROL**

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Approval for use

Mart Doherty

Accredited BAM Assessor # BAAS17044

22 January 2025

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### **SUMMARY**

MJD Environmental have been engaged by Mid North Coast Projects on behalf of Third.i Anambah Pty Ltd to prepare a Biodiversity Development Assessment Report to accompany a Concept Development Application. The proposal is seeking concept approval for the staged development of the concept master plan, creating a Manufactured Home Estate on RU2 Rural Landscape zoned land on Lot 177/DP874171 and Lot 55 DP874170 at 559 Anambah Road, Gosforth.

The subject land is not mapped on the OEH Biodiversity Values Map, however the proposal exceeds the area clearing threshold for the relevant minimum lot size of 450 m², being the clearing of an area of native vegetation greater than 2,500 m². This is one of the triggers for the Biodiversity Offsets Scheme applying to the proposal.

The project location and design are predicated on the avoidance of extant native timber vegetation and the utilisation of primarily cleared agricultural areas on the subject land. Impacts to threatened species habitat have been minimised by the retention of important habitat corridors and hollow bearing trees.

The forest and woodland margins, paddock trees and timbered patches on the subject land have been assessed as being best represented by the Plant Community Types in **Table E1**.

PCT ID	PCT Name	Vegetation formation	Vegetation class	Per cent cleared value (%)
3446	Lower North Foothills Ironbark- Box-Gum Grassy Forest	Dry Sclerophyll Forests	Hunter-Macleay	74.93%
3433	Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	(Shrub/grass sub- formation)	Dry Sclerophyll Forests	68.60%

Table E1. Plant Community Types assessed on the subject land

The PCTs on the subject land include vegetation that has been assessed as representative of BC Act Threatened Ecological Communities:

- BC Act Endangered: Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions
- BC Act Endangered: Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions

Surveys carried out over the subject land ruled out the presence of candidate species credit species with the exception of:

- Litoria brevipalmata (Green-thighed Frog)
- Myotis macropus (Southern Myotis)
- Ninox connivens (Barking Owl)
- Petaurus norfolcensis (Squirrel Glider)
- Phascogale tapoatafa (Brush-tailed Phascogale)

No entities at risk of Serious and Irreversible Impact were identified on the subject land or assessed as having likely habitat within the relevant buffers from the subject land as per the TBDC.

The proposal will impact 6.73 ha of native vegetation comprising the listed PCTs and forming habitat for the listed Threatened Species, with offsets required for relevant impacts to vegetation zones and species polygons calculated in **Table E2** (Ecosystem Credits) and **Table E3** (Species Credits)

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A package of iterative avoidance and mitigation measures are described herein, including site selection, project design and measures to make account for indirect impacts. The project utilises to a large extent previously cleared agricultural land.

Species Credits additional to those listed below and on the Credit Report have been proposed to mitigate prescribed impacts (habitat connectivity) for relevant species credit species detected on the subject land.

Table E2. Impacts that require an offset – ecosystem credits

Vegetation zone PCT		TEC/EC	Impact area (ha)	Number of ecosystem credits required	
VZ1: 3446_Intact	3446	Yes 10416 HLRF	1.94	48	
VZ2: 3433_Intact	3433	Yes 10942 LHSGIF	1.25	29	
VZ3: 3433_Grassland	3433	Not a TEC	3.51	45	

Table E3. Impacts that require an offset - species credits

Scientific name	Common name	Loss of habitat (ha/ # individuals)	Number of species credits required	
Litoria brevipalmata	Green-thighed Frog	0.03	1	
Myotis macropus	Southern Myotis	2.63	64	
Ninox connivens	Barking Owl	3.19	77	
Petaurus norfolcensis	Squirrel Glider	3.19	77	
Phascogale tapoatafa	Brush-tailed Phascogale	3.19	77	

The proposal has been assessed against SEPP (Biodiversity & Conservation) 2021 Chapter 4 Koala Habitat Protection 2021, and a Koala Assessment Report has been prepared. The KAR determined that it was unlikely the proposal would cause impact to Koala.

A preliminary assessment of matters protected by the EPBC Act determined that significant impacts under the proposal are unlikely to occur on entities assessed, and as such Referral to federal DCCEEW has not been recommended.

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Appendix A.	BDAR requirements compliance
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## **SHORTENED FORMS**

APZ	Asset Protection Zone
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BC Act	Biodiversity Conservation Act 2016 (NSW)
BC Regulation	Biodiversity Conservation Regulation 2017 (NSW)
BDAR	Biodiversity Development Assessment Report
BOAMS	Biodiversity Offsets and Agreement Management System
BOS	Biodiversity Offsets Scheme
CDA	Concept Development Application
CEEC	Critically Endangered Ecological Community
Council	Maitland City Council
DBH	Diameter at Breast Height over bark
EC	Ecological Community listed under the EPBC Act
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999 (Cwlth)
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EEC	Endangered Ecological Community
HTW	High Threat Weed
IBRA	Interim Biogeographic Regionalisation for Australia
KAR	Koala Assessment Report
LLS Act	Local Land Services Act 2013 (NSW)
MCC	Maitland City Council
MHE	Manufactured Home Estate
MNES	Matters of National Environmental Significance
NPW Act	National Parks and Wildlife Act 1974 (NSW)
NSW	New South Wales
PCT	Plant Community Type
SAII	Serious and Irreversible Impact
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community
URA	Urban Release Area
VEC	Vulnerable Ecological Community
VI	Vegetation Integrity
Vegetation SEPP	State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017 (NSW)

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#### **DECLARATIONS**

#### I. CERTIFICATION UNDER CLAUSE 6.15 BIODIVERSITY CONSERVATION ACT 2016

I certify that this report has been prepared based on the requirements of, and information provided under, the Biodiversity Assessment Method and clause 6.15 of the Biodiversity Conservation Act 2016 (BC Act).

Date: 22 January 2025

Signature:

BAM Assessor Accreditation no: 17044

This BDAR has been prepared to meet the requirements of BAM 2020. **Appendix A** provides an assessment of compliance with the minimum information requirements outlined in BAM Appendix K.

#### **II. QUALIFICATIONS AND LICENCING**

This BDAR has been prepared by Chris Spraggon (B.Sc.(Hons)), Stephanie Sheehy (B.Sc.), Kurtis Mumford (B.Sc.) and Dr. Simone-Louise Yasui (B.Sc., M.Sc., PhD), under the guidance of Matt Doherty (BAAS# 17044).

Field work was undertaken for the BDAR by various MJD Environmental (Aust) Pty Ltd Ecological staff. Refer to **Appendix N** for personnel qualifications.

Research was conducted under the following licences:

- NSW National Parks and Wildlife Service Scientific Investigation Licence SL101684 (Valid 31 March 2026).
- Animal Research Authority (Trim File No: 16/170) issued by NSW Department of Primary Industries (Valid 8 February 2027).
- Animal Care and Ethics Committee Certificate of Approval (Trim File No: 16/170) issued by NSW Department of Primary Industries (Valid 8 February 2025 to 8 February 2026).
- Animal Research Establishment Accreditation (No. 85120) issued by NSW Department of Primary Industries (Valid 28 February 2024 to 27 February 2025).

#### **III. CONFLICT OF INTEREST**

I declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest

This declaration has been made in the interests of full disclosure to the decision-maker. Full disclosure has also been provided to the client.

Signature:

Date: 22 January 2025

**BAM Assessor Accreditation no: 17044** 



## STAGE 1: BIODIVERSITY ASSESSMENT

#### 1. Introduction

#### 1.1 Proposed development

#### 1.1.1 Development overview

The Project is for a Concept Development Application (CDA) seeking concept approval for the staged development of the concept master plan, and for which detailed proposals for the Site or for separate parts of the site are to be subject of subsequent Development Applications (DAs), apart from stage 1.

The masterplan creates a Manufactured Home Estate (MHE) on RU2 Rural Landscape land including approximately 332 sites.

The application includes a development application for stage 1, which is made up of 291 sites. This stage includes the construction of 291 sites, associated private roads, clubhouses, recreation facilities, lead-in roads and services and associated bulk earth works. The application includes an intersection to provide access into the development via Anambah Road, together with an emergency flood access to be constructed via the unformed River Road. Refer to **Appendix B Concept Plan**.

This BDAR has been prepared on the basis of the cumulative extent of works or other impacts indicated in documentation listed in **Section 1.1.3**.

#### 1.1.2 Proposed development and the subject land

The following nomenclature has been used in this report (Refer to **Figure 1**):

Study Area – Refers to the affected lot/s including road corridor/s

Subject Land – Refers to the assessed impact area.

**Locality** The subject lands are in Anambah, NSW

**Land Title/s** Lot 177 DP874171 and Lot 55 DP874170

**LGA** Maitland

Area Study Area 130.61 ha approx.

Subject Land 36.01 ha approx.

**Zoning** RU2 Rural Landscape; R1 General Residential

Minimum Lot Size/s 40 ha (apply RU2); 450 m<sup>2</sup> (smallest apply R1)

**Boundaries** The subject land is bounded in the east by the interface of RU2 and R1 zoning as

gazetted by NSW EPI Land Zoning, except for proposed roads internal to future R1 development. In the north, the subject land is bounded by the Lot boundary with Lot 462/-/DP858901. In both the north and north-east, the subject land is further bounded by some canopy vegetation. In the south, the subject land is bounded by the bank of a first order stream. In the west, the subject land

boundary approximately follows the boundary of canopy and pasture vegetation.

Current Land Use The subject land and broader study area comprises predominantly of cleared

pastoral land with paddocks trees, actively and continuously grazed by cattle. The western extent of the study area includes areas of remnant timbered vegetation,

from which stock are not excluded.



#### **Topography**

The subject land is a rolling landscape typified by moderate local relief associated with a series of gullies running downstream generally to the east and south. The land slopes moderately steeply to the west, approaching the peak (110 m AHD) of Summer Hill approximately 500 m west of the Lot boundary. Steeper gullies are associated with a third order watercourse in the south of the subject land. Gradient varies generally from 5-10°, with slopes of 15-20° in gullies immediately west of the subject land. Elevation ranges from 35 – 70 m AHD, coarsely increasing south to north.

A first order watercourses flows from the east through centre of the subject land. A third order watercourse also flows from the east through the south of the subject land. All watercourses in the study area join the Hunter River approximately 3 km to the east of the subject land. Three (3) dams occur on or adjacent to the subject land, all formed by constructed heads for pastoral use.

#### 1.1.3 Other documentation

Below documentation or reports are submitted with the proposal and relevant to biodiversity assessment.

- Civil Works Layout Plan MKR00884-10 REV P2 559 Anambah Road MakerENG 6 Dec 2024
- Civil CAD SKT-NL222055-02-LLC REV 02 559 Anambah Rd Northrop 11 Dec 2024
- Bushfire Assessment Report 559 Anambah Rd REF 2477 Bushfire Planning Australia 17 Jan 2024
- Landscape DA Documentation 559 Anambah Road Moir Studio 2529 Rev B 13 Dec 2024

#### 1.2 Biodiversity Offsets Scheme entry

The subject land is not mapped on the OEH Biodiversity Values Map (**Appendix C Biodiversity Values Map and Threshold tool report**), however the proposal exceeds the area clearing threshold for the relevant minimum lot size (MLS). This is one of the triggers for determining whether the Biodiversity Offsets Scheme applies to the proposed impact.

The threshold for clearing is dependent on the minimum lot size applicable to the land under the relevant Local Environmental Plan, detailed in **Table 1** (the threshold relevant to this proposal is **bold**).

Table 1. BC Regulation 7.2 Table

Minimum lot size associated with the property	Threshold for clearing, above which the Biodiversity Assessment Method and Biodiversity Offsets Scheme apply.		
Less than 1 ha	0.25 ha or more		
1 ha to less than 40 ha	0.5 ha or more		
40 ha to less than 1000 ha	1 ha or more		
1000 ha or more	2 ha or more		

The threshold applies to all native vegetation clearing associated with a proposal, regardless of whether this clearing is across multiple lots. In the case of a subdivision, the proposed clearing must include all future clearing likely to be required for the intended use of the land after it is subdivided.

The affected Lot with the smallest MLS has a minimum lot size of 450 m<sup>2</sup> and clearing of over 0.25 ha of native vegetation is proposed, therefore exceeding the area clearing threshold triggering entry into the Biodiversity Offsets Scheme (BOS).



#### 1.3 Excluded impacts

Impacts to Category 1 Land in accordance with the Draft Native Vegetation Regulatory were not considered in BOS thresholds.

#### 1.4 Matters of national environmental significance

Preliminary assessment was undertaken having regard to those threatened entities listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act). Refer to Appendix D Matters of National Environmental Significance (MNES), Appendix E EPBC Likelihood of Occurrence and Appendix F EPBC Assessments of Significance.

This preliminary assessment concluded that no actions associated with the proposal are likely to have a significant impact on a Matter of National Significance. The proposal therefore does not require referral under the EPBC Act. Flora, fauna and ecological communities nominated by the BAM-C and listed under the EPBC Act are tabulated and assessed throughout this BDAR as appropriate and required.

## 1.5 Other legislative considerations

Other legislation or instruments that require consideration under the proposal are listed below, with relevant Appendices references.

SEPP (Biodiversity and Conservation) 2021 – an assessment of the BC SEPP as it applies to habitat
for the Koala is contained in **Appendix G**. As a result of that assessment, a Koala Assessment
Report (KAR) is **Appendix H**.

#### 1.6 Information sources

Key information sources used in the BDAR, including but not limited to:

- Threatened Biodiversity Data Collection (TBDC):
- Biodiversity Assessment Methodology (BAM): Department of Planning, Industry and Environment (DPIE), October 2020;
- Biodiversity Assessment Method Operational Manual- Stage 1 Department of Planning, Industry and Environment (DPIE). December 2020; and
- NSW survey guide for the Biodiversity Assessment Method; Surveying threatened plants and their habitats (DPIE), April 2020;
- NSW Survey Guide for Threatened Frogs A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method DPIE September 2020;
- NSW survey guideline for the Biodiversity Assessment Method; 'Species credit' threatened bats and their habitats (OEH), September 2018;
- NSW Department of Planning and Environment Koala (Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide, 2022; and
- NSW Department of Planning and Environment Threatened reptiles Biodiversity Assessment Method survey guide, 2022.



#### 2. Methods

#### 2.1 Site context methods

Where field survey is listed in **Section 2.1** as used to ground truth desktop appraisal of site context, the delineation surveys for site context were carried out on the following dates:

- 6 December 2023
- 23 January 2024
- 3 October 2024
- 6 November 2024
- 14 November 2024

#### 2.1.1 Landscape features

The landscape features of the subject land were assessed by API of high-quality digital aerial photography (NearMap – imagery capture 6 October 2024), using GIS Software (QGIS) and NSW Digital Topographic Database (NSW DCCEEW 2024). Features were confirmed by ground survey.

#### 2.1.2 Native vegetation cover

The native vegetation cover of the subject land and 1,500 m buffer was carried out by API of high-quality digital aerial photography (NearMap – imagery capture 6 October 2024), using GIS Software (QGIS) and the NSW State Vegetation Type Map regional PCT data (DCCEEW 2022). Vegetation on the subject land and study area was confirmed by ground survey. A large proportion of the assessment area outside the subject land is private land and not accessible for survey. In all instances where the native condition of vegetation was uncertain at a desktop level, precautionarily this vegetation was included in calculations.

## 2.2 Native vegetation, threatened ecological communities and vegetation integrity methods

#### 2.2.1 Existing information

Existing information sources used to assist identification of PCT, TEC and vegetation extent for this assessment include:

- NSW State Vegetation Type Map (DCCEEW 2022)
- NSW BioNet (VIS)
- NSW Landscape Modified (DEM-S) Elevation layer

#### 2.2.2 Mapping native vegetation extent

In accordance with Section 4.1 of the BAM (2020), native vegetation extent, including all native ground cover and tree canopy cover was mapped within the subject land. Native vegetation extent was mapped using digital aerial photography (as described in **Section 2.1.2**), which was informed by the NSW STVM and by field surveys conducted across the study area.

To assist scale, the extent of River Road south of an unnamed 3rd order watercourse has not been mapped other than in Site and Location maps – no native vegetation has been assessed as present beyond the unnamed 3rd order watercourse.



#### 2.2.3 Plot-based vegetation survey

Plot-based vegetation surveys were conducted within the subject land on the following dates:

- 6 December 2023
- 10 July 2024
- 6 November 2024
- 14 November 2024

During these surveys, eight (8) BAM plots were conducted and included the collection of the following:

- Identification of all flora species to genus where identification attributes were present (in accordance with BAM Section 4.2.1);
- Composition, Structure attributes within 20x20 plot (in accordance with BAM Section 4.3.4);
   and
- Function attributes within the 20x50 m plot (in accordance with BAM Section 4.3.4)

Plots to assess timbered vegetation on the site were taken in areas of high coverage, in order to best capture vegetation density when extrapolated to include paddock trees. Plots were carried out in disjunct locations to capture the variability within the modified landscape.

Plots to assess pasture vegetation were taken over a dispersed area to capture any variation and sub-sample if necessary to delineate distinct vegetation.

These methods are discussed further in Section 4.5.1.

Refer to Figure 3 for BAM plot locations.

#### 2.2.4 Vegetation integrity survey

To assess vegetation integrity (vegetation condition) for each of the delineated vegetation zones, the collected BAM plot data was input into the BAM-C to determine the current vegetation integrity scores. All plots were conformant dimensions.

#### 2.3 Threatened flora survey methods

#### 2.3.1 Review of existing information

Existing information sources used to assist identification of habitat constraints, presence of microhabitats and extant woody vegetation for this assessment include:

- NSW State Vegetation Type Map (DCCEEW 2022)
- NSW BioNet (VIS)
- Maitland LEP 2011 Amendment Anambah Investigation Area (3000 lots) (via NSW Planning Portal, accessed 23 July 2024)
- NSW Landscape Modified (DEM-S) Elevation layer

A review of threatened species information was undertaken to provide context and understanding of biodiversity and habitat values occurring within the study area. Information reviewed included:

- Species auto-populated by the BAM-C; and
- Online database searches involving a 10 x 10 km search around the Study Area to provide potentially occurring threatened flora and fauna and migratory species under both the BC Act and EPBC Act:



- NSW Bionet (accessed 17 October 2024 and continually during BDAR production);
- Commonwealth Protected Matters of National Significance search tool (accessed 17 October 2024)

#### 2.3.2 Habitat constraints assessment

Over the duration of the biodiversity impact assessment, habitat constraints which would exclude the presence of threatened flora species were assessed. Such features include:

- Cleared and grazed vegetation; and
- Disturbed vegetation, including frequent management or high weed density.

Methods for assessment included API of high-quality digital aerial photography (NearMap – imagery capture 6 October 2024), using GIS Software (QGIS), and confirmed by ground survey.

The absence of woody vegetation on high resolution API was used as an indicator that threatened flora species of the Tree growth form were unlikely to have habitat present. Based on confirmation by ground survey, areas devoid of all woody vegetation were excluded as likely potential habitat for flora species of the Shrub growth form. All candidate species of a ground layer growth form were individually assessed against available potential habitat in timbered and pasture areas of the subject land. No other habitat constraints were identified to exclude the presence of the listed flora candidate species, however, geographic limitations were considered (refer to **Section 5**).

#### 2.3.3 Field surveys

Threatened flora surveys were undertaken in accordance with the *NSW Survey guide for the Biodiversity Assessment Method; Surveying threatened plants and their habitats* (DPIE, 2020), or as informed by the TBDC, exceptions are described and justified below. In accordance with Section 4.1 of the flora guidelines (DPIE, 2020), parallel field traverses are conducted to systematically cover all areas of suitable habitat on the subject land. This technique includes the following methodology:

- One or more ecologists walk along an array of parallel transects searching for the target flora species;
- The separation distance between the parallel transects is set at a distance between 5-40 m depending on the growth form of the species and the density of the vegetation at time of survey (per Table 1 of the guidelines);
- Transects conducted in suitable habitat for each of the targeted species; and
- Transects were recorded using a hand-held GPS unit.

Modified survey techniques were utilised in the present survey, considered suitable for the condition and extent of native vegetation. Modified transects were used, which followed a meander through all areas of woody vegetation on the site at a suitable distance to relevant growth forms in the open pasture habitat. Some isolated trees that could be clearly identified to species at a distance were not incorporated into the meander.

Refer to Figure 4 for all targeted flora surveys.

#### 2.4 Threatened fauna survey methods

#### 2.4.1 Review of existing information

Existing information sources used to assist identification of habitat constraints, presence of microhabitats and extant woody vegetation for this assessment include:

NSW State Vegetation Type Map (DCCEEW 2022)



- NSW BioNet (VIS)
- Maitland LEP 2011 Amendment Anambah Investigation Area (3000 lots) (via NSW Planning Portal, accessed 23 July 2024)
- NSW Landscape Modified (DEM-S) Elevation layer

A desktop assessment of the potential use of the study area by threatened fauna species (as listed under the BC Act and EPBC Act) identified from the vicinity was undertaken prior to the commencement of field surveys (Refer to **Section 3.2**).

Threatened fauna surveys were compliant with requirements and guidelines listed in **Section 1.6**.

#### 2.4.2 Habitat constraints assessment

Over the duration of the biodiversity impact assessment, habitat features within the subject land were identified in accordance with Section 6 of the BAM (2020) and detailed below. The results of the habitat assessments are detailed in **Section 5** 

#### **Habitat Survey**

An assessment of the relative habitat value present within the subject land was undertaken. This assessment focused primarily on the identification of specific habitat types and resources in the subject land favoured by known threatened species from the locality. The assessment also considered the potential value of the subject land (and surrounds) for all major guilds of native flora and fauna. Habitat assessment included:

- presence, size and types of tree hollows within the subject land;
- survey for trees containing suitable hollows for Large Forest Owls;
- presence of Karst, caves, crevices, cliffs, rocks and other geological features of significance;
- vegetation complexity, structure and quality;
- human-made structures that can be utilised by microbats
- presence of freshwater or estuarine aquatic habitats, noting permanency;
- connectivity to adjacent areas of habitat;
- extent and types of disturbance;
- foraging opportunities, such as winter flowering gum utilised by *Lathamus discolor* (Swift Parrot), and mistletoe (*Amyema spp.*) utilised by *Anthochaera phrygia* (Regent Honeyeater);
- (flowering eucalypts, fruits, seeds or other nectar bearing native plants);
- presence and abundance of various potential prey species;
- fallen Timber and hollow logs utilised by ground nesting or foraging threatened fauna; and
- stick nests utilised by threatened raptors.

Habitat assessment was based on the specific habitat requirements of each threatened fauna species with regard to home range, feeding, roosting, breeding, movement patterns and corridor requirements. Consideration was given to contributing factors including topography, soil, light and hydrology for threatened flora and assemblages.

#### Hollow bearing tree survey

Hollow bearing tree surveys were undertaken in October 2024 (**Figure 3**) across the subject land with the following information collected:

- Location (D-GPS);
- Tree species;

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- Tree DBH;
- Presences of hollows (including potential hollows) and class;
- Habitat suitability for large Forest Owls; and
- Any observational information.

#### Secondary Indications and Incidental Observations

Opportunistic sightings of secondary indications (scratches, scats, diggings, tracks etc.) of resident fauna were noted. Such indicators included:

- Distinctive scats left by mammals;
- Scratch marks made by various types of arboreal animals;
- Nests made by various guilds of birds;
- Feeding scars on Eucalyptus trees made by Gliders;
- Whitewash, regurgitation pellets and prey remains from Owls;
- Aural recognition of bird and frog calls;
- Skeletal material of vertebrate fauna; and
- Searches for indirect evidence of fauna (such as scats, nests, burrows, hollows, tracks, and diggings).

#### 2.4.3 Field surveys

Targeted surveys for fauna species recognised to have potential to occur within the subject land were carried out as part of the works informing this BDAR and are described below. All surveys were conducted in accordance with the relevant guidelines listed in **Section 1.6**, with modifications or adjustments made based on survey comments included in the TBDC or specific site considerations and justifications as described.

Refer to Figure 5 for Field survey locations.

#### Arboreal Mammals

Arboreal mammal surveys targeting *Phascogale tapoatafa* (Brush-tailed Phascogale) and *Petaurus norfolcensis* (Squirrel Glider) were undertaken using Scout Guard remote wildlife cameras deployed primarily on land adjoining the subject land to the east. Other species are commonly incidentally recorded using this methodology. Cameras were mounted to trees via a bracket or strap and set to record images in bursts of three photos, with a three-minute delay before the next photo sequence would be triggered (Refer to **Figure 5**).

To attract fauna to the camera, a bait station was attached to a tree within 1-1.5 m of the camera. The bait station was filled with a bait containing a mixture of oats, honey, and peanut butter. The tree in which the bait station was attached also was sprayed with an attractant of honey/sugar water to increase the chance of detection of arboreal fauna.

A total of 22 cameras were deployed for at least four (4) weeks accounting for 638 camera trap nights undertaken to target arboreal mammals on the property. Bait stations were replenished with bait and resprayed with attractant of honey/sugar water after two (2) weeks.

Arboreal mammal surveys targeting *Phascolarctos cinereus* (Koala) were undertaken by nocturnal spotlighting using headtorches and 6W LED reflector lens handheld searchlights (1 LUX @ 334 m). These spotlight surveys additionally targeted all arboreal fauna including owls, marsupials and reptiles.

Spot Assessment Technique (SAT) surveys were undertaken for *Phascolarctos cinereus* (Koala) as per guidelines.



#### Avifauna

The observation of diurnal avifauna within the subject land was undertaken via opportunistic observations during other diurnal fieldwork (Refer to **Figure 5**). Rigorous assessment of all remnant timber vegetation was undertaken for large stick nests associated with threatened diurnal birds of prey.

Nocturnal bird surveys were undertaken, and detail of methods employed is outlined in below under Spotlighting and Nocturnal Call Playback survey techniques.

#### Spotlighting

Spotlighting surveys targeting Large Forest Owls, *Phascolarctos cinereus* (Koala), *Phascogale tapoatafa* (Brush-tailed Phascogale) and *Petaurus norfolcensis* (Squirrel Glider) were undertaken with the use of a Lightforce Enforcer 140 mm LED (1 LUX @ 334 m) hand-held spotlight and head torch with all areas of timber vegetation targeted.

A total of 20.5 person hours of spotlighting surveys were conducted over 10 nights.

#### Nocturnal Call Playback

The use of pre-recorded calls of Forest Owl that may occur within the subject land and surrounding area were broadcast during the nocturnal surveys in an effort to receive a vocal response or to attract the species to the playback site. The calls were broadcast through an amplification system (45W megaphone) designed to project the sound for at least 1 km under still night conditions.

A 10-minute interval of listening and observation time was conducted prior to the surveys. The call of each species was broadcast for 15 seconds followed by 30 seconds of listening time with the sequence of calls being repeated for 15 minutes for each target owl. Volume of the call was increased by 20% of natural volume up to 200% of natural volume with each repeated broadcast. Followed by a search within a 1 ha plot around the broadcast station at the end of the 15-minute repeated broadcast.

A total of six (6) call playback sessions were undertaken over six separate nights. The location of the call playback sites is shown in **Figure 5**.

#### Ultrasonic sound recorders

Titley Chorus song meters with ultrasonic microphones set to record in zero-crossing format were deployed throughout the site as per the Bat Guidelines. Recordings were analysed by an analysis expert, and the results are reported in **Appendix I**.

#### Expert Assessment

Potential riparian habitat for threatened amphibian species was undertaken by a registered expert (see **Section 5**) to advise on likelihood of occurrence and presence of suitable habitat.

#### 2.5 Weather conditions

Field surveys were undertaken by MJD Environmental between the 23 May 2024 to the 20 November 2024. The prevailing weather conditions during the survey are present in **Table 2** below.



Table 2. Environmental conditions during threatened species surveys

			_	-	-	
Survey undertaken (e.g. method / targeted species)	<b>Date</b> (2024)	Time	Temperature (min. & max.)	Wind (light, mod)	Rain (mm)	Other conditions relevant to the species
Flora Surveys	Oct 16	c.9am	10.2 – 21.9	WNW 6 km/hr – E 13 km/hr	0	
	Oct 24	c.9am	5.8 – 20.6	WNW 9 km/hr – Calm	0	
Chorus Ultrasonic Recorders	Oct 16-24	Night only	8.5 – 30.4 (low & high)	Various, 6 – 25 km/hr (max 67 km/hr)	12.4 (agg.)	
Diurnal Bird Census	Oct 16	c.8am	10.2 – 21.9	WNW 6 km/hr – E 13 km/hr	0	
Habitat Surveys (stick- nests, hollows)	Oct 2		12.3 – 19.4	S 17 – SE 22 km/hr	0	
	Oct 31	c.8pm	12.8 – 30.9	W 13 – ENE 20 km/hr	0	
Arboreal camera trapping Cercartetus nanus Phascogale tapoatafa Petaurus norfolcensis	May 23- Jun 20	24 hrs/ day	6.6 – 23.8 (low & high)	Various, 2 – 24 km/hr (max 50 km/hr)	143.6 (agg.)	
Owl call play back Ninox connivens	Jun 5	c.6pm	13.7 – 20.7	SE 11 km/hr – SE 20 km/hr	20.8	
Ninox strenua Tyto novaehollandiae	Jun 11	c.6pm	6.1 – 18.5	W 13 km/hr – WNW 19 km/hr	0	
	Jun 18	c.6pm	7.1 – 17.7	WNW 19 km/hr – WNW 9 km/hr	0	
	Jun 25	c.6pm	2.2 – 19.4	W 9 km/hr – Calm	0	
	Jul 4	c.6pm	6.2 – 18.0	SSW 7 km/hr – SSE 20 km/hr	2	
	Jul 8	c.6pm	10.6 – 21.8	SSW 2 km/hr – E 15 km/hr	0	
	Jul 25	c.6pm	7.1 – 19.4	NNW 6 km/hr – SSE 2 km/hr	0	
Call playback Burhinus grallarius	Jul 4	c.6pm	6.2 – 18.0	SSW 7 km/hr – SSE 20 km/hr	2	
Spotlight Cercartetus nanus	Jun 5	c.7pm	13.7 – 20.7	SE 11 km/hr – SE 20 km/hr	20.8	
Hoplocephalus stephensii Phascolarctos cinereus Phascogale tapoatafa	Jul 4	c.7pm	6.2 – 18.0	SSW 7 km/hr – SSE 20 km/hr	2	
Petaurus norfolcensis Large Forest Owls	Oct 31	c.8pm	12.8 – 30.9	W 13 – ENE 20 km/hr	0	
	Nov 14	c.8pm	17.4 – 22.0	ESE 15 – 19 km/hr	0	
	Nov 20	c.8pm	13.1 – 26.2	ENE 15 – 28 km/hr	0	
SAT Phascolarctos cinereus	Nov 24	1200- 1630	15.6 – 25.3	WSW 11 km/hr - ESE 28 km/hr	0	No rain in preceding 3 days



#### 2.6 Limitations

Limitations associated with this assessment report are presented herewith. The limitations have been taken into account specifically in relation to threatened species assessments, results and conclusions.

In these instances, a precautionary approach has been adopted, whereby 'assumed presence' of known and expected threatened species, populations and ecological communities has been made where relevant and scientifically justified to ensure a holistic assessment.

#### Seasonality & Conditions

The flowering and fruiting plant species that attract some nomadic or migratory threatened species, often fruit or flower in cycles spanning a number of years. Furthermore, these resources might only be accessed in some areas during years when resources more accessible to threatened species fail. As a consequence, threatened species may be absent from some areas where potential habitat exists for extended periods and this might be the case for nomadic and opportunistic species.

Additionally, Eastern Australia experienced substantially wetter conditions during the summer of 2021 – 2022 due to the declared La Nina. The climate event likely had influence on species occurrence, behaviours and vegetation community traits.

#### Data Availability & Accuracy

The collated threatened flora and fauna species records provided by NSW BioNet are known to vary in accuracy and reliability. This is usually due to the reliability of information provided to the National Parks and Wildlife Service (NPWS) for collation and/or the need to protect specific threatened species locations. During the review of threatened species records sourced from BioNet Atlas of NSW, consideration has been given to the date and accuracy of each threatened species record in addition to an assessment of habitat suitability within the subject land.

Similarly, EPBC Protected Matters Searches provide a list of threatened species and communities that have been recorded within 10 km of the study area, or which have suitable habitat within the wider area, and are subject to the same inherent inaccuracy issues as the State derived databases.

In order to address these limitations in respect to data accuracy, threatened species records have only been used to provide a guide to the types of species that occur within the locality of the study area. Consequently, BAM assessment and the results of surveys conducted within the subject land and surrounds have been used to assess the likelihood of occurrence of threatened species, populations and ecological communities to occur therein.



#### 3. Site context

#### 3.1 Assessment area

The following section provides a description of the landscape features within the subject land and surrounding 1,500 m buffer as outlined in Section 3 of the BAM (2020). Refer to **Figure 1** for Location Map.

#### 3.2 Landscape features

Landscape features identified within the subject land and assessment area are shown on **Figure 2**. A discussion of relevant landscape features is provided below.

Features were assessed by high-resolution aerial image interpretation (NearMap) of the assessment area, coupled with use of DEM-S elevation data overlay and NSW basemap. The subject land was subject to a full site walkover, and the study area was also subject to a meandering walkover

#### 3.2.1 IBRA bioregions and IBRA subregions

#### **Bioregion**

The study area occurs wholly within the Sydney Basin Bioregion. The Syndey Basin Bioregion is includes a significant proportion of the catchments of the Hawkesbury Nepean, Hunter and Shoalhaven river systems, all of the smaller catchments of Lake Macquarie, Lake Illawarra, Hacking, Georges and Parramatta Rivers, and smaller portions of the headwaters of the Clyde and Macquarie rivers (NPWS 2003).

#### Subregion

The study area occurs wholly within the Hunter subregion.

#### 3.2.2 Rivers, streams, estuaries and wetlands

The study area is located within the Hunter River catchment in the Hunter region, with the Hunter River occurring approximately 0.8 km northwest of the extent of the study area.

The hydrology of the subject land is characterised by a mapped third order stream in the south, and two (2) mapped first order streams draining the study area to the east. Other unmapped minor incised gullies occur in association with the mapped waterlines. All waterlines on the property are ultimately tributaries of the Hunter River within approximately one kilometre. Three (3) dams within the subject land provide for grazing cattle. One (1) of these is an online gully dam on the third order watercourse, having substantial surface area, riparian vegetation adjacent and some fringing vegetation. The other dams are online in first order watercourses with no vegetation other than pasture.

#### 3.2.3 Habitat connectivity

The subject land contains canopy vegetation which forms links to further habitat to the east of the subject land, as well as comprising a link for habitat to the west of the study area, connecting approximately 100 ha in the north with approximately 200 ha in the south.

East of the subject land, both within and outside the study area, the subject land facilitates connectivity to a further area of habitat for arboreal fauna comprising of large paddock trees and copses including hollow bearing trees of all size classes.



#### 3.2.4 Karst, caves, crevices, cliffs, rocks or other geological features of significance

There are no occurrences of karst, caves, crevices or cliffs within the study area. The topography of the study area is typically undulating with no apparent escarpments nearby. Rocky outcrop occurs within the subject land and within the broader landscape, namely along the western aspect of Summer Hill west of the site.

#### 3.2.5 Areas of outstanding biodiversity value

There are no Areas of Outstanding Biodiversity Values within the 1,500 m buffer or in the general locality of the study area.

#### 3.2.6 NSW (Mitchell) landscape

The study area occurs wholly within the Sydney Basin Hunter Nrm Newcastle Coastal Ramp:

From Mitchell (2002): 'Undulating lowlands and low to steep hills on complex patterns of faulted and gently folded Carboniferous conglomerate, lithic sandstone, felspathic sandstone, and mudstone, general elevation 50 to 275 m, local relief 40 to 150 m. Stony red texture-contrast soils on steep slopes, yellow and brown texture-contrast soils on lower slopes and deep dark clay loams along streams. Woodland of spotted gum (*Corymbia maculata*), forest red gum (*Eucalyptus tereticornis*), red ironbark (*Eucalyptus sideroxylon*), white mahogany (*Eucalyptus acmenoides*), large-fruited grey gum (*Eucalyptus canaliculata*), with sub-tropical rainforest elements in sheltered gullies. Similar eucalypts with forest oak (*Allocasuarina torulosa*) and grasses on lower slopes, merging to forest of smooth-barked apple (*Angophora costata*), red bloodwood (*Corymbia gummifera*), blackbutt (*Eucalyptus pilularis*) with bracken (*Pteridium esculentum*) and grasses nearer the coast.'

#### 3.2.7 Soil hazard features

A review of the Acid Sulphate Soils Risk mapping (Naylor et al 1998) records indicate the Study Area has not been assessed for ASS.

## 3.3 Native vegetation cover

Native vegetation cover was determined using QGIS and applying a 1500 m buffer to the Lot subject to the proposal and the extent of the associated proposed roads.

Native vegetation cover was assessed using NVACE (DCCEEW 2024). The layer was overlaid and clipped to the assessment area and geometry repaired. Using 2024 Aerial imagery (NearMap), polygons were assessed for native vegetation. Polygons containing no native vegetation were removed. Polygons containing partial native vegetation were split. Uncertain vegetation was retained (generally pasture of unknown composition).

**Table 3** summarises the extent of native vegetation cover within the assessment area. **Figure 2** shows native vegetation cover within the assessment area.

Table 3. Native vegetation cover in the assessment area

Assessment area (ha)	2,082.64
Total area of native vegetation cover (ha)	530.98
Percentage of native vegetation cover (%)	26%
Class (0-10, >10-30, >30-70 or >70%)	>10-30



# 4. Native Vegetation, Threatened Ecological Communities and Vegetation Integrity

### 4.1 Native vegetation extent

#### 4.1.1 Changes to the mapped native vegetation extent

Native vegetation extent on the subject land was assessed by digital aerial photography (as described in **Section 2.1.2**) and confirmed by field surveys conducted across the entire extent of the subject land. Native vegetation extent on the subject land conforms with aerial imagery.

#### 4.1.2 Areas that are not native vegetation

Pasture vegetation which has been surveyed in accordance with the BAM (2020), and which resulted in a VI score below the threshold for determining an offset (BAM 9.2.1), has been nominated as exotic pasture for the purpose of assessment.

Based on the above assessment of the pasture, along with the broader context of other pasture land on nearby landholdings within the Urban Release Area (URA), the unformed River Road corridor has been assessed as not native vegetation, with the exception of all woody vegetation visible on high resolution aerial imagery, which has been conservatively mapped as PCT 3433. No surveys have been carried out over this land due to access constraints. Further, any formed roads, large areas of bare earth, structures and open water were assessed as not native vegetation.

#### 4.2 Plant community types

#### 4.2.1 Overview

The subject land is approximately 36.01 ha in size, of which 6.73 ha was observed as native vegetation. The extent of native vegetation has been interpreted using API and ground truthing during field survey works.

The vegetation within the subject land has been broadly cleared historically for grazing. The historic land use has resulted in a pasture landscape composed of native and exotic species, including high threat exotic species (HTE). The subject land contains a number of large mature eucalypt paddock trees, stands of eucalypt regeneration, and disturbed woodland and forest fringes.

Vegetation within the subject land has been assessed as aligning with the BioNet Vegetation Classification PCTs identified within **Table 4** and their extent is shown in **Figure 3**.

NB due to the historical clearance and fragmentation of the land, the limited diversity of floristic species assemblages and ongoing disturbance, PCTs identified have been assigned as 'Best-Fit'.

Identification of PCTs within the subject land were determined using:

- Occurrence within the Sydney IBRA bioregion & Hunter Sub-region;
- Vegetation formation and class:
- landscape position; and
- dominant species noted during field data collected from the full floristic plots/transects established in accordance.

Due to the Best-Fit assignation of PCTs in a disturbed agricultural landscape, data from the contemporary and historical SVTM resources within the broader locality was also used to filter potential PCTs. Detailed descriptions of each PCT are provided in the following subsections.



Vegetation within the subject land is characterised by a mosaic of cleared areas and remnant and regenerated canopy trees. All vegetation on the subject land has been subject to past or ongoing disturbance. Canopy condition varies and includes copses of late regeneration, large mature paddock trees, and forest and woodland margins. Tree Hollows of all size classes occur among the canopy. Species dominance varies across the subject land, typified by *Corymbia maculata* (Spotted Gum), *Eucalyptus moluccana* (Grey Box), and *Eucalyptus tereticornis* (Forest Red Gum). Subdominant species include *Eucalyptus fibrosa* (Broad-leaved Ironbark) and *Eucalyptus crebra* (Narrow Leaved Ironbark), *Eucalyptus acmenoides* (White Mahogany), and *Eucalyptus punctata* (Grey Gum).

The subject land occurs on the lower slopes of low hills with incised gullies and some steep local gradients. The subject land crosses 1<sup>st</sup> and 3<sup>rd</sup> order watercourses. The subject land contains pasture of mixed native and exotic components. The site continues to be grazed by beef cattle, and cleared areas have been continually managed since at least 1954 (NSW Historic Aerial Imagery).

Table 4. PCTs identified within the subject land

PCT ID	PCT name	Subject land area (ha)
3446	Lower North Foothills Ironbark-Box-Gum Grassy Forest	1.94
3433	Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	4.79
	Total area	6.73

#### 4.2.2 PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest

#### 4.2.2.1 PCT overview

Table 5. PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest

PCT ID	3446
PCT name	Lower North Foothills Ironbark-Box-Gum Grassy Forest
Vegetation formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation class	Hunter-Macleay Dry Sclerophyll Forests
Per cent cleared value (%)	74.9%
Extent within subject land (ha)	1.94

The PCT exists on the subject land as the margins of historically underscrubbed remnant forest, as well as being assessed as the parent class for low condition pasture on the subject land.

The remnants have been subject to varying degrees of ongoing agricultural use, and likely some selective clearing for timber. They are generally restricted to canopy, with a varying diversity of native understorey and rare to absent shrub layer. The canopy comprises of a range of age cohorts, including sapling recruitment, early regeneration, mature regeneration, and remnant trees including mature, senescing and stags. The forest margins include canopy trees which are separated from the remnant connected crowns, but generally too proximal to be considered paddock trees.

Hollow bearing trees of a range of sizes occur in this PCT throughout the subject land. All areas of the PCT on the subject land are subject to ongoing grazing of beef cattle.

The pasture has been consistently managed as such for the duration of aerial imagery, and exhibits low native diversity in both growth form and species assemblage, with a high cove of exotic species.

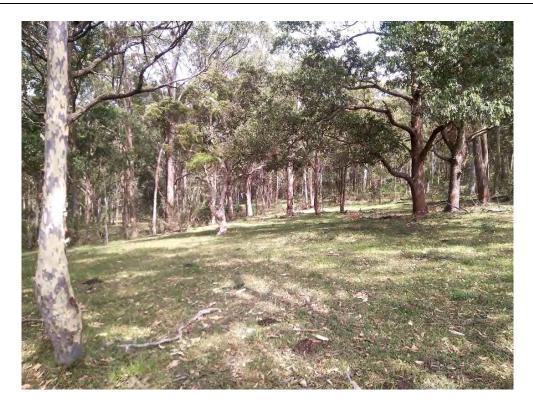


Plate 1 PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest

#### 4.2.2.2 Condition states

The PCT exists as a disturbed and fragmented community, marginal to a broadly cleared agricultural landscape. Variation across the land occurs in canopy cover and native groundcover. Vegetation Zones (VZ) have been delineated based on canopy structure, level of ground disturbance and native groundcover. This delineation resulted in the generation of two (2) VZs, described as:

- VZ 1 3446 Intact, representing forest and woodland margins with canopy cover. This VZ has been disturbed, partially or selectively cleared and generally has a limited shrub layer, but remains resilient and comprises of a diversity of canopy species.
- VZ 3 3446 Pasture, representing generally the broader areas of pasture dominated by exotic species, including high-threat weeds, and with limited native species richness. This VZ appears to have been subject to landform modification, pasture improvement or other disturbance.

#### 4.2.2.3 Justification of PCT selection

On the subject land, PCT selection is considered 'Best-Fit', as floristic diversity is compromised and the landscape historically modified. To assist PCT selection, contemporary and historical NSW SVTM resources within the broader locality were used to guide likely PCTs. Assessment included plots outside of the subject land in order to better capture the representative condition of the PCT.

Initial PCT trims were carried out by occurrence of Dry Sclerophyll Forest in the Hunter subregion of the Sydney Basin bioregion (limiting results to Eastern NSW PCT Classification and classification confidence of at least 'Medium'). Characteristic tree growth form species were filtered by *Corymbia maculata* and *Eucalyptus moluccana*, the most consistent canopy dominants on the subject land. Any PCTs associated with relative extremes of elevation (< 20 m maximum or > 250 m minimum AHD) or occurring on flats, sandflats, or creekflats were removed.

The resulting list was used as a filter for Plot-to-PCT Assignment tool (P2P) results within environmental thresholds, yielding two (2) potential PCTs for the site: 3433 and 3446. All PCT matches were outside centroid distance threshold, however PCT descriptions and species frequency rankings support PCT 3446 on the basis of *Corymbia maculata* and *Eucalyptus moluccana* dominance, and frequent occurrence of *E. tereticornis* and *E. crebra*.



#### 4.2.2.4 Alignment with TECs

BC Act **E** – Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions (NSW BioNet VIS, at 24 October 2024).

Based on landscape position, geology and IBRA subregion this PCT on the subject land where it occurs as an intact community (VZ1) is likely an example of this TEC. The vegetation zone supports some characteristic species from all strata. The vegetation zone also occurs on a landform consistent with 'gentle slopes of depressions and drainage flats on the Hunter Valley floor', per the TBDC, occurring as it does on lower slopes of low hills feeding the Hunter River floodplains.

The other VZs (VZ 2 & VZ3) have been cleared and grazed, and are not representative of the TEC.

#### 4.2.2.5 Alignment with EPBC Act listed ECs

EPBC Act **CE** – Central Hunter Valley eucalypt forest and woodland (NSW BioNet VIS, at 24 October 2024).

This PCT on the subject land has been determined not to be representative of the CEEC. Only VZ1 was considered, as the CEEC does not occur as a derived community. Both *Eucalyptus acmenoides* and *E. fibrosa* in the canopy – both contraindicative species – occur in the subject land, which is furthermore marginal to the range of the CEEC. This CEEC is considered unlikely to occur on this basis and is not further assessed.

#### 4.2.3 PCT 3433 Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest

#### 4.2.3.1 PCT overview

Table 6. PCT 3433 Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest

PCT ID	3433
PCT name	Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Vegetation formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation class	Hunter-Macleay Dry Sclerophyll Forests
Per cent cleared value (%)	68.6%
Extent within subject land (ha)	4.79

The PCT exists on the subject land as the margins of historically underscrubbed remnant forest, as well as being assessed as the parent class for secondary grassland on the subject land.

The remnants have been subject to varying degrees of ongoing agricultural use, and likely some selective clearing for timber. They are generally restricted to canopy, with a varying diversity of native understorey and rare to absent shrub layer. The canopy comprises of a range of age cohorts, including sapling recruitment, early regeneration, mature regeneration, and remnant trees including mature, senescing and stags. The forest margins include canopy trees which are separated from the remnant connected crowns, but generally too proximal to be considered paddock trees.

Hollow bearing trees of a range of sizes occur in this PCT throughout the subject land. All areas of the PCT on the subject land are subject to ongoing grazing of beef cattle.

Secondary grassland has been assigned to this PCT as a parent class – investigation into other PCTs was undertaken, however benchmarks are the same for both PCTs delineated on site.



Plate 2 PCT 3433 Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest

#### 4.2.3.2 Condition states

The PCT exists as a disturbed and fragmented community, marginal to a broadly cleared agricultural landscape. Variation across the land occurs in canopy cover and native groundcover. Vegetation Zones (VZ) have been delineated based on canopy structure, level of ground disturbance and native groundcover. This delineation resulted in the generation of two (2) VZs, described as:

- VZ 2 3433 Intact, representing forest and woodland margins with canopy cover. This VZ has been disturbed, partially or selectively cleared and generally has a limited shrub layer, but remains resilient and comprises of a diversity of canopy species.
- VZ 3 3433 Grassland, representing the mixed herb- and grass-land area with a high diversity
  of native species, and where native species remain dominant over exotic species. This VZ
  exhibits recruitment of canopy species, and does not appear to have been substantially
  historically modified beyond the removal of timber and introduction of grazing.

#### 4.2.3.3 Justification of PCT selection

On the subject land, PCT selection is considered 'Best-Fit', as floristic diversity is compromised and the landscape historically modified. To assist PCT selection, contemporary and historical NSW SVTM resources within the broader locality were used to guide likely PCTs. Assessment included plots outside of the subject land in order to better capture the representative condition of the PCT.

Initial PCT trims were carried out by occurrence of Dry Sclerophyll Forest in the Hunter subregion of the Sydney Basin bioregion (limiting results to Eastern NSW PCT Classification and classification confidence of at least 'Medium). Characteristic tree growth form species were filtered by *Corymbia maculata* and *Eucalyptus fibrosa*, the most consistent canopy dominants on the subject land. Any PCTs associated with relative extremes of elevation (< 20 m maximum or > 250 m minimum AHD) or occurring on flats, sandflats, or creekflats were removed.

The resulting list was used as a filter for Plot-to-PCT Assignment tool (P2P) results within environmental thresholds, yielding two (2) potential PCTs for the site: 3433 and 3446. All PCT matches were outside centroid distance threshold, however PCT descriptions and species frequency rankings support PCT 3433 on the basis of *Corymbia maculata* and *Eucalyptus fibrosa* dominance, and frequent occurrence of *E. acmenoides* and *E. punctata*.



#### 4.2.3.4 Alignment with TECs

BC Act **E** – Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions (NSW BioNet VIS, at 24 October 2024).

Based on species assemblage, geology and IBRA subregion this PCT on the subject land where it occurs as an intact community (VZ1) is likely an example of this TEC. The vegetation zone supports multiple characteristic species from all strata with a suitable landscape position.

The other VZs (VZ 2 & VZ3) have been cleared and grazed, and are not representative of the TEC.

#### 4.2.3.5 Alignment with EPBC Act listed ECs

No associated EPBC Act listed Ecological Communities (NSW BioNet VIS, at 24 October 2024).

## 4.3 Threatened ecological communities

TECs and where relevant, ECs identified within the subject land are listed in **Table 7** and their extent is shown on **Figure 3 Plant Community Types & Vegetation Zones**.

Table 7. TECs within the subject land

TEC name	Profile ID	BC Act Status	EPBC Act Status	Associated VZs	Area (ha)
Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	10416	E	-	VZ1	1.94
Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	10942	E	-	VZ2	1.25

#### 4.4 Vegetation zones

Vegetation on the subject land occurs as three (3) distinct forms based on structure and assemblage – "Intact" (being timbered, with all growth forms present), "Grassland" (being predominantly native) and "Pasture" (being predominantly exotic, with Low VI). The Grassland contains many growth forms including regenerating canopy species, and limited historical disturbances beyond clearing are apparent. The Pasture contains limited growth forms, dominated by exotic species and pasture improvement, and generally lacks regeneration of woody forms or persistence of forbs. It appears to have been subject to more intensive management, turning of soil, or simply proportionally heavy grazing for an extended period.

The timbered vegetation exhibits variation in canopy dominance that supports two (2) PCTs; as such each has an Intact VZ. Grassland and Pasture PCTs are generally difficult to assign to a PCT, and have been captured separately for ease of assessment, as the PCTs share an identical benchmark.

As such, four (4) VZs exist on the subject land: 3446 (Intact), 3433 (Intact), 3433 (Grassland) and 3446 (Pasture), and they are shown in **Figure 3**. Plots were carried out as per **Plate 3** – Table 3 of BAM (2020).

The unformed River Road corridor has been assessed as equivalent to the pasture on the development lots, with the exception of any woody vegetation which has been assigned to PCT 3433.

Patch size was assessed using high-resolution aerial imagery and assessed for hostile connections of > 100 m across the subject land and into adjoining lands. It was determined that patch sizes exceeded 100 ha for all VZs.

Vegetation zones are summarised in Table 8.



Table 3 Minimum number of plots required per zone area

Vegetation zone area (ha)	Minimum number of plots			
<2	1 plot			
>2-5	2 plots			
>5–20	3 plots			
>20-50	4 plots			
>50-100	5 plots			
>100-250	6 plots			
>250–1000	7 plots; more plots may be needed if the condition of the vegetati variable across the zone			
>1000	8 plots; more plots may be needed if the condition of the vegetation is variable across the zone			

Plate 3 Table 3 of the Biodiversity Assessment Method 2020

Table 8. Vegetation zones and patch sizes

Vegetation zone ID, PCT ID and name	Condition / other defining feature	<b>Area</b> (ha)	Patch size class	No. VI plots Completed (Required)	IDs of VI plots used in assessment
VZ1: 3446 Intact	Disturbed forest margins	1.94	> 100 ha	2(2)	B01;B10
VZ2: 3433 Intact	Disturbed forest margins	1.25	> 100 ha	2(1)	B02;B09
VZ3: 3433 Grassland	Native grassland	3.73	> 100 ha	2(2)	B03;B04
VZ4: 3446 Pasture	Grazed pasture	28.91	> 100 ha	4(4)	B05;B06;B07;B08

## 4.5 Vegetation integrity (vegetation condition)

#### 4.5.1 Vegetation integrity survey plots

Vegetation integrity (VI) survey plots have been sampled in accordance with BAM section 4.3.4 (Table 3) for each VZ. The minimum number of plots has been assigned to each VZ based upon these guidelines (See **Table 8**). Vegetation Integrity results are in **Table 9**. Survey results are **Appendix L**.

#### 4.5.2 Scores

Table 9. Vegetation integrity scores

Vegetation zone ID, PCT ID and name	Composition condition score	Structure condition score	Function condition score	VI score	HBTs present?
VZ1: 3446 Intact	49.7	36.6	65	49.1	Yes
VZ2: 3433 Intact	33.5	40.1	77.2	47	Yes
VZ3: 3433 Grassland	37.2	37.8	17.3	28.9	No
VZ4: 3446 Pasture	17.7	17.8	13.9	16.4	No

#### 4.5.3 Use of benchmark data

Default benchmarks were used as generated by the BAM-C. Local reference benchmarks were not employed.



## 5. Habitat suitability for threatened species

Habitat surveys over the subject land (see **Section 2**) extensively assessed potential and actual foraging, breeding and refuge habitat for threatened and protected entities. The subject land includes:

- Eucalypt trees which are hollow-bearing (see **Figure 3**), including hollows of all size classes and suitably elevated for the constraints of hollow-dependent species associated with the PCTs on the subject land.
- Large stick nests suitable for birds of prey occur within and adjacent to the subject land.
- The subject land includes grazed pasture, paddock trees, remnant and regenerating copses, woodland, and forest margins. The understorey on the subject land is generally limited, with exceptions as noted in **Section 4**. Tall canopy trees with separation <50 m provide arboreal connections for gliders across parts of the subject land as well as ground mobile arboreal mammals and reptiles.</p>
- The subject land includes waterbodies in the form of farm dams, and small and large pools in modified watercourses crossing the subject land, including stretches 3 m and wider. Most of the watercourses are incised. The waterbodies on the subject land generally lack substantial emergent or fringing vegetation, and riparian vegetation forming riparian habitat is limited. The watercourses on the subject land are ephemeral with the exception of the pools, with the channel generally defined by a cover of low grazed High Threat Weeds. Waterbodies and watercourses adjacent to the subject land include ephemeral to semi-permanent water, a high cover of remnant vegetation on banks, and some emergent vegetation.
- The subject land is within 1 km of the Hunter River, a 9<sup>th</sup> order (Strahler) perennial natural watercourse. There are no lakes or wetlands within 1 km of the subject land and the subject land is approximately 40 km from the NSW coast at Newcastle.
- In a very limited area of the subject land, deeply embedded surface rocks are exposed at a local high point. The rocks are densely grown through and around with High Threat Weeds which occupy any cracks, and none of the rocks can be lifted or moved by hand, indicating that the rocks do not provide substantial habitat for any candidate species associated with PCTs on the subject land. The rocks are not suitable rocks for relevant species as per DPE (2022) threatened reptile guidelines.
- The subject site does not contain any geological features of significance (cliffs, karst, caves, overhangs, escarpments, outcroppings, steep slopes, gorges, boulder piles, crevices, ledges, sandstone features, pagodas, et. al.).
- The subject land does not contain built structures, derelict or otherwise, culverts, old mines, tunnels old buildings or sheds, or other workings.
- Assessment of surrounding land (see Section 3.1) up to 2 km from the subject land did not indicate the presence of rocky areas containing caves, overhangs, escarpments, outcrops, crevices or boulder piles, old mines, tunnels, old buildings or sheds. A former quarry repurposed as a waste management facility occurs within 1.5 km the modified landform is relatively shallow with no indication of significant formations.



## 5.1 Identification of threatened species for assessment

## 5.1.1 Ecosystem credit species

Table 10. Predicted ecosystem credit species

Scientific name	Common name	Listi	ng status	Dual Sources credit species	Sources		Reason for exclusion	VZ ID species	Sensitivity to gain class
		BC Act	EPBC Act			for further assessment?	from further assessment	retained within, including PCT ID	
Anthochaera phrygia	Regent Honeyeater	CE	CE	Yes	BAM-C	Yes	NA		High
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	-	No	BAM-C	Yes	NA		Moderate
Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	Yes	BAM-C	Yes	NA		Moderate
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	Yes	BAM-C	Partial	2. Habitat constraints	3446_Intact; 3433_Intact	High
Chthonicola sagittata	Speckled Warbler	V	-	No	BAM-C	Yes	NA		High
Circus assimilis	Spotted Harrier	V	-	No	BAM-C	Yes	NA		Moderate
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V	V	No	BAM-C	Yes	NA		High
Daphoenositta chrysoptera	Varied Sittella	V	-	No	BAM-C	Yes	NA		Moderate
Dasyurus maculatus	Spotted-tailed Quoll	V	E	No	BAM-C	Yes	NA		High
Ephippiorhynchus asiaticus	Black-necked Stork	E	-	No	BAM-C	No	2. Habitat constraints	None	Moderate
Falco subniger	Black Falcon	V	-	No	BAM-C	Yes	NA		Moderate
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	-	No	BAM-C	Yes	NA		High
Glossopsitta pusilla	Little Lorikeet	V	-	No	BAM-C	Yes	NA		High
Haliaeetus leucogaster	White-bellied Sea- Eagle	V	-	Yes	BAM-C	Yes	NA		High
Hieraaetus morphnoides	Little Eagle	V	-	Yes	BAM-C	Yes	NA		Moderate



Scientific name	Common name	Listing status			Sources		Reason for exclusion	VZ ID species	Sensitivity
		BC Act	EPBC Act	credit species		for further assessment?	from further assessment	retained within, including PCT ID	to gain class
Hirundapus caudacutus	White-throated Needletail	V	V	No	BAM-C	Yes	NA		High
Ixobrychus flavicollis	Black Bittern	V	-	No	BAM-C	No	2. Habitat constraints	None	Moderate
Lathamus discolor	Swift Parrot	E	CE	Yes	BAM-C	Yes	NA		Moderate
Limicola falcinellus	Broad-billed Sandpiper	V	-	Yes	BAM-C	Yes	NA		High
Lophoictinia isura	Square-tailed Kite	V	-	Yes	BAM-C	Yes	NA		Moderate
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V	-	No	BAM-C	Yes	NA		Moderate
Micronomus norfolkensis	Eastern Coastal Free- tailed Bat	V	-	No	BAM-C	Yes	NA		High
Miniopterus australis	Little Bent-winged Bat	V	-	Yes	BAM-C	Yes	NA		High
Miniopterus orianae oceanensis	Large Bent-winged Bat	V	-	Yes	BAM-C	Yes	NA		High
Neophema pulchella	Turquoise Parrot	V	-	No	BAM-C	Yes	NA		High
Nyctophilus corbeni	Corben's Long-eared Bat	V	V	No	BAM-C	Yes	NA		High
Pandion cristatus	Eastern Osprey	V	-	Yes	BAM-C	Yes	NA		Moderate
Petaurus australis	Yellow-bellied Glider	V	V	No	BAM-C	Yes	NA		High
Petroica boodang	Scarlet Robin	V	-	No	BAM-C	Yes	NA		Moderate
Petroica phoenicea	Flame Robin	V	-	No	BAM-C	Yes	NA		Moderate
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V	-	No	BAM-C	Yes	NA		Moderate
Pseudomys novaehollandiae	New Holland Mouse	-	V	No	BAM-C	Yes	NA		High
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Yes	BAM-C	Yes	NA		High



Scientific name Comm	Common name	Listin	ng status	Dual Source credit species	Sources		Reason for exclusion	VZ ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act			for further assessment?	from further assessment		
Ptilinopus regina	Rose-crowned Fruit- Dove	V	-	No	BAM-C	Yes	NA		Moderate
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	-	No	BAM-C	Yes	NA		High
Scoteanax rueppellii	Greater Broad-nosed Bat	V	-	No	BAM-C	Yes	NA		High
Stagonopleura guttata	Diamond Firetail	V	V	No	BAM-C	Yes	NA		Moderate
Tyto longimembris	Eastern Grass Owl	V	-	No	BAM-C	Yes	NA		Moderate

Justification for Exclusion of Predicted Ecosystem Credit Species										
Scientific name	Common name	VZ ID Species Excluded from	Detailed Justification for Exclusion							
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	3446_Pasture; 3433_Grassland	Habitat Constraint (Foraging): <i>Presence of Allocasuarina and casuarina species</i> . The cleared lands do not contain any suitable foraging species.							
Ephippiorhynchus asiaticus	Black-necked Stork	3446_Intact; 3446_Pasture; 3433_Intact; 3433_Grassland	Habitat Constraint: Swamps-Shallow, open freshwater or saline wetlands or shallow edges of deeper wetlands within 300 m of these swamps; Waterbodies-Shallow lakes, lake margins and estuaries within 300 m of these waterbodies While the subject land and study area contain farm dams, no suitable swamps or waterbodies suitable for this species occur							
Ixobrychus flavicollis	Black Bittern	3446_Intact; 3446_Pasture; 3433_Intact; 3433_Grassland	Habitat Constraint: Waterbodies-Land within 40 m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation While the subject land and study area contain farm dams, no suitable swamps or waterbodies suitable for this species occur. A potentially suitable wetland does occur in the far west of the study area (approx. 225 m from subject land), but neither this waterbody nor vegetation within the 40 m buffer will be impacted							



## 5.1.2 Species credit species

Table 11. Predicted flora species credit species

Scientific name	Common name	Listing status		Sources	Species retained	Reason for exclusion from	VZ ID species
		BC Act	EPBC Act		for further assessment?	further assessment	retained within, including PCT ID
Acacia bynoeana	Bynoe's Wattle	Е	V	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Angophora inopina	Charmhaven Apple	V	V	BAM-C	No	3. Microhabitats	
Asperula asthenes	Trailing Woodruff	V	V	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact; VZ3-3433_Grassland
Callistemon linearifolius	Netted Bottle Brush	V	-	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Corybas dowlingii	Red Helmet Orchid	Е	-	BAM-C	No	1. Geographic limitations	
Eucalyptus castrensis	Singleton Mallee	Е	-	BAM-C	No	1. Geographic limitations	
Eucalyptus glaucina	Slaty Red Gum	V	V	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Eucalyptus parramattensis subsp. decadens	Eucalyptus parramattensis subsp. decadens	V	V	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Eucalyptus pumila	Pokolbin Mallee	V	V	BAM-C	No	1. Geographic limitations	
Grevillea parviflora subsp. parviflora	Small-flower Grevillea	V	V	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Persoonia pauciflora	North Rothbury Persoonia	CE	CE	BAM-C	No	1. Geographic limitations	
Pomaderris queenslandica	Scant Pomaderris	Е	-	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Prostanthera cineolifera	Singleton Mint Bush	V	V	BAM-C	No	1. Geographic limitations	
Pterostylis chaetophora	Pterostylis chaetophora	V	-	BAM-C	Yes	NA	
Rhodamnia rubescens	Scrub Turpentine	CE	CE	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact



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	BC Act	EPBC		for further	further assessment	retained within,
		Act		assessment?		including PCT ID
rinklewort	V	V	BAM-C	Partial	Not assessed on degraded land	VZ1-3446_Intact; VZ2-3433_Intact; VZ3-3433_Grassland
	E	-	BAM-C	No	1. Geographic limitations	
ed Susan	V	V	BAM-C	No	1. Geographic limitations	
7	m burragorang in snock LGA ed Susan	m burragorang in E snock LGA	m burragorang in E - snock LGA	m burragorang in E - BAM-C	m burragorang in E - BAM-C No snock LGA	m burragorang in E - BAM-C No 1. Geographic limitations

Justification for Exclusion of Predicted Species Credit Flora Species					
Scientific name	Common name	VZ ID Species Excluded from	Detailed Justification for Exclusion		
Angophora inopina	Charmhaven Apple	VZ1; VZ2; VZ3; VZ4	Geographic limitations: This species is not recorded in the Hunter subregion, with the exception of a single undescribed 2008 record at Mitchells Flat north of Elderslie. Further, the species is also not recorded more than 20 km from the coast, and at that distance in association with brackish coastal lakes.		
Corybas dowlingii	Red Helmet Orchid	VZ1; VZ2; VZ3; VZ4	Geographic limitations: East of Morpeth		
Eucalyptus castrensis	Singleton Mallee	VZ1; VZ2; VZ3; VZ4	Geographic limitations (TBDC): Known only from a single dense stand near Singleton in the lower Hunter Valley		
Eucalyptus pumila	Pokolbin Mallee	VZ1; VZ2; VZ3; VZ4	Geographic limitations (TBDC): Currently known only from a single population west of Pokolbin in the Hunter Valley. Historical records also exist for Wyong and Sandy Hollow, however, has not been recorded recently in these areas.		
Persoonia pauciflora	North Rothbury Persoonia	VZ1; VZ2; VZ3; VZ4	Geographic limitations: Within 10 km of North Rothbury		
Prostanthera cineolifera	Singleton Mint Bush	VZ1; VZ2; VZ3; VZ4	Geographic limitations (TBDC): Restricted to only a few localities near Scone, Cessnock and St Albans.		
Spyridium burragorang - endangered population	Spyridium burragorang in the Cessnock LGA	VZ1; VZ2; VZ3; VZ4	Geographic limitations: This species has been excluded on the basis of its highly limited distribution, currently known from a single site in the western part of Werakata State Conservation Area The subject land is over 25 km from the known extent of this species' outlier population.		
Syzygium paniculatum	Magenta Lilly Pilly	VZ1; VZ2; VZ3; VZ4			
Tetratheca juncea	Black-eyed Susan	VZ1; VZ2; VZ3; VZ4	Geographic limitations: This species has been excluded on the basis of its distribution in TBDC, occurring in the local government areas of Wyong, Lake Macquarie, Newcastle, Port Stephens, Great Lakes and Cessnock. The subject land is located in Maitland LGA. No records of the species occur within at least 15 km of the subject land.		



Table 12. Predicted fauna species credit species

Scientific name	Common name	Listing status		Dual	Sources	Species retained	Reason for exclusion from	VZ ID species
		BC Act	EPBC Act	credit species		for further assessment?	further assessment	retained within, including PCT ID
Anthochaera phrygia	Regent Honeyeater	CE	CE	Yes	BAM-C	No	2. Habitat constraints	
Burhinus grallarius	Bush Stone-curlew	E	-	No	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Callocephalon fimbriatum	Gang-gang Cockatoo	E	E	Yes	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	Yes	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Cercartetus nanus	Eastern Pygmy-possum	V	-	No	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Chalinolobus dwyeri	Large-eared Pied Bat	V	E	No	BAM-C	No	2. Habitat constraints	
Crinia tinnula	Wallum Froglet	V	-	No	BAM-C	No	3. Vagrant species	
Delma impar	Striped Legless Lizard	E	-	No	BAM-C	No	3. Vagrant species	
Dromaius novaehollandiae - endangered population	Emu population in the NSW North Coast Bioregion and Port Stephens LGA	Е	-	No	BAM-C	No	1. Geographic limitations	
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	-	Yes	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Hieraaetus morphnoides	Little Eagle	V	-	Yes	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Hoplocephalus stephensii	Stephens' Banded Snake	V	-	No	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Lathamus discolor	Swift Parrot	Е	CE	Yes	BAM-C	No	2. Habitat constraints	
Limicola falcinellus	Broad-billed Sandpiper	V	-	Yes	BAM-C	No	2. Habitat constraints	
Litoria aurea	Green and Golden Bell Frog	E	V	No	BAM-C	No	4. Microhabitats	
Litoria brevipalmata	Green-thighed Frog	V	_	No	BAM-C	Yes	NA	



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Scientific name	Common name	Listing status		Dual	Sources	Species retained	Reason for exclusion from	VZ ID species
		BC Act	EPBC Act	credit species		for further assessment?	further assessment	retained within, including PCT ID
Lophoictinia isura	Square-tailed Kite	V	-	Yes	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Miniopterus australis	Little Bent-winged Bat	V	-	Yes	BAM-C	No	2. Habitat constraints	
Miniopterus orianae oceanensis	Large Bent-winged Bat	V	-	Yes	BAM-C	No	2. Habitat constraints	
Myotis macropus	Southern Myotis	V	-	No	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Ninox connivens	Barking Owl	V	-	No	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Ninox strenua	Powerful Owl	V	-	No	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Pandion cristatus	Eastern Osprey	V	-	Yes	BAM-C	No	2. Habitat constraints	
Petauroides volans	Southern Greater Glider	E	E	No	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Petaurus norfolcensis	Squirrel Glider	V	-	No	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Petrogale penicillata	Brush-tailed Rock- wallaby	E	V	No	BAM-C	No	2. Habitat constraints	
Phascogale tapoatafa	Brush-tailed Phascogale	V	-	No	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Phascolarctos cinereus	Koala	E	E	No	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Planigale maculata	Common Planigale	Е	-	No	BAM-C	No	3. Vagrant species	
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	Yes	BAM-C	No	2. Habitat constraints	
Tyto novaehollandiae	Masked Owl	V	-	No	BAM-C	Partial	Not assessed on cleared land	VZ1-3446_Intact; VZ2-3433_Intact
Uperoleia mahonyi	Mahony's Toadlet	Е	E	No	BAM-C	No	3. Vagrant species	
Vespadelus troughtoni	Eastern Cave Bat	V	-	No	BAM-C	No	2. Habitat constraints	





Justification for Exclus	ion of Predicted Species	Credit Fauna Species	
Scientific name	Common name	VZ ID Species Excluded from	Detailed Justification for Exclusion
Anthochaera phrygia	Regent Honeyeater	VZ1; VZ2; VZ3; VZ4	Habitat constraint: As per Important Habitat Map
Chalinolobus dwyeri	Large-eared Pied Bat	VZ1; VZ2; VZ3; VZ4	Habitat constraint: Cliffs-Within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels. No suitable features exist on the subject land or surrounding landscape
Crinia tinnula	Wallum Froglet	VZ1; VZ2; VZ3; VZ4	Vagrant species: This species has been excluded on the basis of vagrancy in the IBRA subregion. The species is not recorded in the Hunter subregion, with the exceptions of a single 2018 record in Cessnock LGA at least 20 km from any other valid record, and a record at Medowie. Further, the subject land is not characterised by suitable vegetation (sedgelands, wet heathlands, swamp sclerophyll forests) or geology (acidic swamps on coastal sand plains).
Delma impar	Striped Legless Lizard	VZ1; VZ2; VZ3; VZ4	Vagrant species: This species has not been recorded east of Ravensworth, indicating that its range is exclusive of the subject land. The soils on the subject land are not prone to cracking, limited surface rocks are present for shelter, and tussock grasses are limited due to grazing.
Dromaius novaehollandiae - endangered population	Emu population in the NSW North Coast Bioregion and Port Stephens LGA	VZ1; VZ2; VZ3; VZ4	Geographic limitation (Hunter): Port Stephens Local Government Area. The subject land is in Maitland Local Government Area
Lathamus discolor	Swift Parrot	VZ1; VZ2; VZ3; VZ4	Habitat constraint: As per Important Habitat Map
Limicola falcinellus	Broad-billed Sandpiper	VZ1; VZ2; VZ3; VZ4	Habitat constraint: As per Important Habitat Map
Litoria aurea	Green and Golden Bell Frog	VZ1; VZ2; VZ3; VZ4	Microhabitat: This species has been excluded on the basis of inadequate microhabitat on the subject land. The subject land has limited suitable waterbodies with emergent vegetation, generally comprising of cattle dams with degraded margins and limited connectivity across the landscape for dispersal. Potential habitat exists in the study area, approximately 225 m west of the western extreme of the subject land. This area contains a dam with fringing vegetation and landscape connectivity. The persistence of this species at that location is still unlikely, due to the known effects of <i>Chytrid</i> fungus in habitat lacking a saline influence to mitigate the pathogen. The species is highly unlikely to persist on the subject land.
Miniopterus australis	Little Bent-winged Bat	VZ1; VZ2; VZ3; VZ4	Habitat constraint: Cave, tunnel, mine, culvert or other structure known or suspected to be
Miniopterus orianae oceanensis	Large Bent-winged Bat	VZ1; VZ2; VZ3; VZ4	used for breeding including records with microhabitat code 'IC – in cave'; observation type 'E nest-roost'; with numbers of individuals >500; or from the scientific literature.  No suitable features exist on the subject land



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Justification for Exclus	ion of Predicted Species	Credit Fauna Species	
Scientific name	Common name	VZ ID Species Excluded from	Detailed Justification for Exclusion
Pandion cristatus	Eastern Osprey	VZ1; VZ2; VZ3; VZ4	Habitat constraint: Presence of stick-nests in living and dead trees (>15 m) or artificial structures within 100 m of a floodplain for nesting.  The subject land is not within 100 m of a floodplain
Petrogale penicillata	Brush-tailed Rock- wallaby	VZ1; VZ2; VZ3; VZ4	Habitat constraint: Land within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines  No suitable features exist on the subject land or surrounding landscape
Planigale maculata	Common Planigale	VZ1; VZ2; VZ3; VZ4	Vagrant species: This species has been excluded on the basis of vagrancy in the IBRA subregion. The species is not recorded in the Hunter subregion, and is very rarely recorded in the Sydney basin. There is limited debris or ground vegetation to shelter this species or provide foraging or refuge habitat.
Pteropus poliocephalus	Grey-headed Flying-fox	VZ1; VZ2; VZ3; VZ4	Habitat constraint: Breeding Camps
Uperoleia mahonyi	Mahony's Toadlet	VZ1; VZ2; VZ3; VZ4	Vagrant species: This species has been excluded on the basis of vagrancy in the IBRA subregion. The species is not recorded in the Hunter subregion, and is very rarely recorded in the Sydney basin except for a population at Norah Head. There is no substantial leaf litter, debris or vegetation surrounding any of the dams on the site to provide habitat for this species. The species is highly unlikely to persist on the subject land.
Vespadelus troughtoni	Eastern Cave Bat	VZ1; VZ2; VZ3; VZ4	Habitat constraint: Caves-Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, crevices or boulder piles, or within two kilometres of old mines, tunnels, old buildings or sheds.  Per the TBDC and the Threatened Bat Guidelines, no suitable features occur within 2 km and no breeding features occur within 100 m of the subject land.



## 5.2 Presence of candidate species credit species

In accordance with BAM Subsection 5.2.4, from the remaining list of Candidate Species from Section **5.1.2**, **Table 13** (flora) and **Table 14** (fauna) identify the species determined to be present within the Subject Land based on:

- assumed presence within the subject land
- an important habitat map (for dual credit species)
- targeted threatened species surveys, or
- an expert report

Table 13. Determining the presence of candidate flora species credit species on the subject land

Scientific name	Common name	Listir statu		Method used to determine	Present?	Further assessment	
		BC Act	EPBC Act	presence		required? (BAM Subsections 5.2.5 and 5.2.6)	
Acacia bynoeana	Bynoe's Wattle	Е	V	Survey (see Section 5.3)	No	No	
Asperula asthenes	Trailing Woodruff	V	V	Survey (see Section 5.3)	No	No	
Callistemon linearifolius	Netted Bottle Brush	V	-	Survey (see Section 5.3)	No	No	
Eucalyptus glaucina	Slaty Red Gum	V	V	Survey (see Section 5.3)	No	No	
Eucalyptus parramattensis subsp. decadens	Eucalyptus parramattensis subsp. decadens	V	V	Survey (see Section 5.3)	No	No	
Grevillea parviflora subsp. parviflora	Small-flower Grevillea	V	V	Survey (see Section 5.3)	No	No	
Pomaderris queenslandica	Scant Pomaderris	E	-	Survey (see Section 5.3)	No	No	
Pterostylis chaetophora	Pterostylis chaetophora	V	-	Survey (see Section 5.3)	No	No	
Rhodamnia rubescens	Scrub Turpentine	CE	CE	Survey (see Section 5.3)	No	No	
Rutidosis heterogama	Heath Wrinklewort	V	V	Survey (see Section 5.3)	No	No	
Syzygium paniculatum	Magenta Lilly Pilly	Е	V	Survey (see Section 5.3)	No	No	



Table 14. Determining the presence of candidate fauna species credit species on the subject land

Common name	Scientific name	Listir statu		Method used to determine	Present?	Further assessment
		BC Act	EPBC Act	presence		required? (BAM Subsections 5.2.5 and 5.2.6)
Burhinus grallarius	Bush Stone- curlew	Ε	-	Survey (see Section 5.3)	No	No
Callocephalon fimbriatum	Gang-gang Cockatoo	E	Ε	Survey (see Section 5.3)	No	No
Calyptorhynchus lathami lathami	South-eastern Glossy Black- Cockatoo	V	V	Survey (see Section 5.3)	No	No
Cercartetus nanus	Eastern Pygmy- possum	V	-	Survey (see Section 5.3)	No	No
Haliaeetus leucogaster	White-bellied Sea- Eagle	V	-	Survey (see Section 5.3)	No	No
Hieraaetus morphnoides	Little Eagle	V	-	Survey (see Section 5.3)	No	No
Hoplocephalus stephensii	Stephens' Banded Snake	V	-	Survey (see Section 5.3)	No	No
Litoria aurea	Green and Golden Bell Frog	E	V	Survey (see Section 5.3)	No	No
Litoria brevipalmata	Green-thighed Frog	V	-	Expert Report (see <b>Section 5.4</b> )	No	No
Lophoictinia isura	Square-tailed Kite	V	-	Survey (see Section 5.3)	No	No
Myotis macropus	Southern Myotis	V	-	Survey (see Section 5.3)	Yes	Yes
Ninox connivens	Barking Owl	V	-	Survey (see Section 5.3)	Yes	Yes
Ninox strenua	Powerful Owl	V	-	Survey (see Section 5.3)	No	No
Petauroides volans	Southern Greater Glider	E	E	Survey (see Section 5.3)	No	No
Petaurus norfolcensis	Squirrel Glider	V	-	Survey (see Section 5.3)	Yes	Yes
Phascogale tapoatafa	Brush-tailed Phascogale	V	-	Survey (see Section 5.3)	Yes	Yes
Phascolarctos cinereus	Koala	Ε	Е	Survey (see Section 5.3)	No	No
Tyto novaehollandiae	Masked Owl	V	-	Survey (see Section 5.3)	No	No





## 5.3 Threatened species surveys

In accordance with the guidelines listed in **Section 2.3** and **Section 2.4**, **Table 15** and **Table 16** list the flora and fauna surveys conducted, respectively. Species lists can be found in **Appendix I**.

Table 15. Surveys for candidate flora species credit species on the subject land

Common name	Scientific name	Threatened flo	ora species surveys	Present	Further assessment		
		Survey method	Timing of survey	(BAM-C / TBDC)	Effort (hours;		required? (BAM Subsections 5.2.5 and 5.2.6)
		(transects or grids)	Dates Comply	Non-comply	no. ppl)		5.2.0)
Acacia bynoeana	Bynoe's Wattle	Transect	<b>2024</b> ; Oct 16		9(2)	No	No
Asperula asthenes	Trailing Woodruff	Transect	<b>2024</b> ; Oct 16		9(2)	No	No
Callistemon linearifolius	Netted Bottle Brush	Transect	<b>2024</b> ; Oct 24		4.5(2)	No	No
Eucalyptus glaucina	Slaty Red Gum	Transect	<b>2024</b> ; Oct 24		4.5(2)	No	No
Eucalyptus parramattensis subsp. decadens	Eucalyptus parramattensis subsp. decadens	Transect	<b>2024</b> ; Oct 24		4.5(2)	No	No
Grevillea parviflora subsp. parviflora	Small-flower Grevillea	Transect	<b>2024</b> ; Oct 24		4.5(2)	No	No
Pomaderris queenslandica	Scant Pomaderris	Transect	<b>2024</b> ; Oct 24		4.5(2)	No	No
Pterostylis chaetophora	Pterostylis chaetophora	Transect	<b>2024</b> ; Oct 16		9(2)	No	No
Rhodamnia rubescens	Scrub Turpentine	Transect	<b>2024</b> ; Oct 24		4.5(2)	No	No
Rutidosis heterogama	Heath Wrinklewort	Transect	<b>2024</b> ; Oct 16		9(2)	No	No
Justification for Non-Co	mpliant Surveys for Pr	edicted Species	Credit Flora Specie	es			
Scientific name	Common name	Variance	Detailed Justifica	tion for Non-Complia	nce		
NA							





Table 16. Surveys for candidate fauna species credit species on the subject land

Common name	Scientific name	Threatened flora sp	ecies surveys			Present	Further assessment	
		Survey method (camera, harp, etc)	Timing of survey (BAM-C / TBDC)		Effort hours(#.ppl);		required? (BAM Subsections 5.2.5 and 5.2.6)	
			Dates Comply Non-comply		other		0.2.0)	
Burhinus grallarius	Bush Stone-curlew	Call Playback/ Spotlight	<b>2024</b> ; Jun 18/ 24		0.5(1)/ 5.5(4)	No	No	
Callocephalon fimbriatum	Gang-gang Cockatoo	Census/Habitat	<b>2024</b> ; Oct 16/ 31		0.5(2)/ 5(2)	No	No	
Calyptorhynchus lathami lathami	South-eastern Glossy Black- Cockatoo	Census/Habitat	<b>2024</b> ; Jun 13; Jul 8/ 25		2(4)/ 3(1)	No	No	
Cercartetus nanus	Eastern Pygmy- possum	Spotlight	<b>2024</b> ; Oct 31; Nov 11,14,20		8.25(4)	No	No	
Haliaeetus leucogaster	White-bellied Sea- Eagle	Census/Habitat	2024; Jun 13; Jul 8,25/ Oct 16,24		2.5(4)/ 3.5(3)	No	No	
Hieraaetus morphnoides	Little Eagle	Census/Habitat	<b>2024</b> ; Oct 16/ 31		0.5(2)/ 5(2)	No	No	
Hoplocephalus stephensii	Stephens' Banded Snake	Spotlight	<b>2024</b> ; Oct 31; Nov 11,14,20		15(4)	No	No	
Litoria brevipalmata	Green-thighed Frog	Expert Report	NA		NA	No	No	
Lophoictinia isura	Square-tailed Kite	Census/Habitat	<b>2024</b> ; Oct 16/ 31		0.5(2)/ 5(2)	No	No	
Myotis macropus	Southern Myotis	Ultrasonic Recorder	<b>2024</b> ; Oct 16-24		32	Yes	Yes	
Ninox connivens	Barking Owl	Call Playback/ Spotlight	<b>2024</b> ; Jun 5,11,18,25; Jul 3,4,8,25		3(4)/ 5.5(4)	Yes	Yes	
Ninox strenua	Powerful Owl	Call Playback/ Spotlight	<b>2024</b> ; Jun 5,11,18,25; Jul 3,4,8,25		3(4)/ 5.5(4)	No	No	
Petauroides volans	Southern Greater Glider	Camera/ Spotlight	<b>2024</b> ; May 23-Jun 20/ Oct 31; Nov 11,14,20		638 / 15(4)	No	No	
Petaurus norfolcensis	Squirrel Glider	Camera/Spotlight	<b>2024</b> ; May 23-Jun 20/ Oct 31; Nov 11,14,20		638 / 15(4)	Yes	Yes	

Common name

Variance





Common name	Scientific name	Threatened flora sp	Threatened flora species surveys					
	Si (c		Timing of survey (BAM-C / TBDC)		Effort hours(#.ppl);		required? (BAM Subsections 5.2.5 and	
			Dates Comply	Non- comply	other `		5.2.6)	
Phascogale tapoatafa	Brush-tailed Phascogale	Camera/Spotlight	<b>2024</b> ; May 23-Jun 20/ Oct 31; Nov 11,14,20		638 / 15(4)	Yes	Yes	
Phascolarctos cinereus	Koala	SAT/Spotlight	2024; Oct 24/ 31; Nov 11,14,20		6(2)/ 15(4)	No	No	
Tyto novaehollandiae	Masked Owl	Call Playback/ Spotlight	<b>2024</b> ; Jun 5,11,18,25; Jul 3,4,8,25		3(4)/ 5.5(4)	No	No	
Justification for Non-Com	Justification for Non-Compliant Surveys for Predicted Species Credit Fauna Species							

#### Survey Notes

NA

Scientific name

During spotlight surveys, a pair of *Phascogale tapoatafa* (Brush-tailed phascogale) were detected in a hollow off the subject land, in the north of the study area. This species is rarely detected by spotlight, and surveys were notably out of season. The location of the hollow tree is noted on **Figure 6**.

**Detailed Justification for Non-Compliance** 

- During surveys for threatened Large Forest Owls, a pair of *Tyto alba* (Barn Owls) were detected utilising a hollow adjacent to Anambah Road. High resolution photographs and call recordings were provided to two (2) species experts to confirm the species identification. The location of the roost tree is noted on **Figure 6**.
- Owl Pellets were detected at the base of a large hollow bearing tree. The tree was stag-watched, but no occupant detected. The location of the pellet tree is noted on **Figure 6**
- During spotlight surveys, an individual Falco cenchroides (Nankeen Kestrel) was observed roosting in various hollows in the subject land and study area.
- A Large Stick-Nest was located in the study area and monitored throughout the survey period for activity. No birds were observed utilising the nest or perching nearby at any time throughout field investigations. The location of the Stick-Nest is noted on Figure 6.



#### 5.4 Expert reports

An export report was obtained for *Litoria brevipalmata* (Green-Thighed Frog) by registered expert Dr Frank Lemckert of Eco Logical. An expert report was anticipated to be required as the required climatic conditions for survey of this species were considered unlikely to occur during the project timeframe. The Expert Report determined that the species could not be ruled out of occurring in the study area, and suitable habitat was identified. The Species Expert Report is **Appendix J**.

#### 5.5 More appropriate local data (where relevant)

No other local data was utilised to assess habitat suitability for the threatened species surveys.

## 5.6 Area or count, and location of suitable habitat for a species credit species (a species polygon)

Habitat condition for Species credit species determined or assumed to be present on the subject land is described in detail below. **Table 17** includes details related to present species from the TBDC.

#### 5.6.1 Flora

No threatened flora species were identified on the subject land.

#### 5.6.2 Fauna

#### 5.6.2.1 Litoria brevipalmata - Green-thighed Frog

This species was not confidently excluded from potential to occur on the subject land, as described in an Expert Report. The Report identified two (2) locations where the species has potential breeding habitat. It was not detected at any location, as no surveys were undertaken. This species is associated with PCT 3433 within the subject land. All areas of VZ2 (3433\_Intact) and VZ3 (3433\_Grassland) within 100 m of suitable habitat as mapped in the Expert Report (**Appendix J**) is included in the species polygon. As the species is not associated with PCT 3446, VZ1 has not been included in the species polygon. Detailed mapping has been provided for the floristic ecotones in proximity to this species potential habitat.

A species polygon is Figure 7

#### 5.6.2.2 Myotis macropus - Southern Myotis

This species was detected on the subject land during ultrasonic recording surveys. The species was detected in two (2) out of four (4) recorder locations as 'definite' records, and one (1) location as 'probable' record. It was not detected at all at the final location. This species is associated with all PCTs within the subject land, and by extension all VZs. All extant timber native vegetation within 200 m of suitable waterbodies where the species was detected with any degree of certainty is included in the species polygon.

A species polygon is Figure 8

#### 5.6.2.3 Ninox connivens - Barking Owl

This species was detected on the subject land during surveys carried out according to the TBDC. One (1) individual was observed or heard on four (4) out of seven (7) call playback nights. This species has recently been changed to species credit only (formerly dual credit), and habitat includes all VZs with suitable hollows within 800 m of survey stations. This species is associated with both PCTs within the subject land, and therefore both Intact VZs – as both contain appropriate hollows. All of the



extant timber native vegetation on the subject land has been included in the species polygon. A tree was detected outside of the subject land that is likely to be a roost tree for this species, as pellets containing insect carapace, fur and down were found at the base (see **Figure 6**).

A species polygon is Figure 9

#### 5.6.2.4 Petaurus norfolcensis - Squirrel Glider

This species was detected on the subject land during surveys carried out according to the TBDC. This species was detected on multiple remote camera stations on the subject land. This species is associated with all PCTs within the subject land. All extant timbered native vegetation on the subject land, has been included in the species polygon.

An additional prescribed impact polygon has been prepared for this species. The proposal would remove vegetation within the subject land that provides connectivity for this species to several small extensions of habitat east of the subject land. These extensions occur generally within the study area, as well as the RU1 Lot to the north, and will become isolated and sterilised. As this prescribed impact is quantitative habitat loss for this species, additional species credits have been applied pro-rata per hectare in accordance with credits generated for direct removal of habitat in the BAM-C.

Parts of this prescribed impact could be mitigated with targeted revegetation of the northern boundary. Should this be proposed and approved, the relevant quantity of credits associated with this portion of the impact should be discharged by the consent authority. Three (3) discrete extensions of intact habitat occur outside of the subject land, and prescribed impact polygons have been calculated for each independently for this purpose.

A species polygon is Figure 10

#### 5.6.2.5 Phascogale tapoatafa - Brush-tailed Phascogale

This species was detected on the subject land during surveys carried out according to the TBDC. This species was detected on multiple remote camera stations on the subject land. This species is associated with all PCTs within the subject land. All extant timber native vegetation on the subject land, has been included in the species polygon.

An additional prescribed impact polygon has been prepared for this species. The proposal would remove vegetation within the subject land that provides connectivity for this species to several small extensions of habitat east of the subject land. These extensions occur generally within the study area, as well as the RU1 Lot to the north, and will become isolated and sterilised. As this prescribed impact is quantitative habitat loss for this species, additional species credits have been applied pro-rata per hectare in accordance with credits generated for direct removal of habitat in the BAM-C.

Parts of this prescribed impact could be mitigated with targeted revegetation of the northern boundary. Should this be proposed and approved, the relevant quantity of credits associated with this portion of the impact should be discharged by the consent authority. Three (3) discrete extensions of intact habitat occur outside of the subject land, and prescribed impact polygons have been calculated for each independently for this purpose.

A species polygon is Figure 11



Table 17. Results for present species (recorded within the subject land)

Scientific name	Common name	Biodiversity risk weighting	SAII entity	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (count measure)	Extent (ha) of suitable habitat present on site (area measure)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Habitat condition (VI score for each VZ in the polygon – area species only)
Litoria brevipalmata	Green- thighed Frog	1.50	no	Semi-permanent/ ephemeral wet areas; Swamps; Waterbodies		0.03		<b>VZ2</b> : 47.0
Myotis macropus	Southern Myotis	2.00	no	200 m x 3 m riparian		2.63		<b>VZ1</b> : 49.1; <b>VZ2</b> : 47.0
Ninox connivens	Barking Owl	2.00	no	HBT > 20 cm +4 m		3.19		<b>VZ1</b> : 49.1; <b>VZ2</b> : 47.0
Petaurus norfolcensis	Squirrel Glider	2.00	no	(none)		3.19	Assessors Note: a prescribed impact polygon has been generated for this species (see 8.3.1)	<b>VZ1</b> : 49.1; <b>VZ2</b> : 47.0
Phascogale tapoatafa	Brush-tailed Phascogale	2.00	no	(none)		3.19	Assessors Note: a prescribed impact polygon has been generated for this species (see 8.3.1)	<b>VZ1</b> : 49.1; <b>VZ2</b> : 47.0

#### Table 18. Results for EPBC Act listed species present (recorded within the subject land)

Common name	Scientific name	Abundance – No. individual plants present on subject land (flora with unit of measure as count)	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure as area)
NA			





## 6. Identifying prescribed impacts

Prescribed impacts are listed below in **Table 19**. Potentially impacted threatened species were generated by the BAM-C and retained for assessment under the proposal (and present, in the case of Species Credit species). Potential impacts were assessed based on habitat and ecology descriptions for relevant species in the TBDC. Prescribed Impacts are further assessed in **Section 8.3**.

Table 19. Prescribed impacts identified

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature. Where relevant, threatened species or fauna that are part of a TEC or EC, that are at risk of vehicle strike
Karst, caves, crevices, cliffs, rocks etc	No		NA. Not further assessed
Human-made structures	Yes	The subject land contains rural style wire fencing along paddock boundaries.	Large Forest Owls are known to perch on fenceposts and may forage opportunistically from these features, however they are unlikely to represent high value habitat. Not further assessed.
Non-native vegetation	Yes	The subject land contains exotic pasture and scattered woody weeds.	While pasture is not a barrier to the movement of mobile species, no threatened species assessed are considered likely to use the non-native pasture as a regular foraging resource or habitat. Exotic olive trees and Lantana occur sparsely in the subject land and do not represent refuge or breeding habitat for protected species within the assessed impact area. Not further assessed.
Habitat connectivity	Yes	The subject land contains canopy vegetation which forms links to further habitat to the east of the subject land, as well as comprising an important link for habitat to the west of the study area.	Petaurus norfolcensis (Squirrel Glider) Phascogale tapoatafa (Brush-tailed Phascogale)
Waterbodies, water quality and hydrological processes	Yes		Agricultural dams within the subject land would be impacted directly or indirectly by the proposal. These represent marginal habitat – not forming part of a larger wetland complex, being proximal to mapped swamps or wetlands or marine shorelines, and are approximately 1 km from the Hunter River in the north. The third order watercourse has a small catchment but nonetheless directly affects water quality downstream for a variety of habitats outside the study area.
Wind turbine strikes	No		NA. Not further assessed.
Vehicle strikes	Yes	Vehicle movement within and adjacent to the subject land is limited. The proposal would significantly increase vehicle movements on a high speed road (100 km/hr).	Anambah Road represents an existing high-speed hostile connection to any fauna moving across the landscape at or near to ground level. The proposal would significantly increase vehicle movements through the landscape.
			Internal roads would be constructed as part of future proposals under the concept, however these would be in a dense residential setting and fauna movement within the future development would likely be highly limited.



# STAGE 2: IMPACT ASSESSMENT (BIODIVERSITY VALUES AND PRESCRIBED IMPACTS)

## 7. Avoid and minimise impacts

#### 7.1 Avoid and minimise direct and indirect impacts

#### 7.1.1 Project location

The project has been located on residual land adjacent to an urban release area – a mosaic of intact forest and woodland, scattered trees and grazed pasture. The location is the interface between predominantly cleared land and a large remnant patch of approximately 300 ha. The location presents opportunities for avoidance of impacts to biodiversity values by developing predominantly cleared land up to the margins of remnant forest and woodland.

The location includes habitat for threatened species and ecological communities, listed under the BC Act and EPBC Act.

#### 7.1.2 Project design

Primary design focussed on avoiding remnant forest and woodland and constraining the development to paddock areas with scattered canopy trees, minimising impacts to threatened ecological communities (TEC) and threatened species habitat.

The location of habitat trees was mapped on the subject land to tighten constraints on the impact footprint in order to preserve all practical habitat for identified threatened species.

## 7.2 Avoid and minimise prescribed impacts

#### 7.2.1 Project location

The project has been located on residual land adjacent to an urban release area – a mosaic of intact forest and woodland, scattered trees and grazed pasture. The location has limited habitat connectivity to the wider landscape for less mobile species.

The location has marginal connectivity to the wider landscape for less mobile species. Mobile species are able to move through the landscape between isolated patches of canopy vegetation. Less mobile species are likely to be constrained to the intact remnants.

Habitat features on the land are relatively frequent, as the scattered trees generally comprise of mature paddock trees hosting hollows of various sizes including very large hollows suitable for forest owls or large cockatoos. The marginal connections in the landscape therefore have substantial refuge value.

The location does not have significant riparian features, and moderate features can be avoided or improved. The project location crosses watercourses and will have temporary impacts on aquatic habitat and water quality, however overall riparian condition will be managed under the proposal.

The project location is accessed via a currently low-utilisation high-speed (100 km/hr) road. The anticipated development of the Anambah Urban Release Area will unavoidably increase vehicle movements by several orders of magnitude.



#### 7.2.2 Project design

A habitat linkage was identified on the boundary of the study area which represented the only sub-50-metre connection for arboreal fauna moving through the large remnant patch west of the subject land. Early iterations would impact two (2) trees considered to be vital in maintaining this connection. The project in this area was redesigned to maintain a buffer from the site boundary to ensure no impact to those trees. The loss of this connection would increase the risk of a local extinction of species such as Squirrel Glider (*Petaurus norfolcensis*) in either of the divided areas of habitat.

The proposal will utilise culverts for higher order watercourse crossings, maintaining aquatic habitat passage and allowing terrestrial fauna to remain mobile through the riparian corridor.

The project retains aquatic habitat by replacing farm dams with water quality basins, and in doing so minimises downstream impacts to water quality. The project also retains aquatic habitat connectivity through the retained 1<sup>st</sup> order stream running east-west through the subject land. Road networks will be designed with traffic calming devices to reduce vehicle speed and decrease the likelihood of vehicle strikes. The risk of vehicle strike within the development will remain low, as road design and speed limits will constrain vehicle movements and reduce the probability of injury or mortality to fauna.

The current proposal represents only a fraction of the increased risk of vehicle strike, which is difficult to avoid or minimise in this context.



## 8. Impact assessment

## 8.1 Direct impacts

#### 8.1.1 Residual direct impacts

Table 20 documents impacts likely to occur on the subject land after steps taken to avoid and minimise impacts (refer to Figure 6 & Figure 7).

Table 20. Summary of residual direct impacts

Direct impact	BC Act	EPBC Act	SAII	Project phase/timing of impact	Extent (ha, # individuals)
PCT 3446 – removal of native vegetation	-	-	No	Construction	1.94
PCT 3433 – removal of native vegetation	-	-	No	Construction	4.79
Litoria brevipalmata (Green-thighed Frog)	V	-	No	Construction	0.03
Myotis macropus (Southern Myotis) – removal of habitat	V	-	No	Construction	2.63
Ninox connivens (Barking Owl) – removal of habitat	V	-	No	Construction	3.19
Petaurus norfolcensis (Squirrel Glider) – removal of habitat #	V	-	No	Construction	3.19
Phascogale tapoatafa (Brush-tailed Phascogale) – removal of habitat #	V	-	No	Construction	3.19

<sup>#</sup> species subject to quantitative prescribed impacts to habitat connectivity – an additional polygon has been described in Section 5.6 and Section 8.3.1.

#### 8.1.2 Change in vegetation integrity score

Table 21. Change in VI for residual direct impacts on native vegetation on the subject land

Vegetation zone	PCT ID	Management zone	Area (ha)	Before development			After develop	ment			Change	
				Composition	Structure	Function	VI score	Composition	Structure	Function	VI	Change in VI
VZ1	3446	Intact	1.94	49.7	36.6	65	49.1	0	0	0	0	49.1
VZ2	3433	Intact	1.25	33.5	40.1	77.2	47	0	0	0	0	47
VZ3	3433	Grassland	3.73	37.2	37.8	17.3	28.9	0	0	0	0	28.9
VZ4	3446	Pasture	28.91	17.7	17.8	13.9	16.4	0	0	0	0	16.4



## 8.2 Indirect impacts

**Table 22** documents residual indirect impacts and the likelihood to occur on native vegetation, threatened entities and their habitat beyond the development footprint.

Table 22. Summary of residual indirect impacts

Indirect impact	Impacted entities	Extent	Frequency	Duration	Project phase/ timing of impact	Likelihood and consequences
inadvertent impacts on adjacent habitat or vegetation	PCT 3446, PCT 3433, potential habitat for Myotis macropus, Phascogale tapoatafa, Petaurus norfolcensis, Ninox connivens	Adjacent vegetation	Daily – during construction stage	Potentially long- term impact	Construction	Unlikely; Risk of disturbance of genetic exchange between flora species; Risk of disturbance to retained vegetation; Risk of loss/disturbance to fauna habitat (nests, foraging habitat); Minor risk of injury or mortality of fauna during clearing within subject land.
reduced viability of adjacent habitat due to edge effects	PCT 3446, PCT 3433, potential habitat for Myotis macropus, Phascogale tapoatafa, Petaurus norfolcensis, Ninox connivens	Adjacent vegetation	Ongoing – all stages	Potentially long- term impacts	All stages of development	Unlikely; Risk of disturbance to retained vegetation; Potential disturbance via erosion and sediment flows tor retained adjacent vegetation; Increased edge effect may have an impact on accessibility to native vegetation for threatened species.
reduced viability of adjacent habitat due to noise, dust or light spill	Potential habitat for Myotis macropus, Phascogale tapoatafa, Petaurus norfolcensis, Ninox connivens	Adjacent vegetation/ habitat	Daily – during construction phase	Medium term impact	Construction	Moderate; Alter fauna behaviour (breeding, roosting and movement) in the immediate locality; Dust cover may impact function of flora species in immediately adjacent vegetation; increased light in the locality impacting on nocturnal fauna movements.
transport of weeds and pathogens from the site to adjacent vegetation	PCT 3446, PCT 3433, potential habitat for <i>Myotis macropus</i>	Adjacent and downstream vegetation	Ongoing during construction and operation	Potentially long- term impact	All stages	Moderate; Mortality and degradation of adjacent vegetation from disease; increase risk in weed presences; loss of fauna habitat.
increased risk of starvation or exposure, and loss of shade or shelter	Myotis macropus, Phascogale tapoatafa, Petaurus norfolcensis, Ninox connivens	Adjacent habitat	Ongoing During construction and Operation	Long term	Ongoing	Unlikely; increased density of fauna biota within given areas due to habitat clearing; starvation based on an increase of competition coupled with habitat lacking resources; dispersal of local fauna due to increase in competition.
loss of breeding habitat	Myotis macropus, Phascogale tapoatafa, Petaurus norfolcensis, Ninox connivens	Adjacent breeding habitat	Ongoing	Long term	Construction	Unlikely; inadvertent impact to breeding habitat through the loss of vegetation within development, increased pressure on existing adjacent breeding habitat.
trampling of threatened flora species	NA	Adjacent vegetation	Ongoing during construction and operation	Potentially long- term impacts	All stages	Unlikely; minor risk of workers trampling adjacent vegetation during construction; minor risk of residents entering retained area and trampling vegetation.



Indirect impact	Impacted entities	Extent	Frequency	Duration	Project phase/ timing of impact	Likelihood and consequences
inhibition of nitrogen fixation and increased soil salinity	PCT 3446, PCT 3433	Adjacent vegetation	During construction	Long Term	All stages	Unlikely; minor risk of inhibition of nitrogen fixation due to increased weed pressure; minor risk due to increase in sediment runoff.
fertiliser drift	PCT 3446, PCT 3433	Adjacent vegetation and downstream vegetation/ waterbodies	Ongoing construction and operation	Long Term	Operational	Unlikely; increase risk of eutrophication within downstream waterbodies, reduction in overall soil health of the area.
rubbish dumping	PCT 3446, PCT 3433, potential habitat for <i>Myotis</i> macropus	Adjacent vegetation	Ongoing construction and operation	Long term	Operational	Possible; moderate risk of residents dumping rubbish within retained vegetation.
wood collection	PCT 3446, PCT 3433, potential habitat for <i>Myotis</i> macropus, <i>Phascogale</i> tapoatafa	Adjacent vegetation	Ongoing construction and operation	Long Term	Operational	Possible; moderate risk of residents collecting wood within retained vegetation.
removal and disturbance of rocks, including bush rock	NA	Adjacent vegetation	Ongoing construction and operation	Long Term	Construction operation	Unlikely; minor risk displacement of bush rock, loss of habitat features.
increase in predators	PCT 3446, PCT 3433, potential habitat for Myotis macropus, Phascogale tapoatafa, Petaurus norfolcensis, Ninox connivens	Adjacent vegetation	Ongoing Operation	Long Term	Operational	Possible; Moderate risk introduction of domesticated predators e.g. cats, within the local area, increased risk of potential native fauna mortality.
increase in pest animal populations	Phascogale tapoatafa, Petaurus norfolcensis,	Adjacent vegetation	Ongoing Construction and operation	Long Term	Construction and Operational	Unlikely; Moderate risk to increase populations of urban adapted species, resulting on increased competition/ risk of disease within local fauna population.
changed fire regimes	PCT 3446, PCT 3433, potential habitat for Myotis macropus, Phascogale tapoatafa, Petaurus norfolcensis, Ninox connivens	Adjacent vegetation	Ongoing Construction and Operation	Long Term	Construction and Operational	Unlikely; Moderate risk to changes in successional flora post fire events, leading to an increased risk of weeds; Minor risk to increase of intensity of fire events due to improper fire regimes.
disturbance to specialist breeding and foraging habitat (eg beach nesting for shorebirds)	NA	Adjacent vegetation and waterbodies	Daily Construction	Short Term	Construction	Unlikely; Minor risk; specialist breeding species not detected within the site's boundaries, as such it is considered unlikely that the proposal would impact upon these specialist species.



#### 8.3 Prescribed impacts

#### 8.3.1 Habitat Connectivity

#### 8.3.1.1 Nature

The proposal would remove vegetation within the subject land that provides connectivity for some arboreal species to several small extensions of habitat east of the subject land. These patches are not further connected to the surrounding environment (gaps greater than 100 m). Although small in size, the patches contain a high density of old growth and hollow trees, providing foraging and breeding resources.

#### 8.3.1.2 Extent

These extensions occur generally within the study area (Lot) east of the subject land, as well as a small area in the RU1 Lot to the north of the subject land. The patches occur as three (3) discrete habitat extensions; from north to south these are equal to approximately 1.98 ha, 0.42 ha and 2.10 ha in area.

#### 8.3.1.3 **Duration**

The loss of these connections is permanent under the current proposal, with the exception of the first patch which sits partially on the RU1 land to the north. Boundary revegetation could be utilised to reconnect this patch to intact remnant forest and woodland (in the west) in the medium- to long-term.

#### 8.3.1.4 Consequences

The isolated habitat will become isolated and sterilised for the relevant species, with the associated loss of breeding habitat and foraging resources. As a result, additional prescribed impact polygons have been prepared for affected species (see **Sections 5.6.2.3-4** and **Figure 6**).

The reconnection of some habitat extensions is practical, and the potential for this is discussed in **Sections 5.6.2.3-4**.

#### 8.3.2 Waterbodies, water quality and hydrological processes

#### 8.3.2.1 Nature

Most of the watercourses in the study area are incised gullies with ephemeral flow, with semipermanent or permanent water held in inline dams which have either been constructed, or modified to take advantage of natural bedform.

The proposal includes road crossings of a third order stream in the south and a first order stream centrally. The proposal would utilise an existing dam on another first order stream for stormwater detention – this stream directly tributes the third order stream at the road crossing. The proposal would also fill a mapped first order stream in the north including an existing farm dam, which would be relocated to the property boundary for stormwater detention.

Impacts to species that utilise the waterbodies will be mitigated by the creation of detention basins which will mimic to a degree the habitat function of dams.

#### 8.3.2.2 Extent

The proposed works in watercourses are limited in area, high in the catchment and generally affecting modified lower-order watercourses. Some reduction in water quality and availability of riparian and aquatic habitat will occur. Each dam proposed to be repurposed as a detention basin is approximately 1000 m² in area. The road crossing will impact approximately 3500 m² of the riparian zone associated with the third order stream, being the channel width and 30 m buffer.



#### **8.3.2.3 Duration**

Crossings and infrastructure are permanent, however the potential impacts to water quality and riparian habitat will be managed in the long term by revegetation in accordance with landscape plans.

#### 8.3.2.4 Consequences

Temporary reductions in availability of aquatic habitat and water quality are likely during construction. The disturbed nature of the waterbodies throughout the site also limits the reach of the potential consequences for threatened species. Revegetation in accordance with an approved landscape plan has the potential to increase habitat quality of waterbodies for some species relative to current condition.

#### 8.3.3 Vehicle strikes

Vehicle strikes remain a potential risk for all protected fauna in associated with increasing vehicle traffic on Anambah Road that cannot be mitigated or managed by the proponent. The increase in traffic movement associated with the residential uptake of Anambah is a broader consequence that should be managed by local and state authorities with responsibility for traffic controls. The risk of strike within the development area is negligible given likely vehicle speeds in an MHE.

Table 23. Residual prescribed impacts – vehicle strikes

Species Name (Common Name)	SAII entity	Likelihood	Estimated vehicle strike rate	Consequences
Dasyurus maculatus (Spotted-tailed Quoll)	No	Low – low species not detected within the site.	Low	Increased risk of mortality in local population.
Phascogale tapoatafa (Brush-tailed Phascogale)	No	Moderate – species detected within the site.	Low	Increased risk of mortality in local population.
Large Forest Owls	No	Low – detected in the site but at reduced risk due to mobility and nocturnal activity pattern	Low	Increased risk of mortality in local population.



## 8.4 Mitigating residual impacts – management measures and implementation

Table 24. Summary of proposed mitigation and management measures for residual impacts (direct, indirect and prescribed)

Mitigation measure	Method/technique	Timing	Freq.	Responsibility	Performance criteria	Corrective Action	Likely efficacy (including risk of failure)	MNES (when relevant)
Mitigate direct loss of individuals of threatened species associated with removal of habitat.	Vegetation removal works are to occur outside core breeding periods for species known to use habitat on site wherever possible. Where not possible supervision by an ecologist is required to ensure harm to individual entities is minimised.	Summer	NA	Proponent/ Ecologist	Works plan indicates tree clearing areas during optimal months	Cease site works and refer to technique & performance criteria and timing of activities	Moderate. Risk of failure remains, as no timing can mitigate risks to all species.	NA
	Pre-clearance survey of trees to be removed	Prior to commencement of works for each stage	NA	Proponent/ Ecologist	Tree pre-clearance survey completed maximum one week prior to removal.	revert to technique	Good. Risk of losses significantly reduced	NA
	Mark habitat trees	Prior to commencement of works for each stage	NA	Proponent		* · ·	Good. Risk of losses significantly reduced	NA
	Under scrubbing of vegetation and removal of non-habitat trees to occur in a sequence to allow for resident fauna to move to adjacent areas of habitat	Prior to commencement of works for each stage	NA	Proponent	All habitat trees flagged and determine fauna presences (utilisation)	Cease site works, revert to technique & performance criteria	Good. Risk of losses significantly reduced	NA
			Proponent/ Civil contractor/s	No injury or mortality of native fauna during clearing works	Cease site works, revert to technique & performance criteria	Good. Risk of losses significantly reduced		
	Felling supervised by Ecologist	During clearing works for each stage	NA	Proponent/ Ecologist	Hollows checked for fauna. Welfare managed	Cease site works, revert to technique	Moderate. Risk of failure remains. Though this is a late	NA



Mitigation measure	Method/technique	Timing	Freq.	Responsibility	Performance criteria	Corrective Action	Likely efficacy (including risk of failure)	MNES (when relevant)
					in accordance with ethics approval	& performance criteria	step in an otherwise effective process	
	Felled trees left in situ before stockpiling to allow for any fauna to relocate	After felling of hollow-bearing and habitat trees, prior to stockpiling	NA	Proponent	Trees left overnight after felling, stockpiled within clearing boundary	Cease site works and refer to technique & performance criteria and timing of activities	Moderate. Risk of failure remains, though this method is the last step in an effective process, so risk is low.	NA
	Develop a Biodiversity Management Plan (BMP) in consult with consent authority for addressing management actions of habitat removal	Prior to commencement of works for each stage	NA	Proponent	Approved BMP prior to construction of each stage	Cease site works, revert to technique & performance criteria	Good. Risk of losses significantly reduced by documenting an effective process	NA
Mitigate indirect impacts to retained vegetation adjacent to the subject land	Credits have been calculated on the loss of habitat due to fragmentation of the vegetation in the study area. If these impacts can be managed, the consent authority should not consider the credits	Prior to commencement of any works	NA	Proponent	Credits listed in Notice of Determination and retired, or discharged by the consent authority if managed	Notify consent authority	Good. Loss of habitat will be directly offset if credit costs are used for the creation or improvement of habitat	NA
	Establish Tree Protection Zones (TPZ) around retained habitat trees on the boundary of the development/ within APZ area	Prior to commencement of works for each stage	NA	Proponent/ Civil contractor/s	TPZ is in accordance with Australian Standards AS4970-2009. No-Go signs & fencing of boundary	Cease site works, revert to technique & performance criteria	Good. Risk of losses significantly reduced	NA
	Develop a weed management protocol to be included in Construction Environment Management Plan (CEMP) for constructions period to limit degradation of interface of development and retained vegetation	Prior to commencement of works for each stage	NA	Proponent	Approved CEMP (Inc. weed management protocols) prior to construction of each stage	Cease site works, revert to technique & performance criteria	Moderate. Risk of failure remains as weed propagules difficult to control and construction spoil creates ideal habitat for establishment of weeds of disturbance and HTEs	NA



Mitigation measure	Method/technique	Timing	Freq.	Responsibility	Performance criteria	Corrective Action	Likely efficacy (including risk of failure)	MNES (when relevant)
	Develop a Vegetation Management Plan (VMP) addressing ongoing impacts to retained and surrounding native vegetation.	Prior to commencement of works for each stage	NA	Proponent	Approved VMP prior to construction of each stage	Cease site works, revert to technique & performance criteria	Good. Risk of degradation significantly reduced and substantial improvement is practically achievable	NA
	Equipment and vehicles entering Site are cleaned of foreign soil and seed prior to entering the site	Prior to machinery arriving on Site	Per Float	Proponent/ Civil contractor/s	Best practice hygiene protocols followed, No visible foreign material, certification available upon request	Cease site works, revert to technique & performance criteria	Moderate. Risk of failure remains as pathogens can persist in very low volumes of material	NA
Mitigate indirect impacts to threatened	Limit construction works to daylight hours to reduce impacts from light and noise	For the duration of Site works	NA	Proponent/ Civil contractor/s	No construction works to occur from dusk till dawn. Site not lit between dusk and dawn	Cease site works, revert to technique & performance criteria	Good. No risk.	NA
species habitat retained adjacent to the subject	All machinery is correctly maintained and operated as per operation manual to reduce excessive noise	For the duration of Site works	NA	Proponent/ Civil contractor/s	No excessive noise of machinery due to poor maintenance or faulty parts	Cease site works, revert to technique & performance criteria	Moderate.	NA
land	Vehicles/machinery to observe 5-10 km/h speed limit on Site to reduce dust	For the duration of Site works	NA	Proponent/ Civil contractor/s	No excessive dust	Cease site works, revert to technique & performance criteria	Good. Risk remains however consequence is relatively low.	NA
Mitigating Prescribed Impacts to threatened species and their habitat	Erosion and sediment controls enacted in accordance with construction environment management plan (CEMP) to limit impacts on retained vegetation and creeklines.	Prior to commencement of works, for duration of Site works	NA	Proponent/ Civil contractor/s	CEMP followed & modified as needed	Cease site works, revert to technique & performance criteria	Good. Significant control is achievable if implemented effectively. High consequence of failure.	NA
	Establish Speed limits during construction and operation of the proposed development	Prior to construction and during operation	NA	Proponent/ Civil contractor/s	Low speed limits set to minimise vehicle strikes	Cease site works, revert to technique & performance criteria	Moderate. Risk of strikes remains and high consequence of failure.	NA



## 9. Serious and irreversible impacts

# 9.1 Assessment for serious and irreversible impacts on biodiversity values

No impacts associated with the proposal are likely to be serious and irreversible. See **Section 5** for details of entities assessed and justification of exclusion of SAII.

Table 25. Entities at risk of an SAII

Common name	Scientific name	Reason for inclusion in assessment
NA		



## 10. Impact summary

## 10.1 Determine an offset requirement for impacts

#### 10.1.1 Impacts on native vegetation and TECs or ECs (ecosystem credits)

**Table 26** identifies impacts on native vegetation and TECs or ECs that do not require an offset (as per BAM Subsection 9.2.1(3.)). **Table 27** identifies impacts that require an offset (as per BAM Subsection 9.2.1(1.)). Refer to **Figure 7** 

Table 26. Impacts that do not require offset – ecosystem credits

Vegetation zone	PCT name	TEC	Impact area (ha)	TEC association	Entity at risk of an SAII?	Current VI score
4	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest	Not representative of a TEC	28.91	Part association Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions (BC Act E)	No	16.4

Table 27. Impacts that require an offset – ecosystem credits

Vegetation zone	PCT name	TEC	Impact area (ha)	Current VI score	Future VI score	Change in VI score	Biodiversity risk weighting	Number of ecosystem credits required
1	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest	Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions (BC Act E)	1.94	49.1	0	-49.1	2	48
2	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest (BC Act E)	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions (BC Act E)	1.25	47	0	-47	2	29
3	_ ,	No	3.73	28.9	0	-28.9	1.75	45
Total credits								122



#### 10.1.2 Impacts on threatened species and their habitat (species credits)

**Table 28** identifies impacts on threatened species (species credits) that require an offset (as per BAM Subsection 9.2.2(2.)) and also provides additional credits to mitigate the prescribed impact to habitat connectivity outside of the subject land affecting relevant species as described in **Sections 5.6.2.3-4** and **8.3.1** 

Table 28. Impacts that require an offset – species credits

Scientific name	Common name	BC Act status	EPBC Act status	Loss of habitat (ha) or individuals	Biodiversity risk weighting	Number of species credits required (BAM-C)				
Litoria brevipalmata	Green-thighed Frog	V	-	0.03	1.50	1				
Myotis macropus	Southern Myotis	V	-	2.63	2.00	64				
Ninox connivens	Barking Owl	V	-	3.19	2.00	77				
Petaurus norfolcensis	Squirrel Glider	V	-	3.19	2.00	77				
Phascogale tapoatafa	Brush-tailed Phascogale	V	-	3.19	2.00	77				
					Total BAM-C Credits	296				
Additional Credits to Mitiga	Additional Credits to Mitigate Prescribed Impact – Habitat Connectivity for Species Credit Species									
Scientific name Common name Patch 1 (ha. (credits)) Patch 2 (ha. (credits)) Patch 3 (ha. (credits)) Total Additional C										

Additional Credits to witigate Fre	dutional Credits to Mitigate Frescribed Impact - Habitat Connectivity for Species Credit Species										
Scientific name	Common name	Patch 1 (ha, (credits))	Patch 2 (ha, (credits))	Patch 3 (ha, (credits))	Total Additional Credits						
Petaurus norfolcensis	Squirrel Glider	1.98 (48)	0.42 (10)	2.10 (52)	109						
Phascogale tapoatafa	Brush-tailed Phascogale	1.98 (48)	0.42 (10)	2.10 (52)	109						

## 10.2 Impacts that do not need further assessment

Table 29 identifies impacts that do not need further assessment for ecosystem credits (as per BAM Section 9.3(1–2.). Refer to Figure 7

Table 29. Impacts that do not need further assessment for ecosystem credits

Impact	Location within subject land	Justification why no further assessment is required
Clearing of pasture vegetation	Throughout and primarily comprising subject land and ancillary works	VI score below threshold for credits, threatened species habitat not present

## 11. Biodiversity credit report

The BAM-C credit report must identify the numbers and classes of biodiversity credits required to be retired in accordance with the like-for-like requirements of the offset rules and those that could be retired in accordance with the variation rules. The BDAR must be submitted to the decision-maker within 14 days of the date the BAM-C credit report was finalised. Refer to **Appendix M Credit reports**.

<u>The consent authority should note</u> that Species Credits additional to those listed below and on the Credit Report have been proposed to mitigate prescribed impacts in **Section 10.1.2**, and described in **Sections 5.6.2.3-4** and **8.3.1**. The additional credits may not be required if the consent authority is satisfied that they can be effectively managed. Note that as a prescribed impact, the proposed additional credits are a mitigation measure – not an offset. As such, they are not listed below

### 11.1 Ecosystem credits

Table 30. Ecosystem credit class and matching credit profile

Ecosystem credits	Attributes shared with matching credits						
	PCT name	PCT vegetation class	PCT vegetation formation	Associated TEC or EC	Offset trading group (BAM Section 10.2, Tables 4 & 5)	Hollow bearing trees present?	IBRA subregion (in which proposal is located)
48	3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest	Hunter-Macleay Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrub/ grass sub- formation)	Yes	Hunter Lowland Redgum Forest in the Sydney Basin & NSW North Coast Bioregions	Yes	SYB-Hunter
29	3433 Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Hunter-Macleay Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrub/ grass sub- formation)	Yes	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin & NSW North Coast Bioregions	Yes	SYB-Hunter
45	3433 Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Hunter-Macleay Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrub/ grass sub- formation)	Not a TEC	Hunter-Macleay Dry Sclerophyll Forests >=50% and <70%	No	SYB-Hunter

## 11.2 Species credits

<u>The consent authority should note</u> that Species Credits additional to those listed below and on the Credit Report have been proposed to mitigate prescribed impacts in **Section 10.1.2**, and described in **Sections 5.6.2.3-4** and **8.3.1**. The additional credits may not be required if the consent authority is satisfied that they can be effectively managed. Note that as a prescribed impact, the proposed additional credits are a mitigation measure – not an offset. As such, they are not listed below.

Table 31. Species credit class and matching credit profile

Species credits	Attributes shared with matching credits					
	Name of threatened species	Kingdom	BC Act status	EPBC Act status	IBRA region	
1	Litoria brevipalmata – Green-thighed Frog	Animalia	Vulnerable	-	Any in NSW	
64	Myotis macropus – Southern Myotis	Animalia	Vulnerable	-	Any in NSW	
77	Ninox connivens – Barking Owl	Animalia	Vulnerable	-	Any in NSW	
77	Petaurus norfolcensis – Squirrel Glider	Animalia	Vulnerable	-	Any in NSW	
77	Phascogale tapoatafa – Brush-tailed Phascogale	Animalia	Vulnerable	-	Any in NSW	



#### 12. Conclusion

MJD Environmental have been engaged by Mid North Coast Projects on behalf of Third.i Anambah Pty Ltd to prepare a Biodiversity Development Assessment Report to accompany a Concept Development Application. The proposal is seeking concept approval for the staged development of the concept master plan, creating a Manufactured Home Estate on RU2 Rural Landscape zoned land on Lot 177/DP874171 and Lot 55 DP874170 at 559 Anambah Road, Gosforth.

The subject land is not mapped on the OEH Biodiversity Values Map, however the proposal exceeds the area clearing threshold for the relevant minimum lot size of 450 m2, being the clearing of an area of native vegetation greater than 2,500 m2. This is one of the triggers for the Biodiversity Offsets Scheme applying to the proposal.

The project location and design are predicated on the avoidance of extant native timber vegetation and the utilisation of primarily cleared agricultural areas on the subject land. Impacts to threatened species habitat have been minimised by the retention of important habitat corridors and hollow bearing trees.

The forest and woodland margins, paddock trees and timbered patches on the subject land have been assessed as being best represented by the Plant Community Types in **Table E1**.

PCT ID	PCT Name	Vegetation formation	Vegetation class	Per cent cleared value (%)
3446	Lower North Foothills Ironbark- Box-Gum Grassy Forest	Dry Sclerophyll Forests	Hunter-Macleay	74.93%
3433	Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	(Shrub/grass sub- formation)	Dry Sclerophyll Forests	68.60%

Table E4. Plant Community Types assessed on the subject land

The PCTs on the subject land include vegetation that has been assessed as representative of BC Act Threatened Ecological Communities:

- BC Act Endangered: Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions
- BC Act Endangered: Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions

Surveys carried out over the subject land ruled out the presence of candidate species credit species with the exception of:

- Litoria brevipalmata (Green-thighed Frog)
- Myotis macropus (Southern Myotis)
- Ninox connivens (Barking Owl)
- Petaurus norfolcensis (Squirrel Glider)
- Phascogale tapoatafa (Brush-tailed Phascogale)

No entities at risk of Serious and Irreversible Impact were identified on the subject land or assessed as having likely habitat within the relevant buffers from the subject land as per the TBDC.

The proposal will impact 6.73 ha of native vegetation comprising the listed PCTs and forming habitat for the listed Threatened Species, with offsets required for relevant impacts to vegetation zones and species polygons calculated in **Table E2** (Ecosystem Credits) and **Table E3** (Species Credits)





A package of iterative avoidance and mitigation measures are described herein, including site selection, project design and measures to make account for indirect impacts. The project utilises to a large extent previously cleared agricultural land.

Species Credits additional to those listed below and on the Credit Report have been proposed to mitigate prescribed impacts (habitat connectivity) for relevant species credit species detected on the subject land.

Table E5. Impacts that require an offset – ecosystem credits

Vegetation zone	PCT	TEC/EC	Impact area (ha)	Number of ecosystem credits required
VZ1: 3446_Intact	3446	Yes 10416 HLRF	1.94	48
VZ2: 3433_Intact	3433	Yes 10942 LHSGIF	1.25	29
VZ3: 3433_Grassland	3433	Not a TEC	3.51	45

Table E6. Impacts that require an offset - species credits

Scientific name	Common name	Loss of habitat (ha/ # individuals)	Number of species credits required
Litoria brevipalmata	Green-thighed Frog	0.03	1
Myotis macropus	Southern Myotis	2.63	64
Ninox connivens	Barking Owl	3.19	77
Petaurus norfolcensis	Squirrel Glider	3.19	77
Phascogale tapoatafa	Brush-tailed Phascogale	3.19	77

The proposal has been assessed against SEPP (Biodiversity & Conservation) 2021 Chapter 4 Koala Habitat Protection 2021, and a Koala Assessment Report has been prepared. The KAR determined that it was unlikely the proposal would cause impact to Koala.

A preliminary assessment of matters protected by the EPBC Act determined that significant impacts under the proposal are unlikely to occur on entities assessed, and as such Referral to federal DCCEEW has not been recommended.

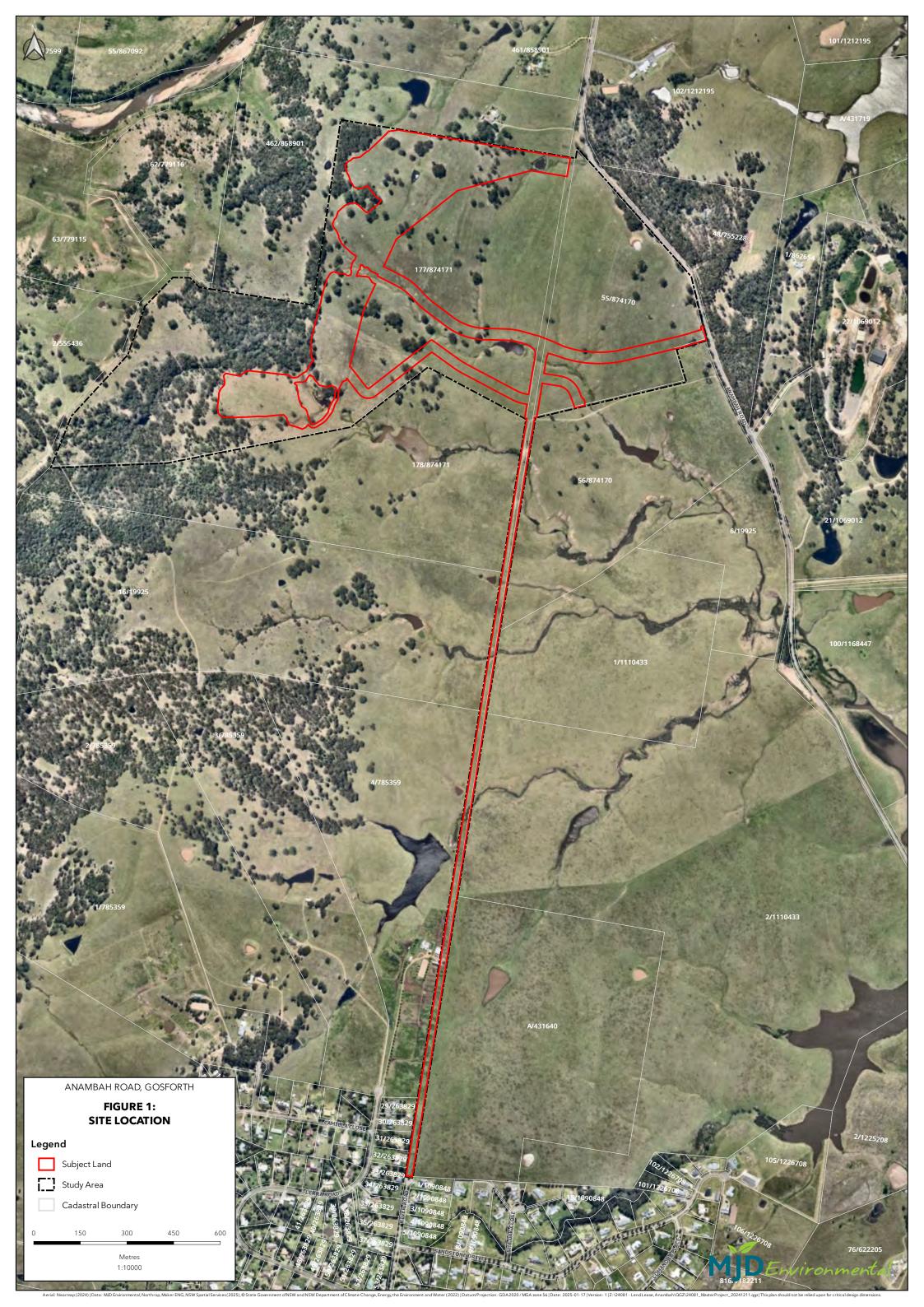


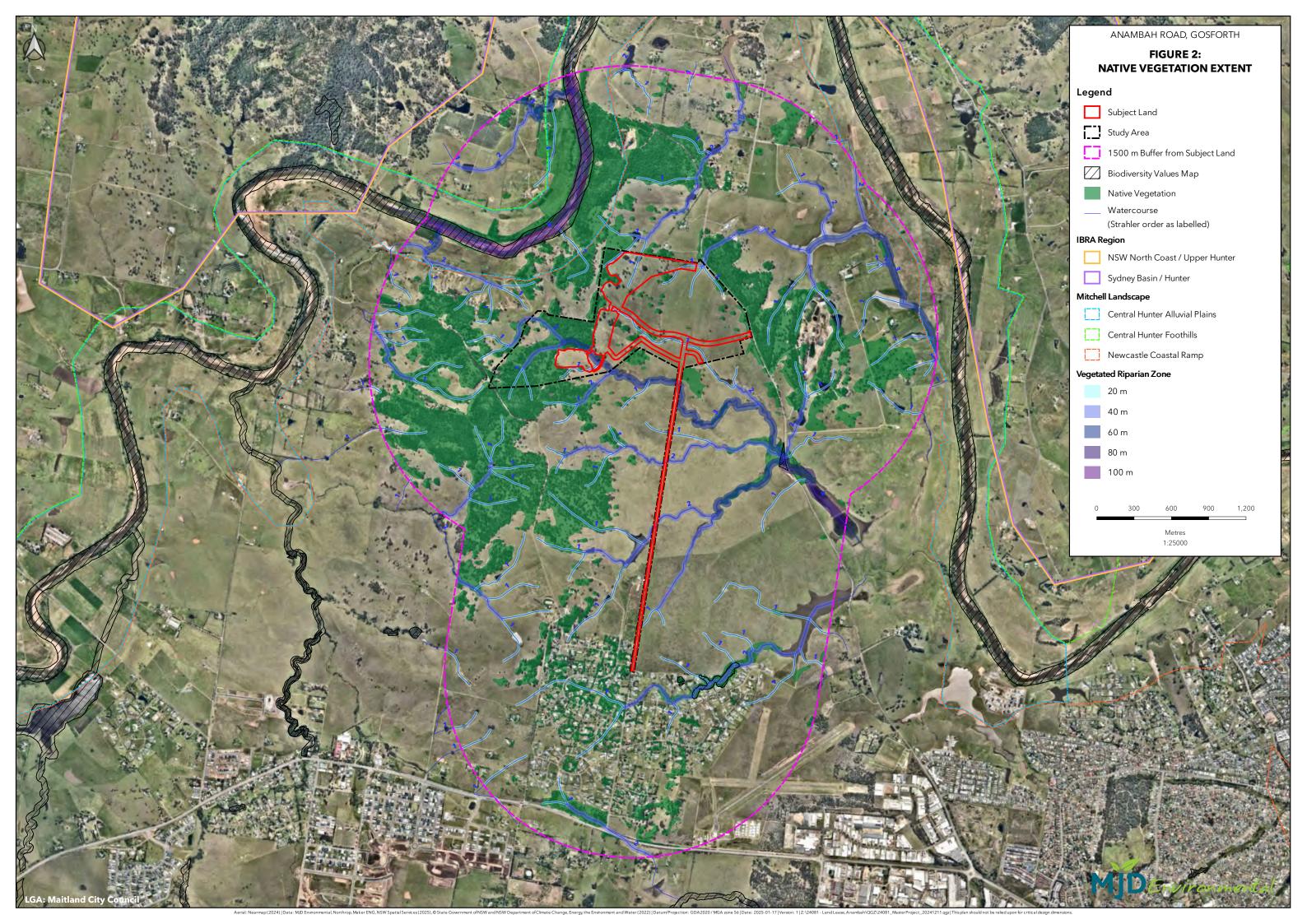
#### 13. References

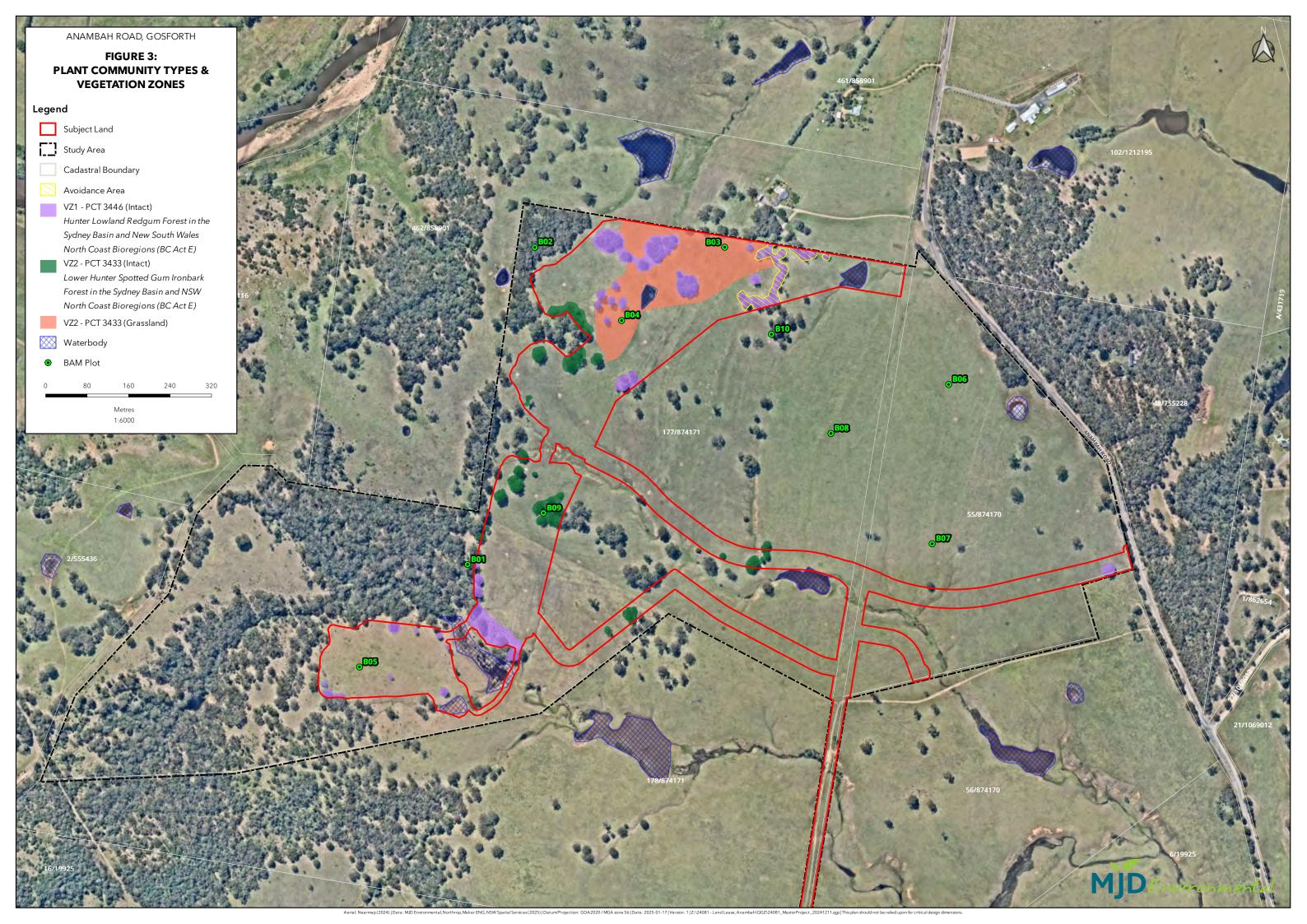
- Royal Botanic Gardens and Domain Trust, 2024 *PlantNET (The Plant Information Network System)*, Sydney, https://plantnet.rbgsyd.nsw.gov.au (accessed ongoing).
- DCCEEW (2024), Commonwealth Protected Matters of National Significance search tool, Department of Climate Change, Energy, Environment and Water, Canberra, Accessed January 2024, https://pmst.awe.gov.au/
- Naylor, S.D., Chapman, G.A., Atkinson, G., Murphy, C.L., Tulau, M.J., Flewin, T.C., Milford, H.B., Morand, D.T. (1998), *Acid Sulphate Soils Risk mapping*, NSW Department of Land and Water Conservation, Kempsey
- NSW DPE (2011), Maitland LEP 2011 Amendment Anambah Investigation Area (3000 lots), Department of Planning and Environment, Parramatta
- NSW DPE (2022a), Koala (Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide, Department of Planning and Environment, Parramatta
- NSW DPE (2022b), NSW Department of Planning and Environment Threatened Threatened reptiles Biodiversity Assessment Method survey guide, Department of Planning and Environment, Parramatta
- NSW DPIE (2020a), *Biodiversity Assessment Methodology (BAM):* Department of Planning, Industry and Environment, Parramatta
- NSW DPIE (2020b), *Biodiversity Assessment Method Operational Manual- Stage 1*, Department of Planning, Industry and Environment
- NSW DPIE (2020c), NSW Survey Guide for Threatened Frogs A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method, Department of Planning, Industry and Environment, Parramatta
- NSW DPIE (2020d) Surveying threatened plants and their habitats, NSW survey guide for the Biodiversity Assessment Method, Department of Planning, Industry and Environment, Parramatta.
- NSW DCCEEW (2018) *Biodiversity Values Map,* NSW Department of Climate Change, Energy, the Environment and Water, Parramatta,
- NSW DCCEEW (2020), NSW Landscape Modified (DEM-S) Elevation layer, NSW Department of Climate Change, Energy, Environment and Water, Parramatta
- NSW DCCEEW (2022), *NSW State Vegetation Type Map*, NSW Department of Climate Change, Energy, Environment and Water, Parramatta
- NSW DCCEEW (2024a), Biodiversity Values Map and Threshold tool, NSW Department of Climate Change, Energy, the Environment and Water, Parramatta, Accessed online June 2024 https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap
- NSW DCCEEW (2024b), NSW Digital Topographic Database, Department of Planning and Environment, Parramatta
- NSW DCCEEW (2024c) *NSW BioNet. Threatened Biodiversity Data Collection*, NSW Department of Climate Change, Energy, Environment and Water, Parramatta, Accessed online June 2024 http://www.bionet.nsw.gov.au/

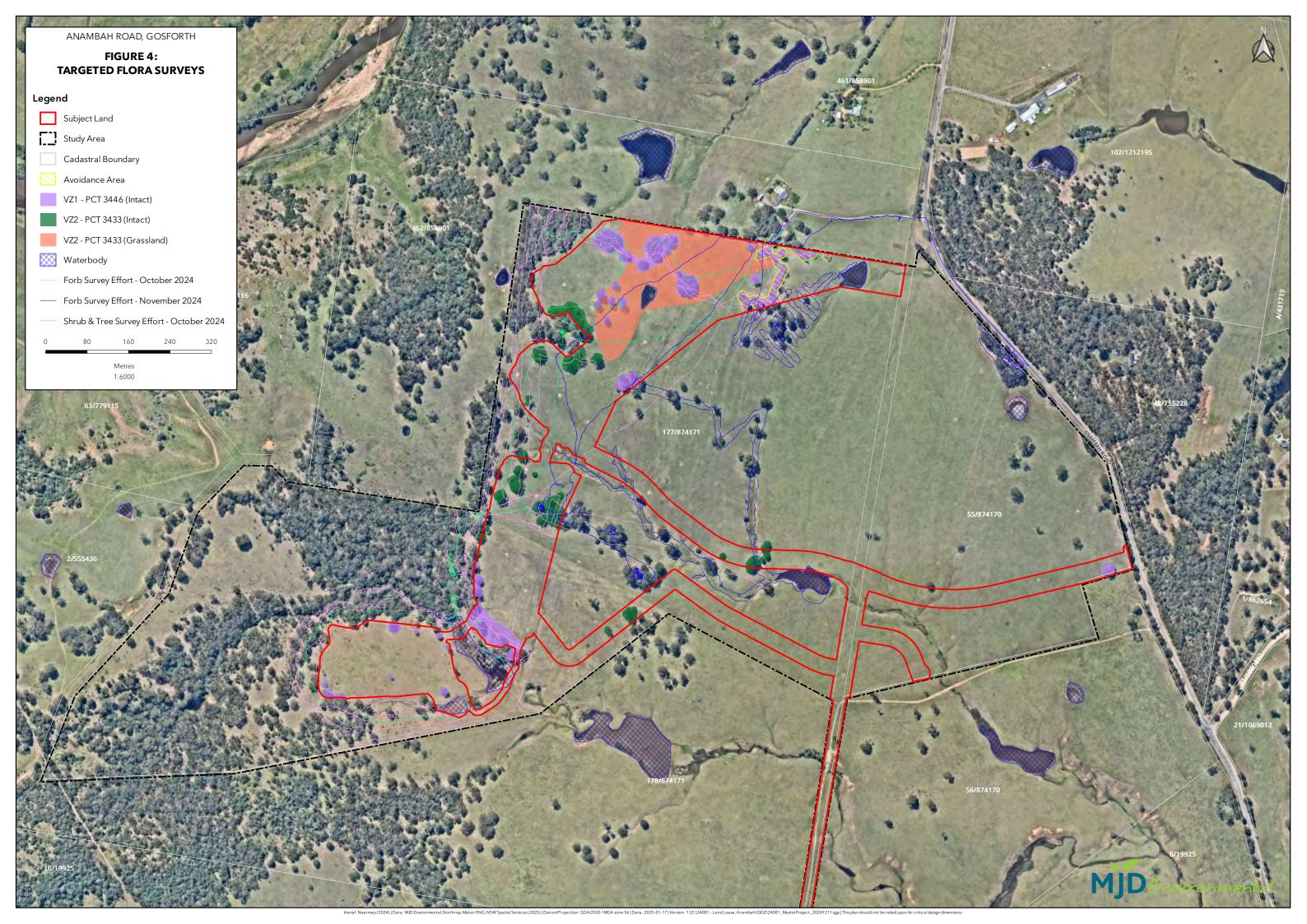


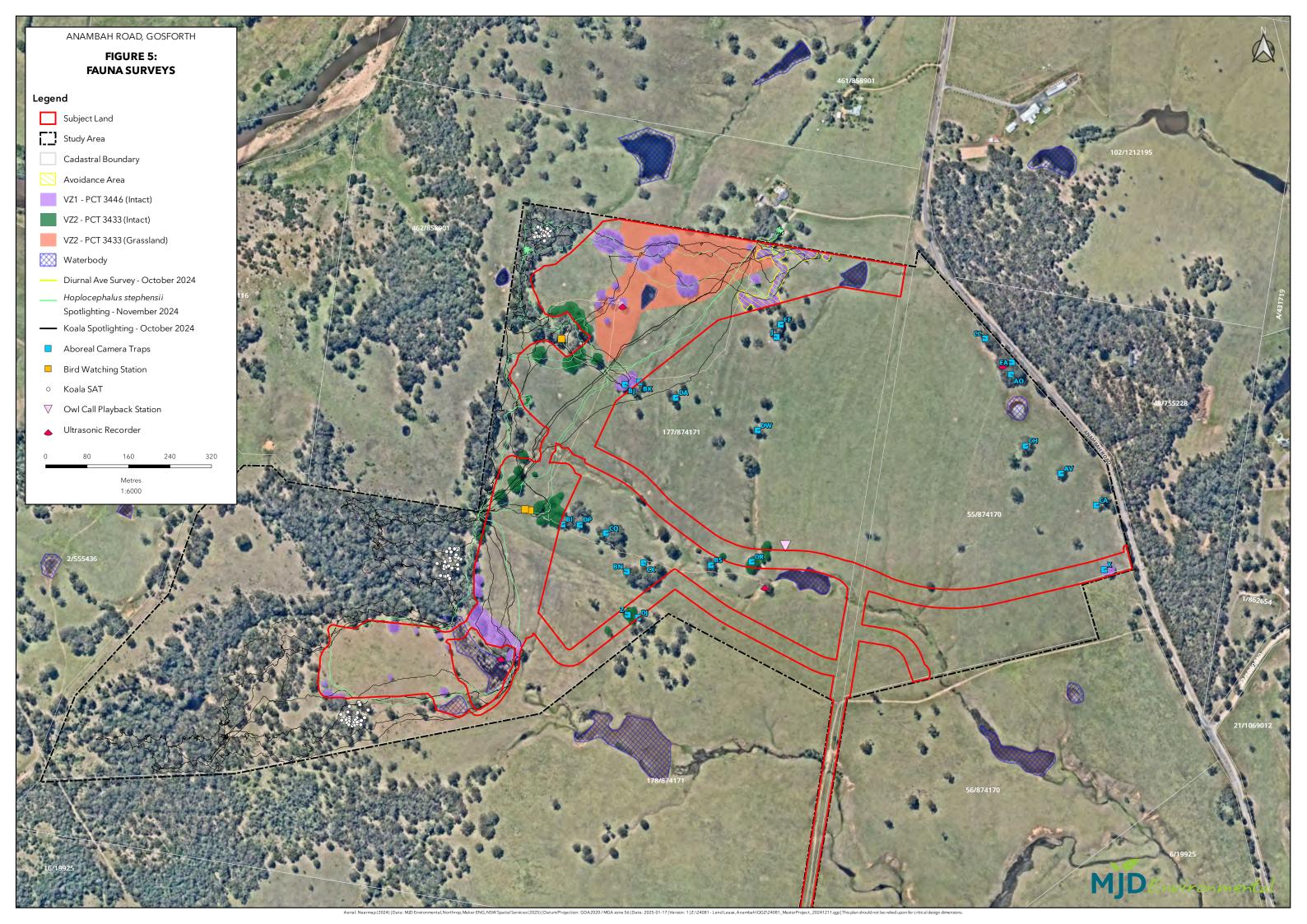
- NSW DCCEEW (2024d), *NSW BioNet (VIS)*, NSW Department of Climate Change, Energy, Environment and Water, Parramatta, Accessed online June 2024, https://vegetation.bionet.nsw.gov.au/
- NSW DCCEEW (2024e), NSW Native Vegetation Area Clearing Estimate (NVACE), NSW Department of Climate Change, Energy, Environment and Water, Parramatta
- NSW OEH 2018, NSW survey guideline for the Biodiversity Assessment Method; 'Species credit' threatened bats and their habitats, Office of Environment and Heritage, Parramatta
- Pizzey, G. and Knight, F. (2007) The Field Guide to the Birds of Australia. Harper Collins, Sydney.
- Robinson, M. (1998) A Field Guide to Frogs of Australia. Reed New Holland, Sydney.
- Simpson. K, and Day. N. (2010) Field Guide to the Birds of Australia. Penguin Group, Australia.
- Strahan, R. (2004) The Mammals of Australia. New Holland Publishers, Australia.
- Thackway. R., Cresswell. I.D. (1995) *An Interim Biogeographic Regionalisation for Australia*. Reserve Systems Unit, Australian nature Conservation Agency
- Tyler, M. J. And Knight. F. (2011) *Field Guide to the Frogs of Australia*. Revised Edition. CSIRO Publishing, Australia.

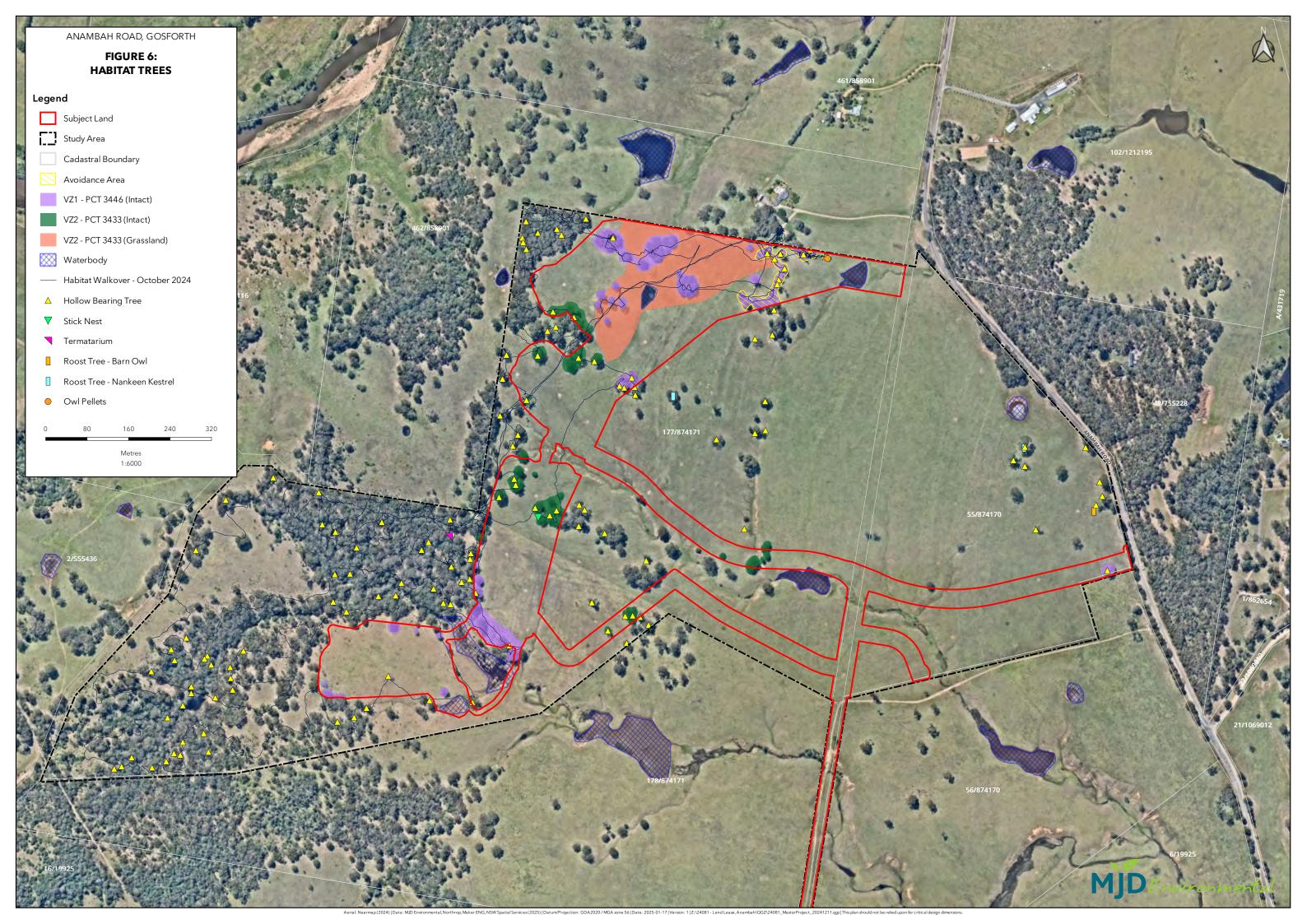


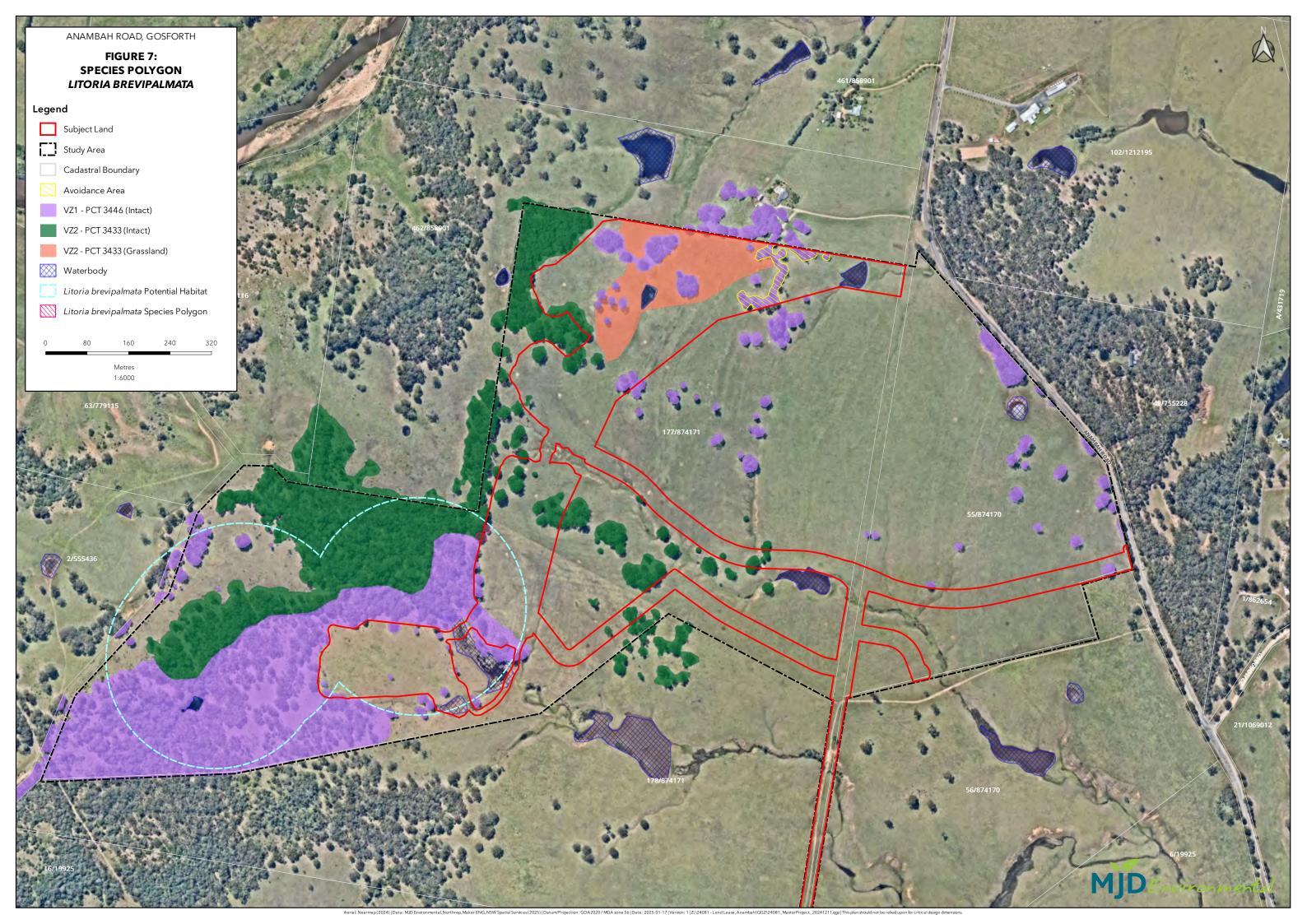


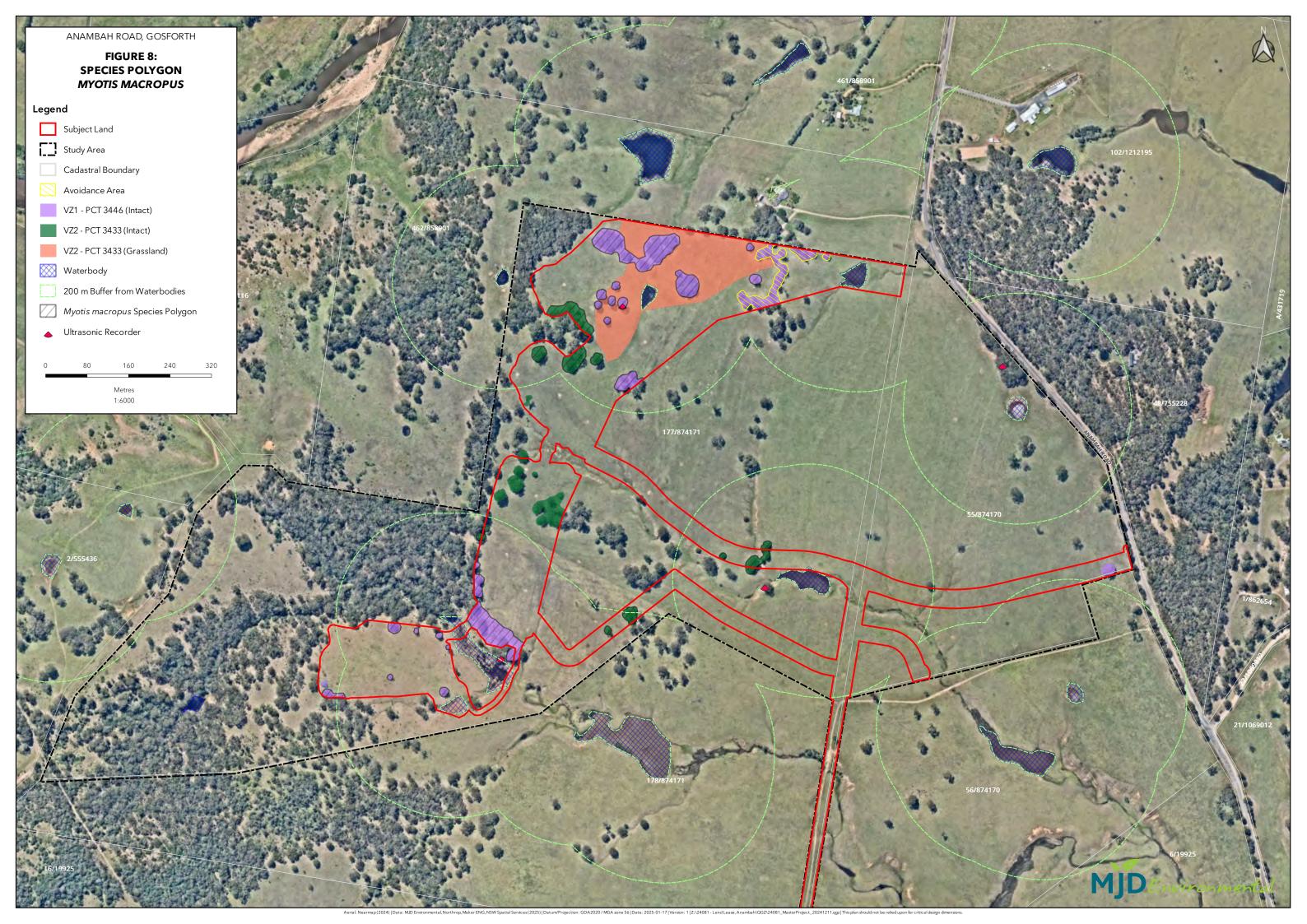


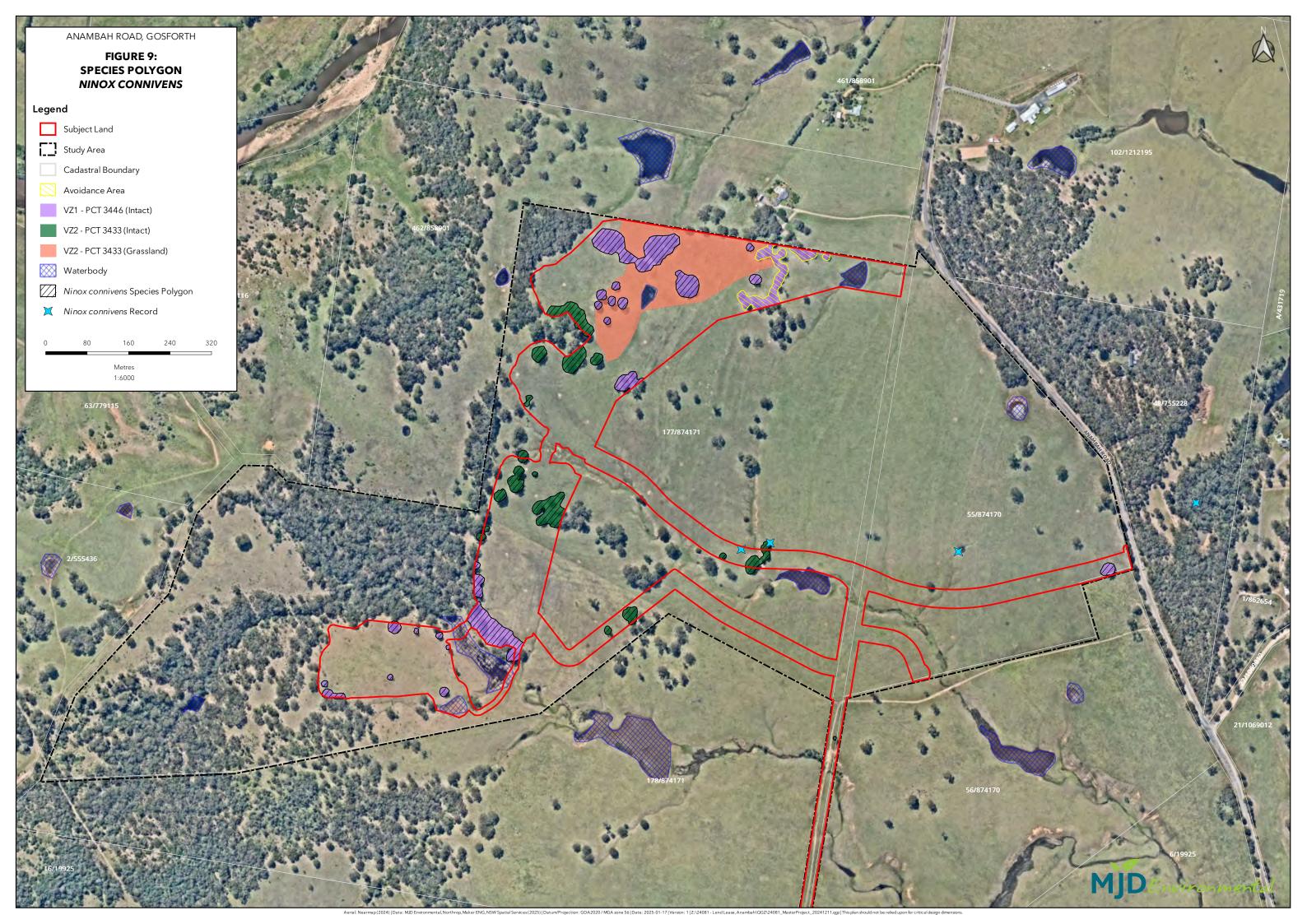


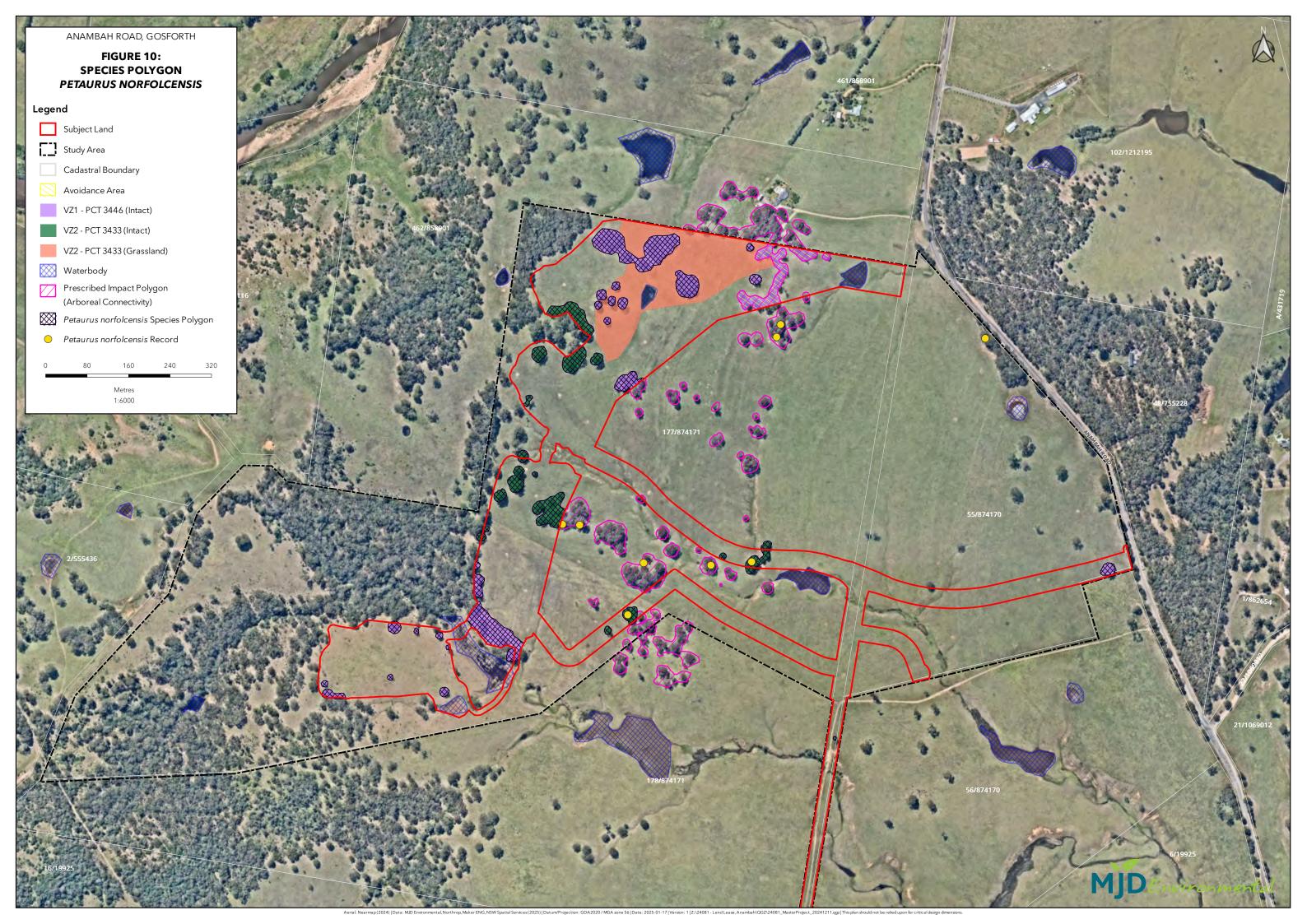


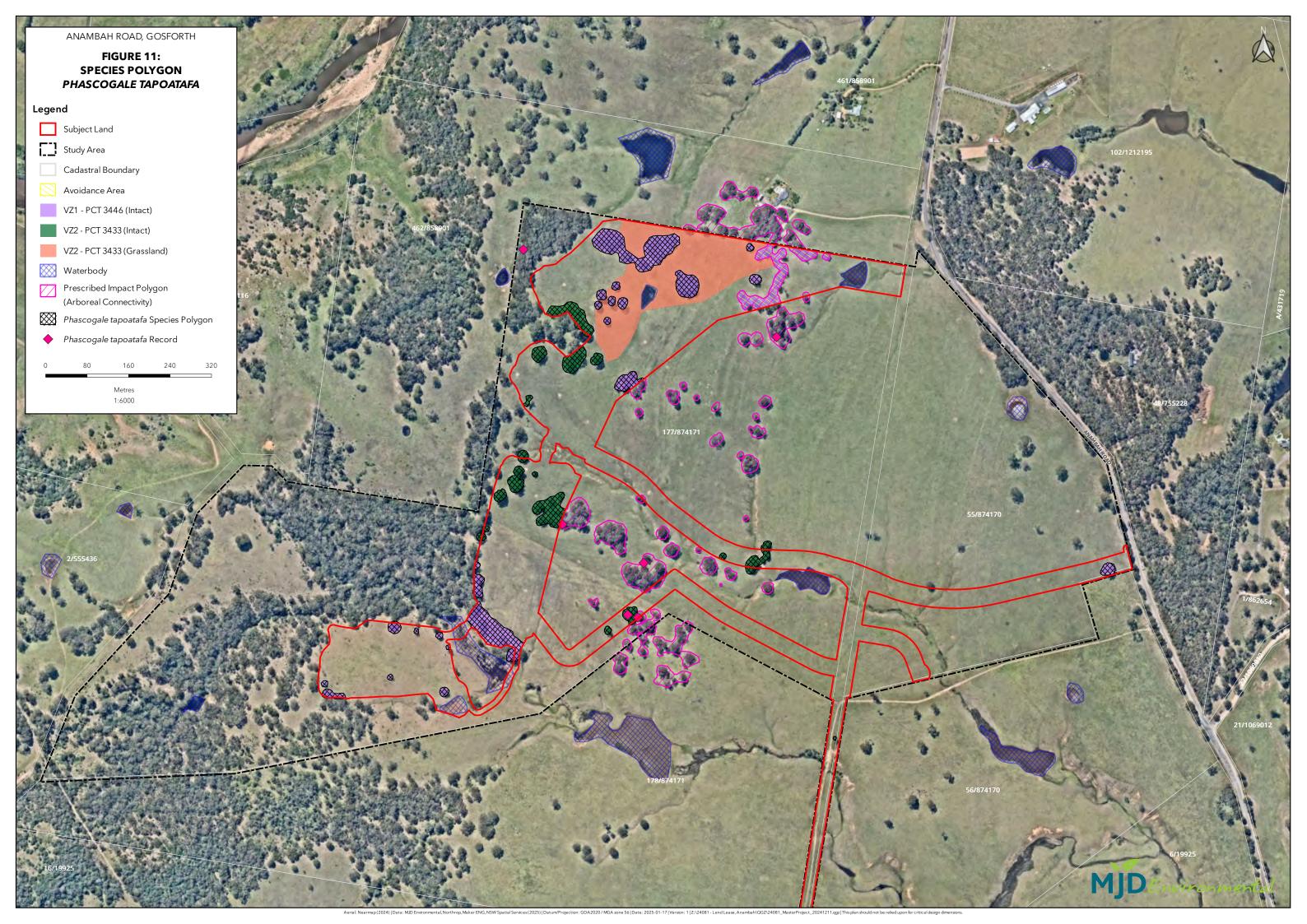


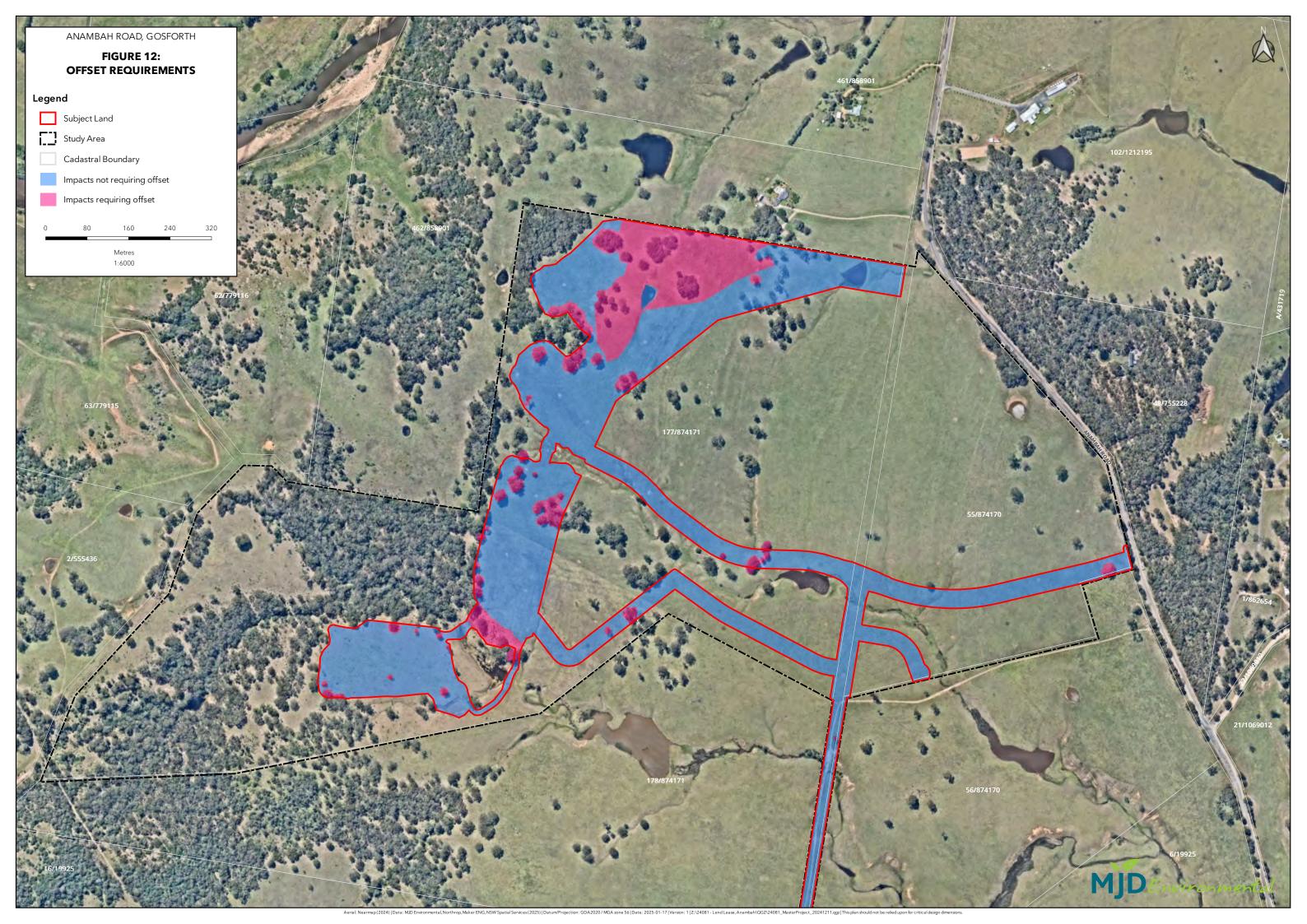














## Appendix A. BDAR requirements compliance

Table 32 specifies where each component of the BDAR minimum information requirements has been addressed in accordance with BAM Appendix K.

Table 32. Assessment of compliance with BDAR minimum information requirements

BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
Introduction	Chapters 2 and 3	Information	
		Introduction to the biodiversity assessment including:	_
			1.1.1
		<ul> <li>☑ identification of subject land boundary, including:</li> <li>☑ operational footprint</li> <li>☑ construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure</li> </ul>	1.1.2
		☐ general description of the subject land	1.1.2
		⊠ sources of information used in the assessment, including reports and spatial data	1.6
		☑ identification and justification for entering the BOS	1.2
		Maps and tables	
			Figure 1
Landscape	Sections 3.1 and 3.2, Appendix E	Information	
		Identification of site context components and landscape features, including:	_
		☑ general description of subject land topographic and hydrological setting, geology and soils	1.1.2
		□ per cent native vegetation cover in the assessment area (as described in BAM Section 3.2)	3.3
		☑ IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))	3.2.1



BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
			3.2.2
			3.2.2
		□ connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6.))	3.2.3
		⋈ karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(12.))	3.2.4
		□ areas of outstanding biodiversity value occurring on the subject land and assessment area (as described in BAM Subsection 3.1.3(8–9.))	3.2.5
		☑ any additional landscape features identified in any SEARs for the proposal	NA
		☑ NSW (Mitchell) landscape on which the subject land occurs	3.2.6
		□ details of field reconnaissance undertaken to confirm the extent and condition of landscape features and native vegetation cover (as described in Operational Manual Stage 1 Section 2.4)	2.1
		Maps and tables	
		⊠ Site Map	Figure 1
		☑ Property boundary	
		⊠ Boundary of subject land	
		☑ Cadastre of subject land (including labelling of Lot and DP or section plan if relevant)	
		☑ Landscape features identified in BAM Subsection 3.1.3	
		□ Location Map	Figure 2
		☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	
		⊠ Boundary of subject land	
		☐ ☑ Assessment area (i.e. the subject land and either 1500 m buffer area or 500 m buffer for linear development)	
		□ Landscape features identified in BAM Subsection 3.1.3	
		Additional detail (e.g. local government area boundaries) relevant at this scale	
		Landscape features identified in BAM Subsection 3.1.3 and to be shown on the Site Map and/or Location Map include:	_
		☑ IBRA bioregions and subregions	Figure 1 & Figure 2
		□ rivers, streams and estuaries	



BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
		□ connectivity of different areas of habitat	
		<ul> <li>karst, caves, crevices, cliffs, rocks and other geological features of significance and if required, soil hazard features</li> </ul>	
		☑ areas of outstanding biodiversity value occurring on the subject land and assessment area	
		☑ any additional landscape features identified in any SEARs for the proposal	
		⋈ NSW (Mitchell) landscape on which the subject land occurs	
		Data	
		☑ All report maps as separate jpeg files	GeoPDF supplied
		Individual digital shape files of:	_
		⊠ subject land boundary	-
		□ assessment area (i.e. subject land and 1500 m buffer area) boundary	_
		⊠ cadastral boundary of subject land	_
		□ areas of native vegetation cover	-
			-
Native vegetation	Chapter 4, Appendix A and Appendix H	Information	
		☑ Identify native vegetation extent within the subject land, including cleared areas and evidence to support differences between mapped vegetation extent and aerial imagery (as described in BAM Section 4.1(1–3.) and Subsection 4.1.1)	4.1.1
			4.1.2
		Review of existing information on native vegetation including references to previous vegetation maps of the subject land and assessment area (described in BAM Section 4.1(3.) and Subsection 4.1.1)	2.2.1
		☑ Describe the systematic field-based floristic vegetation survey undertaken in accordance with BAM Section 4.2	2.2.3
		☑ Where relevant, describe the use of more appropriate local data, provide reasons that support the use of more appropriate local data and include the written confirmation from the decision-maker that they support the use of more appropriate local data (as described in BAM Subsection 1.4.2 and Appendix A)	NA



BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
		For each PCT within the subject land, describe:	_
		□ PCT name and ID	4.2
		□ vegetation class	4.2
		⊠ extent (ha) within subject land	4.2
			2.2.3
		☑ plant species relied upon for identification of the PCT and relative abundance of each species	4.2 & Appendix L
		☑ if relevant, TEC status including evidence used to determine vegetation is the TEC (BAM Subsection 4.2.2(1–2.))	4.2
		☑ estimate of per cent cleared value of PCT (BAM Subsection 4.2.1(5.))	4.2
		Describe the vegetation integrity assessment of the subject land, including:	_
		☑ identification and mapping of vegetation zones (as described in BAM Subsection 4.3.1)	4.4 & Figure 3
		□ description of vegetation zones within the subject land (as described in Operational Manual Stage 1 Table 2 and Subsection 3.3.2)	4.4
		⊠ area (ha) of each vegetation zone	4.4
		☑ assessment of patch size (as described in BAM Subsection 4.3.2)	4.4
		⊠ survey effort (i.e. number of vegetation integrity survey plots) as described in BAM Subsection 4.3.4(1–2.)	4.5.1
		☑ use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsection 4.3.3(5.))	4.5.3
		Where use of more appropriate local benchmark data is proposed (as described in BAM Subsection 1.4.2, BAM Subsection 4.3.3(5.) and BAM Appendix A):	_
		☑ identify the PCT or vegetation class for which local benchmark data will be applied	NA
		☑ identify published sources of local benchmark data (if benchmarks obtained from published sources)	
		☑ describe methods of local benchmark data collection (if reference plots used to determine local benchmark data)	
		☑ provide justification for use of local data rather than BioNet Vegetation Classification benchmark values	NA
		☑ provide written confirmation from the decision-maker that they support the use of local benchmark data	NA



BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
		Maps and tables	
		Map of native vegetation extent within the subject land at scale not greater than 1:10,000 including identification of all areas of native vegetation including areas that are ground cover only, cleared areas (as described in BAM Section 4.1(1−3.)) and all parts of the subject land that do not contain native vegetation (BAM Subsection 4.1.2)	Figure 3
			Figure 3
		☑ Map of vegetation zones within the subject land (as described in BAM Subsection 4.3.1)	Figure 3
		☑ Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCT boundaries	Figure 3
			Figure 3
			Table 8
		Table of current vegetation integrity scores for each vegetation zone within the site and including:	_
		<ul> <li>         □ composition condition score         □ structure condition score         □ function condition score         □ presence of hollow bearing trees     </li> </ul>	4.5.2
		Data	
		☑ All report maps as separate jpeg files	GeoPDF supplied
			Appendix I>
		□ Plot field datasheets	
		Digital shape files of:	_
			_
		□ TEC boundaries within subject land	_
		□ vegetation zone boundaries within subject land	_
		☑ floristic vegetation survey and vegetation integrity plot locations	_



BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
Threatened species	Chapter 5	Information	
		Identify ecosystem credit species likely to occur on the subject land, including:	_
			5.1.1
			5.1.1
			5.1.1
		Identify species credit species likely to occur on the subject land, including:	_
		☑ list of species credit species derived from the BAM-C (as described in BAM Subsection 5.1.1)	5.1.2
			5.1.2
			5.1.2
			5.1.2
		From the list of candidate species credit species, identify:	_
		<ul> <li>         ⊠ species assumed present within the subject land (if relevant) (as described in BAM Subsection 5.2.4(2.a.))     </li> <li>         ⊠ species present within the subject land on the basis of being identified on an important habitat map for a species (as described in BAM Subsection 5.2.4(2.d.))     </li> <li>         ⊠ species for which targeted surveys are to be completed to determine species presence (BAM Subsection 5.2.4(2.b.))     </li> <li>         ⊠ species for which an expert report is to be used to determine species presence (BAM Subsection 5.2.4(2.c.))     </li> </ul>	5.2
		Present the outcomes of species credit species assessments from:	_
			Table 15 & Table 16
		expert reports (if relevant) including justification for presence of the species and information used to make this determination (as described in BAM Subsection 5.2.4, Section 5.3, Box 3)	NA
		Where survey has been undertaken include detailed information on:	_
			Table 15 & Table 16



BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
			0
			5.3
		⊠ survey personnel and relevant experience	Appendix N
		☑ describe any limitations to surveys and how these were addressed/overcome	2.6
		Where an expert report has been used in place of survey (as described in BAM Section 5.3, Box 3), include:	_
		<ul> <li>         □ justification of the use of an expert report     </li> <li>         □ identify the expert, provide evidence of their expert credentials and departmental approval of expert status     </li> <li>         □ all requirements of Box 3 have been addressed in the expert report     </li> </ul>	NA
		Where use of local data is proposed (BAM Subsection 1.4.2):	_
		<ul> <li>☑ identify relevant species</li> <li>☑ identify data to be amended</li> <li>☑ identify source of information for local data, e.g. published literature, additional survey data, etc.</li> <li>☑ justify use of local data in preference to VIS Classification or TBDC data</li> </ul>	NA
		☑ provide written confirmation from the decision-maker that they support the use of local data	NA
		Species polygon completed for species credit species present within the subject land (assumed present or determined on the basis of survey, expert report or important habitat map) ensuring that:	_
			Table 17 & Table 18
		for species assessed by area:	_
			Figures as listed in <b>5.6</b> (if present)
		a description of, and evidence-based justification for, the habitat constraints, features or microhabitats used to map the species polygon including reference to information in the TBDC for that species and any buffers applied	5.6 (if present)
		for species assessed by counts of individuals:	_
			5.6 (if present)



BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
		the method used to derive this number (i.e. threatened species survey or expert report) and evidence-based justification for the approach taken	5.6 (if present)
		the polygon includes all individuals located on the subject land with a buffer of 30 m around the individuals or groups of individuals on the subject land	Figures as listed in 5.6 (if present)
		☑ Identify the biodiversity risk weighting for each species credit species identified as present within the subject land (as described in BAM Section 5.4)	Table 17
		Maps and tables	
		☐ Table showing ecosystem credit species in accordance with BAM Subsection 5.1.1, and identifying:	
			Table 10
		☑ the sensitivity to gain class of each species	Table 10
		☐ Table detailing species credit species in accordance with BAM Section 5.2 and identifying:	Table 11 & Table 1
		the species credit species removed from the list of species because the species is considered vagrant, out of geographic range or the habitat or microhabitat features are not present	5.1.2
		⊠ the candidate species credit species not recorded on the subject land as determined by targeted survey, expert report or important habitat map	Table 11 & Table 1
		☐ Table detailing species credit species recorded or assumed as present within the subject land, habitat constraints or microhabitats associated with the species, counts of individuals (flora)/extent of suitable habitat (flora and fauna) (as described in BAM Subsection 5.2.6) and biodiversity risk weighting (BAM Section 5.4)	Table 13 & Table 14
			Figure 6
		Data	
		☐ Digital shape files of suitable habitat identified for survey for each candidate species credit species	_
		Survey locations including GPS coordinates of any plots, transects, grids	
		☑ Digital shape files of each species polygon including GPS coordinates of located individuals	_
		Species polygon map in jpeg format	GeoPDF supplied
		⊠ Expert reports and any supporting data used to support conclusions of the expert report	
		☑ Field datasheets detailing survey information including prevailing conditions, date, time, equipment used, etc.	



BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
Prescribed impacts	Chapter 6	Information	
		Identify potential prescribed biodiversity impacts on threatened entities, including:	_
		<ul> <li>         ⊠ karst, caves, crevices, cliffs, rocks and other geological features of significance (as described in BAM Subsection 6.1.1)     </li> </ul>	Table 18
		□ occurrences of human-made structures and non-native vegetation (as described in BAM Subsection 6.1.2)	
		<ul> <li>         ⊠ corridors or other areas of connectivity linking habitat for threatened entities (as described in BAM Subsection 6.1.3)     </li> </ul>	
		□ protected animals that may use the proposed wind farm development site as a flyway or migration route (as described in BAM Subsection 6.1.5)	NA
		where the proposed development may result in vehicle strike on threatened fauna or on animals that are part of a threatened ecological community (as described in BAM Subsection 6.1.6)	Table 19
		☑ Identify a list of threatened entities that may be dependent upon or may use habitat features associated with any of the prescribed impacts	6
		☑ Describe the importance of habitat features to the species including, where relevant, impacts on life cycle or movement patterns (e.g. Subsection 6.1.3)	6
		Where the proposed development is for a wind farm:	_
		<ul> <li>identify a candidate list of protected animals that may use the development site as a flyway or migration route, including: resident threatened aerial species, resident raptor species and nomadic and migratory species that are likely to fly over the proposal area (as described in BAM Subsection 6.1.5)</li> </ul>	NA
		□ provide details of targeted survey for candidate species of wind farm developments undertaken in accordance with BAM Subsection 6.1.5(2–3.)	NA
		□ predict the habitual flight paths for nomadic and migratory species likely to fly over the subject land and map the likely habitat for resident threatened aerial and raptor species (BAM Subsection 6.1.5(4.))	NA
		Where the proposal may result in vehicle strike:	-
		⊠ identify a list of threatened fauna or protected fauna species that are part of a TEC and at risk of vehicle strike due to the proposal	8.3.3



BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
		Maps and tables	
		Map showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, human-made structures, etc.)	Figure 1 &
		☐ Map showing location of potential vehicle strike locations	NA
		☐ Maps of habitual flight paths for nomadic and migratory species likely to fly over the site and maps of likely habitat for threatened aerial species resident on the site (for wind farm developments only)	NA
		Data	
		☑ Digital shape files of prescribed impact feature locations	_
		☑ Prescribed impact features map in jpeg format	GeoPDF supplied
Avoid and minimise impacts	Chapter 7	Information	
		Demonstration of efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the proposal location in accordance with Chapter 7, including an analysis of alternative:	_
			7 (where applicable)
		□ routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route	7 (where applicable)
		☑ alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location	7 (where applicable)
		☑ alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site	7 (where applicable)
		Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Sections 7.1 and 7.2)	7 (where applicable)
		☑ Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal (as described in BAM Subsection 7.2.1(3.))	7 (where applicable)
		Detail measures or options considered but not implemented because they are not feasible and/or practical (e.g. due to site constraints)	7 (where applicable)



BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
		Maps and tables	
		□ Table of measures to be implemented to avoid and minimise the impacts of the proposal, including action, outcome, timing and responsibility	NA – see <b>7</b>
			NA – see <b>7</b>
			NA
		Data	
		Digital shape files of:	_
		☑ alternative and final proposal footprint	_
			_
			GeoPDF supplied
Assessment of impacts	Chapter 8, Sections 8.1 and 8.2	Information	
		☑ Determine the impacts on native vegetation and threatened species habitat, including a description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Section 8.1)	8.1
		Assessment of indirect impacts on vegetation and threatened species and their habitat including (as described in BAM Section 8.2):	-
		☑ description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal	8.2
			8.2
		☑ reporting any limitations or assumptions, etc. made during the assessment	8.2
		☑ identification of the threatened entities and their habitat likely to be affected	8.2
		Assessment of prescribed biodiversity impacts (as described in BAM Section 8.3) including:	_
		assessment of the nature, extent frequency, duration and timing of impacts on the habitat of threatened species or ecological communities associated with:	-
		⋈ karst, caves, crevices, cliffs, rocks and other features of geological significance	8.3 (if present)
			8.3 (if present)



BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
		⊠ non-native vegetation	8.3 (if present)
		connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	8.3 (if present)
			8.3 (if present)
			8.3 (if present)
		☑ assessment of the impacts of wind turbine strikes on protected animals	NA
		assessment of the impacts of vehicle strikes on threatened species of animals or on animals that are part of a TEC	8.3.3
			8.3 (if present)
			8.3 (if present)
		☑ document limitations to data, assumptions and predictions	8.3 (if present)
		Maps and tables	
		☐ Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts	Table 9
		Data	
		NA NA	_
Mitigation and management of impacts	Chapter 8, Sections 8.4 and 8.5	Information	
		Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM Sections 8.4 and 8.5 including:	-
		□ techniques, timing, frequency and responsibility	8.4
		identify measures for which there is risk of failure	
		⊠ evaluate the risk and consequence of any residual impacts	
		□ document any adaptive management strategy proposed	NA
		Identification of measures for mitigating impacts related to:	-
			8.4



BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
		☑ displacement of resident fauna (as described in BAM Subsection 8.4.1(2.))	
		☑ indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1(3.))	
		□ Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (BAM Section 8.5)	NA
		Maps and tables	
		☐ Table of measures to be implemented before, during and after construction to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility	Table 24
		Data	
		NA NA	_
Impact summary	Chapter 9	Information	
		Identification and assessment of impacts on TECs and threatened species that are at risk of a serious and irreversible impacts (SAII, in accordance with BAM Section 9.1) including:	_
		☑ addressing all criteria in Subsection 9.1.1 for each TEC listed as at risk of an SAII present on the subject land	9.1 (if present)
			9.1 (if present)
		□ addressing all criteria in Subsection 9.1.2 for each threatened species at risk of an SAII present on the subject land	9.1 (if present)
			9.1 (if present)
			9.1 (if present)
		□ documenting all sources of data, information, references used or consulted	
		□ clearly justifying why any criteria could not be addressed	
		☑ Identification of impacts requiring offset in accordance with BAM Section 9.2	9.1 (if present)
		☑ Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1(3.)	9.1 (if present)
		☑ Identification of areas not requiring assessment in accordance with BAM Section 9.3	9.1 (if present)
		Maps and tables	
			Figures as listed in <b>9.1</b> (if present)



BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
			Figures as listed in <b>9.1</b> (if present)
		Map showing location of:	_
			Figures as listed in <b>9.1</b> (if present)
			Figures as listed in <b>9.1</b> (if present)
		□ areas not requiring assessment	Figures as listed in <b>9.1</b> (if present)
		Data	
		Digital shape files of:	-
			_
		☑ location of threatened species at risk of an SAII within the subject land	-
			_
			_
			_
			GeoPDF supplied
Impact summary	Chapter 10	Information	
		Ecosystem credits and species credits that measure the impact of the development on biodiversity values, including:	_
			Table 27
		□ change in vegetation integrity score (BAM Subsection 8.1.1)	
		number of required ecosystem credits for the direct impacts of the proposal on each vegetation zone within the subject land (BAM Subsection 10.1.2)	
			<b>Table 27 &amp; Table 28</b>
		number of required species credits for each candidate threatened species that is directly impacted on by the proposal (BAM Subsection 10.1.3)	Table 28

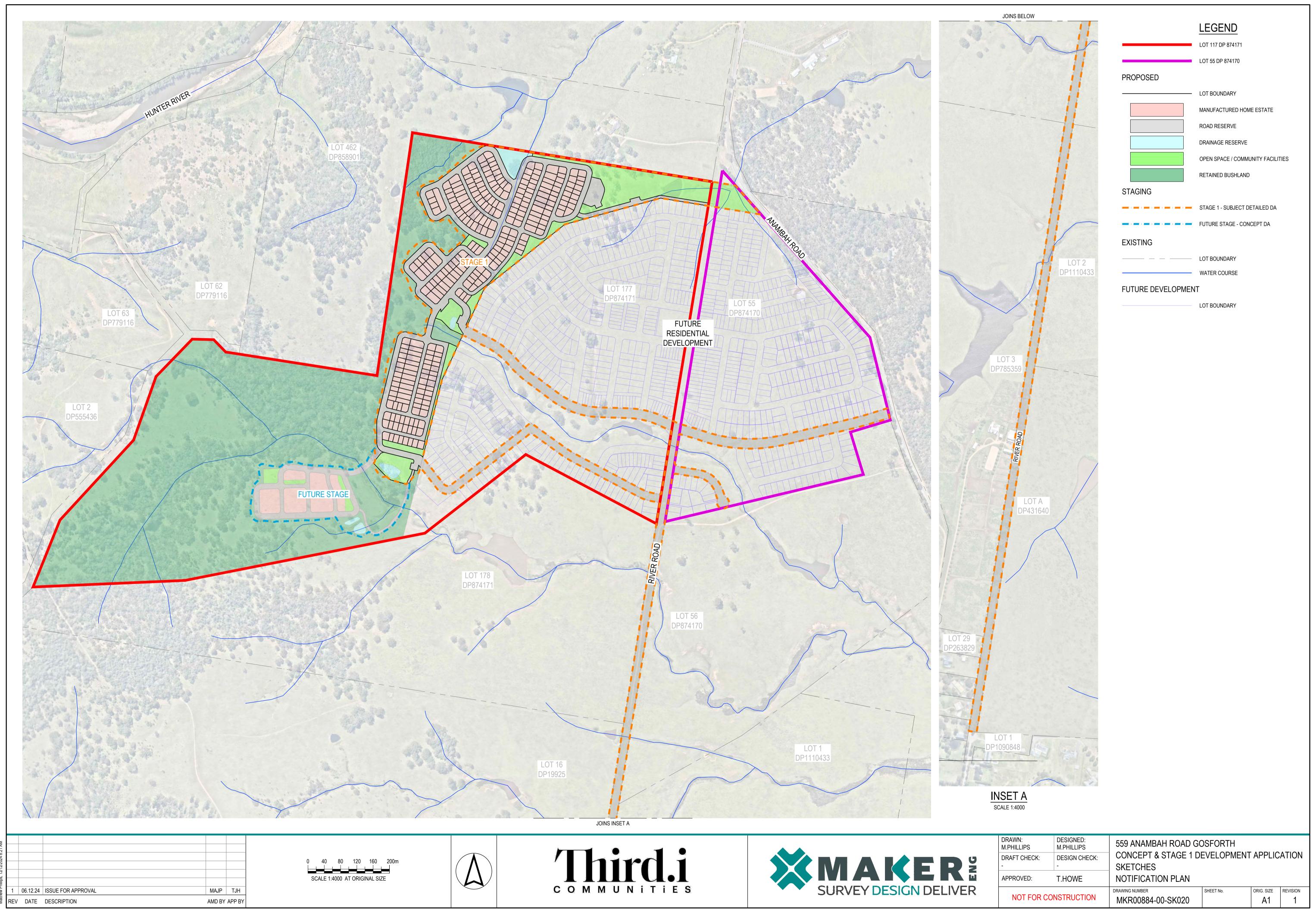


BDAR section	BAM ref.	BAM requirement	Section reference(s) in the BDAR
		Maps and tables	
		☑ Table of PCTs requiring offset and the number of ecosystem credits required	Table 27
			Table 28
		Data	
		Submitted proposal in the BAM Calculator	_
Biodiversity credit report	Chapter 10	Information	
		☑ Description of credit classes for ecosystem credits and species credits at the development or clearing site or land to be biodiversity certified (BAM Section 10.2)	Table 30 & Table 31
			Appendix M
		Maps and tables	
		☐ Table of credit class and matching credit profile	Table 30 & Table 31
		Data	
			Appendix M



# Appendix B. Concept Plan

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# **Appendix C. Biodiversity Values Map and Threshold tool** report

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## Department of Planning and Environment

## Biodiversity Values Map and Threshold Report

This report is generated using the Biodiversity Values Map and Threshold (BMAT) tool. The BMAT tool is used by proponents to supply evidence to your local council to determine whether or not a Biodiversity Development Assessment Report (BDAR) is required under the Biodiversity Conservation Regulation 2017 (Cl. 7.2 & 7.3).

The report provides results for the proposed development footprint area identified by the user and displayed within the blue boundary on the map.

There are two pathways for determining whether a BDAR is required for the proposed development:

- 1. Is there Biodiversity Values Mapping?
- 2. Is the 'clearing of native vegetation area threshold' exceeded?

## Biodiversity Values Map and Threshold Report

Date	e of Report Generation	19/12/2024 5:29 PM		
1. Bi	odiversity Values (BV) Map - Results Summary (Biodiversity Conservation Regulation S	ection 7.3)		
1.1	Does the development Footprint intersect with BV mapping?	no		
1.2	Was <u>ALL</u> BV Mapping within the development footprinted added in the last 90 days? (dark purple mapping only, no light purple mapping present)	no		
1.3	Date of expiry of dark purple 90 day mapping	N/A		
1.4	Is the Biodiversity Values Map threshold exceeded?	no		
2. A	rea Clearing Threshold - Results Summary (Biodiversity Conservation Regulation Section	on 7.2)		
2.1	Size of the development or clearing footprint	71,993.8 sqm		
2.2	Native Vegetation Area Clearing Estimate (NVACE) (within development/clearing footprint)	1,745.4 sqm		
2.3	Method for determining Minimum Lot Size	LEP		
2.4	Minimum Lot Size (10,000sqm = 1ha)	00 sqm		
2.5	Area Clearing Threshold (10,000sqm = 1ha)	2,500 sqm		
2.6	Does the estimate exceed the Area Clearing Threshold?  (NVACE results are an estimate and can be reviewed using the Guidance)	no		
pro	PORT RESULT: Is the Biodiversity Offset Scheme (BOS) Threshold exceeded for the posed development footprint area?  ur local council will determine if a BDAR is required)	no		



### Department of Planning and Environment

## What do I do with this report?

- If the result above indicates the BOS Threshold has been exceeded, your local council may require a Biodiversity Development Assessment Report with your development application. Seek further advice from Council. An accredited assessor can apply the Biodiversity Assessment Method and prepare a BDAR for you. For a list of accredited assessors go to: https://customer.lmbc.nsw.gov.au/assessment/AccreditedAssessor.
- If the result above indicates the BOS Threshold <u>has not been exceeded</u>, you may not require a Biodiversity Development Assessment Report. This BMAT report can be provided to Council to support your development application. Council can advise how the area clearing threshold results should be considered. Council will review these results and make a determination if a BDAR is required. Council may ask you to review the area clearing threshold results. You may also be required to assess whether the development is "likely to significantly affect threatened species" as determined under the test in Section 7.3 of the *Biodiversity Conservation Act 2016*.
- If a BDAR is not required by Council, you may still require a permit to clear vegetation from your local council.
- If all Biodiversity Values mapping within your development footprint was less than 90 days old, i.e. areas are displayed as dark purple on the BV map, a BDAR may not be required if your Development Application is submitted within that 90 day period. Any BV mapping less than 90 days old on this report will expire on the date provided in Line item 1.3 above.

For more detailed advice about actions required, refer to the Interpreting the evaluation report section of the <u>Biodiversity Values Map Threshold Tool User Guide</u>.

## **Review Options:**

- If you believe the Biodiversity Values mapping is incorrect please refer to our <u>BV Map Review webpage</u> for further information.
- If you or Council disagree with the area clearing threshold estimate results from the NVACE in Line Item 2.6 above (i.e. area of Native Vegetation within the Development footprint proposed to be cleared), review the results using the Guide for reviewing area clearing threshold results from the BMAT Tool.

## Acknowledgement

I, as the applicant for this development, submit that I have correctly depicted the area that will be impacted or likely to be impacted as a result of the proposed development.

Signature:	Date:
(Typing your name in the signature field will be considered as your signature for the purposes of this form)	19/12/2024 05:29 PM



## Department of Planning and Environment

### Biodiversity Values Map and Threshold Tool

The Biodiversity Values (BV) Map and Threshold Tool identifies land with high biodiversity value, particularly sensitive to impacts from development and clearing.

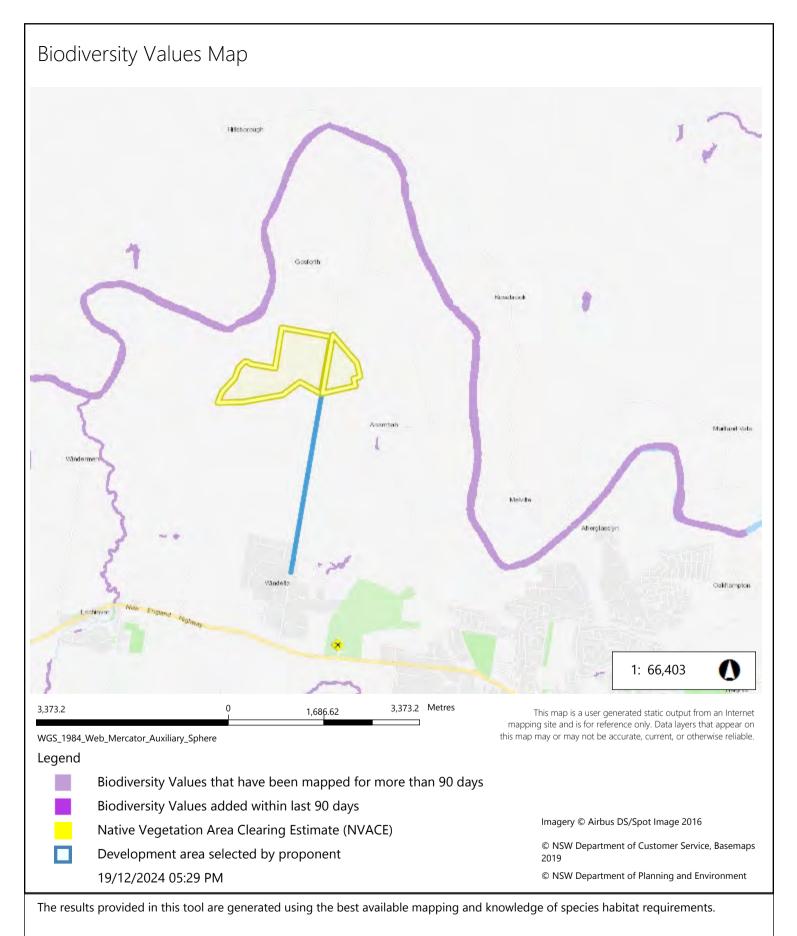
The BV map forms part of the Biodiversity Offsets Scheme threshold, which is one of the factors for determining whether the Scheme applies to a clearing or development proposal. You have used the Threshold Tool in the map viewer to generate this BV Threshold Report for your nominated area. This report calculates results for your proposed development footprint and indicates whether Council may require you to engage an accredited assessor to prepare a Biodiversity Development Assessment Report (BDAR) for your development.

This report may be used as evidence for development applications submitted to councils. You may also use this report when considering native vegetation clearing under the State Environmental Planning Policy (Biodiversity and Conservation) 2021 - Chapter 2 vegetation in non-rural areas.

What's new? For more information about the latest updates to the Biodiversity Values Map and Threshold Tool go to the updates section on the Biodiversity Values Map webpage.

Map Review: Landholders can request a review of the BV Map where they consider there is an error in the mapping on their property. For more information about the map review process and an application form for a review go to the <u>Biodiversity Values Map Review webpage</u>.

If you need help using this map tool see our <u>Biodiversity Values Map and Threshold Tool User Guide</u> or contact the Map Review Team at <u>map.review@environment.nsw.gov.au</u> or on 1800 001 490.



This map is valid as at the date the report was generated. Checking the <u>Biodiversity Values Map viewer</u> for mapping updates is recommended.



# Appendix D. Matters of National Environmental Significance

An EPBC Act Protected Matters Search (accessed 17 October 2024) was undertaken to generate a list of those Matters of National Environmental Significance (MNES) from within 10 km of the subject land. An assessment of those MNES relevant to biodiversity has been undertaken in accordance within EPBC Act Policy Statement 1.1 Significant Impact Guidelines Matters of National Environmental Significance (DoE, 2013). The Matters of National Environmental Significance protected under national environment law include:

- Listed threatened species and communities;
- Listed migratory species;
- Ramsar wetlands of international importance;
- Commonwealth marine environment;
- World heritage properties;
- National heritage places;
- The Great Barrier Reef Marine Park;
- Nuclear actions; and
- A water resource, in relation to coal seam gas development and large coal mining development.

#### Listed Threatened Species and Communities:

A total of 58 threatened species and nine (9) threatened ecological communities listed under the EPBC Act have been recorded on the protected matters search. A likelihood of occurrence assessment for these MNES has been completed in **Appendix E**.

#### **Threatened Species**

21 threatened birds, ten (10) mammals, five (5) herpetofauna, and 22 plants were recorded on the protected matters search. Of these, four (4) species were considered to have the potential to occur within subject land:

- Lathamus discolor (Swift Parrot)
- Anthochaera phrygia (Regent Honeyeater)
- Dasyurus maculatus maculatus (Spotted-tail Quoll, SE mainland population)
- Pteropus poliocephalus (Grey-headed Flying-fox)

#### Listed Migratory Species:

A total of 13 migratory species listed under the EPBC Act have been recorded on the protected matters search. One (1) species also occurs on the threatened species list.

#### Wetlands of International Significance (declared Ramsar wetlands):

The subject land is not a wetland of international significance or declared Ramsar wetland. However, one identified Ramsar wetland is nominated in the protected matter search: the Hunter Estuary Wetlands. The subject land is 10-20 km upstream of the Ramsar Wetland.

#### Commonwealth Marine Areas:

The subject land is not part of a Commonwealth Marine Area.

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#### World Heritage Properties:

The subject land is not a World Heritage area and is not in close proximity to any such area.

#### National Heritage Places:

The subject land is not a National Heritage area and is not in close proximity to any such area.

#### Great Barrier Reef Marine Parks:

The subject land is not part of or within close proximity to any Great Barrier Reef Marine Park.

#### **Nuclear Actions:**

The proposal over the subject land is not and does not form part of a Nuclear action.

#### Water Resources in relation to Coal Mining and CSG:

The proposal over the subject land is related to commercial development and as such is not or does not form part of a coal mining and/or CSG proposal.

In summary, the proposed action is unlikely to have an impact to MNES assessed herewith based on the assessment criteria set out in relevant Commonwealth policies and advice as at the time of this assessment.

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# **Appendix E. EPBC Likelihood of Occurrence**

Scientific Name	Common Name	BC Act	EPBC Act	Records*	Likelihood of Occurrence	Potential Impacts	ToS Req'd
Threatened Ecological	Communities						
Central Hunter Valley eu woodland	calypt forest and	-	CE	L	Low. Location unsuitable	Low	No
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community		-	E	L	Low. Not recorded within the study area	Low	No
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland		-	E	М	Low. Location unsuitable	Low	No
Hunter Valley Weeping Myall (Acacia pendula) Woodland		-	CE	М	Low. Not recorded within the study area	Low	No
Kurri sand swamp woodland of the Sydney Basin bioregion		-	E	L	Low. Not recorded within the study area	Low	No
Lowland Rainforest of So	ubtropical Australia	-	CE	L	Low. Location unsuitable	Low	No
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria		-	CE	L	Low. Not recorded within the study area	Low	No
Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions		-	E	L	Low. Location unsuitable	Low	No
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland		-	CE	L	Low. Location unsuitable	Low	No



Scientific Name	Common Name	BC Act	EPBC Act	Records*	Likelihood of Occurrence	Potential Impacts	ToS Req'd
Flora							
Acacia bynoeana		E	V	3	Low. The site is outside of the range where the species habitat is likely to or may occur, and soil and vegetation are not appropriate. The species was not detected during site survey. Due to the paucity of understorey vegetation in the impact area, it is unlikely the species was overlooked.	Low	No
Arthraxon hispidus	Hairy-joint Grass		V	-	Low. The site is outside of the range where the species habitat is likely to or may occur, and only limited, marginal potential habitat occurs on site.	Low	No
Caladenia tessellata	Thick-lipped Spider- orchid, Daddy Long- legs	E	V	-	Low. No OEH BioNet records present within a 10 km radius. Unlikely to occur on site due to historical land clearance and agricultural use. No further assessment required.	Low. Habitat degraded. Site ground-layer comprises grazed pasture with very limited native assemblage.	No
Cryptostylis hunteriana	Leafless Tongue- orchid	V	V	-	Low. No OEH BioNet records present within a 10 km radius. The species is typically found near coastal areas. The species is unlikely to occur on site due to its historical land clearance and agricultural use as well as the sites' location. No further assessment required.	Low. Habitat degraded. Site ground-layer comprises grazed pasture with very limited native assemblage.	No
Cynanchum elegans	White-flowered Wax Plant	E	E	-	Low. No OEH BioNet records present within a 10 km radius. Unlikely to occur on site due to the species being found in rainforest which does not coincide with PCTs onsite. No further assessment required.	Low. Habitat degraded. Site ground-layer comprises grazed pasture with very limited native assemblage.	No
Dichanthium setosum	bluegrass	V	V	-	Low. No OEH BioNet records present within a 10 km radius. Unlikely to occur as it occurs on the New England Tablelands, North West Slopes, and Plains, and the Central Western Slopes of NSW. No further assessment required.	Low. Habitat degraded. Site ground-layer comprises grazed pasture with very limited native assemblage.	No
Eucalyptus glaucina	Slaty Red Gum	V	V	109	Moderate. There are 109 OEH BioNet occur within a 10 km radius. This species was not detected as present within the site during surveys.as such no further assessment is required.	Low. Surveys did not detect this species	No

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Scientific Name	Common Name	BC Act	EPBC Act	Records*	Likelihood of Occurrence	Potential Impacts	ToS Req'd
Eucalyptus parramattensis subsp. decadens	Earp's Gum, Earp's Dirty Gum		V	155	Moderate. There are 155 OEH BioNet record occurs within a 10 km radius of the site. The tree was not detected within the subject area during surveys and was unlikely to be overlooked, as such this tree is unlikely to occur within the site.	Low. Surveys did not detect this species	No
Euphrasia arguta	null	CE	CE	-	Low. No OEH BioNet records present within a 10 km radius. Unlikely to occur on site due to the only known population is located in the Nundle State Forest. The species is unlikely to occur within the Subject Land, No further assessment required.	Low.	No
Grevillea parviflora subsp. parviflora	Small-flower Grevillea	V	V	31	Low. One OEH BioNet records located within a 10 km radius of the subject site. Due to the heavy management of the of the Subject Land and no mature individuals being located, it is unlikely the species the species would occur within the Subject Land, no further assessment is required.	Low, habitat on site is degraded and mid-storey is generally absent. Surveys did not detect this species	No
Ozothamnus tesselatus	null	V	V	-			
Persicaria elatior	Knotweed, Tall Knotweed	V	V	-	Low. No OEH BioNet records present within a 10 km radius. Unlikely to occur on site as it requires damp places beside streams and lakes. Historic agricultural practices have reduced suitable habitat. The species was no observed within waterlines within the Subject Land. It is unlikely the species persists within the Subject Land, no further assessment required.	Low. Riparian habitat is degraded and survey of waterbodies did not detect this species or its congeners.	No
Persoonia pauciflora	North Rothbury Persoonia	CE	CE	-	Low. No OEH BioNet records occur within a 10 km radius of the site. The species is unlikely to occur as its known range strictly occurs within North Rothbury and a 10 km radius. As the subject area lies outside of this range it is unlikely to occur within the site. No further assessment is required.	Low, habitat on site is degraded and mid-storey is generally absent. Surveys did not detect this species	No
Prasophyllum sp. Wybong (C.Phelps ORG 5269)	a leek-orchid	-	CE	-			

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Scientific Name	Common Name	BC Act	EPBC Act	Records*	Likelihood of Occurrence	Potential Impacts	ToS Req'd
Prostanthera cineolifera	null	V	V	-	Low. No OEH BioNet records present within a 10 km radius. Unlikely to occur on site due to the species having a restrictive range being found in areas of exposed sandstone ridges which do not occur within the site.	Low, habitat on site is degraded and mid-storey is generally absent. Surveys did not detect this species	No
Pterostylis gibbosa	Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood	E	E	1	Low. One OEH BioNet record within a 10 km radius of the Subject Land. Unlikely to occur on site due to historical land clearance and agricultural usage on site. Species in the Hunter is only known from Milbrodale	Low. Habitat degraded. Site ground-layer comprises grazed pasture with very limited native assemblage.	No
Rhizanthella slateri	Eastern Underground Orchid	V	Е	-	Low. No OEH BioNet records present within a 10 km radius.as the site consists of pasture lands with areas of scarce canopy the site does not offer potential habitat in the form of dense leaf litter, as such this species is unlikely to occur within the site. Surveys were undertaken for this species and it was not detected.	Low. Habitat degraded. Site ground-layer comprises grazed pasture with very limited native assemblage.	No
Rhodamnia rubescens	Scrub Turpentine, Brown Malletwood	CE	CE	1	Low. One OEH BioNet records present within a 10 km radius. There is no suitable habitat for the species. The species is typically found in sheltered wet sclerophyll forests. Surveys were undertaken for this species and it was not detected	Low, habitat on site is degraded and mid-storey is generally absent. Surveys did not detect this species	No
Rhodomyrtus psidioides	Native Guava	CE	CE	3	Low. One OEH BioNet records present within a 10 km radius. There is no suitable habitat for the species. The species is typically found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forests. Surveys were undertaken for this species and it was not detected	Low, habitat on site is degraded and mid-storey is generally absent. Surveys did not detect this species	No
Rutidosis heterogama	Heath Wrinklewort	V	V	40	Moderate. There are 40 OEH BioNet records within a 10 km radius of the subject land, however this species is generally recorded in large numbers where present. This species has the potential to occur within the site as the species is known to inhabit disturbed paddocks and pasture lands.	Low. Habitat degraded. Site ground-layer comprises grazed pasture with very limited native assemblage.	No

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Scientific Name	Common Name	BC Act	EPBC Act	Records*	Likelihood of Occurrence	Potential Impacts	ToS Req'd
Syzygium paniculatum	Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry	E	V	4	Low. Four OEH BioNet records found within a 10 km radius of the subject land. Due to the species only occurring on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities the species is unlikely to occur. No further assessment required.	Low, habitat on site is degraded and mid-storey is generally absent. Surveys did not detect this species	No
Thesium australe	Austral Toadflax, Toadflax	V	V	-	Moderate. No OEH BioNet records present within a 10 km radius. The species has the potential to occur within the site due to it inhabiting grasslands or woodlands.	Low. Habitat degraded. Site ground-layer comprises grazed pasture with limited native assemblage.	No
Birds							
Anthochaera phrygia	Regent Honeyeater	CE	CE	6	Moderate. Six OEH BioNet records occur within a 10 km radius of the subject land. The subject land has not been mapped as containing important habitat on important habitat mapping. Use trees for this species do occur however, so there is potential for it to opportunistically forage.	Moderate. Linking habitat and high value foraging resources in the form of old growth winter flowering trees are to be removed, albeit a limit area.	Yes
Botaurus poiciloptilus	Australasian Bittern	E	E	1	Low. No. OEH BioNet Due to the species occurring in densely vegetated wetlands it is unlikely to occur on site as no suitable habitat is present. No further assessment required.	Low	No
Calidris acuminata	Sharp-tailed Sandpiper	E	CE	11	Low. No OEH BioNet records present within a 10 km radius. Unlikely to occur in the Subject Land due to the species occurring mainly on intertidal mudflats in sheltered coastal areas and are less often recorded inland near dams, waterholes. No further assessment required.	Low	No
Calidris ferruginea	Curlew Sandpiper	E	E	-	Low. No OEH BioNet records within a 10 km radius of the site. Species generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. No further assessment required.	Low	Yes
Callocephalon fimbriatum	Gang-gang Cockatoo	V	V	3	Low. One OEH BioNet records within a 10 km radius of the site. Surveys were undertaken for this species and it was not detected.	Low.	No



Scientific Name	Common Name	BC Act	EPBC Act	Records*	Likelihood of Occurrence	Potential Impacts	ToS Req'd
Calyptorhynchus lathami lathami	South-eastern Glossy Black- Cockatoo	V	V	8	Low. No OEH BioNet records present within a 10 km radius. Unlikely to occur on site due to a lack of foraging resources in the form of Casuarina/Allocasuarina species. Surveys were undertaken for this species and it was not detected.	Low	No
Charadrius leschenaultii	Greater Sand Plover, Large Sand Plover	V	V	-	Moderate. No OEH BioNet record within a 10 km of the site. Due to the site contains eucalypt species with a grassy understory present the site contains potential foraging habitat in which the species may utilise.	Low. Significant areas of native vegetation are avoided and the species capacity to utilise the site is not reduced	No
Climacteris picumnus victoriae	Brown Treecreeper (south-eastern)	E	E	3	Low. One OEH BioNet record present within a 10 km radius. The species is often found along coastal rivers and Melaleuca forests, as such habitat is not present within the site this species is not likely to occur.	Low	No
Erythrotriorchis radiatus	Red Goshawk	V	V	-	Low. No OEH BioNet records present within a 10 km radius. Unlikely to occur on site due to the species being restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions. No further assessment required.	Low	No
Falco hypoleucos	Grey Falcon	V	V	-	Low. No OEH BioNet records occur within a 10 km radius. The site does not provide potential habitat in the form of open freshwater wetland this species is unlikely to utilise the subject area, no further assessment required.	Low	No
Gallinago hardwickii	Latham's Snipe, Japanese Snipe	V	V	64	Low. One OEH BioNet record occurs within a 10 km radius of the site	Low	No
Grantiella picta	Painted Honeyeater	V	V	-	Low. No OEH BioNet records present within a 10 km radius. Unlikely to occur in the subject land as the species typically occurs on the inland slopes of the Great Dividing Range, requiring high density of mistletoe not present on the subject land. No further assessment required.	Low	No
Hirundapus caudacutus	White-throated Needletail	-	V	10	Moderate. There are nine (9) OEH BioNet records within a 10 km radius of the subject site. Due to the species being almost exclusively aerial it is possible the species may fly over or perch within the Subject Land.	Low. Significant areas of native vegetation are avoided and the species capacity to utilise the site is not reduced	No



Scientific Name	Common Name	BC Act	EPBC Act	Records*	Likelihood of Occurrence	Potential Impacts	ToS Req'd
Lathamus discolor	Swift Parrot	E	CE	6	Moderate. No OEH BioNet records occur within a 10 km radius of the subject site, the site has not been mapped as containing important habitat on important habitat mapping. Use trees for this species do occur however, so there is potential for it to opportunistically forage.	Low. Significant areas of native vegetation are avoided and the species capacity to utilise the site is not reduced	Yes
Melanodryas cucullata cucullata	South-eastern Hooded Robin, Hooded Robin (south-eastern)	E	E	1	Moderate. There are no OEH BioNet records within a 10 km radius of the subject land. Species occurrence is unlikely as it required structurally diverse habitats and native shrub layers and grasslands, which are not present within the subject land.	Moderate. Species may have habitat utilisation reduced by removal of connectivity and ongoing disturbance	Yes
Neophema chrysostoma	Blue-winged Parrot	V	V	-	Low. No OEH BioNet records found within a 10 km radius of the subject land. The species is uncommon in the area and is typically found in Victoria and southwest NSW. The species is unlikely to occupy the subject land, no further assessment required.	Low	No
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	-	CE	-	Low. No OEH BioNet records found within a 10 km radius of the subject land. Due to the species typical habitat comprising of sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons it is unlikely the species occurs onsite. No further assessment required.	Low	No
Pycnoptilus floccosus	Pilotbird	-	V	-	Low. No OEH BioNet records found within a 10 km radius of the subject land. No suitable habitat is present for the species as they are typically found on the ground of dense forests, with heavy undergrowth. No further assessment required.	Low	No
Rostratula australis	Australian Painted Snipe	E	E	1	Low. No OEH BioNet records within a 10 km radius to the subject land. Due to the species occurring in swamps, dams, and marshy areas and require grass tussocks or reeds to nest in, it is unlikely the species occur onsite. No further assessment required.	Low	No



Scientific Name	Common Name	BC Act	EPBC Act	Records*	Likelihood of Occurrence	Potential Impacts	ToS Req'd
Stagonopleura guttata	Diamond Firetail	V	V	-	Low. No BioNet records occur within a 10 km radius of the site, the species is described as occurring grassy eucalypt woodlands and has the potential to occur in lightly wooded farmland. Despite this, the species requires dense shrubs to build its nest which are not present within the subject land. Further to this there are no records within a 10 km Bionet search of the subject land. It is unlikely that the species utilises the subject land. Therefore, no further assessment required.	Low	No
Tringa nebularia	Common Greenshank, Greenshank	-	E	2	Low. No OEH BioNet records occur within a 10 km radius of the site, this species is unlikely to be present within the site as it inhabits inland wetlands along with sheltered coastal habitats, the site would not provide foraging and or breeding habitat for this species, as such no further assessment is required.	Low	No
Mammals							
Chalinolobus dwyeri	Large-eared Pied Bat, Large Pied Bat	V	Е	5	Low. No OEH BioNet records occur within 10 km radius of the site. No caves or old mines, rocky areas, overhangs, escarpments, outcrops or crevices or culverts were present within the subject land or in close proximity to the subject land. Therefore, it is unlikely that the subject land contains suitable breeding habitat for the species or is regularly utilised for foraging. Therefore, no further survey is required.	Low	No
Dasyurus maculatus maculatus	Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)	V	Е	10	Moderate. 4 OEH BioNet records within a 10 km radius of the site, with only one (1) occurring in the last 15 years. Due to historical land clearing and agricultural usage on-site and the relative lack of canopy area within the Subject Land, it is unlikely the species will occur.	Moderate. Species ability to move between remnant habitat may be reduced affecting access to foraging and denning areas	Yes
Notamacropus parma	Parma Wallaby	V	V	-	Low. No OEH BioNet records found within a 10 km radius of the subject site. The species is unlikely to occur as the species prefers moist eucalypt forests with thick shrubby understorey which is not present within the Subject Land. No further assessment required.	Low	No



Scientific Name	Common Name	BC Act	EPBC Act	Records*	Likelihood of Occurrence	Potential Impacts	ToS Req'd
Petauroides volans	Greater Glider		E	-	Low. No OEH Bionet records occur within a 10 km radius of the site, this species requires large areas of continuous eucalypt forest with a High canopy cover. Surveys were undertaken for this species and it was not detected.	Low	No
Petaurus australis	Yellow-bellied Glider	V	V	-	No OEH BioNet records found within a 10 km radius of the subject site. Due to the species preference of mature old growth forests, the species would not occur within the site due to the lack of a mature canopy stratum. Surveys were undertaken for this species and it was not detected.	Low	No
Petrogale penicillata	Brush-tailed Rock- wallaby	E	V	-	Low. No OEH BioNet records found within a 10 km radius of the Subject Land. The species typically occurs on rocky escarpments, outcrops and cliffs, which are not present within the Subject Land. It is unlikely the species occurs onsite. No further assessment required.	Low	No
Phascolarctos cinereus	Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)	E	E	23	Low. There are 5 OEH BioNet records found within a 10 km radius to the Subject Land. The site contains Koala use trees. Surveys were undertaken for this species and it was not detected.	Low	No
Potorous tridactylus tridactylus	Long-nosed Potoroo (northern)	V	V	-	No OEH BioNet records found within a 10 km radius of the subject site. The species is generally restricted to coastal heaths and forests with a dense understory, as the site does not contain a dense understory it is unlikely that the species will occur within the site as suitable habitat is not present. No further assessment required.	Low	No
Pseudomys novaehollandiae	New Holland Mouse, Pookila	-	V	-	No OEH BioNet records found within a 10 km radius of the subject site. Due to the species inhabiting open heathland, open woodland with a heathland understory and vegetated sand dunes, it is unlikely to occur on site. No further assessment required.	Low	No



Scientific Name	Common Name	BC Act	EPBC Act	Records*	Likelihood of Occurrence	Potential Impacts	ToS Req'd
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	322	There are 112 OEH BioNet records found within a 10 km radius, the land may represent potential foraging habitat for the species, however the resource is very limited on the site in the context of the species range and ecology.	Moderate. Linking habitat and high value foraging resources in the form of old growth winter flowering trees are to be removed, albeit a limit area.	Yes
Herpetofauna							
Aprasia parapulchella	Pink-tailed Worm- lizard, Pink-tailed Legless Lizard	V	V	-	Low. No OEH BioNet records within a 10 km radius of the subject site. The species typically inhabits sloping open woodland areas with predominately native grass ground layers. Other habitat features include well drained areas with rocky outcrops or scattered partially buried rocks. Due to the species habitat features not occurring within the Subject Land, it is unlikely the species would occur. No further assessment required.	Low	No
Delma impar	Striped Legless Lizard, Striped Snake-lizard	V	V	-	Low. No OEH BioNet records found within a 10 km radius of the subject site. Species is not recorded east of Ravensworth, and soil conditions are unsuitable on the subject land. No further assessment required.	Low	No
Heleioporus australiacus	Giant Burrowing Frog	V	V	-	Low. No suitable habitat on site as the substrate is clay-based, excluding this species.	Low	No
Litoria aurea	Green and Golden Bell Frog	E	V	7	Low. 7 OEH BioNet records within a 10 km radius of the site. The site does not offer suitable habitat for this species. As onsite dams are lacking in structural native vegetation within the surrounding areas, due to agricultural land practices and the current grazing of livestock.	Low	No
Mixophyes balbus	Stuttering Frog		V	-	Low. No OEH BioNet records occur within 10 km radius of the site, this species is predominantly found within tall rainforests along with tall open wet forests, as the site does not contain habitat of this nature. It is unlikely that the site would offer foraging or breeding habitat for this species.	Low	No



Scientific Name	Common Name	BC Act	EPBC Act	Records*	Likelihood of Occurrence	Potential Impacts	ToS Req'd
Listed Migratory Spec	ies						
Actitis hypoleucos	Common Sandpiper			-	Low. No OEH BioNet atlas records occur within a 10 km radius of the site as the species inhabits Wetland habitats it is unlikely to occur within the site as suitable foraging habitat does not occur. As such no further assessment is required.	Low	No
Apus pacificus	Fork-tailed Swift			1	Low. 1 OEH BioNet record occurs within a 10 km radius of the site, as this species is almost exclusively arial the proposal would not impact upon the species, no further assessment is required.	Low	No
Calidris acuminata	Sharp-tailed Sandpiper			11	Low. 1 OEH BioNet record occurs within a 10 km radius of the site due to this species inhabiting predominantly terrestrial wetlands it is unlikely to occur within the site as this habitat feature is not present.	Low	No
Calidris ferruginea	Curlew Sandpiper	E	CE	-	No OEH BioNet records present within a 10 km radius. Unlikely to occur in the Subject Land due to the species occurring mainly on intertidal mudflats in sheltered coastal areas and are less often recorded inland near dams, waterholes. No further assessment required.	Low	No
Calidris melanotos	Pectoral Sandpiper			2	2 OEH BioNet records occur within a 10 km radius, this species prefers shallow. fresh to saline water wetlands, as no such habitat occurs within the site this species is unlikely to occur.	Low	No
Charadrius leschenaultii	Greater Sand Plover, Large Sand Plover	V	V	-	Low. No OEH BioNet records occur within a 10 km radius of the site. The site does not consist of sheltered sandy shelly or muddy beaches or large intertidal mudflats as such the species is unlikely to occur within the site due to a lack of suitable habitat.	Low	No
Cuculus optatus	Oriental Cuckoo, Horsfield's Cuckoo			3	Low. 3 OEH Bionet records occur within a 10 km radius of the site, the site does not contain deciduous or coniferous forest habitat in which the species will occur, as such the species is unlikely to occur within the site.	Low	No

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Scientific Name	Common Name	BC Act	EPBC Act	Records*	Likelihood of Occurrence	Potential Impacts	ToS Req'd
Gallinago hardwickii	Latham's Snipe, Japanese Snipe	-	V	64	Low. No OEH BioNet records found within a 10 km radius of the subject site. Due to the species requiring thick understories in rainforests, wet gullies, waterside vegetation, and mangroves, it is unlikely to occur onsite. No further assessment required.	Low	No
Hirundapus caudacutus	White-throated Needletail	-	V	10	Moderate. There are nine (9) OEH BioNet records within a 10 km radius of the subject site. Due to the species being almost exclusively aerial it is possible the species may fly over or perch within the Subject Land.	Low. Significant areas of native vegetation are avoided and the species capacity to utilise the site is not reduced	No
Motacilla flava	Yellow Wagtail	-	-	-	Low. No OEH BioNet records found within a 10 km radius of the subject site. The site does not contain foraging habitat for this species.	Low	No
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew		CE	-	Low. No OEH BioNet records found within a 10 km radius of the site. due to the coastal distribution of the site and the lack of sheltered coast or intertidal mudflats this species is highly unlikely to occur within the site.	Low	No
Pandion haliaetus	Osprey	V	-	3	Low. 4 OEH BioNet records found within a 10 km radius of the site the site does not contain potential breeding habitat, the species is unlikely to occur within the site. No further assessment is required.	Low	No
Tringa nebularia	Common Greenshank, Greenshank	-	-	2	Low. There is one OEH BioNet record within a 10 km radius of the subject site. Due to the species not breeding in Australia and only occurring in different types of wetlands, it is unlikely to occur on site. No further assessment required.	Low	No

#### Key:

V = Vulnerable M = Migratory A = Marine E = Endangered CE = Critically Endangered P = Protected

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<sup>\*</sup> records listed from BioNet Atlas, representing detections and not number of individuals

K = Known where there are confirmed records, specimens or otherwise verified sightings in any CMA subregion overlapping the search area

P = Predicted where there is high expectation by relevant experts that a species is likely to be present in any CMA subregion overlapping the search area, based on known presence of suitable habitat and distribution with adjoining subregions

<sup>1 –</sup> NSW BioNet Atlas, Office of Environment and Heritage (Accessed 17-10-2024).

<sup>2 -</sup> Commonwealth Protected Matters Search Tool, Department of the Environment (Accessed 17-10-2024)



# Appendix F. EPBC Assessments of Significance

# EPBC Listed Endangered and Critically Endangered Species

Anthochaera phrygia (Regent Honeyeater) – Critically Endangered						
Significant Impact Guideline	Assessment					
Lead to a long-term decrease in the size of a population	The proposal will look to remove approximately 3.19 ha of timbered native vegetation comprising of associated vegetation communities (PCT 3433, 3446). However, this vegetation is in a disturbed condition state consisting of scattered paddock trees. The proposal will require the removal of marginal foraging habitat which includes old growth winter flowering trees. However, the proposal avoids a much greater area of foraging habitat that exists in the study area. The species is highly mobile and able to forage over large distances – the removal of disturbed-quality marginal foraging habitat is unlikely to lead to long term decline of any single population. Furthermore, the site is not mapped within important habitat mapping for the species.					
Reduce the area of occupancy of the species	Unlikely. The proposal will modify/remove approximately 3.19 ha of marginal foraging, this marginal foraging habitat is not mapped within important habitat mapping and is unlikely to be utilised by the species. Furthermore, the species is highly mobile and able to forage over large areas, as the proposal will retain a larger area of marginal foraging habitat in the study area. As such the proposal is unlikely to reduce the area of occupancy of the species					
Fragment an existing population into two or more populations	The proposal would not significantly fragment vegetation within the local areas as the proposal aims to avoid fragmentation through avoidance measures. With impacts to vegetation permanently occurring within areas containing scattered paddock trees with no functional mid or ground stratum due to the current agricultural practices of the land.					
	Associated proposal is unlikely to cause fragmentation through-out the broader landscape, it is also unlikely to isolate any population into two or more populations at the regional scale due to the highly mobile nature of the species.					
Adversely affect habitat critical to the survival of a species	The proposal is unlikely to adversely affect critical habitat of the species, this is due to the highly mobile nature of the species along with larger areas of more intact native vegetation occurring to the West of the site. Furthermore, the site is not mapped as containing important habitat mapping for the species.					
Disrupt the breeding cycle of a population	The species is not known to breed in the locality of the proposal. The limited foraging resources on the lands proposed are unlikely to represent a resource important to the breeding cycle of an important population.					
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove/modify up to 3.19 ha of associated timbered PCTs. This reduction of habitat will have limited impacts on the fragmentation of the surrounding vegetation. It is highly unlikely that the removal of this habitat will lead to the decline any population. Due to the site containing limited marginal foraging habitat along with the sites vegetation not being mapped within important habitat mapping for the species.					
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the species' habitat	The subject site is likely already habitat for a range of pest species, including foxes ( <i>Vulpes vulpes</i> ), rabbits ( <i>Oryctolagus cuniculus</i> ). The proposal would likely facilitate the movement of some of these species, which are known to use road corridors while traversing landscapes; however, not to the extent that it would impact the species.					
	Additionally, some weed species were recorded on the subject land. The proposal may spread these weeds or lead to the establishment of new weeds via earthworks, movement of soil, and attachment of seed (and other propagules) to vehicles and machinery.					
	Recommendations are in place to reduce these risks to a low level.					



Anthochaera phrygia (Regent Honeyeater) – Critically Endangered						
Significant Impact Guideline	Assessment					
Introduce disease that may cause the species to decline, or interfere with the recovery of the species.	Machinery used on site can potentially act as a transport mechanism for biosecurity risks.  Recommendations are in place to reduce these risks.					
Lead to a long-term decrease in the size of a population	Listed threats to the species are loss and alterations to foraging and nesting habitat, primarily through land clearing and practises such as forestry, developments, prevention of regeneration and alterations to fire regimes.  Also noted impacts are alterations to habitat structure, composition and					
	resources availability due to climate change.  The proposal contributes to loss and alteration of marginal foraging habitat, however, impacts from the proposal are not solely likely to interfere with the recovery of the species due to the proposal impacting upon less viable habitat for the species.					
Conclusion	Non-significant impact					

Lathamus discolor (Swift Parrot) – Critically Endangered						
Significant Impact Guideline	Assessment					
Lead to a long-term decrease in the size of a population	The proposal will look to remove approximately 3.19 ha of timbered native vegetation comprising of associated vegetation communities (PCT 3433, 3446). However, this vegetation is in a disturbed condition state consisting of scattered paddock trees. The proposal will require the removal of marginal foraging habitat which includes old growth winter flowering trees. However, the proposal avoids a much greater area of foraging habitat that exists in the study area. The species is highly mobile and able to forage over large distances – the removal of disturbed-quality marginal foraging habitat is unlikely to lead to long term decline of any single population. Furthermore, the site is not mapped within important habitat mapping for the species.					
Reduce the area of occupancy of the species	Unlikely. The proposal will modify/remove approximately 3.3 ha of marginal foraging, this marginal foraging habitat is not mapped within important habitat mapping and is unlikely to be utilised by the species. Furthermore, the species is highly mobile and able to forage over large areas, as the proposal will retain a larger area of marginal foraging habitat in the study area. As such the proposal is unlikely to reduce the area of occupancy of the species					
Fragment an existing population into two or more populations	The proposal would not significantly fragment vegetation within the local areas as the proposal aims to avoid fragmentation through avoidance measures.					
	Associated proposal is unlikely to cause fragmentation through-out the broader landscape, it is also unlikely to isolate any population into two or more populations at the regional scale due to the highly mobile nature of the species.					
Adversely affect habitat critical to the survival of a species	The proposal is unlikely to adversely affect critical habitat of the species, this is due to the highly mobile nature of the species along with the site consisting of fragmented and scattered paddock trees which do not provide critical habitat to the species.					
Disrupt the breeding cycle of a population	The species is not known to breed on mainland Australia, with annual migrations to Tasmania occurring for breeding. The breeding cycle of the species will not be disrupted by the proposal.					
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove/modify up to 3.19 ha of associated timbered PCTs. This reduction of habitat will have limited impacts on the fragmentation of the surrounding vegetation. It is highly unlikely that the removal of this habitat will lead to the decline any population. Due to the site containing limited marginal foraging habitat along with the sites vegetation not being mapped within important habitat mapping for the species.					



Lathamus discolor (Swift Parrot) – Critically Endangered					
Significant Impact Guideline	Assessment				
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the species' habitat	The subject site is likely already habitat for a range of pest species, including foxes ( <i>Vulpes vulpes</i> ), rabbits ( <i>Oryctolagus cuniculus</i> ). The proposal would likely facilitate the movement of some of these species, which are known to use road corridors while traversing landscapes; however, not to the extent that it would impact the species.				
	Additionally, some weed species were recorded on the subject land. The proposal may spread these weeds or lead to the establishment of new weeds via earthworks, movement of soil, and attachment of seed (and other propagules) to vehicles and machinery.				
	Recommendations are in place to reduce these risks to a low level.				
Introduce disease that may cause the species to decline, or interfere with the recovery of the species.	Machinery used on site can potentially act as a transport mechanism for biosecurity risks.  Recommendations are in place to reduce these risks.				
Lead to a long-term decrease in the size of a population	Listed threats to the species are loss and alterations to foraging and nesting habitat, primarily through land clearing and practises such as forestry, developments, prevention of regeneration and alterations to fire regimes.				
	Also noted impacts are aggressive exclusion from habitat by noisy miners, Psittacine circovirus disease (PCD) and alterations to habitat structure, composition and resources availability due to climate change.				
	The proposal contributes to loss and alteration of marginal foraging habitat and potential breeding habitat for the species, however, impacts from the proposal are not solely likely to interfere with the recovery of the species due to the proposal impacting upon less viable habitat for the species.				
Conclusion	Non-significant impact				

Dasyurus maculatus maculatu	Dasyurus maculatus maculatus (Spotted-tail Quoll SE Mainland Population) – Endangered		
Significant Impact Guideline	Assessment		
Lead to a long-term decrease in the size of a population	The proposal will look to remove approximately 3.19 ha of timbered native vegetation comprising of associated vegetation communities (PCT 3433, 3446). However, this vegetation is in a disturbed condition state consisting of scattered paddock trees and lacking a functional mid-stratum. This species is known to forage within forest floors and creek/drainage lines containing dense mid and ground stratum vegetation, The species occupies large home ranges preferring large areas of intact vegetation. As such it is unlikely that the proposal would lead to a long-term decrease in the size of any population as the specie is unlikely to utilise impacted areas of vegetation. Furthermore, the proposal seeks to retain large intact areas of more suitable habitat along the western boundary of the affected property.		
Reduce the area of occupancy of the species	The proposal will not reduce the area of occupancy of the species as the species utilises areas of dense understory vegetation, as the impact area consists predominantly of scattered canopy lacking a functional understory and areas of open pasture in which the species is not known to utilise occurrence within the subject land is highly unlikely.		
Fragment an existing population into two or more populations	The proposal would not significantly fragment vegetation within the local areas as the proposal aims to avoid fragmentation through avoidance measures. Areas of scattered canopy that have the potential to becoming more fragmented by the proposal would not constitute core habitat for the species and would not functionally sever any existing population. Furthermore, the species is highly mobile and known to utilise large home ranges.		



Dasyurus maculatus maculatu	Dasyurus maculatus maculatus (Spotted-tail Quoll SE Mainland Population) – Endangered	
Significant Impact Guideline	Assessment	
Adversely affect habitat critical to the survival of a species	The proposal is unlikely to adversely affect critical habitat of the species, this is due to the highly mobile nature of the species along with larger areas of more intact native vegetation occurring within the Western portion of the property to be retained.	
Disrupt the breeding cycle of a population	No potential breeding habitat has been identified within the Subject Land. Furthermore, the species is known to occupy and utilise multiple den sites simultaneously as such the proposal would not disrupt the breeding cycle of a population.	
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove/modify up to 3.19 ha of associated timbered PCTs. However, the site consists predominantly of scattered canopy vegetation lacking a functional understory for the species. This reduction of habitat will have limited impacts on the fragmentation of the surrounding vegetation. It is highly unlikely that the removal of this habitat will lead to the decline any population as the species is unlikely to utilise the vegetation in its current state.	
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the species' habitat	The subject site is likely already habitat for a range of pest species, including foxes ( <i>Vulpes vulpes</i> ), rabbits ( <i>Oryctolagus cuniculus</i> ). The proposal would likely facilitate the movement of some of these species, which are known to use road corridors while traversing landscapes; however, not to the extent that it would impact the species.  Additionally, some weed species were recorded on the subject land. The proposal may spread these weeds or lead to the establishment of new weeds via earthworks, movement of soil, and attachment of seed (and other propagules) to vehicles and machinery.  Recommendations are in place to reduce these risks to a low level.	
Introduce disease that may cause the species to decline, or interfere with the recovery of the species.	Machinery used on site can potentially act as a transport mechanism for biosecurity risks.  Recommendations are in place to reduce these risks.	
Lead to a long-term decrease in the size of a population	Listed threats to the species are loss fragmentation and degradation of habitat, competition with introduced predators such as cats and foxes, deliberate poisoning, shooting and trapping and vehicle strikes.  The proposal is unlikely to lead to a loss or fragmentation of habitat as the vegetation in its current state does not provide suitable foraging / nesting habitat for the species. The proposal however may lead to an increase of movement of introduced predators through the landscape with the potential introduction of roaming domesticated cats associated with urban areas.	
	However, impacts from the proposal are not solely likely to interfere with the recovery of the species due to the proposal impacting upon areas of less viable habitat for the species.	
Conclusion	Non-significant impact	



# **EPBC Listed Vulnerable Species**

Pteropus poliocephalus (Grey-headed Flying-fox) – Vulnerable		
Significant Impact Guideline	Assessment	
Lead to a long-term decrease in the size of an important population of a species	The proposal will look to remove approximately 3.19 ha of timbered native vegetation comprising of associated vegetation communities (PCT 3433, 3446). However, this vegetation is in a disturbed condition state consisting of scattered paddock trees. This species is known to forage over large areas of the landscape. The proposal will require the removal of marginal foraging habitat in the form of flowering eucalypt trees. The species is highly mobile and able to forage over large distances. As such the removal of marginal foraging habitat is unlikely to lead to long term decline of any single population	
Reduce the area of occupancy of an important population	Unlikely. The proposal will modify/remove foraging vegetation however due to the limited area and disturbed condition of the vegetation found within the site, it is unlikely that a population of the species would rely on this habitat. Furthermore due to the highly mobile nature of this species the removal of marginal habitat is unlikely to exclude the species from the landscape, where large areas of foraging habitat are retained.	
Fragment an existing important population into two or more populations	The proposal would not significantly fragment vegetation within the local areas as the proposal aims to avoid fragmentation through avoidance measures. Associated proposal is unlikely to cause fragmentation through-out the broader landscape, it is also unlikely to isolate any population into two or more populations at the regional scale due to the highly mobile nature of the species.	
Adversely affect habitat critical to the survival of a species	The proposal is unlikely to adversely affect critical habitat of the species, this is due to the highly mobile nature of the species along with larger areas of more intact native vegetation occurring to the West of the site.	
Disrupt the breeding cycle of an important population	The species is not known to breed in the locality of the proposal. The limited foraging resources on the lands proposed are unlikely to represent a resource important to the breeding cycle of an important population.	
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposal will remove/modify up to 3.19 ha of associated timbered PCTs. This reduction of habitat will have limited impacts on the isolation of the surrounding vegetation for a highly mobile species. It is highly unlikely that the removal of this habitat will lead to the decline any population.	
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The subject site is likely already habitat for a range of pest species, including foxes ( <i>Vulpes vulpes</i> ), rabbits ( <i>Oryctolagus cuniculus</i> ). The proposal would likely facilitate the movement of some of these species, which are known to use road corridors while traversing landscapes; however, not to the extent that it would impact the species. Additionally, some weed species were recorded on the subject land. The proposal may spread these weeds or lead to the establishment of new weeds via earthworks, movement of soil, and attachment of seed (and other propagules) to vehicles and machinery. Recommendations are in place to reduce these risks to a low level.	
Introduce disease that may cause the species to decline, or	Machinery used on site can potentially act as a transport mechanism for biosecurity risks. Recommendations are in place to reduce these risks.	
Interfere substantially with the recovery of the species.	Listed threats to the species are loss and fragmentation of foraging and breeding habitat, as well as competition, constrained fertility and shooting in orchards. The proposal contributes to loss and alteration of marginal foraging habitat and potential breeding habitat for the species, however, impacts from the proposal are not solely likely to interfere with the recovery of the species due to scale and quality of habitat for the species,	
Conclusion	Non-significant impact	



# Appendix G. SEPP (Biodiversity & Conservation) 2021

The State Environmental Planning Policy (Biodiversity and Conservation) 2021 commenced on 1 March 2022 and combines 11 separate SEPPs into one consolidated document. SEPP (Biodiversity and Conservation) 2021 replaces and repeals those consolidated SEPPs, which includes amongst others, both the SEPP (Koala Habitat protection) 2020 and SEPP (Koala Habitat protection) 2021. The Biodiversity and Conservation SEPP 2021 provides the existing provisions as separate chapters.

The principles of the Biodiversity and Conservation SEPP 2021 are unchanged from the previous Koala SEPP 2020 and 2021 and aim to:

- Encourage the proper conservation and management of areas of natural vegetation that
  provide habitat for koalas to ensure a permanent free-living population over their present range
  and reverse the current trend of koala population decline.
- Help reverse the decline of koala populations by ensuring koala habitat is properly considered during the development assessment process.
- Provide a process for councils to strategically manage koala habitat through the development of koala plans of management.

The Biodiversity and Conservation SEPP 2021 reflects the policy framework of previous Koala SEPP 2020 (Chapter 3) and 2021 (Chapter 4) for Local Government Areas (LGA) in NSW. At this stage:

- In nine of these LGAs Metropolitan Sydney (Blue Mountains, Campbelltown, Hawkesbury, Ku-Ring-Gai, Liverpool, Northern Beaches, Hornsby, Wollondilly) and the Central Coast LGA Chapter 4 of the Biodiversity and Conservation SEPP 2021 applies to all zones.
- In all other identified LGAs, **Chapter 3** of the Biodiversity and Conservation SEPP 2021 **applies** to land zoned RU1 Primary Production, RU2 Rural Landscape or RU3 Forestry.

The SEPP applies in accordance with *Part 4.2 Clause 4.9 – Development assessment process – no approved koala plan of management for land.* 

- (1) This clause applies to land to which this policy applies if the land
  - a) Has an area of at least 1 hectare (including adjoining land within the same ownership, and
  - b) Does not have an approved koala plan of management applying to the land.

The lot in which the subject land occurs is > 1 ha. No koala plan of management occurs within the Maitland LGA.

Additionally, trees belonging to the koala use trees species listed in Schedule 3 for the relevant koala management area (Central Coast) occur within the subject land and are to be removed.

A Koala Assessment Report has been produced (Refer to **Appendix H**).

Three (3) SATs were undertaken over the subject land within areas where these Schedule 3 trees occur with more than a 15% canopy cover and nocturnal spotlighting was conducted (over two nights). No individuals or secondary indications were observed during the surveys.



# Appendix H. Koala Assessment Report (KAR)



## 1 Introduction

This Koala Assessment Report (KAR) has been prepared by MJD Environmental alongside the Biodiversity Development Assessment Report (BDAR) (MJD, 2024) to accompany a concept development application for a Manufactured Home Estate (MHE) at Lot 177 in DP 874171 and Lot 55 DP874170, 559 Anambah Road, Gosforth. This assessment is to be assessed by Maitland City Council under Part 4 of the EP&A Act.

# 1.1 Proposal Description

The Project is for a Concept Development Application (CDA) seeking concept approval for the staged development of the concept master plan, and for which detailed proposals for the Site or for separate parts of the site are to be subject of subsequent Development Applications (DAs), apart from stage 1.

The masterplan creates a Manufactured Home Estate (MHE) on RU2 Rural Landscape land including approximately 332 sites.

The application includes a development application for stage 1, which is made up of 291 sites. This stage includes the construction of 291 sites, associated private roads, clubhouses, recreation facilities, lead-in roads and services and associated bulk earth works. The application includes an intersection to provide access into the development via Anambah Road, together with an emergency flood access to be constructed via the unformed River Road. Refer to **Appendix B** of BDAR for Plan of Proposal.

## 1.2 Application of the SEPP

The Chapter 4 of the SEPP (Biodiversity and Conservation) 2021 applies due to:

- The land being located within the Maitland LGA which is listed under the SEPP [Part 4.1 Clause 4.4(1) and Schedule 1];
- There being no approved Koala Plan of Management for the Study Area;
- The land contains trees listed under the Schedule 3 Koala use tree species; and
- The land has an area of more than 1 ha (including adjoining land within the same ownership).

## 1.3 Aims and Objectives

This KAR has been developed to address the requirements of the SEPP (Biodiversity and Conservation) 2021. In doing this the KAR must address the stated key principles and their associated detailed criteria and assess the subject site for its potential to be defined as 'Core Koala Habitat'.

## 1.4 Suitably Qualified Person

This report has been prepared by Robert Fay (B. Env. Sc. & Mgmt), under the guidance of Director Matt Doherty (BAAS# 17044) of MJD Environmental.

Matt Doherty's tertiary qualification and experience spanning 20 years in the field of ecological consulting – including undertaking general ecological field surveys for NSW flora and fauna (including the Koala) and the associated reporting – satisfies the SEPP criteria defining a suitably qualified and experienced person [*Part 4.11 Clause 4.2 (1)*].



# 2 Koala Assessment Report

### 2.1.1 Site Description

The Site is situated on Lot 177/DP874171, 559 Anambah Road, Gosforth, NSW, and is situated over RU2 Rural Landscape land. The Subject Land is situated over predominantly cleared pastures with scattered trees.

The subject land is approximately 36 ha in size, of which 6.73 ha was observed as native vegetation. The extent of native vegetation has been interpreted using API and ground truthing during field survey works. The native vegetation cover of the Subject Site and 1,500m buffer was carried out by API of high-quality aerial photography using GIS Software (QGIS). The native vegetation cover has been assessed at 26%.

The vegetation within the subject land has been broadly cleared historically for grazing. The historic land use has resulted in a pasture landscape composed of native and exotic species, including high threat exotic species (HTE). The subject land contains a number of large mature eucalypt paddock trees, and some small stands of late regeneration eucalypt.

On this basis, two (2) Plant Community Types (PCT's) were identified within the Site:

- 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest
- 3433 Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest

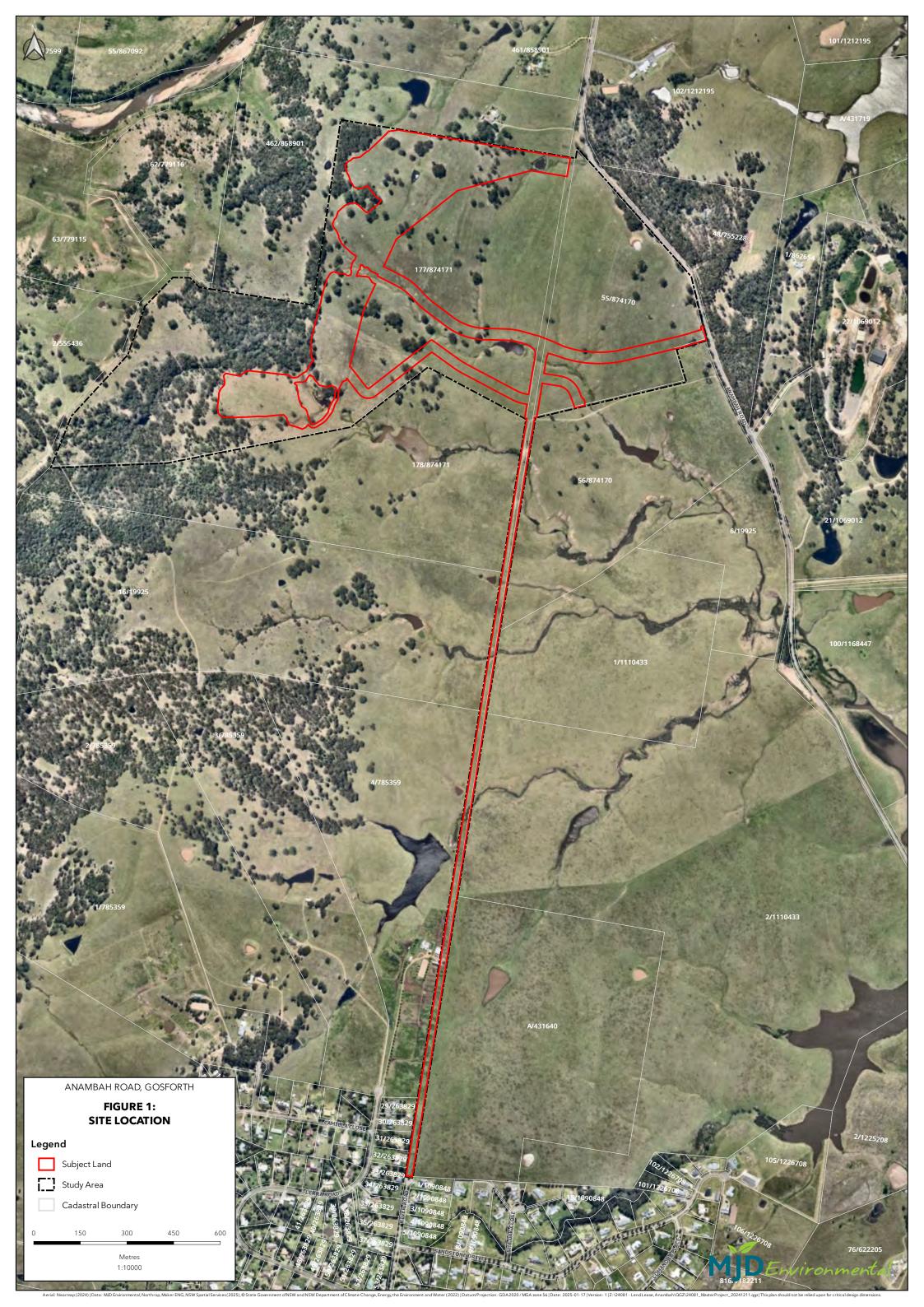
The vegetation exists as a by a mosaic of cleared areas and remnant and regenerated canopy trees. All vegetation on the subject land has been subject to past or ongoing disturbance. Canopy condition varies and includes copses of late regeneration, large mature paddock trees, and forest and woodland margins.

Species dominance varies across the subject land, typified by *Corymbia maculata* (Spotted Gum), *Eucalyptus moluccana* (Grey Box), and *Eucalyptus tereticornis* (Forest Red Gum). Subdominant species include *Eucalyptus fibrosa* (Broad-leaved Ironbark) and *Eucalyptus crebra* (Narrow Leaved Ironbark), *Eucalyptus acmenoides* (White Mahogany), and *Eucalyptus punctata* (Grey Gum).

The subject land occurs on the lower slopes of low hills with incised gullies and some steep local gradients. The subject land crosses 1<sup>st</sup> and 3<sup>rd</sup> order watercourses. The subject land contains pasture of mixed native and exotic components. The site continues to be grazed by beef cattle, and cleared areas have been continually managed since at least 1954 (NSW Historic Aerial Imagery).

The BDAR found that the proposal will remove/modify up to:

- An area of 1.94 ha 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest
- An area of 4.79 ha of 3433 Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest, occurring as 1.25 ha of scattered trees and 3.54 ha of secondary grassland.





### 2.1.2 Targeted Koala Surveys

During the Biodiversity Assessment carried out by MJD Environmental, formal surveys were undertaken to target the Koala. Field surveys were undertaken on 24 & 31 October and 11 November 2024. The prevailing weather conditions during the surveys are presented in a **Table 1** below. The dates preceding SAT surveys are included to demonstrate compliance with climatic constraints.

**Table 1 Prevailing Weather Conditions** 

Date	Survey	Min Temp (°C)	Max Temp (°C)	Rain (mm)	Wind (km/h)	Sunrise- Sunset
21 October 2024	N/A	15.6	22.7	0	SSW 20 – S 17	0606 - 1911
22 October 2024	N/A	11.4	24.8	0	SSW 9 - N 6	0605 - 1912
23 October 2024	N/A	9.4	30.4	0	NW 11 – NW 17	0604 - 1912
24 October 2024	SATs	15.6	25.3	0	WNW 11 - ESE 28	0603 - 1913
31 October 2024	Nocturnal	12.8	30.9	0	W 13 – ENE 20	0556 - 1919
11 November 2024	Nocturnal	16.1	22.9	0	SSE 9 – S 11	0547 – 1929

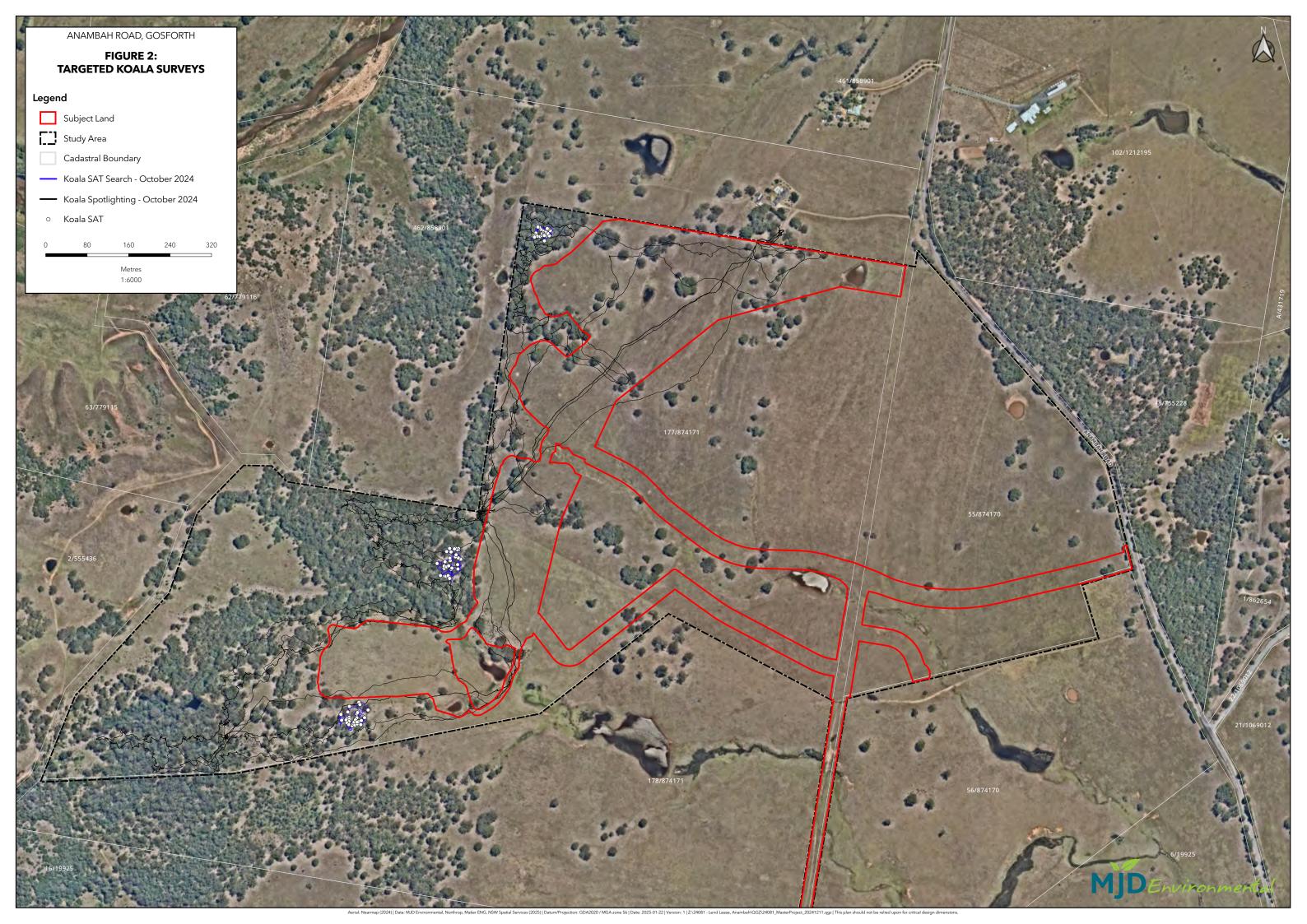
Sources: http://www.bom.gov.au/climate/dwo/IDCJDW0200.shtml

http://www.ga.gov.au/bin/geodesy/run/sunrisenset

In accordance with the Biodiversity and Conservation SEPP 2021, the following survey activities were undertaken to determine the presence of Koalas:

- Spot Assessment Technique SAT search (following Phillips and Callaghan 2011). The standard method is 30 trees per 150m x 150m area to be searched to determine faecal pellet presence / absence. This survey was undertaken on 24 October 2024. At the time of survey, the impact boundary was unknown and as such the areas within the Study Area where the species was most likely to occur (i.e. larger wooded patches) were surveyed to determine presence (refer to Figure 2). These larger areas have now been avoided within the design as such the SATs occur within the Study Area opposed to the Subject Land.
- In keeping with the survey guidelines, the area had not experienced heavy rain in the three (3) days prior to the survey, which was reinforced by the rainfall record from the nearest weather station (refer to **Table 1**).
- Koala use tree species present within the Subject Site included Corymbia maculata, Eucalyptus crebra, Eucalyptus fibrosa, Eucalyptus tereticornis, Eucalyptus punctata, Eucalyptus acmenoides and Eucalyptus moluccana.
- During the SAT search, and in addition to the required survey effort, secondary indications of Koala usage / occupation of local trees was carried out. This included searching trees for Koala signs such as trunk scratches, fur and urine stains.
- Spotlighting. Conducted over two nights on the 31 October 2024 and 11 November 2024 (refer to Attachment 2), all trees within the Subject Site were checked in line with Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC), 2011, Survey Guidelines for Australia's Threatened Mammals.

Some scratches were observed on trees during surveys however, these scratches were determined to not be from Koalas due to size and lack of pock marks. The scratches observed were determined to be caused by smaller mammals and *Varanus varius* (Lace Monitor). Additionally, there were no recent secondary indications such as belly rubs, loose fur nor scats were detected. Despite presence of suitable habitat (through Koala use tree species), there was no recent evidence of Koala presence in or around the Site observed during any of the survey efforts. No Koalas were observed during spotlighting and / or opportunistic observation, and no Koala scats were identified around the base of any Koala use trees during the SAT search.





## 2.2 Koala Habitat Value (criteria 1 and 2)

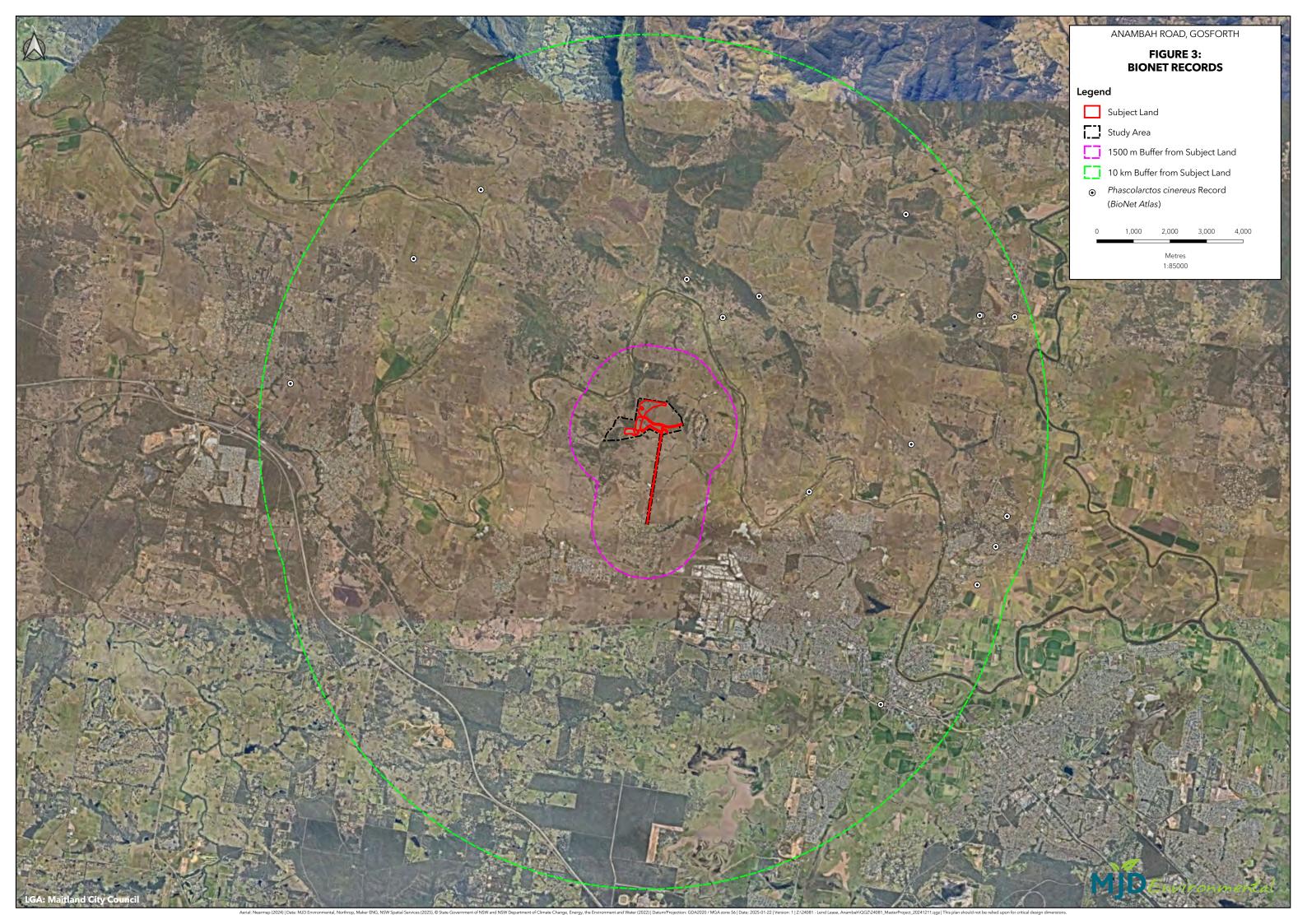
A review of the OEH BioNet Atlas using a search of the locality, revealed the site, on which the proposed development is to occur, has no records occurring within 2.5 km in the last 18 years or historic records within 10km. However, when cross referenced with a Sydney-Hunter Sub-IBRA region Bionet search there are six (6) records within a 10km buffer of the site. Of these, two (2) of these records has an accuracy greater than 1000. Bionet records with a location accuracy greater than 1000 m are not to be considered under the SEPP. excluded from considerations under the SEPP. (DPIE, 2021).

Under the Biodiversity and Conservation State Environmental Planning Policy 2021, 'Core Koala Habitat' is defined as:

- a) an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas are recorded as being present at the time of assessment of the land as highly suitable koala habitat, or
- b) an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas have been recorded as being present in the previous 18 years.

"Highly Suitable Koala Habitat' refers to areas where 15% or greater of the total number of trees within any PCT are the regionally relevant species of those listed in Schedule 3 of the BC SEPP 2021 (DPIE, 2021).

Koala use tree species listed under Schedule 3 of the BC SEPP 2021 in the Central Coast koala management area identified within the Study Area include *Corymbia maculata, Eucalyptus crebra, Eucalyptus fibrosa, Eucalyptus tereticornis, Eucalyptus punctata, Eucalyptus acmenoides and Eucalyptus moluccana*. The Study Area therefore meets the criteria for 'highly suitable koala habitat' as 15% or greater of the total number of trees within any PCT are the regionally relevant species. However, the Study Area is not considered to be 'Core Koala Habitat' as there are no recent records (within 18 years) of the species within 2.5 km of the Study Area. Additionally, no individuals or secondary indications of koalas were observed during targeted surveys across the Study Area.





# 2.3 Measures taken to avoid impacts to koalas – (criteria 3, 4, 5, 6, 7, & 8)

The project has been located on residual land adjacent to an urban release area – a mosaic of intact forest and woodland, scattered trees and grazed pasture. The location is the interface between predominantly cleared land and a large remnant patch of approximately 300 ha. The location presents opportunities for avoidance of impacts to biodiversity by developing predominantly cleared land up to the margins of remnant forest and woodland.

The location has marginal connectivity, with mobile species able to move through the landscape between isolated patches of canopy vegetation. Less mobile species are likely to be constrained to the intact remnants.

Additionally, the project design has considered Koalas and other threatened entities as it has focussed on avoiding remnant forest and woodland. Through constraining the development to paddock areas with scattered canopy trees it has avoided impacts to threatened ecological communities (TEC) and threatened species habitat.

Precautionary measures were taken to determine the likelihood of koalas occurring on site in accordance with the SEPP 2021. No evidence of koalas was observed.

# 2.4 Analysis of potential impacts (criteria 9)

The ecological field assessment found that the proposal will remove / modify up to:

- An area of 1.94 ha 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest
- An area of 4.79 ha of 3433 Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest, occurring as 1.25 ha of scattered trees and 3.54 ha of secondary grassland.

In addition, the following indirect impacts may occur because of the development:

- Vehicle Strike The proposal will create additional roads and there will be increased vehicle movement during construction.
- Edge effects The removal or modification of vegetation within the study area may increase the risk of weed invasions from disturbance of construction and from neighbouring land.
- Disturbance Unauthorised disturbance of Koala habitat as a result of construction and operation; and
- Introduction or spread of disease Increased vehicle movement will be likely during the construction phase that has potential to increase the risk of introduction of *Phytophthora cinnamomi* to the study area via ground disturbance and construction activity combined with machinery bringing spores into the area. Note that mitigation measures have been proposed within the BDAR for the duration of construction period.

Due to the lack of historical records within 2.5km of the Study Area and no signs of koala occupation during targeted surveys it is unlikely the species will directly or indirectly impact Koalas.



# 2.5 Plan to manage and protect koalas and their habitat (criteria 10, 11, 12 & 13)

Impact	Management measures
Vehicle strike	Traffic speed limits throughout the site during construction (10-20 km/hr) and 30 km/hr thereafter.
Noise and light disturbance	Suitably qualified ecologist or similar to inspect vegetation for all fauna (Inc. Koalas) before development commences, including surrounding trees to Subject Site.
	If a koala is identified during construction, temporary suspension of works that might disturb the koala and / or prevent from moving itself to adjacent undisturbed habitat.
Introduction or spread of disease, Edge effects	Ensure that all equipment is free of plant material and soil that may contain weed seeds or soil-borne diseases prior to entering the subject site. Vehicles should be washed down at an appropriate location where weeds are regularly managed prior to commencing work.
	If machinery is transported from an area of confirmed infection of <i>Phytophthora cinnamomi</i> or Exotic Rust Fungi to the subject site, stringent wash down must be completed before leaving the area, removing all soil and vegetative material from cabins, trays, and under carriages;
Disturbance to Koala habitat	Ensure the extent of clearing is clearly marked in the field prior to the commencement of vegetation clearing. Ensure that only the minimum vegetation clearing required is undertaken.
	Suitably qualified ecologist or similar to inspect vegetation for all fauna (Inc. Koalas) before development commences.
	If a koala is identified during construction, temporary suspension of works that might disturb the koala and / or prevent from moving itself to adjacent undisturbed habitat



## 3 Conclusion

This Koala Assessment Report (KAR) has been prepared by MJD Environmental alongside the Biodiversity Development Assessment Report (BDAR) (MJD, 2024) to accompany a concept development application for a Manufactured Home Estate (MHE) at Lot 177 in DP 874171, 559 Anambah Road, Gosforth. This assessment is to be assessed by Maitland City Council under Part 4 of the EP&A Act.

Under the definition of the SEPP, the Study area would be considered 'highly suitable' due to greater than 15% of trees present being listed as regionally relevant to koalas. However, given the lack of evidence of Koala use within the Study Area, the lack of Koala records within the locality and the retention of the larger area of intact vegetation within the Study Area, it is unlikely that koalas will be impacted by the proposal.

## 4 References

- Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) (2011), Survey Guidelines for Australia's Threatened Mammals
- MJD Environmental (2022), Biodiversity Assessment Report
- NSW Environment Energy and Science (2020a) BioNet Atlas: <a href="http://www.bionet.nsw.gov.au/">http://www.bionet.nsw.gov.au/</a> (accessed February 2022)
- NSW Environment Energy and Science (2020b) *Threatened Species Profile Search* http://www.environment.nsw.gov.au/threatenedSpeciesApp/ (accessed November 2024)
- NSW Department of Planning, Industry and Environment (2021) *Koala Habitat Protection SEPP*<a href="https://www.planning.nsw.gov.au/Policy-and-Legislation/Environment-and-Heritage/Koala-Habitat-Protection-SEPP">https://www.planning.nsw.gov.au/Policy-and-Legislation/Environment-and-Heritage/Koala-Habitat-Protection-SEPP</a>, DPIE 8 March 2021 (accessed November 2024)
- NSW Department of Planning, Industry and Environment (2021) Koala SEPP 2021 Fact Sheetdevelopment application <a href="https://www.planning.nsw.gov.au/sites/default/files/2023-03/koala-sepp-2021-fact-sheet.pdf">https://www.planning.nsw.gov.au/sites/default/files/2023-03/koala-sepp-2021-fact-sheet.pdf</a> (accessed November 2024)
- NSW Department of Planning, Industry and Environment (2019) Koala Habitat Protection SEPP Koala Habitat Protection Guideline: Implementing State Environmental Planning Policy
- Phillips and Callaghan (2011). The Spot Assessment Technique: A tool for determining localised levels of habitat use by Koalas Phascolarctos cinereus. *Australian Zoologist* 35(3)
- State Environmental Planning Policy (Biodiversity and Conservation) 2021 <u>www.legislation.nsw.gov.au</u>
- State Environmental Planning Policy (Koala Habitat Protection) 2021 www.legislation.nsw.gov.au



# **Appendix I.** Species Lists

Fauna		
General Type	Scientific Name	Common Name
Bats	Austronomus australis	White-striped Freetail-bat
Bats	Chalinolobus gouldii	Gould's Wattled Bat
Bats	Chalinolobus morio	Chocolate Wattled Bat
Bats	Falsistrellus tasmaniensis (V / - )	Eastern False Pipistrelle
Bats	Micronomus norfolkensis (V / - )	Eastern Coastal Free-tailed Bat
Bats	Miniopterus australis (V / - )	Little Bent-winged Bat
Bats	Miniopterus orianae oceanensis (V / - )	Large Bent-winged Bat
Bats	Myotis macropus (V / - )	Southern Myotis
Bats	Nyctophilus spp.1	A Long-Eared Bat
Bats	Ozimops planiceps <sup>1</sup>	South-eastern Free-tailed Bat
Bats	Ozimops ridei	Eastern Free-tailed Bat
Bats	Pteropus poliocephalus (V / V)	Grey-headed Flying-Fox
Bats	Scotorepens orion <sup>1</sup>	Eastern Broad-nosed Bat
Bats	Vespadelus pumilus	Eastern Forest Bat
Bats	Vespadelus regulus <sup>1</sup>	Southern Forest Bat
Bats	Vespadelus vulturnus¹	Little Forest Bat
Birds	Acridotheres tristis <sup>2</sup>	Common Myna
Birds	Alisterus scapularis	Australian King-Parrot
Birds	Anas superciliosa	Pacific Black Duck
Birds	Aquila audax	Wedge-tailed eagle
Birds	Aythya australis	Hardhead
Birds	Bubulcus ibis	Cattle Egret
Birds	Cacatua galerita	Sulphur-Crested Cockatoo
Birds	Cacatua sanguinea	Little Corella
Birds	Cacatua tenuirostris	Long-billed Corella
Birds	Centropus phasianinus	Pheasant Coucal
Birds	Chenonetta jubata	Australian Wood Duck
Birds	Coracina novaehollandiae	Black-faced Cuckoo-Shrike
Birds	Corcorax melanorhamphos	White-winged Chough
Birds	Cormobates leucophaea	White-throated Treecreeper
Birds	Corvus coronoides	Australian Raven
Birds	Dacelo novaeguineae	Laughing Kookaburra
Birds	Elseyornis melanops	Black-Fronted Dotterel
Birds	Eolophus roseicapilla	Galah
Birds	Eopsaltria australis	Eastern Yellow Robin
Birds	Eurystomus orientalis	Dollarbird
Birds	Falco cenchroides cenchroides	Nankeen Kestrel
Birds	Gerygone olivacea	White-throated Gerygone
Birds	Grallina cyanoleuca	Magpie-lark
Birds	Gymnorhina tibicen	Australian Magpie



O	Onlandific Name	0
General Type	Scientific Name	Common Name
Birds	Malurus cyaneus	Superb Fairy-Wren
Birds	Malurus lamberti	Variegated Fairy-wren
Birds	Manorina melanocephala	Noisy Miner
Birds	Ninox boobook	Southern Boobook
Birds	Ninox connivens (V / - )	Barking Owl
Birds	Ocyphaps lophotes	Crested Pigeon
Birds	Oriolus sagittatus	Olive-backed Oriole
Birds	Platycercus eximius	Eastern Rosella
Birds	Podargus strigoides	Tawny Frogmouth
Birds	Psophodes olivaceus	Eastern Whipbird
Birds	Ptilonorhynchus violaceus	Satin Bowerbird
Birds	Rhipidura albiscapa	Grey Fantail
Birds	Rhipidura leucophrys	Willie Wagtail
Birds	Scythrops novaehollandiae	channel-billed cuckoo
Birds	Strepera graculina	Pied Currawong
Birds	Todiramphus sanctus	Sacred Kingfisher
Birds	Trichoglossus haematodus	Rainbow Lorikeet
Birds	Tyto alba	Barn Owl
Birds	Vanellus miles	Masked Lapwing
Birds	Zanda funereus	Yellow-tailed Black-Cockatoo
Carnivores	Canis lupus dingo	Dingo
Carnivores	Felis catus <sup>2</sup>	Feral Cat
Carnivores	Vulpes vulpes <sup>2</sup>	Red Fox
rogs	Crinia signifera	Common Eastern Froglet
rogs	Limnodynastes peronii	Brown-striped Frog
- Frogs	Limnodynastes tasmaniensis	Spotted Grass Frog
Frogs	Litoria fallax	Eastern Dwarf Tree Frog
Frogs	Litoria latopalmata	Broad-palmed Frog
Frogs	Litoria peronii	Peron's Tree Frog
Frogs	Litoria verreauxii	Verreaux's Frog
Frogs	Uperoleia laevigata	Smooth Toadlet
Marsupials	Macropus giganteus	Eastern Grey Kangaroo
' Marsupials	Notamacropus rufogriseus	Red-necked Wallaby
Marsupials	Petaurus norfolcensis (V / - )	Squirrel Glider
Marsupials	Phascogale tapoatafa (V / - )	Brush-tailed Phascogale
Marsupials	Trichosurus vulpecula	Brushtail possum
Reptiles	Lampropholis guichenoti	Pale-flecked Garden Sunskink
Reptiles	Varanus varius	Lace Monitor

### Key:

1 = 'Probable' record (from Ultrasonic recorder report)

V = Vulnerable E = Endangered CE = Critically Endangered

2 = Exotic species (BC Act/EPBC Act)



Flora		
Family	Scientific Name	Common Name
Acanthaceae	Brunoniella australis	Blue Trumpet
Amaranthaceae	Alternanthera denticulata	Lesser Joyweed
Anthericaceae	Dichopogon fimbriatus	Nodding Chocolate Lily
Apiaceae	Centella asiatica	Indian Pennywort
Аріассас	Cyclospermum leptophyllum <sup>1</sup>	Slender Celery
Apocynaceae	Gomphocarpus fruticosus <sup>1</sup>	Narrow-Leaved Cotton Bush
Аросупассас	Tylophora barbata	Bearded Tylophora
	Bidens spp. <sup>1</sup>	
	Cirsium vulgare <sup>1</sup>	Spear Thistle
	Conyza spp. <sup>1</sup>	A Fleabane
	Euchiton sphaericus <sup>1</sup>	Star Cudweed
	Gamochaeta calviceps	Cudweed
Asteraceae	Hypochaeris albiflora <sup>1</sup>	
	Hypochaeris radicata <sup>1</sup>	Catsear
	Ozothamnus diosmifolius	White Dogwood
	Senecio madagascariensis <sup>1</sup>	Fireweed
	Sigesbeckia orientalis subsp. orientalis	Indian Weed
	Soliva sessilis¹	Bindyi
	Lobelia purpurascens	Whiteroot
Campanulaceae	Wahlenbergia gracilis	Sprawling Bluebell
	Wahlenbergia stricta	Tall Bluebell
Caryophyllaceae	Paronychia brasiliana <sup>1</sup>	Brazilian Whitlow
Chenopodiaceae	Einadia hastata	Berry Saltbush
Commelinaceae	Commelina cyanea	Native Wandering Jew
	Murdannia graminea	Grass Lily
Convolvulaceae	Convolvulus angustissimus	
Convolvalaceae	Dichondra repens	Kidney Weed
	Cyperus brevifolius <sup>1</sup>	Mullumbimby Couch
Cyperaceae	Cyperus gracilis	Slender Flat-Sedge
	Fimbristylis dichotoma	Common Fringe-Sedge
Ericaceae - Epacridoideae	Lissanthe strigosa	Peach Heath
	Daviesia genistifolia	Broom Bitter Pea
	Desmodium varians	Slender Tick-Trefoil
	Glycine clandestina	Twining Glycine
Fabaceae - Faboideae	Glycine tabacina	Variable Glycine
	Pullenia gunnii	Slender Tick-Trefoil
	Trifolium campestre <sup>1</sup>	Hop Clover
	Trifolium repens <sup>1</sup>	White Clover
Fabaceae - Mimosoideae	Acacia ulicifolia	Prickly Moses



Flora		
Family	Scientific Name	Common Name
Gentianaceae	Centaurium tenuiflorum¹	Slender Centaury
Geraniaceae	Geranium solanderi	Native Geranium
Goodeniaceae	Goodenia hederacea	Ivy Goodenia
Iridaaaa	Romulea rosea¹	
Iridaceae	Sisyrinchium iridifolium <sup>1</sup>	Blue Pigroot
	Juncus cognatus <sup>1</sup>	
Juncaceae	Juncus kraussii subsp. australiensis	Sea Rush
	Juncus usitatus	
Lamiaceae	Clerodendrum tomentosum	Hairy Clerodendrum
Lamaceae	Plectranthus graveolens	
Loganiaceae	Mitrasacme polymorpha	
Lomandraceae	Lomandra gracilis	
Lomanuraceae	Lomandra multiflora subsp. multiflora	Many-Flowered Mat-Rush
Luzuriagaceae	Eustrephus latifolius	Wombat Berry
Malvaceae	Brachychiton populneus	Kurrajong
Marvaceae	Sida rhombifolia <sup>1</sup>	Paddy's Lucerne
	Backhousia myrtifolia	Grey Myrtle
	Corymbia maculata	Spotted Gum
	Eucalyptus acmenoides	White Mahogany
Murtagaga	Eucalyptus crebra	Narrow-Leaved Ironbark
Myrtaceae	Eucalyptus fibrosa	Red Ironbark
	Eucalyptus moluccana	Grey Box
	Eucalyptus tereticornis	Forest Red Gum
	Melaleuca styphelioides	Prickly-Leaved Tea Tree
Oleaceae	Notelaea longifolia	Large Mock-Olive
Oleaceae	Olea europaea <sup>1</sup>	Common Olive
Orchidaceae	Dipodium spp.	
Orchidaceae	Microtis unifolia	Common Onion Orchid
Oxalidaceae	Oxalis perennans	
Phormiaceae	Dianella caerulea var. caerulea	
Phyllanthaceae	Breynia oblongifolia	Coffee Bush
	Plantago debilis	Shade Plantain
Plantaginaceae	Plantago lanceolata¹	Lamb's Tongues
	Veronica plebeia	Trailing Speedwell
	Aristida vagans	Threeawn Speargrass
	Austrostipa ramosissima	Stout Bamboo Grass
Poaceae	Axonopus fissifolius¹	Narrow-Leafed Carpet Grass
	Bothriochloa macra	Red Grass
	Briza minor¹	Shivery Grass



Flora		
Family	Scientific Name	Common Name
	Briza subaristata¹	
	Bromus catharticus <sup>1</sup>	Prairie Grass
	Chloris truncata	Windmill Grass
	Cynodon dactylon	Common Couch
	Dichelachne micrantha	Shorthair Plumegrass
	Echinopogon ovatus	Forest Hedgehog Grass
	Ehrharta erecta <sup>1</sup>	Panic Veldtgrass
	Entolasia stricta	Wiry Panic
	Eragrostis brownii	Brown's Lovegrass
	Imperata cylindrica	Blady Grass
Doggoog	Lachnagrostis filiformis	
Poaceae	Lolium perenne <sup>1</sup>	Perennial Ryegrass
	Microlaena stipoides var. stipoides	Weeping Grass
	Oplismenus aemulus	Basket Grass
	Paspalum dilatatum¹	Paspalum
	Poa annua¹	Winter Grass
	Poa labillardierei var. labillardierei	Tussock
	Rytidosperma spp.	
	Sorghum leiocladum	Wild Sorghum
	Sporobolus africanus¹	Parramatta Grass
	Sporobolus creber	Slender Rat's Tail Grass
	Themeda triandra	
Polygonaceae	Rumex brownii	Swamp Dock
Primulaceae	Lysimachia arvensis¹	Scarlet Pimpernel
Proteaceae	Solanum prinophyllum	
Pteridaceae	Pellaea falcata	Sickle Fern
Ranunculaceae	Ranunculus lappaceus	Common Buttercup
Dubiasas	Asperula conferta	Common Woodruff
Rubiaceae	Galium gaudichaudii	Rough Bedstraw
Colonago	Cestrum parqui¹	Green Cestrum
Solanaceae	Solanum prinophyllum	Forest Nightshade
Thymelaeaceae	Pimelea linifolia	Slender Rice Flower
	Lantana camara¹	Lantana
Verbenaceae	Verbena bonariensis¹	Purpletop
	Verbena rigida var. rigida <sup>1</sup>	Veined Verbena

### Key:

1 = Exotic species

V = Vulnerable E = Endangered CE = Critically Endangered (BC Act/EPBC Act)



# Appendix J. Species Expert Report – Litoria brevipalmata



# 24New9681

Expert Report for *Litoria brevipalmata* (Green-thighed Frog)

MJD Environmental on behalf of Third.i Anambah Pty Ltd



### **Document Tracking**

Project Name: Expert report for the *Litoria brevipalmata* (Green-thighed Frog)

Project Number: 24New9681

Project Manager: Frank Lemckert

This report should be cited as 'Eco Logical Australia 2024, Expert report for *Litoria brevipalmata* (Green-thighed Frog), Prepared for MJD Environmental on behalf of Third.i Anambah Pty Ltd.'

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Plate 8. Examples of habitat at known Green-thighed Frog sites on the Kurri Sandbeds, 15 km to the
south30

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# **Abbreviations**

Abbreviation	Description
BC Act	NSW Biodiversity Conservation Act 2016
BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Calculator
BDAR	Biodiversity Development Assessment Report
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
NSW DCCEEW	NSW Department of Climate Change, Energy, the Environment and Water
DPI	Former NSW Department of Primary Industries
DPIE	Former NSW Department of Planning, Infrastructure and Environment
DPIRD	NSW Department of Primary Industry and Regional Development
ELA	Eco Logical Australia
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
Green-thighed Frog	Green-thighed Frog ( <i>Litoria brevipalmata</i> )
IBRA	Interim Biogeographic Regionalisation for Australia
IUCN	International Union for Conservation of Nature and Natural Resources
LEP	Local Environment Plan
MJD	MJD Environmental
NPWS	National Parks and Wildlife Service
NSW	New South Wales
PCT	Plant Community Type

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# 1. Introduction

#### **1.1.** Background

Eco Logical Australia (ELA) was engaged by MJD Environmental (MJD) to undertake an assessment of the habitats available for *Litoria brevipalmata* (Green-thighed FrogGreen-thighed Frog) within the proposed development site boundary located at Anambah NSW (refer to Figure 1). This species was determined by MJD to be a candidate species based on the available habitats and Plant Community Types present. Survey work for this frog is difficult to undertake because of its highly specific breeding requirements, needing heavy rainfall events to flood larger areas of pools. Hence an assessment was completed to indicate if the species was likely to be present based on the available habitat.

The assessment work was completed by ELA's accredited expert in this species, Dr Frank Lemckert to provide expert advice as to whether Green-thighed FrogGreen-thighed Frogs would likely be present on the development site and consider if an expert report for the species is warranted. The Green-thighed Frog is listed as a vulnerable species under the NSW *Biodiversity Conservation Act 2016* (BC Act), but is not listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). There are no records of this species within a 10 km radius of the development site (the locality). There are suitable Plant Community Types (PCT) recorded on site such that the Green-thighed Frog could be present and it has been listed as a candidate species under the Biodiversity Assessment Method (BAM; DPIE 2020a).

The study area itself is considered to be Lot 177/DP874171, which should cover both the lands that are to be subject to direct impacts by the proposed works when the development boundaries are finally defined (subject lands) and also adjacent sections of this land subject to indirect impacts. Surveys required under the BAM survey guidelines (DPIE 2020b) have not been completed for this species as the heavy rainfall conditions required fopr surveys under the BAM Guidelines (DPIE 2020b) did not occur through the assessment period. This expert report has been written to be included as a component of the Biodiversity Development Assessment Report (BDAR) to adequately assess the likelihood of the Green-thighed Frog being present in the study area and, if so, provide an assessment of where this species would be located.

#### 1.2. Project description

The proposed works are part of the proposed Anambah Urban Release Area (AURA), which is located approximately 10 km west of Maitland Central Business District in the Maitland Local Government Area. The AURA is bound to the north and west by rural land, east by Anambah Road and south by Windella rural residential estate and rural lands.

The study area for which this report is being written consists of Lot 177/DP874171, which covers approxmately 97 ha of land (Figure 1) and that is zoned as RU2 Rural Lanscape under the Maitland Local Environment Plan (LEP) 2011. The land in the study area has mostly been cleared for agricultural practices and only approximately 33% is covered by remnant native vegetation (Figure 1). The lands continue to be subject to grazing by stock and so that remaining vegetation is subject to varying degrees of ongoing disturbance.

Development works proposed within the study area are generally expected to be constrained to cleared areas with only scattered trees or small patches of degraded native vegetation (Figure 2).

#### **1.3.** Purpose of the expert report

Section 6.5.2 of the BAM (DPIE 2020a) sets out the following essential requirements for the preparation of an expert report:

- Identify the relevant species or population.
- Justify the use of an expert report.
- Indicate and justify the likelihood of presence of the species or population.
- Estimate the number of individuals or area of habitat (whichever unit of measurement applies to the species/individual) for the biodiversity development assessment area, including a description of how the estimate was made.
- Demonstrate what information was considered, rejected and discounted in relation to the determination made in the expert report.
- Identify the expert and provide evidence of their expert credentials.

The report needs to determine whether:

- The target species is unlikely to be present, in which case no further assessment is required, or
- The target species is likely to be present in which case the expert report must provide estimates of habitat area within the impact assessment area.

# 1.4. Impact assessment area

The location of the study area is provided in Figure 1, with more detail on the study area being provided in Figure 2. Information for the study area encompassed by this infrastructure and the locality of the study area (10 km around development site) was obtained from a range of data layers including:

- Native vegetation: provided by MJD Environmental
- Waterbodies: NSW LPI
- Green-thighed Frog Records: NSW BioNet and the Atlas of Living Australia (NSW DCCEEW 2024).

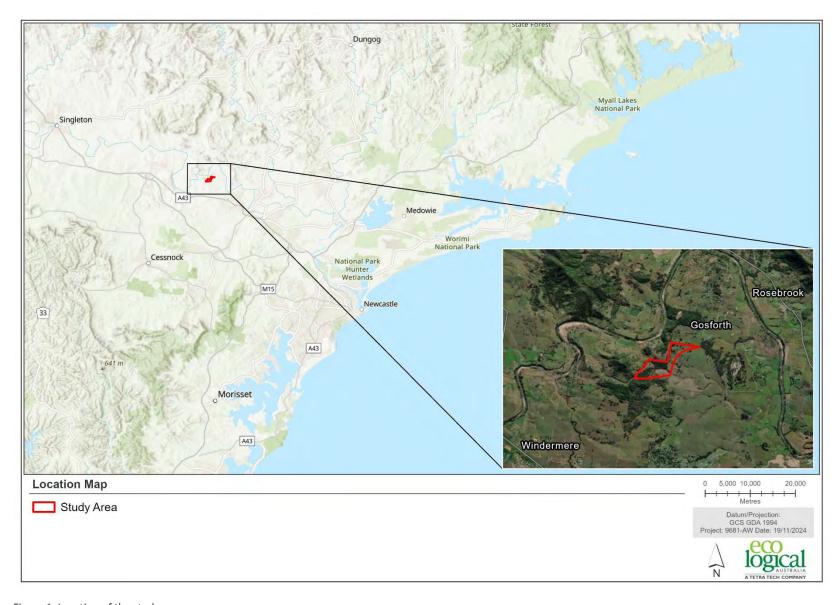


Figure 1. Location of the study area

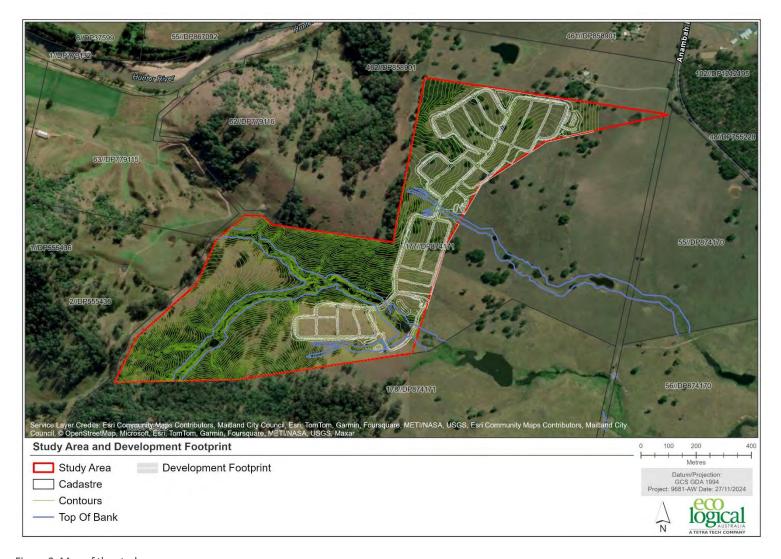


Figure 2. Map of the study area

#### 1.5. Reasons for use of an expert report

Section 5.2.3(2)(b) and 5.2.4(2)(c) of the BAM (DPIE 2020a) places two specific criteria for where an expert report can be used instead of surveys:

- An expert report can only be used instead of a survey for species to which species credits apply.
- An expert report may be obtained instead of undertaking a species survey at a
  development site, clearing site, land to be biodiversity certified or a biodiversity
  stewardship site.

The Green-thighed Frog meets the first criteria, being a species credit species under the BC Act and the proposed action meets the second criteria as it is a development site.

In this case, an expert report has been provided in relation to the Green-thighed Frog, which is listed as vulnerable under the BC Act, and is a species credit species. As noted before, an expert report has been prepared due to the difficulty in meeting the survey requirements set out in the BAM Survey Guidelines (DPIE 2020b). This species calls only after heavy rainfall events that flood breeding sites and such suitable rainfall did not occur through the available survey period.

# 1.6. Credentials of expert

#### 1.6.1. History of expert work on frogs

Dr Frank Lemckert is an Ecologist who has been undertaking studies into the ecology and management of frogs since 1986 and has been an ecological consultant since 2011. His skills include survey design/ implementation/ targeted species surveys, data handling, analysis and interpretation and the production of high level reports including papers published in international peer-reviewed journals and technical reports and recovery plans for the Commonwealth and NSW Governments. He has also been an expert witness for the assessment of the impacts of alleged illegal clearing for the Commonwealth, NSW and Local Governments (Hornsby Council) and provided expert advice to NSW Department of Primary Industry for legal considerations over the potential for forestry operations to impact on rock outcrop dependent species.

Dr Lemckert represented Forests NSW (now Forestry Corporation NSW) as a reptile and amphibian expert in the Comprehensive Regional Assessments and Regional Forest Agreement Process carried out between 2000 and 2002 and as an expert in fauna management for negotiations over a new Threatened Species License for harvesting operations in 2014 that included consideration of this species.

Dr Lemckert is an acknowledged expert on eastern Australian frogs having completed his MSc and PhD on the ecology and management of frogs in this region and has published over 70 papers (or book chapters) in Australian and International peer-reviewed journals. He has been engaged by both the NSW and Commonwealth Governments as an expert witness in court cases assessing the impacts of land clearing on threatened frogs.

He is a member of the Amphibian Specialist Group of the International Union for Conservation of Nature (IUCN), secretary of the NSW Declining Frog Working Group of NSW and past president of the Australian Society of Herpetologists. He co-supervised two PhD students, a Master of Applied Science Student and three Bachelor of Science (Honours) students who completed theses addressing issues of frog biology and conservation. He is listed as an accredited expert by the NSW

Department of Climate Change, Energy, the Environment and Water (NSW DCCEEW) to provide expert reports under the BAM. Dr Lemckert assisted in the writing of the survey guidelines for NSW threatened frog species to be used in assessments under the BAM (DPIE 2020b).

#### 1.6.2. Expertise with the Green-thighed Frog

Dr Lemckert has a long history working with the Green-thighed Frog, starting in 1995 when he undertook a research and monitoring program for this species associated with upgrades of the Pacific Highway around Bulahdelah. This included monitoring of the population over 3-4 years and investigations into habitat requirements and habitat use patterns. He co-supervised an Honours student who undertook an assessment of preferred breeding site characteristics as part of this study. The work around Bulahdelah ultimately led to recommendations of management of the species in road areas, which was followed by additional monitoring. He also completed surveys for the species for upgrades of the Pacific Highway from the Oxley Highway to Kempsey and Woolgoolga to Ballina and reviews of the associated threatened frog management plans and for the upgrade from Maxville to Urunga.

Dr Lemckert has conducted targeted research into movements of this frog, using radio-tracking, and broader habitat relationships through GIS based projects.

Dr Lemckert can demonstrate his expertise on the Green-thighed Frog and its management through the following publications and reports:

- Mahony, M., Gould, J., Beranek, C., Callen, A., Clulow, J., Clulow, S., Klop-Toker, K., Mahony, S., Wallace, S., Stock, S., Garnham, J., Lemckert, F., Thumm, K., Moses, B. and Pickett, E. (2022). A trait-based analysis for predicting impact of wildfires on frogs. Australian Zoologist 42:326-351. https://doi.org/10.7882/AZ.2022.021.
- Geyle, H.M, Hoskin, C.J., Bower, D.S., Catullo, R., Clulow, S., Driessen, M., Daniels, K., Garnett, S., Gilbert, D., Heard, G.W., Hero, J-M., Hines, H.B., Hoffmann, E.P., Hollis, G. Hunter, D.A., Lemckert, F.L., Mahony, M., Marantelli, G., McDonald, K.R., Mitchell, N.J., Newell, D., Roberts, J.D., Scheele, B.C., Scroggie, M., Vanderduys, E., Wassens, S., West, M., Woinarski, J.S.C. and Gillespie, G.R. (2021). Red hot frogs: identifying the Australian frogs most at risk of extinction. Pacific Conservation Biology. https://doi.org/10.1071/PC21019.
- Gillespie, G.R., Roberts, J.D., Hunter, D., Hoskin, C.J., Alford, R.A., Heard, G.W., Hines, H. Lemckert, F., Newell, D. and Scheele, B.C. 2020. Status and Priority Conservation Actions for Australian Frog Species. Biological Conservation 247, 108543. https://doi.org/10.1016/j.biocon.2020.108543.
- Lemckert, F.L., and Mahony, M.J. 2018. The status of Decline and Conservation of Frogs in Temperate Coastal South-eastern Australia. Pp 59-72 In: Amphibian Biology Volume 11 Conservation and Decline of Amphibians: Eastern Hemisphere (Australia, New Zealand and Pacific Islands). H. Heatwole and J. Rowley (Eds.). CSIRO Publishing, Melbourne.
- Lemckert, F., Mahony, M., Brassil, T. and Slatyer, C. 2006. The biology of the threatened Green-thighed Frog *Litoria brevipalmata* (Anura: Hylidae) in the central and mid-north coastal areas of New South Wales. Australian Zoologist 33:337-344.
- Lemckert, F. 2003. Old green-thighed frogs? Herpetofauna 33:13-15.
- Lemckert, F. 2003. Tonight's the night the life of a Green-thighed Frog. Australian Nature 27:24-25.

- Lemckert, F.L. and Slatyer, C. 2002. Short-term movements and habitat use of the green-thighed frog, *Litoria brevipalmata* (Anura: Hylidae). Australian Zoologist 32:56-61.
- Lemckert, F.L., M. Mahony, and C. Slatyer. 1997. Biological Study of the Green-thighed Frog in the Bulahdelah Region. Report to the RTA and NSW NPWS.
- Jean-Marc Hero, Harry Hines, Ed Meyer, **Frank Lemckert**, David Newell, John Clarke. 2004. *Litoria brevipalmata*. The IUCN Red List of Threatened Species: e.T12144A3325725. https://dx.doi.org/10.2305/IUCN.UK.2004.RLTS.T1214

In addition, he is recognised as an expert in the species having been engaged by and prepared the following:

- Completed an expert report for the Green-thighed Frog for a development on the Central Coast of NSW.
- Expert assessment on the presence of the Green-thighed Frog for the Kurri Smelter redevelopment project (2021).
- NSW Office of Environment and Heritage to be part of the expert panel determining the categorisation of this species under the SOS program and in determining the populations requiring specific management to meet the SOS requirement to have a viable population maintained 100 years into the future.
- Provided expert opinion on the status of this species during assessments undertaken for the IUCN in 2001 and 2016.
- Provided expert opinion on the habitat requirements, sub-population status and reservation requirements for the Green-thighed Frog during the NSW Government's Comprehensive Regional Assessment program (2000-2001).

Dr Lemckert's full CV is provided as Appendix A of this report.

# 2. Species information

# 2.1. Litoria brevipalmata (Green-thighed Frog)

#### 2.1.1. Species description

The Green-thighed Frog is a member of the Australian frog family Pelodryadidae (formerly Hylidae) (Cogger 2018) that was described as a species only in 1972 (Tyler et al. 1972). It is a relatively small tree frog, growing up to 45 mm in length, with a brown upper body and thick blackish stripe that extends from the snout to their flank and is lined by a pale stripe along the bottom (NSW DCCEEW, 2024). Some individuals may also have black speckles across the dorsal surface and they can go almost a grey colour during the day (F. Lemckert Pers. Obs., NSW DCCEEW, 2024). The species draws its common name from the bright lime green colour located on the thighs, groin and flanks (Plate 1), with that colouring being much more obvious in males when they are in breeding condition. The toe-discs are small which is in keeping with their more terrestrial habits.





Plate 1. Typical adult Green-thighed Frog male calling and amplexing pair — note the lime green inner thigh and flank colour that gives the frog its common name

#### 2.1.2. Broad distribution and abundance

This species range extends through central and coastal areas of eastern Australia starting at the Hawkesbury River in central coastal New South Wales (NSW) and extending upwards to around the Gympie area of South-East Queensland (NSW OEH, 2024). Error! Reference source not found. shows available records for the species in NSW and demonstrates that the Green-thighed Frog is found scattered across this coastal range. However, Green-thighed Frog records are often patchy within a local area and may predominantly be found in apparently isolated subpopulations, potentially now due to habitat fragmentation (NSW OEH, 2024). It is an enigmatic species that can be found occasionally in large numbers before disappearing from sites (Barker et al. 1995; Cogger 2013) and, along with its very brief calling period, this means that detection of the Green-thighed Frog is quite difficult to make with any certainty and its distribution and status is likely not very well understood. AmphibiaWeb (2008) lists the extent of occurrence of the species as approximately 72,500 km².

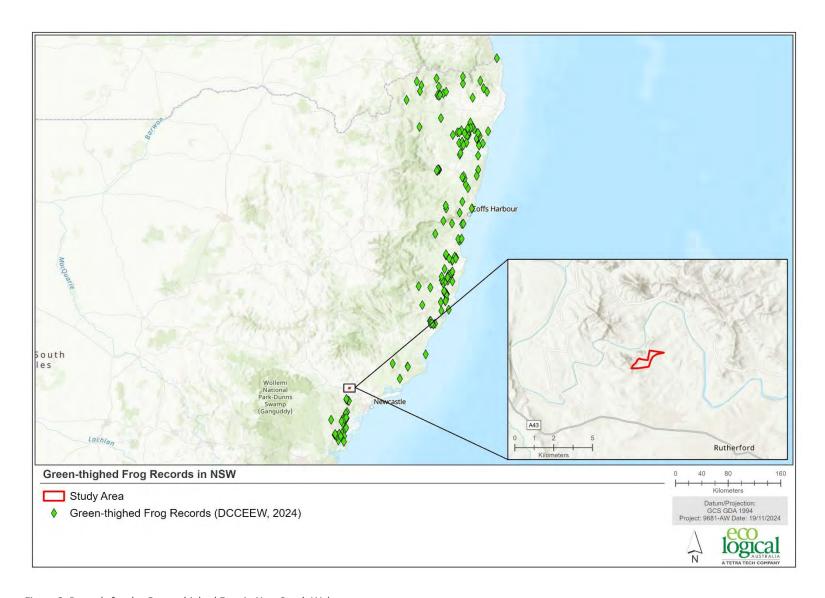


Figure 3. Records for the Green-thighed Frog in New South Wales

Of note also is the recent genetic work of the Green-thighed Frog that has provided two interesting and potentially important facts about the species (M. Mahony Pers. Comm). Firstly, the species is much more closely related to the New Guinea lineage of tree frogs (Nyctimystines) and is not closely related to endemic Australian Pelodryadidae. It appears that the ancestors of the Green-thighed Frog migrated into Australia during one of the recent ice-ages and established populations that were cut off from New Guinea as the climate changed again. There is now a very large gap between the northern point of distribution in Queensland and its most closely related species in New Guinea. Thus the Green-thighed Frog is very likely to be reclassified into a new genus, likely Nyctimystes.

Secondly, the genetics strongly indicates that there are actually two species of Green-thighed Frog within the currently recognised single species, with a geographical split appearing to occur in northern NSW. This does fit in with some apparent habitat preference differences seen between populations present in QLD and northern NSW compared to those populations studied towards the southern end of the range in NSW. This information is not likely to have any bearing on the longer-term conservation listing.

The Green-thighed Frog is only a relatively recently recognised species, being described in 1972 (Tyler et al. 1972) and this may have an effect on our understanding of the historic abundance of the species. There are no estimates of the number of Green-thighed Frogs present in the wild or any estimate of the number of discrete populations, if any. Typically, the number of calling males recorded at breeding sites is less than 10 (Lemckert et al. 2006), which would indicate a relatively small population in most instances. However, there are instances of hundreds of males being recorded on a few occasions (Lemckert et al. 2006, Lemckert Pers. Obs.) and the species was considered to be very common in the Ourimbah Valley (100 km north of Sydney) when first described (Barker et al. 1995), although it appears to be rarer there now. It may be a boom and bust type of species that increases significantly in numbers in good rainfall years and then declines when rainfall is low and restricts their flood dependent reproduction. Anstis (2013) notes that successful reproduction may depend on follow up rainfalls to allow tadpole development to succeed and this may only happen regularly in higher rainfall years. Such patterns of population decline and increase are considered quite typical of many frog species that have been studied (Alford and Richards 1999).

Within areas that the Green-thighed Frog is known to occur, it is often only present in a small percentage of the apparently suitable habitat, as is evident in and around Ourimbah where less than 20% of apparently suitable habitat and breeding sites have been found to contain the species (F. Lemckert Pers. Obs.). The reasons for this patchiness of presence have yet to be properly understood.

Although the Green-thighed Frog has declined at Ourimbah, declines in other areas have not been noted and populations are thought to have remained relatively stable across its range (AmphibiaWeb 2008). This contrasts markedly with many other Australian species (Gillespie et al. 2020) and some work has been completed that indicates that the Green-thighed Frog may not be so severely affected by the amphibian Chytrid fungus (Portway et al. 2020) that has caused major declines in frog populations around the world.

#### 2.1.3. Breeding

Green-thighed Frog exhibit "explosive breeding" (Lemckert et al. 2006) where calling occurs very intensely over a short period of time and in response to rainfall. Calling periods usually occur only once or twice per year, usually between September and April, and is highly reliant on heavy rainfall events that flood depressions to create larger temporary water bodies to be used asbreeding sites (NSW OEH, 2024). A study by Lemckert et al. (2006) found that the calling period for Green-thighed Frog is short lived, usually only lasting one to two nights, although calling will persist for longer if rain

keeps falling (F. Lemckert Pers. Obs.). This very limited calling regime is unusual for Australian coastal frogs and may be an artefact of the species group broadly being of New Guinea origin where heavy rainfall is prevalent in the wet season. Green-thighed Frog's calls comprise 'wok' and 'quack' sounds (NSW OEH, 2024), but is typically mostly a rapidly repeated and constant high pitched and ongoing 'Yap, yap, yap'. Green-thighed Frog breeding and calling is found to occur in both natural and manmade ephemeral pools which form after rainfall (NSW OEH, 2024). These breeding sites are typically associated with forested habitats, being either within or immediately adjacent to forest (Lemckert et al., 2006).

Eggs are laid in clutches of loose floating rafts (Error! Reference source not found.) and usually laid amongst heathy and aquatic vegetation and leaf litter (Anstis 2013, Lemckert et al., 2006). These eggs sink to the bottom of the pool within 24 hours of them being laid. Anstis (2013) indicates the clutch size for Green-thighed Frogs is usually between 366 to 582 eggs. Hatching of embryos occurs within a 24 hr period and tadpole metamorphosis takes place between 40 and 100 days later, dependent on the temperature of the water (Anstis 2013, Lemckert et al., 2006).

Individuals are likely to be able to breed after one year and they have been recorded to reach an age of at least 5 years (Lemckert 2003).



Plate 2. Egg mass of the Green-thighed Frog floating on surface before sinking

#### 2.1.4. Ecology and habitat requirements

The species is one of only a handful of eastern temperate Australian species that exhibit "explosive breeding". Males congregate around larger, temporary pools that form only after very heavy rainfall events (Barker et al. 1995; Lemckert et al. 2006) and calling generally lasts for only one or two nights and reproduction is potentially highly variable between years. Based on the work of Ledlin (1997) and Lemckert et al. (2006), this species appears to breed mainly in relatively large ephemeral pools – typically sites that are at least 10 m long, 5 m wide and have water depths of greater than 30 cm. These sites fill only after sustained rains or bursts of heavy rain, usually being identified by falls of over 50 mm and often closer to 100 mm over 24-48 hours. The use of such larger ephemeral pools appears likely to reflect breeding being concentrated to only once or twice a year so that the breeding site needs have certainty that they will hold water long enough for tadpoles can reach metamorphosis.

Lemckert et al. (2006) recorded that the Green-thighed Frog typically call and breed in depressions adjacent to streams (e.g. old billabongs), but that human-created depressions, such as flooded road verges or excavated hollows were also used. Most pools contained relatively little emergent vegetation and contained a base made up of leaf litter and woody debris (Lemckert et al. 2006). A couple of known sites were located immediately adjacent to forest in grassy depressions in paddocks. In the area from Coffs Harbour down to the Central Coast of NSW Lemckert et al. (2006) found breeding sites for the Green-thighed Frog were typically partly or wholly within rainforest or wet sclerophyll forest or in wet gully lines. The species appears to move into more open forests in the northern half of its distribution including quite open *Corymbia maculata* (Spotted Gum) forest around Grafton.

The impacts on non-native fish on the presence and reproduction of the Green-thighed Frog has received little attention. Presumably the species chooses temporary pools to avoid fish and invertebrate predation present within permanent ponds. Hence the ability of non-native fish to enter into a breeding site is likely to lead to a site being unsuitable for successful breeding. Fish were absent in the ponds studied by Ledlin (1997) and Lemckert et al. (2006), which supports this idea. The Plague Minnow (*Gambusia holbrooki*) was found to have been able to invade breeding habitat in Nerong State Forest (south of Bulahdelah) through overland flows as part of a 10-year monitoring program (F. Lemckert pers. Obs.), but the work did not extend to determine if this caused abandonment of the breeding site. It seems highly likely that the presence of fish, and particularly non-native species, is a significant detriment to breeding by the Green-thighed Frog.

The non-breeding habitat used by the Green-thighed Frog is not well known as the species is rarely seen outside of breeding events. Lemckert and Slatyer (2002) provide the only direct study of non-breeding habitat through radio-tracking of individuals after breeding had occurred. This study found tracked frogs remained within areas of forest no further than 100 m from the breeding site. Within this habitat individual Green-thighed Frog foraged and moved through low vegetation 59% of the time, at heights between 10 cm and 150 cm above the ground. Daytime shelter sites were either under dense leaf litter or in thick vegetation, both of which provide good camouflage and cover and moist conditions that minimise desiccation risks. The work indicated that cover, in the form of thick leaf litter or dense low vegetation, may be a critical requirement for the survival of the Green-thighed Frog, at least in the more southern parts of its range.

#### 2.1.5. Diet

The diet of this species has not been studied. Presumably both juvenile and adult frogs are generalists and feed on a wide range of invertebrates, eating anything small enough to subdue and are likely to have any specific dietary requirements. Tadpoles appear likely to feed on algae and detritus.

## 2.2. Vegetation associations

In the NSW Sydney Basin Bioregion, NSW DCCEEW lists in their profile (NSW OEH 2024) that the Green-thighed Frog is associated with the following vegetation formations and classes:

- a. Dry sclerophyll forests (shrub/grass sub-formation)
  - Clarence Dry Sclerophyll Forests
  - Hunter-Macleay Dry Sclerophyll Forests
  - Northern Gorge Dry Sclerophyll Forests
  - North-west Slopes Dry Sclerophyll Woodlands
- b. Dry sclerophyll forests (shrubby sub-formation)
  - North Coast Dry Sclerophyll Forests
  - Sydney Coastal Dry Sclerophyll Forests
  - Sydney Sand Flats Dry Sclerophyll Forests
- c. Forested wetlands
  - Coastal Floodplain Wetlands
  - Coastal Swamp Forests
  - Eastern Riverine Forests
- d. Freshwater wetlands
  - Coastal Freshwater Lagoons
- e. Grasslands
  - Temperate Montane Grasslands
- f. Grassy woodlands
  - Coastal Valley Grassy Woodlands
- g. Miscellaneous ecosystems
  - Water bodies, rivers, lakes, streams (not wetlands)
- h. Rainforests
  - Dry Rainforests
  - Northern Warm Temperate Rainforests
  - Subtropical Rainforests
- i. Wet sclerophyll forests (grassy sub-formation)
  - Northern Hinterland Wet Sclerophyll Forests
- j. Wet sclerophyll forests (shrubby sub-formation)
  - North Coast Wet Sclerophyll Forests
  - Northern Escarpment Wet Sclerophyll Forests.

#### 2.3. Conservation Status and Threats

This species is listed as Vulnerable in NSW under the BC Act, but is not listed under the EPBC Act and is listed as of Least Concern by the IUCN (IUCN 2023).

The species profile from NSW DCCEEW lists the following threats to the Green-thighed Frog:

- Changes to drainage patterns which reduce periodic local flooding.
- Damage to semi-permanent and ephemeral ponds and flood-prone vegetation.
- Clearing of habitat for development.
- Clearing of habitat for agriculture.
- Habitat disturbance through timber harvesting.
- Reduction in water quality through pasture fertilisation.
- Reduction in habitat and water quality as a result of grazing.
- Reduction of leaf-litter and cover of fallen logs through burning for agricultural purposes.
- Lack of knowledge on threats to the species including susceptibility to chytrid fungus and the impact of development activities.
- Lack of knowledge on the species distribution, persistence in locations, abundance, and population trends (particularly as the species is cryptic and only calls after large rainfall). Habitat use of adults outside of breeding times and movement of the frog in the landscape is not known.

The Green-thighed Frog is recognised as of Least Concern on the IUCN Red List of Threatened species (IUCN 2023), however, the following threats to its survival are still listed:

- Residential and commercial development Housing and urban areas.
- Transportation and service corridors Roads and railroads.
- Biological resource use Logging and wood harvesting.
- Human intrusions and disturbance Work and other activities.
- Natural system modifications Fire and fire suppression.
- Pollution Domestic and urban waste water.
- Invasive and other problematic species, genes and diseases Invasive non-native/alien species/diseases.

Of the above potential threats, the ones likely to be of a significant consideration in the study area:

- Changes to drainage patterns which reduce periodic local flooding.
- Damage to semi-permanent and ephemeral ponds and flood-prone vegetation.
- Clearing of habitat.
- Residential and commercial development.
- Fire and fire suppression.

#### 2.4. Variables determining Green-thighed Frog presence

This information provides the following important points when trying to assess the potential presence of the Green-thighed Frog in any area:

- The Green-thighed Frog is likely to be present where depressions flood and produce large temporary pools that are located within or immediately adjacent to areas of native vegetation.
- The presence of cleared areas does not exclude the species, but a site should have a significant extent of natural vegetation present as the species has been identified as declining due to land clearing (Mahony 1996).
- The presence or likely presence of fish in the potential breeding habitat is likely to result in the species not being present.

# 3. Description of the study area and region

As previously noted, the study area is located at Anambah in the Hunter Valley, approximately 9 km to the west of Maitland and 37 km north west of Newcastle (Figure 1). It consists of Lot 177/DP874171 and covers approxmately 97 ha of land located within the Maitland Local Government Area. The study area forms part of the Anambah Urban Release Plan, details of which can be found at: <a href="Attachment Report - Plan Finalisation Report.pdf">Attachment Report - Plan Finalisation Report.pdf</a>. As stated in the report:

"The draft local environmental plan seeks to deliver around 3,000 residential allotments, a small neighbourhood centre and protection of environmental areas by:

- rezoning the site from RU2 Rural Landscape to predominantly R1 General Residential. Parts of the site will also be rezoned to B1 Neighbourhood Centre, R5 Large Lot Residential, E4 Environmental Living and RE1 Public Recreation (figure 3);
- applying the minimum lot sizes to the following zones:
  - o R1 General Residential zone 450m<sup>2</sup>
  - B1 Neighbourhood Centre 450m²
  - o R5 Large Lot Residential 3,000m<sup>2</sup>
  - E4 Environmental Living −5,000m², 1ha, 2ha, 3ha, 10ha and 100ha;
- inserting new provision (Clause 7.8) to:
  - o provide flexibility in the application of the minimum lot size requirements. A total of 450 allotments may be created below the minimum lot size, provided they are located within 200m from a commercial premise, community facility or recreation area; and
  - require the construction of a Western Road Link via Wyndella Road to the New England Highway before the release of more than 1,200 allotments to provide capacity for flood evacuation.
- mapping as an urban release area under Part 6 of the local environmental plan.

Development will be managed through a site-specific development control plan, known as and referred to in this report as the 'Anambah Area Plan'. The draft Anambah Area Plan will provide more detailed development and subdivision controls to manage future staging and respond to development constraints."

The study area rises from just under 30 m in the north east to over 100 m in the south west where the adjacent landscape reaches 174 m at Winders Hill. There are no named major watercourses in the study area, with the largest stream being a section of 3<sup>rd</sup> order stream located in the south east (Figure 4). None of the areas of creek appear to be permanent, but there are permanent pools in two places as a result of damming of the stream. The closest major watercourse is the Hunter River, which is located less than 500 m from the northwest corner of the development site boundary. Several other permanent dams are mapped as being present in the study area, being constructed to provide water for stock.

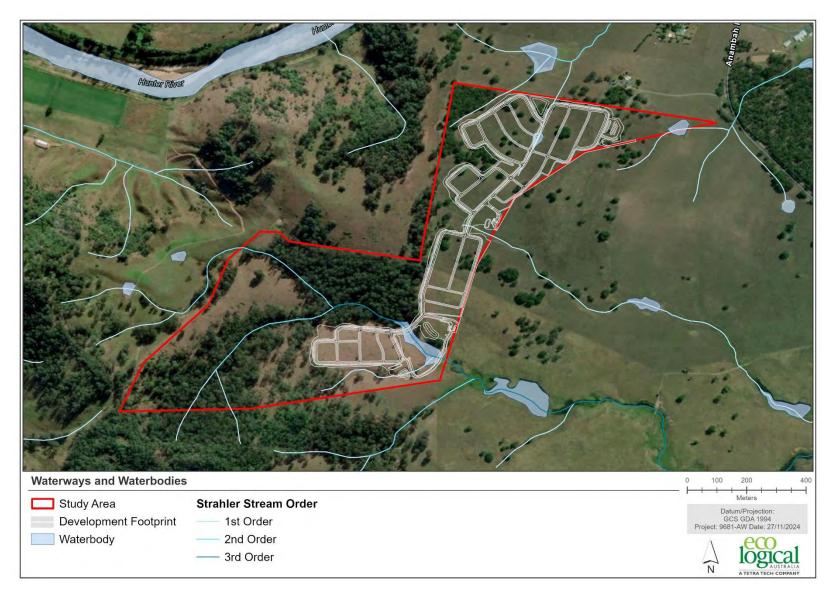


Figure 4. Water bodies and streams mapped for the study area and in the adjacent landscape

#### 3.1. Landscape features

The following landscape features, as defined by the BAM, are relevant to the project.

#### 3.1.1. Bioregions

The Study area is located within the Sydney Basin Interim Biogeographic Regionalisation for Australia (IBRA) Region. The following description for the region is taken directly from NSW NPWS (2003):

The Sydney Basin Bioregion lies on the central east coast of NSW and covers an area of approximately 3,624,008 hectares. It occupies about 4.53% of NSW and is one of two bioregions contained wholly within the state. The bioregion extends from just north of Batemans Bay to Nelson Bay on the central coast, and almost as far west as Mudgee. The bioregion is bordered to the north by the North Coast and Brigalow Belt South bioregions, to the south by the South East Corner Bioregion and to the west by the South Eastern Highlands and South Western Slopes bioregions.

As well as Sydney itself, the Sydney Basin Bioregion encompasses the towns of Wollongong, Nowra, Newcastle, Cessnock, Muswellbrook and Blue Mountains towns such as Katoomba and Mt Victoria.

It includes a significant proportion of the catchments of the Hawkesbury-Nepean, Hunter and Shoalhaven river systems, all of the smaller catchments of Lake Macquarie, Lake Illawarra, Hacking, Georges and Parramatta Rivers, and smaller portions of the headwaters of the Clyde and Macquarie rivers.

The Sydney Basin Bioregion is one of the most species diverse in Australia. This is a result of the variety of rock types, topography and climates in the bioregion (OEH 2016).

#### 3.1.2. Subregions

The study area is located within the Hunter IBRA subregion. Details on this subregion are provided in Table 1.

Table 1. Description of the subregion covering the Study area (from NSW NPWS 2003)

Subregion	Geology	Characteristic landforms	Typical Soils	Vegetation
Hunter	A complex of Permian shales, sandstones, conglomerates, volcanics and coal measures. Bounded on the north by the Hunter Thrust Fault and on the south by cliffs of Narrabeen Sandstone. Pleistocene coastal barrier system in Newcastle bight.	Rolling hills, wide valleys, with a meandering river system on a wide flood plain. River terraces are evident, the highest with silicified gravels. Streams can be brackish or saline at low flow. Numerous small swamps in upper catchment, extensive estuarine swamps behind the coastal barrier of beach dunes.	A variety of harsh texture contrast soils on slopes and deep sandy loam alluvium on the valley floors. Small number of source bordering dunes on southern tributaries of the Hunter. Deep sands with podsol profiles in dunes on the barrier, saline, organic muds in the estuary. Soil salinity is common on some bedrocks in the upper catchment.	Patches of rainforest brush in the lower valley. Forest and open woodland of white box, forest red gum, narrow-leaved ironbark, grey box, grey gum spotted gum, roughbarked apple and extensive stands of swamp oak in upper reaches and foothills. River oak and river red gun along the streams. Coastal dune vegetation of blackbutt, smoothbarked apple, coast banksias and swamp, mahogany. Mangroves, salt marsh and freshwater reed swamps in the estuary.

#### 3.1.3. NSW (Mitchell) Landscape

The Study Area falls into the Newcastle Coastal Ramp NSW Mitchell Landscape Type. The following description for this landscape of is taken directly from DECC (2002).

Undulating lowlands and low to steep hills on complex patterns of faulted and gently folded Carboniferous conglomerate, lithic sandstone, felspathic sandstone, and mudstone, general elevation 50 to 275m, local relief 40 to 150m. Stony red texture-contrast soils on steep slopes, yellow and brown texture-contrast soils on lower slopes and deep dark clay loams along streams. Woodland of spotted gum (Corymbia maculata), forest red gum (Eucalyptus tereticornis), red ironbark (Eucalyptus sideroxylon), white mahogany (Eucalyptus acmenoides), large-fruited grey gum (Eucalyptus canaliculata), with sub-tropical rainforest elements in sheltered gullies. Similar eucalypts with forest oak (Allocasuarina torulosa) and grasses on lower slopes, merging to forest of smooth-barked apple (Angophora costata), red bloodwood (Corymbia gummifera), blackbutt (Eucalyptus pilularis) with bracken (Pteridium esculentum) and grasses nearer the coast.

# 3.2. Native vegetation

Vegetation mapped by MJD is provided in Figure 5. They have identified two Plant Community Types (PCTs) within the study area, with the Green-thighed Frog being listed as associated with only PCT 3433 (highlighted in bold):

- PCT 3433 Lower North White Mahogany-Spotted Gum Moist Forest (12.42 ha)
- PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest (10.69 ha).

This indicates that there is suitable native vegetation present in the Study area for the Green-thighed Frog.

#### 3.3. Water bodies

The Green-thighed Frog does not use regularly flowing streams or permanent ponds as breeding habitat, but is often found breeding in old oxbows and offshoots of streams and depressions close by to where dams are often created to capture water flow. Hence they do provide reference points for where to look for potential breeding sites. The mid-southern section of the study area contains areas of retained suitable vegetation for the Green-thighed Frog and flatter gully lines where pools may potentially form. This combination could provide both breeding and non-breeding habitat if suitable flooding depressions are present.

The Study area does not contain any water bodies listed on the Directory of Important Wetlands in Australia or that are classified as a Ramsar wetland (see (https://www.awe.gov.au/water/wetlands/australian-wetlands-database/directory-important-wetlands).

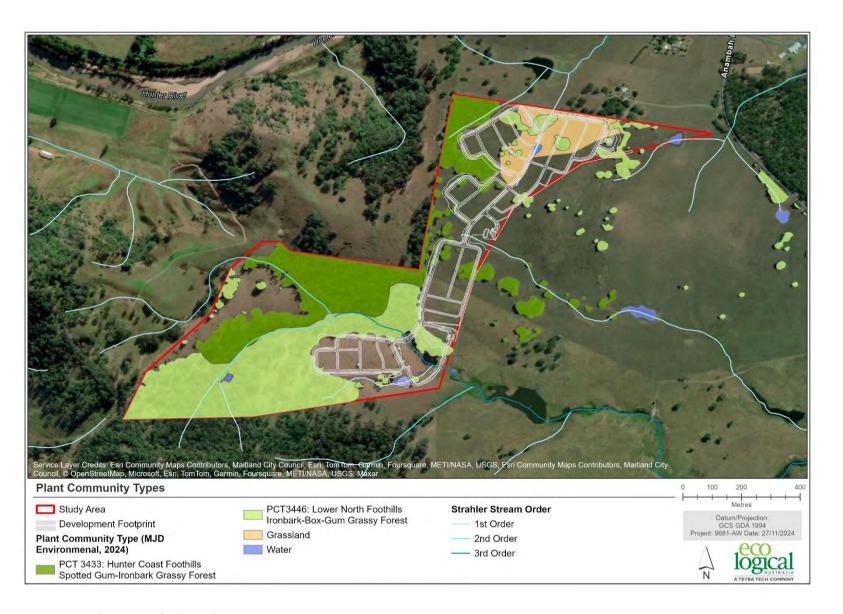


Figure 5. Mapped vegetation for the Study Area.

#### 3.4. Connectivity features

Clearing undertaken for agricultural purposes has left patches of retained vegetation amongst areas of mostly cleared grasslands, fragmenting connectivity. The Green-thighed Frog does not appear to use areas cleared grassland areas, except briefly as breeding habitat when in close proximity to retained vegetation that provides daytime shelter. Larger tracts of retained vegetation remain to the northwest and north of the study area and is potentially connected by the presence of riparian vegetation located along the Hunter River. This retained native vegetation may still allow for migration of the Greenthighed Frog during wetter periods, although conditions are not ideal.

The absence of an extensive road network in the study area is a positive for maintaining connectivity as complex and heavily trafficked roads are considered to have a serious negative impact on the survival of species within a local area (Marsh et al. 2017; Hamer 2018).

## 3.5. Areas of geological significance

No important karsts or other geological formations are located within the Study Area.

#### 3.6. Climate

Key climate statistics for the closest available Bureau of Meteorology stations located around the Study Area are provided in Table 2. The Study area receives moderate rainfall and has a relatively temperate climate.

Table 2. Climatic statistics for the Maitland Visitors Centre weather station (data from the Bureau of Meteorology)

Rainfall station	Mean total rainfall (mm)	Mean January maximum (°C)	Mean January minimum (°C)	Mean July maximum (°C)	Mean July minimum (°C)
Maitland Visitors Centre	838.1	30.2	18.2	18.0	5.5
East Maitland Bowling Club	894.1	30.7	17.6	16.6	5.8

#### 3.7. Land use history

The original inhabitants of Maitland and its surroundings are the Wonnarua people who would have lived on and managed the lands following traditional methods of hunting and farming. Their dreamtime legend says that the great sky spirit Baiame opened his eyes and his creation spirits created the hills, valleys, forests and living things in and around Maitland, including the Hunter, Williams and Paterson Rivers. Many of the Wonnarua people in the area now are part of the Mindaribba Local Aboriginal Land Council.

According to the Coal and Community Website (<a href="www.coalandcommunity.com/maitland.php">www.coalandcommunity.com/maitland.php</a>) and Maitland Stories (maitlandstories.com.au/timeline), the Maitland area was first explored by white settlers in 1801 when Lieutenant James Grant who up the Hunter River and named the general area Schancks Forest Plains. In 1804 a penal settlement was established at Newcastle and timber cutters started to impact the vegetation along the Hunter River, with a camp being established at the

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confluence of the Hunter River and Wallis Creek around 1810. In 1812, settlement started at Paterson's Plains on both sides of the Paterson River and in 1815 the indigenous route from the Hawkesbury River to the Hunter was mapped (the basis for the Great North Road and Buchanan Road). Additional settlements occurred at Wallis Plains in 1818/1819 and various areas around Maitland were surveyed and settled in the 1820s. A wharf, cattle yard and grain store being completed at Wallis Plains (Maitland) in 1823 and a regular passenger and goods boat connected the area with Newcastle, with other buildings becoming established in the following years. Maitland itself was officially surveyed in 1829 and the official names of East and West Maitland established in 1835. A railway connecting Maitland to Newcastle was completed in 1857 and a telegraph to Sydney established in 1860.

The alluvial flats of the Maitland area provides for good farming habitat, but flooding events have caused problems with its use for this purpose.

# 4. Site inspection

A site inspection was undertaken on Wednesday 6 November 2024. This inspection allowed for a traverse of the study area to visually assess the landscape and confirm the quality of extent of both breeding and non-breeding habitats that were present for the Green-thighed Frog. The inspection allowed for the confirmation of the size and suitability of any areas that may provide temporary breeding pools for the Green-thighed Frog and also included checks on the waterbodies to search for the presence of introduced fish. Forest environments were checked adjacent to any potential breeding pools to assess adequate levels of shelter present (e.g. leaf litter and ground logs) to form suitable complementary non-breeding habitat. The focus was on whether the canopy and ground cover provided a suitable microclimate, shelter and foraging sources for the Green-thighed Frog.

The location of visual inspection points are provided in Figure 6 and examples of the habitat present on site can be seen in Plate 3, Plate 4,

Plate 5, Plate 6 and Plate 7.





Plate 3. Two views of the development site illustrating partial clearing on the site  $\,$ 





Plate 4. Permanent dams established on the study area

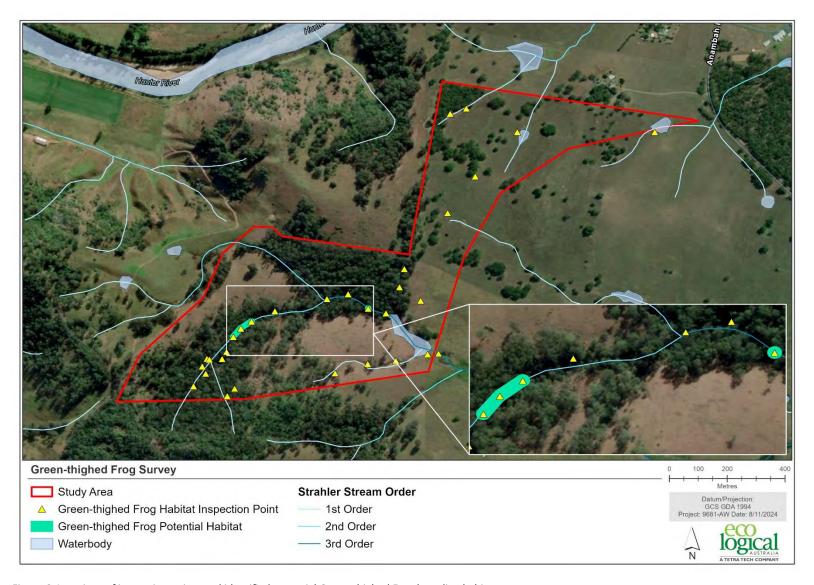


Figure 6. Locations of inspection points and identified potential Green-thighed Frog breeding habitat

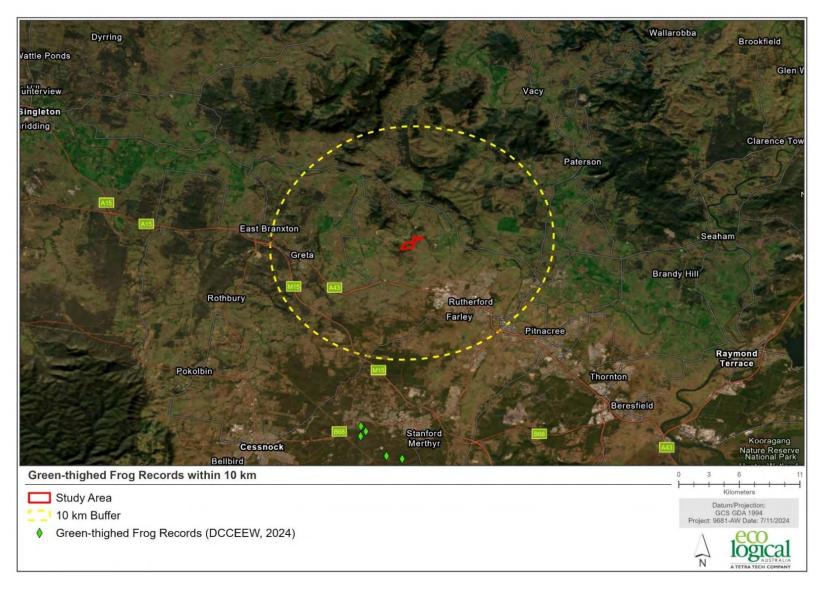


Figure 7. Records of the Green-thighed Frog relative to the study area

# 5. Potential for Green-thighed Frog presence in the study area

## 5.1. Green-thighed Frogs in the region

The NSW DCCEEW species profile predicts that the Green-thighed Frog can occur within the locality of the study area, although the Hunter Valley forms only a intruding finger of potential habitat much further from the coast than is usual. BioNet provides no records of this species within the locality, with the closest records being located more than 15 km to the south in the Kurri Sandbeds (Figure 7).

## 5.2. Subject land as potential habitat

#### 5.2.1. Breeding habitats

Depressions and flooding areas providing potential breeding habitat for the Green-thighed Frog were located in and adjacent to a 1<sup>st</sup> order drainage line in the southern part of the study area (Error! Reference source not found.). There was no water flow at the time, which would only flow briefly during and after rainfall events. Depressions have formed within the stream bed that provide temporary water bodies that, whilst smaller (1-2 m wide and up to 4 m in length) than the ideal pool size (>5 m) still appear large enough and clustered close together enough to form potential breeding habitat for the Green-thighed Frog (Error! Reference source not found.; Plate 6). Some depressions still contained shallow pools of water. There was clear evidence of cattle disturbance, but did not appear sufficient to degrade the breeding habitat and adjacent habitat sufficiently to prevent its use by the Green-thighed Frog. The area of identified potential breeding habitat is mapped in Figure 6, with a 5 m buffer being applied to represent the maximum edge of the observable creek line width and so the maximum extent of flooding. No other locations that showed the potential to form pools that would last long enough for successful breeding. Other areas contained permanent pools that the species would not use (Plate 4).

The Plague Minnow was not evident in the potential breeding pools with water or the permanent dam established on this stream line (Plate 4 right photo). The fish was present in dams established further downstream (Plate 4 left photo). They appear not to have penetrated higher up stream. Hence the Plague Minnow does not impact on these potential breeding sites.





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Plate 5. Potential temporary breeding habitats identified for the Green-thighed Frog



Plate 6. Further potential breeding depressions for the Green-thighed Frog



Plate 7. Native vegetation adjacent to the observed potential breeding habitat

# 5.3. Sheltering and foraging habitat

Large parts of the study area have been cleared (Figure 2) and are not considered suitable non-breeding habitat for the Green-thighed Frog and also do not contain associated Plant Community Types. However, significant areas of vegetation are still present and importantly, the vegetation immediately adjacent to the areas of identified potential Green-thighed Frog breeding habitat was intact. This vegetation typically retained a moderate to good canopy, midstorey and ground cover and provided shade and some leaf litter that frogs can shelter in (Plate 7), albeit the extent was patchy. The vegetation

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was subject to disturbance by cattle in most areas, but the Green-thighed Frog is known to inhabit areas subject to some grazing (e.g. Nerong State Forest, Pers. Obs.). The bands of vegetation suitable for use were relatively narrow and probably only extended at most 20 m either side of the top of the bank, but they did provide adequate cover in that zone. On this basis it is concluded that potentially suitable non-breeding habitat is adjacent to the identified potential breeding habitat.

#### 5.4. Dispersal habitat

There is not a continuous native vegetation cover across the study area (Figure 2) and the intervening patches of clearer lands are likely to represent a significant barrier to dispersal into and out of the observed area of potential breeding habitat. However, there is a patchwork of vegetation across the locality and leading to the Hunter River that may allow for the Green-thighed Frog to continue to be present across the broader landscape. Whilst there is fragmentation of the overall landscape as a result of the vegetation clearing, there is no literature available to indicate what level of clearing represents too much for this species to be able to maintain a population. Hence it remains assumed that the species could still utilise and persist in the available landscape of the locality and study area.

# 6. Potential for the Green-thighed Frog and other threatened frog species to be present on the study area

As noted in section 5, there is potential breeding habitat and adjacent non-breeding habitat that the Green-thighed Frog could use. It is not high quality habitat because the available areas for pooling are smaller than preferred, cattle have created some disturbance of the breeding habitat and the vegetation adjacent to the breeding sites is only of better quality, with leaf litter and denser understorey close to the stream (typically no more than 50 m and often only 20-30 m). Away from the vegetation on the slope adjacent to the potential breeding habitat, ongoing grazing disturbances have left little to no ground cover or low vegetation present and so potential suitable habitat is limited. Having said that, it is not possible to say the Green-thighed Frog is not present. The available habitat is still potentially suitable and in an arrangement that precautionarily it should be assumed that the species could be present on site.

I note that there are no records for this frog within 10 km of the study area (Figure 7; Figure 7) and the species is not usually considered to be present within the broader Hunter Valley outside of areas close to the coast. The locations where the Green-thighed Frog is known from that are closest to the study area are on the Kurri Sandbeds, more than 15 km to the south. This habitat has broadly similar forest, but vegetation is much more intact and the locations of the Green-thighed Frog are in flat riparian gullies with larger pools (5-10 m wide and >20 m long) with a dense overstorey of paperbark and eucalypts and a dense mixed understorey (Plate 8). The habitat on the study area has narrow steeper sided stream valleys with narrow pools and less vegetation coverage overall. This again indicates that most likely the Green-thighed Frog is not present on the study area, but it remains still possible.





Plate 8. Examples of habitat at known Green-thighed Frog sites on the Kurri Sandbeds, 15 km to the south

# 7. Assessment of offset requirements under the BAM

# 7.1. Suitability of habitat on the Project Area

The information in Sections 2 and 4 demonstrates that there is suitable vegetation available within the Project Area that could be used for shelter, foraging and dispersal by the Green-thighed Frog and that these fall adjacent to potential breeding habitat. These bands of suitable vegetation are limited and relatively narrow and the potential temporary water bodies smaller than is ideal. However, they provide what is still potential habitat and so it is assumed that the species is present as a precautionary approach.

#### 7.2. Importance of the Project Area to the Green-thighed Frog

It is concluded that the Green-thighed Frog is potentially present in the study area and its immediate surrounds. The fragmented habitat surrounding the site and the regular clearance of vegetation and ongoing disturbance by stock more broadly would indicate that if the Green-thighed Frog is using the identified breeding and non-breeding habitat, that this area would be important for the maintenance of the local population.

Based on the BAM survey guidelines for threatened frogs (DPIE 2020b) the following applies when assigning any species polygon for the species:

The species polygon boundary should align with aquatic habitats linked directly to the record and a buffer, incorporating the PCTs with which the species is associated, of 100 metres radius from the top of bank.

A polygon for the species can drawn from the information provided in Figure 6, drawing a 100 m radius from the edges of the breeding habitat polygons. Any suitable PCT areas that fall withing that 100 m non-breeding habitat polygon would be used to calculate the number of species credits generated that would need to be retired to complete an appropriate offset. This polygon can be included in this report if a finalised development footprint is provided.

# 8. References

Alford, R.A. and Richards, S.J. 1999. *Global amphibian declines: A problem in applied ecology*. Annual Review of Ecology and Systematics 30: 133-165.

AmphibiaWeb 2008. *Litoria brevipalmata*: Green-thighed Frog <a href="https://amphibiaweb.org/species/1224">https://amphibiaweb.org/species/1224</a>> University of California, Berkeley, CA, USA. Accessed Nov 28, 2023.

Anstis, M. 2013. Tadpoles and Frogs of Australia. New Holland Publishers, Sydney.

Barker, J., Grigg, G.C. and Tyler, M.J. 1995. *A Field Guide to Australian Frogs*. Surrey Beatty and Sons, Chipping Norton.

Cogger, H.G. 2018. *Reptiles and Amphibians of Australia*. Revised 7<sup>th</sup> Edition. CSIRO Publishing, Melbourne.

Gillespie, G.R., Roberts, J.D., Hunter, D., Hoskin, C.J., Alford, R.A., Heard, G.W., Hines, H. Lemckert, F., Newell, D. and Scheele, B.C. 2020. *Status and Priority Conservation Actions for Australian Frog Species*. Biological Conservation 247, 108543. https://doi.org/10.1016/j.biocon.2020.108543.

Hamer A.J. 2018. Accessible habitat and wetland structure drive occupancy dynamics of a threatened amphibian across a peri-urban landscape. Landscape and Urban Planning 178: 228-237.

Ledlin, D. 1997. *Ecology of the Green-thighed Frog (Litoria brevipalmata*). B. Env. Sc (Honours) Thesis. The University of Newcastle.

Lemckert, F. 2003. Old green-thighed frogs? Herpetofauna 33:13-15.

Lemckert, F., Mahony, M., Brassil, T. and Slatyer, C. 2006. The biology of the threatened Green-thighed frog *Litoria brevipalmata* (Anura: Hylidae) in the central and mid-north coastal areas of New South Wales. Australian Zoologist 33: 337-344.

Lemckert, F. and Slatyer, C. 2002. Short-term movements and habitat use by the threatened Greenthighed Frog *Litoria brevipalmata* (Anura: Hylidae) in mid-coastal New South Wales. Australian Zoologist 32: 56-61.

Mahony, M.J., Hamer, A.J., Pickett, E.J., McKenzie, D.J., Stockwell, M.P., Garnham, J.I., Keely, C.C., Deboo, M., O'Meara, J., Pollard, C.J., Clulow, S., Lemckert, F.L., Bower, D.S., and Clulow, J. 2013. Identifying conservation and research priorities in the face of uncertainty: a review of the threatened bell frog complex in eastern Australia. Herpetological Conservation and Biology 8:519-538.

Marsh, D.M., Cosentino, B.J., Jones, K.S., Apodaca, J.J., Beard, K.H., Bell, J.M., Bozarth, C., Carper, D., Charbonnier, J.F., Dantas, A., Forys, E.A., Foster, M., General, J. Genet, K.S., Hanneken, M., Hess, K.R., Hill, S.A., Iqbal, F., Karraker, N.E., Kilpatrick, E.S., Langen, T.A., Langford, J., Lauer, K., McCarthy, A.J., Neale, J., Patel, S., Patton, A., Southwick, C., Stearrett, N., Steijn, N., Tasleem, M., Taylor J.M. and Vonesh, J. 2017. Effects of road and land use on frog distributions across spatial scales and regions in the Eastern and Central United States. Diversity and Distributions. 23(2):158-170. DOI: 10.1111/ddi.12516.

NSW Department of Climate Change, Energy, Environment and Water (NSW DCCEEW) 2024. Threatened Species Database (5 km radius search). OEH Sydney, NSW. Available: http://www.environment.nsw.gov.au/atlaspublicapp/UI\_Modules/ATLAS\_/AtlasSearch.aspx (Accessed: 24 September 2024).

NSW Office of Environment and Heritage (OEH) 2024. *Green-thighed Frog – profile*. Available at https://threatenedspecies.bionet.nsw.gov.au/profile?id=10485.

Portway, C.D., Cutajar, T.P. and Rowley, J.J.L. 2020. Preliminary survey for amphibian chytrid fungus infection in the enigmatic Green-thighed Frog. Herpetological Review 51:252-253.

Tyler, M.J., Martin, A.A., and Watson, G. 1972. A new species of hylid frog from New South Wales. Proceedings of the Linnean Society of New South Wales 97:82-86.

# Appendix A: Curriculum Vitae



# **Dr Frank Lemckert**Senior Principal Scientific Ecologist



Frank has been a professional scientist since 1992, specialising in understanding and managing the ecology and management of threatened species. Frank has conducted ecological work throughout eastern Australia, establishing long-term research and monitoring programs into the management of fauna and developing strategies to mitigate the impacts of human disturbances. He has worked extensively with the NSW and Commonwealth Governments on varying issues of fauna and flora management including the preparation of a draft NSW/National recovery plan for the Giant Burrowing Frog (Heleioporus australiacus), expert review roles on fauna management plans. advised on fauna monitoring approaches for the NSW Natural Resources Commission and prepared reports for the Commonwealth on endemism patterns and the representation in reserves of a broad range of Australian flora and fauna groups. Frank is an accredited expert under the NSW Biodiversity Assessment Method (BAM) for a range of threatened frogs, assisted in writing NSW survey guidelines for threatened reptiles and frogs and represented the NSW Forestry Commission in license negotiations for the Comprehensive Regional Assessment process (2000). He has also, been a member of a regulatory advisory group for the management of Cane Toads across Australia as well as the Taren Point Cane Toad Advisory Group, and provided expert ecological advice on illegal land clearing for the NSW and Commonwealth Governments. He has authored over 100 peer-reviewed publications targeting the status and management of fauna. He contributed to the recently released Amphibian Conservation Action plan produced by the IUCN.

Frank is a research associate with the Australian Museum and University of Newcastle and convenor of the NSW Declining Frog Working Group, past president of the Australian Society of Herpetologists and a member of the Amphibian Specialist Group of the IUCN.

Frank's primary role as a consultant has been to use his expertise and experience in technical writing and threatened species legislation to develop and maintain quality assurance in projects including. This has included a wide diversity of works. some of which are listed below:

- Writing and assisting in >100 flora and fauna reports and assessments of significance using the NSW Environmental Protection Act 1979, NSW Biodiversity Conservation Act 2016 and Commonwealth Environment Protection and Biodiversity Conservation Act 1999.
- Preparation of Flying-fox Management Plans at several locations in NSW.
- Population counts and monitoring for Tammar Wallabies at Garden Island in Western Australia.
- Roadside mapping, survey and management strategies for the Wallum Froglet and Mahony's Toadlet.
- Expert advice in the development of large-scale fauna survey projects for the HumeLink Transmission Line and Euston Mineral Sands project, both needing determination of appropriate lists of target species and suitable survey methods for a wide diversity of threatened terrestrial vertebrate species over hundreds of kilometers of survey corridors.
- Long-term monitoring and reporting of microbat activity at windfarms in SW NSW to assess potential strike impacts from proposed windfarm turbines.
- Exclusion of bats from roosts for the Balickera Tunnel upgrade at Grahamstown, proposed redevelopment of Peat Island on the Hawkesbury River and building demolition at the Corrimal Cokeworks.
- Review of Private Native Forestry prescriptions under the Code of Practices and assessment of habitat changes using BAM as a monitoring tool.
- Provision of species credit species expert reports for the Warragamba Dam raising project and Western Sydney Growth Centres BioCertification and developments on the NSW Central and South Coasts.

• Provision of species credit species expert reports for three windfarms on the New England Tableland and Hunter Valley.

### **QUALIFICATIONS**

- Bachelor of Science, University of Sydney, 1984 (Terrestrial Ecology and Marine Management)
- Master of Science, University of Sydney, 1991 (Population biology of the Common Froglet)
- PhD, University of Newcastle, 2009 (Management of forest frogs in timber production forests of NSW)

### PROJECT EXPERIENCE

#### **ECOLOGICAL IMPACT ASSESSMENT**

- Euston Mineral Sands project survey design for impact assessment for threatened terrestrial fauna and expert advice on impacts of operations (2022-present)
- HumeLink power transmission line biodiversity surveys along 180 km of proposed lines, developing suitable survey methods and locations to meet the requirements of this large and complex project (2020-2022)
- Monitoring of bat populations and assessment of potential impacts of the proposed Jeremiah Windfarm at Adjungbilly, NSW (2019-2022)
- Management of impacts on Green and Golden Bell Frogs for the KIWEF project at Kooragang Island, NSW for Daracon (2019-present)
- Impact assessments for housing developments on Koalas in the Campbelltown area (private development and Campbelltown Council)
- Expert report on the Green and Golden Bell Frog for two Western Sydney Growth Areas BioCertification Project (2018-present)
- Warragamba Dam Raising Project target surveys, impact assessments, expert reporting (six species) and Q/A for Water NSW (2018-19)
- Granite Hills Windfarm Bird and Bat Strike Modelling and Ecological Impact Assessment, Nimmitabel, Akuo Energy (2018) and Elysian Windfarm, Nimmitabel, Akuo Energy (2018)

#### **GOVERNMENT REVIEWS/REPORTS**

- Review and risk assessment of the impacts of the Private Native Forestry Code of Practice protective prescriptions for threatened native species for the Natural Resources Commission (2023)
- Review of the status of forest areas subject to Private Native Forestry using the NSW Biodiversity Assessment Method to assess forest health after harvesting. Conducted for NSW Local Land Services (2022-2023)
- Report on species detection rates and best monitoring practice for forest fauna, led by the University of New England and completed for the NSW Natural Resources Commission (2022-2023)
- Biodiversity Assessment Method Frog Survey Guidelines for Species Credit Species and Reptile Survey Guidelines for Species Credit Species (2019-current)
- Expert workshop to develop a NSW-wide nil-tenure fauna monitoring program, NSW Natural Resources Commission (2020)
- Review of species management plans for the Yellow-bellied Glider, Giant Burrowing Frog, Eastern Bristlebird and Southern Brown Bandicoot prepared under the NSW Threatened Species License for Forestry Operations, NSW Natural Resources Commission (2019)
- Provision of information as the basis for the development of six threatened flora species management plans to be prepared under the NSW Threatened Species License for Forestry Operations, NSW Natural Resources Commission (2019)
- Expert review of Biodiversity Impact Assessment Report for the Hornsby Quarry rehabilitation project (2019)

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- Expert advice on impacts of illegal land clearing at Somersby, Commonwealth Government (2015)
- Expert advice on impacts of illegal land clearing at Evans Head, NSW State Government (2016)
- Review of threatened species modelling in forestry areas, Vic Forests (2012)
- Review impacts to threatened reptiles and amphibians in the Southern Brigalow Belt, for WPS (2008)
- Review of monitoring strategies for the Woolgoolga to Ballina and Warrell Creek to Nambucca Heads programs for the Pacific Highway Upgrade, NSW RMS (2014)
- Hornsby Council expert witness for development impacts at Dural, Hornsby Shire Council (2016)
- Expert representing Forests NSW in the Comprehensive Reginal Assessment Program for the Regional Forest Agreement program (1999-2001)
- Review of threatened species modelling in forestry areas, Vic Forests (2012)
- Flora and fauna representation in the Australian Reserve system, Commonwealth Government (2010)
- Flora and fauna endemism patterns across Australia, Commonwealth Government (2009)
- Review impacts to threatened reptiles and amphibians in the Southern Brigalow Belt, for WPS (2008)
- Expert review of fauna and flora impacts for 13 NSW Forestry Commission EIS reports (1992-94).

#### **EPBC REFERRALS**

- Sloane's Froglet (Crinia sloanei) referral for a housing development at Albury, NSW (2024)
- Green and Golden Bell Frog (*Litoria aurea*) referrals for the Princes Highway Upgrade at South Nowra, NSW RMS (2013)
- Austen Quarry (Eucalyptus pulverulenta), Hartley, Hy-Tec Industries (2014-15)
- Marys Mount Koala (Phascolarctos cinereus) referral, Gunnedah Quarry Products (2015).

#### **MONITORING PROGRAMS**

- Long-term forest frog monitoring in the Watagan Mountains of NSW for Forestry Corporation NSW (2000current)
- Monitoring of Tammar Wallabies on the Australian Navy defence bast on Garden Island in Western Australia (2022-current
- Green and Golden Bell Frog baseline monitoring program at Meroo Lakes, NSW OEH (2016-17 & 2020-21)
- Nil-tenure feral management and monitoring strategy for the Narrabri Coal Seam Gas Project, Santos (2019)
- Threatened fauna monitoring Hume Highway, Kapooka, NSW RMS (2018)
- Oxley Highway to Kempsey threatened biodiversity monitoring, NSW RMS (2013-2017)
- FCNSW state-wide ecological monitoring program, Forestry Corporation of NSW (2009-10).

#### **PLANS OF MANAGEMENT / STRATEGIES**

- Review of species management plans for the Yellow-bellied Glider, Giant Burrowing Frog, Eastern Bristlebird and Southern Brown Bandicoot prepared under the NSW Threatened Species License for Forestry Operations, NSW Natural Resources Commission (2019)
- Provision of information as the basis for the development of six threatened flora species management plans to be prepared under the NSW Threatened Species License for Forestry Operations, NSW Natural Resources Commission (2019)
- Commonwealth/NSW Giant Burrowing Frog Recovery Plan, DEWHA/DECC (2012)
- Eastern Bentwing-bat Management Plan, Gerringong, NSW RMS (2014)
- Nestbox, Microbat and Green and Golden Bell Frog Management Plans, Berry to Bomaderry Upgrade of the Princes Highway, NSW RMS (2017)
- Green and Golden Bell Frog surveys and monitoring, Princes Highway Upgrades at South Nowra and Berry to Bomaderry, NSW RMS (2012-2017)

- Green and Golden Bell Frog Management Strategy, Princes Highway Upgrade, NSW RMS (2012-2014)
- Green and Golden Bell Frog pre-clearing works Kooragang Island (Daracon 2016 & current)
- Microbat Management Plan for Clarencetown Bridge, NSW RMS (2016)
- Expert review of Threatened Frog Management Plan- Woolgoolga to Ballina Upgrade, NSW RMS (2014)
- Threatened Microbat Management Plan for Warringah Mall, Northern Beaches Council (2014)
- Threatened Frog modelled habitat requirements, Hornsby Shire Council (2016)
- NSW DPI representative for the National Advisory Group on Cane Toad management (2009-2011)
- Taren Point Cane Toad management advisory group (207-2008).

#### **TRAINING**

- Lead trainer for four fauna handling course for junior staff in EcoLogical (2021-2023)
- Lead instructor > 50 wildlife training schools run in NSW, ACT and Victoria providing presentations on the survey, identification and management of all flora and fauna. This included detailed instruction on the management of threatened wading and aquatic birds and other aquatic species presented to Queensland, Victorian, NSW and Commonwealth Government staff (1993-2017)
- Private forestry survey requirements, Victorian Timber (2016).

#### **PUBLICATIONS**

#### **Book Chapters**

- Mahony, M.J., Hines, H.B., Lemckert, F., Newell, D., Roberts, J.D., Rowley, J.J.L., Scheele, B.C., & West, M. 2023. The impacts of the 2019-20 wildfires on Australian frogs. In Australia's 2019-20 megafires: biodiversity impacts and lessons for the future. Libby Rumpff, Sarah Legge, Stephen van Leeuwen, Brendan Wintle, John Woinarski (Eds.).
- Lemckert, F.L., & Mahony, M.J. 2018. The status of Decline and Conservation of Frogs in Temperate Coastal South-eastern Australia. Pp 59-72 In Amphibian Biology Volume 11- Conservation and Decline of Amphibians: Eastern Hemisphere (Australia, New Zealand and Pacific Islands). H. Heatwole and J. Rowley (Eds.). CSIRO Publishing, Melbourne.
- Hecnar S. J., & Lemckert, F.L. 2012. Habitat Protection: Refuges and Reserves. Pp 3636-3675 In Biology of the Amphibia Volume 10- Conservation and Decline of Amphibians: Ecology, Effects of Humans, and Management. H. Heatwole (Ed.). Surrey-Beattey and Sons, Sydney.
- Lemckert, F.L., Hecnar S.J., & Pilliod, D.S. 2012. Habitat Destruction and Modification. Pp 3291-3342 In Biology of the Amphibia Volume 10- Conservation and Decline of Amphibians: Ecology, Effects of Humans, and Management. H. Heatwole (Ed.). Surrey-Beattey and Sons, Sydney.
- Lemckert, F.L. & Penman, T. 2012. Climate Change and Australia's frogs: how much do we need to worry? Pp 92-98 In: Wildlife and Climate Change: towards robust conservation strategies for Australian fauna. D. Lunney & P. Hutchings (Eds.). Royal Zoological Society of NSW, Mosman, NSW, Australia.
- Hero, J-M, Richards, S, Alford, R., Allison, A., Bishop, P., Gunther, R., Iskandar, D., Kraus, F., Lemckert, F., Menzies, J., Roberts, D. & Tyler, M. 2008. Amphibians of the Australasian Realm. Pp 65-73 In: Threatened Amphibians of the World. S. N. Stuart, M. Hoffman, J. S., Chanson, N. A. Cox, R. J. Berridge, P. J. Ramani & B. E. Young (Eds.). Lynx Edicions, Barcelona.
- Green, M., Thompson, M.B. & Lemckert, F.L. 2004. The effects of suspended sediments on the tadpoles of two stream-breeding and forest dwelling frogs, Mixophyes balbus and Heleioporus australiacus. Pp 713-720 In Conservation of Australia's Forest Fauna, Second Edition. D. Lunney (Ed.). Royal Zoological Society of NSW, Sydney.
- Lemckert, F.L. & Slatyer, C. 2004. Herps in forests: schools to educate land managers in their conservation. Pp 1055-1058 In Conservation of Australia's Forest Fauna, Second Edition. D Lunney (Ed.). Royal Zoological Society of NSW, Sydney.

• Lemckert, F. & Morse, R. 1999. Frogs in the timber production forests of the Dorrigo escarpment in northern NSW: an inventory of species present and the conservation of threatened species. Pp 72-80 In Declines and Disappearances of Australian Frogs. A. Campbell (Ed.). Environment Australia, Canberra.

#### **Scientific Papers**

- Gould, J., Callen, A., Knibb, G., Donelly, R., Schmahl, K., Maynard, C., Sanders, S., Lemckert, F. & McHenry, C.
   2023. Learning from past designs: improving amphibian fences using an adaptive management approach.
   Wildlife Research. https://doi.org/10.1071/WR23007.
- Nolan, N.; Hayward, M.; Klop-Toker, K.; Mahony, M.; Lemckert, F. & Callen, A. 2023. Complex Organisms Must Deal with Complex Threats: How Does Amphibian Conservation Deal with Biphasic Life Cycles? Animals (Basel) 14; 13(10):1634. doi: 10.3390/ani13101634.
- Mahony, M., Gould, J., Beranek, C., Callen, A., Clulow, J., Clulow, S., Klop-Toker, K., Mahony, S., Wallace, S., Stock, S., Garnham, J., Lemckert, F., Thumm, K., Moses, B. & Pickett, E. (2022). A trait-based analysis for predicting impact of wildfires on frogs. Australian Zoologist 42:326-351. https://doi.org/10.7882/AZ.2022.021.
- Geyle, H.M, Hoskin, C.J., Bower, D.S., Catullo, R., Clulow, S., Driessen, M., Daniels, K., Garnett, S., Gilbert, D., Heard, G.W., Hero, J-M., Hines, H.B., Hoffmann, E.P., Hollis, G. Hunter, D.A. Lemckert, F.L., Mahony, M., Marantelli, G., McDonald, K.R., Mitchell, N.J., Newell, D., Roberts, J.D., Scheele, B.C., Scroggie, M., Vanderduys, E., Wassens, S., West, M., Woinarski, J.S.C. & Gillespie, G.R. (2021). Red hot frogs: identifying the Australian frogs most at risk of extinction. Pacific Conservation Biology. https://doi.org/10.1071/PC21019.
- Mahony, M.J., Penman, T., Bertozzi, T., Lemckert, F., Bilney, R. & Donnellan, S.C. 2021. Taxonomic revision of south-eastern Australian giant burrowing frogs (Anura: Limnodynastidae: Heleioporus Gray). Zootaxa 5016:451–489.
- Gillespie, G.R., Roberts, J.D., Hunter, D., Hoskin, C.J., Alford, R.A., Heard, G.W., Hines, H., Lemckert, F., Newell, D. & Scheele, B.C. 2020. Status and Priority Conservation Actions for Australian Frog Species. Biological Conservation 247: 108543. https://doi.org/10.1016/j.biocon.2020.108543.
- Mahony, M., Moses, B., Mahony, S.V., Lemckert, F.L. & S Donnellan. 2020. A new species of frog in the *Litoria ewingii* species group (Anura: Pelodryadidae) from south-eastern Australia. Zootaxa 4858:201-230.
- Henle, K., Osborne, W., & Lemckert, F. 2014. The herpetofauna of Kioloa, New South Wales: baseline observational data collected 30 years ago and inspired by R. E. Barwick. Australian Journal of Zoology 62:100–107.
- Mahony, M.J., Hamer, A.J., Pickett, E.J., McKenzie, D.J., Stockwell, M.P., Garnham, J.I., Keely, C.C., Deboo, M., O'Meara, J., Pollard, C.J., Clulow, S., Lemckert, F.L., Bower, D.S., & Clulow, J. 2013. Identifying conservation and research priorities in the face of uncertainty: a review of the threatened bell frog complex in eastern Australia. Herpetological Conservation and Biology 8:519-538.
- Daly, G. and Lemckert, F.L. 2012. Herpetofauna of the Tenterfield area. Australian Zoologist.
- Lemckert, F.L. 2011. Managing pond breeding anurans in the selectively harvested forests of coastal New South Wales, Australia. Forest Ecology and Management 262:1199–1204.
- Lemckert, F.L., Penman, T. & Haywood, A. 2011. Adaptive monitoring using the endangered northern corroboree frog (*Pseudophryne pengilleyi*) as a case study. Proceedings of the International Academy of Ecology and Environmental Sciences 1:87-96.
- Hamer, R., Lemckert, F.L. & Banks, P.B. 2011. Adult frogs are sensitive to the predation risks of olfactory communication. Biology Letters 7:361-363.
- Lemckert, F & Mahony, M.J. 2010. The relationship among multiple-scale habitat variables and pond use by anurans in northern New South Wales, Australia. Herpetological Conservation and Biology 5:537–547.
- Lemckert, F.L. 2010. The rich early history of frog research in Sydney. Australian Zoologist 36:102-106.
- Lemckert, F. 2010. Habitat relationships and presence of the threatened heath frog *Litoria littlejohni* (Anura: Hylidae) in central New South Wales, Australia. Endangered Species Research 11:271-278.

- Lemckert, F. & Grigg, G. 2010. Living in the 80s seasonality and phenology of frog calling activity at Darkes Forest from 1987-1989. Australian Zoologist 35:245-250.
- Lemckert, F., Rosauer D. & Slatyer, C. 2009. A comparison of Australia's anuran records against the reserve system. Biodiversity and Conservation 18:1233-1246.
- Penman, T.D., Lemckert, F.L. & Mahony, M.J. 2008. Applied conservation management of a threatened forest dependent frog, *Heleioporus australiacus*. Endangered Species Research 5:45-53.
- Penman, T.D, Lemckert, F.L. & Mahony, M.J. 2008. Spatial ecology of the giant burrowing frog (*Heleioporus australiacus*): implications for conservation prescriptions. Australian Journal of Zoology 56:179–186.
- Lemckert, F.L. & Mahony, M.J. 2008. Core calling periods of the frogs of temperate New South Wales, Australia. Herpetological Conservation and Biology 3:71-76.
- Penman, T. D. & Lemckert F. L. 2008. Monitoring the green and golden bell frog: current problems and an alternative approach. Australian Zoologist 34:373-378.
- Penman, T., Mahony, M., Towerton, A. & Lemckert, F. 2007. Spatial models of giant burrowing frog distributions. Endangered Species Research 3:115-124.
- Phillot, A.D., Skerratt, L.F., McDonald, K.R., Lemckert, F.L., Hines, H.B., Clarke, J.M., Alford, R.A. & Speare, R. 2007. Toe-clipping as an acceptable method of identifying individual anurans in mark recapture studies. Herpetological Review 38:305-308.
- Semeniuk, M., Lemckert, F.L. & Shine, R. 2007. Breeding-site selection by cane toads (*Bufo marinus*) and native frogs in northern New South Wales, Australia. Wildlife Research 34:59-66.
- Slatyer, C., Rosauer, D. & Lemckert, F. 2007. An assessment of endemism and species richness patterns in the Australian Anura. Journal of Biogeography 34:583-596.
- Hero, J-M., Morrison, C., Gillespie, G., Roberts, J.D., Newell, D., Meyer, E., McDonald, K., Lemckert, F., Mahony, M., Osborne, W., Hines, H., Richards, S., Hoskin, C., Clarke, J., Doak, N. & Shoo, L. 2006. Overview of the conservation status of Australian Frogs. Pacific Conservation Biology 12:313-320.
- Lemckert, F., Haywood, A., Brassil, T. & Mahony, M. 2006. Correlations between frogs and pond attributes in central New South Wales, Australia: What makes a good pond? Applied Herpetology 3:67-82.
- Lemckert, F., Mahony, M., Brassil, T. & Slatyer, C. 2006. The biology of the threatened Green-thighed Frog *Litoria brevipalmata* (Anura: Hylidae) in the central and mid-north coastal areas of New South Wales. Australian Zoologist 33:337-344.
- Lemckert, F., Brassil, T., Kavanagh, R. & Law, B. 2006. Trapping small mammals for research and management: how many die and why? Australian Mammalogy 28:201-208.
- Penman, T.D., Lemckert, F.L. & Mahony, M.J. 2006. Meteorological effects on the activity of the giant burrowing frog, *Heleioporus australiacus*, in south-eastern Australia. Wildlife Research 33:35-40.
- Penman, T., Lemckert, F. & Mahony, M. (2006). A preliminary investigation into the potential impacts of fire on a forest dependent burrowing frog species. Pacific Conservation Biology 12:78-83.
- Penman, T., Lemckert, F., Slade, C. & Mahony, M. 2006. Non-breeding habitat requirements of the giant burrowing frog (*Heleioporus australiacus*) in south-eastern Australia. Australian Zoologist 33:251-257.
- Fitzgerald, F., Shine, R., Lemckert, F. & Towerton, A. 2005. Habitat requirements of the threatened snake species *Hoplocephalus stephensii* (Elapidae) in eastern Australia. Austral Ecology 30:465-474.
- Lemckert, F.L. 2005. Body size of male common eastern froglets *Crinia signifera* does not appear to influence mating success during explosive breeding events. Acta Zoologica Sinica 51:232-236.
- Lemckert, F.L. 2005. Population structure, individual growth and survival of an Australian frog *Crinia signifera* at a pond. Acta Zoologica Sinica 51:393-400.
- Penman, T., Mahony, M. & Lemckert, F. 2005. Soil disturbance in integrated logging operations. Applied Herpetology 2:415-424
- Penman, T.D., Mahony, M.J., Towerton, A.L. & Lemckert, F.L. 2005. Bioclimatic analysis of disjunct populations of the giant burrowing Frog, *Heleioporus australiacus*. Journal of Biogeography 32:397-405.

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- Fitzgerald, M., Shine, R. & Lemckert, F. 2004. Life history attributes of a threatened Australian snake *Hoplocephalus stephensii* (Elapidae). Biological Conservation 119:121-128.
- Lemckert, F.L. 2004. Variations in anuran movements and habitat use: implications for conservation. Applied Herpetology 1:165-181.
- Lemckert, F.L. & Brassil, T. 2004. Movements and habitat use by the giant burrowing frog, *Heleioporus australiacus*. Amphibia-Reptilia 24:207-211.
- Lemckert, F.L., Brassil, T. & Haywood, A. 2004. Effects of low intensity fire on pond-breeding anurans in midnorthern New South Wales, Australia. Applied Herpetology 1:183-195.
- Penman, T., Lemckert, F. & Mahony, M. 2004. Two hundred and ten years of looking for giant burrowing frog. Australian Zoologist 32:597-604.
- Fitzgerald, M., Shine, R. & Lemckert, F. 2003. A reluctant heliotherm: thermal ecology of the arboreal snake *Hoplocephalus stephensii* (Elapidae) in dense forest. Journal of Thermal Biology 28:515-524.
- Fitzgerald, M., Shine, R. & Lemckert, F. 2002. Radiotelemetric study of habitat use by the arboreal snake *Hoplocephalus stephensii* (Elapidae) in Eastern Australia. Copeia 2002:321-332.
- Fitzgerald, M., Shine, R. & Lemckert, F. 2002. Spatial ecology of arboreal snakes (*Hoplocephalus stephensii*, Elapidae) in an eastern Australian forest. Austral Ecology 27:537-545.
- Lemckert, F.L. & Slatyer, C. 2002. Short-term movements and habitat use of the green-thighed frog, Litoria brevipalmata (Anura: Hylidae). Australian Zoologist 32:56-61.
- Lemckert, F.L. 2001. The influence of micrometeorological factors on the calling activity of the Australian frog *Crinia signifera* (Anura: Myobatrachidae). Australian Zoologist 31:625-631.
- Lemckert, F.L. & Brassil, T. 2000. Movements and habitat use of the endangered giant barred river frog, *Mixophyes iteratus*, and the implications for its conservation in timber production forests. Biological Conservation 96:177-184.
- Lemckert, F.L. 1999. Impacts of selective logging on frogs in a forested area of northern New South Wales. Biological Conservation 89:321-328.
- Lemckert, F.L. 1998. A Survey for threatened herpetofauna of the south-west slopes of New South Wales. Australian Zoologist 30:492-500.
- Goldingay, R., Daly, G. & Lemckert, F. 1996. Assessing the impacts of logging on reptiles and frogs in the montane forests of southern New South Wales. Wildlife Research 23:495-510.
- Lemckert, F.L. 1996. Surveys for the green and golden bell frog, *Litoria aurea*, by the State Forests of New South Wales. Australian Zoologist 30:208-213.
- Lemckert, F.L. 1996. Effects of toe-clipping on the survival and behaviour of the Australian frog *Crinia signifera*. Amphibia:Reptilia 17:287-290.
- Lemckert, F.L. & Shine, R. 1992. Costs of reproduction in a population of the frog *Crinia signifera* (Anura: Myobatrachidae) from southeastern Australia. Journal of Herpetology 27:420-425.

#### **Shorter Communications**

- Hero, J-M., Gillespie, G., Roberston, P., Lemckert, F. & Littlejohni, M. 2008. Pseudophryne pengilleyi. Pp 464
   In: Threatened Amphibians of the World. S. N. Stuart, M. Hoffman, J. S., Chanson, N. A. Cox, R. J. Berridge, P. J. Ramani & B. E. Young (Eds). Lynx Edicions, Barcelona, Spain.
- Lemckert, F. & Shoulder, J. 2007. The diets of three sympatric barred river frogs (Anura: Myobatrachidae) from southeastern Australia. Herpetological Review 38:152-154.
- Lemckert, F.L., Brassil, T.E. & Towerton, A. 2005. Native vegetation corridors in exotic pine plantations provide long-term habitat for frogs. Ecological Management and Restoration 6:132-134.
- Penman, T., Lemckert, F. and Mahony, M. 2005. A cost-benefit analysis of automated call recorders. Applied Herpetology 2:389-400.
- Lemckert F. 2004. The biology and conservation status of the heath frog (*Litoria littlejohni*). Herpetofauna 34:99-104.

- Lemckert, F.L. 2000. Observations on the effects of fire on the Hip-pocket Frog, *Assa darlingtoni*. Herpetofauna 30:51-52.
- Lemckert, F.L., Brassil, T. & McCray, K. 1998. Recent records of the giant burrowing frog (*Heleioporus australiacus*) from the far south coast of NSW. Herpetofauna 28:32-39.
- Lemckert, F., Potter, M., Smith, B. & Bruest, T. (1997). Recent records of the southern barred frog (*Mixophyes balbus*) from the south coast of NSW. Herpetofauna 27:60-62.

#### **Unpublished reports**

- Lemckert, F. and Brassil, T. 2009. Focusing on the Landscape Biodiversity in Australia's National Reserve System Part A: Fauna. A Report for Caring for Our Country through the Australian Biological Resources Study. Available at http://www.bushblitz.org.au/reports.php.
- Lemckert, F. and Brassil, T. 2009. Focusing on the Landscape Biodiversity in Australia's National Reserve System Part B: Flora. A Report for Caring for Our Country through the Australian Biological Resources Study. Available at .
- Kavanagh, R., Law, B., Lemckert, F., Stanton, M., Chidel, M., Brassil, T., Towerton, A. and Penman, T. 2010.
   Conservation value of eucalypt plantations established for wood production and multiple environmental benefits in agricultural landscapes. Final Report for NAP/NHT2 Eucalypt Plantations project, SLA 0013 R3 NAP, NSW Industry and Investment.
- Kavanagh, R., Law, B., Lemckert, F., Stanton, M., Chidel, M., Brassil, T., Towerton, A. & Herring, M. 2004.
   Biodiversity in eucalypt plantings established to reduce salinity. Report to the Joint Venture Agroforestry Program, RIRDC/Land and Water Australia/FWPRDC/MDBC, Canberra. Published as RIRDC Report No. 05/165.
- Kavanagh, R.P., Law, B., Lemckert, F., Stanton, M., Chidel, M., Towerton, A., 2001. Birds, mammals, reptiles and amphibians in eucalypt plantations near Albury-Wodonga: a pilot study of variables influencing biodiversity. State Forests of New South Wales. Pennant Hills, Sydney.
- Lemckert, F.L., J. Shields & E. Kemmerer. 1993. Fauna report on the flora and fauna survey for the proposed Kaluru Seed Orchard. Report for Softwoods region, State Forests of New South Wales.
- Lemckert, F.L. 1994. Report on the Wallum Froglet (*Crinia tinnula*) in the Bulahdelah Management Area. Report for Bulahdelah District, State Forests of NSW.
- Lemckert, F.L., M. Mahony, and C. Slatyer. 1997. Biological Study of the Green-thighed Frog in the Bulahdelah Region. Report to the RTA and NSW NPWS.
- Lemckert, F.L. 1997. Survey report for the red-crowned toadlet at Allambie Heights, NSW. Unpublished report for the CSIRO.
- Lemckert, F.L. 1998. Survey report for the green and golden bell frog at Badgerys Creek, NSW. Unpublished report for Biosis Pty. Ltd.
- Penman, T. D. and Lemckert, F. L. 2010. Predicted impact of climate change on threatened amphibians. Unpublished report to the Department of the Environment, Climate Change and Water, Hurstville.







# Appendix K. Ultrasonic Recorder Report

JANUARY 2025 APPENDIX K

# Identification of echolocation call sequences recorded at Anambah, New South Wales.

### Methods

#### Data

Data was received by email on the 21<sup>st</sup> October 2024. In total 10,193 files were received, collected at two sites over 23 survey nights, at two locations. Acoustic recordings made with Titley Anabat chorus acoustic detectors.

### Bat call analysis and species identification

Recordings were marked as containing recognisable microbat calls, by the use of a filter in Anabat Insight v2.0.7. The filter (All Bats) used in this analysis screens calls by applying criteria based on smoothness, duration and characteristic frequency. The filter is a generalised filter that includes parameters suitable for the microbat species of Australia (Titley, 2009). Of the 10,193 files received, 6,940 were marked as containing recognisable bats calls. It should be noted that subsequent to identifying species that passed the All Bats filter, all files were manually scanned to identify calls from species who are more likely produce weaker or fragmented calls in ZC.

Call identification was based on call keys and descriptions for bat species in New South Wales (Pennay et al. 2004), and with further reference to information on bat species in southern Queensland (Reinhold et al. 2001), plus the authors' own resource of echolocation recordings (A. Lo Cascio unpublished data).

Nomenclature follows Jackson and Groves (2015). Identifications were supported by distribution information in a curated source of distribution records maintained by the Australasian Bat Society, Inc. (https://www.ausbats.org.au/batmap.html).

Species identification per detector location is presented in Table 1.

### Species of conservation significance

The scope of the analysis required particular attention be given to the identification of echolocation sequences of species of conservation significance. The reliability of identification is as follows:

**Definite**; one or more calls were there is no doubt about the identification of the species.

<u>Probable</u>; most likely to be the species named, low probability of confusion with species that use similar calls.

<u>Possible</u>; call is comparable with the named species, with a moderate to high probability of confusion with species of similar calls.

Table 1. Species identification per detector location.

	BATCAM1	BATCAM2	BATCAM4	BATCAM
Dates	16 – 23 October 2024	16 – 23 October 2024	16 – 22 October 2024	16 – 23 October 2024
Total Files	3,402	1,447	1,955	3,389
Marked files (passed filter)	425	1,180	820	828
Species				
Autonomous australis	D	D	D	D
Ozimops planiceps *	Pr			Pr
Ozimops ridei	D	D	D	Pr
Chalinolobus gouldii	D	D	D	D
Micronomus norfolkensis	Pr	D	D	D
Ozimops planiceps/Ozimops ridei				Pr
Scotorepens orion/Falsistrellus tasmaniensis	Pr	Pr		
Falsistrellus tasmaniensis			D	
Miniopterus orianae oceanensis/Vespadelus regulus	Pr	Pr	Pr	Pr
Miniopterus orianae oceanensis	D		D	D
Myotis macropus/Nyctophilus spp.	Pr	Pr		
Myotis macropus		D		D
Vespadelus troughtoni/Vespadelus vulturnus	Pr		Pr	
Chalinolobus morio	D			
Chalinolobus morio/Vespadelus spp.			Pr	
Vespadelus pumilus/ Miniopterus australis	Pr	Pr	Pr	Pr
Vespadelus pumilus	Pr		D	
Miniopterus australis	D	D	D	

D - Definite

Pr – Probable

<sup>\*</sup> Not expected in the region based on distribution records (https://www.ausbats.org.au/batmap.html).

### Results

If an identification could not be made unambiguously from this dataset, then presence of the species is regarded as a possibility, and presence should be assumed. Statements on species presence are based on this premise. If confirmation of the presence of any species listed here with an ambiguous identification is required, then further work would be necessary (see point 8 in the Limitations section). Please note species complexes were only identified if a species as part of the complex had not been identified previously.

# Reliability of species identification for species of conservation significance Micronomus norfolkensis

This species can be identified reliably from representations in Zero Crossings format. The alternating pattern of high and low characteristic frequency in successive pulses combined with the pulse shape (convex 'upside down cup shapes') is diagnostic, and attribution to this species was made for examples with these features. This species was identified in this dataset.

### Falsistrellus tasmaniensis

Clutter type calls where there was insufficient detail of the initial portion of the call or characteristic frequency (c. 35 kHz) to allow separation from Scoteanax rueppellii or Scotorepens orion were assigned to a complex group based on Fc. This species was identified in this dataset.

### Miniopterus orianae oceanensis

The search phase echolocation calls of *M.o. orianae* sometimes have 'drooped' (decreasing frequency) terminations to pulses, but pulses also terminate abruptly without increasing or decreasing terminating frequency sweeps. The presence of echoes can make interpretations of the character of pulse terminations difficult, especially in Zero Crossings format. The frequency characteristics of the feeding buzz can also be used to separate Miniopterus from vespertilionids, but there are typically relatively few feeding buzz examples in a dataset. These features can be used in combination, when present, and as observed across several quality examples to make a relatively confident identification of *M. orianae* at a particular recording site. Other useful features for use in identification have been reported for Miniopterus species in the Solomon Islands (energy distribution at different points of the pulse; Pennay and Lavery 2017), but their applicability needs to be demonstrated further in Australia, as well as the degree to which such features are diagnostic. **This species was identified in this dataset**.

### Myotis macropus

Calls of Myotis macropus, and species of long-eared bat Nyctophilus spp. cannot be separated reliably. These species are typically reported as a species complex. **This species was identified in this dataset.** 

### Vespadelus spp. Including Vespadelus troughtoni

Within this region of New South Wales three Vespadelus species, *Vespadelus vulturnus*, *V. troughtoni* and *V. pumilus* are reported as having calls that overlap at ~ 50 kHz. Although V. pumilus is often seen calling a little higher. **This species was identified in this dataset.** 

### Miniopterus australis

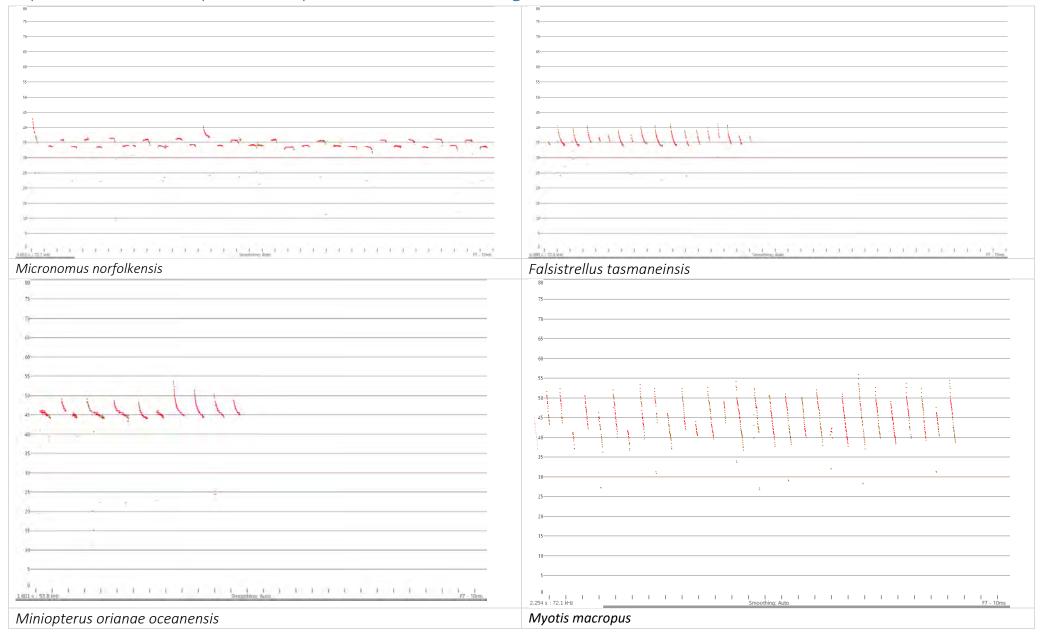
Highly distinctive calls with characteristic frequency 56-60kHz. Calls without clear definition could be confused with *Vespadelus pumilus*, or *Chalinolobus morio* were calls appear to have a down sweeping tail. **This species was identified in this dataset**.

### Limitations

The identifications presented in this report have been made within the following context:

- 1. The identifications made herein were based on the ultrasonic acoustic data recorded and provided by WSP Australia Pty Limited.
- 2. The scope of this report extended to providing information on the identification of bat species in the recordings provided. Further comment on these species and the possible impacts of a planned project on bat species were not part of the scope.
- 3. In the case of the present report the equipment was operated by WSP Australia Pty Limited the during the survey.
- 4. Other than the general location of the study area, Amanda Lo Cascio (ABN 59 357 037 376) has not been provided with detailed information of the survey area, has not made a visit to observe the habitats available for bats, nor have we visited the specific project areas on a previous occasion.
- 5. Amanda Lo Cascio (ABN 59 357 037 376) has had no input into the overall design and timing of this bat survey, recording site placement, nor the degree of recording site replication.
- 6. The identifications listed herein have been made to the best of our ability given the available materials, and we reserve the right to re-examine the data and revise any identification following a query. It is the client's and / or proponent's responsibility to provide supporting evidence for any identification, which might require follow-up trapping effort or non-invasive methods such as video recordings. Amanda Lo Cascio (ABN 59 357 037 376) bears no liability for any follow-up work that may be required to support an identification based initially on the analysis of acoustic recordings undertaken and reported on here.
- 7. There are a variety of factors that affect the 'detectability' of each bat species, given the frequency, power and shape characteristics of their calls. Further information on the analysis and the various factors that can impinge on the reliability of identifications can be provided upon request.
- 8. The analysis of ultrasonic recordings is one of several methods that can be used to survey for bats, and comprehensive surveys typically employ more than one method. If an identification in the present report is ambiguous or in question, a trapping programme would help to resolve the presence of the possibilities in the project area.
- 9. This version of the document supersedes any previous version. Previous drafts are not authorised by us for submission to the regulator or the public domain.

# Representative call sequences of species of conservation significance.



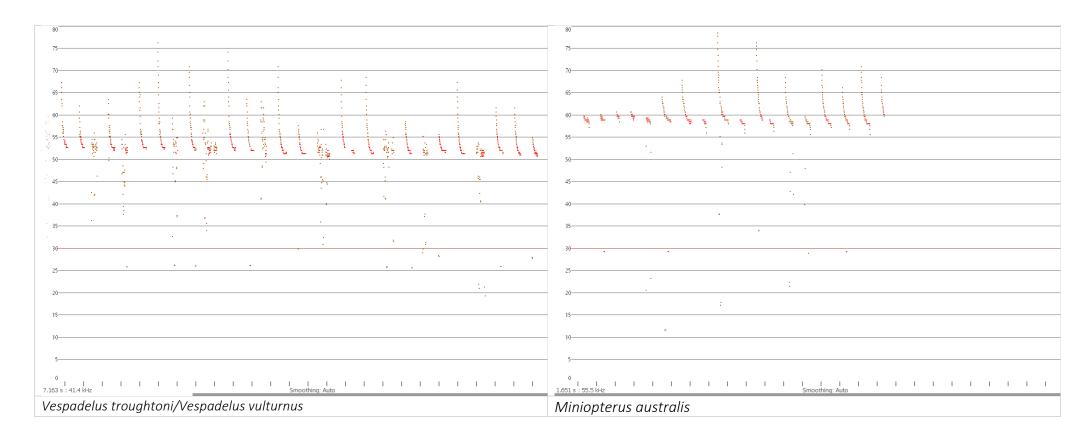


Figure 1. Representative call examples for species of conservation significance identified in the dataset.

### References

ABS (2006). Recommendations of the Australasian Bat Society Inc for reporting standards for insectivorous bat surveys using bat detectors. The Australasian Bat Society Newsletter 27: 6–9. [ISSN 1448-5877]

Churchill, S.K. (2008). Australian bats. 2nd ed. Allen and Unwin, Crows Nest, NSW.

Jackson, S.M. and Groves, C.P. (2015). Taxonomy of Australian mammals. CSIRO Publishing, Victoria.

Pennay, M., Law, B. and Reinhold, L. (2004). Bat calls of New South Wales: Region based guide to the echolocation calls of microchiropteran bats. NSW Department of Environment and Conservation, Hurstville.

Pennay, M. and Lavery, T. (2017). Identification guide to bat echolocation calls of Solomon Islands and Bougainville. Unpublished report available at URL: https://www.ausbats.org.au/bat-calls-of-the-solomon-islands.html

Reinhold, L., Law, B., Ford, G. and Pennay, M. (2001). Key to the bat calls of south-east Queensland and north-east New South Wales. Forest Ecosystem Research and Assessment Technical paper 2001-07, Department of Natural Resources and Mines, Queensland. NRIM Job 16730, QNRM1001, March 2001.

Titley Scientific. 2019. Anabat Insight User Manual Version 1.9.7. Queensland: Titley.

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# **Appendix L.** Vegetation survey data

Table 33 includes BAM plot data.

Field Data Sheets follow **Table 33**.

Data from plot-based vegetation surveys and vegetation integrity survey plots is submitted in electronic format (MS Excel) in data package.

 Table 33.
 Vegetation survey data and locations

plot	pct	area	patchsize	condition class	zone	easting	northing	bearing	compTree	compShrub	compGrass	compForbs	compFerns	compOther	strucTree	strucShrub	strucGrass	strucForbs	strucFerns	strucOther	funLargeTrees	funHollowtrees	funLitterCover	funLenFallenLogs	fun TreeStem5to9	funTreeStem10to19	fun TreeStem20to29	fun TreeStem30to49	fun TreeStem50to79	funTreeRegen	funHighThreatExotic	Plot-based vegetation	Vegetation integrity survey?
B01	3446	1.9	101	Intact	56	357357	6384437	345	2	3	9	13	0	1	30	0.3	31.9	1.3	0	0.1	4	3	74	9	0	0	1	1	1	1	15.9	Υ	Υ
B02	3433	1.9	101	Intact	56	357487	6385049	40	5	0	4	7	0	1	42.4	0	12.2	4.9	0	0.1	3	1	68	60	0	1	1	1	1	0	60.3	Υ	Υ
B03	3433	4.9	101	Grassland	56	357853	6385049	215	3	1	7	5	0	0	0.3	0.5	46.1	5.5	0	0	0	0	15	0	0	0	0	0	0	1	2.2	Υ	Υ
B04	3433	4.9	101	Grassland	56	357654	6384908	180	2	0	8	4	0	1	0.2	0	52.8	0.6	0	0.1	0	0	18	0	0	0	0	0	0	1	1.6	Υ	Υ
B05	3446	19.9	101	Pasture	56	357148	6384239	65	0	0	3	4	0	1	0	0	35.2	0.4	0	0.1	0	0	43	0	0	0	0	0	0	0	2.3	Υ	Υ
B06	3446	19.9	101	Pasture	56	358285	6384784	310	0	0	6	3	0	1	0	0	15.4	0.3	0	0.1	0	0	55	0	0	0	0	0	0	0	30.3	Υ	Υ
B07	3446	19.9	101	Pasture	56	358253	6384477	290	0	2	6	2	0	0	0	0.3	51.9	0.2	0	0	0	0	42	0	0	0	0	0	0	0	10.7	Υ	Υ
B08	3446	19.9	101	Pasture	56	358058	6384690	10	0	0	5	4	0	1	0	0	10.4	0.4	0	0.1	0	0	59	0	0	0	0	0	0	0	50.2	Υ	Υ
B09	3433	1.90	101	Intact	56	357513	6384538	110	2	0	3	6	0	0	40.0	0.0	20.2	8.3	0.0	0.0	6	6	6.0	20.0	0	0	1	1	0	0	5.0	Υ	Υ
B10	3446	1.90	101	Intact	56	357940	6384881	60	2	0	7	5	0	0	40.0	0.0	10.7	0.5	0.0	0.0	5	1	8.0	0.0	0	0	1	1	0	0	15.2	Υ	Υ

JANUARY 2025

# B01, 3446

Created	2024-11-06 10:37:32 AEDT by Matt Doherty
Updated	2024-11-21 16:25:59 AEDT by Matt Doherty
Location	-32.6685274897, 151.4787713
Status	Complete

# Project info

•	
Latitude	-32.66852748968991
Longitude	151.4787713
Easting, Northing	56 S 357357 6384437
Date	2024-11-06
Time	10:37
Job	24081 - Lend Lease, Anambah
Assessor	Chris Spraggon, Simone-Louise Yasui
Survey Type	BAM Plot

# **BAM Plot**

Plot identifier	B01
Plot dimension (L x W)	20 x 50
PCT_VegZone (as mapped)	3446
Midline bearing	345

# Photographs

Transect start (landscape)



Transect start (portrait)



Transect end (landscape)



### Transect end (portrait)



### Additional photos



# Landform and soil

Slope (0° — 90°)	7
Aspect	South
Morphology type and landform element	Lower slope
Landform pattern	Low hill
Geology	Clay
Soil colour (wet)	Brown

# Vegetation structure and condition

Vegetation structure	Trees 10-30 m, Woodland ( Cover 10-29%)
Vegetation condition (qualitative)	Moderate (>50-70% benchmark, moderate disturbance, mature regrowth)
Condition class	Intact

# PCT and large tree threshold

Select either PCT or vegetation formation to show large tree threshold and autopopulate PCT and formation fields. PCT and formation fields can also be free text.

Select PCT	3446, Lower North Foothills Ironbark-Box-Gum Grassy Forest
Vegetation formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
PCT	3446
PCT description	Lower North Foothills Ironbark-Box-Gum Grassy Forest
Large tree threshold size	50
TEC	Has associated TEC
TEC description	Listed BC Act,E: Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions (Part); Listed EPBC Act,CE: Central Hunter Valley eucalypt forest and woodland (Part);

### Survey data

### B01, Corymbia maculata, TG, 10

Plot	B01
Link to species	Corymbia maculata, Spotted Gum
Family	Myrtaceae
Scientific name	Corymbia maculata
Common name	Spotted Gum
Cover (%)	10
Cover_No	10
Abundance	4
Individual	1
Exotic (Y/N)	N
Growth form group	TG
High threat weed? (Y/N)	N

### B01, Eucalyptus moluccana, TG, 20

lot	B01
ink to species	Eucalyptus moluccana, Grey Box
amily	Myrtaceae
cientific name	Eucalyptus moluccana
Common name	Grey Box
Cover (%)	20
Cover_No	20
bundance	4
ndividual	1
xotic (Y/N)	N
Growth form group	TG

B01, Acacia ulicifolia, SG, (
-------------------------------

Plot	B01
Link to species	Acacia ulicifolia, Prickly Moses
Family	Fabaceae (Mimosoideae)
Scientific name	Acacia ulicifolia
Common name	Prickly Moses
Cover (%)	0.1
Cover_No	0.1
Abundance	5
Individual	1
Exotic (Y/N)	N
Growth form group	SG
High threat weed? (Y/N)	N

# B01, Breynia oblongifolia, SG, 0.1

Plot	B01
Link to species	Breynia oblongifolia, Coffee Bush
Family	Phyllanthaceae
Scientific name	Breynia oblongifolia
Common name	Coffee Bush
Cover (%)	0.1
Cover_No	0.1
Abundance	20
Individual	1
Exotic (Y/N)	N
Growth form group	SG
High threat weed? (Y/N)	N

### B01, Lantana camara, 0.5

Plot	B01
Link to species	Lantana camara, Lantana
Family	Verbenaceae
Scientific name	Lantana camara
Common name	Lantana
Cover (%)	0.5
Cover_No	0.5
Abundance	50
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	Manageable HTE

# B01, Sida rhombifolia, 0.1

Plot	B01

Link to species	Sida rhombifolia, Paddy's Lucerne
Family	Malvaceae
Scientific name	Sida rhombifolia
Common name	Paddy's Lucerne
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B01, Olea europaea, 0.1	
Plot	B01
Link to species	Olea europaea, African Olive, Feral Olive
Family	Oleaceae
Scientific name	Olea europaea
Common name	African Olive, Feral Olive
Cover (%)	0.1
Cover_No	0.1
Abundance	20
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	Manageable HTE
B01, Lolium perenne, 0.1	
Plot	B01
Link to species	Lolium perenne, Perennial Ryegrass
Family	Poaceae
Scientific name	Lolium perenne
Common name	Perennial Ryegrass
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B01, Ehrharta erecta, 5	
Plot	B01
Link to species	Ehrharta erecta, Panic Veldt Grass
Family	Poaceae
Scientific name	Ehrharta erecta
Common name	Panic Veldt Grass

5

Cover (%)

Cover_No	5
Abundance	500
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	HTE
mg.r direct weed type	
B01, Microlaena stipoides, GG, 1	
Plot	B01
Link to species	Microlaena stipoides, Weeping Grass
Family	Poaceae
Scientific name	Microlaena stipoides
Common name	Weeping Grass
Cover (%)	1
Cover_No	1
Abundance	1000
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N
DO1 Compadors do et do a CC 20	
B01, Cynodon dactylon, GG, 30	B01
Link to species	Cynodon dactylon, Common Couch
Family	Poaceae
Scientific name	Cynodon dactylon
Common name	Common Couch
Cover (%)	30
Cover_No	30
Abundance	2000
Individual	1
Exotic (Y/N)	N N
Growth form group	GG
High threat weed? (Y/N)	N N
B01, Sporobolus creber, GG, 0.1	
Plot	B01
Link to species	Sporobolus creber, Slender Rat's Tail Grass
Family	Poaceae
Scientific name	Sporobolus creber
Common name	Slender Rat's Tail Grass
Cover (%)	0.1
Cover_No	0.1
Abundance	50
Individual	1

Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

# B01, Echinopogon ovatus, GG, 0.1

Plot	B01
Link to species	Echinopogon ovatus, Forest Hedgehog Grass
Family	Poaceae
Scientific name	Echinopogon ovatus
Common name	Forest Hedgehog Grass
Cover (%)	0.1
Cover_No	0.1
Abundance	50
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

# B01, Juncus usitatus, GG, 0.2

Plot	B01
Link to species	Juncus usitatus
Family	Juncaceae
Scientific name	Juncus usitatus
Cover (%)	0.2
Cover_No	0.2
Abundance	200
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

# B01, Poa labillardierei var. labillardierei, GG, 0.2

Plot	B01
Link to species	Poa labillardierei var. labillardierei, Tussock
Family	Poaceae
Scientific name	Poa labillardierei var. labillardierei
Common name	Tussock
Cover (%)	0.2
Cover_No	0.2
Abundance	100
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

# B01, Eragrostis brownii, GG, 0.1

Plot	B01
Link to species	Eragrostis brownii, Brown's Lovegrass
Family	Poaceae
Scientific name	Eragrostis brownii
Common name	Brown's Lovegrass
Cover (%)	0.1
Cover_No	0.1
Abundance	50
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N
B01, Paspalum dilatatum, 0.1	
Plot	B01
Link to species	Paspalum dilatatum, Paspalum

•	
Plot	B01
Link to species	Paspalum dilatatum, Paspalum
Family	Poaceae
Scientific name	Paspalum dilatatum
Common name	Paspalum
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	HTE

# B01, Senecio madagascariensis, 10

,	
Plot	B01
Link to species	Senecio madagascarensis, Fireweed
Family	Asteraceae
Scientific name	Senecio madagascariensis
Common name	Fireweed
Cover (%)	10
Cover_No	10
Abundance	500
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	HTE

# B01, Imperata cylindrica, GG, 0.1

Plot	B01
Link to species	Imperata cylindrica
Family	Poaceae

Scientific name	Imperata cylindrica
Cover (%)	0.1
Cover_No	0.1
Abundance	50
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N
B01, Centella asiatica, FG, 0.1	
Plot	B01
Link to species	Centella asiatica, Indian Pennywort
Family	Apiaceae
Scientific name	Centella asiatica
Common name	Indian Pennywort
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
B01, Lobelia purpurascens, FG, 0.1	
Plot	B01
Link to species	Lobelia purpurascens
Family	Campanulaceae
Scientific name	Lobelia purpurascens
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
B01, Plantago lanceolata, 0.1	
Plot	B01
Link to species	Plantago lanceolata, Lamb's Tongues
Family	Plantaginaceae
Scientific name	Plantago lanceolata
Common name	Lamb's Tongues
Cover (%)	0.1
Cover_No	0.1

200

Abundance

Individual	1	
Exotic (Y/N)	Υ	
High threat weed? (Y/N)	N	

# B01, Eustrephus latifolius, OG, 0.1

Plot	B01
Link to species	Eustrephus latifolius, Wombat Berry
Family	Luzuriagaceae
Scientific name	Eustrephus latifolius
Common name	Wombat Berry
Cover (%)	0.1
Cover_No	0.1
Abundance	50
Individual	1
Exotic (Y/N)	N
Growth form group	OG
High threat weed? (Y/N)	N

# B01, Bidens spp. (B. aurea, B. bipinnata, B. pilosa, B. subaternans & B. tripartita), 0.1

B01
Bidens spp. (B. aurea, B. bipinnata, B. pilosa, B. subaternans & B. tripartita), Cobblers Pegs
Asteraceae
Bidens spp. (B. aurea, B. bipinnata, B. pilosa, B. subaternans & B. tripartita)
Cobblers Pegs
0.1
0.1
50
1
Υ
Υ
НТЕ

# B01, Solanum prinophyllum, FG, 0.1

,	.41
Plot	B01
Link to species	Solanum prinophyllum, Forest Nightshade
Family	Solanaceae
Scientific name	Solanum prinophyllum
Common name	Forest Nightshade
Cover (%)	0.1
Cover_No	0.1
Abundance	50
Individual	1
Exotic (Y/N)	N
Growth form group	FG

B01, Desmodium gunnii, F0	. 0.1
---------------------------	-------

Plot	B01
Link to species	Desmodium gunnii, Slender Tick-trefoil
Family	Fabaceae (Faboideae)
Scientific name	Desmodium gunnii
Common name	Slender Tick-trefoil
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

# B01, Hypochaeris radicata, 0.3

Plot	B01
Link to species	Hypochaeris radicata, Catsear
Family	Asteraceae
Scientific name	Hypochaeris radicata
Common name	Catsear
Cover (%)	0.3
Cover_No	0.3
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

# B01, Brunoniella australis, FG, 0.1

Plot	B01
Link to species	Brunoniella australis, Blue Trumpet
Family	Acanthaceae
Scientific name	Brunoniella australis
Common name	Blue Trumpet
Cover (%)	0.1
Cover_No	0.1
Abundance	20
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

# B01, Oxalis perennans, FG, 0.1

Plot	B01
Link to species	Oxalis perennans

Family	Oxalidaceae
Scientific name	Oxalis perennans
Cover (%)	0.1
Cover_No	0.1
Abundance	50
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
B01, Soliva sessilis, 0.1	
Plot	B01
Link to species	Soliva sessilis, Bindyi
Family	Asteraceae
Scientific name	Soliva sessilis
Common name	Bindyi
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
DO4 Alt II I I I FG	0.4
B01, Alternanthera denticulata, FG,	
Plot	B01
Plot Link to species	B01 Alternanthera denticulata, Lesser Joyweed
Plot Link to species Family	B01 Alternanthera denticulata, Lesser Joyweed Amaranthaceae
Plot Link to species Family Scientific name	B01 Alternanthera denticulata, Lesser Joyweed Amaranthaceae Alternanthera denticulata
Plot Link to species Family Scientific name Common name	B01 Alternanthera denticulata, Lesser Joyweed Amaranthaceae Alternanthera denticulata Lesser Joyweed
Plot Link to species Family Scientific name Common name Cover (%)	B01 Alternanthera denticulata, Lesser Joyweed Amaranthaceae Alternanthera denticulata Lesser Joyweed 0.1
Plot Link to species Family Scientific name Common name Cover (%) Cover_No	B01 Alternanthera denticulata, Lesser Joyweed Amaranthaceae Alternanthera denticulata Lesser Joyweed 0.1 0.1
Plot Link to species Family Scientific name Common name Cover (%) Cover_No Abundance	B01 Alternanthera denticulata, Lesser Joyweed Amaranthaceae Alternanthera denticulata Lesser Joyweed 0.1 0.1 50
Plot Link to species Family Scientific name Common name Cover (%) Cover_No Abundance Individual	B01 Alternanthera denticulata, Lesser Joyweed Amaranthaceae Alternanthera denticulata Lesser Joyweed 0.1 0.1 50
Plot Link to species Family Scientific name Common name Cover (%) Cover_No Abundance Individual Exotic (Y/N)	B01 Alternanthera denticulata, Lesser Joyweed Amaranthaceae Alternanthera denticulata Lesser Joyweed 0.1 0.1 50 1
Plot Link to species Family Scientific name Common name Cover (%) Cover_No Abundance Individual Exotic (Y/N) Growth form group	B01 Alternanthera denticulata, Lesser Joyweed Amaranthaceae Alternanthera denticulata Lesser Joyweed 0.1 0.1 1 N FG
Plot Link to species Family Scientific name Common name Cover (%) Cover_No Abundance Individual Exotic (Y/N)	B01 Alternanthera denticulata, Lesser Joyweed Amaranthaceae Alternanthera denticulata Lesser Joyweed 0.1 0.1 50 1
Plot Link to species Family Scientific name Common name Cover (%) Cover_No Abundance Individual Exotic (Y/N) Growth form group	B01 Alternanthera denticulata, Lesser Joyweed Amaranthaceae Alternanthera denticulata Lesser Joyweed 0.1 0.1 1 N FG N
Plot Link to species Family Scientific name Common name Cover (%) Cover_No Abundance Individual Exotic (Y/N) Growth form group High threat weed? (Y/N)	B01 Alternanthera denticulata, Lesser Joyweed Amaranthaceae Alternanthera denticulata Lesser Joyweed 0.1 0.1 1 N FG N
Plot Link to species Family Scientific name Common name Cover (%) Cover_No Abundance Individual Exotic (Y/N) Growth form group High threat weed? (Y/N)  B01, Cyclospermum leptophyllum, C	B01 Alternanthera denticulata, Lesser Joyweed Amaranthaceae Alternanthera denticulata Lesser Joyweed 0.1 0.1 1 N FG N
Plot Link to species Family Scientific name Common name Cover (%) Cover_No Abundance Individual Exotic (Y/N) Growth form group High threat weed? (Y/N)  B01, Cyclospermum leptophyllum, C	B01 Alternanthera denticulata, Lesser Joyweed Amaranthaceae Alternanthera denticulata Lesser Joyweed 0.1 0.1 50 1 N FG N B01
Plot Link to species Family Scientific name Common name Cover (%) Cover_No Abundance Individual Exotic (Y/N) Growth form group High threat weed? (Y/N)  B01, Cyclospermum leptophyllum, Cellink to species	B01  Alternanthera denticulata, Lesser Joyweed  Amaranthaceae  Alternanthera denticulata  Lesser Joyweed  0.1  0.1  50  1  N  FG  N  D.1  B01  Cyclospermum leptophyllum, Slender Celery
Plot Link to species Family Scientific name Common name Cover (%) Cover_No Abundance Individual Exotic (Y/N) Growth form group High threat weed? (Y/N)  B01, Cyclospermum leptophyllum, C Plot Link to species Family	B01  Alternanthera denticulata, Lesser Joyweed  Amaranthaceae  Alternanthera denticulata  Lesser Joyweed  0.1  0.1  50  1  N  FG  N  D.1  B01  Cyclospermum leptophyllum, Slender Celery  Apiaceae
Plot Link to species Family Scientific name Common name Cover (%) Cover_No Abundance Individual Exotic (Y/N) Growth form group High threat weed? (Y/N)  B01, Cyclospermum leptophyllum,	B01 Alternanthera denticulata, Lesser Joyweed Amaranthaceae Alternanthera denticulata Lesser Joyweed 0.1 0.1 50 1 N FG N FG N  D.1  B01 Cyclospermum leptophyllum, Slender Celery Apiaceae Cyclospermum leptophyllum
Plot Link to species Family Scientific name Common name Cover (%) Cover_No Abundance Individual Exotic (Y/N) Growth form group High threat weed? (Y/N)  B01, Cyclospermum leptophyllum, Cellon to species Family Scientific name Common name	B01 Alternanthera denticulata, Lesser Joyweed  Amaranthaceae Alternanthera denticulata Lesser Joyweed  0.1 0.1 50 1 N FG N FG N  D.1  B01 Cyclospermum leptophyllum, Slender Celery Apiaceae Cyclospermum leptophyllum Slender Celery

Abundance	100	
Individual	1	
Exotic (Y/N)	Υ	
High threat weed? (Y/N)	N	

# B01, Sigesbeckia orientalis subsp. orientalis, FG, 0.1

Plot	B01
Link to species	Sigesbeckia orientalis subsp. orientalis, Indian Weed
Family	Asteraceae
Scientific name	Sigesbeckia orientalis subsp. orientalis
Common name	Indian Weed
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

# B01, Ozothamnus diosmifolius, SG, 0.1

Plot	B01
Link to species	Ozothamnus diosmifolius, White Dogwood
Family	Asteraceae
Scientific name	Ozothamnus diosmifolius
Common name	White Dogwood
Cover (%)	0.1
Cover_No	0.1
Abundance	10
Individual	1
Exotic (Y/N)	N
Growth form group	SG
High threat weed? (Y/N)	N

# B01, Hypochaeris albiflora, 0.1

Plot	B01
Link to species	Hypochaeris albiflora, White Flatweed
Family	Asteraceae
Scientific name	Hypochaeris albiflora
Common name	White Flatweed
Cover (%)	0.1
Cover_No	0.1
Abundance	50
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

B01, Lysimachia arvensis, 0.1

Plot	B01
Link to species	Lysimachia arvensis, Scarlet Pimpernel
Family	Primulaceae
Scientific name	Lysimachia arvensis
Common name	Scarlet Pimpernel
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

# B01, Cyperus brevifolius, 0.1

Plot	B01
Link to species	Cyperus brevifolius
Family	Cyperaceae
Scientific name	Cyperus brevifolius
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	Y
High threat weed? (Y/N)	N

# B01, Plectranthus graveolens, FG, 0.1

Plot	B01
Link to species	Plectranthus graveolens
Family	Lamiaceae
Scientific name	Plectranthus graveolens
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

# B01, Dichopogon fimbriatus, FG, 0.1

Plot	B01
Link to species	Dichopogon fimbriatus, Nodding Chocolate Lily
Family	Anthericaceae
Scientific name	Dichopogon fimbriatus
Common name	Nodding Chocolate Lily
Cover (%)	0.1

High threat weed? (Y/N)	N	
Growth form group	FG	
Exotic (Y/N)	N	
Individual	1	
Abundance	50	
Cover_No	0.1	

### B01, Microtis unifolia, FG, 0.1

Plot	B01
Link to species	Microtis unifolia, Common Onion Orchid
Family	Orchidaceae
Scientific name	Microtis unifolia
Common name	Common Onion Orchid
Cover (%)	0.1
Cover_No	0.1
Abundance	20
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

### B01, Lomandra multiflora subsp. multiflora, GG, 0.1

Plot	B01	
Link to species	Lomandra multiflora subsp. multiflora, Many-flowered Mat-rush	
Family	Lomandraceae	
Scientific name	Lomandra multiflora subsp. multiflora	
Common name	Many-flowered Mat-rush	
Cover (%)	0.1	
Cover_No	0.1	
Abundance	50	
Individual	1	
Exotic (Y/N)	N	
Growth form group	GG	
High threat weed? (Y/N)	N	

# B01, Wahlenbergia gracilis, FG, 0.1

Plot	B01
Link to species	Wahlenbergia gracilis, Sprawling Bluebell
Family	Campanulaceae
Scientific name	Wahlenbergia gracilis
Common name	Sprawling Bluebell
Cover (%)	0.1
Cover_No	0.1
Abundance	20
Individual	1

Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
B01, Paronychia brasiliana, 0.	1
Plot	B01
Link to species	Paronychia brasiliana, Chilean Whitlow Wort, Brazilian Whitlow
Family	Caryophyllaceae
Scientific name	Paronychia brasiliana
Common name	Chilean Whitlow Wort, Brazilian Whitlow
Cover (%)	0.1
Cover_No	0.1
Abundance	50
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B01, Romulea rosea, 0.1	
Plot	B01
Link to species	Romulea rosea, Onion Grass
Family	Iridaceae
Scientific name	Romulea rosea
Common name	Onion Grass
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	НТЕ
B01, Galium gaudichaudii sub	osp. gaudichaudii 0.2
Plot	B01
Link to species	Galium gaudichaudii subsp. gaudichaudii
Family	Rubiaceae
Scientific name	Galium gaudichaudii subsp. gaudichaudii
Cover (%)	0.2
Cover_No	0.2
Abundance	100
Individual	1
Exotic (Y/N)	N
High threat weed? (Y/N)	N

B01

Dianella caerulea var. caerulea

Plot

Link to species

Family	Phormiaceae
Scientific name	Dianella caerulea var. caerulea
Cover (%)	0.1
Cover_No	0.1
Abundance	10
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

#### Disturbance

#### **Disturbances**

Clearing	Moderate
Grazing	Moderate
Weediness	Moderate

#### **Functional Data**

#### 5 m, 60

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B01
Tape measure	5 m
Litter cover	60
Litter cover	60

#### 15 m, 80

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B01
Tape measure	15 m
Litter cover	80
Litter cover	80

#### 25 m, 90

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B01
Tape measure	25 m
Litter cover	90
Litter cover	90

#### 35 m, 60

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B01
Tape measure	35 m
Litter cover	60
Litter cover	60

#### 45 m, 80

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B01	
Tape measure	45 m	
Litter cover	80	
Litter cover	80	

#### 9

Plot B01

Fallen logs present in a vegetation zone that are at least 10 cm in diameter, contacting the ground and at least 0.5 m in length.

9

Log length (m)

#### Tree stems and hollows

<5cm dbh stems	Present
5-9cm dbh stems	Absent
10-19 cm dbh stems	Absent
20-29 cm dbh stems	Present
30-49cm dbh stems (number of)	3
50-79cm dbh stems (number of)	3
>80cm dbh stems (number of)	1
Number of hollow bearing trees	3

A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. solid wood cannot be seen beyond the entrance); and (d) the hollow is at least 1 m above the ground.

#### **BAM** autocalc fields

#### **BAM** import

B01
3446
0
0
Intact
56
357357
6384437
345
2

Shrub species richness	3
Grass species richness	9
Forb species richness	13
Fern species richness	0
Other species richness	1
Tree cover	30.0
Shrub cover	0.3
Grass cover	31.9
Forb cover	1.3
Number of hollow trees	3
Fern cover	0.0
Other species cover	0.1
Number of large trees	4
Leaf litter cover	74.0
Log lengths	9.0
Stems 5 to 9	0
Stems 10 to 19	0
Stems 20 to 29	1
Stems 30 to 49	1
Stems 50 to 79	1
Regeneration	1
High threat exotic cover	15.9
Tree list	Corymbia maculata, Eucalyptus moluccana
Shrub list	Acacia ulicifolia, Breynia oblongifolia, Ozothamnus diosmifolius
Grass list	Microlaena stipoides, Cynodon dactylon, Sporobolus creber, Echinopogon ovatus, Juncus usitatus, Poa labillardierei var. labillardierei, Eragrostis brownii, Imperata cylindrica, Lomandra multiflora subsp. multiflora
Forb list	Centella asiatica, Lobelia purpurascens, Solanum prinophyllum, Desmodium gunnii, Brunoniella australis, Oxalis perennans, Alternanthera denticulata, Sigesbeckia orientalis subsp. orientalis, Plectranthus graveolens, Dichopogon fimbriatus, Microtis unifolia, Wahlenbergia gracilis, Dianella caerulea var. caerulea
Other list	Eustrephus latifolius
Exotic list	Lantana camara, Sida rhombifolia, Olea europaea, Lolium perenne, Ehrharta erecta, Paspalum dilatatum, Senecio madagascariensis, Plantago lanceolata, Bidens spp. (B. aurea, B. bipinnata, B. pilosa, B. subaternans & B. tripartita), Hypochaeris radicata, Soliva sessilis, Cyclospermum leptophyllum, Hypochaeris albiflora, Lysimachia arvensis, Cyperus brevifolius, Paronychia brasiliana, Romulea rosea
Fauna Surveys  Call Playback	
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### B02, 3446

Created	2024-11-06 15:06:06 AEDT by Matt Doherty
Updated	2024-11-19 14:45:28 AEDT by Matt Doherty
Location	-32.6630263989, 151.4802448
Status	Complete

### Project info

Latitude	-32.66302639889804
Longitude	151.4802448
Easting, Northing	56 S 357487 6385049
Date	2024-11-06
Time	15:06
Job	24081 - Lend Lease, Anambah
Assessor	Chris Spraggon, Simone-Louise Yasui
Survey Type	BAM Plot

### **BAM Plot**

Plot identifier	B02
Plot dimension (L x W)	20 x 50
PCT_VegZone (as mapped)	3446
Midline bearing	40

# Photographs

Transect start (landscape)



Transect start (portrait)



#### Additional photos



# Landform and soil

Slope (0° — 90°)	4
Aspect	East
Morphology type and landform element	Lower slope
Landform pattern	Low hill
Geology	Clay
Soil colour (wet)	Brown

### Vegetation structure and condition

Vegetation structure	Trees 10-30 m, Open -forest ( Cover 30-69%)
Vegetation condition (qualitative)	Low moderate (>30-50% benchmark, moderate disturbance, regrowth)
Condition class	Intact

### PCT and large tree threshold

Select either PCT or vegetation formation to show large tree threshold and autopopulate PCT and formation fields. PCT and formation fields can also be free text.

3446, Lower North Foothills Ironbark-Box-Gum Grassy Forest
Dry Sclerophyll Forests (Shrub/grass sub-formation)
3446
Lower North Foothills Ironbark-Box-Gum Grassy Forest
50
Has associated TEC
Listed BC Act,E: Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions (Part); Listed EPBC Act,CE: Central Hunter Valley eucalypt forest and woodland (Part);

### Survey data

#### B02, Corymbia maculata, TG, 20

Plot	B02
Link to species	Corymbia maculata, Spotted Gum
Family	Myrtaceae
Scientific name	Corymbia maculata
Common name	Spotted Gum
Cover (%)	20
Cover_No	20
Abundance	20
Individual	1
Exotic (Y/N)	N
Growth form group	TG
High threat weed? (Y/N)	N

### B02, Eucalyptus fibrosa, TG, 2

Plot	B02
Link to species	Eucalyptus fibrosa, Red Ironbark
Family	Myrtaceae
Scientific name	Eucalyptus fibrosa
Common name	Red Ironbark
Cover (%)	2
Cover_No	2
Abundance	3
Individual	1
Exotic (Y/N)	N
Growth form group	TG

B02, Eucalyptus acmenoides, TG, 2	s acmenoides, TG, 20	B02. Eucalyptus
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Plot	B02
Link to species	Eucalyptus acmenoides, White Mahogany
Family	Myrtaceae
Scientific name	Eucalyptus acmenoides
Common name	White Mahogany
Cover (%)	20
Cover_No	20
Abundance	10
Individual	1
Exotic (Y/N)	N
Growth form group	TG
High threat weed? (Y/N)	N

### B02, Olea europaea, 3

Plot	B02
Link to species	Olea europaea, African Olive, Feral Olive
Family	Oleaceae
Scientific name	Olea europaea
Common name	African Olive, Feral Olive
Cover (%)	3
Cover_No	3
Abundance	20
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	Manageable HTE

#### B02, Lantana camara, 2

Plot	B02
Link to species	Lantana camara, Lantana
Family	Verbenaceae
Scientific name	Lantana camara
Common name	Lantana
Cover (%)	2
Cover_No	2
Abundance	50
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	Manageable HTE

#### B02, Cestrum parqui, 0.2

	•	
DI :		DOO.
Plot		B02
1100		802

Link to species	Cestrum parqui, Green Cestrum
Family	Solanaceae
Scientific name	Cestrum parqui
Common name	Green Cestrum
Cover (%)	0.2
Cover_No	0.2
Abundance	10
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	НТЕ
B02, Notelaea longifolia, TG, 0.3	
Plot	B02
Link to species	Notelaea longifolia, Large Mock-olive
Family	Oleaceae
Scientific name	Notelaea longifolia
Common name	Large Mock-olive
Cover (%)	0.3
Cover_No	0.3
Abundance	30
Individual	1
Exotic (Y/N)	N
Growth form group	TG
High threat weed? (Y/N)	N
B02, Clerodendrum tomentosur	n, TG, 0.1
Plot	B02
Link to species	Clerodendrum tomentosum, Hairy Clerodendrum
Family	Lamiaceae
Scientific name	Clerodendrum tomentosum
Common name	Hairy Clerodendrum
Cover (%)	0.1
Cover_No	0.1
Abundance	5
Individual	1
Exotic (Y/N)	N
Growth form group	TG
High threat weed? (Y/N)	N
B02, Ehrharta erecta, 55	
Plot	B02
Link to species	Ehrharta erecta, Panic Veldt Grass
Family	Poaceae
Scientific name	Ehrharta erecta

Common name	Panic Veldt Grass
Cover (%)	55
Cover_No	55
Abundance	2000
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	НТЕ
B02, Microlaena stipoides, G	GG, 2
Plot	B02
Link to species	Microlaena stipoides. Weeping Grass

Plot	B02
Link to species	Microlaena stipoides, Weeping Grass
Family	Poaceae
Scientific name	Microlaena stipoides
Common name	Weeping Grass
Cover (%)	2
Cover_No	2
Abundance	500
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

## B02, Oplismenus aemulus, GG, 10

Plot	B02
Link to species	Oplismenus aemulus
Family	Poaceae
Scientific name	Oplismenus aemulus
Cover (%)	10
Cover_No	10
Abundance	2000
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

# B02, Bromus catharticus, 0.2

Link to species  Bromus catharticus, Praire Grass  Family  Poaceae	Plot	B02
	Link to species	Bromus catharticus, Praire Grass
	Family	Poaceae
Scientific name Bromus catharticus	Scientific name	Bromus catharticus
Common name Praire Grass	Common name	Praire Grass
Cover (%) 0.2	Cover (%)	0.2
Cover_No 0.2	Cover_No	0.2
Abundance 200	Abundance	200

Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B02, Lolium perenne, 0.2	
Plot	B02
Link to species	Lolium perenne, Perennial Ryegrass
Family	Poaceae
Scientific name	Lolium perenne
Common name	Perennial Ryegrass
Cover (%)	0.2
Cover_No	0.2
Abundance	300
Individual	1
Exotic (Y/N)	Y
High threat weed? (Y/N)	N
B02, Cyperus gracilis, GG, 0.1	
Plot	B02
Link to species	Cyperus gracilis, Slender Flat-sedge
Family	Cyperaceae
Scientific name	Cyperus gracilis
Common name	Slender Flat-sedge
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N
B02, Echinopogon ovatus, GG, 0.1	
Plot	B02
Link to species	Echinopogon ovatus, Forest Hedgehog Grass
Family	Poaceae
Scientific name	Echinopogon ovatus
Common name	Forest Hedgehog Grass
Cover (%)	0.1
Cover_No	0.1
Abundance	50
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

B02, Dichondra repens, FG, 4

Plot	B02
Link to species	Dichondra repens, Kidney Weed
Family	Convolvulaceae
Scientific name	Dichondra repens
Common name	Kidney Weed
Cover (%)	4
Cover_No	4
Abundance	1000
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
B02, Glycine tabacina, OG, 0.	1
Plot	B02
Link to species	Glycine tabacina, Variable Glycine
Family	Fabaceae (Faboideae)
Scientific name	Glycine tabacina
Common name	Variable Glycine
Cover (%)	0.1
Cover_No	0.1

#### B02, Brunoniella australis, FG, 0.1

Abundance

Individual

Exotic (Y/N)

Growth form group
High threat weed? (Y/N)

Boz, Branomena aastrans, r	G, 0.1
Plot	B02
Link to species	Brunoniella australis, Blue Trumpet
Family	Acanthaceae
Scientific name	Brunoniella australis
Common name	Blue Trumpet
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

100

1

N OG

Ν

# B02, Solanum prinophyllum, FG, 0.3

Plot	B02
Link to species	Solanum prinophyllum, Forest Nightshade
Family	Solanaceae

Scientific name	Solanum prinophyllum
Common name	Forest Nightshade
Cover (%)	0.3
Cover_No	0.3
Abundance	200
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
B02, Senecio madagascariensis, 0.1	
Plot	B02
Link to species	Senecio madagascarensis, Fireweed
Family	Asteraceae
Scientific name	Senecio madagascariensis
Common name	Fireweed
Cover (%)	0.1
Cover_No	0.1
Abundance	50
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	НТЕ
B02, Cirsium vulgare, 0.1	
Plot	B02
Link to species	Cirsium vulgare, Spear Thistle
Family	Asteraceae
Scientific name	Cirsium vulgare
Common name	Spear Thistle
Cover (%)	0.1
Cover_No	0.1
Abundance	10
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B02, Plantago lanceolata, 0.1	
Plot	B02
Link to species	Plantago lanceolata, Lamb's Tongues
Family	Plantaginaceae
Scientific name	Plantago lanceolata
Common name	Lamb's Tongues
Cover (%)	0.1
Cover_No	0.1

Abundance	50
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

### B02, Plectranthus graveolens, FG, 0.2

Plot	B02
Link to species	Plectranthus graveolens
Family	Lamiaceae
Scientific name	Plectranthus graveolens
Cover (%)	0.2
Cover_No	0.2
Abundance	500
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

# B02, Dichopogon fimbriatus, FG, 0.1

Plot	B02
Link to species	Dichopogon fimbriatus, Nodding Chocolate Lily
Family	Anthericaceae
Scientific name	Dichopogon fimbriatus
Common name	Nodding Chocolate Lily
Cover (%)	0.1
Cover_No	0.1
Abundance	20
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

### B02, Goodenia hederacea, FG, 0.1

Plot	B02
Link to species	Goodenia hederacea, Ivy Goodenia
Family	Goodeniaceae
Scientific name	Goodenia hederacea
Common name	Ivy Goodenia
Cover (%)	0.1
Cover_No	0.1
Abundance	10
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

B02, Sigesbeckia orientalis subsp. orientalis, FG, 0.1

Plot	B02
Link to species	Sigesbeckia orientalis subsp. orientalis, Indian Weed
Family	Asteraceae
Scientific name	Sigesbeckia orientalis subsp. orientalis
Common name	Indian Weed
Cover (%)	0.1
Cover_No	0.1
Abundance	20
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

#### B02, Gamochaeta calviceps, 0.1

Plot	B02
Link to species	Gamochaeta calviceps, Cudweed
Family	Asteraceae
Scientific name	Gamochaeta calviceps
Common name	Cudweed
Cover (%)	0.1
Cover_No	0.1
Abundance	10
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

#### Disturbance

#### Disturbances

Clearing	Low
Grazing	Moderate
Weediness	Moderate

#### **Functional Data**

#### 5 m, 70

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B02
Tape measure	5 m
Litter cover	70
Litter cover	70

#### 15 m, 85

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B02
Tape measure	15 m
Litter cover	85
Litter cover	85

#### 25 m, 40

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B02
Tape measure	25 m
Litter cover	40
Litter cover	40

#### 35 m, 70

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B02
Tape measure	35 m
Litter cover	70
Litter cover	70

#### 45 m, 75

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B02
Tape measure	45 m
Litter cover	75
Litter cover	75

#### 60

Plot	B02

Fallen logs present in a vegetation zone that are at least 10 cm in diameter, contacting the ground and at least 0.5 m in length.

Log length (m) 60

#### Tree stems and hollows

<5cm dbh stems	Absent
5-9cm dbh stems	Absent
10-19 cm dbh stems	Present
20-29 cm dbh stems	Present
30-49cm dbh stems (number of)	13
50-79cm dbh stems (number of)	3
>80cm dbh stems (number of)	0

A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. solid wood cannot be seen beyond the entrance); and (d) the hollow is at least 1 m above the ground.

#### **BAM** autocalc fields

lot CT rea atch size	B02 3446 0
rea atch size	
atch size	Λ
	•
	0
ondition class	Intact
one	56
asting	357487
orthing	6385049
earing	40
ree species richness	5
hrub species richness	0
rass species richness	4
orb species richness	7
ern species richness	0
ther species richness	1
ree cover	42.4
hrub cover	0.0
rass cover	12.2
orb cover	4.9
umber of hollow trees	1
ern cover	0.0
ther species cover	0.1
umber of large trees	3
eaf litter cover	68.0
og lengths	60.0
tems 5 to 9	0
tems 10 to 19	1
tems 20 to 29	1
tems 30 to 49	1
tems 50 to 79	1
egeneration	0
igh threat exotic cover	60.3
ree list	Corymbia maculata, Eucalyptus fibrosa, Eucalyptus acmenoides, Notelaea longifolia, Clerodendrum tomentosum
rass list	Microlaena stipoides, Oplismenus aemulus, Cyperus gracilis, Echinopogon ovatus
orb list	Dichondra repens, Brunoniella australis, Solanum prinophyllum, Plectranthus graveolens, Dichopogon fimbriatus, Goodenia hederacea, Sigesbeckia orientalis subsp. orientalis
ther list	Glycine tabacina

### B03, 3433

Created	2024-11-14 12:26:56 AEDT by Matt Doherty
Updated	2024-11-21 16:26:55 AEDT by Matt Doherty
Location	-32.6630719824, 151.4841519
Status	Complete

### Project info

Latitude	-32.66307198242343
Longitude	151.48415189999997
Easting, Northing	56 S 357853 6385049
Date	2024-11-14
Time	12:26
Job	24081 - Lend Lease, Anambah
Assessor	Chris Spraggon
Survey Type	BAM Plot

### **BAM Plot**

Plot identifier	B03
Plot dimension (L x W)	20 x 50
Midline bearing	215
Site information notes	Native pasture, better photos on Avenza

# Photographs

Transect start (landscape)



Transect start (portrait)



Additional photos



# Landform and soil

Slope (0° — 90°)	4
Aspect	North
Morphology type and landform element	Lower slope
Landform pattern	Low hill
Geology	Clay
Soil colour (wet)	Brown

### Vegetation structure and condition

Vegetation structure	Tussock grasses, Tussock grassland ( Cover 30-69%)
Vegetation condition (qualitative)	Low (15-30% benchmark, heavy disturbance, derived grasslands or shrublands)
Condition class	Grazed
Vegetation structure notes	Fully cleared land

### PCT and large tree threshold

Select either PCT or vegetation formation to show large tree threshold and autopopulate PCT and formation fields. PCT and formation fields can also be free text.

Select PCT	3433, Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Vegetation formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
PCT	3433
PCT description	Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Large tree threshold size	50
TEC	Has associated TEC
TEC description	Listed BC Act,E: Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions (Part);

#### Survey data

### B03, Eucalyptus fibrosa, TG, 0.1

Plot	B03
Link to species	Eucalyptus fibrosa, Red Ironbark
Family	Myrtaceae
Scientific name	Eucalyptus fibrosa
Common name	Red Ironbark
Cover (%)	0.1
Cover_No	0.1
Abundance	6
Individual	1
Exotic (Y/N)	N
Growth form group	TG
High threat weed? (Y/N)	N

### B03, Eucalyptus tereticornis, TG, 0.1

Plot	B03
Link to species	Eucalyptus tereticornis, Forest Red Gum
Family	Myrtaceae
Scientific name	Eucalyptus tereticornis
Common name	Forest Red Gum
Cover (%)	0.1
Cover_No	0.1
Abundance	6
Individual	1
Exotic (Y/N)	N
Growth form group	TG

B03, Corymbia maculata, TG, 0.	B03, 0	Corvm	bia n	nacul	lata,	TG,	0.
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Plot	B03
Link to species	Corymbia maculata, Spotted Gum
Family	Myrtaceae
Scientific name	Corymbia maculata
Common name	Spotted Gum
Cover (%)	0.1
Cover_No	0.1
Abundance	6
Individual	1
Exotic (Y/N)	N
Growth form group	TG
High threat weed? (Y/N)	N

### B03, Lissanthe strigosa, SG, 0.5

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Plot	B03
Link to species	Lissanthe strigosa, Peach Heath
Family	Ericaceae
Scientific name	Lissanthe strigosa
Common name	Peach Heath
Cover (%)	0.5
Cover_No	0.5
Abundance	20
Individual	1
Exotic (Y/N)	N
Growth form group	SG
High threat weed? (Y/N)	N

### B03, Themeda triandra, GG, 0.1

Plot	B03
Link to species	Themeda triandra
Family	Poaceae
Scientific name	Themeda triandra
Cover (%)	0.1
Cover_No	0.1
Abundance	20
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

### B03, Dichelachne micrantha, GG, 0.5

Plot	B03
Link to species	Dichelachne micrantha, Shorthair Plumegrass

Family	Poaceae
Scientific name	Dichelachne micrantha
Common name	Shorthair Plumegrass
Cover (%)	0.5
Cover_No	0.5
Abundance	500
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

### B03, Microlaena stipoides, GG, 0.1

Plot	B03
Link to species	Microlaena stipoides, Weeping Grass
Family	Poaceae
Scientific name	Microlaena stipoides
Common name	Weeping Grass
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

### B03, Cynodon dactylon, GG, 45

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Plot	B03
Link to species	Cynodon dactylon, Common Couch
Family	Poaceae
Scientific name	Cynodon dactylon
Common name	Common Couch
Cover (%)	45
Cover_No	45
Abundance	1000
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

# B03, Sporobolus creber, GG, 0.1

Plot	B03
Link to species	Sporobolus creber, Slender Rat's Tail Grass
Family	Poaceae
Scientific name	Sporobolus creber
Common name	Slender Rat's Tail Grass

Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N
B03, Briza minor, 0.5	
Plot	B03
Link to species	Briza minor, Shivery Grass
Family	Poaceae
Scientific name	Briza minor
Common name	Shivery Grass
Cover (%)	0.5
Cover_No	0.5
Abundance	1000
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B03, Juncus cognatus, 0.3	
Plot	B03
Link to species	Juncus cognatus
Family	Juncaceae
Scientific name	Juncus cognatus
Cover (%)	0.3
Cover_No	0.3
Abundance	1000
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B03, Paspalum dilatatum, 0.2	
Plot	B03
Link to species	Paspalum dilatatum, Paspalum
Family	Poaceae
Scientific name	Paspalum dilatatum
Common name	Paspalum
Cover (%)	0.2
Cover_No	0.2
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ

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Plot	B03
Link to species	Lachnagrostis filiformis
Family	Poaceae
Scientific name	Lachnagrostis filiformis
Cover (%)	0.2
Cover_No	0.2
Abundance	200
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

### B03, Lolium perenne, 0.1

Plot	B03
Link to species	Lolium perenne, Perennial Ryegrass
Family	Poaceae
Scientific name	Lolium perenne
Common name	Perennial Ryegrass
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

### B03, Juncus usitatus, GG, 0.1

Plot	B03
Link to species	Juncus usitatus
Family	Juncaceae
Scientific name	Juncus usitatus
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

### B03, Murdannia graminea, FG, 0.1

Plot	B03
Link to species	Murdannia graminea
Family	Commelinaceae
Scientific name	Murdannia graminea

Cover (%)	0.1
Cover_No	0.1
Abundance	20
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
	•
B03, Senecio madagascariensis, 2	
Plot	B03
Link to species	Senecio madagascarensis, Fireweed
Family	Asteraceae
Scientific name	Senecio madagascariensis
Common name	Fireweed
Cover (%)	2
Cover_No	2
Abundance	1000
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	HTE
B03, Centaurium tenuiflorum, 0.2	
Plot	B03
Link to species	Centaurium tenuiflorum, Branched Centaury, Slender centaury
Family	Gentianaceae
Scientific name	Centaurium tenuiflorum
Common name	Branched Centaury, Slender centaury
Cover (%)	0.2
Cover_No	0.2
Abundance	1000
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B03, Hypochaeris radicata, 0.1	
Plot	B03
Link to species	Hypochaeris radicata, Catsear
Family	Asteraceae
Scientific name	Hypochaeris radicata
Common name	Catsear
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1

BO3, Conyza spp., 0.1         N           BO3, Conyza spp., 0.1         BO3           Link to species         Conyza spp.           Scientific name         Conyza spp.           Cover (%)         0.1           Cover, No         0.1           Abundance         200           Individual         1           Exotic (Y/N)         Y           High threat weed? (Y/N)         N           BO3           Gamochaeta calviceps, 0.2         Cower           Plot         B03           Link to species         Gamochaeta calviceps, Cudweed           Scientific name         Gamochaeta calviceps           Common name         Cudweed           Cover (%)         0.2           Cover (%)         0.2           Cover (%)         0.2           Cover (%)         0.2           Abundance         500           Individual         1           Exotic (Y/N)         N           BO3, Soliva sessilis, 0.1         Plot           BO3         Soliva sessilis, Bindyl           Family         Asteraceae           Scientific name         Soliva sessilis           Cover (%)         0.1	otic (Y/N)	Υ
Plot         B03           Link to species         Conyza spp.           Family         Asteraceae           Clentific name         Conyza spp.           Cover (%)         0.1           Abundance         200           Individual         1           Exotic (Y/N)         Y           High threat weed? (Y/N)         N           B03, Gamochaeta calviceps, 0.2           Plot         B03           Link to species         Gamochaeta calviceps, Cudweed           Family         Asteraceae           Scientific name         Gamochaeta calviceps           Cower (%)         0.2           Cower, No         0.2           Cover (%)         0.2           Cover, No         0.2           Abundance         500           Individual         1           Exotic (Y/N)         Y           High threat weed? (Y/N)         N           B03, Soliva sessilis, 0.1         Y           Plot         B03           Link to species         Soliva sessilis, Bindyi           Family         Asteraceae           Scientific name         Soliva sessilis           Cover (%)         0.1     <	h threat weed? (Y/N)	N
Plot         B03           Link to species         Conyza spp.           Family         Asteraceae           Cover (%)         0.1           Cover_No         0.1           Abundance         200           Individual         1           Exotic (Y/N)         Y           High threat weed? (Y/N)         N           B03           Link to species         Gamochaeta calviceps, Cudweed           Family         Asteraceae           Scientific name         Gamochaeta calviceps           Cower (%)         0.2           Cover (%)         0.2           Footic (Y/N)         Y           High threat weed? (Y/N)         N           B03, Soliva sessilis, 0.1         Soliva sessilis, Bindyi           Family         Asteraceae           Scientific name         Soliva sessilis           Cover (%)         0.1           Cover (%	)3, Conyza spp., 0.1	
Family         Asteraceae           Scientific name         Conyza spp.           Cover (%)         0.1           Cover_No         0.1           Abundance         200           Individual         1           Exotic (V/N)         Y           High threat weed? (V/N)         N           B03, Gamochaeta calviceps, 0.2         D           Plot         B03           Link to species         Gamochaeta calviceps, Cudweed           Family         Asteraceae           Scientific name         Gamochaeta calviceps           Corwer (%)         0.2           Cover (%)         0.2           Cover (%)         0.2           Cover, No         0.2           Abundance         500           Individual         1           Exotic (Y/N)         N           B03, Soliva sessilis, 0.1         N           B04         Soliva sessilis, Bindyi           Cover, No         0.1           Abundance         500           Cover (%)         0.1     <		B03
Family         Asteraceae           Scientific name         Conyza spp.           Cover (%)         0.1           Cover_No         0.1           Abundance         200           Individual         1           Exotic (Y/N)         Y           High threat weed? (Y/N)         N           B03           Link to species         Gamochaeta calviceps, Cudweed           Family         Asteraceae           Scientific name         Gamochaeta calviceps           Common name         Cudweed           Cover (%)         0.2           Cover, No         0.2           Abundance         500           Individual         1           Exotic (Y/N)         Y           High threat weed? (Y/N)         N           B03, Soliva sessilis, 0.1         N           B03, Soliva sessilis, 0.1         B03           Earnily         Asteraceae           Cientific name         Soliva sessilis, Bindyi           Cover, No         0.1           Abundance         Soliva sessilis           Cover (%)         0.1           Cover (%)         0.1           Cover (%)         0.1      <	k to species	Conyza spp.
Cover (%)         0.1           Cover_No         0.1           Abundance         200           Individual         1           Exotic (Y/N)         Y           High threat weed? (Y/N)         N           B03, Gamochaeta calviceps, 0.2           Plot         B03           Link to species         Gamochaeta calviceps, Cudweed           Family         Asteraceae           Scientific name         Gamochaeta calviceps           Common name         Cudweed           Cover (%)         0.2           Cover,No         0.2           Abundance         500           Individual         1           Exotic (Y/N)         Y           High threat weed? (Y/N)         N           B03, Soliva sessilis, 0.1         N           B03, Soliva sessilis, 0.1         N           B03, Soliva sessilis, 0.1         Soliva sessilis, Bindyi           Family         Asteraceae           Scientific name         Soliva sessilis, Bindyi           Scientific name         Soliva sessilis           Cover (%)         0.1           Cover (%)         0.1           Cover (%)         0.1           Cover (%		
Cover (%)         0.1           Cover_No         0.1           Abundance         200           Individual         1           Exotic (Y/N)         Y           High threat weed? (Y/N)         N           B03, Gamochaeta calviceps, 0.2           Plot         B03           Link to species         Gamochaeta calviceps, Cudweed           Family         Asteraceae           Scientific name         Gamochaeta calviceps           Common name         Cudweed           Cover (%)         0.2           Cover (%)         0.2           Abundance         500           Individual         1           Exotic (Y/N)         Y           High threat weed? (Y/N)         N           B03, Soliva sessilis, 0.1         N           B03, Soliva sessilis, 0.1         N           Flot         B03           Link to species         Soliva sessilis, Bindyi           Scientific name         Soliva sessilis           Scientific name         Soliva sessilis           Cover (%)         0.1           Cover (%)         0.1           Cover (%)         0.1           Cover (%)         0.1 <td>entific name</td> <td>Conyza spp.</td>	entific name	Conyza spp.
Abundance 200 Individual 1 Exotic (Y/N) Y High threat weed? (Y/N) N  BO3, Gamochaeta calviceps, 0.2 Plot B03 Einki to species Gamochaeta calviceps, Cudweed Family Asteraceae Common name Cudweed Cover (%) 0.2 Cover_No 0.2 Abundance 500 Individual 1 Exotic (Y/N) Y High threat weed? (Y/N) N  BO3, Soliva sessilis, 0.1 Plot B03 Einki to species Soliva sessilis Bindyi Family Asteraceae Scliva fraceae Soliva sessilis O.1 Plot B03 Einki to species Soliva sessilis Bindyi Family Asteraceae Scliva fraceae Soliva sessilis O.1 Einki to species Soliva sessilis Bindyi Family Asteraceae Scliva fraceae Soliva sessilis D.1 Einki to species Soliva sessilis Bindyi Family Asteraceae Soliva sessilis D.1 Einki to species Soliva sessilis Bindyi Family Asteraceae Soliva sessilis D.1 Evoter (%) 0.1 Cover_No 0.1 Abundance 500 Individual 1 Exotic (Y/N) Y High threat weed? (Y/N) N  BO3, Plantago debilis, FG, 5 Plot B03 Link to species Plantago debilis, FG, 5	ver (%)	
Individual 1 Exotic (Y/N) Y High threat weed? (Y/N) N  B03, Gamochaeta calviceps, 0.2 Plot B03 Link to species Gamochaeta calviceps, Cudweed Family Asteraceae Scientific name Gamochaeta calviceps Cover (%) 0.2 Cover (%) 0.2 Abundance 500 Individual 1 Exotic (Y/N) Y High threat weed? (Y/N) N  B03, Soliva sessilis, 0.1 Plot B03 Link to species Soliva sessilis, Bindyi Family Asteraceae Scientific name Soliva sessilis Common name Soliva sessilis Cover (%) 0.1 Cover (%) 0.1 Exotic (Y/N) N  B03, Soliva sessilis (D.1) Plot B03 Link to species Soliva sessilis Common name Soliva sessilis Common name Soliva sessilis Common name Soliva sessilis Common name Soliva sessilis Cover (%) 0.1 Exotic (Y/N) 0.1 Exotic (X/N) 0.1 Ex	ver_No	0.1
Exotic (Y/N) Y High threat weed? (Y/N) N  BO3, Gamochaeta calviceps, 0.2  Plot B03 Link to species Gamochaeta calviceps, Cudweed Family Asteraceae Scientific name Gamochaeta calviceps Common name Cudweed Cover (%) 0.2 Cover, No 0.2 Abundance 500 Individual 1 Exotic (Y/N) Y High threat weed? (Y/N) N   BO3, Soliva sessilis, 0.1  Plot B03 Link to species Soliva sessilis, Bindyi Family Asteraceae Scientific name Soliva sessilis Common name Bindyi Cover (%) 0.1 Bo3, Plantago debilis, FG, 5 Plot B03 Plantago debilis, FG, 5 Plot B03 Plantago debilis, Shade Plantain	undance	200
High threat weed? (Y/N)  B03, Gamochaeta calviceps, 0.2  Plot B03  Link to species Gamochaeta calviceps, Cudweed  Family Asteraceae  Common name Cudweed  Cover (%)  Cover_No  Abundance  Individual  Exotic (Y/N)  Plot  B03  Link to species  Soliva sessilis, 0.1  Plot  B03  Link to species  Soliva sessilis, Bindyi  Asteraceae  Common ame  Soliva sessilis  Common ame  Bindyi  Cover (%)  Cover (%)  Cover (%)  Asteraceae  Coudweed  Cover (%)  Cover (%)	lividual	1
Plot B03 Link to species Gamochaeta calviceps, 0.2 Plot B03 Link to species Gamochaeta calviceps, Cudweed Family Asteraceae Common name Cudweed Cover (%) 0.2 Cover (%) 0.2 Abundance 500 Individual 1 Exotic (Y/N) Y High threat weed? (Y/N) N  B03, Soliva sessilis, 0.1 Plot B03 Link to species Soliva sessilis Common name Soliva sessilis Common name Bindyi Cover (%) 0.1 Cover (%) 0.1 Exotic (Y/N) 0	otic (Y/N)	Υ
Plot B03 Link to species Gamochaeta calviceps, Cudweed Family Asteraceae Scientific name Gamochaeta calviceps Common name Cudweed Cover (%) 0.2 Cover_No 0.2 Abundance 500 Individual 1 Exotic (Y/N) Y High threat weed? (Y/N) N  B03 Link to species Soliva sessilis, 0.1 Plot B03 Link to species Soliva sessilis Common name Soliva sessilis Common name Bindyi Cover_(%) 0.1 Cover_No 0.1 Abundance Soliva sessilis Common name Bindyi Cover_(%) 0.1 Cover_No 0.1 Abundance Soliva sessilis Common tame Soliva sessilis Common tame Bindyi Cover_No 0.1 Cover_No 0.1 Abundance 500 Individual 1 Exotic (Y/N) Y High threat weed? (Y/N) N  B03, Plantago debilis, FG, 5 Plot B03 Plantago debilis, FG, 5 Plot B03 Plantago debilis, Shade Plantain	gh threat weed? (Y/N)	N
Plot B03 Link to species Gamochaeta calviceps, Cudweed Family Asteraceae Scientific name Gamochaeta calviceps Common name Cudweed Cover (%) 0.2 Cover_No 0.2 Abundance 500 Individual 1 Exotic (Y/N) Y High threat weed? (Y/N) N  B03 Link to species Soliva sessilis, 0.1 Plot B03 Link to species Soliva sessilis Common name Soliva sessilis Common name Bindyi Cover_(%) 0.1 Cover_No 0.1 Abundance Soliva sessilis Common name Bindyi Cover_(%) 0.1 Cover_No 0.1 Abundance Soliva sessilis Common tame Soliva sessilis Common tame Bindyi Cover_No 0.1 Cover_No 0.1 Abundance 500 Individual 1 Exotic (Y/N) Y High threat weed? (Y/N) N  B03, Plantago debilis, FG, 5 Plot B03 Plantago debilis, FG, 5 Plot B03 Plantago debilis, Shade Plantain	13 Gamochaeta calvicens 0.2	
Link to species Gamochaeta calviceps, Cudweed  Family Asteraceae  Scientific name Gamochaeta calviceps  Common name Cudweed  Cover (%) 0.2  Cover_No 0.2  Abundance 500  Individual 1  Exotic (Y/N) Y  High threat weed? (Y/N) N  BO3, Soliva sessilis, 0.1  Plot B03  Common name Soliva sessilis Bindyi  Asteraceae  Scientific name Soliva sessilis  Common name Bindyi  Cover (%) 0.1  Cover_No 0.1  Abundance 500  Individual 1  Exotic (Y/N) Asteraceae  Scientific name Soliva sessilis  Common name Bindyi  Cover (%) 0.1  Exotic (Y/N) 0.1  Exotic (Y/N) 0.1  Bo3, Plantago debilis, FG, 5  Plot B03  Plantago debilis, FG, 5  Plot B03  Link to species Plantago debilis, Shade Plantain	·	B03
Family Asteraceae  Scientific name Gamochaeta calviceps  Common name Cudweed  Cover (%) 0.2  Cover_No 0.2  Abundance 500  Individual 1  Exotic (Y/N) Y  High threat weed? (Y/N) N   BO3, Soliva sessilis, 0.1  Plot B03  Common name Soliva sessilis, Bindyi  Family Asteraceae  Scientific name Soliva sessilis  Common name Bindyi  Cover_(%) 0.1  Cover_No 0.1  Abundance 500  Individual 1  Exotic (Y/N) P  BO3, Soliva sessilis Soliva Se		
Scientific name Cudweed Cower (%) 0.2 Cover (%) 0.2 Abundance Individual Exotic (Y/N) High threat weed? (Y/N) N  BO3, Soliva sessilis, 0.1 Plot B03 Link to species Soliva sessilis Common name Bindyi Cover (%) 0.1 Cover (%) 0.1 Exotic (Y/N) N  BO3, Soliva sessilis Soliva		
Common name Cudweed Cover (%) 0.2 Cover_No 0.2 Abundance 500 Individual 1 Exotic (Y/N) High threat weed? (Y/N)  N  BO3, Soliva sessilis, 0.1 Plot B03 Link to species Soliva sessilis, Bindyi  Cover (%) Cover (%) 0.1 Cover_No Abundance Bindyi Cover (%) 0.1 Cover_No Abundance Individual 1 Exotic (Y/N) Y High threat weed? (Y/N) N  BO3 Link to species Soliva sessilis Common name Bindyi Cover (%) 0.1 Cover_No 0.1 Abundance 500 Individual 1 Exotic (Y/N) Y High threat weed? (Y/N) N  BO3, Plantago debilis, FG, 5 Plot B03 Link to species Plantago debilis, Shade Plantain		
Cover_No         0.2           Abundance         500           Individual         1           Exotic (Y/N)         Y           High threat weed? (Y/N)         N           B03, Soliva sessilis, 0.1           Plot         B03           Link to species         Soliva sessilis, Bindyi           Family         Asteraceae           Scientific name         Soliva sessilis           Common name         Bindyi           Cover (%)         0.1           Cover_No         0.1           Abundance         500           Individual         1           Exotic (Y/N)         Y           High threat weed? (Y/N)         N           B03, Plantago debilis, FG, 5         Plot           B03         Plantago debilis, Shade Plantain		
Cover_No         0.2           Abundance         500           Individual         1           Exotic (Y/N)         Y           High threat weed? (Y/N)         N           B03, Soliva sessilis, 0.1         N           Plot         B03           Link to species         Soliva sessilis, Bindyi           Family         Asteraceae           Scientific name         Soliva sessilis           Common name         Bindyi           Cover (%)         0.1           Cover_No         0.1           Abundance         500           Individual         1           Exotic (Y/N)         Y           High threat weed? (Y/N)         N           B03, Plantago debilis, FG, 5           Plot         B03           Link to species         Plantago debilis, Shade Plantain	ver (%)	
Abundance 500 Individual 1 Exotic (Y/N) Y High threat weed? (Y/N) N  B03, Soliva sessilis, 0.1 Plot B03 Link to species Soliva sessilis, Bindyi Family Asteraceae Scientific name Soliva sessilis Common name Bindyi Cover (%) 0.1 Cover_No 0.1 Abundance 500 Individual 1 Exotic (Y/N) Y High threat weed? (Y/N) N  B03, Plantago debilis, FG, 5 Plot B03 Link to species Plantago debilis, Shade Plantain		0.2
Exotic (Y/N) Y High threat weed? (Y/N) N  B03, Soliva sessilis, 0.1  Plot B03 Link to species Soliva sessilis, Bindyi  Family Asteraceae Scientific name Soliva sessilis Common name Bindyi  Cover (%) 0.1  Cover_No 0.1  Abundance 500 Individual 1  Exotic (Y/N) Y High threat weed? (Y/N) N   B03, Plantago debilis, FG, 5  Plot B03  Plantago debilis, Shade Plantain		
High threat weed? (Y/N)  B03, Soliva sessilis, 0.1  Plot  B03  Link to species  Soliva sessilis, Bindyi  Family  Asteraceae  Scientific name  Soliva sessilis  Common name  Bindyi  Cover (%)  0.1  Cover_No  0.1  Abundance  500  Individual  1  Exotic (Y/N)  Y  High threat weed? (Y/N)  N   B03, Plantago debilis, FG, 5  Plot  B03  Link to species  Plantago debilis, Shade Plantain	lividual	1
High threat weed? (Y/N)  B03, Soliva sessilis, 0.1  Plot  B03  Link to species  Soliva sessilis, Bindyi  Family  Asteraceae  Scientific name  Soliva sessilis  Common name  Bindyi  Cover (%)  0.1  Cover_No  0.1  Abundance  500  Individual  1  Exotic (Y/N)  Y  High threat weed? (Y/N)  N   B03, Plantago debilis, FG, 5  Plot  B03  Link to species  Plantago debilis, Shade Plantain	otic (Y/N)	Υ
B03, Soliva sessilis, 0.1  Plot B03  Link to species Soliva sessilis, Bindyi  Family Asteraceae  Scientific name Soliva sessilis  Common name Bindyi  Cover (%) 0.1  Cover_No 0.1  Abundance 500  Individual 1  Exotic (Y/N) Y  High threat weed? (Y/N) N  B03, Plantago debilis, FG, 5  Plot B03  Link to species Plantago debilis, Shade Plantain		N
Plot B03 Link to species Soliva sessilis, Bindyi Family Asteraceae Scientific name Soliva sessilis Common name Bindyi Cover (%) 0.1 Cover_No 0.1 Abundance 500 Individual 1 Exotic (Y/N) Y High threat weed? (Y/N) N  B03, Plantago debilis, FG, 5 Plot B03 Link to species Plantago debilis, Shade Plantain	02 Colive cossilis 0.1	
Link to species  Soliva sessilis, Bindyi  Family  Asteraceae  Scientific name  Soliva sessilis  Common name  Bindyi  Cover (%)  0.1  Cover_No  0.1  Abundance  500  Individual  1  Exotic (Y/N)  Y  High threat weed? (Y/N)  N  B03, Plantago debilis, FG, 5  Plot  B03  Link to species  Soliva sessilis, Bindyi  Asteraceae  Soliva sessilis  Bindyi  0.1  1  Exotic (W)  N  Bindyi  1  Bindyi  1  Bindyi  1  Bindyi  Bindyi		DU3
Family Asteraceae Scientific name Soliva sessilis  Common name Bindyi  Cover (%) 0.1  Cover_No 0.1  Abundance 500  Individual 1  Exotic (Y/N) Y  High threat weed? (Y/N) N  BO3, Plantago debilis, FG, 5  Plot B03  Link to species Plantago debilis, Shade Plantain		
Scientific name  Common name  Bindyi  Cover (%)  0.1  Cover_No  0.1  Abundance  500  Individual  1  Exotic (Y/N)  High threat weed? (Y/N)  N  B03, Plantago debilis, FG, 5  Plot  B03  Link to species  Soliva sessilis  Onl  Bindyi  0.1  1  1  Exotic (Y/N)  N  Plantago debilis, FG, 5  Plantago debilis, Shade Plantain	·	
Common name  Bindyi  Cover (%)  0.1  Cover_No  0.1  Abundance  500  Individual  1  Exotic (Y/N)  Y  High threat weed? (Y/N)  N  B03, Plantago debilis, FG, 5  Plot  B03  Link to species  Bindyi  0.1  N  Bindyi  Bindyi Bindyi  Bindyi Bindyi  Bindyi Bindyi  Bindyi  Bindyi  Bindyi Bindyi  Bindyi  Bindyi Bindyi Bindyi  Bindyi		
Cover (%)         0.1           Cover_No         0.1           Abundance         500           Individual         1           Exotic (Y/N)         Y           High threat weed? (Y/N)         N           B03, Plantago debilis, FG, 5           Plot         B03           Link to species         Plantago debilis, Shade Plantain		
Cover_No 0.1  Abundance 500  Individual 1  Exotic (Y/N) Y  High threat weed? (Y/N) N  B03, Plantago debilis, FG, 5  Plot B03  Link to species Plantago debilis, Shade Plantain		
Abundance 500 Individual 1 Exotic (Y/N) Y High threat weed? (Y/N) N  B03, Plantago debilis, FG, 5 Plot B03 Link to species Plantago debilis, Shade Plantain		
Individual 1  Exotic (Y/N) Y  High threat weed? (Y/N) N  B03, Plantago debilis, FG, 5  Plot B03  Link to species Plantago debilis, Shade Plantain		
Exotic (Y/N)  High threat weed? (Y/N)  N  B03, Plantago debilis, FG, 5  Plot  B03  Link to species  Plantago debilis, Shade Plantain		
High threat weed? (Y/N)  B03, Plantago debilis, FG, 5  Plot  B03  Link to species  Plantago debilis, Shade Plantain		
B03, Plantago debilis, FG, 5  Plot B03  Link to species Plantago debilis, Shade Plantain		
Plot B03 Link to species Plantago debilis, Shade Plantain		
Link to species Plantago debilis, Shade Plantain		R03
FIGHLAGHIACEAC		
Scientific name Plantago debilis		
Scientific fiame Francago debilis	enune name	Page: 9 of 16

Common name	Shade Plantain
Cover (%)	5
Cover_No	5
Abundance	2000
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
B03, Trifolium campestre, 1	
Plot	B03
Link to species	Trifolium campestre, Hop Clover

Plot	B03
Link to species	Trifolium campestre, Hop Clover
Family	Fabaceae (Faboideae)
Scientific name	Trifolium campestre
Common name	Hop Clover
Cover (%)	1
Cover_No	1
Abundance	200
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

# B03, Wahlenbergia gracilis, FG, 0.1

Plot	B03
Link to species	Wahlenbergia gracilis, Sprawling Bluebell
Family	Campanulaceae
Scientific name	Wahlenbergia gracilis
Common name	Sprawling Bluebell
Cover (%)	0.1
Cover_No	0.1
Abundance	500
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

# B03, Plantago lanceolata, 0.1

Plot	B03
Link to species	Plantago lanceolata, Lamb's Tongues
Family	Plantaginaceae
Scientific name	Plantago lanceolata
Common name	Lamb's Tongues
Cover (%)	0.1
Cover_No	0.1
Abundance	200

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Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B03, Sisyrinchium iridifolium, 0	0.1
Plot	B03
Link to species	Sisyrinchium iridifolium, Blue Pigroot
Family	Iridaceae
Scientific name	Sisyrinchium iridifolium
Common name	Blue Pigroot
Cover (%)	0.1
Cover_No	0.1
Abundance	500
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B03, Euchiton sphaericus, FG, (	
Plot	B03
Link to species	Euchiton sphaericus, Star Cudweed
Family	Asteraceae
Scientific name	Euchiton sphaericus
Common name	Star Cudweed
Cover (%)	0.2
Cover_No	0.2
Abundance	200
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
B03, Hypochaeris albiflora, 0.1	
Plot	B03
Link to species	Hypochaeris albiflora, White Flatweed
Family	Asteraceae
Scientific name	Hypochaeris albiflora
Common name	White Flatweed
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B03, Mitrasacme polymorpha,	FG 0.1

B03

Plot

Link to species	Mitrasacme polymorpha
Family	Loganiaceae
Scientific name	Mitrasacme polymorpha
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

### B03, Cyclospermum leptophyllum, 0.1

B03
Cyclospermum leptophyllum, Slender Celery
Apiaceae
Cyclospermum leptophyllum
Slender Celery
0.1
0.1
200
1
Υ
N

### B03, Trifolium repens, 0.1

Plot	B03
Link to species	Trifolium repens, White Clover
Family	Fabaceae (Faboideae)
Scientific name	Trifolium repens
Common name	White Clover
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

### Disturbance

#### Disturbances

Clearing	High	
Cultivation	Low	
Soil erosion	Low	
Grazing	Moderate	
Weediness	Moderate	

#### **Functional Data**

#### 5 m, 10

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B03	
Tape measure	5 m	
Litter cover	10	
Litter cover	10	

#### 15 m, 10

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B03	
Tape measure	15 m	
Litter cover	10	
Litter cover	10	

#### 25 m, 20

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B03	
Tape measure	25 m	
Litter cover	20	
Litter cover	20	

#### 35 m, 20

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B03
Tape measure	35 m
Litter cover	20
Litter cover	20

#### 45 m, 15

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B03
Tape measure	45 m
Litter cover	15
Litter cover	15

#### 0

Fallen logs present in a vegetation zone that are at least 10 cm in diameter, contacting the ground and at least 0.5 m in length.

Log length (m) 0	
------------------	--

#### Tree stems and hollows

<5cm dbh stems	Present
5-9cm dbh stems	Absent
10-19 cm dbh stems	Absent
20-29 cm dbh stems	Absent
30-49cm dbh stems (number of)	0
50-79cm dbh stems (number of)	0
>80cm dbh stems (number of)	0
Number of hollow bearing trees	0

A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. solid wood cannot be seen beyond the entrance); and (d) the hollow is at least 1 m above the ground.

#### **BAM** autocalc fields

BAM	im	port
D,		ρυ. υ

BAIN IMPORT	
Plot	B03
PCT	3433
Area	0
Patch size	0
Condition class	Grazed
Zone	56
Easting	357853
Northing	6385049
Bearing	215
Tree species richness	3
Shrub species richness	1
Grass species richness	7
Forb species richness	5
Fern species richness	0
Other species richness	0
Tree cover	0.3
Shrub cover	0.5
Grass cover	46.1
Forb cover	5.5
Number of hollow trees	0
Fern cover	0.0
Other species cover	0.0
Number of large trees	0
Leaf litter cover	15.0
Stems 5 to 9	0
Stems 10 to 19	0
Stems 20 to 29	0

Stems 30 to 49	0
Stems 50 to 79	0
Regeneration	1
High threat exotic cover	2.2
Tree list	Eucalyptus fibrosa, Eucalyptus tereticornis, Corymbia maculata
Shrub list	Lissanthe strigosa
Grass list	Themeda triandra, Dichelachne micrantha, Microlaena stipoides, Cynodon dactylon, Sporobolus creber, Lachnagrostis filiformis, Juncus usitatus
Forb list	Murdannia graminea, Plantago debilis, Wahlenbergia gracilis, Euchiton sphaericus, Mitrasacme polymorpha
Exotic list	Briza minor, Juncus cognatus, Paspalum dilatatum, Lolium perenne, Senecio madagascariensis, Centaurium tenuiflorum, Hypochaeris radicata, Conyza spp., Gamochaeta calviceps, Soliva sessilis, Trifolium campestre, Plantago lanceolata, Sisyrinchium iridifolium, Hypochaeris albiflora, Cyclospermum leptophyllum, Trifolium repens

### B04, 3433

Created	2024-11-14 14:57:46 AEDT by Matt Doherty
Updated	2024-11-21 16:26:43 AEDT by Matt Doherty
Location	-32.6643216824, 151.48201
Status	Complete

### Project info

Latitude	-32.66432168242308
Longitude	151.48201
Easting, Northing	56 S 357654 6384908
Date	2024-11-14
Time	14:57
Job	24081 - Lend Lease, Anambah
Assessor	Chris Spraggon
Survey Type	BAM Plot

### **BAM Plot**

Plot identifier	B04
Plot dimension (L x W)	20 x 50
Midline bearing	180
Site information notes	Themeda plume grass, less regeneration, use Avenza photos

# Photographs

Transect start (landscape)





#### Landform and soil

Slope (0° — 90°)	7
Aspect	North-east
Morphology type and landform element	Lower slope
Landform pattern	Low hill
Geology	Clay
Soil colour (wet)	Brown

### Vegetation structure and condition

Vegetation structure	Tussock grasses, Tussock grassland ( Cover 30-69%)
Vegetation condition (qualitative)	Low (15-30% benchmark, heavy disturbance, derived grasslands or shrublands)
Condition class	Grazed
Vegetation structure notes	Fully cleared land

### PCT and large tree threshold

Select either PCT or vegetation formation to show large tree threshold and autopopulate PCT and formation fields. PCT and formation fields can also be free text.

3433, Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Dry Sclerophyll Forests (Shrub/grass sub-formation)
3433
Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
50
Has associated TEC

### Survey data

B04, Corymbia maculata, TG	5, 0.1
Plot	B04
Link to species	Corymbia maculata, Spotted Gum
Family	Myrtaceae
Scientific name	Corymbia maculata
Common name	Spotted Gum
Cover (%)	0.1
Cover_No	0.1
Abundance	6
Individual	1
Exotic (Y/N)	N
Growth form group	TG
High threat weed? (Y/N)	N

### B04, Eucalyptus fibrosa, TG, 0.1

Plot	B04
Link to species	Eucalyptus fibrosa, Red Ironbark
Family	Myrtaceae
Scientific name	Eucalyptus fibrosa
Common name	Red Ironbark
Cover (%)	0.1
Cover_No	0.1
Abundance	1
Individual	1
Exotic (Y/N)	N
Growth form group	TG
High threat weed? (Y/N)	N

### B04, Cynodon dactylon, GG, 50

- · · · · · · · · · · · · · · · · · · ·	
Plot	B04
Link to species	Cynodon dactylon, Common Couch
Family	Poaceae
Scientific name	Cynodon dactylon
Common name	Common Couch
Cover (%)	50
Cover_No	50
Abundance	1000
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

### B04, Paspalum dilatatum, 0.5

Plot	B04
Link to species	Paspalum dilatatum, Paspalum
Family	Poaceae
Scientific name	Paspalum dilatatum
Common name	Paspalum
Cover (%)	0.5
Cover_No	0.5
Abundance	200
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	HTE

### B04, Themeda triandra, GG, 0.2

Plot	B04
Link to species	Themeda triandra
Family	Poaceae
Scientific name	Themeda triandra
Cover (%)	0.2
Cover_No	0.2
Abundance	1000
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

### B04, Dichelachne micrantha, GG, 2

Plot	B04
Link to species	Dichelachne micrantha, Shorthair Plumegrass
Family	Poaceae
Scientific name	Dichelachne micrantha
Common name	Shorthair Plumegrass
Cover (%)	2
Cover_No	2
Abundance	1000
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

## B04, Sporobolus creber, GG, 0.1

Plot	B04
Link to species	Sporobolus creber, Slender Rat's Tail Grass
Family	Poaceae

Scientific name	Sporobolus creber
Common name	Slender Rat's Tail Grass
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N
B04, Briza subaristata, 0.1	
Plot	B04
Link to species	Briza subaristata, Chilean Quaking Grass
Family	Poaceae
Scientific name	Briza subaristata
Common name	Chilean Quaking Grass
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	НТЕ
B04, Axonopus fissifolius, 0.2	
Plot	B04
Link to species	Axonopus fissifolius, Narrow-leafed Carpet Grass
Family	Poaceae
Scientific name	Axonopus fissifolius
Common name	Narrow-leafed Carpet Grass
Cover (%)	0.2
Cover_No	0.2
Abundance	200
Individual	1
Exotic (Y/N)	Y
High threat weed? (Y/N)	Y
High threat weed type	НТЕ
B04, Centaurium tenuiflorum, 0.2	
Plot	B04
Link to species	Centaurium tenuiflorum, Branched Centaury, Slender centaury
Family	Gentianaceae
Scientific name	Centaurium tenuiflorum
Common name	Branched Centaury, Slender centaury
Cover (%)	0.2

Cover_No	0.2
Abundance	500
Individual	1
Exotic (Y/N)	· Y
High threat weed? (Y/N)	N
g circuit messa (y	<u>·</u>
B04, Euchiton sphaericus, FG, 0.3	
Plot	B04
Link to species	Euchiton sphaericus, Star Cudweed
Family	Asteraceae
Scientific name	Euchiton sphaericus
Common name	Star Cudweed
Cover (%)	0.3
Cover_No	0.3
Abundance	500
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
B04, Senecio madagascariensis, 0.5	
Plot	B04
Link to species	Senecio madagascarensis, Fireweed
Family	Asteraceae
Scientific name	Senecio madagascariensis
Common name	Fireweed
Cover (%)	0.5
Cover_No	0.5
Abundance	200
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	НТЕ
B04, Trifolium campestre, 0.2	
Plot	B04
Link to species	Trifolium campestre, Hop Clover
Family	Fabaceae (Faboideae)
Scientific name	Trifolium campestre
Common name	Hop Clover
Cover (%)	0.2
Cover_No	0.2
Abundance	100
Individual	1
Exotic (Y/N)	Υ

Plot	B04
Link to species	Romulea rosea, Onion Grass
Family	Iridaceae
Scientific name	Romulea rosea
Common name	Onion Grass
Cover (%)	0.3
Cover_No	0.3
Abundance	2000
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	HTE

## B04, Gamochaeta calviceps, 0.5

Plot	B04
Link to species	Gamochaeta calviceps, Cudweed
Family	Asteraceae
Scientific name	Gamochaeta calviceps
Common name	Cudweed
Cover (%)	0.5
Cover_No	0.5
Abundance	500
Individual	1
Exotic (Y/N)	Y
High threat weed? (Y/N)	N

### B04, Hypochaeris radicata, 0.1

Plot	B04
Link to species	Hypochaeris radicata, Catsear
Family	Asteraceae
Scientific name	Hypochaeris radicata
Common name	Catsear
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

## B04, Conyza spp., 0.1

Plot	B04
Link to species	Conyza spp.
Family	Asteraceae

Scientific name	Conyza spp.	
Cover (%)	0.1	
Cover_No	0.1	
Abundance	100	
Individual	1	
Exotic (Y/N)	Υ	
High threat weed? (Y/N)	N	

# B04, Plantago lanceolata, 0.1

Plot	B04
Link to species	Plantago lanceolata, Lamb's Tongues
Family	Plantaginaceae
Scientific name	Plantago lanceolata
Common name	Lamb's Tongues
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

## B04, Wahlenbergia stricta, FG, 0.1

Plot	B04
Link to species	Wahlenbergia stricta, Tall Bluebell
Family	Campanulaceae
Scientific name	Wahlenbergia stricta
Common name	Tall Bluebell
Cover (%)	0.1
Cover_No	0.1
Abundance	500
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

## B04, Cyclospermum leptophyllum, 0.3

, -, -,	
Plot	B04
Link to species	Cyclospermum leptophyllum, Slender Celery
Family	Apiaceae
Scientific name	Cyclospermum leptophyllum
Common name	Slender Celery
Cover (%)	0.3
Cover_No	0.3
Abundance	200
Individual	1

Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B04, Lolium perenne, 0.1	
Plot	B04
Link to species	Lolium perenne, Perennial Ryegrass
Family	Poaceae
Scientific name	Lolium perenne
Common name	Perennial Ryegrass
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B04, Verbena bonariensis, 0.1	
Plot	B04
Link to species	Verbena bonariensis, Purpletop
Family	Verbenaceae
Scientific name	Verbena bonariensis
Common name	Purpletop
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B04, Briza minor, 0.1	
Plot	B04
Link to species	Briza minor, Shivery Grass
Family	Poaceae
Scientific name	Briza minor
Common name	Shivery Grass
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B04, Wahlenbergia gracilis, FG, 0.1	
Plot	B04
Link to species	Wahlenbergia gracilis, Sprawling Bluebell
Family	Campanulaceae
	Page: 9

Scientific name	Wahlenbergia gracilis
Common name	Sprawling Bluebell
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
B04, Hypochaeris albiflora, 0.1	
Plot	B04
Link to species	Hypochaeris albiflora, White Flatweed
Family	Asteraceae
Scientific name	Hypochaeris albiflora
Common name	White Flatweed
Cover (%)	0.1
Cover_No	0.1
Abundance	100
 Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B04, Sporobolus africanus, 0.1	
Plot	B04
Link to species	Sporobolus africanus, Parramatta Grass
Family	Poaceae
Scientific name	Sporobolus africanus
Common name	Parramatta Grass
Cover (%)	0.1
Cover_No	0.1
Abundance	50
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B04, Plantago debilis, FG, 0.1	
Plot	B04
Link to species	Plantago debilis, Shade Plantain
Family	Plantaginaceae
Scientific name	Plantago debilis
Common name	Shade Plantain
Cover (%)	0.1
Cover_No	0.1

50

Abundance

Individual	1	
Exotic (Y/N)	N	
Growth form group	FG	
High threat weed? (Y/N)	N	

# B04, Lachnagrostis filiformis, GG, 0.1

Plot	B04
Link to species	Lachnagrostis filiformis
Family	Poaceae
Scientific name	Lachnagrostis filiformis
Cover (%)	0.1
Cover_No	0.1
Abundance	50
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

# B04, Bothriochloa macra, GG, 0.1

Plot	B04
Link to species	Bothriochloa macra, Red Grass
Family	Poaceae
Scientific name	Bothriochloa macra
Common name	Red Grass
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

## B04, Chloris truncata, GG, 0.1

Plot	B04
Link to species	Chloris truncata, Windmill Grass
Family	Poaceae
Scientific name	Chloris truncata
Common name	Windmill Grass
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

### B04, Poa labillardierei var. labillardierei, GG, 0.2

Plot	B04
Link to species	Poa labillardierei var. labillardierei, Tussock
Family	Poaceae
Scientific name	Poa labillardierei var. labillardierei
Common name	Tussock
Cover (%)	0.2
Cover_No	0.2
Abundance	50
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

### B04, Glycine clandestina, OG, 0.1

Plot	B04
Link to species	Glycine clandestina, Twining glycine
Family	Fabaceae (Faboideae)
Scientific name	Glycine clandestina
Common name	Twining glycine
Cover (%)	0.1
Cover_No	0.1
Abundance	50
Individual	1
Exotic (Y/N)	N
Growth form group	OG
High threat weed? (Y/N)	N

#### Disturbance

#### Disturbances

Clearing	High	
Cultivation	Low	
Soil erosion	Low	
Grazing	Moderate	
Weediness	Low	

#### **Functional Data**

#### 5 m, 45

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1  $m^2$  plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B04
Tape measure	5 m
Litter cover	45
Litter cover	45

#### 15 m, 15

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B04
Tape measure	15 m
Litter cover	15
Litter cover	15

#### 25 m, 10

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B04	
Tape measure	25 m	
Litter cover	10	
Litter cover	10	

#### 35 m, 10

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B04
Tape measure	35 m
Litter cover	10
Litter cover	10

#### 45 m, 10

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B04	
Tape measure	45 m	
Litter cover	10	
Litter cover	10	

#### 0

Plot B04

Fallen logs present in a vegetation zone that are at least 10 cm in diameter, contacting the ground and at least 0.5 m in length.

Log length (m) 0

#### Tree stems and hollows

<5cm dbh stems	Present
5-9cm dbh stems	Absent
10-19 cm dbh stems	Absent
20-29 cm dbh stems	Absent
30-49cm dbh stems (number of)	0
50-79cm dbh stems (number of)	0

>80cm dbh stems (number of)	0
Number of hollow bearing trees	0

A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. solid wood cannot be seen beyond the entrance); and (d) the hollow is at least 1 m above the ground.

#### **BAM** autocalc fields

BAM import	
Plot	B04
PCT	3433
Area	0
Patch size	0
Condition class	Grazed
Zone	56
Easting	357654
Northing	6384908
Bearing	180
Tree species richness	2
Shrub species richness	0
Grass species richness	8
Forb species richness	4
Fern species richness	0
Other species richness	1
Tree cover	0.2
Shrub cover	0.0
Grass cover	52.8
Forb cover	0.6
Number of hollow trees	0
Fern cover	0.0
Other species cover	0.1
Number of large trees	0
Leaf litter cover	18.0
Stems 5 to 9	0
Stems 10 to 19	0
Stems 20 to 29	0
Stems 30 to 49	0
Stems 50 to 79	0
Regeneration	1
High threat exotic cover	1.6
Tree list	Corymbia maculata, Eucalyptus fibrosa
Grass list	Cynodon dactylon, Themeda triandra, Dichelachne micrantha, Sporobolus creber, Lachnagrostis filiformis, Bothriochloa macra, Chloris truncata, Poa labillardierei var. labillardierei
Forb list	Euchiton sphaericus, Wahlenbergia stricta, Wahlenbergia gracilis, Plantago debilis
Other list	Glycine clandestina

## B05, 3446

Created	2024-11-14 17:00:16 AEDT by Matt Doherty
Updated	2024-11-21 16:28:08 AEDT by Matt Doherty
Location	-32.6702849824, 151.4765164
Status	Complete

## Project info

Latitude	-32.67028498242142
Longitude	151.47651639999998
Easting, Northing	56 S 357148 6384239
Date	2024-11-14
Time	17:00
Job	24081 - Lend Lease, Anambah
Assessor	Chris Spraggon
Survey Type	BAM Plot

## **BAM Plot**

Plot identifier	B05
Plot dimension (L x W)	20 x 50
Midline bearing	65
Site information notes	Very weedy, Avenza photos

# Photographs

Transect start (landscape)





### Landform and soil

Slope (0° — 90°)	3
Aspect	East
Morphology type and landform element	Crest
Landform pattern	Low hill
Geology	Clay
Soil colour (wet)	Brown

## Vegetation structure and condition

Vegetation structure	Herbs, Open herbland ( Cover 10-29%)
Vegetation condition (qualitative)	Very low (<15 % benchmark, heavy disturbance, derived grasslands or shrublands)
Condition class	Ploughed
Vegetation structure notes	Exotic shrub forb

### PCT and large tree threshold

Select either PCT or vegetation formation to show large tree threshold and autopopulate PCT and formation fields. PCT and formation fields can also be free text.

3446, Lower North Foothills Ironbark-Box-Gum Grassy Forest
Dry Sclerophyll Forests (Shrub/grass sub-formation)
3446
Lower North Foothills Ironbark-Box-Gum Grassy Forest
50
Has associated TEC

TEC	desc	crip	tion

Listed BC Act,E: Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions (Part); Listed EPBC Act,CE: Central Hunter Valley eucalypt forest and woodland (Part);

### Survey data

B05, Verbena bonariensis, 0.2		
Plot	B05	
Link to species	Verbena bonariensis, Purpletop	
Family	Verbenaceae	
Scientific name	Verbena bonariensis	
Common name	Purpletop	
Cover (%)	0.2	
Cover_No	0.2	
Abundance	200	
Individual	1	
Exotic (Y/N)	Y	
High threat weed? (Y/N)	N	

### B05, Cirsium vulgare, 10

Plot	B05
Link to species	Cirsium vulgare, Spear Thistle
Family	Asteraceae
Scientific name	Cirsium vulgare
Common name	Spear Thistle
Cover (%)	10
Cover_No	10
Abundance	1000
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

### B05, Cynodon dactylon, GG, 35

Plot	B05
Link to species	Cynodon dactylon, Common Couch
Family	Poaceae
Scientific name	Cynodon dactylon
Common name	Common Couch
Cover (%)	35
Cover_No	35
Abundance	2000
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

### B05, Senecio madagascariensis, 1

Plot	B05
Link to species	Senecio madagascarensis, Fireweed
Family	Asteraceae
Scientific name	Senecio madagascariensis
Common name	Fireweed
Cover (%)	1
Cover_No	1
Abundance	500
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	НТЕ
B05, Gomphocarpus fruticosus, 1	
Plot	B05
Link to species	Gomphocarpus fruticosus, Narrow-leaved Cotton Bush
Family	Apocynaceae
Scientific name	Gomphocarpus fruticosus
Common name	Narrow-leaved Cotton Bush
Cover (%)	1
Cover_No	1
Abundance	200
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B05, Paspalum dilatatum, 1	
Plot	B05
Link to species	Paspalum dilatatum, Paspalum
Family	Poaceae
Scientific name	Paspalum dilatatum
Common name	Paspalum
Cover (%)	1
Cover_No	1
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	НТЕ
B05, Desmodium gunnii, FG, 0.1	
Plot	B05
Link to species	Desmodium gunnii, Slender Tick-trefoil
Family	Fabaceae (Faboideae)
Scientific name	Desmodium gunnii
	0 <del></del>

Common name	Slender Tick-trefoil
Cover (%)	0.1
Cover_No	0.1
Abundance	30
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
B05, Geranium solanderi, FG, 0.1	
Plot	B05
Link to species	Geranium solanderi, Native Geranium
Family	Geraniaceae
Scientific name	Geranium solanderi
Common name	Native Geranium
Cover (%)	0.1
Cover_No	0.1
Abundance	30
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
B05, Cyclospermum leptophyllum, 0.1	
Plot	B05
Link to species	Cyclospermum leptophyllum, Slender Celery
Family	Apiaceae

Plot	B05
Link to species	Cyclospermum leptophyllum, Slender Celery
Family	Apiaceae
Scientific name	Cyclospermum leptophyllum
Common name	Slender Celery
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

# B05, Plantago lanceolata, 0.1

Plot	B05
Link to species	Plantago lanceolata, Lamb's Tongues
Family	Plantaginaceae
Scientific name	Plantago lanceolata
Common name	Lamb's Tongues
Cover (%)	0.1
Cover_No	0.1
Abundance	100

Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

## B05, Austrostipa ramosissima, GG, 0.1

Plot	B05
Link to species	Austrostipa ramosissima, Stout Bamboo Grass
Family	Poaceae
Scientific name	Austrostipa ramosissima
Common name	Stout Bamboo Grass
Cover (%)	0.1
Cover_No	0.1
Abundance	30
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

## B05, Themeda triandra, GG, 0.1

Plot	B05
Link to species	Themeda triandra
Family	Poaceae
Scientific name	Themeda triandra
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

## B05, Ehrharta erecta, 0.2

Plot	B05
Link to species	Ehrharta erecta, Panic Veldt Grass
Family	Poaceae
Scientific name	Ehrharta erecta
Common name	Panic Veldt Grass
Cover (%)	0.2
Cover_No	0.2
Abundance	200
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	HTE

### B05, Romulea rosea, 0.1

High threat weed? (Y/N)	N	
Exotic (Y/N)	Υ	
Individual	1	
Abundance	100	
Cover_No	0.1	
Cover (%)	0.1	

# B05, Trifolium campestre, 0.1

Plot	B05
Link to species	Trifolium campestre, Hop Clover
Family	Fabaceae (Faboideae)
Scientific name	Trifolium campestre
Common name	Hop Clover
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

## B05, Oxalis perennans, FG, 0.1

Plot	B05
Link to species	Oxalis perennans
Family	Oxalidaceae
Scientific name	Oxalis perennans
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

# B05, Convolvulus angustissimus, OG, 0.1

Plot	B05
Link to species	Convolvulus angustissimus
Family	Convolvulaceae
Scientific name	Convolvulus angustissimus
Cover (%)	0.1
Cover_No	0.1
Abundance	20
Individual	1
Exotic (Y/N)	N
Growth form group	OG
High threat weed? (Y/N)	N

#### Disturbance

#### Disturbances

Clearing	High
Cultivation	Moderate
Soil erosion	Low
Grazing	Moderate
Weediness	High

#### **Functional Data**

#### 45 m, 25

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B05	
Tape measure	45 m	
Litter cover	25	
Litter cover	25	

#### 35 m, 80

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B05	
Tape measure	35 m	
Litter cover	80	
Litter cover	80	

#### 25 m, 50

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B05
Tape measure	25 m
Litter cover	50
Litter cover	50

#### 15 m, 40

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B05
Tape measure	15 m
Litter cover	40
Litter cover	40

#### 5 m, 20

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B05
Tape measure	5 m
Litter cover	20
Litter cover	20

#### 0

Plot B05

0

Fallen logs present in a vegetation zone that are at least 10 cm in diameter, contacting the ground and at least 0.5 m in length.

Log length (m)

#### Tree stems and hollows

<5cm dbh stems	Absent
5-9cm dbh stems	Absent
10-19 cm dbh stems	Absent
20-29 cm dbh stems	Absent
30-49cm dbh stems (number of)	0
50-79cm dbh stems (number of)	0
>80cm dbh stems (number of)	0
Number of hollow bearing trees	0

A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. solid wood cannot be seen beyond the entrance); and (d) the hollow is at least 1 m above the ground.

#### BAM autocalc fields

#### **BAM** import

Plot	B05
PCT	3446
Area	0
Patch size	0
Condition class	Ploughed
Zone	56
Easting	357148
Northing	6384239
Bearing	65
Tree species richness	0
Shrub species richness	0
Grass species richness	3
Forb species richness	4
Fern species richness	0
Other species richness	1
Tree cover	0.0
Shrub cover	0.0
Grass cover	35.2

Forb cover	0.4
Number of hollow trees	0
Fern cover	0.0
Other species cover	0.1
Number of large trees	0
Leaf litter cover	43.0
Stems 5 to 9	0
Stems 10 to 19	0
Stems 20 to 29	0
Stems 30 to 49	0
Stems 50 to 79	0
Regeneration	0
High threat exotic cover	2.3
Grass list	Cynodon dactylon, Austrostipa ramosissima, Themeda triandra
Forb list	Desmodium gunnii, Geranium solanderi, Veronica plebeia, Oxalis perennans
Other list	Convolvulus angustissimus
Exotic list	Verbena bonariensis, Cirsium vulgare, Senecio madagascariensis, Gomphocarpus fruticosus, Paspalum dilatatum, Cyclospermum leptophyllum, Plantago lanceolata, Ehrharta erecta, Romulea rosea, Cyperus brevifolius, Sida rhombifolia, Trifolium campestre

## B06, 3446

Created	2024-11-19 13:04:55 AEDT by Matt Doherty
Updated	2024-11-21 16:26:11 AEDT by Matt Doherty
Location	-32.665516, 151.488719
Status	Complete

### Project info

- 3	
Latitude	-32.665516
Longitude	151.488719
Easting, Northing	56 S 358285 6384784
Date	2023-12-06
Time	16:50
Job	24081 - Lend Lease, Anambah
Assessor	Chris Spraggon
Survey Type	BAM Plot

### **BAM Plot**

Plot identifier	B06
Plot dimension (L x W)	20 x 50
Midline bearing	310

## Photographs

Transect start (landscape)





## Vegetation structure and condition

Vegetation structure	Tussock grasses, Open tussock grassland ( Cover 10-29%)
Vegetation condition (qualitative)	Low (15-30% benchmark, heavy disturbance, derived grasslands or shrublands)
Condition class	Grazed

### PCT and large tree threshold

Select either PCT or vegetation formation to show large tree threshold and autopopulate PCT and formation fields. PCT and formation fields can also be free text.

Select PCT	3446, Lower North Foothills Ironbark-Box-Gum Grassy Forest
Vegetation formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
PCT	3446
PCT description	Lower North Foothills Ironbark-Box-Gum Grassy Forest
Large tree threshold size	50
TEC	Has associated TEC
TEC description	Listed BC Act,E: Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions (Part); Listed EPBC Act,CE: Central Hunter Valley eucalypt forest and woodland (Part);

### Survey data

## B06, Senecio madagascariensis, 0.1

Plot	B06
Link to species	Senecio madagascarensis, Fireweed
Family	Asteraceae
Scientific name	Senecio madagascariensis
Common name	Fireweed
Cover (%)	0.1
Cover_No	0.1
Abundance	20
Individual	1
	Dags 2 of 11

Exotic (Y/N)	Υ	
High threat weed? (Y/N)	Υ	
High threat weed type	НТЕ	
B06, Axonopus fissifolius, 30		
Plot	B06	
Link to species	Axonopus fissifolius, Narrow-leafed Carpet Grass	
Family	Poaceae	
Scientific name	Axonopus fissifolius	
Common name	Narrow-leafed Carpet Grass	
Cover (%)	30	
Cover_No	30	
Abundance	1000	
Individual	1	
Exotic (Y/N)	Υ	
High threat weed? (Y/N)	Υ	
High threat weed type	HTE	
B06, Sporobolus creber, GG, 10		
Plot	B06	
Link to species	Sporobolus creber, Slender Rat's Tail Grass	
Family	Poaceae	
Scientific name	Sporobolus creber	
Common name	Slender Rat's Tail Grass	
Cover (%)	10	
Cover_No	10	
Abundance	1000	
Individual	1	
Exotic (Y/N)	N	
Growth form group	GG	
High threat weed? (Y/N)	N	
B06, Austrostipa ramosissima, G		
Plot	B06	
Link to species	Austrostipa ramosissima, Stout Bamboo Grass	
Family	Poaceae	
Scientific name	Austrostipa ramosissima	
Common name	Stout Bamboo Grass	
Cover (%)	5	
Cover_No	5	
Abundance	500	
Individual	1	
Exotic (Y/N)	N	
Growth form group	GG	
11: 1 -1	A I	

Ν

High threat weed? (Y/N)

B06, Plantago lanceolata, 0.1

Plot	B06
Link to species	Plantago lanceolata, Lamb's Tongues
Family	Plantaginaceae
Scientific name	Plantago lanceolata
Common name	Lamb's Tongues
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

### B06, Desmodium varians, OG, 0.1

Plot	B06
Link to species	Desmodium varians, Slender Tick-trefoil
Family	Fabaceae (Faboideae)
Scientific name	Desmodium varians
Common name	Slender Tick-trefoil
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	N
Growth form group	OG
High threat weed? (Y/N)	N

### B06, Vernonia cinerea, FG, 0.1

Plot	B06
Link to species	Vernonia cinerea
Family	Asteraceae
Scientific name	Vernonia cinerea
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

## B06, Microlaena stipoides var. stipoides, GG, 0.1

Plot	B06
Link to species	Microlaena stipoides var. stipoides, Weeping Grass
Family	Poaceae
Scientific name	Microlaena stipoides var. stipoides

Common name	Weeping Grass
Cover (%)	0.1
Cover_No	0.1
Abundance	20
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N
B06, Poa labillardierei var. la	billardierei, GG, 0.1
Plot	B06
Link to species	Poa labillardierei var. labillardierei, Tussock
Family	Poaceae
Scientific name	Poa labillardierei var. labillardierei
Common name	Tussock
Cover (%)	0.1
Cover_No	0.1
Abundance	50
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N
B06, Paspalum dilatatum, 0.	
Plot	B06
Link to species	Paspalum dilatatum, Paspalum
Family	Poaceae
Scientific name	Paspalum dilatatum
Common name	Paspalum
Cover (%)	0.1
Cover_No	0.1
Abundance	20
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	HTE

## B06, Bothriochloa macra, GG, 0.1

Plot	B06
Link to species	Bothriochloa macra, Red Grass
Family	Poaceae
Scientific name	Bothriochloa macra
Common name	Red Grass
Cover (%)	0.1
Cover_No	0.1

Abundance	50
Individual	1
Exotic (Y/N)	N N
Growth form group	GG
High threat weed? (Y/N)	N
B06, Verbena rigida var. rigida, 0.1	
Plot	B06
Link to species	Verbena rigida var. rigida, Veined Verbena
Family	Verbenaceae
Scientific name	Verbena rigida var. rigida
Common name	Veined Verbena
Cover (%)	0.1
Cover_No	0.1
Abundance	50
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
POE Sporobolus africanus 0.1	
B06, Sporobolus africanus, 0.1	B06
Link to species	Sporobolus africanus, Parramatta Grass
Family	Poaceae
Scientific name	Sporobolus africanus
Common name	Parramatta Grass
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
riigii tiii eat weed: (1714)	IV
B06, Briza subaristata, 0.1	
Plot	B06
Link to species	Briza subaristata, Chilean Quaking Grass
Family	Poaceae
Scientific name	Briza subaristata
Common name	Chilean Quaking Grass
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	НТЕ

B06, Hypochaeris albiflora, 0.1

Plot	B06
Link to species	Hypochaeris albiflora, White Flatweed
Family	Asteraceae
Scientific name	Hypochaeris albiflora
Common name	White Flatweed
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

### B06, Rytidosperma spp., GG, 0.1

Plot	B06
Link to species	Rytidosperma spp.
Family	Poaceae
Scientific name	Rytidosperma spp.
Cover (%)	0.1
Cover_No	0.1
Abundance	20
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

## B06, Galium gaudichaudii, FG, 0.1

Plot	B06
Link to species	Galium gaudichaudii, Rough Bedstraw
Family	Rubiaceae
Scientific name	Galium gaudichaudii
Common name	Rough Bedstraw
Cover (%)	0.1
Cover_No	0.1
Abundance	1000
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

## B06, Wahlenbergia gracilis, FG, 0.1

Plot	B06
Link to species	Wahlenbergia gracilis, Sprawling Bluebell
Family	Campanulaceae
Scientific name	Wahlenbergia gracilis

Common name	Sprawling Bluebell
Cover (%)	0.1
Cover_No	0.1
Abundance	20
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

#### **Functional Data**

#### 5 m, 80

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B06
Tape measure	5 m
Litter cover	80
Litter cover	80

#### 15 m, 60

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B06
Tape measure	15 m
Litter cover	60
Litter cover	60

#### 25 m, 50

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B06
Tape measure	25 m
Litter cover	50
Litter cover	50

#### 35 m. 45

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B06	
Tape measure	35 m	
Litter cover	45	
Litter cover	45	

#### 45 m, 40

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B06
Tape measure	45 m
Litter cover	40
Litter cover	40

#### 0

Plot B06

Fallen logs present in a vegetation zone that are at least 10 cm in diameter, contacting the ground and at least 0.5 m in length.

Log length (m) 0

#### Tree stems and hollows

<5cm dbh stems	Absent
5-9cm dbh stems	Absent
10-19 cm dbh stems	Absent
20-29 cm dbh stems	Absent
30-49cm dbh stems (number of)	0
50-79cm dbh stems (number of)	0
>80cm dbh stems (number of)	0
Number of hollow bearing trees	0

A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. solid wood cannot be seen beyond the entrance); and (d) the hollow is at least 1 m above the ground.

#### BAM autocalc fields

#### **BAM** import

Plot	B06
PCT	3446
Area	0
Patch size	0
Condition class	Grazed
Zone	56
Easting	358285
Northing	6384784
Bearing	310
Tree species richness	0
Shrub species richness	0
Grass species richness	6
Forb species richness	3
Fern species richness	0
Other species richness	1
Tree cover	0.0
Shrub cover	0.0
Grass cover	15.4

0.3
0
0.0
0.1
0
55.0
0
0
0
0
0
0
30.3
Sporobolus creber, Austrostipa ramosissima, Microlaena stipoides var. stipoides, Poa labillardierei var. labillardierei, Bothriochloa macra, Rytidosperma spp.
Vernonia cinerea, Galium gaudichaudii, Wahlenbergia gracilis
Desmodium varians
Senecio madagascariensis, Axonopus fissifolius, Plantago lanceolata, Paspalum dilatatum, Verbena rigida var. rigida, Sporobolus africanus, Briza subaristata, Hypochaeris albiflora

## B07, 3446

Created	2024-11-19 14:09:38 AEDT by Matt Doherty
Updated	2024-11-19 14:44:13 AEDT by Matt Doherty
Location	-32.668284, 151.488333
Status	Complete

### Project info

Latitude	-32.668284
Longitude	151.488333
Easting, Northing	56 S 358253 6384477
Date	2023-12-06
Time	14:30
Job	24081 - Lend Lease, Anambah
Assessor	Chris Spraggon
Survey Type	BAM Plot

### **BAM Plot**

Plot identifier	B07
Plot dimension (L x W)	20 x 50
Midline bearing	290

## Photographs

Transect start (landscape)





## Vegetation structure and condition

Vegetation structure	Tussock grasses, Open tussock grassland ( Cover 10-29%)
Vegetation condition (qualitative)	Low (15-30% benchmark, heavy disturbance, derived grasslands or shrublands)
Condition class	Grazed

### PCT and large tree threshold

Select either PCT or vegetation formation to show large tree threshold and autopopulate PCT and formation fields. PCT and formation fields can also be free text.

Select PCT	3446, Lower North Foothills Ironbark-Box-Gum Grassy Forest	
Vegetation formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)	
PCT	3446	
PCT description	Lower North Foothills Ironbark-Box-Gum Grassy Forest	
Large tree threshold size	50	
TEC	Has associated TEC	
TEC description	Listed BC Act,E: Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions (Part); Listed EPBC Act,CE: Central Hunter Valley eucalypt forest and woodland (Part);	

### Survey data

### B07, Themeda triandra, GG, 50

Plot	B07	
Link to species	Themeda triandra	
Family	Poaceae	
Scientific name	Themeda triandra	
Cover (%)	50	
Cover_No	50	
Abundance	1000	
Individual	1	
Exotic (Y/N)	N	
		Dago: 2 of 10

Growth form group	GG
High threat weed? (Y/N)	N
B07, Daviesia genistifolia, SG, 0.2	
Plot	B07
Link to species	Daviesia genistifolia, Broom Bitter Pea
Family	Fabaceae (Faboideae)
Scientific name	Daviesia genistifolia
Common name	Broom Bitter Pea
Cover (%)	0.2
Cover_No	0.2
Abundance	100
Individual	1
Exotic (Y/N)	N
Growth form group	SG
High threat weed? (Y/N)	N
B07, Wahlenbergia gracilis, FG, 0.1	
Plot	B07
Link to species	Wahlenbergia gracilis, Sprawling Bluebell
Family	Campanulaceae
Scientific name	Wahlenbergia gracilis
Common name	Sprawling Bluebell
Cover (%)	0.1
Cover_No	0.1
Abundance	50
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
B07, Pimelea linifolia, SG, 0.1	
Plot	B07
Link to species	Pimelea linifolia, Slender Rice Flower
Family	Thymelaeaceae
Scientific name	Pimelea linifolia
Common name	Slender Rice Flower
Cover (%)	0.1
Cover_No	0.1
Abundance	5
Individual	1
Exotic (Y/N)	N
Growth form group	SG
High threat weed? (Y/N)	N

B07, Axonopus fissifolius, 10

DI :	P07
Plot	B07
Link to species	Axonopus fissifolius, Narrow-leafed Carpet Grass
Family	Poaceae
Scientific name	Axonopus fissifolius
Common name	Narrow-leafed Carpet Grass
Cover (%)	10
Cover_No	10
Abundance	1000
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	HTE
B07, Sporobolus creber, GG, 0.5	
Plot	B07

Plot	B07
Link to species	Sporobolus creber, Slender Rat's Tail Grass
Family	Poaceae
Scientific name	Sporobolus creber
Common name	Slender Rat's Tail Grass
Cover (%)	0.5
Cover_No	0.5
Abundance	500
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

# B07, Senecio madagascariensis, 0.1

Plot	B07
Link to species	Senecio madagascarensis, Fireweed
Family	Asteraceae
Scientific name	Senecio madagascariensis
Common name	Fireweed
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	HTE

# B07, Paspalum dilatatum, 0.5

Plot	B07
Link to species	Paspalum dilatatum, Paspalum
Family	Poaceae

Scientific name	Paspalum dilatatum
Common name	Paspalum
Cover (%)	0.5
Cover_No	0.5
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	НТЕ
B07, Briza subaristata, 0.1	
Plot	B07
Link to species	Briza subaristata, Chilean Quaking Grass
Family	Poaceae
Scientific name	Briza subaristata
Common name	Chilean Quaking Grass
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	нте
B07, Fimbristylis dichotoma, GG, 0.1	
Plot	B07
Link to species	Fimbristylis dichotoma, Common Fringe-sedge
Family	Cyperaceae
Scientific name	Fimbristylis dichotoma
Common name	Common Fringe-sedge
Cover (%)	0.1
Cover_No	0.1
Abundance	40
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N
B07, Cynodon dactylon, GG, 1	
Plot	B07
Link to species	Cynodon dactylon, Common Couch
Family	Poaceae
Scientific name	Cynodon dactylon
Common name	Common Couch
Cover (%)	1

Cover_No	1
Abundance	1000
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N N
riigii tiireat weed: (1714)	N
B07, Verbena rigida var. rigida, 0.1	
Plot	B07
Link to species	Verbena rigida var. rigida, Veined Verbena
Family	Verbenaceae
Scientific name	Verbena rigida var. rigida
Common name	Veined Verbena
Cover (%)	0.1
Cover_No	0.1
Abundance	40
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B07, Ranunculus lappaceus, FG, 0.1	
Plot	B07
Link to species	Ranunculus lappaceus, Common Buttercup
Family	Ranunculaceae
Scientific name	Ranunculus lappaceus
Common name	Common Buttercup
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
B07, Rytidosperma spp., GG, 0.1	
Plot	B07
Link to species	Rytidosperma spp.
Family	Poaceae
Scientific name	Rytidosperma spp.
Cover (%)	0.1
Cover_No	0.1
Abundance	50
Individual	1
Exotic (Y/N)	N
Growth form group	GG
<u> </u>	

#### B07, Poa labillardierei var. labillardierei, GG, 0.2

Plot	B07
Link to species	Poa labillardierei var. labillardierei, Tussock
Family	Poaceae
Scientific name	Poa labillardierei var. labillardierei
Common name	Tussock
Cover (%)	0.2
Cover_No	0.2
Abundance	50
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

#### **Functional Data**

#### 5 m, 40

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B07
Tape measure	5 m
Litter cover	40
Litter cover	40

#### 15 m, 30

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B07
Tape measure	15 m
Litter cover	30
Litter cover	30

#### 25 m, 30

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B07
Tape measure	25 m
Litter cover	30
Litter cover	30

#### 35 m, 45

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B07
Tape measure	35 m
Litter cover	45
Litter cover	45

### 45 m, 65

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B07
Tape measure	45 m
Litter cover	65
Litter cover	65

#### 0

Plot	B07	
Fallen logs present in a vegetation zone that are at least 10 cm in diameter, contacting the ground and at least 0.5 m in length.		
Log length (m)	0	

#### Tree stems and hollows

<5cm dbh stems	Absent
5-9cm dbh stems	Absent
10-19 cm dbh stems	Absent
20-29 cm dbh stems	Absent
30-49cm dbh stems (number of)	0
50-79cm dbh stems (number of)	0
>80cm dbh stems (number of)	0
Number of hollow bearing trees	0

A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. solid wood cannot be seen beyond the entrance); and (d) the hollow is at least 1 m above the ground.

#### **BAM** autocalc fields

### **BAM** import

Plot	B07
PCT	3446
Area	0
Patch size	0
Condition class	Grazed
Zone	56
Easting	358253
Northing	6384477
Bearing	290
Tree species richness	0
Shrub species richness	2
Grass species richness	6
Forb species richness	2

Fern species richness	0
Other species richness	0
Tree cover	0.0
Shrub cover	0.3
Grass cover	51.9
Forb cover	0.2
Number of hollow trees	0
Fern cover	0.0
Other species cover	0.0
Number of large trees	0
Leaf litter cover	42.0
Stems 5 to 9	0
Stems 10 to 19	0
Stems 20 to 29	0
Stems 30 to 49	0
Stems 50 to 79	0
Regeneration	0
High threat exotic cover	10.7
Shrub list	Daviesia genistifolia, Pimelea linifolia
Grass list	Themeda triandra, Sporobolus creber, Fimbristylis dichotoma, Cynodon dactylon, Rytidosperma spp., Poa labillardierei var. labillardierei
Forb list	Wahlenbergia gracilis, Ranunculus lappaceus
Exotic list	Axonopus fissifolius, Senecio madagascariensis, Paspalum dilatatum, Briza subaristata, Verbena rigida var. rigida

# B08, 3446

Created	2024-11-19 14:21:01 AEDT by Matt Doherty
Updated	2024-11-19 14:45:10 AEDT by Matt Doherty
Location	-32.666338, 151.486284
Status	Complete

### Project info

- ,	
Latitude	-32.666338
Longitude	151.486284
Easting, Northing	56 S 358058 6384690
Date	2023-12-06
Time	15:29
Job	24081 - Lend Lease, Anambah
Assessor	Chris Spraggon
Survey Type	BAM Plot

### **BAM Plot**

Plot identifier	B08
Plot dimension (L x W)	20 x 50
Midline bearing	10

# Photographs

Transect start (landscape)



Transect start (portrait)



Transect end (landscape)



# Vegetation structure and condition

Vegetation structure	Tussock grasses, Open tussock grassland ( Cover 10-29%)
Vegetation condition (qualitative)	Low (15-30% benchmark, heavy disturbance, derived grasslands or shrublands)
Condition class	Grazed

### PCT and large tree threshold

Select either PCT or vegetation formation to show large tree threshold and autopopulate PCT and formation fields. PCT and formation fields can also be free text.

Select PCT	3446, Lower North Foothills Ironbark-Box-Gum Grassy Forest
Vegetation formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
PCT	3446
PCT description	Lower North Foothills Ironbark-Box-Gum Grassy Forest

TEC description  Listed E Wales Neucalyp  Survey data  B08, Cynodon dactylon, GG, 5  Plot B08  Link to species Cynodo  Family Poacea  Scientific name Commo  Cower (%) 5  Cover_No 5  Abundance 1000  Individual 1  Exotic (Y/N) N  Growth form group GG  High threat weed? (Y/N) N  B08, Axonopus fissifolius, 50  Plot B08  Link to species Axonopus  Family Poacea  Scientific name Axonopus  Scientific name Axonopus  Common name Narrow	Act,E: Hunter Lowland Redgum Forest in the Sydney Basin and New South North Coast Bioregions (Part); Listed EPBC Act,CE: Central Hunter Valley of forest and woodland (Part);  and dactylon, Common Couch  e  and dactylon  for Couch
Survey data  B08, Cynodon dactylon, GG, 5  Plot B08  Link to species Cynodo  Scientific name Commo  Cower (%) 5  Cover_No 5  Abundance 1000  Individual 1  Exotic (Y/N) N  Growth form group GG  High threat weed? (Y/N) N  B08, Axonopus fissifolius, 50  Plot B08  Link to species Axonopus GG  Link to species Axonopus GC  Family Poacea  Scientific name Axonopus GC  Common name Narrow	North Coast Bioregions (Part); Listed EPBC Act,CE: Central Hunter Valley of forest and woodland (Part);  on dactylon, Common Couch e
BO8, Cynodon dactylon, GG, 5  Plot B08  Link to species Cynodo  Family Poacea  Scientific name Cynodo  Common name Commo  Cover (%) 5  Cover_No 5  Abundance 1000  Individual 1  Exotic (Y/N) N  Growth form group GG  High threat weed? (Y/N) N  BO8, Axonopus fissifolius, 50  Plot B08  Link to species Axonopus  Family Poacea  Common name Narrow	e on dactylon
Plot B08  Link to species Cynodo Family Poacea Scientific name Cynodo Common name Commo Cover (%) 5  Cover_No 5  Abundance 1000  Individual 1  Exotic (Y/N) N  Growth form group GG High threat weed? (Y/N) N  B08, Axonopus fissifolius, 50  Plot B08  Link to species Axonop Family Poacea Common name Narrow	e on dactylon
Link to species  Cynodo Family  Poacea Scientific name  Common name  Cower (%)  Cover_No  Abundance  Individual  Exotic (Y/N)  Growth form group  High threat weed? (Y/N)  BOS, Axonopus fissifolius, 50  Plot  Bos  Emily  Poacea  Scientific name  Common name  Common name  Cynodo  5  Avanop  5  Ros  Ros  Ros  Ros  Ros  Ros  Ros	e on dactylon
Family Poacea Scientific name Cynode Common name Commo Cover (%) 5 Cover_No 5 Abundance 1000 Individual 1 Exotic (Y/N) N Growth form group GG High threat weed? (Y/N) N  BO8, Axonopus fissifolius, 50 Plot B08 Link to species Axonop Family Poacea Scientific name Axonop Common name Narrow	e on dactylon
Scientific name Cynodo Common name Cower (%) Cover_No S Abundance Individual Exotic (Y/N) N Growth form group High threat weed? (Y/N) N BO8, Axonopus fissifolius, 50 Plot B08 Link to species Family Scientific name Axonop Common name Common name Common name Common name Common name Common Narrow	n dactylon
Common name Cover (%) 5 Cover_No 5 Abundance 1000 Individual 1 Exotic (Y/N) N Growth form group GG High threat weed? (Y/N) N BO8, Axonopus fissifolius, 50 Plot B08 Link to species Axonop Family Poacea Scientific name Axonop Common name Narrow	
Cover (%) 5  Cover_No 5  Abundance 1000  Individual 1  Exotic (Y/N) N  Growth form group GG  High threat weed? (Y/N) N  BO8, Axonopus fissifolius, 50  Plot B08  Link to species Axonop  Family Poacea  Scientific name Axonop  Common name Narrow	on Couch
Cover_No 5  Abundance 1000  Individual 1  Exotic (Y/N) N  Growth form group GG  High threat weed? (Y/N) N  B08, Axonopus fissifolius, 50  Plot B08  Link to species Axonopus  Family Poacea  Scientific name Axonopus  Common name Narrow	
Abundance 1000 Individual 1 Exotic (Y/N) N Growth form group GG High threat weed? (Y/N) N  B08, Axonopus fissifolius, 50 Plot B08 Link to species Axonop Family Poacea Scientific name Axonop Common name Narrow	
Individual 1  Exotic (Y/N) N  Growth form group GG  High threat weed? (Y/N) N  B08, Axonopus fissifolius, 50  Plot B08  Link to species Axonopus Family Poacea  Scientific name Axonopus Common name Narrow	
Exotic (Y/N)  Growth form group  GG  High threat weed? (Y/N)  BO8, Axonopus fissifolius, 50  Plot  B08  Link to species  Family  Poacea  Scientific name  Axonopus  Common name	
Growth form group  GG  High threat weed? (Y/N)  BO8, Axonopus fissifolius, 50  Plot  B08  Link to species  Axonopus family  Poacea  Scientific name  Axonopus fissifolius, 50  Narrow	
High threat weed? (Y/N)  B08, Axonopus fissifolius, 50  Plot B08 Link to species Axonop Family Poacea Scientific name Axonop Common name Narrow	
B08, Axonopus fissifolius, 50  Plot B08  Link to species Axonopus Family Poacea Scientific name Axonopus Axonop	
Plot B08 Link to species Axonop Family Poacea Scientific name Axonop Common name Narrow	
Plot B08 Link to species Axonop Family Poacea Scientific name Axonop Common name Narrow	
Family Poacea Scientific name Axonop Common name Narrow	
Family Poacea Scientific name Axonop Common name Narrow	ous fissifolius, Narrow-leafed Carpet Grass
Scientific name Axonop Common name Narrow	
Common name Narrow	ous fissifolius
	-leafed Carpet Grass
Cover_No 50	
Abundance 1000	
Individual 1	
Exotic (Y/N) Y	
High threat weed? (Y/N)	
High threat weed type HTE	
B08, Sporobolus creber, GG, 5	
Plot B08	
Link to species Sporob	olus creber, Slender Rat's Tail Grass
Family Poacea	
-	olus creber
	· Rat's Tail Grass
Cover (%) 5	
Cover_No 5	
Abundance 1000	
Individual 1	

Growth form group         GG           418th threat weed? (*/N)         N           308, Vernonia cinerea var. cinerea, FG, 0.1           Plot         B08           Link to species         Vernonia cinerea var. cinerea           Asteraceae         Vernonia cinerea var. cinerea           Genetific name         Vernonia cinerea var. cinerea           Lover (%)         0.1           Cover, No         0.1           Abundance         100           Addividual         1           Cover (YN)         N           Scrowth form group         FG           4-Bigh threat weed? (Y/N)         N           308, Bothriochloa macra, GG, 0.1         N           201ct         B08           Link to species         Bothriochloa macra, Red Grass           Family         Poaceae           Scientific name         Bothriochloa macra           Gover (%)         0.1           Cover (%)         0.1           Cover (%)         0.1           Cover (%)         0.1           Cover (No)         0.1           Cover (No)         0.1           Cover (No)         0.1           Cover (No)         0.1           C		
High threat weed? (Y/N)  808, Vernonia cinerea var. cinerea, FG, 0.1  Pot B08  Link to species Vernonia cinerea var. cinerea  Samily Astraceae  Scover (%)  O.1  Cover, No  O.1  Cover, No  O.1  Cover, No  O.1  Cover, No  No  Scrowth form group FG  High threat weed? (Y/N)  No  SOB, Bothriochloa macra, GG, O.1  Pot Cover (%)  Doaceae  Scover (%)  O.1  Cover (%)  Doaceae  Cover (%)  O.1  Cover (%)  No  SOB, Bothriochloa macra, GG, O.1  Pot (Sobre (%)  Doaceae  Cover (%)  O.1  Cover (%)  Doaceae  Cover (%)  O.1  Cover (%)  O.1  Cover (%)  Doaceae  Cover (%)  O.1  Cover (%)  O.2  Cover (%)  O.3  Cover (%)  O.3  Cover (%)  O.4  Cover (%)  O.5  Cover (%)  O.5  Cover (%)  O.7  Cover (%)	Exotic (Y/N)	N
Bos Avernonia cinerea var. cinerea, FG, D.1  Plot Bos Bos Vernonia cinerea var. cinerea Vernonia Cinerea Vernonia cinerea var. cinerea Vernonia cinerea Vernonia cinerea Vernonia cinerea Vernonia cinerea Vernonia cinerea Vernonia vinerea Vernonia cinerea Vernonia var. Vern	Growth form group	GG
Polot         B08           Link to species         Vernonia cinerea var. cinerea           Granijy         Asteraceae           Cover (%)         0.1           Cover (%)         0.1           Cover, No         0.1           Abundance         100           Additional         1           Exotic (Y/N)         N           Growth form group         FG           Fighth threat weed? (Y/N)         N           B08, Bothriochloa macra, GG, 0.1         B08           Polot         B08           Link to species         Bothriochloa macra, Red Grass           Family         Poaceae           Scientific name         Bothriochloa macra           Cover (%)         0.1           Cover (%)         N           Cover (%)         0.1           Cover (%)         N           Cover (%)         N <td>High threat weed? (Y/N)</td> <td>N</td>	High threat weed? (Y/N)	N
Polot         B08           Link to species         Vernonia cinerea var. cinerea           Granijy         Asteraceae           Cover (%)         0.1           Cover (%)         0.1           Cover, No         0.1           Abundance         100           Additional         1           Exotic (Y/N)         N           Growth form group         FG           Fighth threat weed? (Y/N)         N           B08, Bothriochloa macra, GG, 0.1         B08           Polot         B08           Link to species         Bothriochloa macra, Red Grass           Family         Poaceae           Scientific name         Bothriochloa macra           Cover (%)         0.1           Cover (%)         N           Cover (%)         0.1           Cover (%)         N           Cover (%)         N <td>P08 Vornonia cinoroa var cin</td> <td>poros EG 0.1</td>	P08 Vornonia cinoroa var cin	poros EG 0.1
sink to species         Vernonia cinerea var. cinerea           Gamily         Asteraceae           Scientific name         Vernonia cinerea var. cinerea           Cover (%)         0.1           Cover_No         0.1           Abbundance         100           Individual         1           Exotic (Y/N)         N           Sorowth form group         FG           High threat weed? (Y/N)         N           308, Bothriochloa macra, GG, 0.1         B08           John Link to species         Bothriochloa macra, Red Grass           Jamily         Poaceae           John Link to species         Bothriochloa macra           John Link to species         Link to species           John Link to species         Link to species           John Link to species         Aristida vagans, Threeawn Speargrass           John Link to species         Aristida vagans           John Link to species         Aristida vagans           John Link to species         Aristida vagans <td></td> <td></td>		
Family         Asteraceae           Scientific name         Vernonia cinerea var. cinerea           Cover (%)         0.1           Cover_No         0.1           Abundance         100           Individual         1           Exotic (V/N)         N           Growth form group         FG           High threat weed? (V/N)         N           308, Bothriochloa macra, GG, 0.1         B08           Link to species         Bothriochloa macra, Red Grass           Family         Poaceae           Common name         Red Grass           Cover (%)         0.1           Abundance         200           Abundance         308           Abundance         308           Abundance         30		
Scientific name         Vernonia cinerea var. cinerea           Cover (%)         0.1           Cover (%)         0.1           Abundance         100           Modividual         1           Scxotic (V/N)         N           Growth form group         FG           High threat weed? (Y/N)         N           308, Bothriochloa macra, GG, 0.1         B08           Link to species         Bothriochloa macra, Red Grass           Scientific name         Bothriochloa macra           Common name         Red Grass           Cover (%)         0.1           Cover (%)         0.1           Abundance         200           Abundance         200           Abundance         200           Abundance (Y/N)         N           Bos (Y/N)         N		
Description		
Cover_No 0.1 Abundance 100 Abu		
Abundance 100 Individual 1 Individual I		
Individual 1 Indiv		
Exotic (Y/N)  Growth form group  FG  High threat weed? (Y/N)  BO8  BO8  BO8  BO8  BO8  BO8  BO8  BO	Individual	
FG High threat weed? (Y/N)  BOBA, Bothriochloa macra, GG, 0.1  Plot BOBA Link to species Bothriochloa macra Family Poaceae  Common name Red Grass  Cover (%)  Cover_No  O.1  Cover_No  O.1		
BOB, Bothriochloa macra, GG, 0.1  BOB BOB BOB BOB BOB BOB BOB BOB BOB B		
BOS, Bothriochloa macra, GG, 0.1  Pote BOS  Link to species Bothriochloa macra, Red Grass  Family Poaceae  Bothriochloa macra  Edition ame Bothriochloa macra, Red Grass  Edition ame Bothriochloa macra, Red Grass  Edition ame Bothriochloa macra, Red Grass  Edition ame Bothriochloa macra, Red Grass Bothriochloa macra Bothrioch		
Plot below Both ich to species Both ich to spe	The threat weed. (1714)	
Emik to species  Bothriochloa macra, Red Grass  Gramily Poaceae Bothriochloa macra Red Grass Cover (%) 0.1 Cover (%) 0.1 Cover (%) 0.1 Cover (No) 0.1 Cover (No) Cover (No) 0.1 Cover (No) Co	B08, Bothriochloa macra, GG,	, 0.1
Poaceae Scientific name Bothriochloa macra Common name Red Grass Cover (%) 0.1 Cover_No 0.1 Abundance 200 Individual 1 Exotic (Y/N) N Growth form group GG High threat weed? (Y/N) N BOSA BOSA Cover (M) BOSA Cover (M) Aristida vagans, GG, 0.2 Cover (M) Cover	Plot	B08
Scientific name Bothriochloa macra Common name Red Grass Cover (%) 0.1 Cover_No 0.1 Abundance 200 Individual 1 Exotic (Y/N) N Growth form group GG High threat weed? (Y/N) N  BOSA, Aristida vagans, GG, 0.2 Plot Bos Link to species Aristida vagans, Threeawn Speargrass Family Poaceae Aristida vagans Common name Threeawn Speargrass Cover (%) 0.2	Link to species	Bothriochloa macra, Red Grass
Common name Red Grass Cover (%) 0.1 Cover_No 0.1 Abundance 200 Individual 1 Exotic (Y/N) N Growth form group GG High threat weed? (Y/N) N 808, Aristida vagans, GG, 0.2 Plot B08 Link to species Aristida vagans, Threeawn Speargrass Family Poaceae Scientific name Aristida vagans Common name Threeawn Speargrass Cover (%) 0.2	Family	Poaceae
Cover (%) Cover_No  0.1  Abundance 200  Individual 1  Exotic (Y/N) N  Growth form group High threat weed? (Y/N)  BOS, Aristida vagans, GG, 0.2  Plot BOS  Aristida vagans, Threeawn Speargrass Family Poaceae  Aristida vagans  Common name Threeawn Speargrass  Cover (%) 0.2	Scientific name	Bothriochloa macra
Cover_No 0.1 Abundance 200 Individual 1 Exotic (Y/N) N Growth form group GG High threat weed? (Y/N) N  BOS, Aristida vagans, GG, 0.2 Plot BOS Emily Poaceae Scientific name Aristida vagans Cover (%) 0.2	Common name	Red Grass
Abundance 200 Individual 1 Individual N Indi	Cover (%)	0.1
Individual  Exotic (Y/N)  Growth form group  GG  High threat weed? (Y/N)  BO8, Aristida vagans, GG, 0.2  Plot  BO8  Link to species  Family  Foaceae  Common name  Cover (%)  DI  ARISTIDA SPEARS  Threeawn Speargrass  Tover (%)  0.2	Cover_No	0.1
Exotic (Y/N) Growth form group GG High threat weed? (Y/N)  BO8, Aristida vagans, GG, 0.2  Plot BO8 Link to species Aristida vagans, Threeawn Speargrass Family Poaceae Aristida vagans Common name Threeawn Speargrass Cover (%)  0.2	Abundance	200
Growth form group  Growth form group  High threat weed? (Y/N)  BO8, Aristida vagans, GG, 0.2  Plot  BO8  Aristida vagans, Threeawn Speargrass  Family  Poaceae  Aristida vagans  Threeawn Speargrass  Common name  Threeawn Speargrass  Cover (%)  0.2	Individual	1
High threat weed? (Y/N)  BO8, Aristida vagans, GG, 0.2  Plot B08 Link to species Aristida vagans, Threeawn Speargrass Family Poaceae Scientific name Aristida vagans Common name Threeawn Speargrass Cover (%)  0.2	Exotic (Y/N)	N
B08, Aristida vagans, GG, 0.2  Plot B08 Link to species Aristida vagans, Threeawn Speargrass Family Poaceae Scientific name Aristida vagans Common name Threeawn Speargrass Cover (%) 0.2	Growth form group	GG
Plot B08 Link to species Aristida vagans, Threeawn Speargrass Family Poaceae Scientific name Aristida vagans Common name Threeawn Speargrass Cover (%) 0.2	High threat weed? (Y/N)	N
Plot B08 Link to species Aristida vagans, Threeawn Speargrass Family Poaceae Scientific name Aristida vagans Common name Threeawn Speargrass Cover (%) 0.2	B08, Aristida vagans, GG. 0.2	
Family Poaceae Scientific name Aristida vagans Common name Threeawn Speargrass Cover (%) 0.2	Plot	B08
Family Poaceae Scientific name Aristida vagans Common name Threeawn Speargrass Cover (%) 0.2	Link to species	Aristida vagans, Threeawn Speargrass
Common name Aristida vagans Cover (%) Aristida vagans O.2	Family	Poaceae
Cover (%) 0.2	Scientific name	Aristida vagans
Cover (%) 0.2	Common name	Threeawn Speargrass
	Cover (%)	
	Cover_No	

200

1

Ν

GG

Ν

# B08, Desmodium varians, OG, 0.1

Abundance

Individual

Exotic (Y/N)

Growth form group

High threat weed? (Y/N)

Plot	B08
Link to species	Desmodium varians, Slender Tick-trefoil
Family	Fabaceae (Faboideae)
Scientific name	Desmodium varians
Common name	Slender Tick-trefoil
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	N
Growth form group	OG
High threat weed? (Y/N)	N

, ,	·
Plot	B08
Link to species	Galium gaudichaudii, Rough Bedstraw
Family	Rubiaceae
Scientific name	Galium gaudichaudii
Common name	Rough Bedstraw
Cover (%)	0.1
Cover_No	0.1
Abundance	1000
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

# B08, Wahlenbergia gracilis, FG, 0.1

,	
Plot	B08
Link to species	Wahlenbergia gracilis, Sprawling Bluebell
Family	Campanulaceae
Scientific name	Wahlenbergia gracilis
Common name	Sprawling Bluebell
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

# B08, Verbena rigida var. rigida, 0.1

Plot	B08
Link to species	Verbena rigida var. rigida, Veined Verbena
Family	Verbenaceae

Scientific name	Verbena rigida var. rigida
Common name	Veined Verbena
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B08, Asperula conferta, FG, 0.1	
Plot	B08
Link to species	Asperula conferta, Common Woodruff
Family	Rubiaceae
Scientific name	Asperula conferta
Common name	Common Woodruff
Cover (%)	0.1
Cover_No	0.1
Abundance	1000
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
DOO Deemakum diletetum 0.2	
B08, Paspalum dilatatum, 0.2	B08
Link to species	Paspalum dilatatum, Paspalum
Family	Poaceae
Scientific name	Paspalum dilatatum
Common name	Paspalum
Cover (%)	0.2
Cover_No	0.2
Abundance	50
Individual	
	1
Exotic (Y/N)	1 Y
Exotic (Y/N)	
	Υ
Exotic (Y/N) High threat weed? (Y/N) High threat weed type	Y Y
Exotic (Y/N) High threat weed? (Y/N)	Y Y
Exotic (Y/N) High threat weed? (Y/N) High threat weed type  B08, Cirsium vulgare, 0.1	Y Y HTE
Exotic (Y/N)  High threat weed? (Y/N)  High threat weed type  B08, Cirsium vulgare, 0.1  Plot	Y Y HTE  B08
Exotic (Y/N)  High threat weed? (Y/N)  High threat weed type  B08, Cirsium vulgare, 0.1  Plot  Link to species	Y Y HTE  B08 Cirsium vulgare, Spear Thistle
Exotic (Y/N)  High threat weed? (Y/N)  High threat weed type  B08, Cirsium vulgare, 0.1  Plot  Link to species  Family	Y Y HTE  B08 Cirsium vulgare, Spear Thistle Asteraceae
Exotic (Y/N) High threat weed? (Y/N) High threat weed type  B08, Cirsium vulgare, 0.1 Plot Link to species Family Scientific name	Y Y HTE  B08  Cirsium vulgare, Spear Thistle  Asteraceae Cirsium vulgare
Exotic (Y/N) High threat weed? (Y/N) High threat weed type  B08, Cirsium vulgare, 0.1 Plot Link to species Family Scientific name Common name	Y Y HTE  B08 Cirsium vulgare, Spear Thistle Asteraceae Cirsium vulgare Spear Thistle

Abundance	5	
Individual	1	
Exotic (Y/N)	Υ	
High threat weed? (Y/N)	N	

#### B08, Rytidosperma spp., GG, 0.1

Plot	B08
Link to species	Rytidosperma spp.
Family	Poaceae
Scientific name	Rytidosperma spp.
Cover (%)	0.1
Cover_No	0.1
Abundance	20
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

#### **Functional Data**

#### 5 m, 35

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B08
Tape measure	5 m
Litter cover	35
Litter cover	35

#### 15 m, 75

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B08
Tape measure	15 m
Litter cover	75
Litter cover	75

### 25 m, 50

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B08
Tape measure	25 m
Litter cover	50
Litter cover	50

### 35 m, 65

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B08
Tape measure	35 m
Litter cover	65
Litter cover	65

### 45 m, 70

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B08	
Tape measure	45 m	
Litter cover	70	
Litter cover	70	

#### 0

Plot B08

Fallen logs present in a vegetation zone that are at least 10 cm in diameter, contacting the ground and at least 0.5 m in length.

0

Log length (m)

#### Tree stems and hollows

<5cm dbh stems	Absent
5-9cm dbh stems	Absent
10-19 cm dbh stems	Absent
20-29 cm dbh stems	Absent
30-49cm dbh stems (number of)	0
50-79cm dbh stems (number of)	0
>80cm dbh stems (number of)	0
Number of hollow bearing trees	0

A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. solid wood cannot be seen beyond the entrance); and (d) the hollow is at least 1 m above the ground.

#### BAM autocalc fields

#### **BAM** import

Plot	B08
PCT	3446
Area	0
Patch size	0
Condition class	Grazed
Zone	56
Easting	358058
Northing	6384690
Bearing	10
Tree species richness	0

Shrub species richness	0
Grass species richness	5
Forb species richness	4
Fern species richness	0
Other species richness	1
Tree cover	0.0
Shrub cover	0.0
Grass cover	10.4
Forb cover	0.4
Number of hollow trees	0
Fern cover	0.0
Other species cover	0.1
Number of large trees	0
Leaf litter cover	59.0
Stems 5 to 9	0
Stems 10 to 19	0
Stems 20 to 29	0
Stems 30 to 49	0
Stems 50 to 79	0
Regeneration	0
High threat exotic cover	50.2
Grass list	Cynodon dactylon, Sporobolus creber, Bothriochloa macra, Aristida vagans, Rytidosperma spp.
Forb list	Vernonia cinerea var. cinerea, Galium gaudichaudii, Wahlenbergia gracilis, Asperula conferta
Other list	Desmodium varians
Exotic list	Axonopus fissifolius, Verbena rigida var. rigida, Paspalum dilatatum, Cirsium vulgare

# B09, 3433

Created	2024-11-21 16:06:38 AEDT by Matt Doherty
Updated	2024-11-21 16:42:06 AEDT by Matt Doherty
Location	-32.667652, 151.480345
Status	Complete

### Project info

<i>J</i>	
Latitude	-32.667652
Longitude	151.480345
Easting, Northing	56 S 357503 6384536
Date	2024-11-21
Time	15:50
Job	24081 - Lend Lease, Anambah
Assessor	Chris Spraggon, Simone-Louise Yasui
Survey Type	BAM Plot

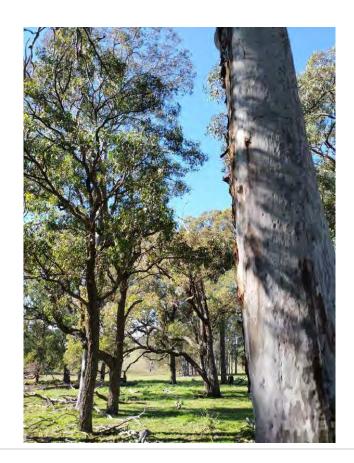
# **BAM Plot**

Plot identifier	B09
Plot dimension (L x W)	20 x 50
Midline bearing	110

# Photographs

Transect start (landscape)





### Landform and soil

Slope (0° — 90°)	4
Aspect	East
Morphology type and landform element	Lower slope
Landform pattern	Low hill
Geology	Clay
Soil colour (wet)	Brown

# Vegetation structure and condition

Vegetation structure	Trees > 30 m, Tall woodland ( Cover 10-29%)
Vegetation condition (qualitative)	Moderate (>50-70% benchmark, moderate disturbance, mature regrowth)
Condition class	Intact

### PCT and large tree threshold

Select either PCT or vegetation formation to show large tree threshold and autopopulate PCT and formation fields. PCT and formation fields can also be free text.

3433, Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Dry Sclerophyll Forests (Shrub/grass sub-formation)
3433
Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
50
Has associated TEC
Listed BC Act,E: Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions (Part);

# Survey data

Survey data	
B08, Corymbia maculata, TG, 15	
Plot	B08
Link to species	Corymbia maculata, Spotted Gum
Family	Myrtaceae
Scientific name	Corymbia maculata
Common name	Spotted Gum
Cover (%)	15
Cover_No	15
Abundance	3
Individual	1
Exotic (Y/N)	N
Growth form group	TG
High threat weed? (Y/N)	N
B08, Eucalyptus fibrosa, TG, 25	
Plot	B08
Link to species	Eucalyptus fibrosa, Red Ironbark
Family	Myrtaceae
Scientific name	Eucalyptus fibrosa
Common name	Red Ironbark
Cover (%)	25
Cover_No	25
Abundance	6
Individual	1
Exotic (Y/N)	N
Growth form group	TG
High threat weed? (Y/N)	N
B08, Solanum prinophyllum, FG, 1	
Plot	B08
Link to species	Solanum prinophyllum, Forest Nightshade
Family	Solanaceae
Scientific name	Solanum prinophyllum
Common name	Forest Nightshade
Cover (%)	1
Cover_No	1
Abundance	100
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N N
ingii dii eat weed: (1/14)	IN .

Plot	B08
Link to species	Dichondra repens, Kidney Weed
Family	Convolvulaceae
Scientific name	Dichondra repens
Common name	Kidney Weed
Cover (%)	5
Cover_No	5
Abundance	1000
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
B08, Commelina cyanea, FG, 2	
Plot	B08
Link to species	Commelina cyanea, Native Wandering Jew
Family	Commelinaceae
Scientific name	Commelina cyanea
Common name	Native Wandering Jew
Cover (%)	2
Cover_No	2
Abundance	1000
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
B08, Cynodon dactylon, GG, 20	
Plot	B08
Link to species	Cynodon dactylon, Common Couch
Family	Poaceae
Scientific name	Cynodon dactylon
Common name	Common Couch
Cover (%)	20
Cover_No	20
Abundance	2000
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

Link to species	Oxalis perennans
Family	Oxalidaceae

B08

Plot

Scientific name	Oxalis perennans
Cover (%)	0.1
Cover_No	0.1
Abundance	500
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
Tight direct weed. (174)	.,
B08, Cyperus gracilis, GG, 0.1	
Plot	B08
Link to species	Cyperus gracilis, Slender Flat-sedge
Family	Cyperaceae
Scientific name	Cyperus gracilis
Common name	Slender Flat-sedge
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N
B08, Lobelia purpurascens, FG, 0.1	
Plot	B08
Link to species	Lobelia purpurascens
Family	Campanulaceae
Scientific name	Lobelia purpurascens
Cover (%)	0.1
Cover_No	0.1
Abundance	1000
Individual	1
Individual Exotic (Y/N)	1 N
Exotic (Y/N)	N
Exotic (Y/N) Growth form group	
Exotic (Y/N)  Growth form group  High threat weed? (Y/N)	N FG
Exotic (Y/N)  Growth form group  High threat weed? (Y/N)  B08, Einadia hastata, FG, 0.1	N FG N
Exotic (Y/N)  Growth form group  High threat weed? (Y/N)  B08, Einadia hastata, FG, 0.1  Plot	N FG N B08
Exotic (Y/N)  Growth form group  High threat weed? (Y/N)  B08, Einadia hastata, FG, 0.1  Plot  Link to species	N FG N B08 Einadia hastata, Berry Saltbush
Exotic (Y/N)  Growth form group  High threat weed? (Y/N)  B08, Einadia hastata, FG, 0.1  Plot  Link to species  Family	N FG N B08 Einadia hastata, Berry Saltbush Chenopodiaceae
Exotic (Y/N)  Growth form group  High threat weed? (Y/N)  B08, Einadia hastata, FG, 0.1  Plot  Link to species  Family  Scientific name	N FG N  B08  Einadia hastata, Berry Saltbush Chenopodiaceae Einadia hastata
Exotic (Y/N)  Growth form group  High threat weed? (Y/N)  B08, Einadia hastata, FG, 0.1  Plot  Link to species  Family  Scientific name  Common name	N FG N B08 Einadia hastata, Berry Saltbush Chenopodiaceae Einadia hastata Berry Saltbush
Exotic (Y/N)  Growth form group  High threat weed? (Y/N)  B08, Einadia hastata, FG, 0.1  Plot  Link to species  Family  Scientific name	N FG N  B08  Einadia hastata, Berry Saltbush Chenopodiaceae Einadia hastata

50

Abundance

Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
riigii tiireat weed: (1714)	N .
B08, Juncus usitatus, GG, 0.1	
Plot	B08
Link to species	Juncus usitatus
Family	Juncaceae
Scientific name	Juncus usitatus
Cover (%)	0.1
Cover_No	0.1
Abundance	10
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N
B08, Lantana camara, 0.1	
Plot	B08
Link to species	Lantana camara, Lantana
Family	Verbenaceae
Scientific name	Lantana camara
Common name	Lantana
Cover (%)	0.1
Cover_No	0.1
Abundance	10
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	Manageable HTE
B08, Cestrum parqui, 0.1	
Plot	B08
Link to species	Cestrum parqui, Green Cestrum
Family	Solanaceae
Scientific name	Cestrum parqui
Common name	Green Cestrum
Cover (%)	0.1
Cover_No	0.1
Abundance	20
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	HTE
<u> </u>	

B08, Senecio madagascariensis, 0.1

Plot	B08
Link to species	Senecio madagascarensis, Fireweed
Family	Asteraceae
Scientific name	Senecio madagascariensis
Common name	Fireweed
Cover (%)	0.1
Cover_No	0.1
Abundance	50
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	HTE

### B08, Ehrharta erecta, 5

Plot	B08
Link to species	Ehrharta erecta, Panic Veldt Grass
Family	Poaceae
Scientific name	Ehrharta erecta
Common name	Panic Veldt Grass
Cover (%)	5
Cover_No	5
Abundance	1000
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	HTE

### B08, Poa annua, 35

B08
Poa annua, Winter Grass
Poaceae
Poa annua
Winter Grass
35
35
2000
1
Υ
N

# B08, Soliva sessilis, 0.1

Plot	B08
Link to species	Soliva sessilis, Bindyi
Family	Asteraceae

Scientific name	Soliva sessilis
Common name	Bindyi
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B08, Sida rhombifolia, 0.1	Doo
Plot	B08
Link to species	Sida rhombifolia, Paddy's Lucerne
Family	Malvaceae
Scientific name	Sida rhombifolia
Common name	Paddy's Lucerne
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B08, Trifolium repens, 0.1	
Plot	B08
Link to species	Trifolium repens, White Clover
Family	Fabaceae (Faboideae)
Scientific name	Trifolium repens
Common name	White Clover
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B08, Cirsium vulgare, 0.1	
Plot	B08
Link to species	Cirsium vulgare, Spear Thistle
Family	Asteraceae
Scientific name	Cirsium vulgare
Common name	Spear Thistle
Cover (%)	0.1
Cover_No	0.1
Abundance	10
Individual	1
marriadu	•

Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

#### B08, Hypochaeris radicata, 0.1

Plot	B08
Link to species	Hypochaeris radicata, Catsear
Family	Asteraceae
Scientific name	Hypochaeris radicata
Common name	Catsear
Cover (%)	0.1
Cover_No	0.1
Abundance	50
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

#### **Functional Data**

#### 5 m, 10

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B08
Tape measure	5 m
Litter cover	10
Litter cover	10

#### 15 m, 5

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B08
Tape measure	15 m
Litter cover	5
Litter cover	5

#### 25 m, 5

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B08
Tape measure	25 m
Litter cover	5
Litter cover	5

#### 35 m, 5

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B08
Tape measure	35 m
Litter cover	5
Litter cover	5

### 45 m, 5

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B08
Tape measure	45 m
Litter cover	5
Litter cover	5

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Log length (m)

Plot	B08	
Fallen logs present in a vegetation zone that are at least 10 cm in diameter, contacting the ground and at least 0.5 m in length.		cacting the ground and at least 0.5 m in length.

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#### Tree stems and hollows

<5cm dbh stems	Absent
5-9cm dbh stems	Absent
10-19 cm dbh stems	Present
20-29 cm dbh stems	Present
30-49cm dbh stems (number of)	6
50-79cm dbh stems (number of)	3
>80cm dbh stems (number of)	3
Number of hollow bearing trees	6

A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. solid wood cannot be seen beyond the entrance); and (d) the hollow is at least 1 m above the ground.

#### **BAM** autocalc fields

### **BAM** import

Plot	B09
PCT	3433
Area	0
Patch size	0
Condition class	Intact
Zone	56
Easting	357503
Northing	6384536
Bearing	110
Tree species richness	2
Shrub species richness	0
Grass species richness	3
Forb species richness	6

0
0
40.0
0.0
20.2
8.3
6
0.0
0.0
6
6.0
26.0
0
1
1
1
1
0
5.3
Corymbia maculata, Eucalyptus fibrosa
Cynodon dactylon, Cyperus gracilis, Juncus usitatus
Solanum prinophyllum, Dichondra repens, Commelina cyanea, Oxalis perennans, Lobelia purpurascens, Einadia hastata
Lantana camara, Cestrum parqui, Senecio madagascariensis, Ehrharta erecta, Poa annua, Soliva sessilis, Sida rhombifolia, Trifolium repens, Cirsium vulgare, Hypochaeris radicata

# B10, 3446

Created	2024-11-21 16:25:26 AEDT by Matt Doherty
Updated	2024-11-21 16:25:26 AEDT by Matt Doherty
Location	-32.664599, 151.485088
Status	Complete

### Project info

Latitude	-32.664599
Longitude	151.485088
Easting, Northing	56 S 357943 6384881
Date	2024-07-10
Time	16:06
Job	24081 - Lend Lease, Anambah
Assessor	Chris Spraggon, Simone-Louise Yasui
Survey Type	BAM Plot

# **BAM Plot**

Plot identifier	B10
Plot dimension (L x W)	20 x 50
Midline bearing	60

# Photographs

Transect start (landscape)





### Landform and soil

Slope (0° — 90°)	5
Aspect	East
Morphology type and landform element	Lower slope
Landform pattern	Low hill
Geology	Clay
Soil colour (wet)	Brown

# Vegetation structure and condition

Vegetation structure	Trees 10-30 m, Woodland ( Cover 10-29%)
Vegetation condition (qualitative)	Low moderate (>30-50% benchmark, moderate disturbance, regrowth)
Condition class	Intact

### PCT and large tree threshold

Select either PCT or vegetation formation to show large tree threshold and autopopulate PCT and formation fields. PCT and formation fields can also be free text.

Select PCT	3446, Lower North Foothills Ironbark-Box-Gum Grassy Forest
Vegetation formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
PCT	3446
PCT description	Lower North Foothills Ironbark-Box-Gum Grassy Forest
Large tree threshold size	50
TEC	Has associated TEC

### Survey data

B10, Corymbia maculata, TG, 35	
Plot	B10
Link to species	Corymbia maculata, Spotted Gum
Family	Myrtaceae
Scientific name	Corymbia maculata
Common name	Spotted Gum
Cover (%)	35
Cover_No	35
Abundance	8
Individual	1
Exotic (Y/N)	N
Growth form group	TG
High threat weed? (Y/N)	N

# B10, Eucalyptus crebra, TG, 5

Plot	B10
Link to species	Eucalyptus crebra, Narrow-leaved Ironbark
Family	Myrtaceae
Scientific name	Eucalyptus crebra
Common name	Narrow-leaved Ironbark
Cover (%)	5
Cover_No	5
Abundance	1
Individual	1
Exotic (Y/N)	N
Growth form group	TG
High threat weed? (Y/N)	N

# B10, Cynodon dactylon, GG, 10

Plot	B10
Link to species	Cynodon dactylon, Common Couch
Family	Poaceae
Scientific name	Cynodon dactylon
Common name	Common Couch
Cover (%)	10
Cover_No	10
Abundance	1000
Individual	1
Exotic (Y/N)	N
Growth form group	GG

B10, Themeda 1	triandra,	GG, 0.2
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Plot	B10
Link to species	Themeda triandra
Family	Poaceae
Scientific name	Themeda triandra
Cover (%)	0.2
Cover_No	0.2
Abundance	50
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

# B10, Oxalis perennans, FG, 0.1

Plot	B10
Link to species	Oxalis perennans
Family	Oxalidaceae
Scientific name	Oxalis perennans
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

# B10, Lomandra gracilis, GG, 0.1

Plot	B10
Link to species	Lomandra gracilis
Family	Lomandraceae
Scientific name	Lomandra gracilis
Cover (%)	0.1
Cover_No	0.1
Abundance	10
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

# B10, Juncus kraussii subsp. australiensis, GG, 0.1

Plot	B10
Link to species	Juncus kraussii subsp. australiensis, Sea Rush
Family	Juncaceae
Scientific name	Juncus kraussii subsp. australiensis

Common name	Sea Rush
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

# B10, Microlaena stipoides var. stipoides, GG, 0.1

Plot	B10
Link to species	Microlaena stipoides var. stipoides, Weeping Grass
Family	Poaceae
Scientific name	Microlaena stipoides var. stipoides
Common name	Weeping Grass
Cover (%)	0.1
Cover_No	0.1
Abundance	20
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N

# B10, Solanum prinophyllum, FG, 0.1

Plot B10  Link to species Solanum prinophyllum, Forest Ni Family Solanaceae  Scientific name Solanum prinophyllum	ghtshade
Family Solanaceae	ghtshade
Scientific name Solanum prinophyllum	
Common name Forest Nightshade	
Cover (%) 0.1	
Cover_No 0.1	
Abundance 20	
Individual 1	
Exotic (Y/N) N	
Growth form group FG	
High threat weed? (Y/N) N	

# B10, Lobelia purpurascens, FG, 0.1

Plot	B10
Link to species	Lobelia purpurascens
Family	Campanulaceae
Scientific name	Lobelia purpurascens
Cover (%)	0.1
Cover_No	0.1
Abundance	10

Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
<u> </u>	
B10, Aristida vagans, GG, 0.1	
Plot	B10
Link to species	Aristida vagans, Threeawn Speargrass
Family	Poaceae
Scientific name	Aristida vagans
Common name	Threeawn Speargrass
Cover (%)	0.1
Cover_No	0.1
Abundance	10
Individual	1
Exotic (Y/N)	N
Growth form group	GG
High threat weed? (Y/N)	N
B10, Rumex brownii, FG, 0.1	
Plot	B10
Link to species	Rumex brownii, Swamp Dock
Family	Polygonaceae
Scientific name	Rumex brownii
Common name	Swamp Dock
Cover (%)	0.1
Cover_No	0.1
Abundance	10
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N
B10, Entolasia stricta, GG, 0.1	
Plot	B10
Link to species	Entolasia stricta, Wiry Panic
Family	Poaceae
Scientific name	Entolasia stricta
Common name	Wiry Panic
Cover (%)	0.1
Cover_No	0.1
Abundance	10
Individual	1
Exotic (Y/N)	N
Growth form group	GG
. O I.	

B10, Asperula conferta, F	G, I	0.1
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Plot	B10
Link to species	Asperula conferta, Common Woodruff
Family	Rubiaceae
Scientific name	Asperula conferta
Common name	Common Woodruff
Cover (%)	0.1
Cover_No	0.1
Abundance	10
Individual	1
Exotic (Y/N)	N
Growth form group	FG
High threat weed? (Y/N)	N

# B10, Senecio madagascariensis, 15

Plot	B10
Link to species	Senecio madagascarensis, Fireweed
Family	Asteraceae
Scientific name	Senecio madagascariensis
Common name	Fireweed
Cover (%)	15
Cover_No	15
Abundance	1000
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	НТЕ

# B10, Trifolium repens, 0.1

Plot	B10
Link to species	Trifolium repens, White Clover
Family	Fabaceae (Faboideae)
Scientific name	Trifolium repens
Common name	White Clover
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

### B10, Ehrharta erecta, 0.1

Plot	B10
Link to species	Ehrharta erecta, Panic Veldt Grass

Family	Poaceae
Scientific name	Ehrharta erecta
Common name	Panic Veldt Grass
Cover (%)	0.1
Cover_No	0.1
Abundance	200
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	Υ
High threat weed type	НТЕ
B10, Poa annua, 30	
Plot	B10
Link to species	Poa annua, Winter Grass
Family	Poaceae
Scientific name	Poa annua
Common name	Winter Grass
Cover (%)	30
Cover_No	30
Abundance	2000
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B10, Plantago lanceolata, 0.5	
Plot	B10
Link to species	Plantago lanceolata, Lamb's Tongues
Family	Plantaginaceae
Scientific name	Plantago lanceolata
Common name	Lamb's Tongues
Cover (%)	0.5
Cover_No	0.5
Abundance	500
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B10, Sporobolus africanus, 0.1	
Plot	B10
Link to species	Sporobolus africanus, Parramatta Grass
Family	Poaceae
Scientific name	Sporobolus africanus
Scientific name Common name	
	Sporobolus africanus

Abundance	20
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B10, Soliva sessilis, 0.2	
Plot	B10
Link to species	Soliva sessilis, Bindyi
Family	Asteraceae
Scientific name	Soliva sessilis
Common name	Bindyi
Cover (%)	0.2
Cover_No	0.2
Abundance	1000
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N
B10, Hypochaeris radicata, 0.1	
Plot	B10
Link to species	Hypochaeris radicata, Catsear
Family	Asteraceae
Scientific name	Hypochaeris radicata
Common name	Catsear
Cover (%)	0.1
COVEL (70)	0.1
Cover_No	0.1
Cover_No	0.1
Cover_No Abundance	0.1 50
Cover_No Abundance Individual	0.1       50       1
Cover_No Abundance Individual Exotic (Y/N)	0.1 50 1 Y
Cover_No Abundance Individual Exotic (Y/N) High threat weed? (Y/N)	0.1 50 1 Y
Cover_No Abundance Individual Exotic (Y/N) High threat weed? (Y/N)  B10, Lantana camara, 0.1	0.1 50 1 Y
Cover_No Abundance Individual Exotic (Y/N) High threat weed? (Y/N)  B10, Lantana camara, 0.1 Plot	0.1 50 1 Y N
Cover_No Abundance Individual Exotic (Y/N) High threat weed? (Y/N)  B10, Lantana camara, 0.1 Plot Link to species	0.1 50 1 Y N B10 Lantana camara, Lantana
Cover_No Abundance Individual Exotic (Y/N) High threat weed? (Y/N)  B10, Lantana camara, 0.1 Plot Link to species Family	0.1 50 1 Y N B10 Lantana camara, Lantana Verbenaceae
Cover_No Abundance Individual Exotic (Y/N) High threat weed? (Y/N)  B10, Lantana camara, 0.1 Plot Link to species Family Scientific name	0.1 50 1 Y N  B10 Lantana camara, Lantana Verbenaceae Lantana camara
Cover_No Abundance Individual Exotic (Y/N) High threat weed? (Y/N)  B10, Lantana camara, 0.1 Plot Link to species Family Scientific name Common name	0.1 50 1 Y N  B10 Lantana camara, Lantana Verbenaceae Lantana camara Lantana
Cover_No Abundance Individual Exotic (Y/N) High threat weed? (Y/N)  B10, Lantana camara, 0.1 Plot Link to species Family Scientific name Common name Cover (%)	0.1 50 1 Y N  B10  Lantana camara, Lantana Verbenaceae  Lantana camara  Lantana  0.1
Cover_No Abundance Individual Exotic (Y/N) High threat weed? (Y/N)  B10, Lantana camara, 0.1 Plot Link to species Family Scientific name Common name Cover (%) Cover_No	0.1 50 1 Y N  B10 Lantana camara, Lantana Verbenaceae Lantana camara Lantana 0.1 0.1
Cover_No Abundance Individual Exotic (Y/N) High threat weed? (Y/N)  B10, Lantana camara, 0.1 Plot Link to species Family Scientific name Common name Cover (%) Cover_No Abundance	0.1 50 1 Y N  B10 Lantana camara, Lantana Verbenaceae Lantana camara Lantana 0.1 0.1
Cover_No Abundance Individual Exotic (Y/N) High threat weed? (Y/N)  B10, Lantana camara, 0.1 Plot Link to species Family Scientific name Common name Cover (%) Cover_No Abundance Individual	0.1 50 1 Y N  B10 Lantana camara, Lantana Verbenaceae Lantana camara Lantana 0.1 0.1 10
Cover_No Abundance Individual Exotic (Y/N) High threat weed? (Y/N)  B10, Lantana camara, 0.1 Plot Link to species Family Scientific name Common name Cover (%) Cover_No Abundance Individual Exotic (Y/N)	0.1 50 1 Y N  B10 Lantana camara, Lantana Verbenaceae Lantana camara Lantana 0.1 0.1 10 1

B10, Lysimachia arvensis, 0.1

Plot	B10
Link to species	Lysimachia arvensis, Scarlet Pimpernel
Family	Primulaceae
Scientific name	Lysimachia arvensis
Common name	Scarlet Pimpernel
Cover (%)	0.1
Cover_No	0.1
Abundance	100
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

### B10, Sida rhombifolia, 0.1

Plot	B10
Link to species	Sida rhombifolia, Paddy's Lucerne
Family	Malvaceae
Scientific name	Sida rhombifolia
Common name	Paddy's Lucerne
Cover (%)	0.1
Cover_No	0.1
Abundance	10
Individual	1
Exotic (Y/N)	Υ
High threat weed? (Y/N)	N

#### **Functional Data**

#### 5 m, 5

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m² plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B10
Tape measure	5 m
Litter cover	5
Litter cover	5

#### 15 m, 5

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m² plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B10
Tape measure	15 m
Litter cover	5
Litter cover	5

#### 25 m, 10

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B10
Tape measure	25 m
Litter cover	10
Litter cover	10

#### 35 m, 10

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B10	
Tape measure	35 m	
Litter cover	10	
Litter cover	10	

#### 45 m, 10

Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter), native and exotic species combined, that is detached from a plant and in contact with the ground surface, including litter under canopies of erect plants. Within these 1 m<sup>2</sup> plots, assessors may also record the cover of rock, bare ground and cryptogam soil crusts.

Plot	B10
Tape measure	45 m
Litter cover	10
Litter cover	10

### 0

Plot B10

Fallen logs present in a vegetation zone that are at least 10 cm in diameter, contacting the ground and at least 0.5 m in length.

Log length (m) 0

#### Tree stems and hollows

A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. solid wood cannot be seen beyond the entrance); and (d) the hollow is at least 1 m above the ground.

#### BAM autocalc fields

#### **BAM** import

Plot	B10
PCT	3446

Area	0
Patch size	0
Condition class	Intact
Zone	56
Easting	357943
Northing	6384881
Bearing	60
Tree species richness	2
Shrub species richness	0
Grass species richness	7
Forb species richness	5
Fern species richness	0
Other species richness	0
Tree cover	40.0
Shrub cover	0.0
Grass cover	10.7
Forb cover	0.5
Number of hollow trees	1
Fern cover	0.0
Other species cover	0.0
Number of large trees	5
Leaf litter cover	8.0
Stems 5 to 9	1
Stems 10 to 19	1
Stems 20 to 29	1
Stems 30 to 49	1
Stems 50 to 79	1
Regeneration	1
High threat exotic cover	15.2
Tree list	Corymbia maculata, Eucalyptus crebra
Grass list	Cynodon dactylon, Themeda triandra, Lomandra gracilis, Juncus kraussii subsp. australiensis, Microlaena stipoides var. stipoides, Aristida vagans, Entolasia stricta
Forb list	Oxalis perennans, Solanum prinophyllum, Lobelia purpurascens, Rumex brownii, Asperula conferta
Exotic list	Senecio madagascariensis, Trifolium repens, Ehrharta erecta, Poa annua, Plantago lanceolata, Sporobolus africanus, Soliva sessilis, Hypochaeris radicata, Lantana camara Lysimachia arvensis, Sida rhombifolia
Fauna Surveys	
Call Playback	

#### Page: 12 of 13



### Appendix M. Credit reports

Appended copies of the following Finalised BAM-C credit reports follow:

- Credits summary report
- Biodiversity credit report (Like-for-like)
- Candidate threatened species report
- Predicted species report.

JANUARY 2025 APPENDIX M



### **Proposal Details**

Proposal Name BAM data last updated \* Assessment Id

00052278/BAAS17044/24/00052279 Anambah Rd MHE January 2025 28/10/2024

Report Created Assessor Name BAM Data version \*

22/01/2025 Current classification (live - default) (80) Matt Doherty

Assessor Number **BAM Case Status** Date Finalised

Finalised 22/01/2025 BAAS17044

BOS entry trigger Assessment Type Assessment Revision

BOS Threshold: Area clearing threshold 5 Part 4 Developments (General)

#### Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetatio	TEC name	Current	Change in	Are	Sensitivity to	Species	BC Act Listing	EPBC Act	Biodiversit	Potenti	Ecosyste
	n		Vegetatio	Vegetatio	a	loss	sensitivity to	status	listing status	y risk	al SAII	m credits
	zone		n	n integrity	(ha)	(Justification)	gain class			weighting		
	name		integrity	(loss /								
			score	gain)								

<sup>\*</sup> Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.



2	3433_Intac t	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	47	47.0	1.2	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		2
											Subtot al	2
ite	r Coast Foo	thills Spotted Gum	-Ironbark Gr	assy For	est							
3	3433_Gras sland	Not a TEC	28.9	28.9	3.5	PCT Cleared - 69%	High Sensitivity to Gain			1.75		4
											Subtot al	4
er	North Foo	thills Ironbark-Box	-Gum Grassy	Forest								
1	3446_Intac t	Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	49.1	49.1	1.9	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		4
		9									Subtot	4



Lower	ower North Foothills Ironbark-Box-Gum Grassy Forest											
4	3446_Past ure	Not a TEC	16.4	16.4	28.9	PCT Cleared - 75%	High Sensitivity to Gain			2.00		0
											Subtot al	0
											Total	122

### Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Litoria brevipali	mata / Green-thig	hed Frog ( Fau	na )						
3433_Intact	47.0	47.0	0.03	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Vulnerable	Not Listed	False	1
								Subtotal	1
Myotis macropu	s / Southern Myo	tis ( Fauna )							
3446_Intact	49.1	49.1	1.9	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	46



3433_Intact	47.0	47.0	0.75	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	18
								Subtotal	64
Ninox connivens / B	Barking Owl ( F	Fauna )							
3446_Intact	49.1	49.1	1.9	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	48
3433_Intact	47.0	47.0	1.2	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	29
								Subtotal	77
Petaurus norfolcens	is / Squirrel Gl	lider ( Fauna )							
3446_Intact	49.1	49.1	1.9	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	48
3433_Intact	47.0	47.0	1,2	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	29
								Subtotal	77



Phascogale tapoata	fa / Brush-tail	led Phascogale	( Fauna )						
3446_Intact	49.1	49.1	1.9	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	48
3433_Intact	47.0	47.0	1.2	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	29
								Subtotal	77

Anambah Rd MHE January 2025



#### **Proposal Details**

Assessment Id Proposal Name BAM data last updated \*

00052278/BAAS17044/24/00052279 Anambah Rd MHE January 2025 28/10/2024

Assessor Name Assessor Number BAM Data version \*

Matt Doherty BAAS17044 Current classification (live - default)

(80)

Proponent Names Report Created BAM Case Status

22/01/2025 Finalised

Assessment Revision BOS entry trigger Assessment Type

BOS Threshold: Area clearing threshold Part 4 Developments (General)

Date Finalised

22/01/2025 BAM calculator database. BAM calculator database may not

\* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

#### Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		
Species		
Nil		

#### **Additional Information for Approval**

Assessment Id Proposal Name

Anambah Rd MHE January 2025



PCT Outside Ibra Added
None added

**PCTs With Customized Benchmarks** 

PCT

No Changes

Predicted Threatened Species Not On Site

Name

Ephippiorhynchus asiaticus / Black-necked Stork

Ixobrychus flavicollis / Black Bittern

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)



Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest	Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	1.9	48	0	48
3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	1.3	29	0	29
3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Not a TEC	3.5	0	45	45
3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest	Not a TEC	28.9	0	0	0

3433-Hunter Coast Foothills
<b>Spotted Gum-Ironbark Grassy</b>
Forest

Like-for-like credit retir	rement options				
Name of offset trading group	Trading group	Zone	НВТ	Credits	IBRA region
Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions This includes PCT's: 3433, 3442, 3443, 3444, 4158	-	3433_Intact	Yes	29	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.



3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest										
3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	Like-for-like credit retirement options									
	Class	Trading group	Zone	HBT	Credits	IBRA region				
	Hunter-Macleay Dry Sclerophyll Forests This includes PCT's: 1608, 3431, 3433, 3436, 3437, 3439, 3442, 3444, 3446	Hunter-Macleay Dry Sclerophyll Forests >=50% and <70%	3433_Grasslan d	No	45	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.				
3446-Lower North Foothills	Like-for-like credit reti	rement options								
Ironbark-Box-Gum Grassy Forest	Name of offset trading group	Trading group	Zone	НВТ	Credits	IBRA region				



Hunter Lowland	-	3446_Intact	Yes 48	Hunter, Ellerston, Karuah Manning,
Redgum Forest in the				Kerrabee, Liverpool Range, Peel,
Sydney Basin and New				Tomalla, Upper Hunter, Wyong and
South Wales North				Yengo.
Coast Bioregions				or
This includes PCT's:				Any IBRA subregion that is within 100
1603, 1605, 1691, 1692,				kilometers of the outer edge of the
3328, 3446, 3634				impacted site.

#### 3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest

Like-for-like credit retirement options					
Class	Trading group	Zone	НВТ	Credits	IBRA region
Hunter-Macleay Dry Sclerophyll Forests This includes PCT's: 3431, 3442, 3446	Hunter-Macleay Dry Sclerophyll Forests >=70% and <90%	3446_Pasture	No	C	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.



### **Species Credit Summary**

Species	Vegetation Zone/s	Area / Count	Credits
Litoria brevipalmata / Green-thighed Frog	3433_Intact	0.0	1.00
Myotis macropus / Southern Myotis	3446_Intact, 3433_Intact	2.6	64.00
Ninox connivens / Barking Owl	3446_Intact, 3433_Intact	3.2	77.00
Petaurus norfolcensis / Squirrel Glider	3446_Intact, 3433_Intact	3.2	77.00
Phascogale tapoatafa / Brush-tailed Phascogale	3446_Intact, 3433_Intact	3.2	77.00

Credit Retirement Options	Like-for-like credit retirement options
---------------------------	---

Litoria brevipalmata / Green-thighed Frog	Spp	IBRA subregion
	Litoria brevipalmata / Green-thighed Frog	Any in NSW
Myotis macropus / Southern Myotis	Spp	IBRA subregion
	Myotis macropus / Southern Myotis	Any in NSW
Ninox connivens / Barking Owl	Spp	IBRA subregion
	Ninox connivens / Barking Owl	Any in NSW
Petaurus norfolcensis / Squirrel Glider	Spp	IBRA subregion
	Petaurus norfolcensis / Squirrel Glider	Any in NSW



Phascogale tapoatafa / Brush-tailed Phascogale	Spp	IBRA subregion
	Phascogale tapoatafa / Brush-tailed Phascogale	Any in NSW



### **Proposal Details**

Assessment Id Proposal Name BAM data last updated \*

00052278/BAAS17044/24/00052279 Anambah Rd MHE January 2025 28/10/2024

Assessor Name Report Created BAM Data version \*

Matt Doherty 22/01/2025 Current classification (live - default) (80)

Assessor Number Assessment Type BAM Case Status

BAAS17044 Part 4 Developments (General) Finalised

Assessment Revision BOS entry trigger Date Finalised
5 BOS Threshold: Area 22/01/2025

clearing threshold

### List of Species Requiring Survey

Name	Presence	Survey Months
<b>Acacia bynoeana</b> Bynoe's Wattle	No (surveyed)	□ Jan □ Feb □ Mar □ Apr □ May □ Jun □ Jul □ Aug □ Sep ☑ Oct □ Nov □ Dec □ Survey month outside the specified months?
<b>Asperula asthenes</b> Trailing Woodruff	No (surveyed)	□ Jan □ Feb □ Mar □ Apr □ May □ Jun □ Jul □ Aug □ Sep ☑ Oct □ Nov □ Dec □ Survey month outside the specified months?
<b>Burhinus grallarius</b> Bush Stone-curlew	No (surveyed)	□ Jan □ Feb □ Mar □ Apr □ May ☑ Jun □ Jul □ Aug □ Sep □ Oct □ Nov □ Dec □ Survey month outside the specified months?

<sup>\*</sup> Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.



<b>Callistemon linearifolius</b> Netted Bottle Brush	No (surveyed)	□ Jan □ Feb □ Mar □ Apr □ May □ Jun □ Jul □ Aug □ Sep ☑ Oct □ Nov □ Dec
		☐ Survey month outside the specified months?
<b>Callocephalon fimbriatum</b> Gang-gang Cockatoo	No (surveyed)	□ Jan □ Feb □ Mar □ Apr □ May □ Jun □ Jul □ Aug
		☐ Sep ☑ Oct ☐ Nov ☐ Dec
		☐ Survey month outside the specified months?
Calyptorhynchus lathami lathami South-eastern Glossy Black-	No (surveyed)	□ Jan □ Feb □ Mar □ Apr
Cockatoo		□ May ☑ Jun ☑ Jul □ Aug
		□ Sep □ Oct □ Nov □ Dec
		☐ Survey month outside the specified months?
Cercartetus nanus Eastern Pygmy-possum	No (surveyed)	□ Jan □ Feb □ Mar □ Apr
		□ May □ Jun □ Jul □ Aug
		□ Sep ☑ Oct ☑ Nov □ Dec
		☐ Survey month outside the specified months?
Eucalyptus glaucina Slaty Red Gum	No (surveyed)	□ Jan □ Feb □ Mar □ Apr
		□ May □ Jun □ Jul □ Aug
		☐ Sep ☑ Oct ☐ Nov ☐ Dec
		☐ Survey month outside the specified months?
Eucalyptus parramattensis subsp. decadens	No (surveyed)	□ Jan □ Feb □ Mar □ Apr
Eucalyptus parramattensis subsp. decadens		□ May □ Jun □ Jul □ Aug
decadens		☐ Sep ☑ Oct ☐ Nov ☐ Dec
		☐ Survey month outside the specified months?



<b>Grevillea parviflora subsp. parviflora</b> Small-flower Grevillea	No (surveyed)	□ Jan □ Feb □ Mar □ Apr
		□ May □ Jun □ Jul □ Aug
		☐ Sep ☑ Oct ☐ Nov ☐ Dec
		☐ Survey month outside the specified months?
Haliaeetus leucogaster White-bellied Sea-Eagle	No (surveyed)	□ Jan □ Feb □ Mar □ Apr
Trime beined bed Lagie		□ May □ Jun □ Jul □ Aug
		☐ Sep ☑ Oct ☐ Nov ☐ Dec
		☐ Survey month outside the specified months?
Hieraaetus morphnoides Little Eagle	No (surveyed)	□ Jan □ Feb □ Mar □ Apr
Little Lagic		□ May □ Jun □ Jul □ Aug
		☐ Sep ☑ Oct ☐ Nov ☐ Dec
		☐ Survey month outside the specified months?
<b>Litoria brevipalmata</b> Green-thighed Frog	Yes (expert report)	□ Jan □ Feb □ Mar □ Apr
and magness and		□ May □ Jun □ Jul □ Aug
		□ Sep □ Oct □ Nov □ Dec
		☐ Survey month outside the specified months?
<b>Lophoictinia isura</b> Square-tailed Kite	No (surveyed)	□ Jan □ Feb □ Mar □ Apr
Square tensor rate		☐ May ☐ Jun ☐ Jul ☐ Aug
		□ Sep ☑ Oct □ Nov □ Dec
		☐ Survey month outside the specified months?
<b>Myotis macropus</b> Southern Myotis	Yes (surveyed)	□ Jan □ Feb □ Mar □ Apr
Southern Myous		□ May □ Jun □ Jul □ Aug
		□ Sep ☑ Oct □ Nov □ Dec
		☐ Survey month outside the specified months?



Ninox connivens	Yes (surveyed)	
Barking Owl		☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☑ Jun ☑ Jul ☐ Aug
		☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec
		☐ Survey month outside the specified months?
<b>Ninox strenua</b> Powerful Owl	No (surveyed)	□ Jan □ Feb □ Mar □ Apr
		☐ May ☑ Jun ☑ Jul ☐ Aug
		□ Sep □ Oct □ Nov □ Dec
		☐ Survey month outside the specified months?
<b>Petaurus norfolcensis</b> Squirrel Glider	Yes (surveyed)	□ Jan □ Feb □ Mar □ Apr
		☑ May ☑ Jun □ Jul □ Aug
		☐ Sep   Oct   Nov ☐ Dec
		☐ Survey month outside the specified months?
<b>Phascogale tapoatafa</b> Brush-tailed Phascogale	Yes (surveyed)	□ Jan □ Feb □ Mar □ Apr
2. a.s		✓ May ✓ Jun □ Jul □ Aug
		☐ Sep ☐ Oct ☐ Nov ☐ Dec
		☐ Survey month outside the specified months?
<b>Phascolarctos cinereus</b> Koala	No (surveyed)	□ Jan □ Feb □ Mar □ Apr
i contra		□ May □ Jun □ Jul □ Aug
		☐ Sep ☑ Oct ☑ Nov ☐ Dec
		☐ Survey month outside the specified months?
<b>Pomaderris queenslandica</b> Scant Pomaderris	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr
ocant i omadems		□ May □ Jun □ Jul □ Aug
		☐ Sep ☑ Oct ☐ Nov ☐ Dec
		☐ Survey month outside the specified months?



Pterostylis chaetophora	No (surveyed)	
Pterostylis chaetophora	, , ,	☐ Jan ☐ Feb ☐ Mar ☐ Apr
		☐ May ☐ Jun ☐ Jul ☐ Aug
		☐ Sep ☑ Oct ☐ Nov ☐ Dec
		☐ Survey month outside the specified months?
<b>Rhodamnia rubescens</b> Scrub Turpentine	No (surveyed)	□ Jan □ Feb □ Mar □ Apr
·		☐ May ☐ Jun ☐ Jul ☐ Aug
		☐ Sep ☑ Oct ☐ Nov ☐ Dec
		☐ Survey month outside the specified months?
<b>Rutidosis heterogama</b> Heath Wrinklewort	No (surveyed)	□ Jan □ Feb □ Mar □ Apr
		☐ May ☐ Jun ☐ Jul ☐ Aug
		☐ Sep ☑ Oct ☐ Nov ☐ Dec
		☐ Survey month outside the specified months?
<b>Tyto novaehollandiae</b> Masked Owl	No (surveyed)	□ Jan □ Feb □ Mar □ Apr
		☐ May ☑ Jun ☑ Jul ☐ Aug
		□ Sep □ Oct □ Nov □ Dec
		☐ Survey month outside the specified months?

### **Threatened species Manually Added**

None added

### Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Black-eyed Susan	Tetratheca juncea	Species is vagrant
Broad-billed Sandpiper	Limicola falcinellus	Habitat constraints
Brush-tailed Rock-wallaby	Petrogale penicillata	Habitat constraints
Charmhaven Apple	Angophora inopina	Species is vagrant



Page 6 of 6

Common Planigale	Planigale maculata	Species is vagrant
Eastern Cave Bat	Vespadelus troughtoni	Habitat constraints
Eastern Osprey	Pandion cristatus	Habitat constraints
Emu population in the New South Wales North Coast Bioregion and Port Stephens local government area	Dromaius novaehollandiae - endangered population	Refer to BAR
Green and Golden Bell Frog	Litoria aurea	Habitat degraded
Grey-headed Flying-fox	Pteropus poliocephalus	Habitat constraints
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat constraints
Large-eared Pied Bat	Chalinolobus dwyeri	Habitat constraints
Little Bent-winged Bat	Miniopterus australis	Habitat constraints
Magenta Lilly Pilly	Syzygium paniculatum	Habitat degraded
Mahony's Toadlet	Uperoleia mahonyi	Species is vagrant
North Rothbury Persoonia	Persoonia pauciflora	Refer to BAR
Pokolbin Mallee	Eucalyptus pumila	Species is vagrant
Red Helmet Orchid	Corybas dowlingii	Refer to BAR
Regent Honeyeater	Anthochaera phrygia	Habitat constraints
Singleton Mallee	Eucalyptus castrensis	Species is vagrant
Singleton Mint Bush	Prostanthera cineolifera	Species is vagrant
Spyridium burragorang in the Cessnock local government area	Spyridium burragorang - endangered population	Species is vagrant
Striped Legless Lizard	Delma impar	Species is vagrant
Swift Parrot	Lathamus discolor	Habitat constraints
Wallum Froglet	Crinia tinnula	Species is vagrant



### **Proposal Details**

Assessment Id	Proposal Name	BAM data last updated *
00052278/BAAS17044/24/00052279	Anambah Rd MHE January 2025	28/10/2024
Assessor Name	Report Created	BAM Data version *
Matt Doherty	22/01/2025	Current classification (live - default) (80)
Assessor Number	Assessment Type	BAM Case Status
BAAS17044	Part 4 Developments (General)	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
5	BOS Threshold: Area clearing	22/01/2025

<sup>\*</sup> Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

# Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

threshold

Common Name	Scientific Name	Vegetation Types(s)
Black Falcon	Falco subniger	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Black-chinned	Melithreptus gularis gularis	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Honeyeater (eastern subspecies)		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Broad-billed Sandpiper	Limicola falcinellus	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Corben's Long-eared Bat	Nyctophilus corbeni	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Diamond Firetail	Stagonopleura guttata	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest



Dusky Woodswallow	Artamus cyanopterus cyanopterus	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Eastern Coastal	Micronomus norfolkensis	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Free-tailed Bat		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Eastern Grass Owl	Tyto longimembris	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Eastern Osprey	Pandion cristatus	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Flame Robin	Petroica phoenicea	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Gang-gang	Callocephalon	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Cockatoo	fimbriatum	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Grey-crowned	Pomatostomus	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Babbler (eastern subspecies)	temporalis temporalis	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Grey-headed Flying-	Pteropus poliocephalus	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
fox		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Large Bent-winged	Miniopterus orianae oceanensis	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Bat		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Little Bent-winged	Miniopterus australis	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Bat		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Little Eagle	Hieraaetus morphnoides	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Little Lorikeet	Glossopsitta pusilla	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
New Holland Mouse	Pseudomys novaehollandiae	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest



Regent Honeyeater	Anthochaera phrygia	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Scarlet Robin	Petroica boodang	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
South-eastern	Calyptorhynchus lathami lathami	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Glossy Black- Cockatoo		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Speckled Warbler	Chthonicola	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
	sagittata	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Spotted Harrier	Circus assimilis	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Spotted-tailed Quoll	Dasyurus maculatus	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Square-tailed Kite	Lophoictinia isura	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Swift Parrot	Lathamus discolor	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Turquoise Parrot	Neophema pulchella	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Varied Sittella	Daphoenositta chrysoptera	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
White-bellied Sea-	Haliaeetus	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Eagle	leucogaster	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
White-throated Needletail	Hirundapus caudacutus	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest



Yellow-bellied	Saccolaimus	3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy
Sheathtail-bat	flaviventris	Forest

#### **Threatened species Manually Added**

None added

#### Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Common Name	Scientific Name	Plant Community Type(s)
Black Bittern	Ixobrychus flavicollis	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
Black-necked Stork	Ephippiorhynchus asiaticus	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
		3433-Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest

#### Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C
Black Bittern	Ixobrychus flavicollis	Refer to BAR
Black-necked Stork	Ephippiorhynchus asiaticus	Refer to BAR

Anambah Rd MHE January 2025



### Appendix N. Staff Qualifications

Name	Title	Qualifications	Roles
Matt Doherty	Director	<ul> <li>Accredited BAM Assessor (#BAAS17044)</li> </ul>	<ul> <li>Approval of BDAR for submission</li> </ul>
		<ul> <li>B. Landscape Management and Conservation (Soil and Water Management)</li> </ul>	<ul><li>Review of BDAR and BAM- C</li></ul>
		<ul> <li>Bush Regeneration Cert IV</li> </ul>	
Chris Spraggon	Senior Ecologist	<ul><li>B. Science (Honours)</li><li>Conservation &amp; Land Management Cert III</li></ul>	<ul> <li>Undertake BAM assessment, preparation of BDAR.</li> </ul>
		Management Cert III	<ul> <li>Targeted species field survey methodology determination</li> </ul>
			<ul> <li>Vegetation determination and field work including BAM floristic plots and threatened fauna surveys</li> </ul>
		<ul> <li>Accredited BAM Assessor (#BAAS24059)</li> </ul>	
	Ecologist	B: Biological Sciences (Hons)	Review of BDAR.
Dr Simone- Louise Yasui		<ul> <li>Msc: Ecology and Evolutionary Biology</li> </ul>	<ul> <li>Field work including BAM floristic plots</li> </ul>
		<ul> <li>PhD: Biological and Environmental Sciences</li> </ul>	
Ctanhania		B. Environmental Science and	<ul><li>Preparation of BDAR</li></ul>
Stephanie Sheehy	Ecologist	Management	<ul> <li>Field work including threatened fauna surveys</li> </ul>
		B. Environmental Science and	<ul><li>Preparation of BDAR</li></ul>
Kurtis Mumford	Ecologist	Management Management	<ul> <li>Field work including threatened fauna surveys</li> </ul>
Mathew Grassi	Ecologist	<ul> <li>B. Environmental Science and Management (Ecosystems and Biodiversity)</li> </ul>	<ul><li>Field work</li></ul>
Marcus Lulham	Field Ecologist	<ul><li>Msc: Environmental Management</li></ul>	Field work
ILISTIN CITATI	Field	<ul> <li>Assoc Deg in Environmental Science</li> </ul>	Field work
		<ul> <li>NSW Biosecurity Legislation Online Certificate</li> </ul>	
Laidlaw Puha	GIS Officer	B. Science	
Laiulaw Pulla			<ul> <li>Mapping &amp; assisting with BDAR production (Figures &amp;</li> </ul>
		<ul> <li>Cert IV in Information Technology</li> </ul>	mapping)

JANUARY 2025 APPENDIX N