Biodiversity Development Assessment Report (BDAR)

Residential Subdivision Proposal Lot 32 DP778111, Lot 31 DP778111, 173 McFarlanes Road & 507 Raymond Terrace Road, Chisholm

Prepared for

Allam Property Group

Final V2 / May 2023

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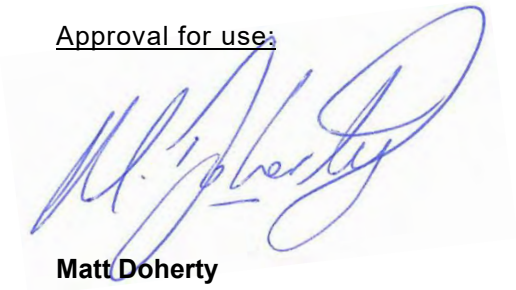

Matt Doherty

Accredited BAM Assessor # BAAS17044

29 May 2023

EXECUTIVE SUMMARY

MJD Environmental has been engaged by Allam Property Group to prepare a Biodiversity Development Assessment Report (BDAR) to accompany a Development Application for a proposed residential subdivision over Lot 32 DP778111 and Lot 31 DP778111, 173 McFarlanes Road and 507 Raymond Terrace Road, Chisholm.

The subject land is not mapped on the *Biodiversity Values Map* (BVM); however, the proposal exceeds the area clearing threshold associated with the Minimum Lot Size (MLS) of the Lot. In the instance of a proposal occurring over two lots the lots with the smallest MLS is utilised to determine the area clearing threshold. Therefore the area clearing threshold associated with the proposal is clearance of native vegetation over 0.25 ha. As such, the proposal triggers assessment under the Biodiversity Assessment Method (BAM) and entry into the Biodiversity Offset Scheme (BOS) as per Section 7.1.1 (b) of the BC Regulations (2017).

Application of the BAM was used to the establish biodiversity impacts of the proposal inclusive of impacts to native vegetation and threatened entities (species and communities) within the locality listed under the BC Act, requiring that an accredited assessor (AA) prepare and submit a BDAR to the approval consent authority; Maitland City Council (MCC) as part of the Development Application.

In addition, preliminary assessment was undertaken having regard to those threatened entities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. Assessment has been considered against the *State Environmental Planning Policy (Koala Habitat Protection) 2021.*

The land is zoned primarily R1 General Residential with a portion of the far north-west of RU2 Rural Landscape. The land has been historically cleared across the majority of the subject land. Vegetation regeneration presents in different conditions between the northern and southern portions of the subject land due to the implementation of different management. The northern portion contains native canopy and a heavily grazed understorey with the presence of exotic grasses and shrubs. The southern portion of the subject land contains a higher density of mid stratum species due to lack of grazing and slashing practices however less remnant canopy trees have been retained.

The subject land contains three unmapped ephemeral drainage lines which have been dammed, resulting in a total of four dams. Gully erosion, soil compaction and exotic species resultant from active cattle grazing have degraded the dams, making them marginal habitat for entities known to utilise or rely on water bodies.

A total of two Plant Community Types (PCTs) have been identified within the subject land:

- 1598 – Forest Red Gum grassy open forest on floodplains of the Lower Hunter
- 1600 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter

Impact Avoidance & Mitigation

A package of avoidance and mitigation measures have been described in this BDAR associated with the project.

The subject land for development was selected due to the largely cleared or highly disturbed lands with poor-moderate native species diversity as a result of past and present land use. 24.65 ha of native vegetation is to be entirely removed, and 1.70 ha of native vegetation is to be retained under this proposal within the study area. All measures have been incorporated into the design (avoidance) in the first instance with mitigation measures assessed for the construction phases of the project. Considerations have been made with regards to the impacts of the proposal to the broader connectivity of the landscape. This is discussed further within Sections 9 of this report.

Impact Analysis

The proposal will result in the following impacts and required Biodiversity Offset Liability as calculated using the BAM-C Calculator.

PCT	TEC	Area (ha)	HBT Cr	No HBT Cr	Offset Credits required
Ecosystem Credits					
PCT 1598: Forest Red Gum grassy open forest on floodplains of the lower Hunter	Yes, commensurate with *Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions*	0.62	0	32	17
PCT 1600: Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter	No, not commensurate with *Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions*	6.30	0	0	0
PCT 1600: Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter	Yes, commensurate with *Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions*	17.7	227	262	489

The current method to retire credits for the proposal is likely to be via payment into the Biodiversity Conservation Fund or retirement of credits available on the market.

A preliminary assessment under the EPBC Act determined the proposed action is unlikely to have an impact to MNES assessed in this report based on the assessment criteria set out in relevant Commonwealth policies and advice as at the time of this assessment.

Assessment against the SEPP (Biodiversity and Conservation) 2021 criteria concerning Koala determined the proposal is unlikely to impact the species.

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GLOSSARY OF TERMS AND ABBREVIATIONS

Term/ Abbreviation	Meaning
BAM	Biodiversity Assessment Method
BDAR	Biodiversity Development Assessment Report
BC Act	Biodiversity Conservation Act 2016
BS Act	Biosecurity Act 2016
Council	Maitland City Council
DoEE	Commonwealth Department of the Environment & Energy
DPE	NSW Department of Planning and Environment
DPI Water	NSW Department of Primary Industries – Water
EP&A Act	NSW Environmental Planning and Assessment Act 1979
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
ha	hectare
LGA	Local Government Area
LLS Act	Local Land Services Act
MCC	Maitland City Council
OEH	NSW Office of Environment and Heritage [former]

1 Introduction

MJD Environmental has been engaged by Allam Property Group to prepare a Biodiversity Development Assessment Report (BDAR) to accompany a Development Application for a proposed residential subdivision over Lot 32 DP778111 and Lot 31 DP778111, 173 McFarlanes Road and 507 Raymond Terrace Road, Chisholm. hereafter referred to as the 'subject land'. Refer to **Figure 1**.

1.1 Description of Proposal

The Development seeks the approval for a residential subdivision and development, the proposal containing 264 residential lots. The proposal application seeks approval for the following works:

- Demolition of existing structures; two residential buildings and associated agricultural infrastructure/outbuildings;
- Site clearance of vegetation with the areas as indicated by the Plan of Proposal (Appendix A);
- Bulk earthworks to create level development pads for future construction
- Creation of construction access and lay down area
- Playground area and amenities
- Internal road works, driveways etc
- Associated drainage works, services and landscaping
- Access via the adjoining development sites to the north, south, east and west.

Project Context

The proposal intends to develop lots Lot 32 DP778111 and Lot 31 DP778111 for the purposes of a subdivision containing up to 264 lots, over an area of approximately 30.20 ha. The proposal will retain up to 1.70 ha of native vegetation within the detailed design, with areas retained to incorporate a park space and a stand of forested vegetation along the northern boundary of the site. It is anticipated that the remainder of the two lots will be cleared, with some retention of individual trees were allowable based on final design. Noting that total loss is assumed in this assessment.

Refer to **Appendix A** for plans of the proposal.

1.2 Aims & Objectives

The thresholds for clearing is dependent on the minimum lot size applicable to the land under the relevant Local Environmental Plan (Refer to **Table 1**).

Table 1: Clearing Thresholds (BC Act Regulation 2020)

Minimum lot size associated with the property	Threshold for clearing, above which the BAM 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 Study Area has a minimum lot size of 450 m^2 (0.045 ha) with clearing of up to 24.65 ha of native vegetation (>0.25 ha), therefore exceeds the area clearing threshold triggering entry into the Biodiversity Offsets Scheme (BOS).

In accordance with Section 6.2 of the *Biodiversity Conservation Act 2016* an accredited assessor must prepare and submit a Biodiversity Development Assessment Report (BDAR) to the approval authority (MCC) as part of the development application.

This BDAR is based on an application of the NSW Biodiversity Assessment Methodology 2020 (BAM), which provides a framework for assessing development impact on biodiversity. A two-stage investigation path was performed in accordance with the BAM as listed below:

Stage 1 – Biodiversity Assessment; and

Stage 2 – Impact Assessment.

This report sets out the minimum BAM assessment requirements for the preparation of a BDAR in Appendix K of the BAM (2020).

In addition, preliminary assessment was also undertaken having regard to those threatened entities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

1.3 Site Particulars

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

- Study Area – Refers to the two lots
- Subject Land – Refers to the impact area.

Locality	The Subject land is located in Chisholm, NSW
Land Title	Lot 31 DP778111, 507 Raymond Terrace Road; and Lot 32 DP778111, 173 McFarlanes Road, Chisholm
LGA	Maitland City Council
Area	Lot (Study Area) – 20.17 ha, 10.11 ha and 0.34 ha Paper Road Subject land – 30.62 ha
Zoning	R1 – General Residential RU2 – Rural Landscape
Boundaries	The study area is bounded rural properties to the north, and east. To the west exists a moderately sized forested area. To the south is Raymond Terrace Road before continuation of rural properties. Higher density housing exists in the township of Thornton.
Current Land Use	The land is currently managed through low density livestock grazing with multiple small dams located within the subject land. Both lots contain residential dwellings and associated infrastructure such as sheds, garages, driveways and outbuildings.
Topography	The study area occurs on low-lying hills that adjoin the floodplains on the Hunter River catchment. The study area contains undulations and gully's ranging from 6 m to 26 m ASL.

1.4 Qualifications & Licencing

Qualifications

This BDAR has been prepared by Coral Pearce (BAAS# 21024), under the guidance of Matt Doherty (BAAS# 17044) both accredited BAM Assessors.

Vegetation delineation and BAM floristic plots conducted by Josh Smart and Phoebe Smith. Targeted survey works conducted by Josh Smart, Robert Fay, Chris Spraggon, Ross Duncan, Ali Bragg and Max Manion-Sharrock of MJD Environmental (Aust) Pty Ltd; see **Appendix J** for full list and qualifications.

Licencing

Research was conducted under the following licences:

- NSW National Parks and Wildlife Service Scientific Investigation Licence SL101684 (Valid 31 March 2024).
- Animal Research Authority (Trim File No: 16/170) issued by NSW Government – Regional NSW on recommendation of Animal Care and Ethics Committee (Valid 8 February 2027).

LOT 32 DP778111, LOT 31 DP778111, 173 MCFARLANES ROAD & 507 RAYMOND TERRACE ROAD, CHISHOLM

0 100 200 300 400

Metres

1:6000

FIGURE 1: SITE LOCATION

Legend

- Study Area
- Subject Land
- Cadastral Boundary

Riparian Corridor Width

- 20 m
- 40 m

Watercourse

- 1st Order Stream
- 2nd Order Stream

N W E S

MJD Environmental

Aerial: Nearmap (2023) | Data: MJD Environmental, ADW Johnson, NSW Spatial Services (2023) | Datum/Projection: GDA2020 / MGA zone 56 | Date: 22/05/2023 | Version: 1 | Z:\20039 - 173 Mcfarlanes Road, Chisholm | This plan should not be relied upon for critical design dimension.

STAGE 1 BIODIVERSITY ASSESSMENT

2 Landscape Context

2.1 Landscape Features

The following section provides a description of the landscape features within the Study Area and surrounding 1,500 m buffer as outlined in Section 3 of the BAM (2020).

2.1.1 Interim Biogeographic Regionalisation of Australia (IBRA)

Bioregion

The Subject Site occurs wholly within the Sydney Basin Bioregion. The Sydney Basin Bioregion comprises of Mesozoic sandstones and shales; dissected plateaus: forest, woodlands and heaths: The soils are primarily skeletal soils, sands and podzolics (Thackway & Cresswell 1995).

This Bioregion borders NSW North Coast to north: Nandewar and Brigalow Belt south to the north and the South Eastern Highlands in the south.

Subregion

The Study Area occurs wholly within the Hunter subregion.

2.1.2 Mitchell Landscapes

The Study Area occurs wholly within the Sydney Basin – Hunter – *Newcastle Coastal Ramp (Nrm).*

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.

2.1.3 Rivers, Streams, Estuaries and Wetlands

The Study Area is located ~3.2 km to the south of the Hunter River. There are no mapped watercourses present within the subject land, with the exception of a portion of a 1st order stream which is mapped as crossing the north-western boundary of the subject land. However, ground truthing of this watercourse identified only a low-lying area which across as a drainage which crosses into the neighbouring lot at an elevation of 4 m a.s.l.

The subject land would have historically contained watercourses which have been dammed. The southern portion of the subject land contains a dam, the overflow of which connects to the neighbouring dm becoming a 1st order watercourse to the east. This water course connects a series of four dams across lots to the west and east, until connecting to a 2nd order watercourse off-site. This is functionally a tributary of Francis Greenway Creek to the south east; eventually joining the Hunter River.

2.1.4 Connectivity

The subject land is situated within a fragmented rural landscape situated north east of Chisholm, within the Maitland LGA. The subject land provides connectivity to the broader patch of wooded vegetation however this is ultimately isolated; terminating at the residential development of Thornton to the south, Chisholm to the west, and heavily cleared agricultural lands to the north and east.

Forested areas occur directly to the east and west with C3 Environmental Management zoned lands abutting the subject land.

2.1.5 Areas of Geological significance and soil hazard features

No karsts, caves, crevices or cliffs or other areas of geological significance occur in or adjacent to the subject site.

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

2.1.6 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.

2.2 Site Context

The site context was assessed for the Study Area and wider area via desktop assessment of, Aerial Photograph Interpretation (API) using GIS Software and site visit. Site context considerations included native woody cover and patch size in accordance with section 3.2 of the BAM (2020).

2.2.1 Native Vegetation Cover

The native vegetation cover of the Subject Site and 1,500 m buffer was carried out by API of high-quality aerial photography using GIS Software (Map Info), and the State Vegetation Type Map (SVTM) as well as consultation of local vegetation mapping data *Lower Hunter Vegetation Mapping* (Cockerill *et al* 2013).

Native vegetation cover has been assessed as 37%.

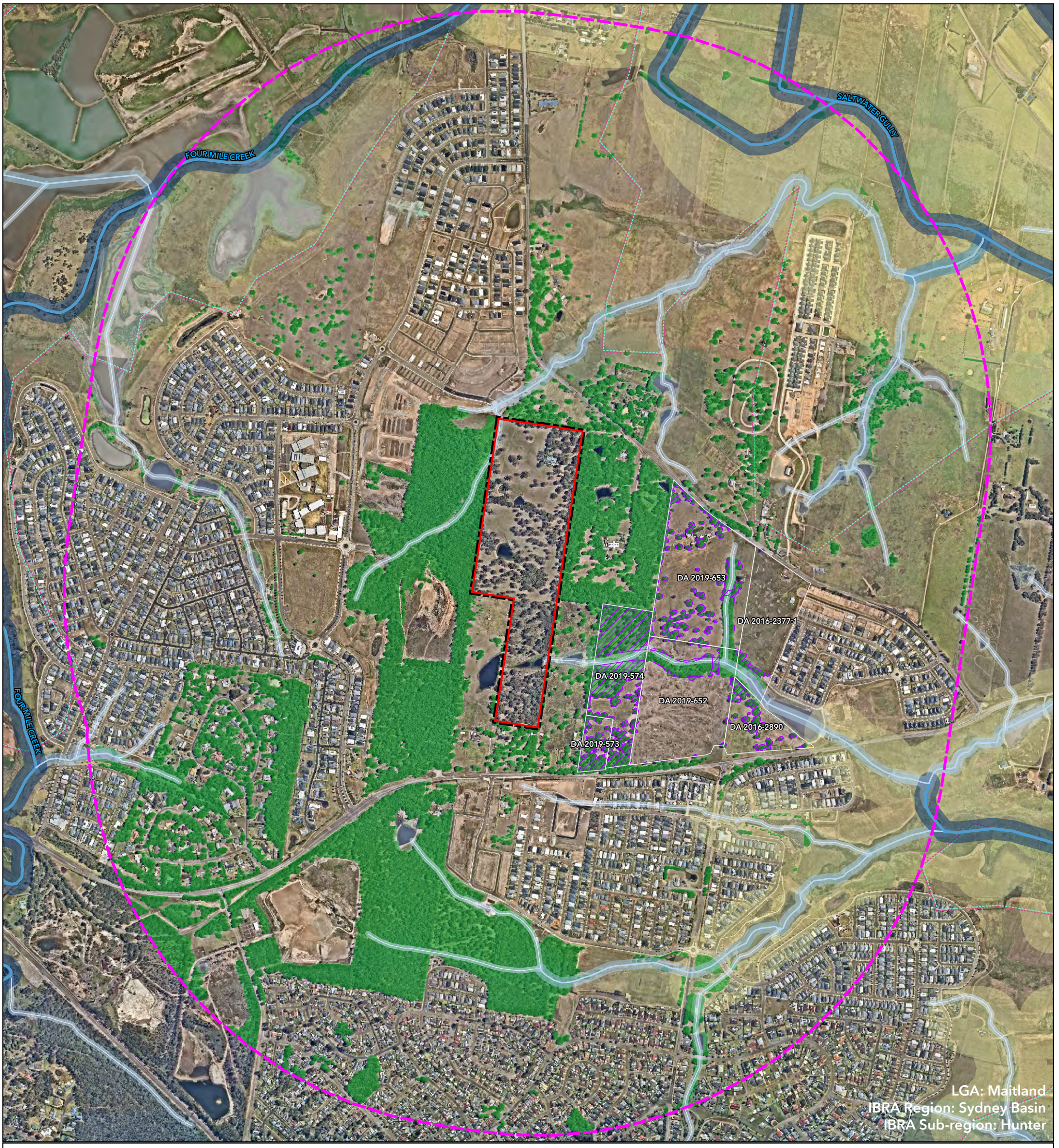
Refer to **Figure 2**.

2.2.2 Patch Size

A patch is defined in the BAM as:

an area of intact native vegetation that occurs on the Subject Site. The patch may extend onto adjoining land beyond the footprint of the Subject Site, and for woody ecosystems, includes native vegetation separated by ≤100 metres from the next area of intact native vegetation. For non-woody vegetation, this gap is reduced to ≤30 metres.

Patch size for the Study Area has been assessed using the methods outlined above in Section 4.3.2 and it has been determined that the patch size is greater than 100 ha.



LOT 32 DP778111, LOT 31 DP778111, 173 MCFARLANES ROAD & 507 RAYMOND TERRACE ROAD, CHISHOLM

0 200 400 600 800

Metres

1:13500

FIGURE 2: NATIVE VEGETATION EXTENT

Legend

- Study Area
- Subject Land
- 1500m Buffer from Site Boundary
- Coastal Wetland Proximity Area (Coastal SEPP 2018)
- Partial Clearing per DA Approval
- Native Vegetation

Riparian Corridor Width

- 20 m
- 40 m
- 60 m
- 80 m

Mitchell Landscape

- Lower Hunter Channels and Floodplains
- Newcastle Coastal Ramp

Watercourse

- 1st Order Stream
- 2nd Order Stream
- 3rd Order Stream
- 4th Order Stream

N W E S

MJD Environmental

Aerial: Nearmap (2023) | Data: MJD Environmental, NSW Spatial Services (2023), NSW Office of Environment and Heritage (2016) | Datum/Projection: GDA2020 / MGA zone 56 | Date: 23/05/2023 | Version: 3 | Z:\20039 - 173 Mcfarlanes Road, Chisholm | This plan should not be relied upon for critical design dimension.

3 Native Vegetation

3.1 Preliminary Vegetation Review

A desktop analysis of vegetation within the Study Area and its surrounds were informed by large-scale vegetation mapping projects and aerial photography to determine potential Plant Community Types (PCT) occurring within the Study Area, they include:

- State Vegetation Type Map C1.1.M1.1 (SVTM 2022);
- *Lower Hunter Vegetation Mapping* (Cockerill *et al* 2013);
- GIS analysis including - Aerial Photograph Interpretation (API) and consultation of topographic map (Scale 1:25,000) layers for the Study Area; and
- OEH VIS Classification Database.

As the BDAR works displayed within this document were prepared prior to the launch of the Eastern NSW PCTs within the BAM-C, and therefore this project is subject to the transitional arrangements. As such, all communities listed here at listed under the Legacy Classification.

3.2 Methodology: Field Assessment

All vegetation survey methods have been carried in accordance with the following documentation and methods:

- *Biodiversity Assessment Methodology (BAM):* Department of Planning, Industry and Environment (DPIE) October 2020;
- *Biodiversity Assessment Method 2020 Operational Manual- Stage 1* Department of Planning, Industry and Environment (DPIE) December 2020;
- *Biodiversity Assessment Method Operational Manual- Stage 2* Department of Planning, Industry and Environment (DPIE) September 2019;
- *Surveying threatened plants and their habitats; NSW survey guide for the Biodiversity Assessment Method* Department of Planning, Industry and Environment (DPIE) April 2020;
- *'Species credit' threatened bats and their habitats; NSW survey guide for the Biodiversity Assessment Method* NSW Office of Environment and Heritage September 2018;
- *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 (DPIE) September 2020; and
- *Threatened reptiles; Biodiversity Assessment Method survey guide* Department of Planning and Environment (DPE) November 2022.

3.2.1 Field Survey

Initial field assessments of vegetation were carried out within the study area between the 7th of May – 12th of May 2020 by Phoebe Smith. Subsequent field surveys have occurred between 1st Oct 2020 – May 2022, all of which conducted in accordance with Biodiversity Assessment Methodology (BAM 2020) and relevant guidelines, with additional assessment methods to assist in gaining an overview of Subject land biodiversity values.

The following methods were used to inform the vegetation survey associated with the BDAR:

- Broad vegetation identification, delineation and stratification into vegetation zones carried out by detailed random meander methods (Cropper 1993);

- Collection of 13 BAM plots/transect based full floristic data as per Section 4 of the BAM, recording the following;
    - Identification of all flora species to genus where identification attributes were present
    - Composition, Structure attributes within 20x20 m plot; and
    - function attributes within the 20X50 m plot
- Collection of Subject land landscape attributes that included, landform, aspect, soil type, detailed descriptions of the vegetation condition, current land use and the current impacts.

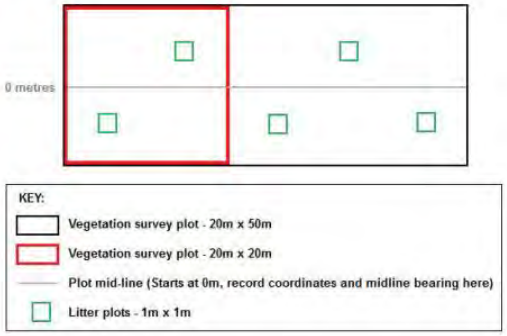


Plate 2: Plot Lay out (BAM Stage 1 Operational Manual Dec 2020)

3.2.2 Hollow Bearing Tree Survey

A comprehensive hollow bearing tree survey was undertaken (February/March 2020) across the subject land, recording all hollow types to inform determination of potential fauna occupation. The following information collected:

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

3.3 Results

3.3.1 Native Vegetation Extent

The subject land is 30.20 ha in size which includes disturbed native and exotic vegetation. The extent of native vegetation has been interpreted using API and ground truthing during field survey works. (Refer to **Figure 3**). Vegetation within the subject land exists both as regenerating woodland from historic clearance/logging in the southern lot and remnant mature canopy within grazed and managed paddocks.

Canopy trees within the subject land vary from semi-young to mature (30 – 70 cm diameter at breast height [DBH]). Areas where non-native vegetation occurs in high abundance is present within the gullies and surrounding dams within the subject lands, likely due to less active land management and the increased moisture.

Identification of PCTs within the subject land was determined using:

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

Two PCTs were identified within the subject land. All PCTs occur within the Hunter subregion of the Sydney Basin Bioregion. The identified PCTs are as follows:

- PCT 1598: *Forest Red Gum grassy open forest on floodplains of the Lower Hunter*
- PCT 1600: *Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box Shrub-grass open forest of the lower Hunter*

Of these, the following Threatened Ecological Community (TEC) are associated;

- BC Act listed Endangered (E): *Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions*
- BC Act listed E: *Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion*
- BC Act listed E: *Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions*
- BC Act listed E: *Central Hunter Ironbark—Spotted Gum—Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions*

PCTs are delineated into a total of six vegetation zones (VZ) driven primarily by condition. Complete VZ descriptions are included in **Section 4.1.** See **Table 2** below for TEC determinations.

Table 2 Threatened Ecological Community associations

Plant Community Type (PCT)	Threatened Ecological Community (TEC) Association	TEC Presence
1598 - *Forest Red Gum grassy open forest on floodplains of the lower Hunter*	BC Act listed Endangered (E) *Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions*	The subject land is located within the Sydney Basin Bioregion with a portion occurring within a depression/drainage flat on Permian sands of the Hunter Valley. The species composition of the Vegetation Zone containing PCT 1598 contains *Eucalyptus tereticornis* with nearby *Eucalyptus moluccana.* The lack of other characteristic species of the community is likely the result of the high level of disturbance within the subject land. Therefore the example of PCT 1598 is precautionary determined to be an example of the TEC

Plant Community Type (PCT)	Threatened Ecological Community (TEC) Association	TEC Presence
		based on landform and functionality of the system.
1598 - *Forest Red Gum grassy open forest on floodplains of the lower Hunter*	BC Act listed E *Subtropical Coastal Floodplain Forest of the New South Wales North Coast Bioregion*	The subject land does not occur in the bioregion associated with this community; therefore the PCT is not an example of the TEC.
1600 - *Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box Shrub-grass open forest of the lower Hunter*	BC Act Listed E *Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions*	The subject land is located within the Sydney Basin Bioregion on Permian sediments within the Hunter Valley. Floristics and landform were considered when determining TEC association. Vegetation within the subject land considered commensurate is limited to VZ1, 2 and 4. The three VZs either contain a canopy species composition in accordance with the assemblage list for the TEC or contain evidence of regeneration of these species. VZ3 is not considered commensurate with the TEC as the zone is void of a canopy, midstratum and signs of regeneration and contains a high cover of exotic perennial grasses.
1600 - *Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box Shrub-grass open forest of the lower Hunter*	BC Act Listed E *Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions*	The subject land is located within the Sydney Basin Bioregion on Permian sediments within the Hunter Valley. Vegetation within the subject land identified as PCT 1600 is floristically similar to the floristics associated with the TEC, however the biogeophyical factors associated with the subject land are more in alignment with the determination that the example of PCT 1600 is an example of Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions, therefore the PCT is not considered commensurate with this TEC.

3.3.2 Vegetation Description

The two PCTs identified as occurring within the subject land have been delineated into five Vegetation Zones (VZs) with delineation primarily driven by variation in management. See **Figure 3** for PCT and VZ stratification.

VZ1

PCT 1600 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter (Scattered Trees with Native Ground Cover)	
Area within Development Area	10.18 ha
Vegetation Formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation Class	Hunter Macleay Dry Sclerophyll Forests
Floristic Description	PCT 1600 represents the majority of vegetation present within the subject land; of that VZ1 is the most dominant VZ spatially. The dominant canopy species include *Corymbia maculata* (Spotted Gum) with *Eucalyptus fibrosa* (Red Ironbark) being the dominant canopy species. Also present are *Eucalyptus umbra* (Broad-leaved White Mahogany) and *Eucalyptus moluccana* (Grey Box) occurring infrequently. The mid stratum is largely absent resultant from land management practices such as slashing and grazing. However, when present it contains scattered *Bursaria spinosa*, *Daviesia ulicifolia* and *Solanum prinophyllum* (Forest Nightshade). The ground stratum is highly managed occurring as a mosaic of native and non-native species, with the dominant native species being *Microlaena stipoides var. stipoides* (Weeping grass). Other native grass species include; *Cynodon dactylon* (Couch), *Rytidosperma* spp., *Echinopogon caespitosus* (Hedgehog Grass), *Entolasia stricta* (Wiry Panic), *Eragrostis brownii* (Brown's Lovegrass), *Paspalidium distans, Aristida vagans* (Threeawn Speargrass), *Cyperus gracilis, Digitaria didactyla* (Queensland Blue Couch), *Cymbopogon refractus* (Barbed-wire Grass), *Digitaria* spp., *Lomandra multiflora* subsp. *multiflora* (Many-flowered Mat-rush), *Juncus usitatus* and *Sporobolus creber* (Slender Rat's Tail Grass). Native forb species present include; *Einadia trigonos subsp. trigonos* (Fishweed), *Dichondra repens* (Kidney Weed), *Goodenia rotundifolia, Lobelia purpurascens* (Whiteroot), *Veronica plebeia* (Trailing Speedwell), *Oxalis chnoodes, Desmodium varians* (Slender Tick-trefoil) with native twiners *Glycine tabacina* and *Glycine clandestina*. Exotic species were prevalent including; *Paspalum dilatatum* (Paspalum), *Soliva sessilis* (Bindy-i), *Sida rhombifolia* (Paddy's Lucerne), *Plantago lanceolata* (Plantain), *Paronychia brasiliensis, Axonopus fissifolius* (Carpet Grass), *Hypochaeris radicata* (Cat's Ears), *Senecio madagascariensis* (Fireweed), *Trifolium repens* (White Clover), *Sporobolus fertilis* (Giant Parramatta Grass) and *Ehrharta erecta* (Panic Veldtgrass).
Condition	Scattered Trees with Native Ground Cover
Structure	The VZ has undergone selective clearing, with remaining canopy present within a mature to semi-mature aged cohort of remnant canopy trees. The midstratum sparse to absent, with typically species unpalatable to cattle remaining. Ground stratum is heavily managed and grazed, therefore though some tussock-forming species are recorded they rarely formed within the pasture.

PCT 1600 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter (Scattered Trees with Native Ground Cover)	
Justification for PCT Selection	This vegetation community presents as a Dry Sclerophyll Forests (Shrub/grass sub-formation) and Hunter Macleay Dry Sclerophyll Forests Class. The subject land is within the Hunter subregion of the Sydney Basin IBRA bioregion located in the mid-lower Hunter Valley. The dominant and subdominant canopy species for PCT 1600 are in alignment with the species within VZ1, specifically noting the presence of *Eucalyptus moluccana* and both *Eucalyptus crebra* and *Eucalyptus fibrosa.* Additionally, midstratum and groundcover species within the VZ fit the floristic characteristic of PCT 1600. Similar PCTs that were discounted included: ▪ PCT 1601 - does not contain *E. moluccana* as a diagnostic species within the community. ▪ PCT 1602 - does not consider *E. fibrosa* a part of the community.
Status	BC Act: *EEC - Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions* VZ 1 was found to be commensurate with the BC Act listed community (see **Table 2**).
	EPBC Act: Not listed

VZ2

PCT 1600 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter (Modified)	
Area within Development Area	5.01 ha
Vegetation Formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation Class	Hunter Macleay Dry Sclerophyll Forests
Floristic Description	VZ 2 occurs within scattered patches, typically adjacent to dams and gullies. It also occurs within the southern portion of the site in areas that have been less disturbed. The VZ contains a greater canopy cover percentage; canopy trees include *E. fibrosa*, *C. maculata, E. acmenoides* with *E. moluccana* occurring infrequently. The midstratum occurs in a higher density with a greater species richness to that of VZ1, species including predominantly *Bursaria spinosa, Solanum prinophyllum, Breynia oblongifolia* and *Daviesia ulicifolia* with *Indigofera australis*. The ground stratum is dominated by the native grass species *Microlaena stipoides var. stipoides* and forb species *Lobelia purpurascens.* Other native groundcover species include; *Brunoniella australis* (Blue Trumpet), *Eremophila debilis* (Winter Apple), *Echinopogon caespitosus var. caespitosus, Entolasia stricta, Commelina cyanea, Oxalis chnoodes, Cyperus gracilis, Pseuderanthemum variable* (Pastel Flower), *Lomandra filiformis subsp. filiformis* (Wattle Mat-rush), *Caesia parviflora* (Pale Grass-lily), *Einadia trigonos subsp. trigonos, Plectranthus parviflorus* (Cockspur Flower), *Desmodium varians, Juncus usitatus, Aristida vagans*, and *Cymbopogon refractus*. Exotic groundcover species include*; Ehrharta erecta, Sida rhombifolia, Senecio madagascariensis, Plantago lanceolata, Paronychia brasiliensis, Hypochaeris radicata* and *Sonchus oleraceus* (Common Sowthistle). Native vines and twiners were also present including; *Clematis glycinoides var. glycinoides* (Headache Vine), *Parsonsia straminea* (Common Silkpod), *Glycine clandestina* and *G. tabacina*. Groundfern species *Cheilanthes sieberi subsp. sieberi* (Poison Rock Fern) and *Cheilanthes distans* (Bristly Cloak Fern) were also present. The exotic species Lantana camara was also observed in low numbers within this area.
Condition	Moderate
Structure	The VZ has undergone selective clearing however has not been managed (slashed) as frequently due to the VZ's presence within the landscape. Therefore, a greater abundance and richness of mid and ground stratum species has proliferated; though still impacted by active grazing and historic management. The increased moisture levels associated within the gullies and drainage lines also influencing the floristics of the VZ, noting the increased fern and forb species.

PCT 1600 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter (Modified)	
Justification for PCT Selection	As listed within VZ1, the VZ presents as a Dry Sclerophyll Forests (Shrub/grass sub-formation) and Hunter Macleay Dry Sclerophyll Forests Class. The subject land is within the Hunter subregion of the Sydney Basin IBRA bioregion located in the mid-lower Hunter Valley. The dominant and subdominant canopy species for PCT 1600 are in alignment with the species within VZ1, specifically noting the presence of *Eucalyptus moluccana* and both *Eucalyptus crebra* and *Eucalyptus fibrosa.* Additionally, midstratum and groundcover species within the VZ fit the floristic characteristic of PCT 1600. Similar PCTs that were discounted included: ▪ PCT 1601 - does not contain *E. moluccana* as a diagnostic species within the community. ▪ PCT 1602 - does not consider *E. fibrosa* a part of the community.
Status	BC Act: *EEC - Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions* VZ 2 was found to be commensurate with the BC Act listed community (see **Table 2**).
	EPBC Act: Not listed

VZ 3

PCT 1600 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter (Pasture)	
Area within Development Area	6.30 ha
Vegetation Formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation Class	Hunter Macleay Dry Sclerophyll Forests
Floristic Description	VZ 3 occurs in large distinct patches across the subject land; a derived grassland from the historically cleared PCT 1600 forest community. The VZ does not contain an upper or mid stratum, being maintained by slashing and active cattle grazing. The ground stratum is contains a mosaic of native and non native species occurring over highly compacted soils. *Cynodon dactylon* is the main native grass species present, followed by the exotic grass species *Paspalum dilatatum.* Other native grass species present include; *Digitaria didactyla, Microlaena stipoides var. stipoides, Eragrostis brownii, Sporobolus creber, Dichelachne crinita, Aristida vagans, Cyperus gracilis*, and *Juncus usitatus*. Native forb species present include; *Desmodium varians, Cotula australis* and *Oxalis perrenans.* Other exotic grass species present include; *Axonopus fissifolius*, *Sporobolus fertilis* with exotic forb species; *Trifolium repens, Sida rhombifolia, Soliva sessilis, Hypochaeris radicata* and *Plantago lanceolata.*
Condition	Poor – Pasture
Structure	Due to historic and current land management practices this VZ occurs as a derived grassland managed as pasture for grazing livestock. Therefore, upper stratum species are absent with only the ground stratum remaining.
Justification for PCT Selection	As the VZ is a derived community resultant from the clearance of the surrounding examples of PCT 1600 Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest, it is assigned to this PCT albeit in a poor condition. The majority of the diagnostic features of the community are therefore absent. Determination is based on the presence of the parent woodland as per BAM Operations Manual 1 (2020), Section 3.3.1.
Status	BC Act: *EEC - Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions* VZ 3 was found to not be commensurate with the BC Act listed community (see **Table 2**).
	EPBC Act: Not listed

PCT 1600 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter (Pasture)

VZ 4

PCT 1600 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter (Regenerating/Disturbed)	
Area within Development Area	2.53 ha
Vegetation Formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation Class	Hunter Macleay Dry Sclerophyll Forests

PCT 1600 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter (Regenerating/Disturbed)	
Floristic Description	VZ 4 is present as a disturbed area that has more recently been cleared, therefore minimal canopy is present with the VZ being dominated by the mid stratum. The canopy species, where present, are *E. fibrosa* and *C. maculata* with *E. moluccana* occurring infrequently. Due to the recent disturbance this VZ contains a high number of juvenile Eucalypts. The mid stratum becoming dense in places containing mainly *Bursaria spinosa, Daviesia ulicifolia, Pultenaea spinosa* and *Acacia parvipinnula*. The groundcover comprises mainly the native grass species *Microlaena stipoides var. stipoides, Themeda triandra* and forb species *Lobelia purpurascens.* Other native groundcover species include; *Brunoniella australis* (Blue Trumpet), *Goodenia rotundifolia, Echinopogon caespitosus* var. *caespitosus, Entolasia stricta, Commelina cyanea, Oxalis chnoodes, Fimbristylis dichotoma* (Common Fringe-sedge), *Lomandra multiflora* (Many-flowered Mat-rush), *Einadia nutans, Desmodium rhytidophyllum, Juncus usitatus, Aristida vagans,* and *Cymbopogon refractus.* Exotic groundcover species include; *Ehrharta erecta, Sida rhombifolia, Senecio madagascariensis, Plantago lanceolata, Hypochaeris radicata* and *Sonchus oleraceus* (Common Sowthistle). Native vines and twiners were also present including; *Parsonsia straminea* (Common Silkpod), *Glycine clandestina* and *Glycine tabacina.* Groundfern species were limited to *Cheilanthes sieberi subsp. sieberi* (Poison Rock Fern). The exotic species Lantana camara was also observed in low numbers within this area, alongside dense areas of *Verbena bonariensis* (Tall Purpletop) and *Biden pilosa* (Farers Fiend).
Condition	Regenerating/Disturbed
Structure	Due to historic and current land management practices this VZ occurs as a regenerating patch dominated by pioneer mid stratum species and young Eucalypts.
Justification for PCT Selection	PCT determination followed the same process as with VZ1, 2 and 3 as the VZ is a contiguous with the neighbouring zones of the same community.
Status	BC Act: *EEC - Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions* VZ 4 was found to be commensurate with the BC Act listed community (see **Table 2**).
	EPBC Act: Not listed

PCT 1600 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter (Regenerating/Disturbed)

VZ5

PCT 1598 – Forest Red Gum grassy open forest on floodplains of the lower Hunter (Moderate)	
Area within Development Area	0.62 ha
Vegetation Formation	Forested Wetlands
Vegetation Class	Coastal Floodplain Wetlands
Floristic Description	The VZ occurs within the northwest corner of the of the subject land and contains a distinctly different community; both structurally and floristically. Canopy species present include; *Eucalyptus tereticornis* (Forest Redgum), *Corymbia maculata* and *Eucalyptus acmenoides.* The mid stratum contains predominantly *Bursaria spinosa* in high abundance. The native grass species *Microlaena stipoides var. stipoides* which is most prevalent in this area, followed by *Digitaria didactyla* and *Cynodon dactylon.* Other native Groundcover species present include; *Viola hederacea, Dichondra repens, Juncus usitatus, Entolasia stricta, Eragrostis brownii, Echinopogon caespitosus* var. *caespitosus, Pelargonium inodorum, Plectranthus parviflorus, Lobelia purpurascens, Veronica plebeia, Cyperus imbecillis, Desmodium varians, Sporobolus creber, Brunoniella australis, Paspalidium distans* and *Einadia hastata*. Exotic groundcover species present include; *Sida rhombifolia, Plantago lanceolata, Senecio madagascariensis, Paspalum dilatatum, Setaria parviflora, Hypochaeris radicata, Sonchus oleraceus, Ehrharta erecta, Solanum nigrum* (Blackberry Nightshade), *Soliva sessilis, Trifolium repens* and *Lysimachia arvensis* (Scarlet Pimpernel).
Condition	Moderate
Structure	The VZ occurs within a lower elevation adjacent to a mapped 1st order stream. The floristics of the ground stratum are distinctly different within this VZ as a result of the high soil moisture, with dense stands of Bursaria spinosa also characteristic of the VZ. The zone appears to be less heavily grazed by cattle.
Justification for PCT Selection	PCT determination followed the same process as with VZ1, 2 and 3 as the VZ is a contiguous with the neighbouring zones of the same community.
Status	BC Act: *EEC - Hunter Lowlands Redgum Forest in the Sydney Basin and NSW North Coast Bioregions* VZ 5 was found to be commensurate with the BC Act listed community (see **Table 2**).
	EPBC Act: Not listed

PCT 1598 – Forest Red Gum grassy open forest on floodplains of the lower Hunter (Moderate)

LOT 32 DP778111, LOT 31 DP778111, 173 MCFARLANES ROAD & 507 RAYMOND TERRACE ROAD, CHISHOLM

FIGURE 3: PLANT COMMUNITY TYPE AND VEGETATION ZONE

0 60 120 180 240

Metres

1:3800

Legend

- Study Area
- Subject Land
- Cadastral Boundary
- Survey Transect
- BAM Plot

Incidental Observations

- Grey-crowned Babbler Nest
- Grey-crowned Babbler (Vulnerable)
- Hollow Bearing Tree
- Little Lorikeet (Vulnerable)

Vegetation

- VZ1 - PCT 1600 Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter (Scattered Trees with Native Ground Cover)
- VZ2 - PCT 1600 Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the Lower Hunter (Moderate)
- VZ3 - PCT 1600 Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the Lower Hunter (Pasture - Native and Exotic)
- VZ4 - PCT 1600 Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the Lower Hunter (Regenerating/Disturbed)
- VZ5 - PCT 1598 Forest Red Gum grassy open forest on floodplains of the Lower Hunter (Moderate Condition)

N W E S

MJD Environmental

Aerial: Nearmap (2023) | Data: MJD Environmental, ADW Johnson, NSW Spatial Services (2023) | Datum/Projection: GDA2020 / MGA zone 56 | Date: 22/05/2023 | Version: 1 | Z:\20039 - 173 Mcfarlanes Road, Chisholm | This plan should not be relied upon for critical design dimension.

4 Vegetation Integrity Assessment

Native vegetation identified on site has been delineated into two PCTs – PCT 1600 and PCT 1598. PCT 1600 is delineated into four (4) VZs, while PCT 1598 was categorised as a singular VZ. These vegetation zones were delineated based on the condition of vegetation, observation of distinct change or variation in the vegetation based on attributes such as age, observable disturbance (past and present), exotic species presences and structural difference within floristics of each stratum.

The subject land contained the following five (5) vegetation zones:

- VZ 1: 1600_ScatteredTrees with native ground cover
- VZ 2: 1600_Moderate
- VZ 3: 1600_Pasture – Native and Exotic
- VZ 4: 1600_Regenerating/Disturbed
- VZ 5: 1598_Moderate

The following table provides a brief description of the vegetation zones justifying the categorisation.

Thirteen full floristic BAM plots were conducted. The number of plots carried out are in accordance with the minimum required plots per area as outlined in Table 3 of the BAM (2020).

4.1 Vegetation Integrity Assessment results

A total of 137 plant species were identified within thirteen plots comprising 113 native species and 24 exotic species. The results of the plot field data and a flora species list can be found in **Appendix B** and **Appendix C**.

The plot data from the vegetation plot was entered into the BAM-C calculator and the results of the vegetation integrity assessment is summarised in **Table 2**.

Table 3 Vegetation Integrity Results

Vegetation Zone	No. of Plots	Composition Condition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score (V.I)	TEC
VZ 1 –1600_ScatteredTrees	3	61.8	69.5	31.8	**51.5**	Yes
VZ 2 –1600_Moderate	3	75.1	65.5	54.2	**64.4**	Yes
VZ 3 –1600_Pasture	3	24.3	29.0	0.9	**8.5**	No
VZ 4 –1600_Regenerating/Disturbed	2	83.4	45.1	38.6	**52.5**	Yes
VZ 5 –1598_Moderate	1	68.4	72.9	34.9	**55.8**	Yes

- As outlined in section 9.2.1 of the BAM biodiversity offset credits are required for native vegetation where the vegetation integrity score:
    - is ≥15 where the PCT is representative of an endangered or critically endangered ecological community; or
    - is ≥17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or is representative of a vulnerable ecological community: or
    - is ≥20 where the PCT is not representative of a TEC or associated with threatened species habitat.

5 Threatened Species

5.1 Desktop Assessment

A review of threatened species information was undertaken to provide context and understanding of biodiversity values occurring within the subject land Information reviewed included:

- Online database searches involving a 10-km buffer 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 28th May 2020 and continually during BDAR production)
    - Commonwealth Protected Matters of National Significance search tool (accessed May 2023)
- BioNet Vegetation Classification – Threatened species associated with known PCTs to occur within the Study Area.

5.2 Ecosystem Credit Species

Ecosystem Credit Species are reliably predicted to occur by vegetation surrogates and landscape features. An assessment of the habitat suitability for each predicted species was undertaken to determine the presences or potential utilisation of the Subject Site as part of their home range. These species are presented in **Table 3**.

Table 4 Ecosystem Credit Species

Scientific Name	Common Name	BC Act	EPBC Act	PCT 1600	PCT 1598	Habitat Present
**Anthochaera phrygia*	Regent Honeyeater (foraging)	CE	CE	X		Yes
**Callocephalon fimbriatum*	Gang-gang Cockatoo (foraging)	V		X		Yes
**Calyptorhynchus lathami*	Glossy Black Cockatoo (foraging)	V		X		No
Chthonicola sagittata	Speckled Warbler	V		X	X	Yes
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V		X	X	Yes
Daphoenositta chrysoptera	Varied Sittella	V		X	X	Yes
Dasyurus maculatus	Spotted-tailed Quoll	V	E	X	X	Yes
Falco subniger	Black Falcon	V			X	Yes
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V		X		Yes
Glossopsitta pusilla	Little Lorikeet	V		X	X	Yes
Grantiella picta	Painted Honeyeater	V	V	X		Yes
**Haliaeetus leucogaster*	White-bellied Sea-eagle	V		X	X	Yes
**Hieraaetus morphnoides*	Little Eagle	V		X		Yes
Hirundapus caudactus	White-throated Needletail		V	X	X	Yes

Scientific Name	Common Name	BC Act	EPBC Act	PCT 1600	PCT 1598	Habitat Present
**Lathamus discolor*	Swift Parrot	E	CE	X		Yes
**Lophoictinia isura*	Square-tailed Kite (Foraging)	V		X		Yes
Melanodryas cucullate cucullata	Hooded Robin (south-eastern form)	V		X	X	Yes
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V		X		Yes
Micronomus norfolkensis	Eastern Coastal Freetail-bat	V		X		Yes
**Miniopterus australis*	Little Bent-wing-bat	V		X		Yes
**Miniopterus orianae oceansis*	Large Bent-wing bat	V		X		Yes
Neophema pulchella	Turquoise Parrot	V		X		Yes
**Ninox connivens*	Barking Owl (Foraging)	V		X	X	Yes
**Ninox strenua*	Powerful Owl (Foraging)	V		X		Yes
Petaurus australis	Yellow-bellied Glider	V		X		Yes
Petroica boodang	Scarlet Robin	V		X	X	Yes
Pomatostomus temporalis temporalis	Grey-crowned Babbler (eastern subspecies)	V		X		Yes
Pteropus poliocephalus	Grey-headed Flying Fox (Foraging)	V	V	X		Yes
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V		X		Yes
Scoteanax rueppellii	Greater Broad-nosed Bat	V		X		Yes
Stagonopleura guttata	Diamond Firetail	V		X		Yes
**Tyto novaehollandiae*	Masked Owl	V		X		Yes

Key:

V = Vulnerable E = Endangered CE = Critically Endangered * Dual Credit Species

The vegetation within the Subject Land has been assessed to provide marginal suitable habitat for all species listed above. It is therefore assumed that these species may utilise the subject land for foraging opportunities.

Table 5 Ecosystem Credit Species assessed as habitat not occurring within the Subject land

Scientific Name	Common Name	Habitat requirement	Unsuitable PCT	Habitat Constraint
Birds				
Anthochaera phrygia	Regent Honeyeater (Foraging)	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. The species range is between north-eastern Victoria and south-eastern Queensland. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In the last 10 years Regent Honeyeaters have been recorded in urban areas around Albury where woodlands tree species such as Mugga Ironbark and Yellow Box were planted 20 years ago. The Regent Honeyeater is a generalist forager, although it feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. The species is associated with PCTs 1600. VZ1, 2, 4 and 5 provide potential foraging for the species due to the presence of winter flowering gum species such as *C. maculata, E. fibrosa, E. siderophloia* and *E. moluccan.* VZ 3 does not support potential habitat for the species as they do not contain upper stratum species as they are present within a pasture setting post disturbance ie no Eucalypts are present	1600 – VZ3	Yes
Calytorhynchus lathami	Glossy Black-Cockatoo (Foraging)	The Glossy Black-Cockatoo is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. An isolated population exists on Kangaroo Island, South Australia. Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (*A. torulosa*) are important foods. Inland populations feed on a wide range of sheoaks, including Drooping Sheoak, *Allocasuaraina diminuta*, and *A. gymnathera*. Belah is also utilised and may be a critical food source for some populations. In the Riverina, birds are associated with hills and rocky rises supporting Drooping Sheoak, but also recorded in open woodlands dominated by Belah (*Casuarina cristata*). Feeds almost exclusively on the seeds of several species of she-oak (Casuarina and Allocasuarina species), shredding the cones with the massive bill. Dependent on large hollow-bearing eucalypts for nest sites. A single egg is laid between March and May.	1600_VZ1, 1600_VZ2, 1600_VZ3, 1600_VZ4, 1600_VZ5,	Yes

Scientific Name	Common Name	Habitat requirement	Unsuitable PCT	Habitat Constraint
		The species requires the presence of Allocasuarina and Casuarina species for foraging browse. Browse species are not present in VZ1, 2, 3, 4 or 5 therefore other areas within subject land are not considered to contain suitable foraging habitat for the species.		
Chthonicola sagittata	Speckled Warbler	The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth and an open canopy. The species is associated with PCTs 1600. VZ1, 2, 4 and 5 provide potential habitat for the species due to the forest formation. VZ3 does not contain the structural complexity to support the species.	1600 – VZ3	Yes
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (*Eucalyptus camaldulensis*) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains. The species is associated with PCTs 1600. VZ1, 2, 4 and 5 provide potential habitat for the species due to the forest formation. VZ3 does not contain the structural complexity to support the species.	1600 – VZ3	Yes
Daphoenositta chrysoptera	Varied Sittella	Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. The species is associated with PCTs 1600. VZ1, 2, 4 and 5 provide potential habitat for the species due to the forest formation. VZ3 does not contain the structural complexity to support the species.	1600 – VZ3	Yes
Glossopsitta pusilla	Little Lorikeet	Forages primarily in the canopy of open Eucalyptus Forest and woodland, yet also finds food in Angophora, Melaleuca and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity. Isolated flowering trees in open country, e.g. paddocks, roadside remnants and urban trees also help sustain viable populations of the species. Feeds mostly on nectar and pollen, occasionally on native fruits such as mistletoe, and only rarely in orchards.	1600 – VZ3	Yes

Scientific Name	Common Name	Habitat requirement	Unsuitable PCT	Habitat Constraint
		The species is associated with PCTs 1600. VZ1, 2, 4 and 5 provide potential habitat for the species due to the forest formation. VZ3 does not contain the structural complexity to support the species nor feed trees.		
Grantiella picta	Painted Honeyeater	This species occurs in Boree/ Weeping Myall (*Acacia pendula*), Brigalow (*A. harpophylla*) and Box-Gum Woodlands and Box-Ironbark Forest. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus *Amyema* and requires presence of mistletoes at a density greater than five mistletoes per hectare. No mistletoe species were observed within VZ3, as such this is considered a habitat constraint, and is unlikely to occur within this VZ.	1600_VZ3	Yes
Lathamus discolor	Swift Parrot	Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Forest Red Gum *E. tereticornis*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens.* Commonly used lerp infested trees include Inland Grey Box *E. microcarpa*, Grey Box *E. moluccana*, Blackbutt *E. pilularis*, and Yellow Box *E. melliodora*. The species is associated with PCTs 1600. VZ1, 2, and 4 provide potential habitat for the species due to the forest formation containing potential feed trees. VZ3 does not contain the relevant species.	1600_VZ3	Yes
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Occupies mostly upper levels of drier open forests or woodlands dominated by box and ironbark eucalypts, especially Mugga Ironbark (*Eucalyptus sideroxylon*), White Box (*E. albens*), Inland Grey Box (*E. microcarpa*), Yellow Box (*E. melliodora*), Blakely's Red Gum *(E. blakelyi*) and Forest Red Gum (*E. tereticornis*). Also inhabits open forests of smooth-barked gums, stringybarks, ironbarks, river sheoaks (nesting habitat) and tea-trees. The species is associated with PCTs 1600. VZ1, 2, and 4 provide potential habitat for the species due to the forest formation containing potential feed trees. VZ3 does not contain the relevant species.	1600_VZ3	Yes
Mammals				
Falsistrellus tasmaniensis	Eastern False Pipistrelle	The Eastern False Pipistrelle is found on the south-east coast and ranges of Australia, from southern Queensland to Victoria and Tasmania. Prefers moist	1600 – VZ3	Yes

Scientific Name	Common Name	Habitat requirement	Unsuitable PCT	Habitat Constraint
		habitats, with trees taller than 20 m. Generally roosts in eucalypt hollows, but has also been found under loose bark on trees or in buildings. The species is associated with PCTs 1600. VZ1, 2, 4 and 5 provide potential habitat for the species due to the forest formation. VZ3 does not contain the structural complexity to support the species.		
Miniopterus australis	Little Bent-winged Bat	Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. The species is associated with PCTs 1600. VZ1, 2, 4 and 5 provide potential habitat for the species due to the forest formation. VZ3 does not contain the structural complexity to support the species.	1600 – VZ3	Yes
Petaurus australis	Yellow-bellied Glider	Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. The species is associated with PCTs 1600. VZ1, 2, 4 and 5 provide potential habitat for the species due to the forest formation. VZ3 does not contain the structural complexity to support the species.	1600 – VZ3	Yes

5.3 Species Credit Species

Species Credit Species (Candidate Species) are species that cannot be reliably predicted to use an area based on habitat surrogates. Species credit species that have potential to occur within the Subject Site must be surveyed to determine presences/absence or provide an expert report. In the absence of either of these the species will be presumed to be present within the Subject Site.

The conditions of vegetation and habitat within the Subject Site can be assessed by an accredited assessor to have sufficient degradation of key habitat constraints associated with species credits species, therefore is unlikely to utilise the Subject Site and not requiring further assessment. These species are identified in **Table 5** and a habitat assessment for species credit species in **Table 6**.

Table 6 Species Credit Species

Scientific Name	Common Name	BC Act	EPBC Act	Habitat Constraint / Geographic Limitation	Species is Vagrant	Confirmed Candidate Species
Acacia bynoeana	Bynoe's Wattle	E	V	-	No	Yes
Anthochaera phrygia	Regent Honeyeater (Breeding)	CE	CE	As per mapped areas	No	No
Aprasia parapulchella	Pink-tailed Legless Lizard	V	V	Rocky Areas or within 50 m of Rocky Areas	No	No
Burhinus grallarius	Bush-stone Curlew	E	-	Fallen/Standing dead timber including logs	No	Yes
Callistemon linearfolius	Netted Bottle Brush	V	-	-	No	Yes
Callocephalon fimbriatum	Gang-gang Cockatoo	V	E	Hollow-bearing Trees (>9 cm diameter)	No	Yes
Calyptorhynchus lathami	Glossy Black Cockatoo	V	-	Dead/Alive Hollow-bearing Trees (>15 cm diameter)	No	Yes
Cercartetus nanus	Eastern Pygmy-possum	E		-	No	Yes
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Cliffs Within 2 km of Rocky Areas	No	No
Cryptostylis hunteriana	Leafless Tongue Orchid	V	V	-	No	Yes
Cynanchum elegans	White-flowered Wax Plant	E	E	-	No	Yes
Delma impar	Striped Legless Lizard	V	V	-	No	No
Diuris praecox	Rough Doubletail	V	V	Newcastle LGA	No	No
Diuris tricolor	Pine Donkey Orchid	V		-	No	No
Eucalyptus castrensis	Singleton Mallee	E		-	No	Yes
Eucalyptus glaucina	Slaty Red Gum	E		-	No	Yes

Scientific Name	Common Name	BC Act	EPBC Act	Habitat Constraint / Geographic Limitation	Species is Vagrant	Confirmed Candidate Species
Eucalyptus parramattensis subsp. decadens		V	V	-	No	Yes
Eucalyptus pumila	Pokolbin Mallee	V	V	-	No	Yes
Grevillea parviflora subsp. parviflora	Small-flower Grevillea	V	V	-	No	Yes
Haliaeetus leucogaster	White-bellied Sea-eagle (Breeding)	V		Living/Dead mature trees within 1 km of lakes or rivers	No	Yes
Hieraaetus morphnoides	Little Eagle (breeding)	V		Living/Dead mature trees within vegetation	No	Yes
Hoplocephalus bitorquatus	Pale-headed Snake	V		-	No	No
Lathamus discolor	Swift Parrot (Breeding)	E	CE	As per mapped areas	No	No
Litoria aurea	Green and Golden Bell Frog	E	V	Within 1 km of wet areas (swamp / waterbodies)	No	Yes
Litoria brevipalmata	Green-thighed Frog	V		Semi-permanent / Ephemeral wet areas	No	Yes
Lophoictinia isura	Square-tailed Kite (Breeding)	V		Nest Trees	No	Yes
Miniopterus australis	Little Bent-Wing Bat (Breeding)	V		Caves, tunnels or other structures used for suspected breeding	No	Yes
Miniopterus orianae oceanensis	Large Bent-winged Bat (Breeding)	V		Caves, tunnels or other structures used for suspected breeding	No	Yes
Monotaxis macrophylla	Large-leafed Monotaxis	E		-	No	Yes
Myotis macropus	Southern Myotis	V		Hollow bearing trees Within 200 m of riparian zone Bridges, caves or artificial structures within 200 m of riparian zone Waterbodies - This include rivers, creeks, billabongs, lagoons, dams and other waterbodies on or within 200m of the site	No	Yes
Ninox connivens	Barking Owl (Breeding)	V		Dead/Alive Hollow-bearing Trees (>20cm diameter)	No	Yes

Scientific Name	Common Name	BC Act	EPBC Act	Habitat Constraint / Geographic Limitation	Species is Vagrant	Confirmed Candidate Species
Ninox strenua	Powerful Owl (Breeding)	V		Dead/Alive Hollow-bearing Trees (>20cm diameter)	No	Yes
Ozothamnus tesselatus	Ozothamnus tesselatus	V	V	-	No	Yes
Persoonia pauciflora	North Rothbury Persoonia	CE	CE	Within 10km of North Rothbury	No	No
Petauroides volans	Greater Glider	-	V		No	Yes
Petrogale penicillata	Brush-tailed Rock Wallaby	E	V	Land within 1km of Rocky Escarpments/Rocky land formations	No	No
Phascogale tapoatafa	Brush-tailed Phascogale	V		-	No	Yes
Phascolarctos cinereus	Koala (Breeding)	V	V	Presence of koala use trees	No	Yes
Planigale maculata	Common Planigale	V		-	No	Yes
Pomaderris queenslandica	Scant Pomaderris	E		-	No	Yes
Prostanthera cineolifera	Singleton Mint Bush	V	V	-	No	Yes
Pteropus poliocephalus	Grey-headed Flying-Fox (Breeding)	V	V	Breeding Camps	No	No
Pterostylis chaetophora	Pterostylis chaetophora	V	-	-	No	Yes
Rutidosis heterogama	Heath Wrinklewort	V	V	-	No	Yes
Thesium australe	Austral Toadflax	V	V	-	No	Yes

Scientific Name	Common Name	BC Act	EPBC Act	Habitat Constraint / Geographic Limitation	Species is Vagrant	Confirmed Candidate Species
Tyto novaehollandiae	Masked Owl (Breeding)	V		Dead/Alive Hollow-bearing Trees (>20cm diameter)	No	Yes
Vespadelus troughtoni	Eastern Cave Bat	V		Caves, tunnels or other structures used for suspected breeding within 2km of site	No	Yes

Key:

V = Vulnerable E = Endangered CE = Critically Endangered EX = Extinct

Table 7 Species Credit Species Habitat Assessment

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
Acacia bynoeana	Bynoe's Wattle	Yes	The species is currently known from about 30 locations, with the size of the populations at most locations being very small (1-5 plants). Occurs in heath or dry sclerophyll forest on sandy soils. Seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches. Associated overstorey species include Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrow-leaved Apple. No BioNET records of the species occur within 10 kms of the subject land. The vegetation this species is associated with was not detected on site. The species was not detected during threatened flora searches and is therefore assessed as not present.	Absent
Anthochaera phrygia	Regent Honeyeater (Breeding)	No	This species inhabits dry open forest and woodland, particularly Box-Ironbark woodland, and riparian forests of River She-Oak. Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes. Every few years non-breeding flocks are seen foraging in flowering coastal Swamp Mahogany and Spotted Gum forests, particularly on the central coast and occasionally on the upper north coast. The Regent Honeyeater is a generalist forager, although it feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. Key eucalypt species include Mugga Ironbark, Yellow Box, White Box and Swamp Mahogany. Other tree species may be regionally important. For example, the Lower Hunter Spotted Gum forests have recently been demonstrated to support regular breeding events. Flowering of associated species such as Thin-leaved Stringybark *Eucalyptus eugenioides* and other Stringybark species, and Broad-leaved Ironbark *E. fibrosa* can also contribute important nectar flows at times. The subject land supports some preferred feed trees (*Eucalyptus fibrosa, Corymbia maculata*) and vegetation formation suitable for this species, however, is not a Mapped Important Area for breeding nor foraging for this species. No further survey is required.	Absent
Aprasia parapulchella	Pink-tailed Legless Lizard	No	There is a concentration of populations in the Canberra/Queanbeyan Region. Other populations have been recorded near Cooma, Yass, Bathurst, Albury and West Wyalong. This species is also found in the Australian Capital Territory. Inhabits sloping, open woodland	Absent

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
			areas with predominantly native grassy groundlayers, particularly those dominated by Kangaroo Grass (*Themeda australis*). Sites are typically well-drained, with rocky outcrops or scattered, partially buried rocks. Commonly found beneath small, partially embedded rocks and appear to spend considerable time in burrows below these rocks; the burrows have been constructed by and are often still inhabited by small black ants and termites. There are no BioNET records of the species within 10 km. No rock outcrops were recorded within the subject land nor does the subject land contain a high amount of tussock forming grasses due to the current land management. Soil compaction resultant from grazing by hard hoofed stock has resulted in a lack of suitable habitat for the entity. The subject land is not within the known geographic range of the species. Therefore, due to lack of suitable habitat and range, the subject land does not provide habitat for the species. No further assessment required.	
Burhinus grallarius	Bush-stone Curlew	Yes	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and in the south-east it is either rare or extinct throughout its former range. Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber. There are no BioNET records of the species within 10 km. Targeted searches for the species were conducted over multiple nights within the subject land including call-play backs of the species call. The species was not detected.	Absent
Callistemon linearfolius	Netted Bottle Brush	Yes	Recorded from the Georges River to Hawkesbury River in the Sydney area, and north to the Nelson Bay area of NSW. Recorded in 2000 at Coalcliff in the northern Illawarra. Grows in dry sclerophyll forest on the coast and adjacent ranges. There is one (1) historic BioNET record of the species within 10 kms of the subject land. Callistemon species detected on site were identified as *C. linearis*. The species was not detected during threatened flora searches and is therefore not present within the subject land.	Absent
Callocephalon fimbriatum	Gang-gang Cockatoo	Yes	The Gang-gang Cockatoo is distributed from southern Victoria through south- and central-eastern New South Wales. In New South Wales, the Gang-gang Cockatoo is distributed from	Absent

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
			the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. It occurs regularly in the Australian Capital Territory. It is rare at the extremities of its range, with isolated records known from as far north as Coffs Harbour and as far west as Mudgee. In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. Feeds on eucalyptus seeds. One record of the species occurs within 10 km of the subject land. Surveys for this species were conducted during site walkovers each morning and each afternoon whilst opening pitfall arrays during the recommended survey period (January). The species was not detected.	
Calyptorhynchus lathami	Glossy Black Cockatoo	Yes	The Glossy Black-Cockatoo is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. An isolated population exists on Kangaroo Island, South Australia. Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (*A. torulosa*) are important foods. Inland populations feed on a wide range of sheoaks, including Drooping Sheoak, *Allocasuaraina diminuta,* and *A. gymnathera*. Belah is also utilised and may be a critical food source for some populations. In the Riverina, birds are associated with hills and rocky rises supporting Drooping Sheoak, but also recorded in open woodlands dominated by Belah (*Casuarina cristata*). Feeds almost exclusively on the seeds of several species of she-oak (Casuarina and Allocasuarina species), shredding the cones with the massive bill. Dependent on large hollow-bearing eucalypts for nest sites. A single egg is laid between March and May. One record occurs within 10 km of the Subject Site. Surveys were conducted as stag watches of relevant hollow-bearing trees at dusk to determine hollow occupancy. The species was not detected.	Absent
Cercartetus nanus	Eastern Pygmy-possum	Yes	The Eastern Pygmy-possum is found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it extents from the coast inland as far as the Pilliga, Dubbo, Parkes and Wagga Wagga on the western slopes. Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to	Absent

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
			heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum (Pseudocheirus peregrinus) dreys or thickets of vegetation, (e.g. grass-tree skirts). There are no BioNET records of the species within 10 km. The species was not detected during targeted surveys to determine the species composition of arboreal mammals.	
Chalinolobus dwyeri	Large-eared Pied Bat	Yes	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (*Petrochelidon ariel*), frequenting low to mid-elevation dry open forest and woodland close to these features. Found in well-timbered areas containing gullies. The species is a full species credit because it can not be reliably predicted to occur on a site based on vegetation and other landscape features (either foraging or breeding). This species usually gives birth to twins. SAII threshold is potential breeding habitat and presence of breeding individuals. Potential breeding habitat is PCTs associated with the species within 100m of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings. Surveys must be undertaken as per the Threatened Bat Survey Guide to confirm breeding habitat. Habitat constraints listed, within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within 2 kms of old mine tunnels. No suitable habitat was identified within the subject land or immediately adjacent. There is no BioNET records of the species within 10 km of the subject land. The species was not detected via acoustic detection nor was the species captured during Harp Trapping to confirm the presence of breeding individuals within the subject land. Therefore, species credits are not generated for this candidate species. Therefore, no further assessment required.	Absent

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
Cryptostylis hunteriana	Leafless Tongue Orchid	Yes	The Leafless Tongue Orchid has been recorded from as far north as Gibraltar Range National Park south into Victoria around the coast as far as Orbost. It is known historically from a number of localities on the NSW south coast and has been observed in recent years at many sites between Batemans Bay and Nowra (although it is uncommon at all sites). Also recorded at Nelson Bay, Wyee, Washpool National Park, Nowendoc State Forest, Ku-Ring-Gai Chase National Park and Ben Boyd National Park. Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. There are no BioNET records of the species within 10 km. The species is associated with PCT 1600 only. The subject land is highly disturbed by land clearing and active cattle grazing. Due to heavy soil compaction the species is unlikely to be present within the subject land. Further, if the species were to have been present historically it would likely be selectively grazed by cattle. In addition, the species was not detected during threatened flora searches (January) and is therefore not present within the subject land. No further assessment required.	Absent
Cynanchum elegans	White-flowered Wax Plant	Yes	Restricted to eastern NSW where it is distributed from Brunswick Heads on the north coast to Gerroa in the Illawarra region. The species has been recorded as far west as Merriwa in the upper Hunter River valley. The White-flowered Wax Plant usually occurs on the edge of dry rainforest vegetation. Other associated vegetation types include littoral rainforest. There are no BioNET records of the species within 10 km. Marginal habitat for the species exists within the subject land. Vine species detected during field investigations were mostly limited to *Parsonsia straminea.* The species was not detected during threatened flora searches and is therefore not present within the subject land. No further assessment required.	Absent
Delma impar	Striped legless lizard	No	The Striped Legless Lizard occurs in the Southern Tablelands, the South West Slopes and possibly on the Riverina. Populations are known in the Goulburn, Yass, Queanbeyan, Cooma and Tumut areas. Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Habitat is where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo Grass *Themeda australis,* spear-grasses *Austrostipa* spp. and poa tussocks *Poa* spp., and occasionally wallaby grasses *Austrodanthonia* spp. Sometimes present in modified grasslands with a significant content of	Absent

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
			exotic grasses. Usually found where soils are predominantly basalt with a high clay content and a propensity for cracking. Favoured habitat typically contains little bare ground, with plant litter to a depth of approximately 3 cm. The subject land occurs within a highly fragmented landscape with limited connectivity. The species is known to have an extremely limited home range of approximately 10 m2 and a slow population spread (ie migration) of <12 m per year with the species known to be deterred by hostile barriers such as roads and substantial cleared areas (Robertson and Smith 2010). Therefore, based on the limited connectivity of the subject land to the broader landscape, the species is unlikely to migrate to utilise the subject land. If the species was at one time present, it is unlikely to persist due to the heavy disturbance of the subject land through land clearing, cattle grazing and ongoing management such as mowing/slashing. In addition, the subject land contains heavily compacted soils and minimal formation of tussocks therefore lacks the structural diversity to provide habitat refuge for the entity. Further to this the species, or other legless lizard species, were not detected during site investigation including pitfall trapping efforts, albeit targeting the Common Planigale (*Planigale maculata*). No BioNet records occur within 10 km of the subject land, therefore the species is not present within the subject land. No further assessment required.	
Diuris praecox	Rough Doubletail	No	The Rough Doubletail is known from between Bateau Bay and Smiths Lake. Grows on hills and slopes of near-coastal districts in open forests which have a grassy to fairly dense understorey. There are no BioNET records of the species within 10 km. Marginal habitat exists within the subject land however, due to the subject land being located outside the Newcastle LGA and not within proximity to coastal environment, the subject land does not constitute suitable habitat for the entity as it is outside of the species known range. No further assessment required.	Absent
Diuris tricolor	Pine Donkey Orchid	Yes	Sporadically distributed on the western slopes of NSW, extending from south of Narrandera all the way to the north of NSW. Localities in the south include Red Hill north of Narrandera, Coolamon, and several sites west of Wagga Wagga. Condobolin-Nymagee road, Wattamondara towards Cowra, Eugowra, Girilambone, Dubbo and Cooyal, in the Central West. Pilliga SCA, Pilliga National Park and Bibblewindi State Forest in the north and Muswellbrook in the east. Disturbance regimes are not known, although the species is	Absent

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
			usually recorded from disturbed habitats. Associated species include Callitris glaucophylla, Eucalyptus populnea, Eucalyptus intertexta, Ironbark and Acacia shrubland. The understorey is often grassy with herbaceous plants such as Bulbine species. The Pine Donkey Orchid grows in sclerophyll forest among grass, often with native Cypress Pine (Callitris spp.). It is found in sandy soils, either on flats or small rises. Also recorded from a red earth soil in a Bimble Box community in western NSW. No individuals were detected during threatened flora survey which was undertaken during the flowering period for this species. Additionally, the subject land is highly disturbed within the understorey due to the frequent grazing of livestock. No associated vegetation occurs within the subject land. No BioNet records of this species occur within 10km of the subject land. Therefore, the species does not occur within the subject land. No further assessment required.	
Eucalyptus castrensis	Singleton Mallee	Yes	Known only from a single dense stand near Singleton in the lower Hunter Valley. Here it is locally dominant stand over about ten hectares with a number of smaller outlying stands over a 2.5 km range. Very restricted in range, but locally dominant, occurring as a dense mallee stand over about three hectares, on a low broad ridgetop on loam over sandstone. Occurs on a low broad ridgetop on loam over sandstone. The understorey consists of grasses and scattered shrubs, with bare ground and litter. Eucalyptus fibrosa and *Corymbia maculata* grow adjacent to, but not within, the stand. This species was not detected during threatened flora surveys. It is likely that this species would be detected if it were to occur due to its conspicuous nature. No records occur within 10 km of the subject land as this species is most likely limited to the Singleton LGA. On this basis, it is unlikely this species occurs within the subject land. No further assessment required.	Absent
Eucalyptus glaucina	Slaty Red Gum	Yes	Found only on the north coast of NSW and in separate districts: near Casino where it can be locally common, and farther south, from Taree to Broke, west of Maitland. Grows in grassy woodland and dry eucalypt forest. Grows on deep, moderately fertile and well-watered soils. This species was not detected during threatened flora surveys. All red gum individuals were assessed as *Eucalyptus tereticornis* due to fruit, bud and juvenile leaf attributes. Therefore the species does not occur within the subject land. No further assessment required.	Absent

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
Eucalyptus parramattensis subsp. decadens		Yes	There are two separate meta-populations of *E. parramattensis* subsp. *decadens*. The Kurri Kurri meta-population is bordered by Cessnock—Kurri Kurri in the north and Mulbring—Abedare in the south. Large aggregations of the subspecies are located in the Tomalpin area. The Tomago Sandbeds meta-population is bounded by Salt Ash and Tanilba Bay in the north and Williamtown and Tomago in the south. Generally occupies deep, low-nutrient sands, often those subject to periodic inundation or where water tables are relatively high. It occurs in dry sclerophyll woodland with dry heath understorey. It also occurs as an emergent in dry or wet heathland. Often where this species occurs, it is a community dominant. This species was not detected during threatened flora surveys. All red gum individuals were assessed as *Eucalyptus tereticornis* due to fruit, bud and juvenile leaf attributes. Therefore, the species does not occur within the subject land. No further assessment required.	Absent
Eucalyptus pumila	Pokolbin Mallee	Yes	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. The single known population occupies north-west-facing slopes derived from sandstone. Present as a mid-canopy species to a height of 6 m within dry sclerophyll woodland which has a canopy comprising *Eucalyptus fibrosa, Callitris endlicheri* and, to a lesser extent, *Corymbia maculata*. Very little is known about the biology or ecology of this species. This species was not detected during threatened flora surveys. It is likely that this species would be detected if it were to occur due to its conspicuous nature. No records occur within 10 km of the subject land as this species is limited to the sandstone derived slopes. Therefore, the species does not occur within the subject land. No further assessment required.	Absent
Grevillea parviflora subsp. parviflora	Small-flower Grevillea	Yes	Grows in sandy or light clay soils usually over thin shales, often with lateritic ironstone gravels and nodules. Sydney region occurrences are usually on Tertiary sands and alluvium, and soils derived from the Mittagong Formation. Soil landscapes include Lucas Heights or Berkshire Park.	Absent

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
			Occurs in a range of vegetation types from heath and shrubby woodland to open forest. In Sydney it has been recorded from Shale Sandstone Transition Forest and in the Hunter in Kurri Sand Swamp Woodland. however, other communities occupied include *Corymbia maculata - Angophora costata* open forest in the Dooralong area, in Sydney Sandstone Ridgetop Woodland at Wedderburn and in Cooks River / Castlereagh Ironbark Forest at Kemps Creek. This species was not detected during threatened flora surveys. No BioNet records occur within 10 km of the subject land as this species is limited to sandstone/shale derived soils. Therefore, the species does not occur within the subject land. No further assessment required.	
Haliaeetus leucogaster	White-bellied Sea-eagle (Breeding)	Yes	The White-bellied Sea-Eagle is distributed along the coastline (including offshore islands) of mainland Australia and Tasmania. It also extends inland along some of the larger waterways, especially in eastern Australia. The habitats occupied by the sea-eagle are characterised by the presence of large areas of open water (larger rivers, swamps, lakes, the sea and sewage ponds). Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest (including rainforest) and even urban areas. Breeding territories are located close to water, and mainly in tall open forest or woodland, although nests are sometimes located in other habitats such as dense forest (including rainforest), closed scrub or in remnant trees on cleared land. No large stick nests were detected during surveys. Therefore, the species does not utilise the subject land for breeding. No further assessment required.	Absent
Hieraaetus morphnoides	Little Eagle	Yes	The Little Eagle is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Nests in tall living trees within a remnant patch, where pairs build a large stick nest in winter. No large stick nests were detected during surveys. Therefore, the species does not utilise the subject land for breeding. No further assessment required.	Absent

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
Hoplocephalus bitorquatus	Pale-headed Snake	Yes	The Pale-headed Snake has a patchy distribution from north-east Queensland to the north-eastern quarter of NSW. The Pale-headed Snake is a highly cryptic species that can spend weeks at a time hidden in tree hollows. Found mainly in dry eucalypt forests and woodlands, cypress forest and occasionally in rainforest or moist eucalypt forest. In drier environments, it appears to favour habitats close to riparian areas. Shelter during the day between loose bark and tree-trunks, or in hollow trunks and limbs of dead trees. Studies by Fitzgerald et al. (2006) found the species to utilise riparian woodland typically associated with watercourses, billabongs and other flood prone areas due to the diet of amphibian species, with the study noting that an individual was never located greater than160 m from a river. A strong association was noted with *Eucalyptus camaldulensis* and *E. coolabah*, as typical riparian hollow-bearing tree species within the species range. Regardless of floristics the species typically was identified within trees containing hollows and/or decorticating bark, indicating a complexity of habitat structure is required as refuge for prey targeted by the snake as well as hollows for the species own hollow denning. The species was not detected during nocturnal spotlight surveys, nor were any Squamates. The subject land lacks suitable habitat in the form of structurally complex wooded vegetation within riparian areas or close proximity to waterbodies. The waterbodies within the subject land are highly modified dams which lack connectivity within the landscape via wooded riparian corridors. No BioNet records of the species occur within 10 km of the subject land. Based on the lack of suitable habitat and lack of detection during targeted searches the species does not utilise the subject land. Therefore, no further assessment required.	Absent
Lathamus discolor	Swift Parrot (Breeding)	No	The Swift Parrot breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. Migrates to the Australian south-east mainland between March and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*. Commonly used lerp infested trees include Inland Grey Box *E. microcarpa*, Grey Box *E. moluccana* and Blackbutt *E. pilularis*.	Absent

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
			The subject land supports some preferred feed trees (*Corymbia maculata* and *Eucalyptus moluccana*) and vegetation formation for this species, however, is not a Mapped Important Area for breeding nor foraging for this species. Therefore, no further assessment required.	
Litoria aurea	Green and Golden Bell Frog	Yes	The Green and Golden Bell Frog main populations in NSW are located around the metropolitan areas of Sydney, Shoalhaven and mid north coast (one an island population). There is only one known population on the NSW Southern Tablelands. Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (Typha spp.) or spikerushes (Eleocharis spp.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. The species was not detected during targeted amphibian surveys. All waterbodies within the subject land contain limited fringing vegetation due to erosion and soil compaction from cattle. All waterbodies were found to contain the pest predator *Gambusia holbrooki* known to exclude the species. Therefore, the species does not utilise the subject land. Therefore, no further assessment required.	Absent
Litoria brevipalmata	Green-thighed Frog	Yes	Isolated localities along the coast and ranges from just north of Wollongong to south-east Queensland. Green-thighed Frogs occur in a range of habitats from rainforest and moist eucalypt forest to dry eucalypt forest and heath, typically in areas where surface water gathers after rain. It prefers wetter forests in the south of its range but extends into drier forests in northern NSW and southern Queensland. The species was not detected during targeted amphibian surveys. All waterbodies within the subject land contain limited fringing vegetation due to erosion and soil compaction from cattle. All waterbodies were found to contain the pest predator *Gambusia holbrooki* known to exclude the species. Some surveys were conducted during and immediately after large rain events which occurred in the Summer of 2021-2022. The site contains little in regard to semi-permanent/ephemeral pools for which this species requires for breeding. Therefore, the species does not utilise the subject land. Therefore, no further assessment required.	Absent

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
Lophoictinia isura	Square-tailed Kite (Breeding)	Yes	The Square-tailed Kite ranges along coastal and subcoastal areas from south-western to northern Australia, Queensland, NSW and Victoria. In NSW, scattered records of the species throughout the state indicate that the species is a regular resident in the north, north-east and along the major west-flowing river systems. Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. In arid north-western NSW, has been observed in stony country with a ground cover of chenopods and grasses, open acacia scrub and patches of low open eucalypt woodland. No large stick nests were detected during surveys. Therefore, the species does not utilise the subject land for breeding. No further assessment required.	Absent
Miniopterus australis	Little Bent-Wing Bat (Breeding)	Yes	East coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW. Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Little Bentwing-bats roost in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats. The species was detected by acoustic devises which was deployed over November 2021. Results of the Acoustic survey identified the species as a 'Definite' call (see **Appendix G** for Microbat Call Analysis). The entity is a candidate species for breeding habitat only, therefore further field surveys were conducted to determine the presence of breeding individuals (be the interception of lactating females) as per state guidelines (OEH 2018). Harp Trapping was conducted on the subject land over 16 trap nights, no individuals belonging to this species were captured. In addition, roost watches were conducted at suitable structures across the site to determine potential roosting. No microbats were detected using this method. The lack of identified roosting habitat and therefore lack of breeding habitat within the subject land despite targeted search efforts indicates that the recording of the entity via acoustic device is likely the result of a foraging individual that does not habitually utilise the site. Therefore, the subject land does not contain utilised breeding habitat for the species, nor does it trigger the potential SAII assessment. No further assessment required.	Absent

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
Miniopterus orianae oceanensis	Large Bent-winged Bat (Breeding)	Yes	Large Bent-winged Bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young. Maternity caves have very specific temperature and humidity regimes. At other times of the year, populations disperse within about 300 km range of maternity caves. Cold caves are used for hibernation in southern Australia. Breeding or roosting colonies can number from 100 to 150,000 individuals. Hunt in forested areas, catching moths and other flying insects above the tree tops. The species was detected by Acoustic devise which was deployed over November 2021. Results of the Acoustic survey identified the species as a 'Definite' call (see **Appendix G)** for Microbat Call Analysis). The entity is a candidate species for breeding habitat only, therefore further field surveys were conducted to determine the presence of breeding individuals (be the interception of lactating females) as per state guidelines (OEH 2018). Harp Trapping was conducted on the subject land over 16 trap nights, no individuals belonging to this species were captured. In addition, roost watches were conducted at suitable structures across the site to determine potential roosting. No microbats were detected using this method. The lack of identified roosting habitat and therefore lack of breeding habitat within the subject land despite targeted search efforts indicates that the recording of the entity via acoustic device is likely the result of a foraging individual that does not habitually utilise the site. Therefore, the subject land does not contain utilised breeding habitat for the species, nor does it trigger the potential SAII assessment. No further assessment required.	Absent
Monotaxis macrophylla	Large-leafed Monotaxis	Yes	Large-leafed Monotaxis has a great diversity in the associated vegetation within NSW (less though in Queensland), encompassing coastal heath, arid shrubland, forests and montane heath from almost sea level to 1300 m altitude. Large-leafed Monotaxis is recorded from several highly disjunct populations in NSW: eastern edge of Deua NP (west of Moruya), Bemboka portion of South East Forests National Park, Cobar area (Hermitage Plains), the Tenterfield area, and Woodenbong (near the Queensland border). It is also in Queensland. A recent record from the eastern spur of the Nandewar Range is in the Namoi catchment. This species was not detected during threatened flora surveys and due to its conspicuous nature, it is likely it would have been detected if it were present. Currently, there are no	Absent

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
			records of this species within 10km of the Subject Site. On this basis, it is unlikely this species occurs within the Subject Site and therefore is unlikely this proposal will impact this species.	
Myotis macropus	Southern Myotis	Yes	The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. Generally, roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over streams and pools catching insects and small fish by raking their feet across the water surface. The species may have been detected by Acoustic devise which was deployed over November. Results of the Acoustic survey identified the species as a 'Probable' call (see **Appendix G** for Microbat Call Analysis). The entity is a candidate species for breeding habitat only, therefore further field surveys were conducted to determine the presence of breeding individuals (be the interception of lactating females) as per state guidelines (OEH 2018). Harp Trapping was conducted on the subject land over 16 trap nights, no individuals belonging to this species were captured. In addition, roost watches were conducted at suitable structures across the site to determine potential roosting. No microbats were detected using this method. The lack of identified roosting habitat and therefore lack of breeding habitat within the subject land despite targeted search efforts indicates that the recording of the entity via acoustic device is likely the result of a foraging individual that does not habitually utilise the site. Therefore, the subject land does not contain utilised breeding habitat for the species, nor does it trigger the potential SAII assessment. No further assessment required.	Absent
Ninox connivens	Barking Owl (Breeding)	Yes	The Barking Owl is found throughout continental Australia except for the central arid regions and now occurs in a wide but sparse distribution in NSW. Core populations exist on the western slopes and plains (especially the Pilliga) and in some northeast coastal and escarpment forests. Sometimes extend their home range into urban areas, hunting birds in garden trees and insects attracted to streetlights. Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey on these fertile soils. Roost in shaded portions of tree	Absent

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
			canopies, including tall midstorey trees with dense foliage such as Acacia and Casuarina species. This species was not detected during owl surveys. All large hollows were inspected at dusk to determine hollow occupation. Distressed animal calls, such as rats, were projected via megaphone during nocturnal walkover to entice predator birds to inspect. Only one BioNet record of this species occurs within 10 km of the subject land. At the time of survey the subject land frequently used as foraging habitat by a mating pair of Southern Boobook owls which are potentially breeding/roosting in a large Spotted Gum to the north of McFarlanes Road. It is unlikely that the Barking Owl would utilise the subject land as breeding/foraging habitat in sympatry with the Southern Boobook pair due to resource competition. Based on the results of targeted surveys the species does not utilise the subject land as potential breeding habitat. Therefore, no further surveys required.	
Ninox strenua	Powerful Owl (Breeding)	Yes	The Powerful Owl is endemic to eastern and south-eastern Australia, mainly on the eastern side of the Great Dividing Range, from south-eastern Queensland to Victoria. The Powerful Owl is found in open forests and woodlands, as well as along sheltered gullies in wet forests with dense understoreys, especially along watercourses. Will sometimes be found in open areas near forests such as farmland, parks and suburban areas, as well as in remnant bushland patches. Needs old growth trees to nest. This species was not detected during owl surveys. All large hollows were inspected at dusk to determine hollow occupation. Distressed animal calls, such as rats, were projected via megaphone during nocturnal walkover to entice predator birds to inspect. Only one BioNet record of this species occurs within 10 km of the subject land. At the time of survey the subject land frequently used as foraging habitat by a mating pair of Southern Boobook owls which are potentially breeding/roosting in a large Spotted Gum to the north of Mcfarlanes Road. It is unlikely that the Powerful Owl would utilise the subject land as breeding/foraging habitat in sympatry with the Southern Boobook pair due to resource competition coupled with an absence of the species during targeted surveys. Based on the results of targeted surveys the species does not utilise the subject land as potential breeding habitat. Therefore, no further surveys required.	Absent

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
Ozothamnus tesselatus	Ozothamnus tesselatus	Yes	Restricted to a few locations in an east-west zone south of Bunnan and between west Bylong and east Ravensworth. Grows within Eucalypt woodlands. This species was not detected during threatened flora surveys. There are no BioNet records of this species within 10 km of the subject land. Therefore, the species does not occur within the subject land. No further assessment required.	Absent
Persoonia pauciflora	North Rothbury Persoonia	Yes	Extremely restricted distribution; all but one of the plants which make up the only known population occur within a 2.5 km radius of the original specimen at North Rothbury in the Cessnock local government area. Within this range, there are three main sub-populations which comprise approximately 90% of the total population. The other 10% of the population occurs as scattered individuals in what is a relatively disturbed landscape. It is found in dry open forest or woodland dominated by Spotted Gum (*Corymbia maculata*), Broad-leaved Ironbark (Eucalyptus fibrosa) and/or Narrow-leaved Ironbark (*E. crebra*) and supporting a moderate to sparse shrub layer and grassy groundcover. The majority of the population is known to occur on silty sandstone soils derived from the Farley Formation. This species was not detected during threatened flora surveys. There are no BioNet records of this species within 10 km of the subject land, this is likely due to this species only occurring within the proximity to North Rothbury/Branxton area, therefore the subject land is outside of the species range. Based on the results of targeted surveys the species does not utilise the subject land as potential breeding habitat. Therefore, no further surveys required.	Absent
Petrogale penicillata	Brush-tailed Rock Wallaby	No	The range of the Brush-tailed Rock-wallaby extends from south-east Queensland to the Grampians in western Victoria, roughly following the line of the Great Dividing Range. However the distribution of the species across its original range has declined significantly in the west and south and has become more fragmented. In NSW they occur from the Queensland border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees. There are no BioNET records of the species within 10 km of the subject land. Species was not detected during survey work including spotlighting and deployment of camera traps. In	Absent

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
			addition, there is no suitable habitat within or near to the subject land of rocky features or escarpments. Therefore, the subject land does not provide suitable habitat for the entity. No further assessment required.	
Phascogale tapoatafa	Brush-tailed Phascogale	Yes	The Brush-tailed Phascogale has a patchy distribution around the coast of Australia. In NSW it is mainly found east of the Great Dividing Range although there are occasional records west of the divide. Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter. Also inhabit heath, swamps, rainforest and wet sclerophyll forest. Females are territorial over a 20-40 ha range. Nest and shelter in tree hollows with entrances 2.5 - 4 cm wide and use many different hollows over a short time span. There are five BioNET records within 10 km of the subject land. Potential denning habitat in the form of medium size hollows is present however, the species was not detected during survey works targeting the entity consisting of baited arboreal camera traps capturing over 28 continuous days (as per TBDC). Therefore, the subject land does not provide suitable habitat for the entity. No further assessment required.	Absent
Phascolarctos cinereus	Koala (Breeding)	Yes	The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. Inhabit eucalypt woodlands and forests. Marginal habitat in the form of preferred feed trees exist within the subject land. Five formal Spot Assessment Technique (SAT) searches were undertaken. No secondary signs of Koala visitation such as belly rubs, scratches or scats were detected on any trees. Repeated natural surveys were conducted searching for the entity within wooded areas. Additionally, Koala play callback was undertaken during the winter nocturnal surveys (primarily targeting owl species) with no responses. Therefore, the subject land does not provide suitable habitat for the entity. No further assessment required.	Absent
Planigale maculata	Common Planigale	Yes	Coastal north-eastern NSW, coastal east Queensland and Arnhem Land. The species reaches its confirmed southern distribution limit on the NSW lower north coast however there are reports of its occurrence as far south as the central NSW coast west of Sydney. Common Planigales inhabit rainforest, eucalypt forest, heathland, marshland, grassland and rocky areas where there is surface cover, and usually close to water.	Absent

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
			There are no BioNET records of the species within 10 km. Targeted survey methodology was determined through liaising with OEH as per the TBDC, with a total of 22 pitfall trap arrays set across the subject land. The species was not detected during targeted surveys. Therefore, the subject land does not provide suitable habitat for the entity. No further assessment required.	
Pomaderris queenslandica	Scant Pomaderris	Yes	The Scant Pomaderris is widely scattered but not common in north-east NSW and in Queensland. It is known from several locations on the NSW north coast and a few locations on the New England Tablelands and North West Slopes, including near Torrington and Coolata. Found in moist eucalypt forest or sheltered woodlands with a shrubby understorey, and occasionally along creeks. There are no BioNET records of the species occur within 10 km of the subject land. Targeted searches were completed for the species which was not detected within the subject site. Therefore, the subject land does not provide suitable habitat for the entity. No further assessment required.	Absent
Prostanthera cineolifera	Singleton Mint Bush	Yes	Restricted to only a few localities near Scone, Cessnock and St Albans. Grows in open woodlands on exposed sandstone ridges. Usually found in association with shallow or skeletal sands. There are no BioNET records of the species occur within 10 km of the subject land. Targeted flora searches were completed for the species which did not detect the entity. The subject land is located on clay soils with no presence of skeletal sands nor influences of sandstone. Therefore, the subject land does not provide suitable habitat for the entity. No further assessment required.	Absent
Pteropus poliocephalus	Grey-headed Flying-Fox (Breeding)	Yes	Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations. Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	Absent

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
			Species habitat constraints listed is the presence of breeding camps. Species is detected on site, with feeding individuals observed over numerous nights. There is a total of 43 BioNET records of the species within 10 km of the subject land, however, no breeding camp occurs within the subject land or within the surrounding lands. A flying-fox camp is registered in Raymond Terrace, supporting Grey-headed Flying Foxes. This camp is approximately 10 km to the east of the site. Therefore, no suitable breeding habitat is present within the subject land and species credits are not required. No further assessment required.	
Pterostylis chaetophora	Pterostylis chaetophora	Yes	Recorded in Queensland and NSW. In NSW it is currently known from 18 scattered locations in a relatively small area between Taree and Kurri Kurri, extending to the south-east towards Tea Gardens and west into the Upper Hunter, with additional records near Denman and Wingen. There are also isolated records from the Sydney region. The species occurs in two conservation reserves, Columbey National Park and Wingen Maid Nature Reserve. The preferred habitat is seasonally moist, dry sclerophyll forest with a grass and shrub understorey. The most commonly observed habitat is vegetation characterized by grassy open forests or derived native grasslands of *Eucalyptus amplifolia* and *Eucalyptus moluccana* on gentle flats, or that are dominated by *Corymbia maculata* with any of Eucalyptus fibrosa, *Eucalyptus sideroploia* or *Eucalyptus crebra*. Flowers from September to November. Vegetative reproduction is not common in this group of Greenhoods, but some species may form more than one dropper annually. Fails to flower in dry seasons. Plants are deciduous and die back to the large, underground tubers after seed release. New rosettes are produced following soaking autumn and winter rains. There are no BioNET records of the species within 10 km of the subject land. Targeted surveys for the species were conducted during the seasonal flowering window during 2020 and 2021. Due to the frequent grazing from livestock and the heavily disturbed understorey, it is unlikely this species would persist within the subject land if historically present. No further assessment required.	Absent
Rutidosis heterogama	Heath Wrinklewort	Yes	On the Central Coast it is located north from Wyong to Newcastle. Grows in heath on sandy soils and moist areas in open forest, and has been recorded along disturbed roadsides. There are no BioNET records of the species within 10 km of the subject land. Targeted surveys for the species were conducted during the seasonal flowering window during 2022. Due to the frequent grazing from livestock and the heavily disturbed understorey, it is unlikely	Absent

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
			this species would exist within the subject land if historically present. No further assessment required.	
Thesium australe	Austral Toadflax	Yes	Austral Toad-flax is found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Although originally described from material collected in the SW Sydney area, populations have not been seen in a long time. It may persist in some areas in the broader region. Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. There are no BioNET records of the species within 10 km. Targeted surveys for the species were conducted during the seasonal flowering window during 2022. Due to the frequent grazing from livestock and the heavily disturbed understorey, it is unlikely this species would exist within the subject land if historically present. No further assessment required.	Absent
Tyto novaehollandiae	Masked Owl (Breeding)	Yes	The Masked Owl extends from the coast where it is most abundant to the western plains. Overall records for this species fall within approximately 90% of NSW, excluding the most arid north-western corner. There is no seasonal variation in its distribution. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides. Roosts and breeds in moist eucalypt forested gullies, using large tree hollows or sometimes caves for nesting. This species was not detected during owl surveys. All large hollows were inspected at dusk to determine hollow occupation. Distressed animal calls, such as rats, were projected via megaphone during nocturnal walkover to entice predator birds to inspect. Only one BioNet record of this species occurs within 10 km of the subject land. At the time of survey the subject land frequently used as foraging habitat by a mating pair of Southern Boobook owls which are potentially breeding/roosting in a large Spotted Gum to the north of Mcfarlanes Road. It is unlikely that the Masked Owl would utilise the subject land as breeding/foraging habitat in sympatry with the Southern Boobook pair due to resource competition coupled with the absence of the species during surveys. Based on the results of targeted surveys the species does not utilise the subject land as potential breeding habitat. Therefore no further surveys required.	Absent
Vespadelus troughtoni	Eastern Cave Bat	Yes	The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. The western limit appears to be the Warrumbungle Range, and there is a single record from southern NSW, east of the ACT. A cave-roosting species that is usually	Absent

Scientific Name	Common Name	Surveyed	Habitat Assessment	Species detected within subject land
			found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally found along cliff-lines in wet eucalypt forest and rainforest. Species habitat constraints listed subject land within 2 km of rocky areas containing caves, overhangs, escarpments, outcrops, crevices or boulder piles, or within 2 kms of old mines, tunnels, old buildings or sheds. This species was potentially detected using passive detection of calls, however, it should be noted that due to the calls of the three local Vespadelus species hard to differentiate, microbat analysis (see **Appendix G**) assessed that this Genus was detected on site. One other species that is likely to be found within the area is the non-threatened Little Forest Bat (*Vespadelus vulturnus*) which occurs throughout the broader landscape and more commonly. As the relevant guidelines, acoustic detection requires further surveying to assess reproductive condition of potential individuals due to potential SAII. Species was not intercepted using Harp Trapping (methods as per as per OEH 2018). In addition all potential structures within the subject land search were searched for evidence of microbat occupation and roost watched to determine occupancy. No roost or breeding habitat confirmed within the subject land. Therefore, SAII for the species is not triggered and species credits not required. There is a total of four BioNET records of the species within 10 km of the subject land. As the species was not detected during Harp Trapping there is no evidence that the species utilises the Subject Land as breeding habitat and therefore not species credits are generated.	

5.4 Candidate Species Surveys

5.4.1 Survey Methodology

Targeted surveys for all flora and fauna candidate species recognised to have potential to occur within the Subject land were carried out by ecologists from MJD Environmental (2020-2022) as part of the works informing this BDAR.

The flora survey was conducted in accordance with the BAM (2020), and requirements for threatened flora surveys in line with DPIE's *Surveying threatened plants and their habitats, NSW Survey guide for the BAM (2020).*

Fauna surveys were conducted in accordance with the current TBDC guidelines as well as consultation with relevant threatened species guidelines to determine minimum fauna survey effort required for candidate species as per Section 5 of the BAM (2020). The following guidelines were consulted in conjunction with the TBDC:

- 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; and
- NSW survey guideline for the Biodiversity Assessment Method; 'Species credit' threatened bats and their habitats (OEH), October 2018.

Flora Survey

Targeted threatened flora surveys were carried out on the following dates:

- 2nd and 7th of October 2020
- 6th and 7th of October 2021, and
- 13th, 14th and 17th of January 2022

Surveys targeted flora species within respective flowering periods, based on TBDC survey timeframes, that could not be conclusively ruled out from occurring on site due to suitable habitat occurring on site. These species include:

- *Acacia bynoeana* – Bynoe's Wattle
- *Callistemon linearifolius* - Netted Bottle Brush
- *Cryptostylis hunteriana* - Leafless Tongue Orchid
- *Cynanchum elegans* - White-flowered Wax Plant
- *Diuris tricolor* – Pine Donkey
- *Eucalyptus castrensis* - Singleton Mallee
- *Eucalyptus glaucina* - Slaty Red Gum
- *Eucalyptus parramattensis* subsp. *decadens* - Eucalyptus parramattensis subsp. decadens
- *Eucalyptus pumila* - Pokolbin Mallee
- *Grevillea parviflora* subsp. *parviflora* - Small-flower Grevillea
- *Monotaxis macrophylla* - Large-leafed Monotaxis
- *Ozothamnus tesselatus*
- *Persoonia pauciflora* – North Rothbury Persoonia
- *Pomaderris queenslandica* - Scant Pomaderris

- *Prostanthera cineolifera* - Singleton Mint Bush
- *Pterostylis chaetophora* -Taree Rustyhood
- *Rutidosis heterogama* - Heath Wrinklewort
- *Thesium australe* - Austral Toadflax

Threatened flora surveys were undertaken in accordance with the DPIE's *Surveying threatened plants and their habitats, NSW Survey guide for the BAM (2020).* The following techniques were employed:

- Parallel field-transverse survey technique. Two ecologists walking at a distance 10 m due to the open structure of the vegetation within the subject land;
- Surveys conducted in suitable habitat for each of the targeted species; and
- Transects were recorded using a hand-held GPS unit.

The following **Table 7** provides the survey schedule for each species. Refer to **Figure 4** for survey transects.

Table 8 Flora survey timeframes

Species	Survey Period	Survey Carried out	Presence/ Absence
Acacia bynoeana	All Year	January	Absent
Callistemon linearifolius	Oct-Jan	October	Absent
Cryptostylis hunteriana	Nov-Jan	January	Absent
Cynanchum elegans	All year	January	Absent
Diuris tricolor	Sep-Oct	October	Absent
Eucalyptus castrensis	All year	October	Absent
Eucalyptus glaucina	All year	January	Absent
Eucalyptus parramattensis subsp. parramattensis – endangered population	All Year	October	Absent
Eucalyptus pumila	All year	October	Absent
Grevillea parviflora subsp. parviflora	Aug-Nov	October	Absent
Ozothamnus tesselatus	Sep-Oct	October	Absent
Monotaxis macrophylla	Aug-Jan	October	Absent
Persoonia pauciflora	All year	October	Absent

Species	Survey Period	Survey Carried out	Presence/ Absence
Pomaderris queenslandica	All Year	October	Absent
Prostanthera cineolifera	Sep-Oct	October	Absent
Pterostylis chaetophora	Sep-Nov	October	Absent
Rutidosis heterogama	All Year	January	Absent
Thesium australe	Nov-Feb	January	Absent

LOT 32 DP778111, LOT 31 DP778111, 173 MCFARLANES ROAD & 507 RAYMOND TERRACE ROAD, CHISHOLM

FIGURE 4: TARGETED FLORA SURVEYS

Legend

- Study Area
- Subject Land
- Cadastral Boundary

Vegetation

- VZ1 - PCT 1600 - Scattered Trees with Native Ground Cover
- VZ2 - PCT 1600 - Moderate
- VZ3 - PCT 1600 - Pasture - Native and Exotic
- VZ4 - PCT 1600 - Regenerating/Disturbed
- VZ5 - PCT 1598 - Moderate Condition

- Survey Transects - October 2020
- Survey Transects - October 2021
- Survey Transects - January 2022
- Red Gum Sample

0 60 120 180 240

Metres

1:3800

N W E S

MJD Environmental

Aerial: Nearmap (2023) | Data: MJD Environmental, ADW Johnson, NSW Spatial Services (2023) | Datum/Projection: GDA2020 / MGA zone 56 | Date: 22/05/2023 | Version: 1 | Z:\20039 - 173 Mcfarlanes Road, Chisholm | This plan should not be relied upon for critical design dimension.

Fauna Survey Methods

Threatened fauna surveys were conducted for species whose absence could not be conclusively confirmed based on the presence of suitable habitat within or adjacent to the subject land. All fauna surveys were conducted as per the TBDC. Amphibian surveys were conducted in accordance with *NSW Survey Guide for threatened frogs; A guide for the survey of threatened frogs and their habitats for the BAM (DPIE 2020).* Surveys targeted microbat species were conducted in accordance with *'Species credit' threatened bats and their habitats; NSW Survey guide for the BAM (OEH 2018).* Where advice has been sought directly from OEH email correspondence can be provided. Fauna survey effort is tabulated in **Table 8**.

Refer to **Figure 5, 6, 7** and **8** for all targeted fauna surveys.

Arboreal

- *Cercartetus nanus* Eastern Pygmy Possum
- *Petauroidea volans* Greater Glider
- *Phascogale tapoatafa* Brush-tailed Phascogale
- *Phascolarctos cinereus* Koala

Terrestrial

- *Planigale maculata* Common Planigale

Birds

- *Burhinus grallarius* – Bush Stone-curlew
- *Callocephalon fimbriatum* – Gang-gang Cockatoo
- *Calyptorhynchus lathami* – Glossy Black-Cockatoo
- *Haliaeetus leucogaster* – White-bellied Sea Eagle
- *Hieraeetus morphnoides* – Little Eagle
- *Lophoictinia isura* – Square-tailed Kite

Herpetofauna

- H*oplocephalus bitorquatus* – Pale-headed Snake
- *Litoria aurea* – Green and Golden Bell Frog
- *Litoria brevipalmata* – Green-thighed Frog

Bats

- *Miniopterus australis* – Little Bent-wing Bat
- *Miniopterus orianae oceanensis* – Large Bent-wing Bat
- *Myotis macropus* – Southern Myotis
- *Vespadelus troughtoni* – Eastern Cave Bat

Please note that in addition to the targeted surveys listed above for candidate entities, a targeted survey was also conducted for the BC Act listed Endangered Giant Dragonfly (*Petalura gigantea*) on January 14th 2022.

Table 9 Fauna Survey Effort

Scientific Name	Common Name	Survey Period	Surveys Carried Out	Survey Method	Survey Effort	Comments
Birds						
Burhinus grallarius	Bush Stone-curlew	All Year	Aug-Sept 2021 & Nov-Jan 2021-2022	**Flushing** On foot diurnal and nocturnal surveys achieves flushing the cryptic species from terrestrial habitat features. **Spotlighting** Spotlighting was conducted using headtorches, as fauna is able to be detected by searching for eyeshine. Headtorches were at least 1000 lm **Call playback survey** Calls were projected across the site, predominantly within the wooded areas.	The subject land experienced extensive on foot coverage throughout the two years field assessment. Spotlighting and call playbacks were conducted coinciding with owl and frog surveys.	Species not detected
Callocephalon fimbriatum	Gang-gang Cockatoo (Breeding)	Oct-Jan	Nov-Jan 2021-2022	**Habitat Searches** Searches for signs of breeding were conducted during breeding season, including trees with hollows >9cm. **Opportunistic observations** Via direct visual observation or by recognition of calls or distinctive features such as hollows **Opportunistic surveys** Additional surveys during other fieldwork	The subject land experienced extensive on foot coverage throughout the two years field assessment, including within the breeding season for the species. Ecologists were on site at dusk during November through to February for Frog Surveys, Pitfall checking and Harp traps. A large portion of field work occurred during the breeding season.	Species not detected

Scientific Name	Common Name	Survey Period	Surveys Carried Out	Survey Method	Survey Effort	Comments
Calyptorhynchus lathami	Glossy Black-Cockatoo (Breeding)	Jan-Sep	May 2020, Aug-Sept 2021 & Nov-Feb 2021-2022	**Habitat Searches** Searches for signs of breeding were conducted during breeding season, including trees with hollows >15cm. **Opportunistic observations** Via direct visual observation or by recognition of calls or distinctive features such as hollows **Opportunistic surveys** Additional surveys during other fieldwork	The subject land experienced extensive on foot coverage throughout the two years field assessment, including within the breeding season for the species.	Species not detected
Haliaeetus leucogaster	White-bellied Sea-eagle (Breeding)	Jul-Oct	Aug-Sept 2021	**Habitat Searches** Searches for potential breeding habitat in the form of large old trees and the presence of large stick nests was undertaken across the site during the breeding season. **Opportunistic surveys** Additional surveys during other fieldwork	The subject land experienced extensive on foot coverage throughout the two years field assessment, including within the breeding season for the species.	Species not detected
Hieraaetus morphnoides	Little Eagle (Breeding)	Aug-Oct	Aug-Sept 2021			
Lophoictinia isura	Square-tailed Kite (Breeding)	Sep-Jan	Aug-Sept 2021, Nov 2021 – Jan 2022			
Ninox connivens	Barking Owl (Breeding)	May-Dec	Aug-Sept 2021	**Habitat Searches** Potential Owl nest trees (hollows >20 cm and >4 m above the ground) were identified. Searches for signs of breeding were undertaken during breeding season. **Stag Watch and Call playback** Stag watches commenced 30 mins before sunset and 1hr after sunset on all potential breeding trees. Call playback surveys followed the stag watch surveys across the site.		All Forest Owl Species not detected.

Scientific Name	Common Name	Survey Period	Surveys Carried Out	Survey Method	Survey Effort	Comments
Ninox strenua	Powerful Owl (Breeding)	May-Aug	Aug-Sept 2021	**Habitat Searches** Potential Owl nest trees (hollows >20 cm) were identified. Searches for signs of breeding were undertaken during breeding season. **Stag Watch and Call playback** Stag watches commenced 30 mins before sunset and 1hr after sunset on all potential breeding trees. Call playback surveys followed stag watch surveys across the site.	Habitat tree surveys were conducted across the site identifying potential owl trees. Call playback & Nocturnal site walk-over were conducted over eight nights from 19th August – 3rd September 2021 Dates are as follows; 19/08/2021, 24/08/2021, 25/08/2021, 26/08/2021, 30/08/2021, 01/09/2021, 02/09/2021, 03/09/2021.	
Tyto novaehollandiae	Masked Owl (Breeding)	May-Aug	Aug-Sept 2021			
Bats						
Miniopterus australis	Little Bentwing-bat (Breeding)	Dec-Feb	Oct 2021-Jan 2022	**Habitat searches** The subject land and perimeter were searched for potential breeding habitat. A disused shed was observed on the northern boundary outside of the subject land. All crevices were inspected for evidence of microbat use (urine stains, droppings [scat spray], remains) or the presence of roosting individuals.	**Habitat Searches** Habitat searches and roost watched were conducted on nights after setting harp traps **Anabat** Multiple Anabat recording units were	Both *Miniopterus spp.* were detected on Anabat units being "Definite" whilst *Vespadelus* was only confirmed on site to a Genus level. No
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat (Breeding)	Dec-Feb				

Scientific Name	Common Name	Survey Period	Surveys Carried Out	Survey Method	Survey Effort	Comments
Vespadelus troughtoni	Eastern Cave Bat	Nov-Jan		**Roost watch** Roost watched were conducted at identified structure. This consisted of watching the structure 30 mins before sunset and 1hr after sunset for signs of bat use.	deployed, with devised recording during the following dates; 10/11/2021 – 15/11/2021, 01/11/202 – 07/11/2021, 08/11/2021 – 09/11/2021, 10/11/2021 – 16/11/2021, 01/11/2021 – 09/11/2021. **Hap Traps** Two (2) harp traps were deployed over 8 nights (Total 16 trapping nights) with a week break in between from the 10th of Jan until 28th of Jan 2022. List of dates are as follows; Northern Lot Harp 1 & 2 – 10/01/2022 – 14/01/2022 Southern Lot Harp 1 & 2 18/01/2022 – 21/01/2022 Harp 1 week 2 31/01/2022	individuals were captured via Harp Traps.
Myotis macropus	Southern Myotis	Oct-Mar	Oct 2021-Feb 2022	**Acoustic detection** Two acoustic records (Anabat passive detector) were deployed. Anabat units were deployed within proximity to waterbodies to detect microbat species during feeding, e.g. gleaning for insects. **Harp Trapping** Two harp traps were used to capture individuals of microbat species utilising the subject land. Harp traps were placed to intercept individual's when leaving potential breeding habitat to feed as well as next to water bodies where this species was expected to be gleaning for insects. One of the two harp traps were moved to a different location following microbat observations, therefore surveying a total of three locations.		The species was detected as probable on both Anabat recorders. No individuals were captured via Harp Traps.

Scientific Name	Common Name	Survey Period	Surveys Carried Out	Survey Method	Survey Effort	Comments
Reptiles						
Hoplocephalus bitorquatus	Pale-headed Snake	Nov-Mar	Nov-Mar 2021-2022	**Spotlighting** Herpetofauna surveys targeting areas of appropriate habitat 1-2 days following rainfall on humid nights. **Opportunistic surveys**	Surveys were conducted in conjunction with setting pitfalls during Feb-Mar	Species not detected
Amphibians						
Litoria brevipalmata	Green-thighed Frog	Sep-Apr	Nov-Mar 2021-2022	**Targeted species call playback** Amphibian surveys targeting water bodies and ephemeral pools after rain events (>50 mm) Areas of flooded land adjacent to native vegetation primarily targeted as preferred habitat Visual searches were undertaken in flooded areas and waterbodies.	Aural/Visual surveys were conducted over seven nights with one including tadpole retrieval. Survey dates are as follows; 09/11/2021, 17/01/2022, 20/01/2022, 02/02/2022, 20/02/2022, 23/02/2022, 24/02/2022.	Species not detected
Litoria aurea	Green and Golden Bell Frog	Nov-Mar		**Targeted species call playback** Amphibian surveys targeting still vegetated water bodies formed around the riparian area. Visual searches were undertaken along the riparian zone including call playback.		
Marsupials						
Cercartetus nanus	Eastern Pygmy - Possum	Oct-Mar	Jan-April 2022	**Infrared Camera Surveys** Baited arboreal camera traps were mounted in appropriate forested habitat within the subject land, designed to take photographs when triggered by motion.	38 Infrared Cameras were deployed across the subject land in two tranches with the northern Lot being deployed 18/01/2022	Species not detected

Scientific Name	Common Name	Survey Period	Surveys Carried Out	Survey Method	Survey Effort	Comments
Phascogale tapoatafa	Brush-tailed Phascogale	Dec-Jun		Cameras were used to detect both diurnal and nocturnal faunal movement. Cameras were checked weekly to ensure equipment failure was addressed promptly, and rebaited after two weeks into the deployment. Baits consisted of peanut butter, oats and honey. Additionally, honey water was applied to the surface of the host tree. **Spotlighting** Spotlighting was conducted using headtorches, as fauna is able to be detected by searching for eyeshine. Headtorches were at least 1000 lm.	and the southern Lot being deployed 12/01/2022. Cameras were deployed for an additional number of days to ensure the required total of 28 days were met. Survey effort met the requirements for the Brush-tailed Phascogale as per the TBDC guidelines were approved for the Brush-tailed Phascogale as an adapted methodology by the BCD threatened species officer. Spotlighting was carried out coinciding with Koala, owl and frog nocturnal surveys over the two-year survey period.	
Planigale maculata	Common Planigale	All Year	Feb-Mar 2022	A total of 22 arrays of pitfall traps were deployed across the site for 4 consecutive nights as per the adapted methodology approved by BCD threatened species officer. A total of 13 pitfall arrays were deployed within the northern lot, pitfalls 1-6 being deployed 23/02/2022 – 26/02/2023 and	A total of 22 pitfall arrays consisting of a 10 m drift fence with two 20 L buckets at each end. Pitfalls were deployed for a total of four nights each, checked each	During determining sample methodology, the two Lots which comprise the subject land were considered two

Scientific Name	Common Name	Survey Period	Surveys Carried Out	Survey Method	Survey Effort	Comments
				pitfalls 7-13 being deployed 11/03/2023 – 14/03/2023. Noting that this deployment was staggered to allow the land holder to continue cattle grazing within the subject land without impacting survey results. The second tranche of pitfall arrays deployed within the southern lot, pitfalls 1-9 were deployed 23/02/2022 – 236/02/2022.	morning as close to dawn as possible to ensure captured fauna are processed and released prior to the heat of the day. A buoyant sponge and leaf litter/substrate was placed in each bucket to ensure animal welfare.	separate BDAR project. Therefore they were sampled separately. Since that time the proposal has been redesigned and the Lots adjoined as a single impact boundary. Therefore multiple tranches of pitfall arrays were deployed.
Phascolarctos cinereus	Koala (Breeding)	All Year	Aug-Sept 2021	**Call Playback** Call playbacks were conducted at two separate locations on separate nights between September and November as per the Koala Habitat Protection methodology guidelines (DPIE 2019). **Spot Assessment Technique (SAT) searches** SAT requires the identification of a single tree, followed by searching the closet 29 trees and searching in a 1m circumference at their base for scat. SATs are employed in a maximum grid spacing of 250 m within wooded areas. Search for *P. cinereus* faecal pellets beneath each of the 30 marked trees based on a cursory inspection of the undisturbed ground surface within a distance of 100 centimetres around the base of each tree, followed (if no faecal pellets are initially detected) by a more thorough inspection involving disturbance of the leaf litter and ground cover within the prescribed search area.	Call playback was completed over multiple nights during spotlighting; 24/08/2021, 25/08/2021, 30/08/2021, 31/08/2021. Koala SAT searches were conducted 17/01/2022 and 18/01/2022.	Please note that though >10 mm of rain was recorded within three days of the Koala SAT searches being conducted at the closet weather station, no rain fell on the subject land. Therefore scat if present would not be affected by rainfall.

Scientific Name	Common Name	Survey Period	Surveys Carried Out	Survey Method	Survey Effort	Comments
				Two person minutes per tree were dedicated to a faecal pellet search at the base of each tree. Only documented Koala use tree species are used (refer to Schedule 2 of the SEPP). **Spotlighting** Spotlighting was conducted using headtorches, as fauna is able to be detected by searching for eyeshine. Headtorches were at least 1000 lm		

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).

5.4.2 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 determinations of habitat use by threatened species, presence of populations and ecological communities has been conservative 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.

Atypical climatic trends impacted conditions during surveys with the declared 2021-2022 La Niña resulting increased rainfall (both frequency and volume) and increased likelihood of tropical cyclones (BOM 2022).

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 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.

LOT 32 DP778111, LOT 31 DP778111, 173 MCFARLANES ROAD & 507 RAYMOND TERRACE ROAD, CHISHOLM

FIGURE 5: FAUNA SURVEY - MAMMALS - SEARCH & TRAP EFFORT

Legend

- Study Area
- Subject Land
- Cadastral Boundary

Vegetation

- VZ1 - PCT 1600 - Scattered Trees with Native Ground Cover
- VZ2 - PCT 1600 - Moderate
- VZ3 - PCT 1600 - Pasture - Native and Exotic
- VZ4 - PCT 1600 - Regenerating/Disturbed
- VZ5 - PCT 1598 - Moderate Condition

- Survey Transects (Nocturnal)
- Camera Trap - Tranche 1
- Camera Trap - Tranche 2
- Koala SAT
- Pitfall Trap Array

0 60 120 180 240

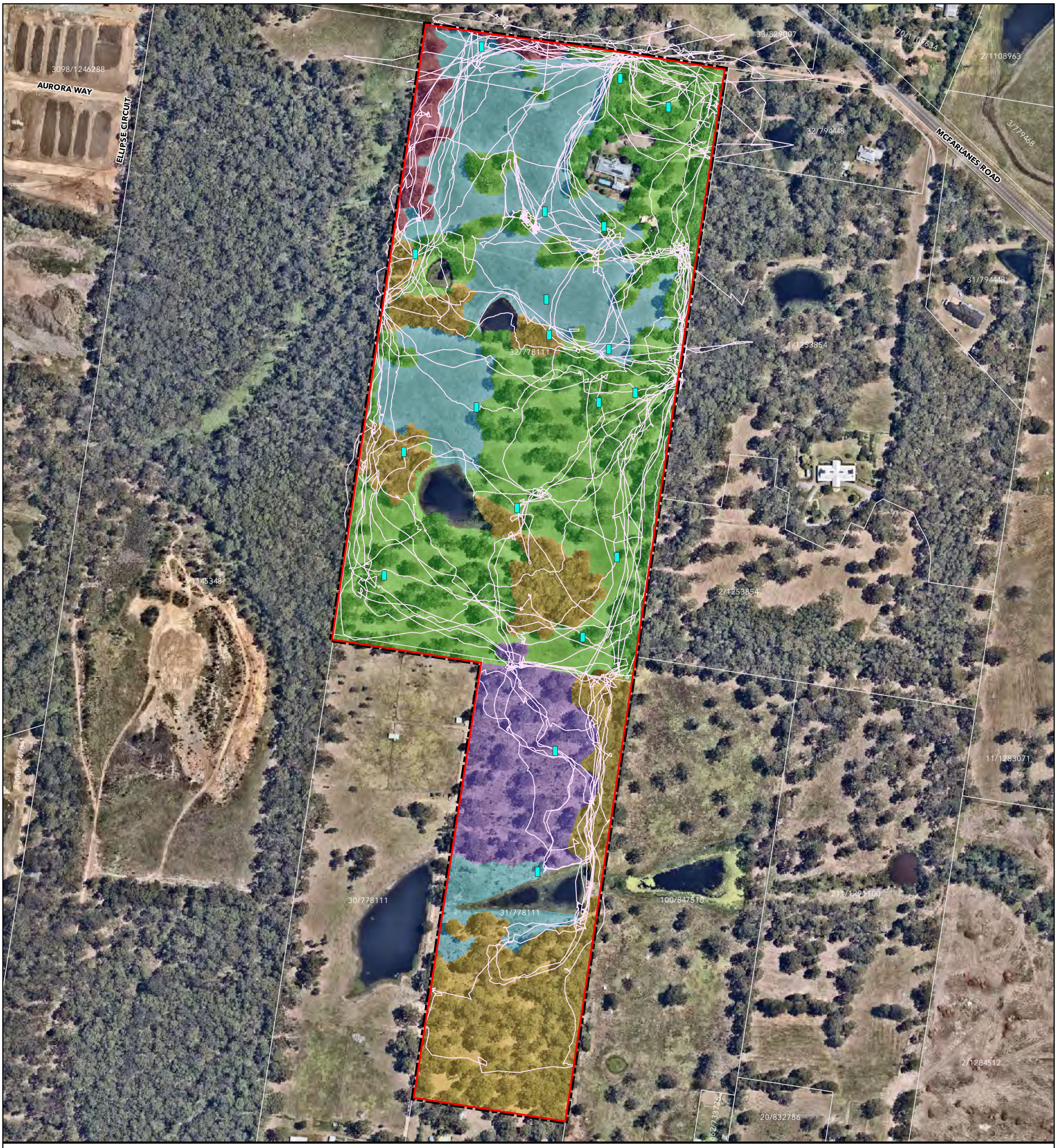
Metres

1:3800

N W E S

MJD Environmental

Aerial: Nearmap (2023) | Data: MJD Environmental, ADW Johnson, NSW Spatial Services (2023) | Datum/Projection: GDA2020 / MGA zone 56 | Date: 22/05/2023 | Version: 1 | Z:\20039 - 173 Mcfarlanes Road, Chisholm | This plan should not be relied upon for critical design dimension.



LOT 32 DP778111, LOT 31 DP778111, 173 MCFARLANES ROAD & 507 RAYMOND TERRACE ROAD, CHISHOLM

0 60 120 180 240

Metres

1:3800

FIGURE 6: FAUNA SURVEY - AVES

Legend

- Study Area
- Subject Land
- Cadastral Boundary
- Survey Transects (Nocturnal)
- Owl Call Playback

Vegetation

- VZ1 - PCT 1600 - Scattered Trees with Native Ground Cover
- VZ2 - PCT 1600 - Moderate
- VZ3 - PCT 1600 - Pasture - Native and Exotic
- VZ4 - PCT 1600 - Regenerating/Disturbed
- VZ5 - PCT 1598 - Moderate Condition

N W E S

MJD Environmental

Aerial: Nearmap (2023) | Data: MJD Environmental, ADW Johnson, NSW Spatial Services (2023) | Datum/Projection: GDA2020 / MGA zone 56 | Date: 22/05/2023 | Version: 1 | Z:\20039 - 173 Mcfarlanes Road, Chisholm | This plan should not be relied upon for critical design dimension.

LOT 32 DP778111, LOT 31 DP778111, 173 MCFARLANES ROAD & 507 RAYMOND TERRACE ROAD, CHISHOLM

FIGURE 7: FAUNA SURVEY - HERPETOFAUNA

0 60 120 180 240

Metres

1:3800

Legend

- Study Area
- Subject Land
- Cadastral Boundary

Vegetation

- VZ1 - PCT 1600 - Scattered Trees with Native Ground Cover
- VZ2 - PCT 1600 - Moderate
- VZ3 - PCT 1600 - Pasture - Native and Exotic
- VZ4 - PCT 1600 - Regenerating/Disturbed
- VZ5 - PCT 1598 - Moderate Condition

Survey Transects

- 09/11/2021
- 17/01/2022
- 02/02/2022
- 20/02/2022
- 23/02/2022
- 24/02/2022
- Frog Call Playback
- Giant Dragonfly Survey

N W E S

MJD Environmental

Aerial: Nearmap (2023) | Data: MJD Environmental, ADW Johnson, NSW Spatial Services (2023) | Datum/Projection: GDA2020 / MGA zone 56 | Date: 22/05/2023 | Version: 1 | Z:\20039 - 173 Mcfarlanes Road, Chisholm | This plan should not be relied upon for critical design dimension.

LOT 32 DP778111, LOT 31 DP778111, 173 MCFARLANES ROAD & 507 RAYMOND TERRACE ROAD, CHISHOLM

FIGURE 8: FAUNA SURVEY - MICROCHIROPTERA

Legend

- Study Area
- Subject Land
- Cadastral Boundary

Vegetation

- VZ1 - PCT 1600 - Scattered Trees with Native Ground Cover
- VZ2 - PCT 1600 - Moderate
- VZ3 - PCT 1600 - Pasture - Native and Exotic
- VZ4 - PCT 1600 - Regenerating/Disturbed
- VZ5 - PCT 1598 - Moderate Condition

- Anabat 1 - 01/11/2021 - 07/11/2021
- Anabat 1 - 08/11/2021 - 09/11/2021
- Anabat 1 - 10/11/2021 - 16/11/2021
- Anabat 2 - 01/11/2021 - 09/11/2021
- Anabat 2 - 10/11/2021 - 15/11/2021
- Harp 1 - 10/01/2022 - 14/01/2022
- Harp 2 - 10/01/2022 - 14/01/2022
- Harp 1 - 18/01/2022 - 21/01/2022
- Harp 2 - 18/01/2022 - 21/01/2022
- Harp 1 week 2 - 31/01/2022 - 04/02/2022
- Roost Watch

0 60 120 180 240

Metres

1:3800

N W E S

MJD Environmental

Aerial: Nearmap (2023) | Data: MJD Environmental, ADW Johnson, NSW Spatial Services (2023) | Datum/Projection: GDA2020 / MGA zone 56 | Date: 22/05/2023 | Version: 1 | Z:\20039 - 173 Mcfarlanes Road, Chisholm | This plan should not be relied upon for critical design dimension.

5.5 Fauna Survey Results

5.5.1 Weather Conditions

Field surveys by MJD Environmental commenced on the 7th May 2020 and concluded on the 14th March 2022. Noting that Acoustic recorders and Arboreal cameras were deployed during this period, the conditions not listed below. The prevailing weather conditions during the survey are presented in **Table 9** below. The values are drawn from Maitland Airport AWS (station 061428) and not necessarily representative of conditions of the Subject Land due to proximity of weather stations.

Table 10 Prevailing Weather Conditions

Date	Min Temp (°C)	Max Temp (°C)	Rain (mm)	Wind (km/h)	Sunrise-Sunset
19th August 2021	1.8	22	0	WNW 15 - WNW 11	0625- 1728
25th August 2021	8.9	17	21.6	NW 26 – W 13	0618- 1732
26th August 2021	6.7	19	0.2	WNW 20 – W 13	0617 – 1732
30st August 2021	6.8	20.9	0	WNW 15 – WNW 11	0612 - 1735
31st August 2021	3.4	24	0	NW 7 – NW 9	0611 – 1735
1st September 2021	3.7	25.6	0	WNW 9 – ESE11	0610 – 1736
2nd September 2021	10.8	25.6	0	E 6 – ENE 24	0608 – 1737
3rd September 2021	7.4	25.5	0.2	W 13 – W 6	0607 - 1737
6th October 2021	9.5	25.6	0	WNW 20 – WNW 13	0623 - 1859
7th October 2021	5.6	29.7	0	NW 9 – NW 24	0622 - 1900
1st November 2021	6.4	24.1	0	WNW 4 – E 7	0554 - 1919
9th November 2021	14.9	27.2	0.2	S 4 - ESE 19	0547 - 1927
23rd November 2021	16	23.5	6.4	SE 17 – ESE 9	0539 - 0939
10th January 2022	22.1	30.3	0.2	ENE 7 – SSE 9	0556 – 2005
11th January 2022	20.5	31.1	0	ENE 7 – SSE 9	0557 – 2005
12th January 2022	21	28.8	0	SSE 7 – SE 22	0558 – 2005
13th January 2022	18.3	29.2	0	SE 9 – SE 19	0559 - 2005
14th January 2022	17.9	29.6	0	NNE 9 – WNW 7	0600 – 2004
17th January 2022	19.9	33.4	0	NNE 7 – NE 6	0602 - 2004
18th January 2022	22	27.2	1	SSE19 – WSW 6	0603 - 2003
19th January 2022	19.7	22.2	17.8	S 15 – SSE 19	0604 – 2003
20th January 2022	17.7	25.9	16.6	SSE 26 – SE 31	0605 – 2003
24th January 2022	17.3	27.9	2	WSW 6 – SE 15	0609 – 2001
25th January 2022	15.7	28.7	0	E 11 – SE 19	0610 – 2001
26th January 2022	17	27.8	0	E 13 – E 20	0611 – 2000
27th January 2022	13.7	30.2	0	ESE 13 – E17	0612 - 1959
28th January 2022	17.9	31.7	0	NE 2 – SE 11	0613 - 1959
2nd February 2022	23	24.1	3.8	SSE 11 – S 20	0618 – 1956
18th February 2022	16.7	32.4	6	W 9 – SE 6	0633 - 1941
22nd February 2022	20	26.5	5	WNW 7 – SSE 9	0636 – 1937
23rd February 2022	19.3	29.8	0.6	ESE 9 – NNE 4	0637 - 1936
24th February 2022	21.1	25.6	25.8	ESE 7 – E 15	0638 – 1935
25th February 2022	21.3	28.3	8.2	ESE 15 – E 15	0639 – 1933
26th February 2022	19.8	25.4	0.8	ENE 9 – SE 11	0639 - 1932

Date	Min Temp (°C)	Max Temp (°C)	Rain (mm)	Wind (km/h)	Sunrise-Sunset
28th February 2022	18.5	26.7	11.2	SSE 7 – E 19	0641 - 1930
1st March 2022	19.9	24.6	1.8	S 11 – ESE 20	0642 – 1929
2nd March 2022	19.7	27.1	16	SE 13 – E 26	0643 - 1927
8th March 2022	21.2	24	18.8	ESE 9 – WNW 17	0647 - 1920
9th March 2022	18	25.5	17.6	WNW 17 – SW 15	0648 – 1919
10th March 2022	17.1	23.6	1	WSW 9 – ESE 7	0649 – 1916
11th March 2022	13.9	25.4	0	CALM – ESE 15	0650 – 1916
12th March 2022	12.5	25.9	0	W 2 – ESE 19	0650 – 1915
14th March 2022	13	26.6	0	ESE 6 – SE 24	0652 - 1912

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

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

Mammals

Arboreal

No threatened species were recorded within the subject land. Multiple gliders were detected during nocturnal surveys and via infrared cameras, however, due to small nose and small size, all individuals have been identified as Sugar Gliders (*Petaurus breviceps*). A complete list of fauna detected within the subject land can be found in **Appendix C.**

Terrestrial

No threatened species were observed. Native species including the Eastern Grey Kangaroo (*Macropus giganteus*), Brown Antechinus (*Antechinus stuartii*), as well as the introduced Black Rat (*Rattus rattus*) and European Fox (*Vulpes vulpes*) were also regularly recorded.

Grey-headed Flying Fox (*Pteropus poliocephalus*) was observed flying over and sporadically foraging on the site. For a complete list of fauna detected within the subject land can be found in **Appendix C.**

Avifauna

A limited number of bird species were recorded during the dusk survey efforts. A distinct lack of birds were observed on site and heard calling. A total of 27 bird species were identified visually or by vocalisation during the surveys. One threatened species which was detected on site with multiple nests is the Grey-Crowned Babbler (*Pomatostomus temporalis temporalis*). A complete list of fauna detected within the Subject Site can be found in **Appendix C.**

Herpetofauna

No threatened herpetofauna were detected within the Subject Site. Amphibian species found within the subject site, occurring within the dams and flooded pastures, included; Common Eastern Froglet (*Crinia signifera*), Green Tree Frog (*Litoria cerulea*), Rocket Frog (*Litoria latopalmata*), Striped Marsh Frog (*Limnodynastes peronii*), Spotted Marsh Frog (*Limnodynastes tasmaniensis*), Eastern Dwarf Tree Frog (*Litoria fallax*) and Peron's Tree Frog (*Litoria peroni*). A complete list of fauna detected within the Subject Site can be found in **Appendix C.**

Microchiropterans Bats

A total of ten labelled 'Definite' microbat species were detected via the use of the Anabat express echo-location call recorder.

Of the recorded species, four species that are marked as 'Definite' and one marked as 'Probable' are listed as threatened under the BC Act. These include;

- Little Bent-wing Bat (*Miniopterus australis* – Definite,
- Large Bent-wing Bat (*Miniopterus orianae oceanensis*) – Definite,
- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*) – Definite,
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*) – Definite, and
- Southern Myotis (*Myotis macropus*) – Probable

Due to these species being detected, further assessment in regard to breeding habitat was necessary. As a result, harp trapping was conducted. No bats were intercepted and therefore have been assessed as not containing breeding habitat on site and contains only foraging potential.

Refer to **Appendix G** for the Anabat Call Recording report for a complete list of detected species.

5.6 Identified Threatened Species

Although the site contains some marginal habitat for some native species, only six threatened entities have been assessed as utilising the subject land. These species include;

- Grey-crowned Babbler (*Pomatostomus temporalis temporalis*)
- Little Bent-wing Bat (*Miniopterus australis*),
- Large Bent-wing Bat (*Miniopterus orianae oceanensis*),
- Eastern Coastal Free-tailed Bat (*Micronomus norfolkensis*),
- Eastern False Pipistrelle (*Falsistrellus tasmaniensis*), and
- Southern Myotis (*Myotis macropus*)

Of which, only three species are candidate species which have the potential to generate species credits. These are as follows Little Bent-wing Bat (*Miniopterus australis*), Large Bent-wing Bat (*Miniopterus orianae oceanensis*), and Southern Myotis (*Myotis macropus*). However, these detected entities only generate a credit liability if breeding habitat is detected. As targeted surveys did not determine the presence of breeding individuals utilising the subject land, no credit liability is generated.

6 Identify Prescribed Additional Biodiversity Impacts

6.1 Habitat for threatened entities

Karst, caves, crevices, cliffs, rocks, and other geological features of significance

No geological features of significance occur within the subject land and therefore no impacts to associated threatened entities are anticipated as a result.

Human made structures

Two structures occur within the subject land, with one being an occupied residential dwelling as well as a large shed. The shed structure was searched for evidence of use by threatened entities such as scats/urine staining associated with microbat occupation. No evidence of utilisation by threatened entities was detected. Roost watches of structures were conducted at structures over nights 20th January and 24th January 2022; the methodology employed listed in Table 8 Section 5.4.1. The anthropogenic structures listed were not found to provide suitable habitat for threatened entities at the time of survey and therefore the removal of them does not constitute a prescribed impact to threatened entities.

Non-native vegetation

The subject land contains non-native vegetation surrounding the residential dwelling to the north of the site as an ornamental garden. This area was in active use by the land holders and contained no suitable habitat for threatened entities such as hollows.

Non-native vegetation/bare ground is present around the perimeter of dams within the subject land. Additionally areas of pastural grasses present within the subject land (VZ3) has a VI score below 14, therefore this area does not generate a biodiversity offset credit liability.

As no threatened entities associated with waterbodies have been confirmed as present based on survey results, nor where any threatened flora species identified within targeted searches of VZ3, these areas does not constitute habitat for threatened entities. Areas of bare ground exist within the subject land boundaries which have been excised from the vegetation mapping. Therefore, there are no prescribed additional impacts associated with impacts to non-native vegetation.

6.2 Habitat Connectivity

The subject land is situated within a fragmented rural landscape situated north east of Chisholm, within the Maitland LGA. The subject land provides connectivity to the broader patch of wooded vegetation however this is ultimately isolated; terminating at the residential development of Thornton to the south, Chisholm to the west, and heavily cleared agricultural lands to the north and east.

Forested areas occur directly to the east and west with C3 Environmental Management zoned lands abutting the subject land. Loss of native vegetation within the subject land resultant from the proposal will remove remnant canopy trees and regenerating cohort of forested community which will impact connectivity within the patch immediately surrounding the study area comprising of neighbouring forested lots. However, this patch is functionally isolated within the broader landscape of cleared agricultural land and surrounding industrial and residential development in the form of the suburbs of Maitland; Chisholm and Metford to the west, and Thornton to the south. Therefore, the proposal will impact habitat connectivity within the study area and areas immediately surrounding however this represents a functionally isolated patch, and the will not result in reduced habitat connectivity within the broader landscape or region.

6.3 Water bodies, water quality and hydrological processes that sustain threatened entities

The subject land occurs 2.5 km south from the Hunter River and currently contains three rural dams utilised by livestock. The subject land sits along the undulating slope of a gentle hill with run-off flowing to the west into an unnamed ephemeral creek (a tributary off Hunter River). No mapped creek lines occur within the subject land. As part of the detailed designs the dams will be removed, with the installation of a basin in the northern lot and a rehabilitation riparian area (to the south). The loss of the waterbodies was found to not provide habitat for threatened entities such as amphibian species, therefore the loss and augmentation of them, is unlikely to constitute a prescribed biodiversity impact.

6.4 Wind turbine strikes

Not applicable to this proposal.

6.5 Vehicle strikes

The proposal will result in an increase in vehicle access to the subject land, both during the construction phase and as a result of the proposed subdivision. As part of the proposed subdivision detailed design, altered access roads are proposed which will provide access via the north of the subject land as well as a central road connecting through Lots 33/ DP 794448 and 4/ DP 1145348. Despite increase vehicle traffic resultant from the proposal, increased vehicle strikes of fauna as to constitute a prescribed impact are not anticipated due the current vehicle traffic of McFarlanes Road to the north and Raymond Terrace to the south. Both roads providing connection from East Maitland to Raymond Terrace and Hexham via Morpeth and Metford.

7 Matters of National Environmental Significance

An EPBC Act Protected Matters Search (accessed 02-05-2022) was undertaken to generate a list of those Matters of National Environmental Significance (MNES) from within 10 km of the Study Area. An assessment of those MNES relevant to biodiversity has been undertaken in accordance with 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 102 threatened species and eight 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 D**.

Threatened Species

Thirty-seven threatened birds, ten mammals, four frogs, one reptile, and twenty-seven plants were recorded on the protected matters search. Of these, four species were considered to have the potential to utilise the habitats within the subject land:

- *Climacteris picumnus victoriae* Brown Treecreeper
- *Dasyurus maculatus* Spotted-tailed Quoll
- *Phascolarctos cinereus* (combined populations of Qld, NSW and the ACT) Koala
- *Pteropus poliocephalus* Grey-headed Flying-fox

This assessment concluded that the proposal is unlikely to impact the listed threatened species.

No Threatened Ecological Community listed under the EPBC Act have been recorded within the subject land

Listed Migratory Species:

The protected matters search nominated thirty-five migratory species or species habitat that may occur with the 10 km Study Area buffer search area. No listed migratory species were observed within the subject site. The assessment contained in **Appendix D**, concluded that, no habitat within the subject land or Study Area is critical to their survival. Therefore, it is unlikely that the proposal over the Subject Site will impact migratory species.

Wetlands of International Significance (declared Ramsar wetlands):

The Subject Site lies within proximity to the Hunter Estuary Wetlands. The Wetlands is located downstream of the Hunter river. This proposal is unlikely to cause direct impacts to the Hunter Wetlands. Erosion and run off mitigation measures during construction and operation phase have been recommended in Section 11.

Commonwealth Marine Areas:

The Subject land is not part of a Commonwealth Marine Area and is not in close proximity to any such area.

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 residential development and as such is not or does not form part of a coal mining and/or CSG proposal.

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

8 SEPP (Biodiversity and Conservation) 2021

The *State Environmental Planning Policy (Koala Habitat Protection) 2021* commenced on 17 March 2021 to replace and repeal the State Environmental Planning Policy (Koala Habitat protection) 2020. These two SEPPs were amalgamated into two chapters of the State Environment Planning Policy (Biodiversity and Conservation) 2021

The principles of chapter 4 of Biodiversity and Conservation SEPP 2021; Koala Habitat Protection:

- 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 reinstates the policy framework of SEPP Koala Habitat Protection 2019 to 83 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 – Koala SEPP 2021 applies to **all zones**.
- In all other identified LGAs, Koala SEPP 2021 **does not apply** to land zoned RU1 Primary Production, RU2 Rural Landscape or RU3 Forestry.

The SEPP applies in accordance with *Part 2 Clause 11 – 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

The lot in which the Subject Site occurs is >1ha.

b) Does not have an approved koala plan of management applying to the land.

No koala plan of management occurs within the Maitland LGA.

Additionally, trees belonging to the koala use trees species listed in Schedule 2 for the relevant koala management area occur within the subject land and are to be removed.

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

A total of five SATs were undertaken over the subject land within areas where these Schedule 2 trees occur with more than a 15% canopy cover and nocturnal spotlighting was conducted during owl surveys (Aug-Sep) and frog surveys (Dec-Feb) with no responses to call playback. No individuals or secondary indications were observed during the surveys.

There are no koala records occurring within 2.5 km of the land within the last 18 years, however this record exists in an area which has major movement barriers in relation to the location of the land, including major roads and large commercial areas. However, it should be noted that a total of 449 records are present within 10 km of the subject land.

Due to the very low number of recorded koala sightings within the area within the last 18 years, coupled with the disturbed nature of the subject land within a highly fragmented landscape, minor area of intact native vegetation under assessment, the subject land is not considered to serve as an important ecological function for koalas, or important to the recovery of the koala.

Assessment determined the proposal is unlikely to have an impact on the Koala with due regard to the proposal and site context.

STAGE 2 - IMPACT ASSESSMENT

9 Avoid and Minimise Impacts

9.1 Biodiversity Values

Site Selection

The subject land is located within the Maitland City Council LGA. The subject land is situated in an urban release area, and occurs across the majority of the study area; Lots 32 DP 778111 and 31 DP 778111 zoned as RU2 Rural Landscape and R1 General Residential respectively. The subject land has road access from of Raymond Terrace Road to the south (that will not be formalised under this proposal) and McFarlanes Road to the north via existing development; located approximately 600 m east of Chisholm and 1200 m north of Thornton, making the study area a suitable location for subdivision within the larger City of Maitland.

The study area represents a portion of an isolated patch of remnant and regenerating forested areas in the form of scattered remnant paddock trees, young regenerating areas from recent clearance and a C3 Environmental Management abutting the boundary to the west. The vegetation within the subject land is characterised as scattered paddock trees with a mosaic of native and non-native pasture and patches denser mid stratum resultant from less regular slashing. Therefore the subject land contains limited biodiversity value.

An initial site inspection provided a preliminary assessment of biodiversity values within the subject land to assist with site selection, confirming the limited biodiversity values of the predominantly disturbed study area, ensuring avoidance of higher biodiversity values in the study area (conducted May 2020).

Project Design

Development of the proposed subdivision concept has been an iterative process between the proponent and key project technical inputs of biodiversity and engineering over the duration of the project lifetime. The outcomes were presented to Maitland City Council at a meeting and separate site walkover. The BDAR - Urban Design Supplement presented to council, is provided as **Appendix H** and details site considerations and options analysis pertinent to Avoidance and Minimisation that has culminated in the development concept plan (**Appendix A**) adopted for this development application.

Refer to **Appendix A** showing the plan of the proposal..

9.2 Prescribed Biodiversity Impacts

The avoidance and minimisation of prescribed biodiversity impacts is a critical component of the BAM, as many of these biodiversity values are difficult to quantify, replace or offset.

The BC regulation (clause 6.1) identified actions that are prescribed as impacts to be assessed under the biodiversity offset scheme. Where these items occur, they have been addressed below.

9.2.1 Habitat for Threatened Entities

Karst, caves, crevices, cliffs, rocks, and other geological features of significance

No geological features of significance occur within the subject land and therefore no avoidance and minimisation measures are required.

Human-made structures

As discussed in **Section 6.1**, two human-made structures occur within the subject land which were inspected and targeted searches conducted where appropriate by the ecologist during field assessment for evidence of use by fauna, specifically microbat species. The anthropogenic structures listed were not found to provide suitable habitat for threatened entities at the time of survey and therefore the loss of them does not constitute a prescribed impact to threatened entities requiring avoidance and minimisation measures or impact assessment.

Non-native vegetation

As discussed in **Section 6.1**, the subject land contains non-native vegetation in the form of ornamental garden surrounding the primary residential dwelling, immediately surrounding dams and VZ3; though a native vegetation zone, does not contain a high enough number of native species compositionally to generate biodiversity credits, which occupies up to 6.31 ha of the subject land. See **Section 3.3** for the species composition. As such, the proposal will impact up to 0.35 ha of bare ground ad non-native vegetation in addition to VZ3 constituting a potential prescribed impact. However, given the lack of structural complexity and based on results of visual inspections the non-native vegetation is unlikely to constitute suitable habitat for threatened entities. Therefore, no avoidance and minimisation measures are required.

9.2.2 Habitat Connectivity

As discussed in **Section 6.2**, the subject land is highly modified and subject to consistent disturbance in the form of grazing pressure and slashing. As per **Section 2.1.5 and 6.2**, the study area though connected to neighbouring vegetation represents a section of an isolated patch and subsequently does not meaningful habitat connectivity to a broader landscape regionally.

The proposed development was designed to avoid impacts to higher quality patches of vegetation in the broader landscape context. This housing development has been proposed within an area which has been rezoned by Maitland City Council to R1 – General Residential which occurs adjacent to two C3 – Environmental Management zoned areas. The subject land comprises existing disturbed land consisting of native vegetation, a portion of which is in moderate condition. The final proposed development footprint will retain 1.7 ha of vegetated areas as part of the detailed design, with the remainder of the subject land to be impacted for the proposed development and associated ancillary infrastructure. Currently, the native vegetation within the subject land forms fragmented corridors for fauna movement from west to east. The removal of this will have an impact on connectivity across the isolated patch of forested vegetation within the highly fragmentated rural landscape.

Connectivity is being retained through detailed design both within this proposal and considerations of neighbouring developments, to ensure connectivity is maintained within the immediate landscape. Post development implementation of detailed design features such as riparian embellishment street tree plantings are proposed to aid in minimising potential impacts to connectivity. As such the proposal

represents a loss of connectivity within the immediate patch, albeit isolated. Considerations have been made throughout the detailed design phase to ensure connectivity is retained both within the subject land and considerations of proposed developments occurring external to the subject land boundary, see **Appendix H** for further detail. Therefore, cumulatively the proposal will have minor prescribed impacts on biodiversity values. As such, no avoidance and minimisation measures are required.

9.3 Water bodies, Water Quality and Hydrological Processes that Sustain Threatened Entities

As part of the designs of the proposal a total of three dams will be removed, with the installation of a basin in the northern lot and a rehabilitation riparian area (to the south). The waterbodies exist as man-made farm dams, the implementation of which has historically altered hydrology of the subject land. The loss of the waterbodies was found to not provide habitat for threatened entities such as amphibian species, therefore the loss and augmentation of them, is unlikely to constitute a prescribed biodiversity impact. As such, no avoidance and minimisation measures are required.

9.3.1 Wind Turbine Strikes

Not relevant to the proposal, therefore no avoidance and minimisation is required.

9.3.2 Vehicle Strikes

As discussed in **Section 6.5**, it is anticipated that the proposal will result in increased traffic to and from the subject land as a resultant from the proposed development. However, this is unlikely to result in increased vehicle strikes as the existent roads currently experience high traffic, from traffic along McFarlanes Road to the north and Raymond Terrace to the south.

Traffic calming devices including line marking, signage, and speed bumps as appropriate coupled with reduced speed limits within the development form part of the proposal to ensure safety for humans and the local fauna. Increased vehicle strikes resulting from increased traffic associated with the future development are an unavoidable impact of the proposal, though they are anticipated to be minimal, therefore no avoidance and minimisation measures are required.

10 Unavoidable Impacts

The following section outlines potential direct and indirect impacts on biodiversity values and prescribed impacts associated with the proposal.

10.1 Direct Impacts

The proposed development of a multistage housing development and associated infrastructure at 173 McFarlanes Road and 507 Raymond Terrace, Chisholm occurring over Lots 32/ DP 778111 and 31/ DP 778111 respectively, which will result in the following direct impacts:

Removal of Native Vegetation & TEC

A total of 24.65 ha of native vegetation is to be entirely removed. **Table 10** provides an overview of the area to be cleared and the current and future vegetation integrity score (V.I).

Of this, 18.35 ha of PCT 1600 (VZ 1, VZ2, and VZ4) to be removed is commensurate with the BC Act listed Endangered *Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions*.

A total 0.62 ha of PCT 1598 (VZ5) will be removed which is commensurate with the BC Act listed Endangered *Hunter Lowlands Redgum Forest in the Sydney Basin and NSW North Coast Bioregions.*

Removal of Threatened Species (Candidate Species Credit Species)

No threatened Species Credit Species were detected on site.

Table 11 Direct Impacts on Native Vegetation

Vegetation Zone	Condition	Threatened Ecological Community	Area (ha)	Current V.I Score	Future V.I Score
1600: Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter					
VZ1	1600_Scattered Trees	Yes – commensurate with BC Act listed EEC *Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions*	10.18	51.5	0
VZ2	1600_Moderate	Yes – commensurate with BC Act listed EEC *Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions*	5.01	64.4	0
VZ3	1600_Pasture – Native and Exotic	No – Not commensurate with BC Act listed EEC *Lower Hunter Spotted Gum Ironbark Forest in the*	6.30	8.5	0

		Sydney Basin and NSW North Coast Bioregions			
VZ4	1600_Regenerating/Disturbed	Yes – commensurate with BC Act listed EEC *Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions*	2.53	52.5	0
1598: Forest Red Gum grassy open forest on floodplains of the Lower Hunter					
VZ5	1598_Moderate	Yes – commensurate with BC Act listed EEC *Hunter Lowlands Redgum Forest in the Sydney Basin and NSW North Coast Bioregions*	0.62	55.8	0

Candidate Species Credit Species and SAII

As part of the biodiversity assessment, it has been determined the proposal will:

- Not impact any threatened ecological communities which are listed as a candidate Serious and Irreversible Impact entity in accordance with *Guidance to assist a decision-maker to determine a serious and irreversible impact* (BAM 2020)
- Twenty-seven hollow-bearing trees were identified within the subject land, three of which are to be retained under this proposal. These hollows provide potential habitat for glider species such as Sugar Glider (*Petaurus breviceps*) which was identified as present within the subject land. Noting that though the Candidate Species Squirrel Glider (*Petaurus norfolcensis*), was not identified within the subject land, this would provide habitat for the entity. In addition, some hollows also considered large enough hollows for other threatened species such as Forest Owls, though not detected during targeted surveys.

10.2 Indirect Impacts

The proposed construction of a multistage residential estate at 173 Mcfarlanes Road and 507 Raymond Terrace, Chisholm, NSW will result in the following indirect impacts described in **Table 11**.

Table 12 Potential Indirect Impacts

Impact	Extent	Frequency/likeliness	Duration	Threatened species or TEC likely to be affected	Consequence of the impact on bioregional persistence of the threatened species, TEC and/or habitat
Inadvertent impacts on adjacent habitat or vegetation	Immediate surrounds	Likely – Ongoing	During & post construction	▪ Hollow bearing trees potential to be used by threatened species such as birds, forest owls, microbats and arboreal mammals (potential to occur). ▪ Adjacent EEC – (PCT 1600) to the north, east and south boundaries of the site	▪ 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 the Subject Site ▪ Loss of waterbodies (multiple dams within subject land)
Reduced viability of adjacent habitat due to edge effects	Immediate surrounds	Likely – Ongoing	During & post construction	▪ Hollow bearing trees potential to used by threatened species such as birds, forest owls, microbats and arboreal mammals (potential to occur) ▪ Threatened flora and fauna ▪ Adjacent EEC – (PCT 1600) to the north, east and south boundaries of the site	▪ Increase in weed dispersal via seed dispersal from proposed developments, construction machinery, increased vehicle and human traffic flow nearby. ▪ Disturbance likely to native flora and fauna habitat along the boundaries and any retained vegetation within the development site. ▪ Disturbance to adjacent HBTs. ▪ Potential disturbance via erosion and sediment flows to retained adjacent vegetation ▪ Increased edge effect may have an impact on accessibility to native vegetation for threatened species

Impact	Extent	Frequency/likeliness	Duration	Threatened species or TEC likely to be affected	Consequence of the impact on bioregional persistence of the threatened species, TEC and/or habitat
Reduced viability of adjacent habitat due to noise, dust or light spill	Immediate surrounds	Likely - On-going	On-going during construction and post development	▪ Forest Owls (foraging) ▪ Arboreal mammals (foraging) ▪ All potential threatened fauna that may forage in the adjacent habitat ▪ Adjacent EEC – (PCT 1600) to the north, east and south boundaries of the site	▪ 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 Subject Site to adjacent vegetation	Immediate surrounds	Likely – During Construction	During construction and post construction: particularly adjacent to the Subject Site boundary	▪ All threatened flora and fauna known to reside within the area ▪ Adjacent EEC – (PCT 1600) to the north, east and south boundaries of the site	▪ Mortality and degradation of adjacent vegetation from disease; ▪ Increase risk in weed presences, that will restrict native flora establishment and colonisation and native fauna movements; ▪ Risk of establishment of high threat weed that would degrade native vegetation ▪ Loss of fauna habitat
Increased risk of starvation, exposure and loss of shade or shelter	Immediate surrounds	Initial development stages	Construction stage only	▪ Adjacent EEC – (PCT 1600) to the north, east and south boundaries of the site	▪ Impact on potential habitat during construction by exposing edges of vegetation that were not accustom to loss of shade or direct environmental factors (increased wind, sunlight) ▪ Minor risk of loss due to exposure of root balls of retained trees during construction ▪ Minor risk of loss of retained individuals via compaction of soils in the immediate area of the root zone
Increase in pest animal populations	Unknown	Likely - Ongoing	During construction	▪ Any threatened species that may forage in the adjacent vegetation	▪ Minor increase in mortality of threatened fauna species due to pest animal presences.

Impact	Extent	Frequency/likeliness	Duration	Threatened species or TEC likely to be affected	Consequence of the impact on bioregional persistence of the threatened species, TEC and/or habitat
			and post construction		▪ Minor increase in native vegetation degradation associated with pest animals foraging on native flora species, ground disturbance ▪ Moderate risk of increasing weed presences within adjacent vegetation by acting as a vector of weed species. ▪ Risk of pest animal population excluding threatened fauna due to favourable modification of vegetation (clearing)
Erosion and sediment impacts to adjacent vegetation	Unknown	Infrequent pending mitigation measures	Construction and Operational	▪ Adjacent EEC – (PCT 1600) to the north, east and south boundaries of the site ▪ Runn-off into adjacent EEC (PCT1598) to north-west of site	▪ Erosion and sedimentation impact on potential adjacent native vegetation ▪ Erosion and sedimentation impact on potential adjacent disturbed swamp forest/creeklines
Exposure of known soil contamination from development site into adjacent lands	Unknown	Likely - Ongoing	During construction and post construction	▪ Adjacent EEC – (PCT 1600) to the north, east and south boundaries of the site ▪ Runn-off into adjacent EEC (PCT1598) to north-west of site	▪ Risk of contamination exposure impacting health of native vegetation reducing extent and quality;

10.3 Assessment of Prescribed Biodiversity Impacts

10.3.1 Habitat for Threatened Entities

Karst, caves, crevices, cliffs, rocks, and other geological features of significance

No geological features of significance occur within the subject land and therefore no avoidance and minimisation measures are required.

Human-made structures &

As discussed in **Section 6.1** and **9.2**, two human-made structures occur within the subject land which were inspected and targeted searches conducted where appropriate by the ecologist during field assessment for evidence of use by fauna, specifically microbat species. The anthropogenic structures listed were not found to provide suitable habitat for threatened entities at the time of survey and therefore the loss of them does not constitute a prescribed impact to threatened entities requiring impact assessment.

Non-native vegetation

As discussed in **Section 6.2**, the subject land contains non-native vegetation in the form of ornamental garden surrounding the primary residential dwelling, immediately surrounding dams and VZ3; though a native vegetation zone, does not contain a high enough number of native species compositionally to generate biodiversity credits, which occupies up to 6.31 ha of the subject land. See **Section 3.3** for the species composition. As such, the proposal will impact up to 0.35 ha of bare ground ad non-native vegetation in addition to VZ3 constituting a potential prescribed impact. However, given the lack of structural complexity and based on results of visual inspections the non-native vegetation is unlikely to constitute suitable habitat for threatened entities, and therefore does not require assessment.

10.4 Habitat Connectivity

The development will result in the removal of 24.65 ha of native vegetation which will reduce connectivity between areas of habitat surrounding the subject land, as described in **Section 6.2.** The study area though connected to neighbouring vegetation represents a section of an isolated patch and subsequently does not meaningful habitat connectivity to a broader landscape regionally.

The proposal will influence habitat connectivity and modify existing fragmentation patterns within nearby corridors. The removal or modification of vegetation from the subject land occurs in a highly modified state due to historic land-use.

The site vegetation would support highly mobile species moving across the landscape, in particularly, fauna species that would use the site for foraging on blossom species such as *Eucalyptus* species and potentially fauna species that prey on small mammals such as the Common Brushtail Possum, Ringtail Possum, Antechinus, Gliders and Bush Rat. Fauna that potentially would use the site in times of high blossom include threatened species such as the Grey-headed Flying-fox. In addition, several other predicted threatened species would potentially use this site as a steppingstone across the landscape for foraging purposes. These species would include but not limited to large Forest Owls and Microchiropteran bats.

As per **Section 9.2.2** connectivity is being retained through detailed design both within this proposal and considerations of neighbouring developments, to ensure connectivity is maintained within the immediate landscape. As such the proposal represents a loss of connectivity within the immediate patch, albeit isolated. Cumulatively the proposal will have minor prescribed impacts on biodiversity values. As such no prescribed impacts associated within habitat connectivity are anticipated resultant from the proposal, therefore no assessment required.

10.5 Water bodies, Water Quality and Hydrological Processes that Sustain Threatened Entities

As per **Section 9.3**, part of the designs of the proposal a total of three dams will be removed, with the installation of a basin in the northern lot and a rehabilitation riparian area (to the south). The waterbodies exist as man-made farm dams, the implementation of which has historically altered hydrology of the subject land. The loss of the waterbodies was found to not provide habitat for threatened entities such as amphibian species, therefore the loss and augmentation of them, is unlikely to constitute a prescribed biodiversity impact. As such, no assessment of prescribed impacts are required.

10.5.1 Wind Turbine Strikes

Not relevant to the proposal, therefore no avoidance and minimisation is required.

10.5.2 Vehicle Strikes

As per **Section 9.3.2**, it is anticipated that the proposal will result in increased traffic to and from the subject land as a resultant from the proposed development. Increased vehicle strikes resulting from increased traffic associated with the future development are an unavoidable impact of the proposal, though they are anticipated to be minimal, therefore no assessment of prescribed impacts required.

11 Mitigation and Managing Impacts

The following section outlines general mitigation measures required to manage impacts associated with the development proposal. All mitigation measures propose to manage impacts that include techniques, timing, frequency and responsibility for implementing each measure.

Table 13 Mitigation Measures

Mitigation Measures	Responsibility	KPI	Timing	Corrective Action
Direct Impacts				
Vegetation Clearing				
Vegetation removal works are to occur outside core breeding periods for species known to use habitat within the subject land wherever possible.	Project ecologist in consultation with project manager, where appropriate	Works plan indicates tree clearing areas during optimal months	Spring to Summer where possible	Cease site works, revert to KPI
Pre-clearance survey of tree to be removed	Project Ecologist, if required	Tree pre-clearance survey completed maximum one week prior to removal No breeding fauna observed at time of clearing	Prior to commencement of works for each stage	Cease site works, revert to KPI
Mark habitat tree	Project Ecologist, if required	All habitat trees flagged and determine fauna presences (utilisation)	Prior to commencement of woks for each stage	Cease site works, revert to KPI
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	Project ecologist in consultation with project manager	CEMP to be developed to outline clearing plan for each stage, that includes fauna management	Prior to commencement of works for each stage	Cease site works, revert to KPI
Habitat Tree Removal				
Clear hollow-bearing tree	Contractors	Trees soft-felled or similar method used	During clearing works	Cease site works and refer to KPI and timing of activities
Felled trees left in situ before stockpiling to allow for any fauna to move on	Contractors	Trees left overnight after felling, stockpiled within clearing boundary	After felling of hollow-bearing and habitat trees, prior to stockpiling	Cease site works and refer to KPI and timing of activities
Felling supervised by Ecologist	Project Ecologist	Tree hollows checked for fauna Fauna welfare managed in accordance with ethic licencing	During clearing works	Cease site works and refer to KPI and timing of activities

Mitigation Measures	Responsibility	KPI	Timing	Corrective Action
Indirect Impacts				
Weeds, disease and edge effects				
Equipment and vehicles entering the Subject Site are cleaned of foreign soil and seed prior to entering the Study Area	Contractors	Best practice hygiene protocols followed, No visible foreign material, certification available upon request	Prior to machinery arriving to the Subject Site	Non-compliance due to foreign material present, Refer to KPI
Retained Vegetation				
Establish No go zones at the subject land and study area interface.	Contractor in consultation with project ecologist	Fencing to include high vis bunting and star pickets or similar	Prior to construction	Cease site works and refer to KPI
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	Contractor with Ecologist input	Approved CEMP (Inc. weed management protocols) prior to construction of each stage	Prior to construction of each stage adjacent to retained vegetation	Increases in weed presences, will require amendments to weed management protocols
Noise and light Impacts				
Limit construction works to daylight hours to reduce impacts from light and noise	Construction contractor	No construction works to occur from dusk till dawn.	During construction works	Cease site works and refer to KPI
All machinery is correctly maintained and operator as per operation manual	Construction contractor	No excessive noise of machinery due to poor maintenance or faulty parts	During construction works	Cease site works and refer to KPI
Dust Impacts				
Vehicles/machinery to observe 10 km/h speed limit on subject land	Contractors	No excessive dust	For the duration of Subject Site works until impervious surfaces established.	Reassess KPI and control measures if excessive dust continues
Pest animal				
Develop a Pest animal protocol to control any increases in pest animal population that may impact retained vegetation	Pest Animal contractor	Protocol approved as part of CEMP approval	During construction and operation	
Prescribed Biodiversity Impacts				
Erosion and sediment controls enacted in accordance with construction environment management plan (CEMP) to limit impacts on retained vegetation or riparian zones	Construction Contractor	CEMP followed & modified as needed	Prior to commencement of works, for duration of Subject Site works	Cease site works, Refer to KPI
Establish Speed limits during construction and operation of the proposed development	Project Manager	Low speed limits set to minimise vehicle strikes	Prior to construction and during operation	

12 Offset Requirements for Unavoidable Impacts

A summary of offset liabilities for the proposed development with respect to native vegetation are provided below (Refer to **Table 14**):

An offset is required for all impacts of development on PCTs that are associated with:

- a vegetation zone that has a vegetation integrity score ≥15 where the PCT is representative of an endangered or critically endangered ecological community, or
- a vegetation zone that has a vegetation integrity score of ≥17 where the PCT is associated with threatened species habitat (as represented by ecosystem credits), or is representative of a vulnerable ecological community, or
- a vegetation zone that has a vegetation integrity score ≥20 where the PCT is not representative of a TEC or associated with threatened species habitat.

12.1 Ecosystem Credits

Table 14 Ecosystem Credits

Vegetation Zone	PCT ID	Area (ha)	Vegetation Integrity Score (V.I) loss	Ecosystem Credits Required
VZ1_1600_Scattered Trees	1600	10.18	51.5	262
VZ2_1600_Moderate	1600	5.01	64.4	161
VZ3_1600_Pasture	1600	6.30	8.5	0
VZ$_1600_Regenerating/Disturbed	1600	2.53	52.5	66
VZ5_1598_Moderate	1598	0.62	55.8	17
			Total	**506**

12.2 Species Credit

No Species Credit Species are required for this proposed development.

12.3 Areas not requiring Offsets

There is 6.30 ha of poor vegetation within VZ3 – Pasture that will be impacted by the proposal. As this vegetation does not meet the Vegetation Integrity threshold scoring guidelines, the VZ does not require offsetting or further assessment.

12.4 Credit Summary

The following **Table 14** displays the required Biodiversity Offset Liability based on the BAM-C and **Figure 9** depicts areas that require offset. Refer to **Appendix I** for the BAM Credit Report.

Table 15 Biodiversity Liability Credit Summary

PCT	TEC	Area (ha)	HBT Cr	No HBT Cr	Offset Credits required
Ecosystem Credits					
PCT 1598: Forest Red Gum grassy open forest on floodplains of the lower Hunter	Yes, commensurate with *Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions*	0.62	0	32	17
PCT 1600: Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter	No, not commensurate with *Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions*	6.30	0	0	0
PCT 1600: Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter	Yes, commensurate with *Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions*	17.7	227	262	489
Total Credit Liability					506

The current method to retire credits for the proposal is likely to be a combination of purchase of biodiversity credits on the open market coupled with a payment into the Biodiversity Conservation Fund subject to market availability.

Section 12.5 below includes a Biodiversity Credit Management Plan (BCMP) for a proposed staged credit retirement to occur over six staged clearance schedule (see Appendix A; Overall Stage Master Plan). Please note that as proportions of Biodiversity Credits cannot be retired, at each stage the liability has been rounded up, resulting in an additional two Biodiversity Credits (508 Ecosystem Credits required compared to 506 Ecosystem Credits as per Table 15). Therefore the proponent will retire biodiversity credits per stage as per the BCMP with the exception being Stage 6, when the two less will be retired to ensure the liability is met. Therefore Stage 6 Biodiversity Credit liability is a toal of 80 Ecosystem Credits.

12.5 Biodiversity Credit Management Plan (BCMP)

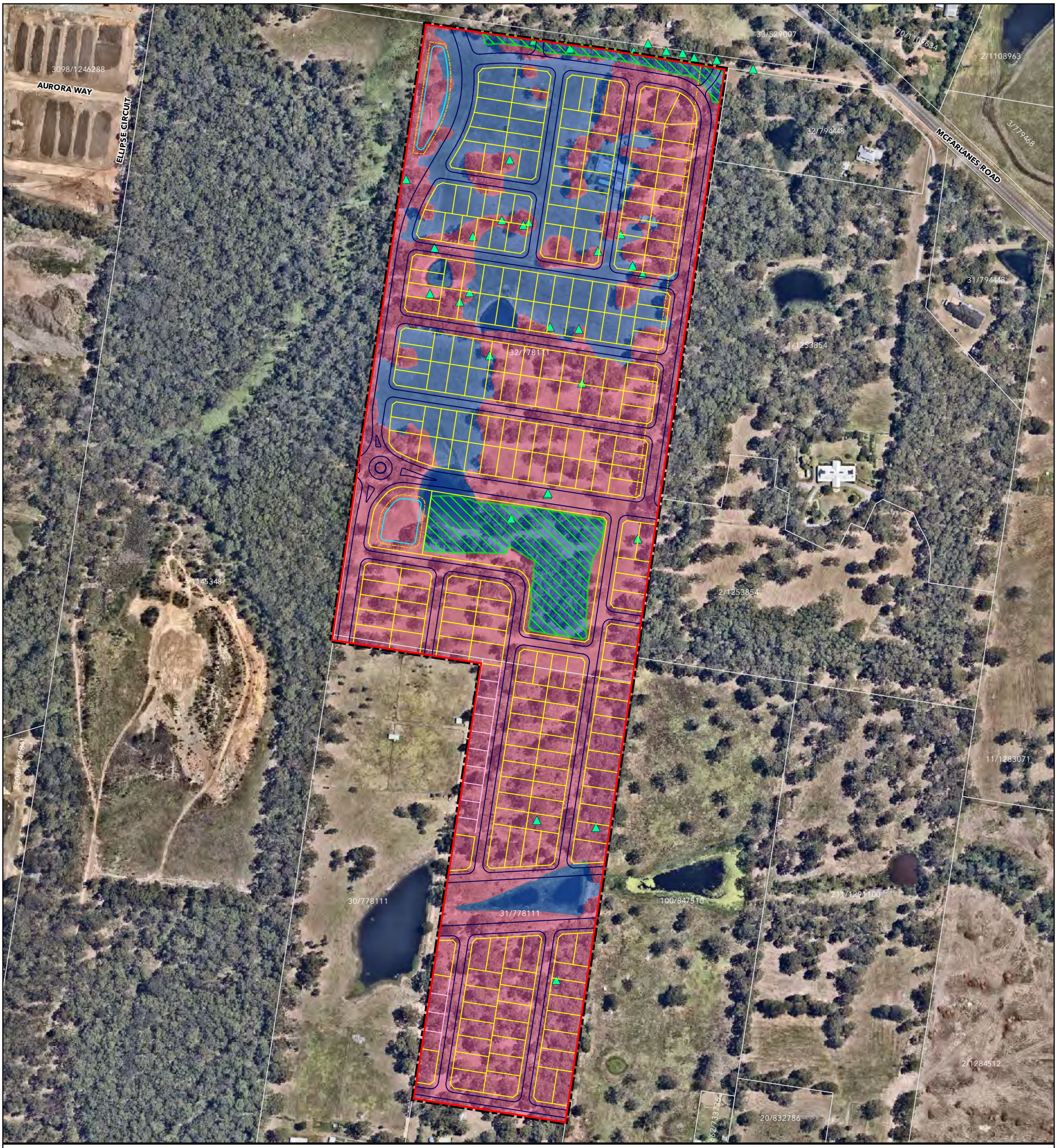
PCT 1600						
Proposed Clearing	**Credit Class**	**Trading Group**	**Total Clearing Area (ha)**	**Total Credit required to retire**	**Total Credit required to retire (Round Up)**	**Total Credit required to retire (Round Up)**
Stage 1	Ecosystem credits	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	3.39	93.66	94.00	94
Stage 2	Ecosystem credits		4.4	121.56	122.00	122
Stage 3	Ecosystem credits		0.93	25.69	26.00	26
Stage 4	Ecosystem credits		2.99	82.61	83.00	83
Stage 5	Ecosystem credits		3.04	83.99	84.00	84
Stage 6	Ecosystem credits		2.95	81.50	82.00	82*
Total			**17.7**	**489.00**	**491.00**	**491****

PCT 1598						
Proposed Clearing	**Credit Class**	**Trading Group**	**Total Clearing Area (ha)**	**Total Credit**	**Total Credit required to retire (Round Up)**	**Total Credit required to retire (Round Up)**
Stage 3	Ecosystem credits	Hunter Lowland Redgum Forest in the Sydney Basin and NSW Coast Bioregions	0.63	17	17	17
Total			**0.63**	**17**	**17**	**17**

Total Credit Liability	**Ecosystem credits**		**508**

*Noting that a total of 80 Biodiversity Credits will be retired to meet to the credit liability required for PCT 1600 (as per Table 15).

**A total of 489 Biodiversity Credits will be retired to meet the credit liability required for PCT 1600 (as per Table 15).



LOT 32 DP778111, LOT 31 DP778111, 173 MCFARLANES ROAD & 507 RAYMOND TERRACE ROAD, CHISHOLM

0 60 120 180 240

Metres

1:3800

FIGURE 9: OFFSET REQUIREMENTS

Legend

- Study Area
- Subject Land
- Cadastral Boundary
- Retained Vegetation
- Batter
- Proposed Lots
- Proposed Future Lots
- Kerb
- Basin
- Hollow Bearing Tree

Offset Requirements

- Impacts requiring offset
- Impacts not requiring offset

N W E S

MJD Environmental

Aerial: Nearmap (2023) | Data: MJD Environmental, ADW Johnson, NSW Spatial Services (2023) | Datum/Projection: GDA2020 / MGA zone 56 | Date: 22/05/2023 | Version: 3 | Z:\20039 - 173 Mcfarlanes Road, Chisholm | This plan should not be relied upon for critical design dimension.

13 Conclusion

MJD Environmental has been engaged by Allam Property Group to prepare a Biodiversity Development Assessment Report (BDAR) to accompany a Development Application for a proposed residential subdivision over Lot 32 DP778111 and Lot 31 DP778111, 173 McFarlanes Road and 507 Raymond Terrace Road, Chisholm.

The subject land is not mapped on the *Biodiversity Values Map* (BVM); however, the proposal exceeds the area clearing threshold associated with the Minimum Lot Size (MLS) of the Lot. In the instance of a proposal occurring over two lots the lots with the smallest MLS is utilised to determine the area clearing threshold. Therefore, the area clearing threshold associated with the proposal is clearance of native vegetation over 0.25 ha. As such, the proposal triggers assessment under the Biodiversity Assessment Method (BAM) and entry into the Biodiversity Offset Scheme (BOS) as per Section 7.1.1 (b) of the BC Regulations (2017).

Application of the BAM was used to the establish biodiversity impacts of the proposal inclusive of impacts to native vegetation and threatened entities (species and communities) within the locality listed under the BC Act, requiring that an accredited assessor (AA) prepare and submit a BDAR to the approval consent authority; Maitland City Council (MCC) as part of the Development Application.

In addition, preliminary assessment was undertaken having regard to those threatened entities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*. Assessment has been considered against the *State Environmental Planning Policy (Koala Habitat Protection) 2021.*

The land is zoned primarily R1 General Residential with a portion of the far north-west of RU2 Rural Landscape. The land has been historically cleared across the majority of the subject land. Vegetation regeneration presents in different conditions between the northern and southern portions of the subject land due to the implementation of different management. The northern portion contains native canopy and a heavily grazed understorey with the presence of exotic grasses and shrubs. The southern portion of the subject land contains a higher density of mid stratum species due to lack of grazing and slashing practices however less remnant canopy trees have been retained.

The subject land contains three unmapped ephemeral drainage lines which have been dammed, resulting in a total of four dams. Gully erosion, soil compaction and exotic species resultant from active cattle grazing have degraded the dams, making them marginal habitat for entities known to utilise or rely on water bodies.

A total of two Plant Community Types (PCTs) have been identified within the subject land:

- 1598 – Forest Red Gum grassy open forest on floodplains of the Lower Hunter
- 1600 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter

Impact Avoidance & Mitigation

A package of avoidance and mitigation measures have been described in this BDAR associated with the project.

The subject land for development was selected due to the largely cleared or highly disturbed lands with poor-moderate native species diversity as a result of past and present land use. 24.65 ha of native vegetation is to be entirely removed, and 1.70 ha of native vegetation is to be retained under this proposal within the study area. All measures have been incorporated into the design (avoidance) in the first instance with mitigation measures assessed for the construction phases of the project. Considerations have been made with regards to the impacts of the proposal to the broader connectivity of the landscape. This is discussed further within Sections 9 of this report.

All measures have been incorporated into the design (avoidance) in the first instance with mitigation measures assessed for the construction phases of the project.

Impact Analysis

The proposal will result in the following impacts and required Biodiversity Offset Liability as calculated using the BAM-C Calculator.

PCT	TEC	Area (ha)	HBT Cr	No HBT Cr	Offset Credits required
Ecosystem Credits					
PCT 1598: Forest Red Gum grassy open forest on floodplains of the lower Hunter	Yes, commensurate with *Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions*	0.62	0	32	17
PCT 1600: Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter	No, not commensurate with *Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions*	6.30	0	0	0
PCT 1600: Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter	Yes, commensurate with *Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions*	17.7	227	262	489

The current method to retire credits for the proposal is likely to be via payment into the Biodiversity Conservation Fund or retirement of credits available on the market.

A preliminary assessment under the EPBC Act determined the proposed action is unlikely to have an impact to MNES assessed in this report based on the assessment criteria set out in relevant Commonwealth policies and advice as at the time of this assessment.

Assessment against the SEPP (Biodiversity and Conservation) 2021 criteria concerning Koala determined the proposal is unlikely to impact the species.

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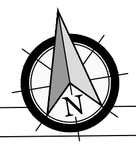
Appendix A Plan of Proposal



LEGEND

- SITE BOUNDARY
- EXISTING EXTERNAL BOUNDARY
- VEGETATION TO BE RETAINED
- FUTURE LIMIT OF CLEARING
- SURVEYED VEGETATION

ver.	date	comment	drawn	pm	co-ordinate information	level information	scale (A1 original size)	notes
B	21.04.2023	REVISED ISSUE	LS	CMO	CO-ORDINATE SYSTEM: MGA56 GDA94	DATUM: N/A CONTOUR INTERVAL: N/A	A1 1:1500 · 0 30 60 75m · A3 1:3000	

drawing title:

RETAINED VEGETATION AND LIMIT OF CLEARING PLAN

location: MCFARLANES ROAD, THORNTON

council: MAITLAND CITY COUNCIL

dwg ref: 240294(70)-PSK-005[B]

client: ALLAM PROPERTY GROUP

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sydney office ph: (02) 8046 7411
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working beyond expectations

240294(70)-DA-006

N

3860
DP1269997

4100
DP1274674

33
D.P.529007

1
DP1108963

MCFARLANES ROAD

170
DP1109634

32
DP794448

3098
DP1246288

4
DP1145348

5200
DP1247841

DP12

DA 2020/173
(Under Assessment)

2
DP1253854

100
DP847510

211
DP1291100

30
DP778111

662
DP733736

20
DP832786

Pt.1
(RESIDUE)
5117.30m^2
(3704.71m^2)

Pt.1
(RESIDUE)
5117.30m^2
(1412.59m^2)

1 INTO 2
SUBDIVISION
OF SOUTHERN
PORTION
OF LOT 31 DP778111
UNDER SEPARATE
CONSENT

RAYMOND TERRACE ROAD

LEGEND

- PROPOSED RESIDENTIAL DEVELOPMENT
- STAGE BOUNDARY
- PROPOSED BOUNDARY
- FUTURE BOUNDARY
- EXISTING BOUNDARY
- 2 STAGE NUMBER
- STORMWATER BASIN
- PROPOSED RESIDENTIAL
- PROPOSED RESIDUE LOT
- PROPOSED COUNCIL DEDICATED RESERVE
- PROPOSED ROAD

LOT SCHEDULE

STAGE	RESIDENTIAL LOTS	PUBLIC RESERVE LOTS
STAGE 1	41	1
STAGE 2	54	0
STAGE 3	46	1
STAGE 4	55	0
STAGE 5	36	1
STAGE 6	32	0
TOTAL LOTS	264	3
RESIDUE LOTS	1	

DETAIL PLAN
SCALE 1:2000

SHEET 6 OF 13

ver.	date	comment	drawn	pm	co-ordinate information	level information	scale (A1 original size)	notes
A	20.04.2023	INITIAL ISSUE	LS	CMO	CO-ORDINATE SYSTEM: MGA56 GDA94	DATUM: N/A CONTOUR INTERVAL: N/A	A1 1:2000 · 0 · 50 · 100m · A3 1:4000	

working beyond expectations

drawing title:

OVERALL STAGE MASTER PLAN

location: 507 RAYMOND TERRACE RD & 173 MCFARLANES RD, CHISHOLM

council: MAITLAND CITY COUNCIL

dwg ref: 240294(70)-DA-006

client: ALLAM PROPERTY GROUP

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• urban design • visualisation • development feasibility • surveying • town planning • social impact • infrastructure • civil engineering • superintendency • project management

Plotted By: Leah Swain Plot Date: 24/04/23 12:30:27PM Cad File: N:\240294\240294(70)\DWG\PLANNING\DA\240294(70)-DA-006.DWG

This plan includes coloured information. If you have a black and white copy you do not have all of the information. This note is coloured RED.

Appendix B BAM Plot Data

Plot Info							Composition								Structure (%)							Function							
Plot	PCT	Condition Class	Vegetation Zone	Easting	Northing	Bearing	Tree	Shrub	Grass	Forbs	Ferns	Other	Tree	Shrub	Grass	Forbs	Ferns	Other	Lge Tree	Hollow bearing tree	Litter Cover (%)	Logs	Tree Stem 5-10	Tree Stem 10-20	Tree Stem 20-30	Tree Stem 30-50	Tree Stem 50-80	Tree Regen	HTE (%)
B01	1600	Moderate	VZ2	372921.8	6374823	230	3	4	10	14	2	7	45	2.4	32	27.3	0.2	1.3	3	1	65	25	1	1	1	1	1	0	5
B02	1600	Scattered Trees	VZ1	372716	6374813	68	2	1	13	7	0	3	55	0.1	64.7	2.1	0	0.4	1	0	45	2	0	0	1	1	1	0	5.1
B03	1600	Pasture	VZ3	372836	6375369	190	0	0	9	2	0	0	0	0	73.3	0.3	0	0	0	0	1	0	0	0	0	0	0	0	8
B04	1600	Pasture	VZ3	372757	6375002	2	0	0	6	1	0	2	0	0	38.3	0.1	0	0.2	0	0	6	0	0	0	0	0	0	0	33
B05	1600	Scattered Trees	VZ1	372969	6374975	264	3	1	10	8	0	3	45	0.5	53.2	6.8	0	0.7	1	0	32	4	0	1	1	1	1	0	0.9
B06	1598	Moderate	VZ5	372762.7	6375317	9	3	1	13	8	0	3	50	0.2	50.4	2.6	0	0.3	2	0	16	15	0	0	1	1	0	0	2.3
B07	1600	Scattered Trees	VZ1	372981	6375334	82	2	3	11	10	0	4	30	0.9	57.2	4	0	0.5	1	0	46	2	0	0	1	1	1	0	2
B08	1600	Unmanaged	Not included	373022.1	6375374	273	3	3	7	12	0	3	68	1.1	4.5	33.4	0	1.2	4	0	73	20	1	1	1	1	1	0	12.5
B09	1600	Regenerating/Disturbed	VZ4	372895	6374719	197	2	6	10	18	1	4	12	8.2	55	4.3	0.7	0.8	2	1	43	2	0	0	0	1	1	1	1.1
B10	1600	Regenerating/Disturbed	VZ4	372886	6374582	240	3	7	10	15	1	3	16	9.2	59.4	1.9	0.1	0.4	0	0	26	0	1	0	0	1	0	1	0
B11	1600	Regenerating/Disturbed	VZ4	372885.9	6374582	210	1	5	4	6	0	2	1	3.4	12.1	1.7	0	0.3	0	0	26	0	0	0	0	1	0	0	72.6
B12	1600	Scattered Trees	VZ2	372893	6374421	332	3	3	11	14	1	3	45.2	1.7	50.8	5.4	0.1	0.3	1	1	52	0	0	1	1	1	1	0	3
B13	1600	Scattered Trees	VZ2	372796	6374371	89	2	4	12	13	1	3	13	1.4	87.5	1.4	0.1	0.4	1	0	80	0	0	0	1	1	1	0	0

Appendix C Flora and Fauna Species Tables

Flora																	
Family	Scientific Name	Common Name	Non-native	B01	B02	B03	B04	B05	B06	B07	B08	B09	B10	B11	B12	B13
Acanthaceae	*Brunoniella australis*	Blue Trumpet		x					x	x	x	x	x		x	x
Acanthaceae	*Pseuderanthemum variabile*	Pastel Flower		x						x	x					
Anthericaceae	*Arthropodium milleflorum*	Pale Vanilla-lily										x			x	x
Anthericaceae	*Caesia parviflora*	Pale Grass-lily		x				x		x						
Apiaceae	*Centella asiatica*	Indian Pennywort												x	x	x
Apocynaceae	*Parsonsia straminea*	Common Silkpod		x					x			x	x			
Asteraceae	*Asteraceae spp.*	Daisy santa clause			x											
Asteraceae	*Bidens spp. (B. aurea, B. bipinnata, B. pilosa, B. subaternans & B. tripartita)*	Cobbler's Pegs	*								x	x	x	x	x	x
Asteraceae	*Brachyscome multifida*	Cut-leaved Daisy											x	x		
Asteraceae	*Chrysocephalum apiculatum*	Common Everlasting										x	x			x
Asteraceae	*Conyza canadensis*		*										x			
Asteraceae	*Cotula australis*	Common Cotula			x		x									
Asteraceae	*Cyanthillium cinereum*	little ironweed		x	x			x		x		x	x		x	x
Asteraceae	*Euchiton involucratus*	Star Cudweed										x			x	
Asteraceae	*Hypochaeris radicata*	Catsear	*	x	x		x					x	x	x		x
Asteraceae	*Hypochaeris spp.*	A Catsear						x	x							
Asteraceae	*Ozothamnus diosmifolius*	White Dogwood										x		x	x	x
Asteraceae	*Senecio madagascariensis*	Fireweed	*	x	x		x	x	x			x	x	x	x	x
Asteraceae	*Solenogyne bellioides*	Solengyne										x	x			
Asteraceae	*Soliva sessilis*	Bindyi	*		x		x	x	x	x						
Asteraceae	*Sonchus oleraceus*	Common Sowthistle	*											x		
Asteraceae	*Sonchus spp.*	Sowthistle	*	x			x		x							
Asteraceae	*Tagetes minuta*	Stinky Roger	*		x											
Campanulaceae	*Pratia purpurascens*	Whiteroot		x	x			x	x	x	x	x	x	x	x	x
Campanulaceae	*Wahlenbergia communis*	Tufted Bluebell								x					x	
Campanulaceae	*Wahlenbergia gracilis*	Sprawling Bluebell										x		x		x
Caryophyllaceae	*Paronychia brasiliana*	Chilean Whitlow Wort, Brazilian Whitlow	*					x			x					
Caryophyllaceae	*Paronychia spp.*		*	x	x											
Chenopodiaceae	*Einadia hastata*	Berry Saltbush		x					x		x					
Chenopodiaceae	*Einadia nutans*	Climbing Saltbush										x			x	
Chenopodiaceae	*Einadia trigonos*	Fishweed		x				x			x					
Commelinaceae	*Commelina cyanea*	Native Wandering Jew		x							x				x	
Convolvulaceae	*Dichondra repens*	Kidney Weed		x				x	x	x			x			
Cyperaceae	*Cyperus gracilis*	Slender Flat-sedge		x	x			x		x	x					
Cyperaceae	*Cyperus imbecillis*				x				x							
Cyperaceae	*Cyperus spp.*					x										
Cyperaceae	*Fimbristylis dichotoma*	Common Fringe-sedge										x		x	x	x
Cyperaceae	*Lepidosperma laterale*	Variable Sword-sedge										x				
Ericaceae - Epacridoideae	*Leucopogon juniperinus*	Prickly Beard-heath										x	x			
Fabaceae - Faboideae	*Daviesia ulicifolia*	Gorse Bitter Pea		x						x		x	x	x		x
Fabaceae - Faboideae	*Desmodium rhytidophyllum*												x			x
Fabaceae - Faboideae	*Desmodium varians*	Slender Tick-trefoil		x	x		x	x	x	x						
Fabaceae - Faboideae	*Dillwynia retorta*									x	x					
Fabaceae - Faboideae	*Glycine clandestina*	Twining glycine		x	x					x						

Fabaceae - Faboideae	*Glycine microphylla*	Small-leaf Glycine											x				
Fabaceae - Faboideae	*Glycine spp.*											x					
Fabaceae - Faboideae	*Glycine tabacina*	Variable Glycine		x	x		x	x	x	x	x	x	x	x	x	x	x
Fabaceae - Faboideae	*Hardenbergia violacea*	False Sarsaparilla		x				x		x	x	x	x	x	x	x	x
Fabaceae - Faboideae	*Indigofera australis*	Australian Indigo		x													
Fabaceae - Faboideae	*Kennedia prostrata*	Running Postman		x								x					
Fabaceae - Faboideae	*Pullenia gunnii*	Slender Tick-trefoil											x				
Fabaceae - Faboideae	*Pultenaea spinosa*	A Bush Pea											x	x	x		x
Fabaceae - Faboideae	*Trifolium repens*	White Clover	*		x		x	x	x						x		
Fabaceae - Mimosoideae	*Acacia elongata*	Swamp Wattle												x			
Fabaceae - Mimosoideae	*Acacia parvipinnula*	Silver-stemmed Wattle											x	x	x		
Geraniaceae	*Pelargonium inodorum*				x				x								
Goodeniaceae	*Goodenia bellidifolia*													x	x		x
Goodeniaceae	*Goodenia hederacea*	Ivy Goodenia											x	x			
Goodeniaceae	*Goodenia rotundifolia*							x		x	x	x	x			x	x
Goodeniaceae	*Goodenia spp.*			x													
Goodeniaceae	*Goodenia stelligera*	Spiked Goodenia								x							
Haloragaceae	*Gonocarpus tetragynus*	Poverty Raspwort											x				
Hypericaceae	*Hypericum gramineum*	Small St John's Wort												x			
Hypoxidaceae	*Hypoxis hygrometrica*	Golden Weather-grass												x			x
Juncaceae	*Juncus acutus*								x								
Juncaceae	*Juncus spp.*	A Rush							x								
Juncaceae	*Juncus usitatus*			x	x	x				x						x	x
Lamiaceae	*Plectranthus parviflorus*			x					x		x						
Lomandraceae	*Lomandra confertifolia*	Matrush												x			
Lomandraceae	*Lomandra filiformis*	Wattle Matt-rush			x					x							
Lomandraceae	*Lomandra filiformis subsp. coriacea*	Wattle Matt-rush		x													
Lomandraceae	*Lomandra filiformis subsp. filiformis*			x													
Lomandraceae	*Lomandra multiflora subsp. multiflora*	Many-flowered Mat-rush			x			x		x	x	x	x		x	x	
Loranthaceae	*Dendrophthoe glabrescens*															x	x
Malvaceae	*Sida rhombifolia*	Paddy's Lucerne	*	x			x	x			x					x	
Malvaceae	*Sida spp.*				x	x			x								
Meliaceae	*Melia azedarach*	White Cedar														x	
Myrtaceae	*Corymbia maculata*	Spotted Gum		x	x			x	x	x	x	x	x			x	x
Myrtaceae	*Eucalyptus acmenoides*	White Mahogany		x					x		x						
Myrtaceae	*Eucalyptus fibrosa*	Red Ironbark		x	x			x		x	x	x	x				x
Myrtaceae	*Eucalyptus siderophloia*	Grey Ironbark														x	
Myrtaceae	*Eucalyptus tereticornis*	Forest Red Gum							x								
Myrtaceae	*Eucalyptus umbra*	Broad-leaved White Mahogany						x						x	x		
Orchidaceae	*Thelymitra spp.*													x			
Oxalidaceae	*Oxalis chnoodes*			x	x	x						x					
Oxalidaceae	*Oxalis perennans*												x			x	
Passifloraceae	*Passiflora edulis*	Common Passionfruit	*													x	
Phormiaceae	*Dianella caerulea var. assera*												x	x			
Phormiaceae	*Dianella revoluta*	Blueberry Lily										x				x	
Phyllanthaceae	*Breynia oblongifolia*	Coffee Bush		x								x		x		x	
Pittosporaceae	*Bursaria spinosa*	Native Blackthorn		x				x	x	x	x	x	x	x	x	x	x
Plantaginaceae	*Plantago lanceolata*	Lamb's Tongues	*				x				x				x		

Plantaginaceae	*Plantago spp.*	Plantain	*	x	x			x	x			x	x					
Plantaginaceae	*Veronica calycina*	Hairy Speedwell										x				x		
Plantaginaceae	*Veronica plebeia*	Trailing Speedwell		x	x			x	x	x	x							
Poaceae	*Aristida vagans*	Threeawn Speargrass		x	x	x				x		x	x			x	x	
Poaceae	*Axonopus fissifolius*	Narrow-leafed Carpet Grass				x	x										x	
Poaceae	*Chloris truncata*	Windmill Grass										x	x					
Poaceae	*Chloris ventricosa*	Tall Chloris			x													
Poaceae	*Cymbopogon refractus*	Barbed Wire Grass		x	x								x			x		
Poaceae	*Cynodon dactylon*	Common Couch			x	x	x	x	x	x	x							
Poaceae	*Dichelachne crinita*	Longhair Plumegrass				x	x		x									
Poaceae	*Dichelachne micrantha*	Shorthair Plumegrass			x								x			x	x	
Poaceae	*Digitaria didactyla*	Queensland Blue Couch					x	x	x									
Poaceae	*Digitaria parviflora*	Small-flowered Finger Grass		x														
Poaceae	*Echinopogon caespitosus*	Bushy Hedgehog-grass		x	x				x	x		x	x			x	x	
Poaceae	*Echinopogon caespitosus var. caespitosus*	Tufted Hedgehog Grass						x										
Poaceae	*Ehrharta erecta*	Panic Veldtgrass	*	x				x	x		x					x		
Poaceae	*Entolasia stricta*	Wiry Panic		x				x	x	x	x	x	x	x		x	x	
Poaceae	*Eragrostis brownii*	Brown's Lovegrass					x	x	x			x	x			x	x	
Poaceae	*Microlaena stipoides*	Weeping Grass		x	x	x	x	x	x	x	x	x		x		x	x	
Poaceae	*Paspalidium distans*			x				x	x	x				x			x	
Poaceae	*Paspalum dilatatum*	Paspalum	*		x	x	x	x	x	x	x	x		x				
Poaceae	*Poaceae spp.*			x					x									
Poaceae	*Rytidosperma spp.*							x		x	x							
Poaceae	*Setaria parviflora*		*				x											
Poaceae	*Setaria pumila*	Pale Pigeon Grass	*									x		x				
Poaceae	*Setaria spp.*				x	x			x	x	x							
Poaceae	*Sporobolus creber*	Slender Rat's Tail Grass			x	x	x		x									
Poaceae	*Sporobolus elongatus*	Slender Rat's Tail Grass				x												
Poaceae	*Sporobolus fertilis*	Giant Parramatta Grass	*				x	x										
Poaceae	*Themeda triandra*										x	x	x			x	x	
Primulaceae	*Lysimachia arvensis*	Scarlet Pimpernel	*						x									
Proteaceae	*Grevillea robusta*	Silky Oak								x								
Pteridaceae	*Cheilanthes distans*	Bristly Cloak Fern		x														
Pteridaceae	*Cheilanthes sieberi*	Rock Fern		x								x	x			x	x	
Ranunculaceae	*Clematis aristata*	Old Man's Beard		x														
Rosaceae	*Rubus fruticosus agg.*	Blackberry complex												x				
Rubiaceae	*Opercularia diphylla*	Stinkweed										x					x	
Scrophulariaceae	*Eremophila debilis*	Amulla			x													
Solanaceae	*Solanum nigrum*	Black-berry Nightshade	*						x		x					x		
Solanaceae	*Solanum prinophyllum*	Forest Nightshade		x	x	x		x			x					x		
Verbenaceae	*Lantana camara*	Lantana	*								x							
Verbenaceae	*Verbena bonariensis*	Purpletop	*									x		x				
Violaceae	*Viola hederacea*	Ivy-leaved Violet							x			x		x				
Poaceae	*Panicum simile*	Two-colour Panic															x	
Haloragaceae	*Haloragis stricta*																x	

Fauna			
Scientific Name	**Common Name**	**BC Act**	**EPBC Act**
Acridotheres tristis	Common Myna		
Acrobates pygmaeus	Feathertail Glider		
Aquila audax	Wedge-tailed Eagle		
Austronomus australis	White-striped Freetail-bat		
Aviceda subcristata	Pacific Baza		
Bubulcus ibis	Cattle Agret		
*Bos taurus**	Cattle		
Cacatua galerita	Sulphur-crested Cockatoo		
Cacatua sanguinea	Little Corella		
Cacatua tenuirostris	Long-billed Corella		
Chalinolobus gouldii	Gould's Wattled Bat		
Chalinolobus morio	Chocolate Wattled Bat		
Chenonetta jubata	Australian Wood Duck		
Corvus coronoides	Australian Raven		
Cracticus nigrogularis	Pied Butcherbird		
Cracticus torquatus	Grey Butcherbird		
Crinia signifera	Common Eastern Froglet		
Dacelo novaeguineae	Laughing Kookaburra		
*Dama dama**	Fallow Deer		
Egretta novaehollandiae	White-faced Heron		
Eolophus roseicapilla	Galah		
Falsistrellus tasmaniensis	Eastern False Pipistrelle		
Grallina cyanoleuca	Magpie-lark		
Glossopsitta pusilla	Little Lorikeet	V	
Gymnorhina tibicen	Australian Magpie		
Haliastur sphenurus	Whistling Kite		
Lampropholis delicata	Rainbow Skink		
Limnodynastes peronii	Brown-striped Frog		
Limnodynastes tasmaniensis	Spotted Marsh Frog		
Litoria cerulea	Green Tree Frog		
Litoria fallax	Eastern Dwarf Tree Frog		
Litoria latopalmata	Rocket frog		
Litoria peroni	Person's Tree Frog		
Macropus giganteus	Eastern Grey Kangaroo		
Manorina melanocephala	Noisy Miner		
Manorina melanophrys	Bell Miner		
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat		
Miniopterus australis	Little Bent-winged Bat	V	
Miniopterus orianae oceanensis	Large Bent-winged Bat	V	
Ninox boobook	Southern Boobook		
Ozimops ridei	Eastern Free-tailed Bat		
Petaurus breviceps	Sugar Glider		
Platycercus eximius	Eastern Rosella		
Podargus strigoides	Tawny Frogmouth		
Pomatostomus temporalis	Grey-crowned Babbler	V	
Porphyrio porphyrio	Purple Swamphen		
Pteropus poliocephalus	Grey-headed Flying-fox	V	V
Rhipidura albiscapa	Grey Fantail		
Scotorepens orion	Eastern Broad-nosed Bat		
Trichoglossus chlorolepidotus	Scaly-breasted Lorikeet		
Trichoglossus haematodus	Rainbow Lorikeet		
Trichosurus vulpecula	Brushtail Possum		
Vespadelus regulus	Southern Forest Bat		
*Vulpes vulpes**	Fox		

*Exotic species

Appendix D EPBC Likelihood of Occurrence Table

Scientific Name	Common Name	Status	Habitat Description	Impact Assessment Required
Threatened Ecological Communities				
Lowland Rainforest of Subtropical Australia		Critically Endangered	The ecological community primarily occurs from Maryborough in Queensland to the Clarence River (near Grafton) in New South Wales (NSW). The ecological community also includes isolated areas between the Clarence River and Hunter River such as the Bellinger and Hastings valleys. The ecological community occurs in the following Interim Biogeographic Regionalisation for Australia Version 6.1 (IBRA) Bioregions: South Eastern Queensland Bioregion and NSW North Coast Bioregion. The ecological community occurs on basalt and alluvial soils, including sand and old or elevated alluvial soils as well as floodplain alluvia. It also occurs occasionally on enriched rhyolitic soils and basaltically enriched metasediments. Lowland Rainforest mostly occurs in areas <300 m above sea level. Aspect can result in the ecological community being found at >300 m altitude on north-facing slopes, but typically 300 m defines the extent of the lowlands. In addition, Lowland Rainforest typically occurs in areas with high annual rainfall (>1300 mm). This TEC was not observed on site.	Unlikely
Subtropical and Temperate Coastal Saltmarsh		Vulnerable	This EEC occurs within a relatively narrow margin of the Australian coastline, within the subtropical and temperate climatic zones south of the South-east Queensland IBRA bioregion boundary at 23° 37' latitude along the east coast and south of (and including) Shark Bay at 26° on the west coast. It is typically restricted to the upper intertidal environment, occurring in areas within the astronomical tidal limit, often between the elevation of the mean high tide and the mean spring tide. Associated sediments generally consist of poorly-sorted anoxic sandy silts and clays, and may have salinity levels that are much higher than seawater due to evaporation. This TEC was not observed on site.	Unlikely
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland		Endangered	The ecological community is associated with forested palustrine wetlands, or swamp forests, found in the temperate to subtropical coastal valleys of Australia's east coast, and occurs between the Great Dividing Range and the coastline from near Gladstone in Queensland, through to the south coast of New South Wales. This TEC was not observed on site.	Unlikely

Central Hunter Valley eucalypt forest and woodland	Critically Endangered	The Central Hunter Valley eucalypt forest and woodland ecological community generally occurs on soils derived from the Permian sedimentary bedrock found on the valley floors and on lower hillslopes and low ridges. This TEC was not observed on site.	Unlikely
Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions	Endangered	This subtropical forest occurs on the coastal floodplains of the North Coast of NSW. It hs a tall open tree layer of eucalypts, angophoras, melaleucas and bloodwoods, which may exceed 40m in height, but can be considerably shorter in regrowth stands or under conditions of lower site quality. This TEC was not observed on site.	Unlikely
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community	Endangered	The ecological community occurs in sub-tropical, sub-humid and temperate climatic zones from Curtis Island, north of Gladstone, in Queensland to Bermagui in southern New South Wales. The ecological community occurs in coastal catchments, mostly at elevations of less than 20 m above sea-level (ASL) that are typically found within 30 km of the coast. However, this distance varies by catchment. This TEC was not observed on site.	Unlikely
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	The River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria is found in the South East Corner (SEC) and Sydney Basin (SYB) IBRA bioregions. This encompasses the area from around Sale on the south-east coast of Victoria to around Raymond Terrace, just north of Newcastle on the New South Wales east coast. This TEC was not observed on site.	Unlikely
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	The Box – Gum Grassy Woodland and Derived Grassland ecological community occurs in an arc along the western slopes and tablelands of the Great Dividing Range from Southern Queensland through NSW to central Victoria (Beadle 1981). It occurs in the Brigalow Belt South, Nandewar, New England Tableland, South Eastern Queensland, Sydney Basin, NSW North Coast, South Eastern Highlands, South East Corner, NSW South Western Slopes, Victorian Midlands and Riverina Bioregions (Environment Australia 2000). This TEC was not observed on site.	Unlikely
Flora			

Acacia bynoeana	Bynoe's Wattle, Tiny Wattle	Vulnerable	Bynoe's wattle is found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. The species is currently known from about 30 locations in heath or dry sclerophyll forest on sandy soils. Seems to prefer open, sometimes slightly disturbed sites such as trail margins, edges of roadside spoil mounds and in recently burnt patches. Associated overstorey species include Red Bloodwood, Scribbly Gum, Parramatta Red Gum, Saw Banksia and Narrow-leaved Apple. The subject land occurs on the outer perimeter of the species known range, althoughno NSW Bionet records exist within a 10 km search of the subject land. The species is associated with one of the PCTs assigned to the subject land (PCT 1600), which occurs as a disturbed condition state of this PCT. Given the presence a potential suitable habitat, targeted surveys were completed for this species (see Section 5.4.1), with no individuals being observed within the subject land. Therefore, no further assessment is required.	Unlikely
Angophora inopina	Charmhaven Apple	Vulnerable	Endemic to the Central Coast region of NSW. Is lignotuberous, allowing vegetative growth to occur following disturbance. However, such vegetative reproduction may suppress the production of fruits/seeds, necessary for the recruitment of new individuals to a population, and the time between such disturbance and the onset of sexual reproduction is not known. Occurs most frequently in four main vegetation communities: (i) *Eucalyptus haemastoma–Corymbia gummifera–Angophora inopina* woodland/forest; (ii) *Hakea teretifolia–Banksia oblongifolia* wet heath; (iii) *Eucalyptus resinifera–Melaleuca sieberi–Angophora inopina* sedge woodland; (iv) *Eucalyptus capitellata–Corymbia gummifera–Angophora inopina* woodland/forest. The subject land occurs outside the species known and predicted range and no NSW Bionet records exist within a 10 km search of the subject land. Additionally, the species is not associated with either of the PCT assigned to the subject land. Therefore, no further assessment is required.	Unlikely
Arthraxon hispidus	Hairy-joint Grass	Vulnerable	Occurs over a wide area in south-east Queensland, and on the northern tablelands and north coast of NSW but is never common. Moisture and shade-loving grass, found in or on the edges of rainforest and in wet eucalypt forest, often near creeks or swamps. The subject land occurs outside the species known and predicted range and no NSW Bionet records exist within a 10 km search of the subject land. The species is not associated with either PCT assigned to the subject land. Therefore, no further assessment is required.	Unlikely
Asperula asthenes	Trailing Woodruff	Vulnerable	The trailing woodruff occurs only in NSW. It is found in scattered locations from Bulahdelah north to near Kempsey, with several records from the Port Stephens/Wallis Lakes area. Occurs in damp sites, often along river banks.	Unlikely

			The subject land occurs outside the where the species habitat is likely to or may occur, and no NSW Bionet records exist within a 10 km search of the subject land. The species is not associated with either PCT assigned to the subject land. No further assessment is required.	
Caladenia tessellata	Thick-lipped Spider-orchid, Daddy Long-legs	Vulnerable	Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil. The single leaf regrows each year. The subject land occurs outside the species known and predicted range and no NSW Bionet records exist within a 10 km search of the subject land. The species is associated with one of the PCTs assigned to the subject land (PCT 1600), however, this community occurs as a disturbed condition state. In addition, no species of Caladenia were detected during targeted flora surveys. Therefore, no further assessment is required.	Unlikely
Commersonia prostrata	Dwarf Kerrawang	Endangered	Dwarf Kerrawang occurs on the Southern Highlands and Southern Tablelands, a larger population in the Thirlmere Lakes area and on the North Coast. Occurs on sandy, sometimes peaty soils in a wide variety of habitats. Associated native species may include *Imperata cylindrica*, *Empodisma minus* and *Leptospermum continentale*. The subject land occurs outside the species known and predicted range and no NSW Bionet records exist within a 10 km search of the subject land. The species is not associated with either PCT assigned to the subject land. Therefore, no further assessment is required.	Unlikely
Cryptostylis hunteriana	Leafless Tongue-orchid	Vulnerable	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*Eucalyptus sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black Sheoak (Allocasuarina littoralis); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (*Cryptostylis subulata*) and the Tartan Tongue Orchid (*Cryptostylis erecta*). The subject land occurs within the species known range, although, no NSW Bionet records exist within a 10 km search of the subject land. Given that the species is associated with one of the PCTs assigned to the subject land (PCT 1600), targeted surveys were completed for this species (see Section 5.4.1). This species was not observed within the subject land, and therefore, no further assessment is required.	Unlikely
Cynanchum elegans	White-flowered Wax Plant	Endangered	Restricted to eastern NSW where it is distributed from Brunswick Heads on the north coast to Gerroa in the Illawarra region. The species has been recorded as far west as Merriwa in the upper Hunter River valley. The	Unlikely

			White-flowered Wax Plant usually occurs on the edge of dry rainforest vegetation. Other associated vegetation types include littoral rainforest. The subject land occurs within the species known range, with one NSW Bionet record occurring within a 10 km search of the subject land, approximately 8.5km away. Moreover, the species is associated with one of the PCTs assigned to the subject land (PCT 1600), though this example of the PCT does not present as an in situ community. As such, targeted surveys for this species were conduction, with no individuals being observed within the subject land (see Section 5.4.1). Therefore, no further assessment is required.	
Dichanthium setosum	Bluegrass	Vulnerable	Bluegrass occurs on the New England Tablelands, North West Slopes and Plains and the Central Western Slopes of NSW, extending to northern Queensland. It occurs widely on private property, including in the Inverell, Guyra, Armidale and Glen Innes areas. Associated with heavy basaltic black soils and red-brown loams with clay subsoil. Often found in moderately disturbed areas such as cleared woodland, grassy roadside remnants and highly disturbed pasture. (Often collected from disturbed open grassy woodlands on the northern tablelands, where the habitat has been variously grazed, nutrient-enriched and water-enriched). The subject land occurs outside the species known and predicted range and no NSW Bionet records exist within a 10 km search of the subject land. The species is not associated with either PCT assigned to the subject land. Therefore, no further assessment is required.	Unlikely
Diuris praecox	Newcastle Doubletail	Vulnerable	The Rough Doubletail is known from between Bateau Bay and Smiths Lake. Grows on hills and slopes of near-coastal districts in open forests which have a grassy to fairly dense understorey. The subject land occurs outside the species known range, however, it is within predicted range. Although this species is associated with one of the PCTs assigned to the subject land (PCT 1600), no NSW Bionet records exist within a 10 km search of the subject land nor is there is suitable habitat in the form of slopes or hills. Therefore, no further assessment is required.	Unlikely
Eucalyptus camfieldii	Camfield's Stringybark	Vulnerable	Restricted distribution in a narrow band with the most northerly records in the Raymond Terrace area south to Waterfall. Localised and scattered distribution includes sites at Norah Head (Tuggerah Lakes), Peats Ridge, Mt Colah, Elvina Bay Trail (West Head), Terrey Hills, Killara, North Head, Menai, Wattamolla and a few other sites in Royal National Park. Occurs mostly in small scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas. Associated species frequently include stunted species of *Eucalyptus oblonga* (Narrow-leaved Stringybark), *Eucalyptus capitellata* (Brown Stringybark) and *Eucalyptus Haemastoma* (Scribbly Gum).	Unlikely

			The subject land occurs within the species predicted range, however, no NSW Bionet records exist within a 10 km search of the subject land. Moreover, the species is not associated with either PCT assigned to the subject land, and therefore No further assessment is required.	
Eucalyptus glaucina	Slaty Red Gum	Vulnerable	Found only on the north coast of NSW and in separate districts: near Casino where it can be locally common, and farther south, from Taree to Broke, west of Maitland. Grows in grassy woodland and dry eucalypt forest. Grows on deep, moderately fertile and well-watered soils. The subject land occurs within the species known range, and there are two NSW Bionet records exist within a 10 km search of the subject land, The species is associated with both PCTs assigned to the subject land (PCT 1598 and PCT 1600) with suitable habitat in the form of grassy woodlands present within the subject land. As such, targeted surveys were completed for this species, however, it was not observed within the subject land (see Section 5.4.1). Therefore, no Further assessment is required.	Unlikely
Eucalyptus parramattensis subsp. decadens	Earp's Gum, Earp's Dirty Gum	Vulnerable	There are two separate meta-populations of E. parramattensis subsp. decadens. The Kurri Kurri meta-population is bordered by Cessnock—Kurri Kurri in the north and Mulbring—Abedare in the south. Large aggregations of the subspecies are located in the Tomalpin area. The Tomago Sandbeds meta-population is bounded by Salt Ash and Tanilba Bay in the north and Williamtown and Tomago in the south. Generally occupies deep, low-nutrient sands, often those subject to periodic inundation or where water tables are relatively high. It occurs in dry sclerophyll woodland with dry heath understorey. It also occurs as an emergent in dry or wet heathland. Often where this species occurs, it is a community dominant. The subject land occurs within the species known range, with one NSW Bionet record present within a 10 km search of the subject land, approximately 9.9km away. The species is associated with one of the PCTs assigned to the subject land (PCT 1600), though this example of the PCT does not present as an insitu community. Targeted surveys were completed for this species, however it was not observed within the subject land (see Section 5.4.1). Therefore, no further assessment required.	Unlikely
Euphrasia arguta	null	Critically Endangered	The current known populations are located in the Nundle State Forest in eucalypt forest with a mixed grass and shrub understorey (D Binns pers. comm. February 2009). This area is located at the junction of the New England Tableland, NSW North Coast, and Nandewar Bioregions. here are no known occurrences of Euphrasia arguta in a conservation reserve. The majority of *Euphrasia arguta* plants are located in Nundle State Forest. A small part of the largest population of *E. arguta* is located on private land that is adjacent to the State Forest. The land is currently used for rough grazing by sheep or cattle.	Unlikely

			The subject land occurs outside the species known and predicted range and no NSW Bionet records exist within a 10 km search of the subject land. The species is not associated with either PCT assigned to the subject land, nor is suitable habitat present. No further assessment is required.	
Grevillea parviflora subsp. parviflora	Small-flower Grevillea	Vulnerable	Grows in sandy or light clay soils usually over thin shales, often with lateritic ironstone gravels and nodules. Sydney region occurrences are usually on Tertiary sands and alluvium, and soils derived from the Mittagong Formation. Soil landscapes include Lucas Heights or Berkshire Park. Occurs in a range of vegetation types from heath and shrubby woodland to open forest. In Sydney it has been recorded from Shale Sandstone Transition Forest and in the Hunter in Kurri Sand Swamp Woodland. however, other communities occupied include Corymbia maculata - Angophora costata open forest in the Dooralong area, in Sydney Sandstone Ridgetop Woodland at Wedderburn and in Cooks River / Castlereagh Ironbark Forest at Kemps Creek. The subject land occurs outside the species known range, with four NSW Bionet records occurring within a 10 km search of the subject land. The species is associated with one of the PCTs assigned to the subject land (PCT 1600). There is suitable habitat on the subject land in the form of an open forest with a grassy understory. As such, targeted surveys were completed for this species, however, it was not observed within the subject land (see Section 5.4.1). Therefore, no further assessment is required.	Unlikely
Melaleuca biconvexa	Biconvex Paperbark	Vulnerable	Biconvex Paperbark is only found in NSW, with scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north. Biconvex Paperbark generally grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects. The subject land occurs outside the species known range, but within the predicted range. No NSW Bionet records exist within a 10 km search of the subject land. The species is not associated with either PCT assigned to the subject land, and no suitable low-lying wet habitat is present within the site. The species is conspicuous and was not identified during surveys of the subject land (see Section 5.4.1), therefore, no further assessment is required.	Unlikely
Persicaria elatior	Knotweed, Tall Knotweed	Vulnerable	In northern NSW it is known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). The species also occurs in Queensland. This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance. The subject land occurs within the species known range, with one NSW Bionet records occurring within a 10 km search of the subject land, approximately 9.5km away. The species is not associated with either PCT assigned to the subject land, and although a small section of the subject land includes a low lying which is	Unlikely

			prone to water logging, it does not contain standing water. Therefore, no suitable habitat is present within the subject land and no further assessment is required.	
Pomaderris brunnea	Rufous Pomaderris, Brown Pomaderris	Vulnerable	This species occurs in small populations in NSW. It is found on the Colo R., the Nepean R. floodplain at Menangle, in creeklines at Wirrumbirra Sanctuary (Bargo) and on the Hawkesbury R. The distribution may extend into the southern section of Yengo NP along major creeklines and floodplains. Also, in the East Gippsland region of Vic. The subject land occurs outside the species known range, but within the predicted range. No NSW Bionet records exist within a 10 km search of the subject land and given that the species is not associated with either PCT assigned to the subject land, nor is suitable habitat present, therefore no. further assessment is required.	Unlikely
Prasophyllum sp. Wybong (C.Phelps ORG 5269)	a leek-orchid	Critically Endangered	Prasophyllum sp. Wybong (C. Phelps ORG 5269) is a terrestrial orchid known from seven populations in open eucalypt woodland and grassland in New South Wales. The species' area of occupancy is estimated to be 1.5 km2 with an estimated population size based on surveys in 2006 of 460 mature individuals. The subject land occurs outside the species known, but within the predicted range. Although this species is associated with the Sydney Basin IBRA, it is not associated with either PCT assigned to the subject land. Moreover, there are no NSW Bionet records within a 10 km search of the subject land. Therefore, no further assessment is required.	Unlikely
Pterostylis gibbosa	Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood	Endangered	Known from a small number of populations in the Hunter region (Milbrodale), the Illawarra region (Albion Park and Yallah) and the Shoalhaven region (near Nowra). It is apparently extinct in western Sydney which is the area where it was first collected (1803). All known populations grow in open forest or woodland, on flat or gently sloping land with poor drainage. In the Illawarra region, the species grows in woodland dominated by Forest Red Gum Eucalyptus tereticornis, Woollybutt E. longifolia and White Feather Honey-myrtle Melaleuca decora. Near Nowra, the species grows in an open forest of Spotted Gum Corymbia maculata, Forest Red Gum and Grey Ironbark E. paniculata. In the Hunter region, the species grows in open woodland dominated by Narrow-leaved Ironbark E. crebra, Forest Red Gum and Black Cypress Pine Callitris endlicheri. The Illawarra Greenhood is a deciduous orchid that is only visible above the ground between late summer and spring, and only when soil moisture levels can sustain its growth. The leaf rosette grows from an underground tuber in late summer, followed by the flower stem in winter. After a spring flowering, the plant begins to die back and seed capsules form (if pollination has taken place). As with many other greenhoods, male fungus gnats are believed to be the pollinator. The Illawarra Greenhood can survive occasional burning and grazing because of its capacity to reshoot from an underground tuber.	Unlikely

			The subject land occurs within the species known range; however, no NSW Bionet records exist within a 10 km search of the subject land. Moreover, the species is not associated with either PCT assigned to the subject land. Therefore, no further assessment is required.	
Rhizanthella slateri	Eastern Underground Orchid	Endangered	The Eastern Underground Orchid occurs from south-east Queensland to south-east NSW. In NSW, currently known from fewer than 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. Habitat requirements are poorly understood, and no particular vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. The subject land occurs outside the species known and predicted range, with no NSW Bionet records occurring within a 10 km search of the subject land. Moreover, the species is not associated with either PCT assigned to the subject land, and therefore, no further assessment is required.	Unlikely
Rhodamnia rubescens	Scrub Turpentine, Brown Malletwood	Critically Endangered	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Populations of R. rubescens typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000-1,600 mm. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. The subject land occurs within the species known range, with two NSW Bionet records exist within a 10 km search of the subject land. However, the species is not associated with either PCT assigned to the subject land, nor it there any suitable habitat within the subject land in the form escarpment landforms or littoral, warm temperate and subtropical rainforest and wet sclerophyll forest vegetation. As such, no further assessment is required.	Unlikely
Rhodomyrtus psidioides	Native Guava	Critically Endangered	Occurs from Broken Bay, approximately 90 km north of Sydney, New South Wales, to Maryborough in Queensland. Populations are typically restricted to coastal and sub-coastal areas of low elevation however the species does occur up to c. 120 km inland in the Hunter and Clarence River catchments and along the Border Ranges in NSW. Pioneer species found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest often near creeks and drainage lines. The subject land occurs within the species known range, with four NSW Bionet records occurring within a 10 km search of the subject land However, the species is not associated with either PCT assigned to the subject land, nor it there any suitable habitat within the subject land in the form littoral, warm temperate and subtropical rainforest and wet sclerophyll forest vegetation. Therefore, no further assessment is required.	Unlikely

Rutidosis heterogama	Heath Wrinklewort	Vulnerable	On the Central Coast it is located north from Wyong to Newcastle. Grows in heath on sandy soils and moist areas in open forest and has been recorded along disturbed roadsides. The subject land occurs within the species known range, with one NSW Bionet record occurring within a 10 km search of the subject land, approximately 9.5km away. The species is associated with one of the PCTs assigned to the subject land (PCT 1600), as such targeted surveys were completed for this species. The species was not identified within the Subject Land (see section 5.4.1), and therefore, no further assessment required.	Unlikely
Syzygium paniculatum	Magenta Lilly Pilly, Magenta Cherry, Daguba, Scrub Cherry, Creek Lilly Pilly, Brush Cherry	Vulnerable	The Magenta Lilly Pilly is found only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. On the central coast Magenta Lilly Pilly occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities. The subject land occurs within the species known range, with three NSW Bionet records occurring within a 10 km search of the subject land, the closest being approximately 8km away. The species is not associated with either PCT assigned to the subject land, nor is suitable habitat present. Therefore, no further assessment is required.	Unlikely
Tetratheca juncea	Black-eyed Susan	Vulnerable	Confined to the northern portion of the Sydney Basin bioregion and the southern portion of the North Coast bioregion in the local government areas of Wyong, Lake Macquarie, Newcastle, Port Stephens, Great Lakes and Cessnock. It is usually found in low open forest/woodland with a mixed shrub understorey and grassy groundcover. However, it has also been recorded in heathland and moist forest. The majority of populations occur on low nutrient soils associated with the Awaba Soil Landscape. While some studies show the species has a preference for cooler southerly aspects, it has been found on slopes with a variety of aspects. It generally prefers well-drained sites below 200m elevation and annual rainfall between 1000 - 1200mm. The preferred substrates are sandy skeletal soil on sandstone, sandy-loam soils, low nutrients; and clayey soil from conglomerates, pH neutral. The subject land occurs within the species known range, and a total of 18 NSW Bionet records exist within a 10 km search of the subject land, with the closest being approximately 6,5km away. The species is not associated with either PCT assigned to the subject land/ Due to the lack of suitable habitat and not being associated with any PCTs found on the subject land, no further assessment is required.	Unlikely
Thesium australe	Austral Toadflax, Toadflax	Vulnerable	Austral Toad-flax is found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Although originally described from material collected in the SW Sydney area, populations have not been seen	Unlikely

			in a long time. It may persist in some areas in the broader region. Occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. The subject land occurs within the species known range; however, no NSW Bionet records exist within a 10 km search of the subject land., nor is this species associated with either PCT assigned to the subject land. Targeted surveys were completed for this species, however, it was not identified within the subject land (see Section 5.4.1). No further assessment is required.	
Birds				
Anthochaera phrygia	Regent Honeyeater	Critically Endangered	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. Range is between north-eastern Victoria and south-eastern Queensland. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In the last 10 years Regent Honeyeaters have been recorded in urban areas around Albury where woodlands tree species such as Mugga Ironbark and Yellow Box were planted 20 years ago. The Regent Honeyeater is a generalist forager, although it feeds mainly on the nectar from a relatively small number of eucalypts that produce high volumes of nectar. The subject land occurs within the species known range, and a total of four Bionet records exist within a 10 km search of the subject land. The species is also associated with one PCT assigned to the subject land (PCT 1600). However, while the subject land supports some preferred feed trees (*Eucalyptus fibrosa & Corymbia maculata*) and vegetation formation for this species, it lacks a large number of mature trees due to past clearing and does not comprise of a high abundancy of mistletoe species. Therefore, no further assessment is required.	Unlikely
Botaurus poiciloptilus	Australasian Bittern	Endangered	Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (*Typha spp*.) and spikerushes (*Eleocharis spp*.). Hides during the day amongst dense reeds or rushes and feed mainly at night on frogs, fish, yabbies, spiders, insects and snails. Feeding platforms may be constructed over deeper water from reeds trampled by the bird; platforms are often littered with prey remains. Breeding occurs in summer from October to January; nests are built in secluded places in densely vegetated wetlands on a platform of reeds; there are usually six olive-brown eggs to a clutch. The subject land occurs within the species known range, however no NSW Bionet records exist within a 10 km search of the subject land. Moreover, this species is not associated with either PCT assigned to the subject land, nor does the subject land contain permanent freshwater wetlands or suitable favoured vegetation. No further assessment is required.	Unlikely

Calidris canutus	Red Knot, Knot	Endangered	The Red Knot is common in all the main suitable habitats around the coast of Australia. They mainly inhabit intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs. They move south, mostly along coasts, with some inland records from September–November and arrive in south-west Australia from September. The subject land occurs within the species known range, however no NSW Bionet records exist within a 10 km search of the subject land. Moreover, this species is not associated with either PCT assigned to the subject land, nor does the subject land contain appropriate coastal or wetland habitat. No further assessment is required.	Unlikely
Calidris ferruginea	Curlew Sandpiper	Critically Endangered	In Australia, Curlew Sandpipers occur around the coasts and are also quite widespread inland, though in smaller numbers. Records occur in all states during the non-breeding period, and also during the breeding season when many non-breeding one year old birds remain in Australia rather than migrating north. Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters. The subject land occurs within the species known range, however no NSW Bionet records exist within a 10 km search of the subject land. Moreover, this species is not associated with either PCT assigned to the subject land, nor does the subject land contain permanent freshwater wetlands or suitable favoured vegetation. No further assessment is required.	Unlikely
Calidris tenuirostris	Great Knot	Critically Endangered	The Great Knot has been recorded in Narooma, Tullakool, Armidale, Gilgandra and Griffith. Occurs within sheltered, coastal habitats containing large, intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons. Often recorded on sandy beaches with mudflats nearby, sandy spits and islets and sometimes on exposed reefs or rock platforms. Migrates to Australia from late August to early September, although juveniles may not arrive until October-November. The subject land occurs within the species known range, however no NSW Bionet records exist within a 10 km search of the subject land. Moreover, this species is not associated with either PCT assigned to the subject land, nor does the subject land contain permanent freshwater wetlands or suitable favoured vegetation. No further assessment is required.	Unlikely

Callocephalon fimbriatum	Gang-gang Cockatoo	Endangered	The Gang-gang Cockatoo is distributed from southern Victoria through south- and central-eastern New South Wales. In New South Wales, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. It occurs regularly in the Australian Capital Territory. It is rare at the extremities of its range, with isolated records known from as far north as Coffs Harbour and as far west as Mudgee. In spring and summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, the species often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. The subject land occurs within the northern extent of the species known range. There are two historic NSW Bionet records occurring within a 10 km search of the subject land, however these records are from 2004. The species is associated with one PCT assigned to the subject land (PCT 1600), when the species moves to lower altitudes it generally occupies box-gum and box-ironbark assemblages. It is unlikely the species utilises that subject land, no assessment required.	Likely
Calyptorhynchus lathami	South-eastern Glossy Black-Cockatoo	Vulnerable	The Glossy Black-Cockatoo is uncommon although widespread throughout suitable forest and woodland habitats, from the central Queensland coast to East Gippsland in Victoria, and inland to the southern tablelands and central western plains of NSW, with a small population in the Riverina. An isolated population exists on Kangaroo Island, South Australia. Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (*Allocasuarina torulosa*) are important foods. Inland populations feed on a wide range of sheoaks, including Drooping Sheoak (*Allocasuaraina diminuta*), and Mallee Sheoak (Allocasuarina gymnanthera). Belah is also utilised and may be a critical food source for some populations. In the Riverina, birds are associated with hills and rocky rises supporting Drooping Sheoak, but also recorded in open woodlands dominated by Belah (*Casuarina cristata*). Feeds almost exclusively on the seeds of several species of she-oak (*Casuarina* and *Allocasuarina spp*), shredding the cones with the massive bill. Dependent on large hollow-bearing eucalypts for nest sites. A single egg is laid between March and May. The subject land occurs within the species known range, and a total of 13 NSW Bionet records exist within a 10 km search of the subject land. Moreover, the species is associated with one PCT assigned to the subject land (PCT 1600), however, the subject land lacks suitable foraging habitat in the form of *Allocasuarina* or *Casuarina spp*. As such, no further assessment is required.	Unlikely
Charadrius leschenaultii	Greater Sand Plover, Large Sand Plover	Vulnerable	In Australia, the Greater Sand Plover occurs in coastal areas in all states. n the non-breeding grounds in Australasia, the species is almost entirely coastal, inhabiting littoral and estuarine habitats. They mainly occur	Unlikely

			on sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons, and inshore reefs, rock platforms, small rocky islands or sand cays on coral reefs. The subject land occurs within the species known range; however no NSW Bionet records exist within a 10 km search of the subject land. Moreover, this species is not associated with either PCT assigned to the subject land, nor does the subject land contain suitable coastal landforms or vegetation. No further assessment is required.	
Charadrius mongolus	Lesser Sand Plover, Mongolian Plover	Endangered	The Lesser Sand Plover breeds in central and north eastern Asia, migrating further south for winter. Occurs almost entirely coastal in NSW, favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats; occasionally occurs on sandy beaches, coral reefs and rock platforms. Roosts during high tide on sandy beaches, spits and rocky shores; forage individually or in scattered flocks on wet ground at low tide, usually away from the water's edge. The subject land occurs within the species known range; however no NSW Bionet records exist within a 10 km search of the subject land. Moreover, this species is not associated with either PCT assigned to the subject land, nor does the subject land contain suitable coastal landforms or vegetation. No further assessment is required.	Unlikely
Climacteris picumnus victoriae	Brown Treecreeper (south-eastern)	Vulnerable	The Brown Treecreeper is endemic to eastern Australia and occurs in eucalypt forests and woodlands of inland plains and slopes of the Great Dividing Range. It is less commonly found on coastal plains and ranges. The western boundary of the range of the species runs approximately through Corowa, Wagga Wagga, Temora, Forbes, Dubbo and Inverell. The eastern subspecies lives in eucalypt woodlands through central NSW and in coastal areas with drier open woodlands. Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey; also found in mallee and River Red Gum (*Eucalyptus camaldulensis*) Forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging. The subject land occurs within the species known range, with one NSW Bionet record occurring within a 10 km search of the subject land, approximately 5.5km away. Moreover, this species is associated with one PCT assigned to the subject land (PCT 1600), and suitable foraging and breeding habitat in the form of an open forest with a grassy understory occurs within the subject site. As such, further assessment is required.	Likely
Erythrotriorchis radiatus	Red Goshawk	Endangered	The Red Goshawk occurs from the north-west to north-east coast of Australia. The Red Goshawk occurs in coastal and sub-coastal areas in wooded and forested lands of tropical and warm-temperate Australia. This	Unlikely

			species prefers forest and woodland with a mosaic of vegetation types, large prey populations (birds), and permanent water. The vegetation types include eucalypt woodland, open forest, tall open forest, gallery rainforest, swamp sclerophyll forest, and rainforest margins. In NSW favoured habitat is mixed subtropical rainforest and Melaleuca forest along coastal rivers, often in rugged terrain. The subject land occurs outside the species known or predicted range, and no NSW Bionet records exist within a 10 km search of the subject land. Moreover, the species is not associated with either of the PCTs assigned to the subject land, nor is there any suitable habitat in the form of an adjacent permanent waterbody. Therefore, no further assessment is required.	
Falco hypoleucos	Grey Falcon	Vulnerable	The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast. Also occurs near wetlands where surface water attracts prey. The subject land occurs outside the species known or predicted range, and no NSW Bionet records exist within a 10 km search of the subject land. The species is associated with one PCT assigned to the subject land (PCT 1600) and occurs within 3 km of the Hunter River and Saltwater Gully marshlands, few large mature trees are present within the subject land and no evidence of raptors was observed on site, therefore, no further assessment is required.	Unlikely
Grantiella picta	Painted Honeyeater	Vulnerable	The greatest concentrations of the bird and almost all breeding occurs on the inland slopes of the Great Dividing Range in NSW, Victoria and southern Queensland. During the winter it is more likely to be found in the north of its distribution. Inhabits Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema. The subject land occurs within the species known range, but no NSW Bionet records exist within a 10 km search of the subject land. Although this species is associated with one PCT assigned to the subject land (PCT 1600), and the subject land does have some suitable foraging habitat, there are too few mature trees and mistletoe present to sustain a population. Therefore, no further assessment is required.	Unlikely
Hirundapus caudacutus	White-throated Needletail	Vulnerable	The White-throated Needletail is widespread in across the coast of eastern and south-eastern Australia, and Tasmania. White-throated Needletails only occur as vagrants in the Northern Territory and in Western Australia. In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Because they are aerial, it has been stated that conventional habitat descriptions are inapplicable (Cramp 1985), but there are, nevertheless, certain preferences exhibited by the species. They are probably recorded most often above wooded areas, including open forest and	Unlikely

			rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. The subject land occurs within the species known range and a total of 22 NSW Bionet records exist within a 10 km search of the subject land. This species is also associated with one PCT assigned to the subject land (PCT 1600). Given that this species utilises a variety of habitats when not aerial therefore there is suitable habitat present within the Study Area. However, dense foliage for roosting and foraging is limited within the study area. Given the chiefly aerial nature of the species, it is unlikely that the species would utilise the site. No further assessment is required.	
Lathamus discolor	Swift Parrot	Critically Endangered	Breeds in Tasmania during spring and summer, migrating in the autumn and winter months to south-eastern Australia from Victoria and the eastern parts of South Australia to south-east Queensland. In NSW mostly occurs on the coast and south west slopes. Migrates to the Australian south-east mainland between March and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as *Eucalyptus robusta* (Swamp Mahogany), *Corymbia maculata* (Spotted Gum), *Corymbia gummifera* (Red Bloodwood), *Eucalyptus sideroxylon* (Mugga Ironbark), and *Eucalyptus albens* (White Box). Commonly used lerp infested trees include *Eucalyptus microcarpa* (Inland Grey Box), *Eucalyptus moluccana* (Grey Box) and *Eucalyptus pilularis* (Blackbutt). Return to some foraging sites on a cyclic basis depending on food availability. Following winter they return to Tasmania where they breed from September to January, nesting in old trees with hollows and feeding in forests dominated by Tasmanian Blue Gum Eucalyptus globulus. The subject land occurs within the species known range but not within the NSW DPIE Important Areas Mapping for this species. A total of 6 NSW Bionet records exist within a 10 km search of the subject land. The species is associated with one PCT assigned to the subject land (PCT 1600), and the subject land supports some preferred feed trees (*Corymbia maculata & Eucalyptus moluccana*) and vegetation formation for this species; however, the site lacks a large number of mature trees due to past clearing with more abundant *Eucalyptus* species within the vegetation to the immediate west and east. On this basis, it is unlikely this species occurs within the subject land and therefore is unlikely this proposal will impact this species.	Unlikely
Limosa lapponica baueri	Nunivak Bar-tailed Godwit, Western Alaskan Bar-tailed Godwit	Vulnerable	The Bar-tailed Godwit has been recorded in the coastal areas of all Australian states. The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh. It has been sighted in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. It is rarely found on inland wetlands or in areas of short grass, such as farmland, paddocks and airstrips, although it is commonly recorded in paddocks at some locations overseas.	Unlikely

			The subject land occurs within the species known range; however, no NSW Bionet records exist within a 10 km search of the subject land. Moreover, this species is not associated with either PCT assigned to the subject land, nor does the subject land contain suitable coastal landforms or vegetation. No further assessment is required.	
Melanodryas cucullata cucullata	South-eastern Hooded Robin, Hooded Robin (south-eastern)	Endangered	The Hooded Robin is widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. However, it is common in few places, and rarely found on the coast. Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. Often perches on low dead stumps and fallen timber or on low-hanging branches, using a perch-and-pounce method of hunting insect prey. The subject land occurs within the species known range; although no NSW Bionet records exist within a 10 km search of the subject land. The species is associated with one PCT assigned to the subject land (PCT 1600), with some suitable habitat occurring on the subject land in the form of eucalypt woodlands. However, this habitat is marginal as much of the subject land is managed and disturbed, and therefore, no further assessment is required.	Unlikely
Neophema chrysostoma	Blue-winged Parrot	Vulnerable	Blue-winged Parrots are nomadic, moving to different areas depending on the availability of grasses and herbs. Habitat includes woodlands, coastal heaths and grasslands. The subject land is outside of the known or predicted distribution for the species, and there have been no sightings within 10km. Moreover, this species is not associated with the PCTs assigned to the subject land. Therefore, no further assessment is required.	Unlikely
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	Critically Endangered	Within Australia, the Eastern Curlew has a primarily coastal distribution. The species is found in all states and rarely inland. The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The birds are often recorded among saltmarsh and on mudflats fringed by mangroves, and sometimes use the mangroves. The birds are also found in saltworks and sewage farms. The subject land occurs within the species known range; however, no NSW Bionet records exist within a 10 km search of the subject land. Moreover, this species is not associated with either PCT assigned to the subject land, nor does the subject land contain suitable coastal landforms or vegetation. No further assessment is required.	Unlikely

Pachyptila turtur subantarctica	Fairy Prion (southern)	Vulnerable	Fairy Prions (including other subspecies) are often beachcast on the south-eastern coast of Australia (including the entirety of NSW coastline) and are commonly seen offshore over the continental shelf and over pelagic waters. The southern subspecies of the Fairy Prion is a marine bird, found mostly in temperate and subantarctic seas. Primarily a pelagic species, whose suitable habitat does not occur within the subject land. Moreover, there are no NSW Bionet records for this species within a 10 km search are of the subject land. Therefore, no further assessment is required.	Unlikely
Pycnoptilus floccosus	Pilotbird	Vulnerable	Pilotbirds are endemic to south-east Australia. Upland Pilotbirds occur above 600 m in the Brindabella Ranges in the Australian Capital Territory, and in the Snowy Mountains in New South Wales and north-east Victoria, where Lowland Pilotbirds occur in forests from the Blue Mountains west of Newcastle, around the wetter forests of eastern Australia, to Dandenong near Melbourne. The subject land occurs where the species habitat may occur. However, there are no NSW Bionet records within a 10 km search of the subject land, nor are the assigned PCTs associated with this species. Wetter forests do not occur within the subject land; therefore, no further assessment is required.	Unlikely
Rostratula australis	Australian Painted Snipe	Endangered	Most records of the Australian Painted Snipe are from the south east, particularly the Murray Darling Basin, with scattered records across northern Australia and historical records from around the Perth region in Western Australia. In NSW many records are from the Murray-Darling Basin including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp and more recently, swamps near Balldale and Wanganella. Other important locations with recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. The subject land occurs within the species known range; however, no NSW Bionet records exist within a 10 km search of the subject land. Moreover, this species is not associated with either PCT assigned to the subject land. Although there are some elements of suitable habitat on and near to the subject land (eg. dams on site, and wetland/swamps habitat in proximity), frequent disturbance within the subject land would make it unlikely that this species would utilise this area. Therefore, no further assessment is required.	Unlikely
Stagonopleura guttata	Diamond Firetail	Vulnerable	The Diamond Firetail is endemic to south-eastern Australia, extending from central Queensland to the Eyre Peninsula in South Australia. It is widely distributed in NSW, with a concentration of records from the Northern,	Unlikely

			Central and Southern Tablelands, the Northern, Central and South Western Slopes and the North West Plains and Riverina. Not commonly found in coastal districts, though there are records from near Sydney, the Hunter Valley and the Bega Valley. This species has a scattered distribution over the rest of NSW, though is very rare west of the Darling River. Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands. Also occurs in open forest, mallee, Natural Temperate Grassland, and in secondary grassland derived from other communities. Often found in riparian areas (rivers and creeks), and sometimes in lightly wooded farmland. The subject land occurs within the species known range, but no NSW Bionet records exist within a 10 km search of the subject land. Although this species is associated with one of the PCTs assigned to the subject land (PCT 1600), this species is rarely found along coastal regions, like that of the subject land. Therefore, no further assessment is required.	
Mammals				
Chalinolobus dwyeri	Large-eared Pied Bat, Large Pied Bat	Vulnerable	Found mainly in areas with extensive cliffs and caves, from Rockhampton in Queensland south to Bungonia in the NSW Southern Highlands. It is generally rare with a very patchy distribution in NSW. There are scattered records from the New England Tablelands and North West Slopes. Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin (Petrochelidon ariel), frequenting low to mid-elevation dry open forest and woodland close to these features. Found in well-timbered areas containing gullies. The subject land occurs within the species known range and there have been three sighting's within 10km of the subject land. Although this species is associated with one of the PCTs assigned to the subject land (PCT 1600), there is no suitable roosting habitat within the subject land in the form of cliffs or caves. No further assessment is required.	Unlikely
Dasyurus maculatus maculatus (SE mainland population)	Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)	Endangered	The spotted-tailed Quoll is recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Individual animals use hollow-bearing trees, fallen logs, small caves, rock outcrops and rocky-cliff faces as den sites. The subject land occurs within the species known range and there have been four known records of this species within a 10km radius of the subject land according to NSW Bionet data. The species is associated with both PCTs assigned to the subject land (PCT 1598 and PCT 1600), and there is some suitable habitat within the subject land in the form of open forest and woodlands with some fallen logs and hollow-bearing trees. further assessment is required.	Likely

Notamacropus parma	Parma Wallaby	Vulnerable	The species once occurred in north-eastern NSW from the Queensland border to the Bega area in the southeast. Their range is now confined to the coast and ranges of the central and northern NSW from the Gosford district to south of the Bruxner Highway between Tenterfield and Casino. The subject land is outside of the known distribution for the species, and there have been no known records of this species within a 10km radius according to NSW Bionet data. Moreover, the species is not associated with either of the PCTs assigned to the subject land, nor is there suitable habitat present in the form of moist eucalypt forests with a dense midstory. Therefore, no further assessment required.	Unlikely
Petauroides volans	Greater Glider (southern and central)	Endangered	The greater glider is restricted to eastern Australia, occurring from the Windsor Tableland in north Queensland through to central Victoria (Wombat State Forest), with an elevational range from sea level to 1200 m above sea level. The greater glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species. Roosts in tree hollows and is more common in areas abundant in tree hollows. The subject land occurs within the species known range and there are two known records of this species within a 10km radius of subject land according to NSW Bionet data. The species is associated with one PCT assigned to the subject land (PCT 1600), and there is suitable foraging and breeding habitat with eucalypt forests with hollow bearing trees present across much of the subject land. This species was not detected during target surveys for arboreal species within the subject land (see Section 5.5), and therefore no further assessment is required.	Unlikely
Petaurus australis	Yellow-bellied Glider (south-eastern)	Vulnerable	The Yellow-bellied Glider is found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria. Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. The subject land occurs within the species known range, but there are no known Bionet records of this species within a 10km radius of the subject land. Although the species is associated with one PCT assigned to the subject land (PCT 1600), this species is typically exhibits a preference for large patches of mature old growth forest that provide suitable trees for foraging and shelter. As such, this habitat is not present within the subject land due to the history of disturbance and clearance. Therefore, given the lack of suitable habitat this species is unlikely to utilise this area and no further assessment is required.	Unlikely
Petrogale penicillata	Brush-tailed Rock-wallaby	Vulnerable	The range of the Brush-tailed Rock-wallaby extends from south-east Queensland to the Grampians in western Victoria, roughly following the line of the Great Dividing Range. However, the distribution of the species across its original range has declined significantly in the west and south and has become more fragmented. In NSW they occur from the Queensland border in the north to Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Occupy rocky escarpments, outcrops and cliffs with a	Unlikely

			preference for complex structures with fissures, caves and ledges, often facing north. Browse on vegetation in and adjacent to rocky areas eating grasses and forbs as well as the foliage and fruits of shrubs and trees. The subject land occurs within the species known range, however, there are no Bionet records of this species within a 10km radius of the subject land. Although the species is associated with one PCT assigned to the subject land (PCT 1600), no suitable habitat in the form of rocky are present within the subject land, so it's highly unlikely the site is utilised for foraging. Therefore, no further assessment is required.	
Phascolarctos cinereus	Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)	Endangered	The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. Inhabit eucalypt woodlands and forests. The subject land occurs within the species known range, and there are over 400 NSW Bionet records exist of this species within a 10km radius. Moreover, the species is associated with one PCT assigned to the subject land (PCT 1600), with suitable foraging trees present within the subject land. Therefore, further assessment is required.	Likely
Potorous tridactylus tridactylus	Long-nosed Potoroo (northern)	Vulnerable	The Long-nosed Potoroo is restricted to the eastern coast of Australia. In NSW it is generally restricted to coastal heaths and forests east of the Great Dividing Range, with an annual rainfall exceeding 760 mm. Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature. The subject land occurs outside the species known range, and no NSW Bionet records exist within a 10 km search of the subject land. Moreover, this species is not associated with either of the PCTs assigned to the subject land, therefore, no further assessment ing required.	Unlikely
Pseudomys novaehollandiae	New Holland Mouse, Pookila	Vulnerable	The New Holland Mouse has a fragmented distribution across Tasmania, Victoria, NSW and Queensland. The species is now largely restricted to the coast of central and northern NSW, with one inland occurrence near Parkes. The New Holland Mouse has been found from coastal areas and up to 100 km inland on sandstone country. The species has been recorded from sea level up to around 900 m above sea level. Soil type may be an important indicator of suitability of habitat for the New Holland Mouse, with deeper top soils and softer substrates being preferred for digging burrows (Wilson & Laidlaw 2003). In Victoria, the species has been recorded on deep siliceous podsols, sandy clay, loamy sands, sand dunes and coastal dunes. Due to the largely granivorous diet of the species, sites where the New Holland Mouse is found are often high in floristic diversity, especially leguminous perennials. The mouse is known to inhabit open heathland, open woodland with a heathland understorey and vegetated sand dunes.	Unlikely

			The subject land occurs within the species known range, but no NSW Bionet records exist within a 10 km search of the subject land. Moreover, this species is not associated with either of the PCTs assigned to the subject land, therefore, no further assessment ing required.	
Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Grey-headed Flying-foxes are generally found within 200 km of the eastern coast of Australia, from Rockhampton in Queensland to Adelaide in South Australia. In times of natural resource shortages, they may be found in unusual locations. Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy. The subject land occurs within the species known range and there is a total of 162 NSW Bionet records exist within a 10 km search of the subject land. Moreover, this species is associated with one of the PCTs assigned to the subject land (PCT 1600), with sufficient habitat features are present on the site. Additionally, this species was observed incidentally flying over the subject land and therefore further assessment is required.	Likely
Herpetofauna				
Delma impar	Striped Legless Lizard, Striped Snake-lizard	Vulnerable	The Striped Legless Lizard occurs in the Southern Tablelands, the South West Slopes and possibly on the Riverina. Populations are known in the Goulburn, Yass, Queanbeyan, Cooma and Tumut areas. Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Habitat is where grassland is dominated by perennial, tussock-forming grasses such as Kangaroo Grass Themeda australis, spear-grasses Austrostipa spp. and poa tussocks Poa spp., and occasionally wallaby grasses Austrodanthonia spp. Sometimes present in modified grasslands with a significant content of exotic grasses. Usually found where soils are predominantly basalt with a high clay content and a propensity for cracking. Favoured habitat typically contains little bare ground, with plant litter to a depth of approximately 3 cm. The subject land occurs within a highly fragmented landscape with limited connectivity. The species is known to have an extremely limited home range of approximately 10 m2 and a slow population spread (ie migration) of <12 m per year with the species known to be deterred by hostile barriers such as roads and substantial cleared areas (Robertson and Smith 2010). Therefore based on the limited connectivity of the subject land to the broader landscape, the species is unlikely to migrate to utilise the subject land. If the species was at one time present, it is unlikely to persist due to the heavy disturbance of the subject land through land clearing, cattle grazing and ongoing management such as mowing/slashing. In addition the subject land contains heavily compacted soils and minimal formation of tussocks therefore lacks the structural diversity to provide habitat refuge for the entity.	Unlikely

			Further to this the species, or other legless lizard species, were not detected during site investigation including pitfall trapping efforts, albeit targeting the Common Planigale (*Planigale maculata*). No BioNet records occur within 10 km of the subject land, therefore the species is not present within the subject land. No Furter assessment required.	
Litoria aurea	Green and Golden Bell Frog	Vulnerable	The Green and Golden Bell Frog main populations in NSW are located around the metropolitan areas of Sydney, Shoalhaven and mid north coast (one an island population). There is only one known population on the NSW Southern Tablelands. Inhabits marshes, dams and stream-sides, particularly those containing bullrushes (Typha spp.) or spikerushes (*Eleocharis spp*.). Optimum habitat includes water-bodies that are unshaded, free of predatory fish such as Plague Minnow (*Gambusia holbrooki*), have a grassy area nearby and diurnal sheltering sites available. Some sites, particularly in the Greater Sydney region occur in highly disturbed areas. The subject land occurs within the species known range, there are 7 NSW Bionet records occurring within a 10 km search of the subject land. This species was not detected during frog surveys (see Section 5.5). All waterbodies within the subject land contain limited fringing vegetation due to the frequent visitations from livestock and contain the pest predator *Gambusia holbrooki*. On this basis, it is unlikely this species occurs within the subject land and therefore is unlikely this proposal will impact this species.	Unlikely
Mixophyes balbus	Stuttering Frog, Southern Barred Frog (in Victoria)	Vulnerable	Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Outside the breeding season adults live in deep leaf litter and thick understorey vegetation on the forest floor. Stuttering Frogs occur along the east coast of Australia from southern Queensland to north-eastern Victoria. It is the only Mixophyes species that occurs in south-east NSW and in recent surveys it has only been recorded at three locations south of Sydney, and Dorrigo being the stronghold. There is no suitable habitat on the subject land, with the site being on a clay base far from rainforest or any thick understory. There are no NSW Bionet records occurring within 10km of the subject land. This species was not detected during frog surveys (see Section 5.5). No further assessment is required.	Unlikely
Mixophyes iteratus	Giant Barred Frog, Southern Barred Frog	Vulnerable	The Giant Barred Frog is distributed along the coast and ranges from Eumundi in south-east Queensland to Warrimoo in the Blue Mountains. Declines appear to have occurred at the margins of the species' range, with no recent records south of the Hawkesbury River and disappearances from a number of streams in QLD. Northern NSW, particularly the Coffs Harbour-Dorrigo area, is a stronghold. Giant Barred Frogs are found along freshwater streams with permanent or semi-permanent water, generally (but not always) at lower elevation. Moist riparian habitats such as rainforest or wet sclerophyll forest are favoured for the deep leaf litter that they provide for shelter and foraging, as well as open perching sites on the forest floor. However, Giant	Unlikely

			Barred Frogs will also sometimes occur in other riparian habitats, such as those in drier forest or degraded riparian remnants, and even occasionally around dams. This species was not detected during frog surveys. There are no NSW Bionet records occurring within 10km of the subject land. All waterbodies within the subject land contain limited fringing vegetation due to the frequent visitations from livestock and contain the pest predator *Gambusia holbrooki*. On this basis, it is unlikely this species occurs within the subject land and therefore is unlikely this proposal will impact this species.	
Uperoleia mahonyi	Mahony's Toadlet	Endangered	Mahony's Toadlet is endemic to the mid-north coast of New South Wales (NSW) and to date has been found between Kangy Angy and Seal Rocks. Current observations indicate Mahony's Toadlet inhabits ephemeral and semi-permanent swamps and swales on the coastal fringe of its range. Known records occur in heath or wallum habitats almost exclusively associated with leached (highly nutrient impoverished) white sand. Known records are associated with shallow ephemeral/semi-permanent water bodies with limited flow of water. The species prefers sandy soils, and the subject land is clay. There is no other suitable habitat on subject land. There are no NSW Bionet records occurring within 10km of the subject land. On this basis, it is unlikely this species occurs within the subject land and therefore is unlikely this proposal will impact this species.	Unlikely
Listed Migratory Species				
Migratory Terrestrial Birds				
Cuculus optatus	Oriental Cuckoo, Horsfield's Cuckoo		This species migrates to the north and east coasts of Australia during the non-breeding season over winter. Mainly inhabiting forests, the Oriental cuckoo occurs in mixed, deciduous and coniferous forest. It is present at all levels of the forest canopy, and can be found at a range of elevations, occasionally being recorded in mountains as high up as 1,100 metres. The species is a non-breeding migrant to Australia, there is marginal habitat on the subject land, which is unlikely to be utilised. A total of two NSW Bionet records exist within a 10 km search of the subject land. No further assessment required.	Unlikely
Hirundapus caudacutus	White-throated Needletail	Vulnerable	The White-throated Needletail is widespread in across the coast of eastern and south-eastern Australia, and Tasmania. White-throated Needletails only occur as vagrants in the Northern Territory and in Western Australia. In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Because they are aerial, it has been stated that conventional habitat descriptions are inapplicable (Cramp 1985), but there are, nevertheless, certain preferences exhibited by the species. They are probably recorded most often above wooded areas, including open forest and	Unlikely

			rainforest, and may also fly between trees or in clearings, below the canopy, but they are less commonly recorded flying above woodland. A total of 19 NSW Bionet records exist within a 10 km search of the subject land. As the species is almost exclusively aerial there is potential that the species would fly over the subject land but unlikely that it would utilise the subject land. No further assessment required.	
Monarcha melanopsis	Black-faced Monarch		The Black-faced Monarch is widespread in eastern Australia. In Queensland, it is widespread from the islands of the Torres Strait and on Cape York Peninsula, south along the coasts (occasionally including offshore islands) and the eastern slopes of the Great Divide, to the New South Wales border. In New South Wales and the Australian Capital Territory, the species occurs around the eastern slopes and tablelands of the Great Divide, inland to Coutts Crossing, Armidale, Widden Valley, Wollemi National Park, Wombeyan Caves and Canberra. The Black-faced Monarch mainly occurs in rainforest ecosystems, including semi-deciduous vine-thickets, complex notophyll vine-forest, tropical (mesophyll) rainforest, subtropical (notophyll) rainforest, mesophyll (broadleaf) thicket/shrubland, warm temperate rainforest, dry (monsoon) rainforest and (occasionally) cool temperate rainforest. There is no suitable habitat in the form of rainforest vegetation occurring within the subject land. No NSW Bionet records exist within a 10 km search of the subject land. No further assessment required.	Unlikely
Motacilla flava	Yellow Wagtail		Occurs throughout Australia. Can be found in a range of land uses including pastures, wetlands, shrublands, grasslands and man made environments. The yellow wagtail typically forages in damp grassland and on relatively bare open ground at edges of rivers, lakes and wetlands, but also feeds in dry grassland and in fields of cereal crops. Marginal habitat does occur within the subject land however, the species is known to forage at the edges of rivers, lakes and wetlands which are not present within the subject land. There is one known NSW Bionet record of this species within a 10km radius which is ~8.5km north of the site boundary. No further assessment required.	Unlikely
Myiagra cyanoleuca	Satin Flycatcher		The Satin Flycatcher is widespread in eastern Australia and vagrant to New Zealand (Blakers et al. 1984; Coates 1990a). In Queensland, it is widespread but scattered in the east, being recorded on passage on a few islands in the western Torres Strait. Satin Flycatchers inhabit heavily vegetated gullies in eucalypt-dominated forests and taller woodlands, and on migration, occur in coastal forests, woodlands, mangroves and drier woodlands and open forests. Satin Flycatchers mainly inhabit eucalypt forests, often near wetlands or watercourses. They generally occur in moister, taller forests than the Leaden Flycatcher, Myiagra rebecula, often occurring in gullies. They also occur in eucalypt woodlands with open understorey and grass ground cover, and are generally absent from rainforest.	Unlikely

			Some marginally suitable habitat occurs on the subject land, however, the species are generally found in heavily vegetated gullies or forest in close proximity to wetlands or watercourses. No NSW Bionet records exist within a 10 km search of the subject land. No further assessment required.	
Rhipidura rufifrons	Rufous Fantail		The Rufous Fantail occurs in coastal and near coastal districts of northern and eastern Australia. In east and south-east Australia, the Rufous Fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts such as Tallow-wood (*Eucalyptus microcorys*), Mountain Grey Gum (*E. cypellocarpa*), Narrow-leaved Peppermint (*E. radiata*), Mountain Ash (*E. regnans*), Alpine Ash (*E. delegatensis*), Blackbutt (*E. pilularis)* or Red Mahogany (*E. resinifera*); usually with a dense shrubby understorey often including ferns. They also occur in subtropical and temperate rainforests; for example near Bega in south-east NSW, where they are recorded in temperate Lilly Pilly (A*cmena smithi)* rainforest, with Grey Myrtle (*Backhousia myrtifolia*), Sassafras (*Doryphora sassafras*) and Sweet Pittosporum (*Pittosporum undulatum*) subdominants. They occasionally occur in secondary regrowth, following logging or disturbance in forests or rainforests. When on passage, they are sometimes recorded in drier sclerophyll forests and woodlands, including Spotted Gum (*Eucalyptus maculata*), Yellow Box (*E. melliodora*), ironbarks or stringybarks, often with a shrubby or heath understorey. They are also recorded from parks and gardens when on passage. In north and north-east Australia, they often occur in tropical rainforest and monsoon rainforests, including semi-evergreen mesophyll vine forests, semi-deciduous vine thickets or thickets of Paperbarks (*Melaleuca* spp.) (Higgins et al. 2006). There is marginal suitable habitat for the species when on passage. The species is generally found in wet sclerophyll forests, often in gullies dominated by eucalypts, which are not present. No NSW Bionet records exist within a 10 km search of the subject land. No further assessment required.	Unlikely
Symposiachrus trivirgatus	Spectacled Monarch		This species occurs around the coast of NSW. The Spectacled Monarch prefers thick understorey in rainforests, wet gullies and waterside vegetation, as well as mangroves. There is no l suitable habitat for the species in the form of rainforest vegetation and wet gullies. No NSW Bionet records exist within a 10 km search of the subject land. No further assessment required.	Unlikely
Migratory Wetland Birds				
Actitis hypoleucos	Common Sandpiper		The Common Sandpiper is found along all coastlines of Australia and in many areas inland. The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. The Common Sandpiper has been recorded in estuaries and deltas of streams, as well as on banks farther upstream; around lakes, pools, billabongs, reservoirs, dams and claypans, and occasionally piers and jetties. The muddy margins utilised by	Unlikely

			the species are often narrow, and may be steep. The species is often associated with mangroves, and sometimes found in areas of mud littered with rocks or snags. There is no suitable habitat, no wetlands occur within the subject land or in close proximity. There are five NSW Bionet records of the species within a 10km search of the subject land, however, these records all occur in the same location in more suitable habitat around the Hunter Wetlands and Hexham Swamp which are approximately 10km south east of the subject land. As there is no suitable habitat, for foraging or breeding no further assessment is required.	
Arenaria interpres	Ruddy Turnstone		The Ruddy Turnstone is widespread within Australia during its non-breeding period of the year. It is mainly found on coastal regions with exposed rock coast lines or coral reefs. This species arrives in east Australia from September. There is no suitable habitat, the subject land is not located in close proximity to coastal habitat, and such does not contain exposed rock coast lines or coral reefs within it. There are no NSW Bionet records of the species within a 10km search of the subject land. No further assessment is required.	Unlikely
Calidris acuminata	Sharp-tailed Sandpiper		The Sharp-tailed Sandpiper spends the non-breeding season in Australia with small numbers occurring regularly in New Zealand. Most of the population migrates to Australia, mostly to the south-east and are widespread in both inland and coastal locations and in both freshwater and saline habitats. Many inland records are of birds on passage. In Australasia, the Sharp-tailed Sandpiper prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland. They also occur in saltworks and sewage farms. They use flooded paddocks, sedgelands and other ephemeral wetlands, but leave when they dry. They use intertidal mudflats in sheltered bays, inlets, estuaries or seashores, and also swamps and creeks lined with mangroves. They tend to occupy coastal mudflats mainly after ephemeral terrestrial wetlands have dried out, moving back during the wet season. They may be attracted to mats of algae and water weed either floating or washed up around terrestrial wetlands, and coastal areas with much beachcast seaweed. Sometimes they occur on rocky shores and rarely on exposed reefs. There is marginal habitat for the species in the form of small, isolated and degraded farm dams, however this does not constitute the species usual habitat with it preferring lagoons, swamps and lakes in coastal areas. There are 100 NSW Bionet records of the species within a 10km search of the subject land. Due to the degraded nature of the dams present within the subject land and more suitable habitat in the surrounding area, it is unlikely that the species would utilise the subject land. No further assessment is required.	Maybe
Calidris canutus	Red Knot, Knot	Endangered	The Red Knot is common in all the main suitable habitats around the coast of Australia. They mainly inhabit intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and	Unlikely

			harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs. They move south, mostly along coasts, with some inland records from September–November and arrive in south-west Australia from September. There is no suitable habitat, the subject land is not located in close proximity to coastal habitat, and such does not contain estuaries, harbours or coral reefs which the species inhabits. There is one NSW Bionet record of the species within a 10km search of the subject land. No further assessment is required.	
Calidris ferruginea	Curlew Sandpiper	Critically Endangered	In Australia, Curlew Sandpipers occur around the coasts and are also quite widespread inland, though in smaller numbers. Records occur in all states during the non-breeding period, and also during the breeding season when many non-breeding one year old birds remain in Australia rather than migrating north. Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast, and ponds in saltworks and sewage farms. They are also recorded inland, though less often, including around ephemeral and permanent lakes, dams, waterholes and bore drains, usually with bare edges of mud or sand. They occur in both fresh and brackish waters. Occasionally they are recorded around floodwaters. There is marginal habitat for the species in the form of small, isolated and degraded farm dams, however this does not constitute the species usual habitat with it preferring intertidal mudflats in sheltered coastal areas. There are 17 NSW Bionet records of the species within a 10km search of the subject land. Due to the degraded nature of the dams present within the subject land and more suitable habitat in the surrounding area, it is unlikely that the species would utilise the subject land. No further assessment is required.	Unlikely
Calidris melanotos	Pectoral Sandpiper		the Pectoral Sandpiper is widespread, but scattered. Records exist east of the Great Divide, from Casino and Ballina, south to Ulladulla. West of the Great Divide, the species is widespread in the Riverina and Lower Western regions. In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands. There is marginal habitat for the species in the form of small, isolated and degraded farm dams, however this does not constitute the species usual habitat with it preferring coastal lagoons, bays and swamps. There are 5 NSW Bionet records of the species within a 10km search of the subject land. Due to the degraded nature of the dams present within the subject land and more suitable habitat in the surrounding area, it is unlikely that the species would utilise the subject land. No further assessment is required.	Unlikely
Calidris ruficollis	Red-necked Stint		It is distributed along most of the Australian coastline with large densities on the Victorian and Tasmanian coasts. The Red-necked Stint has been recorded in all coastal regions, and found inland in all states when conditions are suitable. In Australasia, the Red-necked Stint is mostly found in coastal areas, including in sheltered inlets, bays, lagoons and estuaries with intertidal mudflats, often near spits, islets and banks and,	Unlikely

			sometimes, on protected sandy or coralline shores. Occasionally they have been recorded on exposed or ocean beaches, and sometimes on stony or rocky shores, reefs or shoals. They also occur in saltworks and sewage farms; saltmarsh; ephemeral or permanent shallow wetlands near the coast or inland, including lagoons, lakes, swamps, riverbanks, waterholes, bore drains, dams, soaks and pools in saltflats. They sometimes use flooded paddocks or damp grasslands. They have occasionally been recorded on dry gibber plains, with little or no perennial vegetation. There is marginal habitat for the species in the form of small, isolated and degraded farm dams, however this does not constitute the species usual habitat, with it mostly found in coastal areas containing sheltered inlets, bays, lagoons and estuaries with intertidal mudflats. There are 11 NSW Bionet records of the species within a 10km search of the subject land. Due to the degraded nature of the dams present within the subject land and more suitable habitat in the surrounding area, it is unlikely that the species would utilise the subject land. No further assessment is required.	
Calidris tenuirostris	Great Knot	Critically Endangered	The Great Knot has been recorded in Narooma, Tullakool, Armidale, Gilgandra and Griffith. Occurs within sheltered, coastal habitats containing large, intertidal mudflats or sandflats, including inlets, bays, harbours, estuaries and lagoons. Often recorded on sandy beaches with mudflats nearby, sandy spits and islets and sometimes on exposed reefs or rock platforms. Migrates to Australia from late August to early September, although juveniles may not arrive until October-November. There is no suitable habitat, the subject land is not located in close proximity to coastal habitat, and such does not contain large, intertidal mudflats or sandflats which the species inhabits. There is one NSW Bionet record of the species within a 10km search of the subject land. No further assessment is required.	Unlikely
Charadrius bicinctus	Double-banded Plover		The Double-banded Plover can be found in both coastal and inland areas. During the non-breeding season, it is common in eastern and southern Australia, mainly between the Tropic of Capricorn and western Eyre Peninsula. The Double-banded Plover is found on littoral, estuarine and fresh or saline terrestrial wetlands and also saltmarsh, grasslands and pasture. It occurs on muddy, sandy, shingled or sometimes rocky beaches, bays and inlets, harbours and margins of fresh or saline terrestrial wetlands such as lakes, lagoons and swamps, shallow estuaries and rivers. The species is sometimes associated with coastal lagoons, inland saltlakes and saltworks. There is no suitable habitat, the subject land does not contain the coastal or terrestrial wetland environment the species would usually occupy. There are no NSW Bionet records of the species within a 10km search of the subject land. No further assessment is required.	Unlikely

Charadrius leschenaultii	Greater Sand Plover, Large Sand Plover	Vulnerable	In Australia, the Greater Sand Plover occurs in coastal areas in all states. n the non-breeding grounds in Australasia, the species is almost entirely coastal, inhabiting littoral and estuarine habitats. They mainly occur on sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons, and inshore reefs, rock platforms, small rocky islands or sand cays on coral reefs. There is no suitable habitat, the subject land is not located in close proximity to coastal habitat, and such does not contain large intertidal mudflats or sandbanks which the species inhabits. There are no NSW Bionet records of the species within a 10km search of the subject land. No further assessment is required.	Unlikely
Charadrius mongolus	Lesser Sand Plover, Mongolian Plover	Endangered	The Lesser Sand Plover breeds in central and north eastern Asia, migrating further south for winter. Occurs almost entirely coastal in NSW, favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats; occasionally occurs on sandy beaches, coral reefs and rock platforms. Roosts during high tide on sandy beaches, spits and rocky shores; forage individually or in scattered flocks on wet ground at low tide, usually away from the water's edge. There is no suitable habitat, the subject land is not located in close proximity to coastal habitat, and such does not contain large intertidal mudflats or sandbanks which the species inhabits. There are no NSW Bionet records of the species within a 10km search of the subject land. No further assessment is required.	Unlikely
Gallinago hardwickii	Latham's Snipe, Japanese Snipe		Latham's Snipe is a non-breeding visitor to south-eastern Australia, and is a passage migrant through northern Australia. The species has been recorded along the east coast of Australia from Cape York Peninsula through to south-eastern South Australia. In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies) . However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity. There is no suitable habitat, the dams present within the site are small, isolated and degraded and are unlikely to provide habitat for the species. There are 130 NSW Bionet records of the species within a 10km search of the subject land. Due to the lack of suitable habitat, no further assessment is required.	Unlikely
Gallinago megala	Swinhoe's Snipe		Swinhoe's Snipe occurs along the coast of Australia during the non-breeding season. During the non-breeding season Swinhoe's Snipe occurs at the edges of wetlands, such as wet paddy fields, swamps and freshwater streams. The species is also known to occur in grasslands, drier cultivated areas (including crops of rapeseed and wheat) and market gardens. Habitat specific to Australia includes the dense clumps of grass and rushes round the edges of fresh and brackish wetlands. This includes swamps, billabongs, river pools, small streams and sewage ponds. They are also found in drying claypans and inundated plains pitted with crab holes.	Unlikely

			There is no suitable habitat, the dams present within the site are small, isolated and degraded and are unlikely to provide habitat for the species. There are no NSW Bionet records of the species within a 10km search of the subject land. Due to the lack of suitable habitat, no further assessment is required.	
Gallinago stenura	Pin-tailed Snipe		The Pin-tailed Snipe's distribution within Australia is not well understood, in NSW a single banded bird was reported near West Wyalong. During non-breeding period in Australia, the Pin-tailed Snipe occurs most often in or at the edges of shallow freshwater swamps, ponds and lakes with emergent, sparse to dense cover of grass/sedge or other vegetation. The species is also found in drier, more open wetlands such as claypans in more arid parts of species' range. It is also commonly seen at sewage ponds; not normally in saline or inter-tidal wetlands. There is no suitable habitat, the dams present within the site are small, isolated and degraded and are unlikely to provide habitat for the species. There are no NSW Bionet records of the species within a 10km search of the subject land. Due to the lack of suitable habitat, no further assessment is required.	Unlikely
Limicola falcinellus	Broad-billed Sandpiper		Broad-billed Sandpiper breeds in northern Siberia before migrating southwards in winter to Australia. In NSW, the main site for the species is the Hunter River estuary, with birds occasionally reaching the Shoalhaven estuary. There are few records for inland NSW. Broad-billed Sandpipers favour sheltered parts of the coast such as estuarine sandflats and mudflats, harbours, embayments, lagoons, saltmarshes and reefs as feeding and roosting habitat. Occasionally, individuals may be recorded in sewage farms or within shallow freshwater lagoons. Broad-billed Sandpipers roost on banks on sheltered sand, shell or shingle beaches. There is no suitable habitat, the subject land is not located in close proximity to coastal habitat, and such does not contain large intertidal mudflats or sandbanks which the species inhabits. There are no NSW Bionet records of the species within a 10km search of the subject land. No further assessment is required.	Unlikely
Limosa lapponica	Bar-tailed Godwit		The Bar-tailed Godwit has been recorded in the coastal areas of all Australian states. The Bar-tailed Godwit is found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh. It has been sighted in coastal sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. It is rarely found on inland wetlands or in areas of short grass, such as farmland, paddocks and airstrips, although it is commonly recorded in paddocks at some locations overseas. There is no suitable habitat, the subject land is not located in close proximity to coastal habitat, and such does not contain large intertidal mudflats or sandbanks which the species inhabits. There are five NSW Bionet records of the species within a 10km search of the subject land. No further assessment is required.	Unlikely

Limosa limosa	Black-tailed Godwit		The Black-tailed Godwit is found in all states and territories of Australia, however, it prefers coastal regions and the largest populations are found on the north coast between Darwin and Weipa. In Australia the Black-tailed Godwit has a primarily coastal habitat environment. The species is commonly found in sheltered bays, estuaries and lagoons with large intertidal mudflats or sandflats, or spits and banks of mud, sand or shell-grit; occasionally recorded on rocky coasts or coral islets. The use of habitat often depends on the stage of the tide. It is also found in shallow and sparsely vegetated, near-coastal, wetlands; such as saltmarsh, saltflats, river pools, swamps, lagoons and floodplains. There are a few inland records, around shallow, freshwater and saline lakes, swamps, dams and bore-overflows. They also use lagoons in sewage farms and saltworks There is no suitable habitat, the subject land is not located in close proximity to coastal habitat, and such does not contain large intertidal mudflats or sandbanks which the species inhabits. There are two NSW Bionet records of the species within a 10km search of the subject land. No further assessment is required.	Unlikely
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	Critically Endangered	Within Australia, the Eastern Curlew has a primarily coastal distribution. The species is found in all states and rarely inland. The Eastern Curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The birds are often recorded among saltmarsh and on mudflats fringed by mangroves, and sometimes use the mangroves. The birds are also found in saltworks and sewage farms There is no suitable habitat, the subject land is not located in close proximity to coastal habitat, and such does not contain large intertidal mudflats or sandbanks which the species inhabits. There are no NSW Bionet records of the species within a 10km search of the subject land. No further assessment is required.	Unlikely
Numenius minutus	Little Curlew, Little Whimbrel		Little Curlews generally spend the non-breeding season in northern Australia from Port Hedland in Western Australia to the Queensland coast (Minton 2002 pers. comm.). There are records of the species from inland Australia, and widespread but scattered records on the east coast. The species has also been recorded on Lord Howe Island, Cocos-Keeling Island and Christmas Island. There is no suitable habitat, with the closest wetland being ~10km away – Hexham Swamp and Hunter Wetlands. As there is no suitable habitat, for foraging or breeding no further assessment is required.	Unlikely
Numenius phaeopus	Whimbrel		The Whimbrel is a regular migrant to Australia and New Zealand, with a primarily coastal distribution. There are also scattered inland records of Whimbrels in all regions. It is found in all states but is more common in the north. The Whimbrel is often found on the intertidal mudflats of sheltered coasts. It is also found in harbours, lagoons, estuaries and river deltas, often those with mangroves, but also open, unvegetated mudflats. It is occasionally found on sandy or rocky beaches, on coral or rocky islets, or on intertidal reefs and platforms. It has been infrequently recorded using saline or brackish lakes near coastal areas. It also used saltflats with	Unlikely

			saltmarsh, or saline grasslands with standing water left after high spring-tides, and in similar habitats in sewage farms and saltfields. There are a small number of inland records from saline lakes and canegrass swamps. There is no suitable habitat, with the closest wetland being ~10km away – Hexham Swamp and Hunter Wetlands. As there is no suitable habitat, for foraging or breeding no further assessment is required.	
Pandion haliaetus	Osprey		The breeding range of the Eastern Osprey extends around the northern coast of Australia (including many offshore islands) from Albany in Western Australia to Lake Macquarie in NSW; with a second isolated breeding population on the coast of South Australia, extending from Head of Bight east to Cape Spencer and Kangaroo Island. Eastern Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia. They require extensive areas of open fresh, brackish or saline water for foraging. There is no suitable habitat, as the subject land is not in close proximity to a major river. There are 11 NSW Bionet records of the species within a 10km search of the subject land. No further assessment is required.	Unlikely
Philomachus pugnax	Ruff (Reeve)		In Australia the Ruff is found on generally fresh, brackish of saline wetlands with exposed mudflats at the edges. It is found in terrestrial wetlands including lakes, swamps, pools, lagoons, tidal rivers, swampy fields and floodlands. They are occasionally seen on sheltered coasts, in harbours, estuaries, seashores and are known to visit sewage farms and saltworks. They are sometimes found on wetlands surrounded by dense vegetation including grass, sedges, saltmarsh and reeds. They have been observed on sand spits and other sandy habitats including shingles. The Ruff forages on exposed mudflats, in shallow water and occasionally on dry mud. They have been observed foraging in dry waterside plants and in swampy areas next to aeration tanks in sewage farms. They prefer to roost amongst shorter vegetation Most NSW records come from the Sydney region. There is no suitable habitat, the dams present within the site are small, isolated and degraded and are unlikely to provide habitat for the species. There are no NSW Bionet records of the species within a 10km search of the subject land. Due to the lack of suitable habitat, no further assessment is required.	Unlikely
Pluvialis fulva	Pacific Golden Plover		Within Australia, the Pacific Golden Plover is widespread in coastal regions, though there are also a number of inland records, sometimes far inland and usually along major river systems, especially the Murray and Darling Rivers and their tributaries. Most occur along the east coast. Pacific Golden Plovers usually occur on beaches, mudflats and sandflats.	Unlikely

			There is no suitable habitat, the subject land is not located in close proximity to coastal habitat, and such does not contain large intertidal mudflats or sandbanks which the species inhabits. There are 19 NSW Bionet records of the species within a 10km search of the subject land. No further assessment is required.	
Pluvialis squatarola	Grey Plover		The Grey Plover has been recorded in all states, where it is found along the coasts. In non-breeding grounds in Australia, Grey Plovers occur almost entirely in coastal areas, where they usually inhabit sheltered embayments, estuaries and lagoons. The species is also very occasionally recorded further inland, where they occur around wetlands or salt-lakes. There is no suitable habitat, the subject land is not located in close proximity to coastal habitat, and such does not contain sheltered embayments, estuaries and lagoons which the species inhabits. There are no NSW Bionet records of the species within a 10km search of the subject land. No further assessment is required.	Unlikely
Tringa brevipes	Grey-tailed Tattler		In NSW the Grey-tailed Tattler is distributed along most of the coast from the Queensland border, south to Tilba Lake. It is more heavily distributed along coastal regions north of Sydney. It is often found on sheltered coasts with reefs and rock platforms or with intertidal mudflats. The Grey-tailed Tattler arrives in Australia mostly in August, however, they sometimes appear south of the breeding range as early as July. There is no suitable habitat, the subject land is not located in close proximity to coastal habitat, and such does not sheltered coasts with reefs and rock platforms or with intertidal mudflats which the species inhabits. There is one NSW Bionet record of the species within a 10km search of the subject land. No further assessment is required.	Unlikely
Tringa nebularia	Common Greenshank, Greenshank		The Common Greenshank does not breed in Australia, however, the species occurs in all types of wetlands across Australia. The Common Greenshank is found in a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. It occurs in sheltered coastal habitats, typically with large mudflats and saltmarsh, mangroves or seagrass. There is no suitable habitat, the dams present within the site are small, isolated and degraded and are unlikely to provide habitat for the species. There are 25 NSW Bionet records of the species within a 10km search of the subject land. Due to the lack of suitable habitat, no further assessment is required.	Unlikely
Tringa stagnatilis	Marsh Sandpiper, Little Greenshank		The Marsh Sandpiper is found on coastal and inland wetlands throughout Australia. The species is widespread in coastal Queensland, but few records exist north of Cooktown. It is recorded in all regions of NSW but especially the central and south coasts and (inland) on the western slopes of Great Divide and western plains. The Marsh Sandpiper lives in permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats	Unlikely

			and also regularly at sewage farms and saltworks. They are recorded less often at reservoirs, waterholes, soaks, bore-drain swamps and flooded inland lakes. There is no suitable habitat, the dams present within the site are small, isolated and degraded and are unlikely to provide habitat for the species. There are 27 NSW Bionet records of the species within a 10km search of the subject land. Due to the lack of suitable habitat, no further assessment is required.	
Xenus cinereus	Terek Sandpiper		The Terek Sandpiper is a rare migrant to the eastern and southern Australian coasts, being most common in northern Australia. The two main sites for the species in NSW are the Richmond River estuary and the Hunter River estuary. The latter has been identified as nationally and internationally important for the species. In Australia, has been recorded on coastal mudflats, lagoons, creeks and estuaries. Favours mudbanks and sandbanks located near mangroves, but may also be observed on rocky pools and reefs, and occasionally up to 10 km inland around brackish pools. Generally roosts communally amongst mangroves or dead trees, often with related wader species. There is no suitable habitat, the dams present within the site are small, isolated and degraded and are unlikely to provide habitat for the species. There are no NSW Bionet records of the species within a 10km search of the subject land. Due to the lack of suitable habitat, no further assessment is required.	Unlikely
Listed Marine Species				
Birds				
Apus pacificus	Fork-tailed Swift		In NSW, the Fork-tailed Swift is recorded in all regions. Many records occur east of the Great Divide, however, a few populations have been found west of the Great Divide. The Fork-tailed Swift is almost exclusively aerial, flying from less then 1 m to at least 300 m above ground and probably much higher. In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes. The sometimes occur above rainforests, wet sclerophyll forest or open forest or plantations of pines. There are three BioNet records of this species within 10 km of the Study Area, with one occurring close to the site. As the species is almost exclusively aerial there is potential that the species would fly over the subject land but unlikely that it would utilise the subject land. No further assessment required.	Unlikely

Appendix E EPBC Act Assessment of Significance

EPBC Listed Endangered Species

Koala - *Phascolarctos cinereus*	
Significant Impact Guideline	Assessment
Lead to a long-term decrease in the size of an important population of a species	Approximately 30.2 ha of potential habitat exists within the subject land. This is in the form of open forests PCT 1600 and PCT 1598, containing a mostly intact mature canopy and preferred feed trees suitable for the species. Approximately ## ha of vegetation of suitable open forest and woodland exists within the 1500m study area. Adjacent areas, (such as the lot to the northeast) contain a high abundance of foraging habitat and are zoned as such to be conserved. 449 records of Koalas occur within 10km of the Subject Site. It is unlikely Koalas visit this area due to fragmentation within the broader area and a lack of connectivity. The majority of OEH Bionet records are located further north or east toward Port Stephens, the number of records occurring closer to the site is minimal. It is unlikely the removal of vegetation within the subject land will lead to significant impacts to this species.
Reduce the area of occupancy of an important population	No. The subject land is unlikely visited by an important population. No important sub-populations of Koalas have been reported within the Maitland LGA, with a large Koala population occurring within the Port Stephens LGA with potential habitat starting to occur 10km east of the site.
Fragment an existing important population into two or more populations	No. The proposal will not create new points of fragmentation of areas identified as important habitat for the species. The proposal will decrease an already fragmented area of vegetation by ~24.65 ha. The reduction in potential foraging habitat will not impact dispersal and movement for the species.
Adversely affect habitat critical to the survival of a species	The proposal will impact up to 24.65 ha of potential foraging habitat for the species. Adjacent areas contain a high abundance of foraging habitat and are zoned as such to be conserved; therefore, it is unlikely the removal of vegetation within the subject land will lead to significant impacts to this species.
Disrupt the breeding cycle of an important population	No. The subject land is exclusively foraging habitat, therefore there is no risk to breeding cycle impacts.
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 impact up to 24.65 ha of potential foraging habitat for the species. The proposal will not modify, destroy, remove isolate, or decrease habitat to the extent that the species is likely to decline at a regional scale or local.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The subject land is likely already habitat for a range of pest species, including foxes (*Vulpes vulpes*) and rabbits (*Oryctolagus cuniculus*). The proposal is unlikely to alter the potential for impacts from these species.

Interfere with the recovery of the species.	The recovery plan takes focus on maintaining critical habitat such as extremely large patches on continuous vegetation. The proposal will not impact critical habitat due to the severity of fragmentation within the broader area. The scale of the proposed vegetation clearing is unlikely to interfere with the recovery of the species.
Conclusion	Non-significant impact

EPBC Listed Vulnerable Species

Brown Treecreeper - *Climacteris picumnus victoriae*	
Significant Impact Guideline	Assessment
Lead to a long-term decrease in the size of an important population of a species	Approximately 30.2 ha of potential habitat exists within the subject land. This is in the form of open forests PCT 1600 and PCT 1598, containing a mostly intact mature canopy suitable for the species. Adjacent areas, such as the lot to the northeast and to the west, contain a high abundance of potential breeding and foraging habitat. Only one record of Brown Treecreeper occurs within 10km of the subject land. The subject land is not located within a priority management site. The subject land has been subject to extensive fragmentation and provides poor connectivity. There are several hollow bearing trees within the subject land however, the species is known to avoid heavily degraded woodlands. Given the low number of records within the area and the condition of the vegetation within the subject land, it is unlikely the removal of vegetation within the subject land will lead to significant impacts to this species.
Reduce the area of occupancy of an important population	No. The subject land is unlikely visited by an important population.
Fragment an existing important population into two or more populations	No. The proposal will not create new points of fragmentation of areas identified as important habitat for the species. The proposal will decrease an already fragmented area of vegetation by 24.65 ha. The area of vegetation proposed to be removed will not impact dispersal and movement for the species.
Adversely affect habitat critical to the survival of a species	The proposal will impact up to 24.65 ha of potential habitat for the species. The proposal will retain a portion of vegetation within its design (northern boundary), enabling connectivity. Adjacent areas contain a high abundance of foraging habitat therefore, it is unlikely the removal of an already fragmented area within the subject land will lead to significant impacts to this species.
Disrupt the breeding cycle of an important population	No. No known breeding groups occur within a 10 km radius of the subject land with only one record occurring within approximately 5 km of the subject land. The species is usually observed in groups of 8-12 individuals and often occupy permanent territories, however, no individuals were observed during surveys. Therefore, the proposal is unlikely to disrupt the breeding cycle for the species.
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 impact up to 24.65 ha of potential habitat for the species. 30.3The proposal will not modify, destroy, remove isolate, or decrease habitat to the extent that the species is likely to decline at a regional scale or local.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The subject land is likely already habitat for a range of pest species, including foxes (*Vulpes vulpes*) and rabbits (*Oryctolagus cuniculus*). The proposal is unlikely to alter the potential for impacts from these species.

Interfere with the recovery of the species.	The recovery plan takes focus on maintaining critical habitat such as extremely large patches on continuous vegetation. The proposal will not impact critical habitat due to the severity of fragmentation within the broader area. The scale of the proposed vegetation clearing is unlikely to interfere with the recovery of the species.
Conclusion	Non-significant impact

***Dasyurus maculatus* (Spotted-Tail Quoll)**	
Significant Impact Guideline	Assessment
Lead to a long-term decrease in the size of a population	Approximately 24.65 ha of potential habitat exists within the subject land. This is in the form of vegetation community PCT 1600 and PCT 1598, which occurs in varying condition classes throughout. Approximately 6027 ha of suitable habitat in the form of Dry Sclerophyll Forests and Forested Wetlands exists within the 10 km buffer area. The subject land represents approximately 0.4% of the available habitat within this area. Extensive nocturnal surveys were completed across the site over two year, with no signs of species or breeding habitat detected over the period. Therefore, it is unlikely the proposal will lead to the long-term decrease of a population.
Reduce the area of occupancy of the species	No. The subject land is unlikely an reduce the occupancy of the species (see above).
Fragment an existing population into two or more populations	No. As discussed above, extensive surveys were conducted across the site and no evidence of the species was detected. The proposal will impact up to 24.65 ha of potential habitat for the species, this represents 0.4% of available habitat within 10 km of the subject land. The subject land is bordered to the east and west by C3 environmental management lands which is made up of continuous vegetation which is not being impacted by this proposal. The reduction in potential habitat will not largely impact dispersal and movement for the mobile species.
Adversely affect habitat critical to the survival of a species	The proposal will impact up to 24.65 ha of potential habitat for the species, this represents 0.4% of available habitat within 10 km of the subject land. No signs of the species or breeding habitat was detected during extensive targeted surveys. Therefore, it is unlikely the removal of 24.65 ha of potential habitat will adversely affect the survival of the species.
Disrupt the breeding cycle of a population	No. No signs of the species or breeding habitat was detected during extensive surveys. No burrows or dens were observed within the subject land. Therefore, the subject land is unlikely 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 impact up to 24.65 ha of potential habitat for the species, this represents 0.4% of available habitat within 10 km of the subject land. The proposal will not modify, destroy, remove isolate, or decrease habitat to the extent that the species is likely to decline at a regional scale or local.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The subject land is likely already habitat for a range of pest species, including foxes (*Vulpes vulpes*), rabbits (*Oryctolagus cuniculus*) and cats (*Felis catus*). The proposal is unlikely to alter the potential for impacts from these species.
Introduce diseases that may cause the species to decline	The proposal is not at risk of introducing disease. Mitigation and management of impacts (**Section 11**) strategies to avoid contamination risks.
Interfere with the recovery of the species.	The recovery plan takes focus on understanding the biology and ecology of the Spotted-tailed Quoll, and reducing impacts from exotic species and human activities. While the proposal is contributing to 24.65 ha of habitat loss, the species was not detected during the extensive surveys across the site. Therefore, the site is unlikely to serve as important habitat for the species and is unlikely to interfere with the recovery of the species.
Conclusion	Non-significant impact

***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	Approximately 24 ha of potential habitat exists within the subject land. This is in the form of vegetation community PCT 1600, which occurs in varying condition classes throughout. Approximately 4546 ha of suitable habitat in the form of Dry Sclerophyll Forests exists within the 10 km buffer area. The subject land represents approximately 0.5% of the available foraging habitat within this area. Although, the Study Area is identified as occurring within a Priority Management Area for this species, this area does not represent roosting habitat as no camps were detected during the surveys of the subject land. The subject land only represents foraging habitat. As such, the proposal is unlikely to impact the species leading to a long-term decrease in the size of the important population.
Reduce the area of occupancy of an important population	No. The subject land is unlikely to support an important population. The closest known active camp is located in Tenambit approximately 3.5 km north west of the site. The population is estimated to contain 500- 2499 individuals at a time. There is a nationally important flying fox camp that is located in Raymond Terrace approximately 10 km to the east of the site. The population within this camp is estimated to be between 16,000 and 49,999 individuals at a time. The subject land serves solely as foraging habitat for this population and as such will not reduce the occupancy of an important population.

***Pteropus poliocephalus* (Grey-headed Flying-Fox)**	**Vulnerable**
Significant Impact Guideline	Assessment
Fragment an existing important population into two or more populations	No, The proposal will remove up to 24 ha of foraging habitat for the species. The proposal will not substantially increase the overall fragmentation of habitat for the species and will not split an existing population into two or more populations as it is a highly mobile species that is widespread through the region.
Adversely affect habitat critical to the survival of a species	No, habitat within the Study Area is not considered critical to the survival of the species. The subject land is a managed rural land that represents foraging habitat for the species. Less fragmented vegetation occurs to the west and east of the land within the C3 zoned land, which is not being impacted by this proposal. The proposal will not adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population	No. There are no breeding roosts within the Study Area.
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 impact up to 24 ha of potential foraging habitat for the species, this represents 0.5% of available habitat within 10 km of the subject land. The proposal will not modify, destroy, remove isolate, or decrease habitat to the extent that the species is likely to decline at a regional scale or local.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The subject land is likely already habitat for a range of pest species, including foxes (Vulpes vulpes), rabbits (Oryctolagus cuniculus) and cats (Felis catus). The proposal is unlikely to alter the potential for impacts from these species.
Interfere substantially with the recovery of the species.	The recovery plan takes focus on maintaining critical habitat, primarily in the form of camp site. The proposal will not impact a camp site or day roost sites, solely foraging habitat. Given the highly mobile nature of the species and high-quality potential foraging habitat to the north of the site, it is unlikely the proposal will interfere with the recovery of the species.
Conclusion	Non-significant impact.

Appendix F Koala Assessment Report - SEPP (Biodiversity and Conservation) 2021

Koala Assessment Report - SEPP (Biodiversity and Conservation) 2021

1 Introduction

This Koala Assessment Report (KAR) has been prepared by MJD Environmental in association with a Biodiversity Development Assessment Report (BDAR) to accompany a Development Application for a subdivision over the land at Lot 32 DP 7788111, 173 McFarlanes Road, & Lot 31 DP778111, 507 Raymond Terrace Road, Chisholm, NSW, hereafter referred to as the 'subject land' (refer to **Figure 1**).

This assessment is to be assessed by Maitland City Council under Part 4 of the EP&A Act and forms part of a Biodiversity Assessment Report (BDAR).

1.1 Proposal Description

The Development Application seeks the approval for a residential subdivision and development, containing 211 residential lots. The proposal application seeks approval for the following works:

- Demolition of existing structures; two residential buildings and associated agricultural infrastructure/outbuildings;
- Site clearance of vegetation with the areas as indicated by the Plan of Proposal (Appendix A);
- Bulk earthworks to create level development pads for future construction;
- Creation of construction access and lay down area;
- Playground area and amenities;
- Internal road works, driveways etc;
- Associated drainage works, services and landscaping; and
- Access via McFarlanes Road and Raymond Terrace Road.

Project Context

The proposal intends to develop lots Lot 32 DP778111 and 31 DP778111 for the purposes of a residential subdivision containing up to 211 lots, over an area of approximately 30.20 ha. The proposal will retain up to 1.70 ha of native vegetation within the detailed design, with areas retained to incorporate a park space and a stand of forested vegetation along the northern boundary of the site. It is anticipated that the remainder of the two lots will be cleared, with some retention of individual trees were allowable based on final design. Noting that total loss is assumed in this assessment.

Refer to Appendix A of the associated BDAR for plans of the proposal.

1.2 Application of the SEPP

The Chapter 4 of the Biodiversity and Conservation SEPP 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 Subject land;
- the land contains trees listed under the Schedule 2 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 Biodiversity and Conservation SEPP 2021. In doing this, the KAR must address the stated key principles and their associated detailed criteria and assess the Subject land for its potential to be defined as 'Core Koala Habitat'.

1.4 Suitably Qualified Person

This report has been prepared by Ecologist Max Manion-Sharrock [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)*].

LOT 32 DP778111, LOT 31 DP778111, 173 MCFARLANES ROAD & 507 RAYMOND TERRACE ROAD, CHISHOLM

0 100 200 300 400

Metres

1:6000

FIGURE 1: SITE LOCATION

Legend

- Study Area
- Subject Land
- Cadastral Boundary

Riparian Corridor Width

- 20 m
- 40 m

Watercourse

- 1st Order Stream
- 2nd Order Stream

N W E S

MJD Environmental

Aerial: Nearmap (2023) | Data: MJD Environmental, ADW Johnson, NSW Spatial Services (2023) | Datum/Projection: GDA2020 / MGA zone 56 | Date: 22/05/2023 | Version: 1 | Z:\20039 - 173 Mcfarlanes Road, Chisholm | This plan should not be relied upon for critical design dimension.

2 Koala Assessment Report

2.1 Koala Habitat Value (criteria 1 and 2)

A review of the OEH BioNet Atlas using a search of the locality, revealed the Subject land, on which the proposed development is to occur, has no records occurring within 2.5 km in the last 18 years, and 449 historical Koala records within 10km to the Subject land.

Furthermore, Koala use tree species listed under Schedule 2 of the Biodiversity and Conservation SEPP 2021 occur within the development footprint and constitute at least 15% of the total number of trees in the upper stratum, therefore 'koala habitat' is present in accordance with the Biodiversity and Conservation SEPP 2021 definition.

2.1.1 Subject Land Description

The Subject land is situated on Lot 32 DP 7788111, 173 McFarlanes Road, & Lot 32 DP778111, 507 Raymond Terrace Road, Chisholm, NSW, zoned as R1 – General Residential, with a small area of RU2 – Rural Landscape within the north-western corner. The Subject land occurs wholly within the Sydney Basin Bioregion, within the Hunter subregion.

The Subject land is located ~3.2 km to the south of the Hunter River. There are no mapped watercourses present within the Subject land, with the exception of a portion of a 1st order stream which is mapped as crossing the north-western boundary of the Subject land. However, ground truthing of this watercourse identified only a low-lying area which across as a drainage which crosses into the neighbouring lot at an elevation of 4 m a.s.l.

The Subject land would have historically contained watercourses which have been dammed. The southern portion of the subject land contains a dam, the overflow of which connects to the neighbouring dam becoming a 1st order watercourse to the east. This water course connects a series of four dams across lots to the west and east, until connecting to a 2nd order watercourse off-site. This is functionally a tributary of Francis Greenway Creek to the south east; eventually joining the Hunter River.

Vegetation within the subject land exists both as regenerating woodland from historic clearance / logging in the southern lot and remnant mature canopy within grazed and managed paddocks. Canopy trees within the subject land vary from semi-young to mature (30 – 70 cm diameter at breast height [DBH]). Areas where non-native vegetation occurs in high abundance is present within the gullies and surrounding dams within the subject lands, likely due to less active land management and the increased moisture. This Subject land is currently actively grazed by domestic stock included cattle and horses.

Vegetation observed within the Subject land is characterised by an intact native canopy consisting of juvenile to mature trees predominantly made up of *Corymbia maculata* (Spotted Gum), *Eucalyptus fibrosa* (Broad-leaved Red Ironbark), *Eucalyptus umbra* (Broad-leaved White Mahogany), *Eucalyptus Acmenoides* (White Mahogany), and *Eucalyptus tereticornis* (Forest Red Gum).

Two PCTs were identified within the Subject land. All PCTs occur within the Hunter subregion of the Sydney Basin Bioregion. The identified PCTs are as follows:

- PCT 1598: *Forest Red Gum grassy open forest on floodplains of the Lower Hunter*
- PCT 1600: *Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box Shrub-grass open forest of the lower Hunter*

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 multiple occasions with Call playback being

completed over four nights in late-August 2021, and SAT searches being completed over two days in mid-January May 2022. Furthermore, addition call playback and secondary indication surveys were conducted during other threatened species surveys at the Subject land. The prevailing weather conditions during the surveys are presented in a **Table 1** below.

Table 1 Prevailing Weather Conditions

Date	Min Temp (°C)	Max Temp (°C)	Rain (mm)	Wind (km/h)	Sunrise-Sunset
24th August 2021	10.3	13.3	25.2	NNE 10 –N 20	0621-1731
25th August 2021	8.9	17	21.6	NW 26 – W 13	0618-1732
30st August 2021	6.8	20.9	0	WNW 15 – WNW 11	0612-1735
31st August 2021	3.4	24	0	NW 7 – NW 9	0611-1735
14th January 2022	17.9	29.6	0	NNE 9 – WNW 7	0500-1905
15th January 2022	17.8	34.0	0	SSW 9 – E 7	0501-1905
16th January 2022	17.7	30.6	10.6	NNW 9 – WSW 7	0502-1905
17th January 2022	19.9	33.4	0	NNE 7 – NE 6	0502 - 1904
18th January 2022	22	27.2	1	SSE19 – WSW 6	0504 - 1904

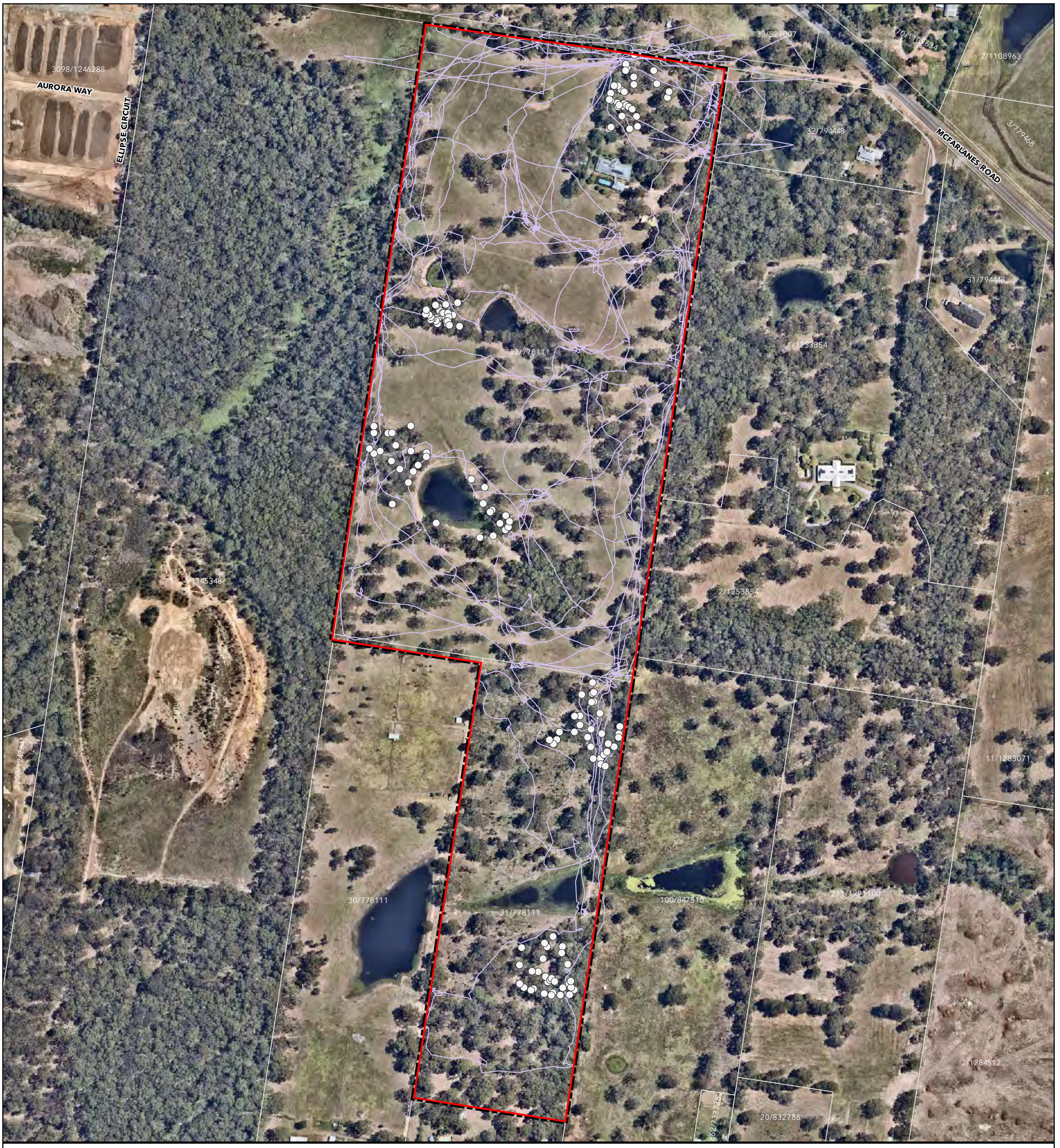
Sources: http://www.bom.gov.au/climate/dwo/IDCJDW0200.shtml

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 – Five (5) SAT searches (following Phillips and Callaghan 2011) were undertaken over the subject land within areas where Schedule 2 trees occur with more than 15% canopy cover on the 17th and 18th of January 2022. The standard method is 30 trees per 250 m x 250 m area (refer to **Figure 2**). In keeping with the survey guidelines, the local area had not experienced heavy rain in the three (3) days prior to the survey, or during survey time.
- Koala use trees present within the lubject land included *Eucalyptus fibrosa, Eucalyptus umbra, Eucalyptus tereticornis,* and *Corymbia maculata.*
- Nocturnal spotlighting was conducted over multiple nights during August of 2021; 25/08/2021, 25/08/2021 and 30/08/2021, 31/08/2021.
- In addition call play backs for the species were conducted during call play back survey works targeted a range of species. These were conducted between August and September 2021, dates as follows;
    - 19/08/2021
    - 24/08/2021
    - 25/08/2021
    - 26/08/2021
    - 30/08/2021
    - 31/08/2021
    - 1/09/2021
    - 2/09/2021
    - 3/09/2021
- During the SAT searches and nocturnal spotlighting, 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.
- No individuals or secondary indications were observed during these surveys.

During surveys of the subject land, there were no koala scratch marks displayed on trees within the site and no recent secondary indications such as belly rubs, loose fur or scats were detected. Despite presence of suitable habitat (through Koala use tree species), there was no recent evidence of Koala presence observed during targeted survey works.



LOT 32 DP778111, LOT 31 DP778111, 173 MCFARLANES ROAD & 507 RAYMOND TERRACE ROAD, CHISHOLM

0 60 120 180 240

Metres

1:3800

FIGURE 2: KOALA SAT & NOCTURNAL SEARCHES

Legend

- Study Area
- Subject Land
- Cadastral Boundary
- Survey Transects (Nocturnal)
- Koala SAT

N
W E
S

MJD Environmental

Aerial: Nearmap (2023) | Data: MJD Environmental, ADW Johnson, NSW Spatial Services (2023) | Datum/Projection: GDA2020 / MGA zone 56 | Date: 22/05/2023 | Version: 1 | Z:\20039 - 173 Mcfarlanes Road, Chisholm | This plan should not be relied upon for critical design dimension.

2.1.3 Subject land context

The subject land is situated within a fragmented rural landscape situated north east of Chisholm, within the Maitland LGA. The subject land provides connectivity to the broader patch of wooded vegetation however this is ultimately isolated; terminating at the residential development of Thornton to the south, Chisholm to the west, and heavily cleared agricultural lands to the north and east.

Forested areas occur directly to the east and west with C3 Environmental Management zoned lands abutting the subject land. Loss of native vegetation within the subject land resultant from the proposal will remove remnant canopy trees and regenerating cohort of forested community which will impact connectivity within the patch immediately surrounding the study area comprising of neighbouring forested lots. However, this patch is functionally isolated within the broader landscape of cleared agricultural land and surrounding industrial and residential development in the form of the suburbs of Maitland; Chisholm and Metford to the west, and Thornton to the south. Therefore, the proposal will impact habitat connectivity within the study area and areas immediately surrounding however this represents a functionally isolated patch, and the will not result in reduced habitat connectivity within the broader landscape or region. There have been no recorded koala sightings within 2.5 km of the area within the last 18 years (**Refer to Figure 3**); coupled with the small area, the subject land is not considered to serve an important ecological function for koalas, nor is it important to the recovery of the koala.

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

The proposed location of the development is situated on historically disturbed lands. The land immediately to the west is part of an environmental rehabilitation zone, lands to the south are historically disturbed lands similar to the Subject land that are a part of the larger subdivision proposed, and land to the east consists largely of managed native vegetation. The extent of the proposed development is relatively small, removing no more than 0.4 ha of native vegetation. The proposed development should not further impede the movement by Koalas across the landscapes or impact recovery and / or expansion of Koala populations.

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

2.3 Analysis of potential impacts (criteria 9)

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

- PCT 1598: *Forest Red Gum grassy open forest on floodplains of the Lower Hunter*
- PCT 1600: *Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box Shrub-grass open forest of the lower Hunter*

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 Subject land 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. Note that mitigation measures have been proposed within the BAR (MJD 2022) for the duration of construction period; 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 BAR (MJD 2022) for the duration of construction period.

LOT 32 DP778111, LOT 31 DP778111, 173 MCFARLANES ROAD & 507 RAYMOND TERRACE ROAD, CHISHOLM

0 100 200 300 400

Metres

1:6000

FIGURE 1: SITE LOCATION

Legend

- Study Area
- Subject Land
- Cadastral Boundary

Riparian Corridor Width

- 20 m
- 40 m

Watercourse

- 1st Order Stream
- 2nd Order Stream

N W E S

MJD Environmental

Aerial: Nearmap (2023) | Data: MJD Environmental, ADW Johnson, NSW Spatial Services (2023) | Datum/Projection: GDA2020 / MGA zone 56 | Date: 22/05/2023 | Version: 1 | Z:\20039 - 173 Mcfarlanes Road, Chisholm | This plan should not be relied upon for critical design dimension.

2.4 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).
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 land. If a koala is identified during construction, temporary suspension of works that might disturb the koala and / or prevent the koala 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 land. 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 *Phytophthora cinnamomi* or Exotic Rust Fungi to the Subject land, 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 the koala from moving itself to adjacent undisturbed habitat

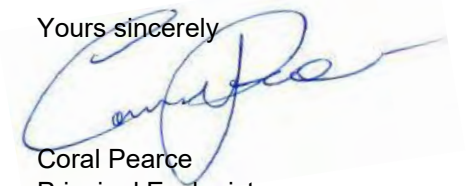
3 Conclusion

This Koala Assessment Report (KAR) has been prepared by MJD Environmental in association with a Biodiversity Development Assessment Report (BDAR) to accompany a Development Application for a subdivision over the land at Lot 32 DP 7788111, 173 McFarlanes Road, & Lot 31 DP778111, 507 Raymond Terrace Road, Chisholm, NSW. This assessment is to be assessed by Maitland City Council under Part 4 of the EP&A Act.

Owing to the lack of evidence of Koala use within the Subject land, the large extent of historical disturbance and the lack of recent Koala records within the locality, it is not considered necessary to prescribe monitoring / adaptive management plans or compensatory measures for the proposal. Connectivity of the Subject land within the wider area, is already heavily impacted with rural and residential interfaces to the north and south respectively creating hostile barriers for the movement of fauna through the Subject land. The conservation corridor immediately to the west of the site would provide better connectivity and an ability for any Koala's present to move through the surrounding landscape.

We trust this is sufficient for your purposes, however, should you require any further information or clarification, please do not hesitate to contact Max Manion-Sharrock (Ecologist) or the writer.

Yours sincerely



Coral Pearce
Principal Ecologist
MJD Environmental

4 References

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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 www.legislation.nsw.gov.au

State Environmental Planning Policy (Koala Habitat Protection) 2021 www.legislation.nsw.gov.au

Appendix G Anabat Recording Results

Identification of echolocation call sequences recorded at Chisolm, Maitland, New South Wales.

Data

Data was received by email via share drive on the 26/11/2021 and was analysed using Anabat Insight v1.9.9. In total data from five locations was received containing a total of 12,638 Anabat sequence files, 8,628 of which were, marked as containing recognisable microbat calls, by the use of a filter (please see below). Filtering is a done as a first pass and subsequently, all files were manually viewed.

The data was recorded from the 1st – 16th of November 2021, results per site are presented in Table 1.

Calls were recorded with a division ratio of 8. The original call files display Australian Eastern Standard Time.

Reference Library

Call identification for this data set was based on call keys and descriptions for New South Wales (Pennay et al 2004) with reference to descriptions published for southern Queensland (Reinhold et al 2001), and the authors own library.

Analysis

The reliability of identification is as follows:

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

Probable; most likely to be the species named, low probability of confusion with species that use similar calls

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

The filter (All Bats) used in this analysis used particular parameters set to include recordings that pass certain criteria including smoothness, duration and characteristic frequency. The filter is a generalised filter that includes parameters suitable for the microbat species of Australia (Titley, 2009). 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.

Table 1. Species identification per detector location.

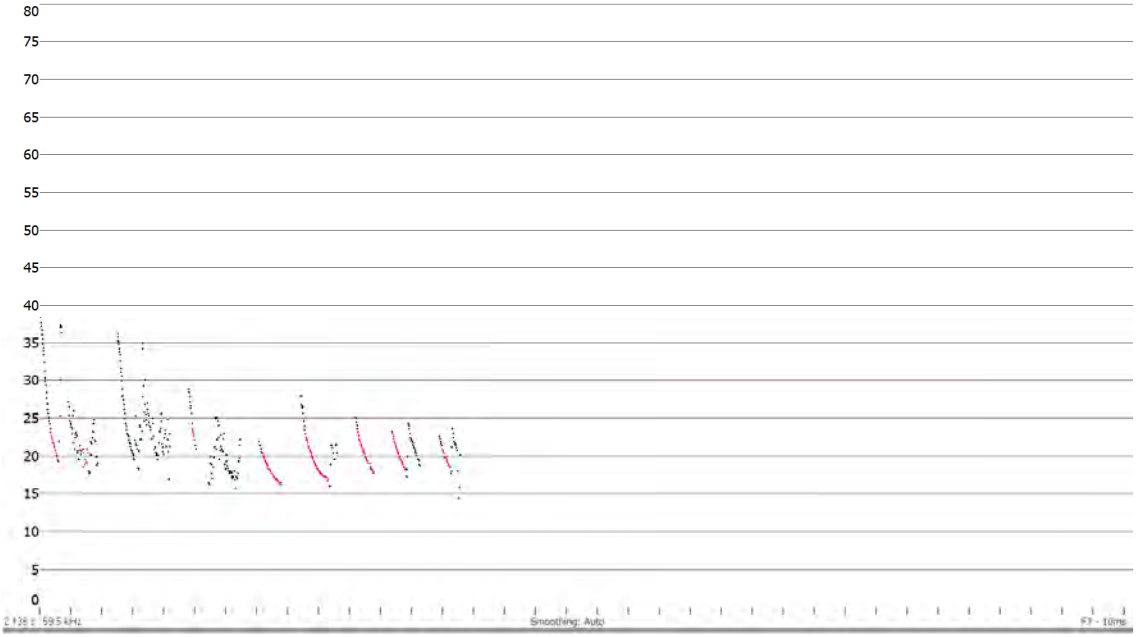
	Anabat 1			Anabat 2	
	Location 1	Location 2	Location 3	Location 1	Location 2
Dates	01/11/2021 - 07/11/2021	08/11/2021 - 09/11/2021	10/11/2021 - 16/11/2021	01/11/2021 - 09/11/2021	10/11/2021 - 15/11/2021
Total Files	3,096	815	4,136	1,746	2,845
Marked files (passed filter)	2,053	805	2,600	1,662	1,508
Species					
Austronomus australis	X	X	X	X	X
Saccolaimus flaviventris		*		*	
Micronomus norfolkensis	X	X	X	X	X
Ozimops ridei	X	X	X	X	X
Chalinolobus gouldii	X	X	X	X	X
Ozimops spp./*C. gouldii*	#		#	#	#
Ozimops ridei/Scoteanax rueppellii	#	#	#	#	#
Scoteanax rueppellii/Scotorepens orion/Falsistrellus tasmaniensis	#	#	#	#	#
Scoteanax rueppellii			#		
Scotorepens orion	X	#	X	X	
Falsistrellus tasmaniensis	X	#	X	X	
Falsistrellus tasmaniensis/Scotorepens orion	#	#	#		
Vespadelus darlingtoni/Scotorepens sp.	#			#	
Miniopterus orianae oceanensis	X	X	X	X	X
M. o. oceanensis /Vespadelus regulus	#		#		
Vespadelus regulus	X				
Myotis macropus	#	#	#	#	
Myotis macropus/Nyctophilus spp.	#	#	#	#	#
Vespadelus vulturnus/V. troughtoni/V. pumilus	#		#	#	#
Chalinolobus morio	X	X	X	X	X
Chalinolobus morio/V. pumilus/V. troughtoni/V. vulturnus	#	#	#	#	
Miniopterus australis/Vespadelus pumilus	#	#			
Miniopterus australis	X	X	X	X	X

X - Definite
- Probable
* - Possible

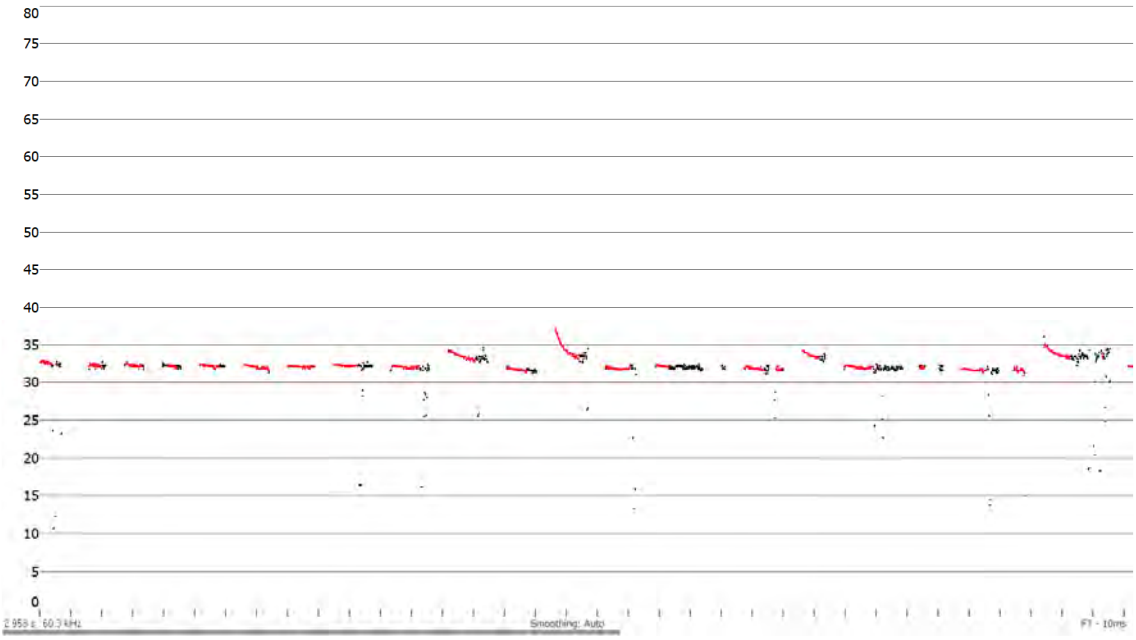
Call Examples (calls have been edited and filtered for reporting purposes)

Section 1.

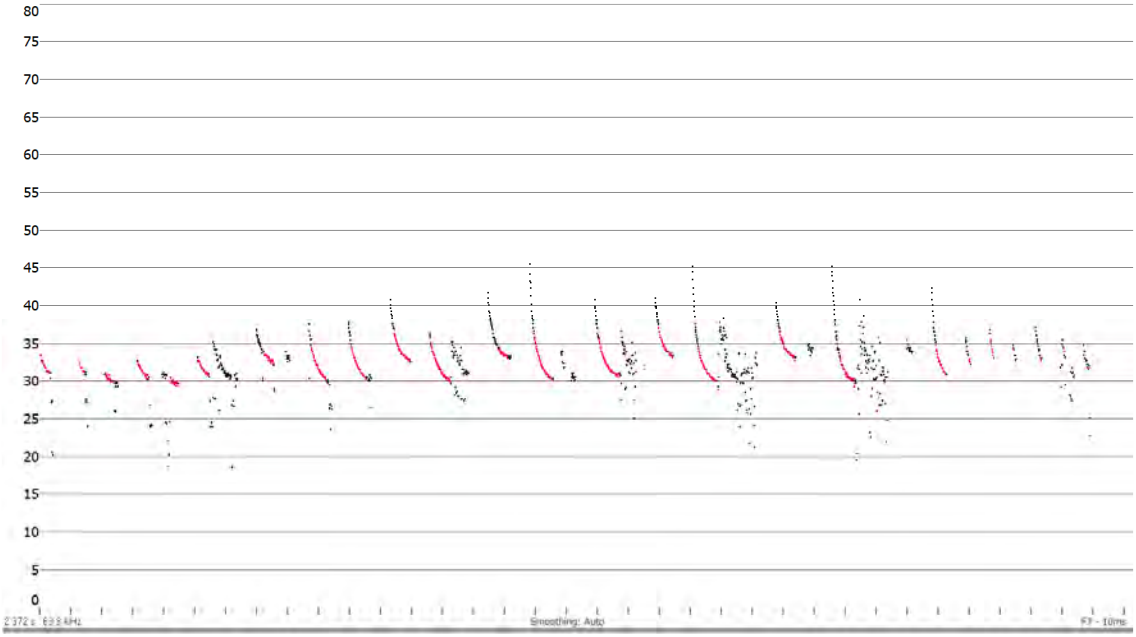
Species positively identified



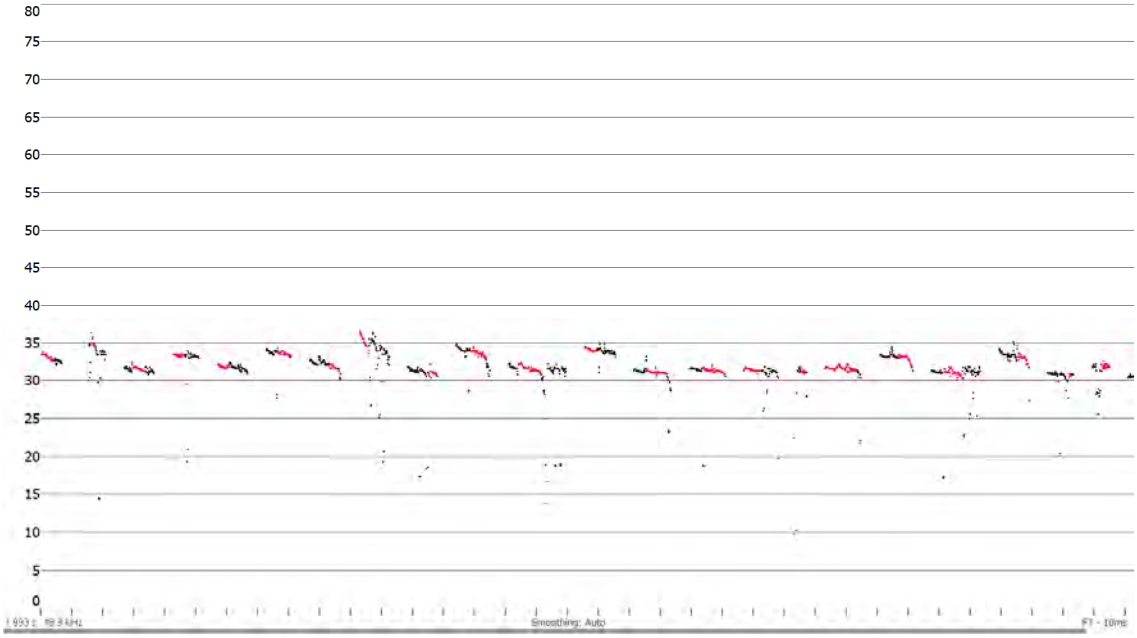
Definitely *Austronomus australis*. The characteristic frequency if this species is between 10 – 15 kHz. This species may be confused with *Saccolaimus flaviventris* at its lower harmonics.



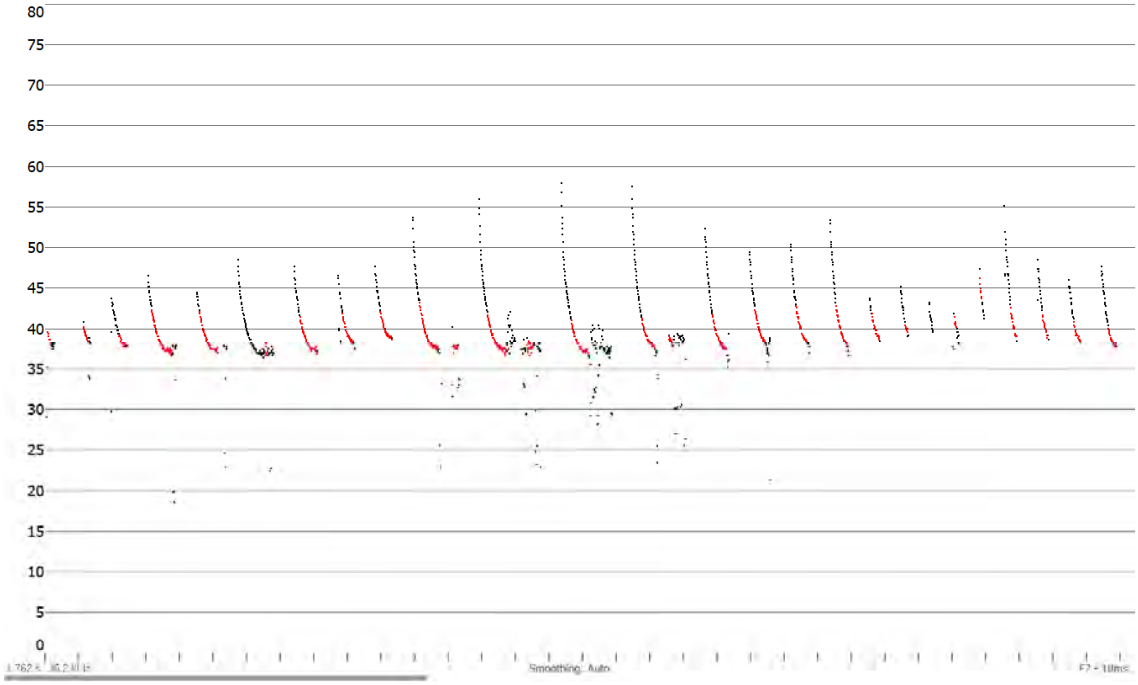
Definitely *Ozimops ridei*. The species calls between 31 – 36 kHz (Pennay, Law & Reinhold 2004).



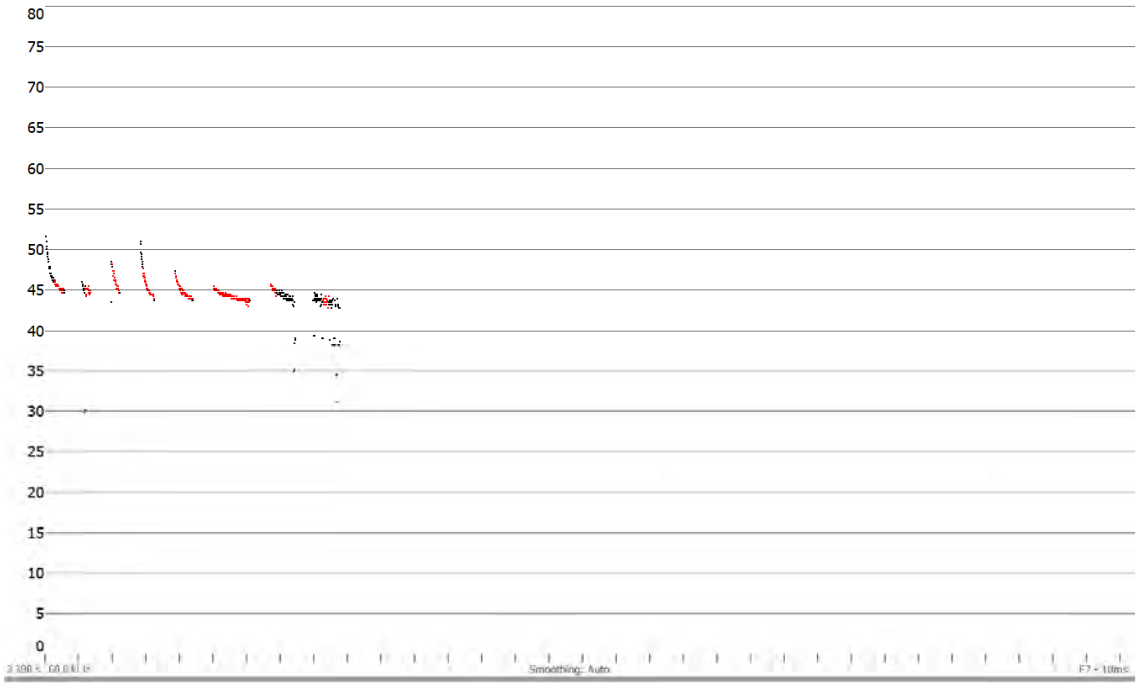
Definitely *Chalinolobus gouldii*. The call sequence is curved average characteristic frequency is between 25 and 34 KHz. Consecutive pulses alternate in frequency.



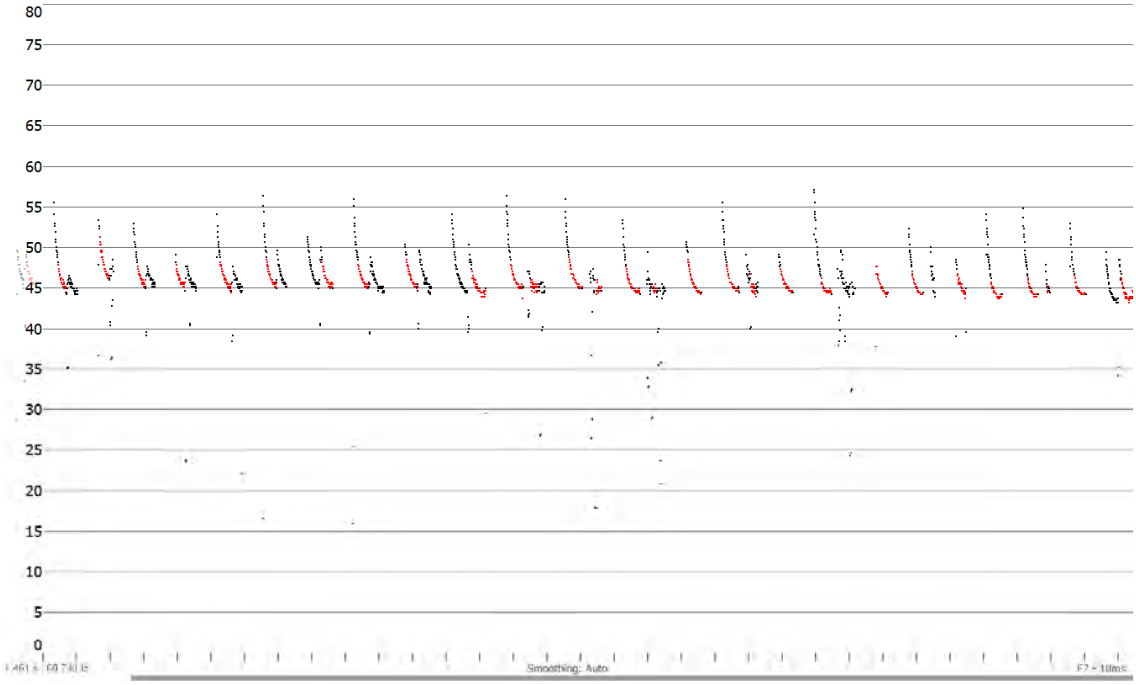
Definitely *Micronomus norfolkensis*. The pulses area indicative of the species, and alternation is evident in this call sequence.



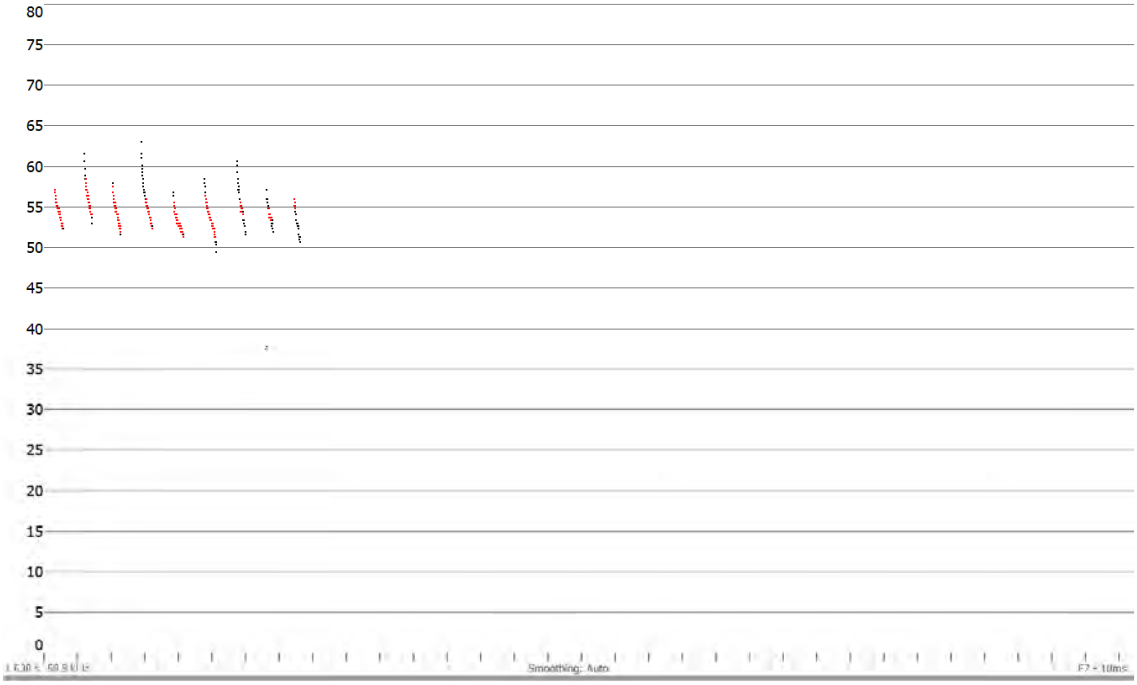
Definitely *Falsistrellus tasmaniensis*. The species exhibit steep pulses with a characteristic frequency between 35 – 39 kHz in this region. Calls in this sequence consistently displayed a drop in frequency of the pre – characteristic section greater than 3kHz.



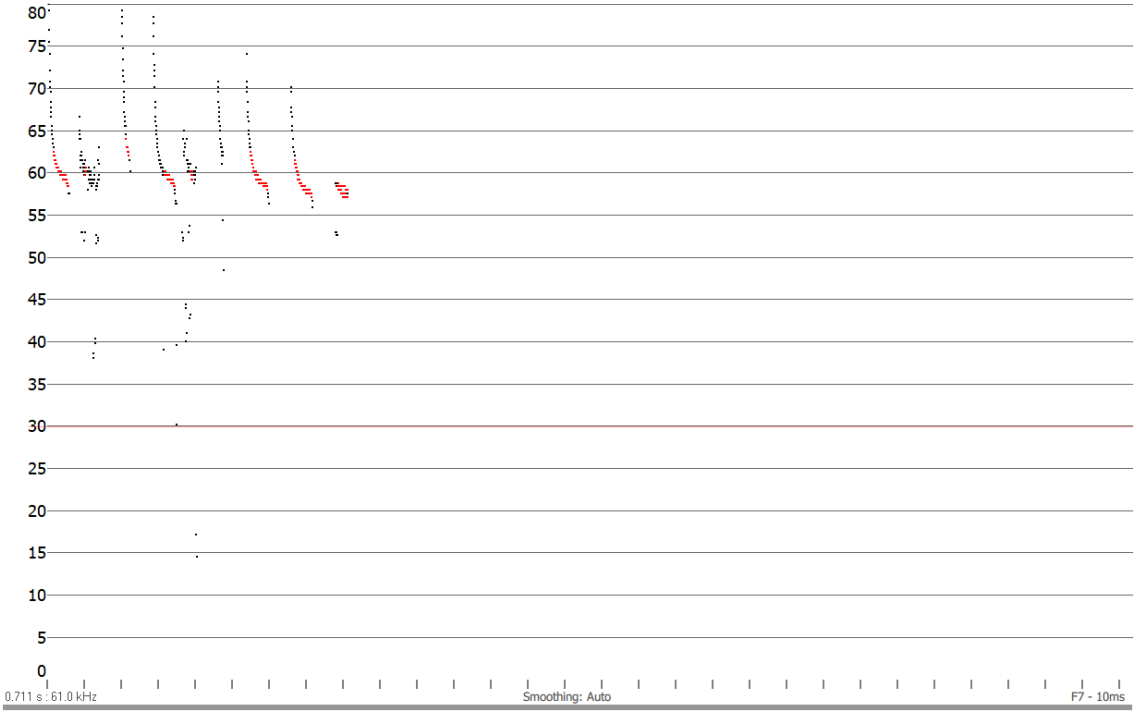
Definitely *Miniopterus orianae oceanensis*. The species has a characteristic call between 44.5 – 48 in this region, with pulses that display a down sweeping tail (Pennay, Law & Reinhold 2004).



Definitely *Vespadelus regulus*. The species displays a characteristic frequency between 45 – 47 kHz in this region. Calls at this frequency overlap with *Miniopterus orianae oceanensis*.



Definitely *Chalinolobus morio*. The species can be distinguished by a down sweeping tail.

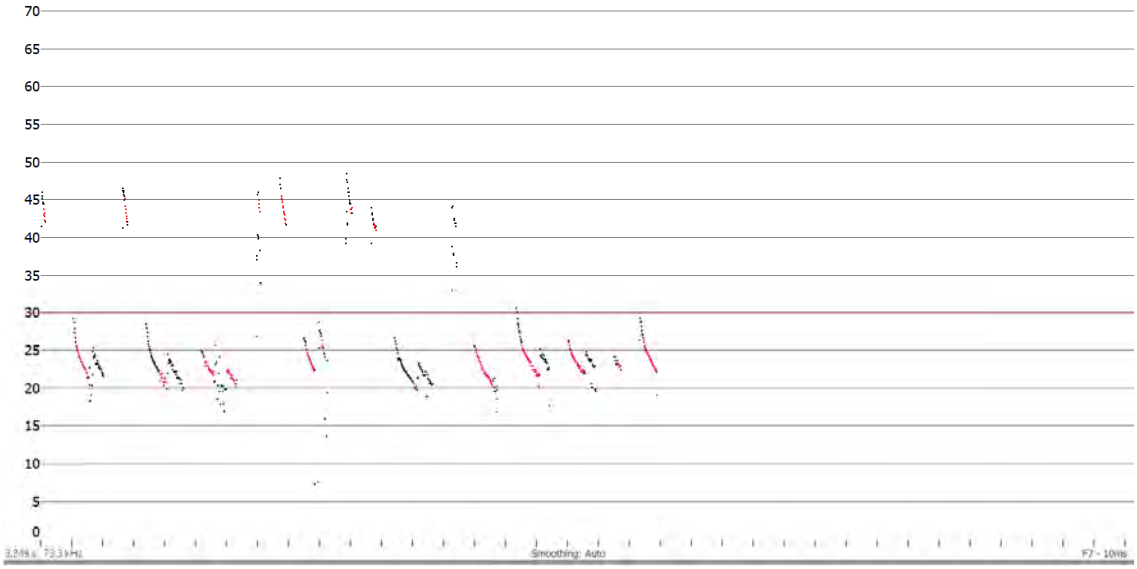


Definitely *Miniopterus australis.* The characteristic frequency and the down sweeping tail are indicative of this species.

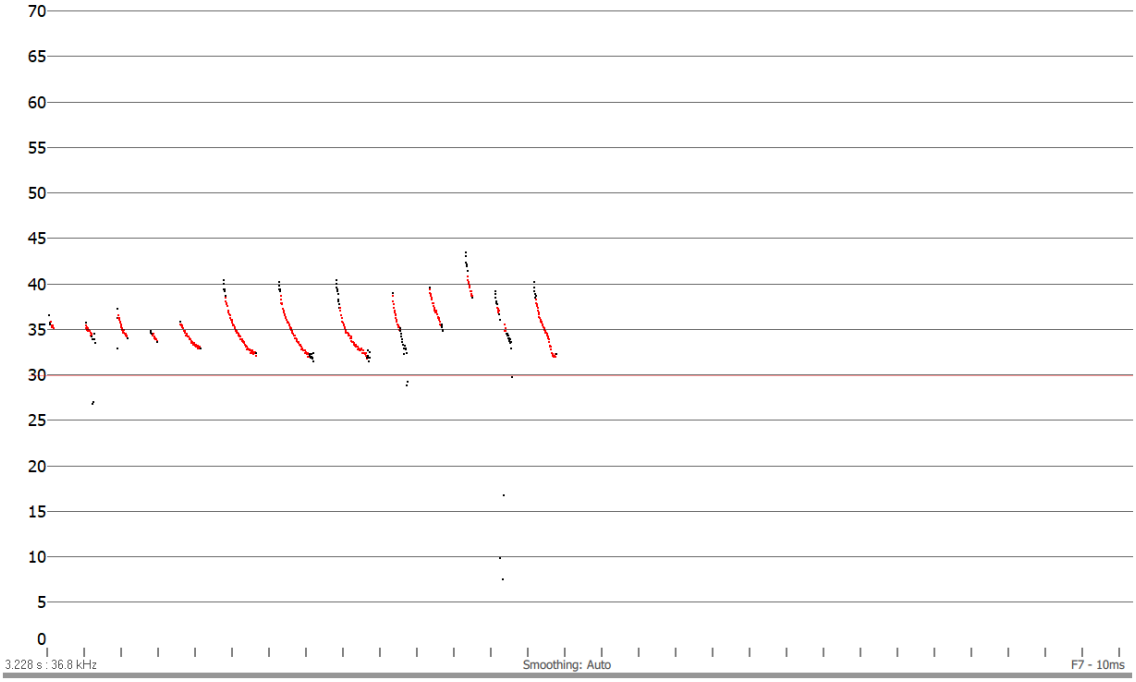
Section 2.

Species composites/groups identified.

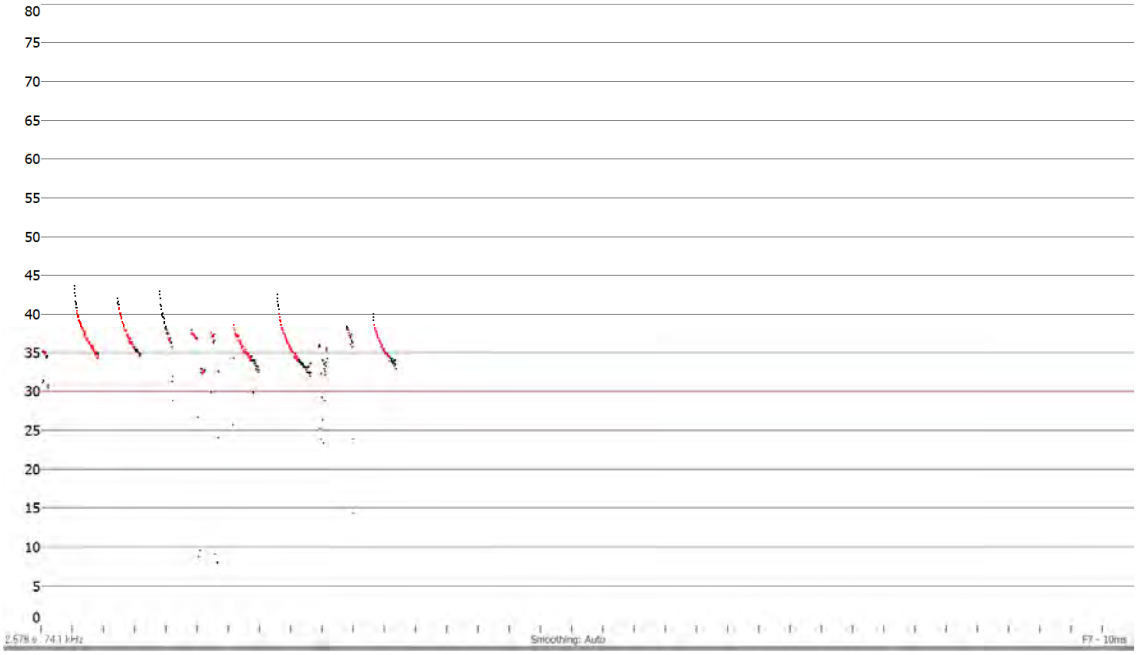
A species listed here that is not also listed in the species positively identified should be considered as present. Likelihood of occurrence and call identification issues for these species are discussed below each call example.



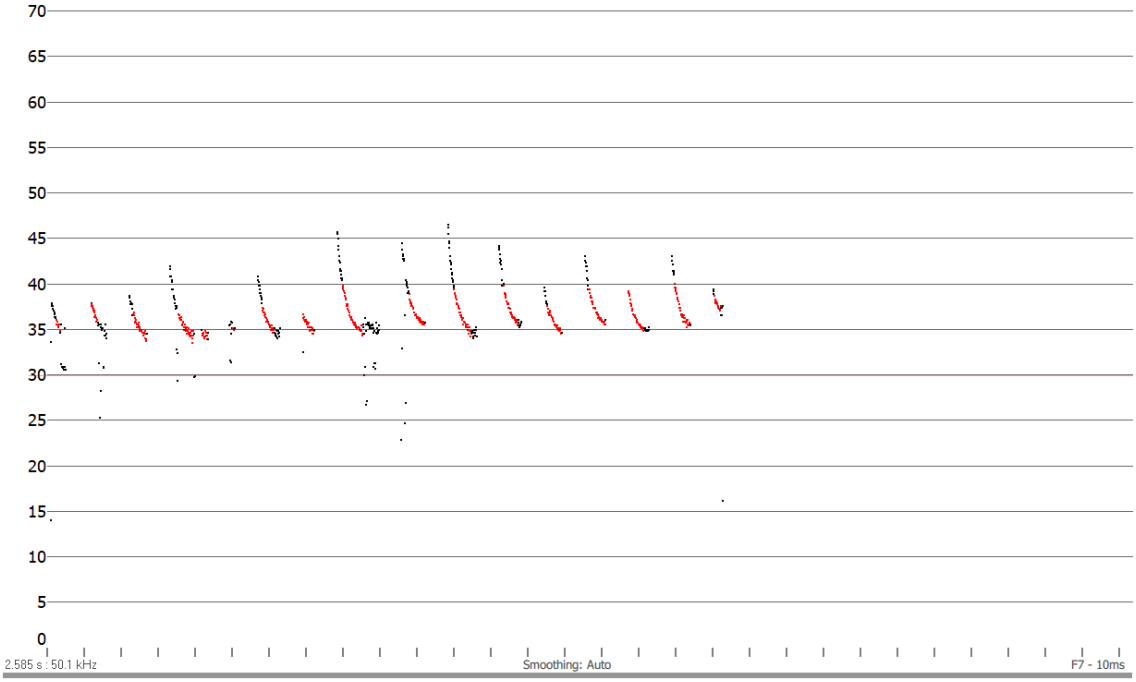
Possibly *Saccolaimus flaviventris*. The species has a characteristic frequency of 17.5 – 19 kHz in this region. These calls are steep, and 'erratic' and could be social calls of another unidentified species.



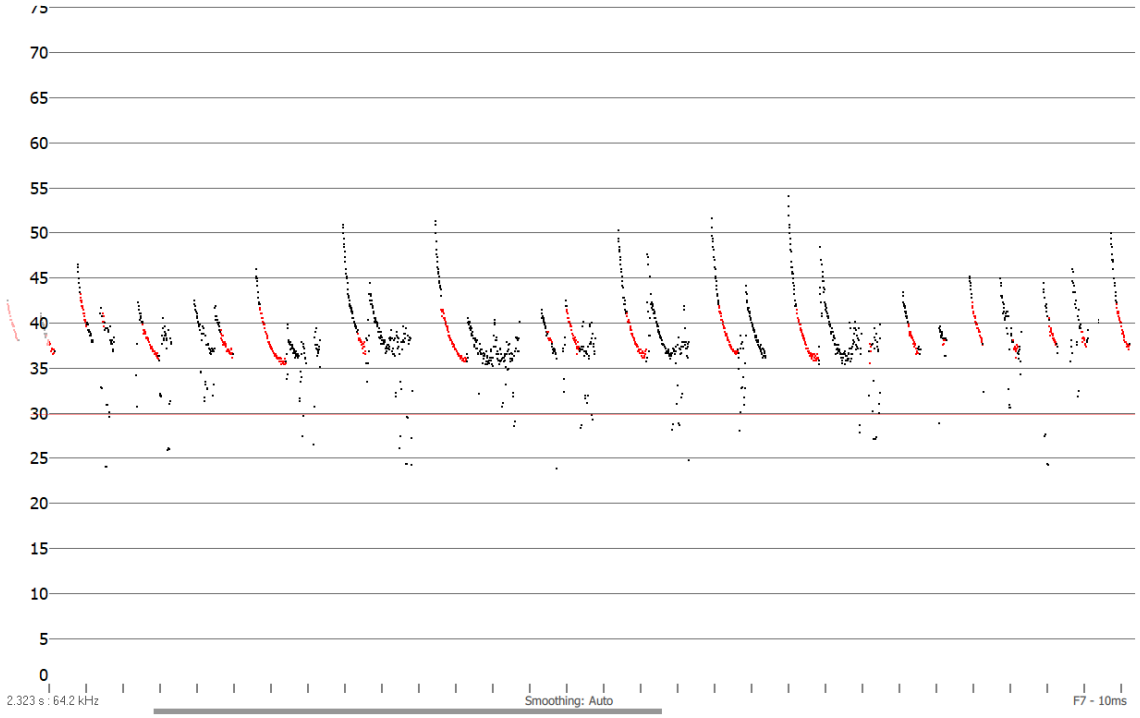
Probably *Ozimops spp./Chalinolobus gouldii*. Frequency ranges of these species C. gouldii usually has steep, curved pulses that alternate in frequency compared to flat or shallow-curved pulses with no alternation in *Ozimops* species.



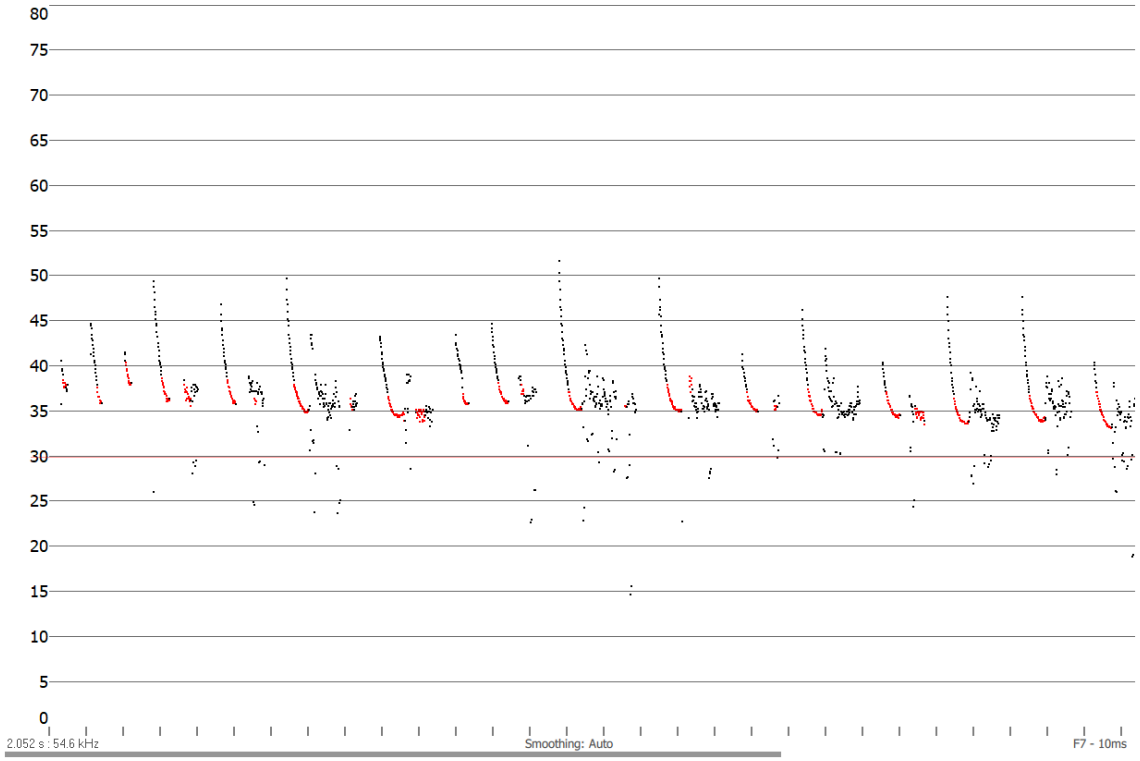
Probably *Ozimops ridei/Scoteanax rueppellii*. There is insufficient detail in this call to assign species identification, the species overlap at this frequency.



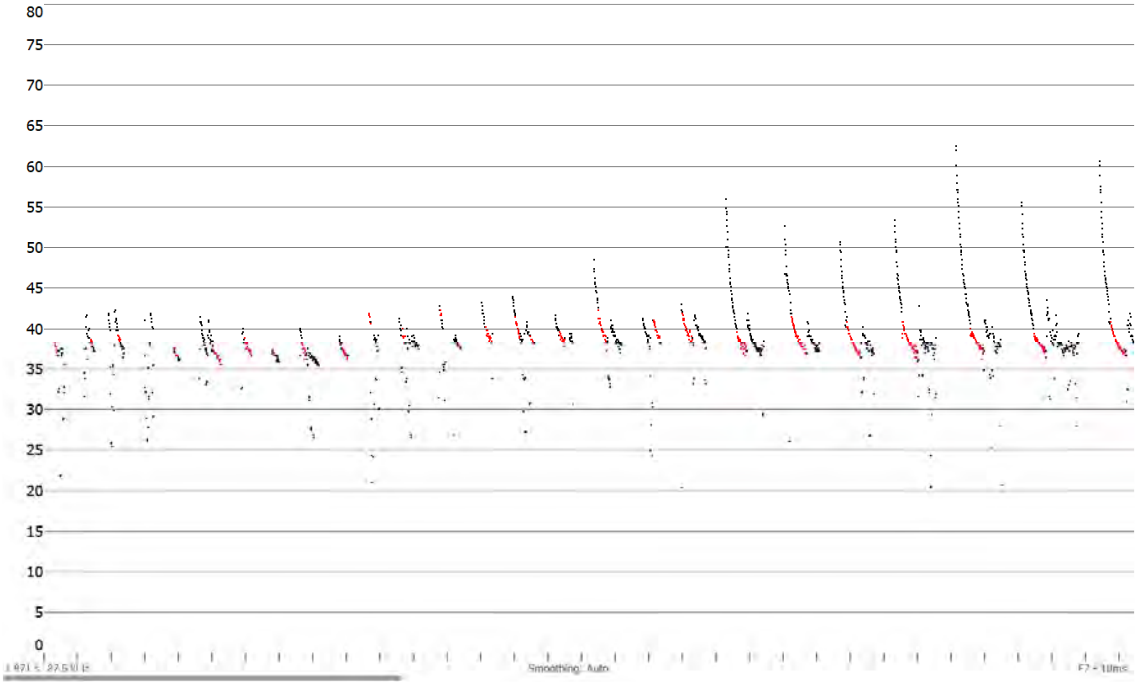
Probably *Scoteanax rueppellii/Scotorepens orion/Falsistrellus tasmaniensis*. These species overlap at approximately 35 kHz. There is insufficient detail, or shape definition to assign a positive identification and so a species complex has been assigned.



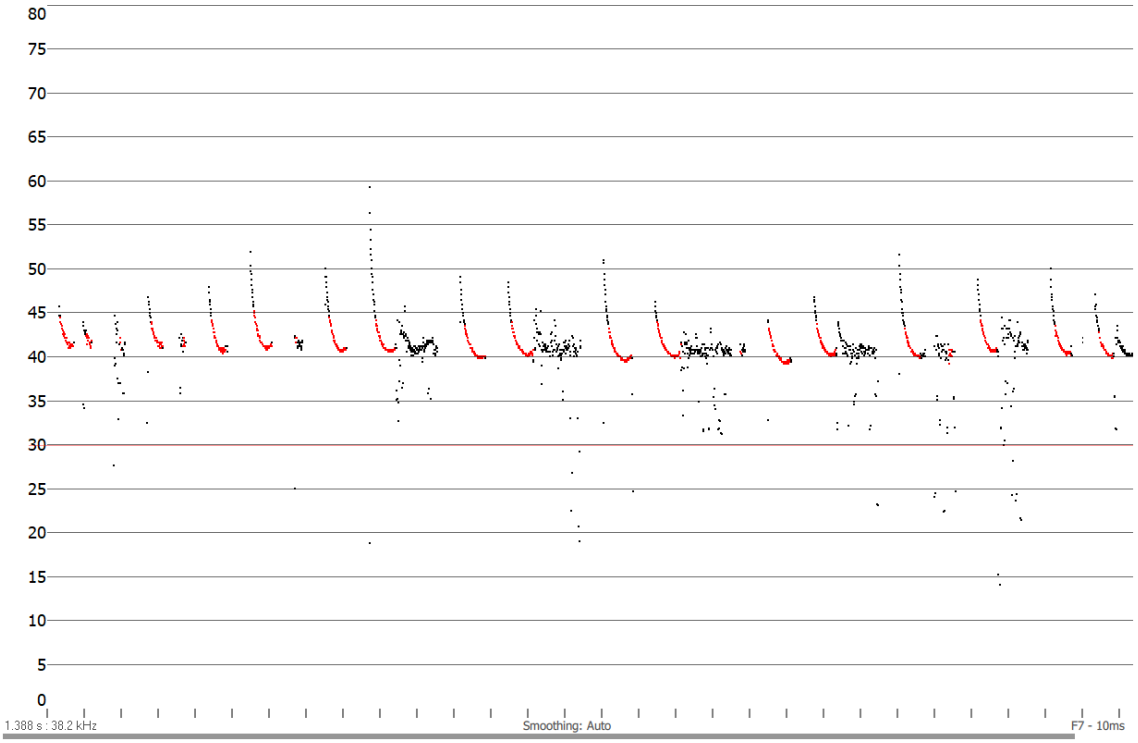
Probably Scoteanax rueppellii. The average characteristic frequency of this call sequence is between 33- 36 kHz, with the frequency of the knee greater 37kHz, the drop over the pre - characteristic section being consistently more than 3 kHz.



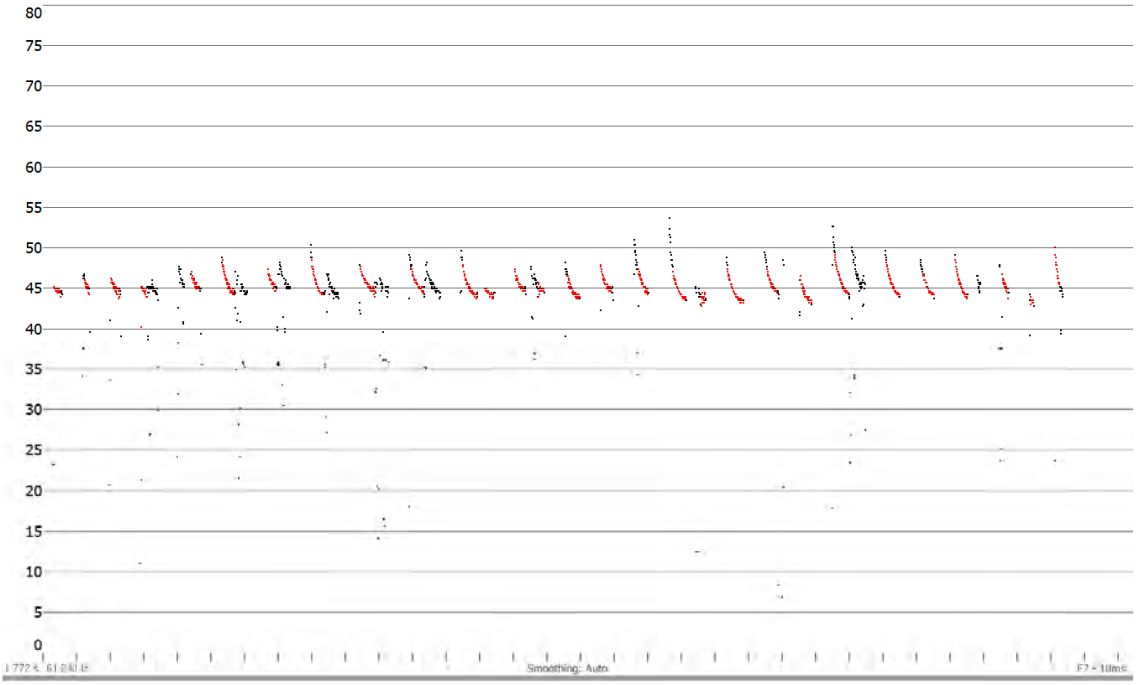
Probably *Scotorepens orion*. The drop in frequency over the pre – characteristic section is less than 3 (ranging from ~1.6 – 2.7 kHz), and a 'hook' at the end of the tail which is suggestive of the species.



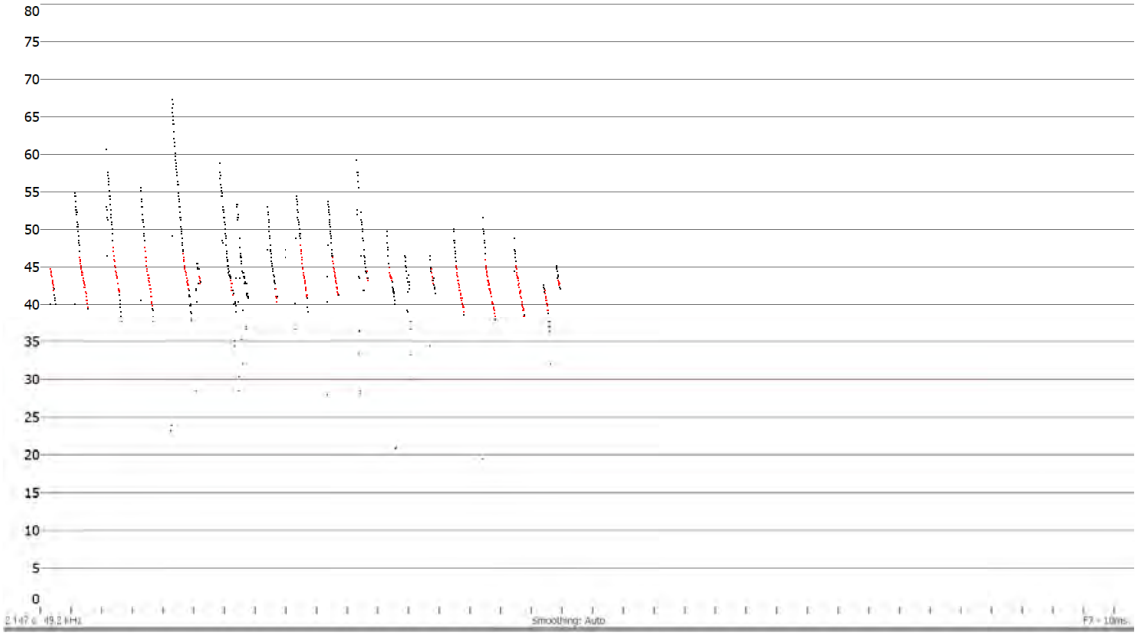
Probably *Falsistrellus tasmaniensis/Scotorepens orion*. These species have calls that overlap above 35 kHz in this region.



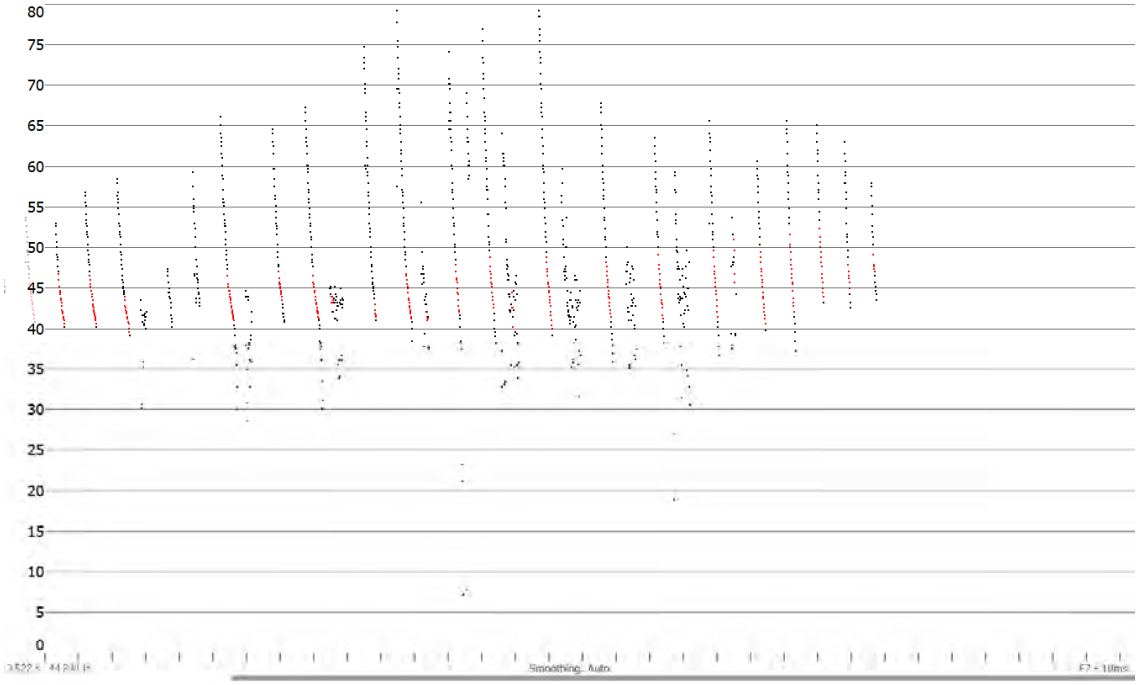
Probably *Vespadelus darlingtoni/Scotorepens* species. The species overlap at this frequency, in this region.



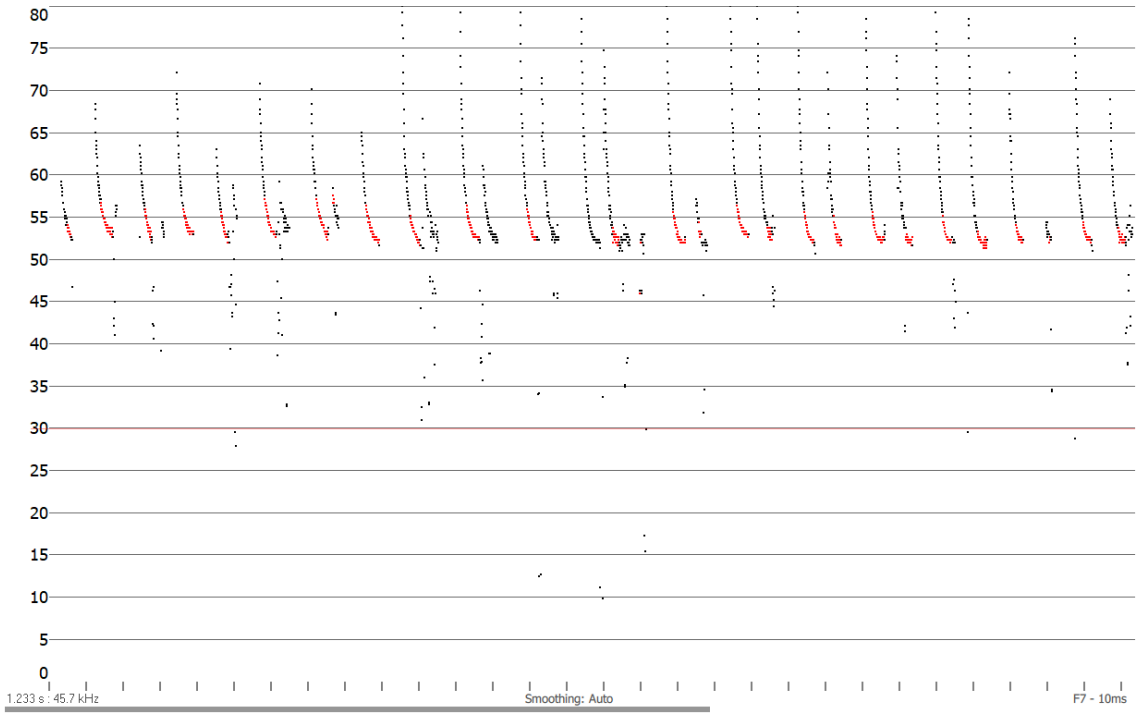
Probably *Miniopterus orianae oceanensis/Vespadelus regulus*. These species overlap between 44 –47 kHz in the North East region (Pennay et al., 2004).



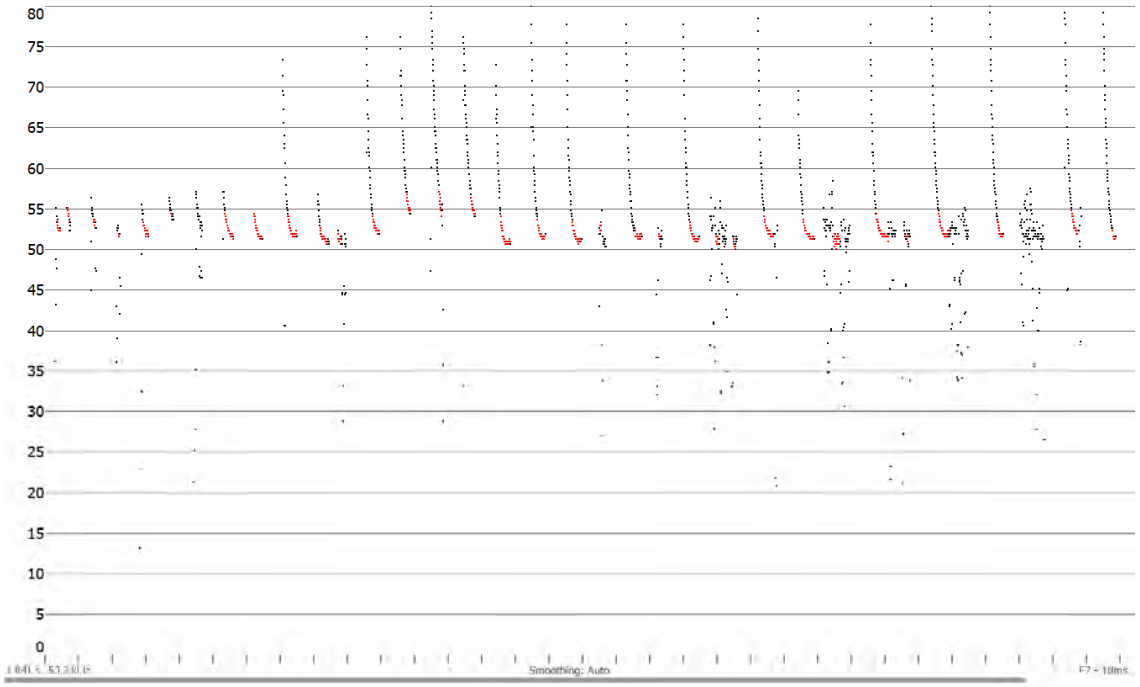
Probably *Myotis macropus*. The pulses in this call sequence are suggestive of M. *macropus*. A description of the site provided with the dataset indicate that habitat suitable for foraging is present for this species.



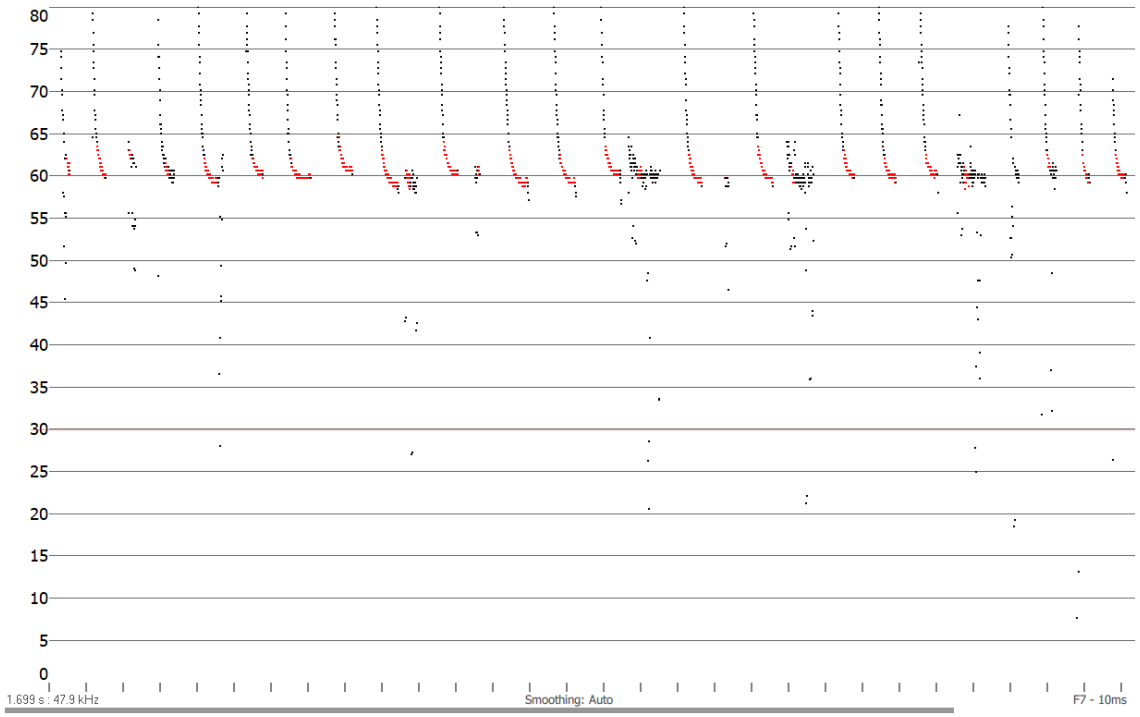
Probably *Myotis macropus/Nyctophilus species*. *M. macropus* calls can be differentiated from Nyctophilus species by having a pulse interval less than 75ms, an initial slope of greater than 400 OPS and often displaying a single change in slope (kink) in the central part of the pulse. There is insufficient detail in the call sequence to separate the species. *Nyctophilus* bats generally produce distinctive calls, however the species within the genus cannot be reliably differentiated from call data.



Probably *Vespadelus species/Chalinolobus morio*. The species overlap at approximately 50kHz. The shape of the pulses, indicate clutter calls and definition in the tail section necessary to separate the species is not present.



Probably *Vespadelus troughtoni/Vespadelus vulturnus/ Vespadelus pumilus*. The species overlap at this frequency in this region (Pennay, Law & Reinhold 2004).



Probably *Miniopterus australis/Vespadelus pumilus*. Calls in this sequence are suggestive of either species so a species complex has been assigned.

References

Churchill, S. (2008) Australian Bats, Allen and Unwin, Sydney.

Pennay, M., & Lavery, T. (2017). Identification guide to bat echolocation calls of Solomon Islands and Bougainville.

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

Reardon T. B., McKenzie N. L., Cooper S. J. B., Appleton B., Carthew S. & Adams M. (2014) A molecular and morphological investigation of species boundaries and phylogenetic relationships in Australian free-tailed bats Mormopterus (Chiroptera : Molossidae). Australian Journal of Zoology 62, 109-36.

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

Disclaimer

Identification of echolocation call sequences recorded at Chisolm, Maitland, New South Wales.

Data

Data was received by email via share drive on the 26/11/2021 and was analysed using Anabat Insight v1.9.9. In total data from five locations was received containing a total of 2,845 Anabat sequence files, 1,508 of which were, marked as containing recognisable microbat calls, by the use of a filter (please see below). Filtering is a done as a first pass and subsequently, all files were manually viewed.

The data was recorded from the 10th – 15th h of November 2021, results are presented in Table 1.

Calls were recorded with a division ratio of 8. The original call files display Australian Eastern Standard Time.

Reference Library

Call identification for this data set was based on call keys and descriptions for New South Wales (Pennay et al 2004) with reference to descriptions published for southern Queensland (Reinhold et al 2001), and the authors own library.

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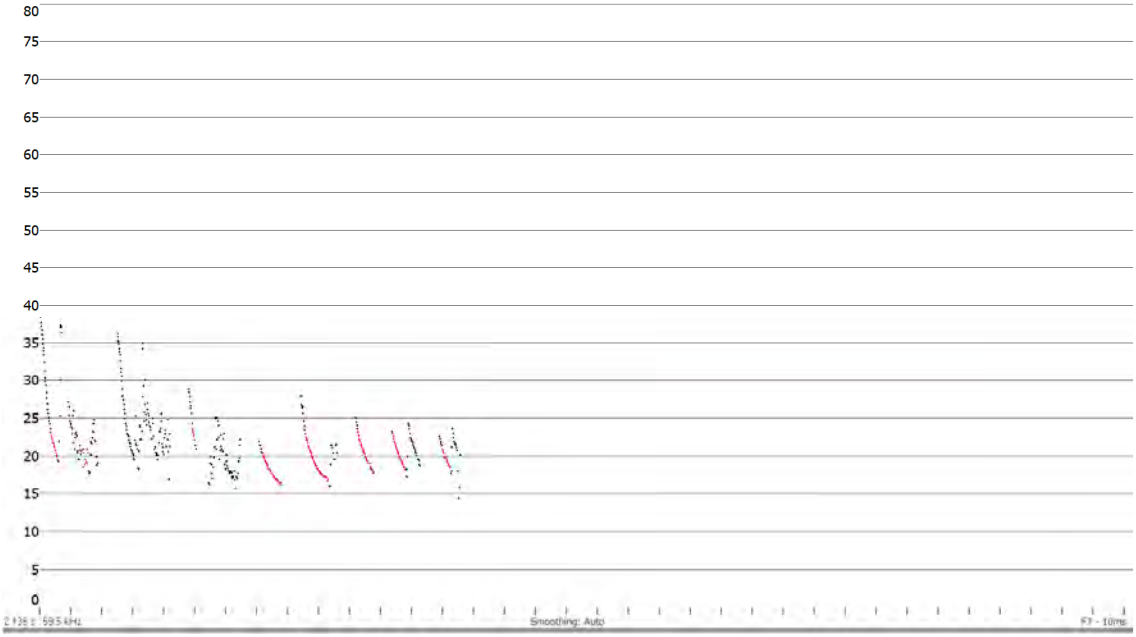
Table 1. Species identification per detector location.

	Anabat 2
Dates	10/11/2021 - 15/11/2021
Total Files	2,845
Marked files (passed filter)	1,508
Species	
Austronomus australis	X
Micronomus norfolkensis	X
Ozimops ridei	X
Chalinolobus gouldii	X
Ozimops spp./*C. gouldii*	#
Ozimops ridei/Scoteanax rueppelli	#
Scoteanax rueppellii/Scotorepens orion/Falsistrellus tasmaniensis	#
Miniopterus orianae oceanensis	X
Myotis macropus/Nyctophilus spp.	#
Vespadelus vulturnus/V. troughtoni/V. pumilus	#
Chalinolobus morio	X
Miniopterus australis	X

Call Examples (calls have been edited and filtered for reporting purposes)

Section 1.

Species positively identified



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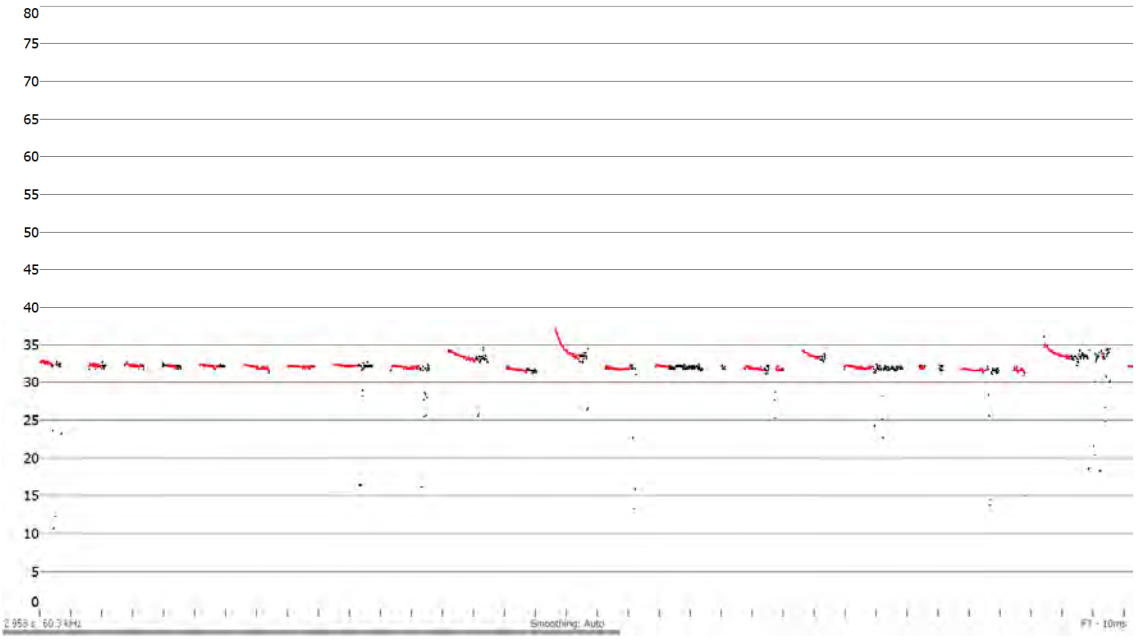
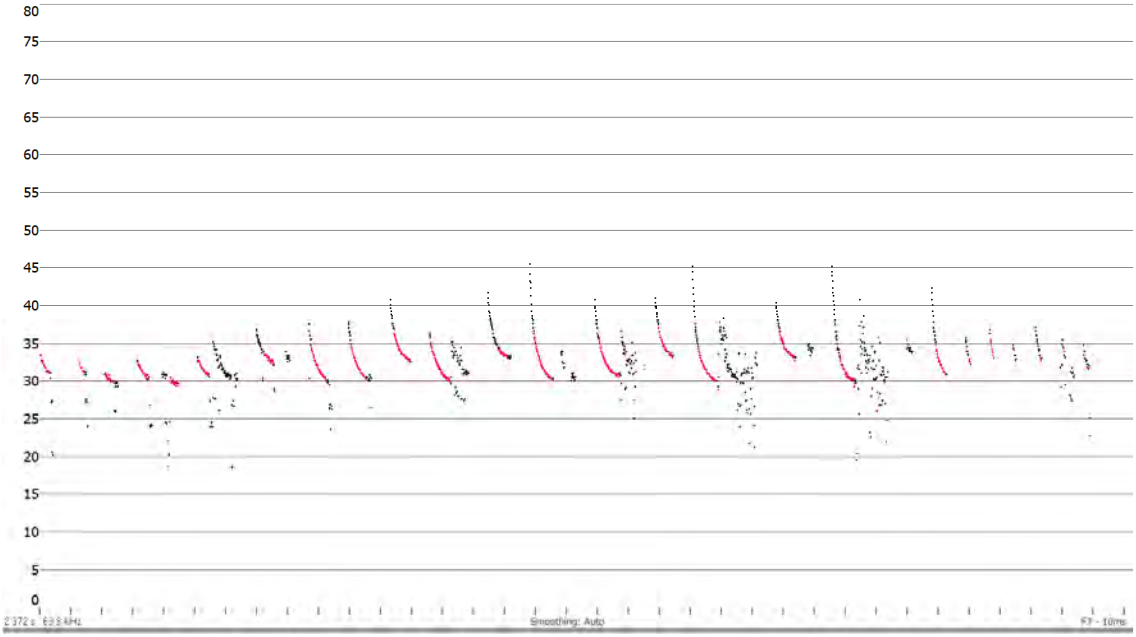


Definitely *Ozimops ridei*. The species calls between 31 – 36 kHz (Pennay, Law & Reinhold 2004).



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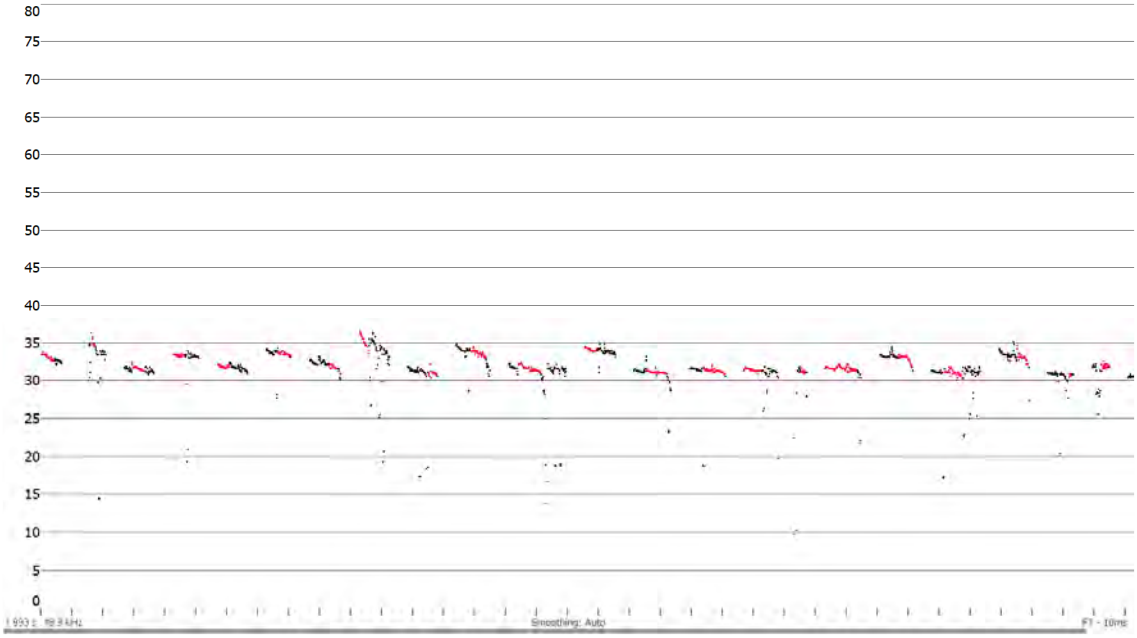

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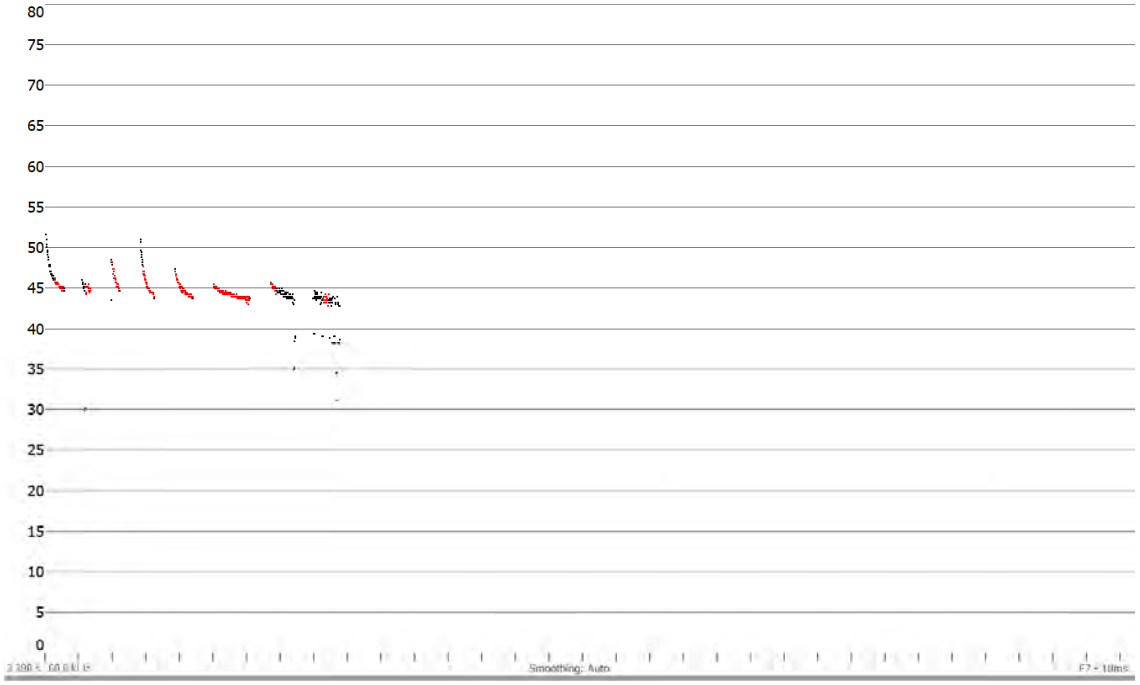
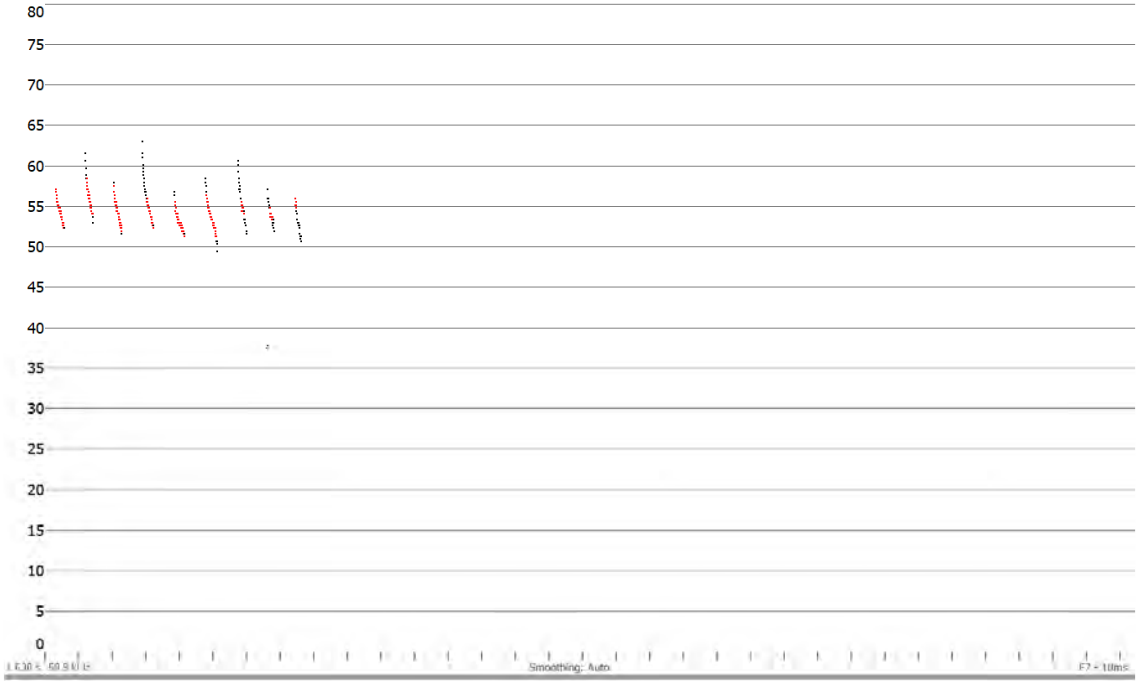
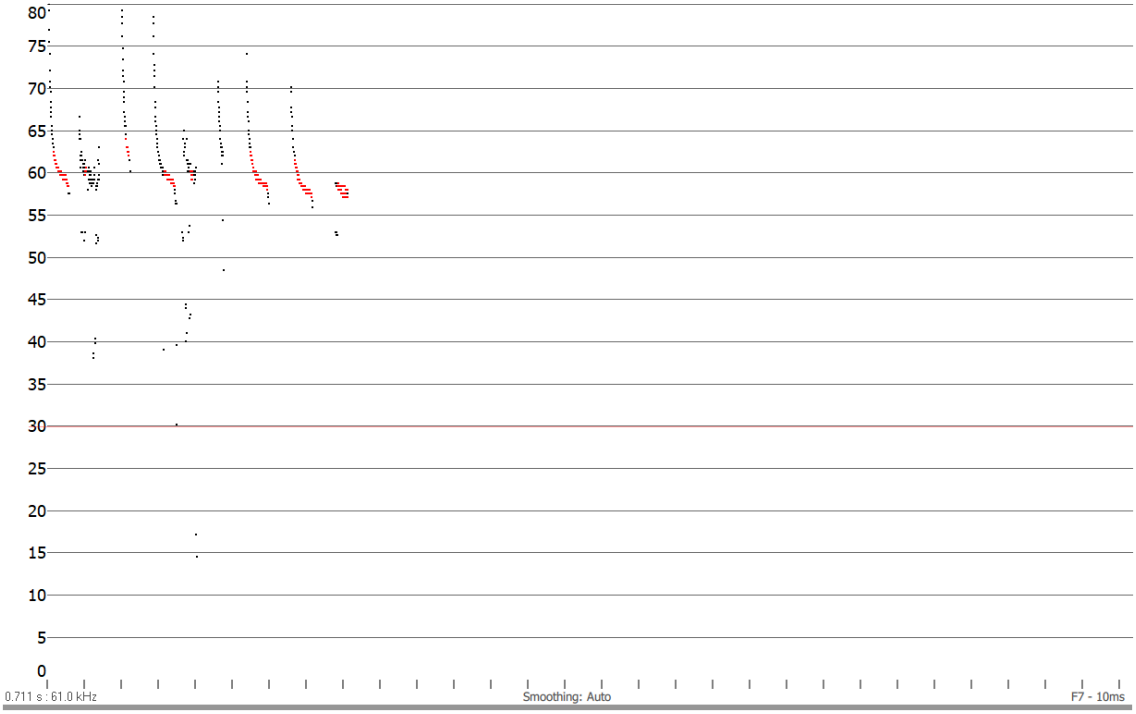


Definitely *Miniopterus orianae oceanensis*. The species has a characteristic call between 44.5 – 48 in this region, with pulses that display a down sweeping tail (Pennay, Law & Reinhold 2004).



Definitely *Chalinolobus morio*. The species can be distinguished by a down sweeping tail.

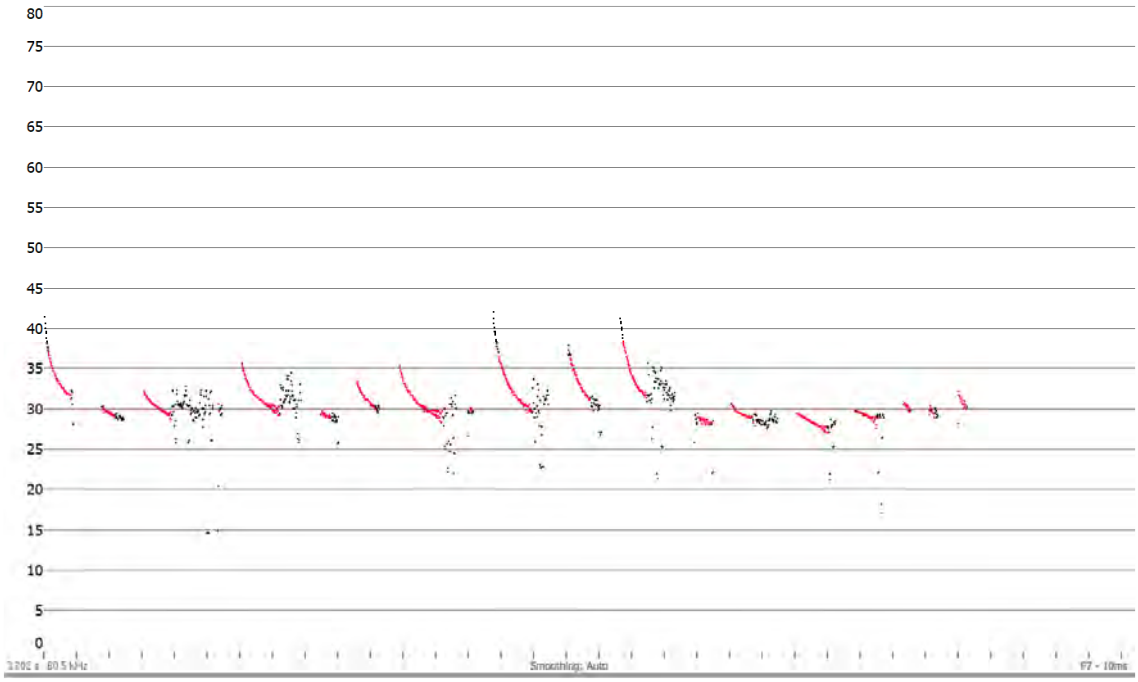


Definitely *Miniopterus australis.* The characteristic frequency and the down sweeping tail are indicative of this species.

Section 2.

Species composites/groups identified.

A species listed here that is not also listed in the species positively identified should be considered as present. Likelihood of occurrence and call identification issues for these species are discussed below each call example.



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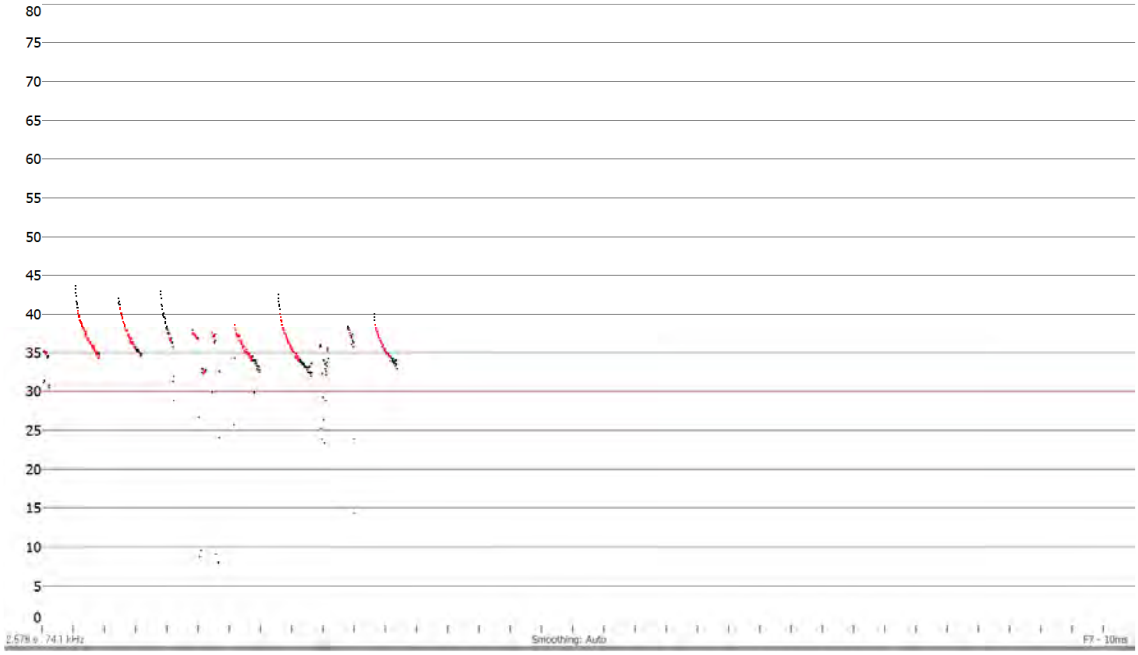
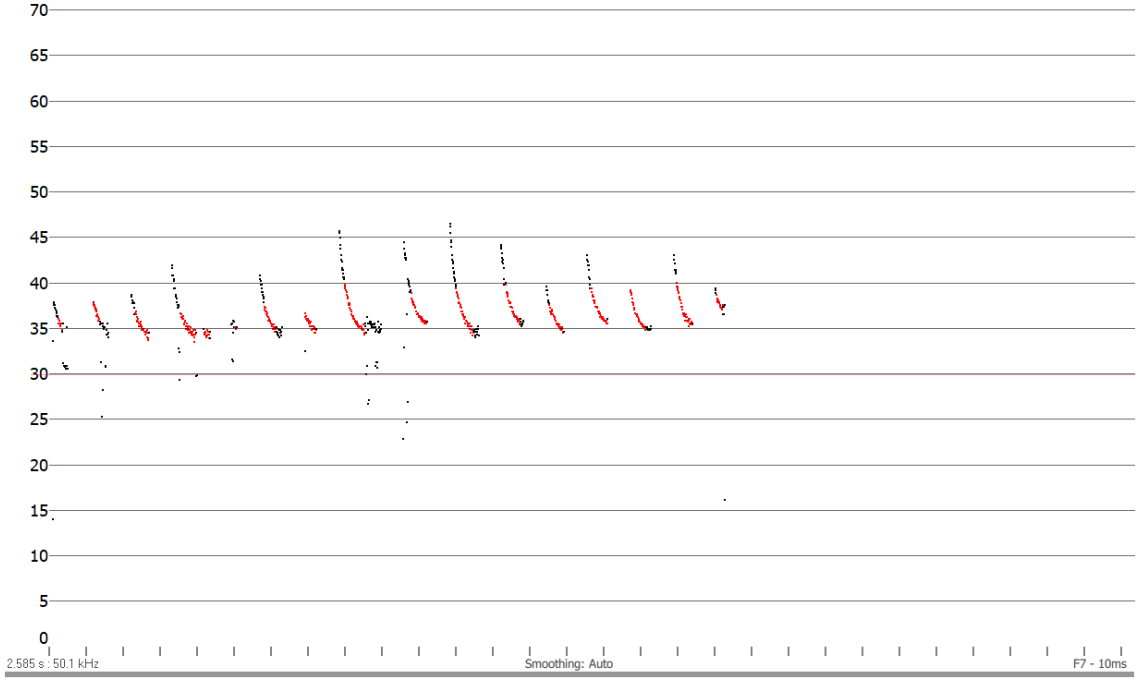
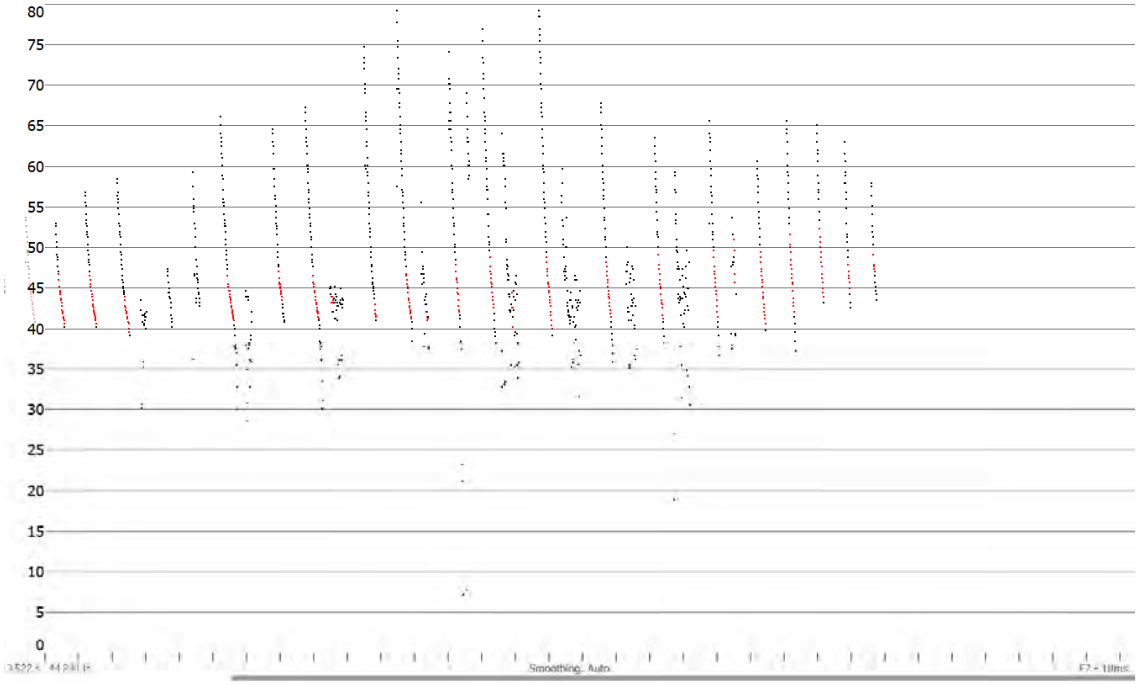


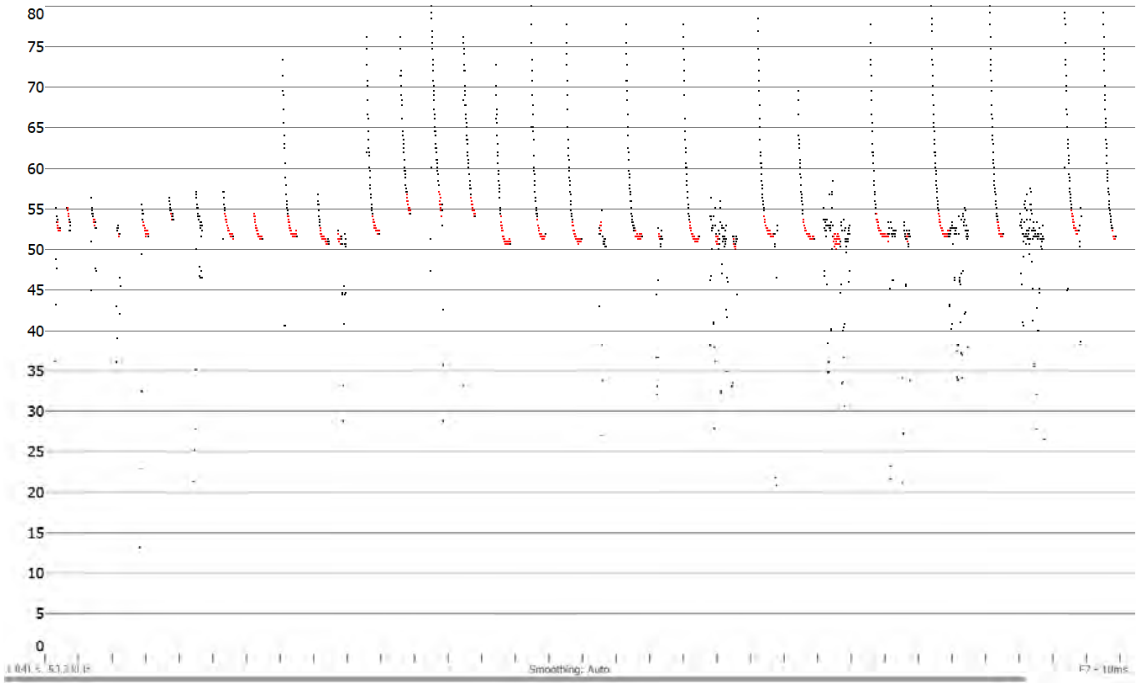
Probably *Ozimops ridei/Scoteanax rueppellii*. There is insufficient detail in this call to assign species identification, the species overlap at this frequency.



Probably *Scoteanax rueppellii/Scotorepens orion/Falsistrellus tasmaniensis*. These species overlap at approximately 35 kHz. There is insufficient detail, or shape definition to assign a positive identification and so a species complex has been assigned.



Probably *Myotis macropus/Nyctophilus species*. *M. macropus* calls can be differentiated from Nyctophilus species by having a pulse interval less than 75ms, an initial slope of greater than 400 OPS and often displaying a single change in slope (kink) in the central part of the pulse. There is insufficient detail in the call sequence to separate the species. *Nyctophilus* bats generally produce distinctive calls, however the species within the genus cannot be reliably differentiated from call data.



Probably *Vespadelus troughtoni/Vespadelus vulturnus/ Vespadelus pumilus*. The species overlap at this frequency in this region (Pennay, Law & Reinhold 2004).

References

Churchill, S. (2008) Australian Bats, Allen and Unwin, Sydney.

Pennay, M., & Lavery, T. (2017). Identification guide to bat echolocation calls of Solomon Islands and Bougainville.

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

Reardon T. B., McKenzie N. L., Cooper S. J. B., Appleton B., Carthew S. & Adams M. (2014) A molecular and morphological investigation of species boundaries and phylogenetic relationships in Australian free-tailed bats Mormopterus (Chiroptera : Molossidae). Australian Journal of Zoology 62, 109-36.

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

Disclaimer

Appendix H Supplementary Avoid and Minimise Document

BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT URBAN DESIGN SUPPLEMENT

HARRIS & MAY
DEVELOPMENT APPLICATION

LOT 3 & 31 DP 778111
2 INTO 251 LOT RESIDENTAL SUBDIVISION

ALLAM PROPERTY GROUP
OCTOBER 2022

adw johnson

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Document Control Sheet

Issue No.	Amendment	Date	Prepared By	Checked By
A	Draft Issue	23/10/2022	RK	-
B	Updated Draft	31/10/2022	RK	-

Limitations Statement

This report has been prepared in accordance with and for the purposes outlined in the scope of services agreed between ADW Johnson Pty Ltd and the Client. It has been prepared based on the information supplied by the Client, as well as investigation undertaken by ADW Johnson and the sub-consultants engaged by the Client for the project.

Unless otherwise specified in this report, information and advice received from external parties during the course of this project was not independently verified. However, any such information was, in our opinion, deemed to be current and relevant prior to its use. Whilst all reasonable skill, diligence and care have been taken to provide accurate information and appropriate recommendations, it is not warranted or guaranteed and no responsibility or liability for any information, opinion or commentary contained herein or for any consequences of its use will be accepted by ADW Johnson or by any person involved in the preparation of this assessment and report.

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The Client should be aware that this report does not guarantee the approval of any application by any Council, Government agency or any other regulatory authority.

Executive Summary

We provide this report in support of the Development Application (DA) for a 251 lot subdivision of parent lots 3 and 31 in DP778111 (the site). The purpose of this report is to demonstrate how the principles of "avoid and minimise" with regard to biodiversity impact have been observed in the development of the site masterplan.

It is a requirement of Clause 6.12 of the Biodiversity Conservation Act 2016 (BC Act) to address the principles of avoid and minimise within a DA. The Statement of Environmental Effects (SoEE) for the DA includes a Biodiversity Development Assessment Report (BDAR) prepared by MJD Environmental to address Clause 6.12 of the BC Act, this report supplements the BDAR with a specific focus on urban design and engineering.

The site was rezoned as part of Stage 2 of the Thornton North Urban Release Area (TNURA) in 2011. it is noted that during the rezoning process;

- DECCW considered that the outstanding matters to be addressed at DA, post gazettal of the LEP, related specifically to "offsetting matters";
- Amendments were made to the draft rezoning plan in consultation with DECCW during the Planning Proposal process to minimise potential impacts by "retaining larger areas of the highest condition vegetation and broadening the connectivity of the environmental corridor running north-south through the site"; and
- DECCW considered that the outcomes of the planning proposal "protect areas of high ecological significance whilst ensuring that suitable biodiversity offsets will be achieved through the assessment and determination of future development applications"

We consider that the planning proposal process avoided and minimised impacts on the vegetation of highest ecological significance by creating a north-south corridor through the area zoned C3 on adjacent Lot 4 DP1145348 and that DECCW envisaged that only ecological offsetting would be addressed during the DA process (not further avoidance or minimisation) at the time of rezoning.

The site is not encumbered by any biodiversity corridor outlined within the Planning Proposal, LSPS or DCP.

There is clear and deliberately planned biodiversity connectivity at the macro-scale around the site with no connectivity through the site. On this basis there is no opportunity to provide macro-connectivity through the site and as such the focus of our design work is to create micro connections at the landscape scale.

The development approach to date in the TNURA has been to fully develop R1 zoned land (with the exception of riparian corridors) which has left limited opportunity to make biodiversity connections at the landscape scale.

We have evolved a masterplan which maximises the limited opportunity remaining to preserve meaningful ecological habitat. The masterplan includes three biodiversity connection strategies as follows;

1. Connection of the *Forest Red Gum Grassy Open Forest on Floodplains* Endangered Ecological Community (EEC) via an existing unnamed road reserve at the north of the site plus a 10m additional buffer within the site;

2. Connection of *Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland* EEC through strategic location of open space in the centre of Lot 32 DP778111 aligned to the C3 zones on adjacent lots 4 DP1145348 and 33 DP794448;

2a. Ancillary connection from item 2 along the proposed east-west distributor road to the riparian corridor on Lot 11 DP 1283071; and

3. Connection along the east-west riparian corridor via removal of the existing farm dam and reinstatement of riparian vegetation befitting the Ironbark – Spotted Gum EEC.

The evolution of the masterplan was a two-and-a-half-year process which considered over 30 options and revisions including;

- Ecological Survey and Input;
- Bushfire Input;
- Town Planning & Urban Design Input;
- Engineering Input;
- Location and Ground Truthing of Site Features with Regard to Various Layouts.

In evolving the masterplan we discounted the following redundant avoid and minimise strategies;

- Development of the full R1 zoned portion of land generating maximum yield;
- Split northern road carriageway with vegetated median which was found to contravene MCC Manual of Engineering Standards (MOES);
- Connection of the C3 zones on adjacent lots via existing mature vegetation in the north of the site, which was found to provide limited connectivity once land ownership and earthworks to fill an existing farm dam were considered;
- Connection of the C3 zones on adjacent lots via open space north of the proposed distributor road. This approach was found to be inferior to our Strategy 2 (outlined above) as it did not retain as much mature vegetation nor did it provide connectivity through mature Spotted Gum EEC.

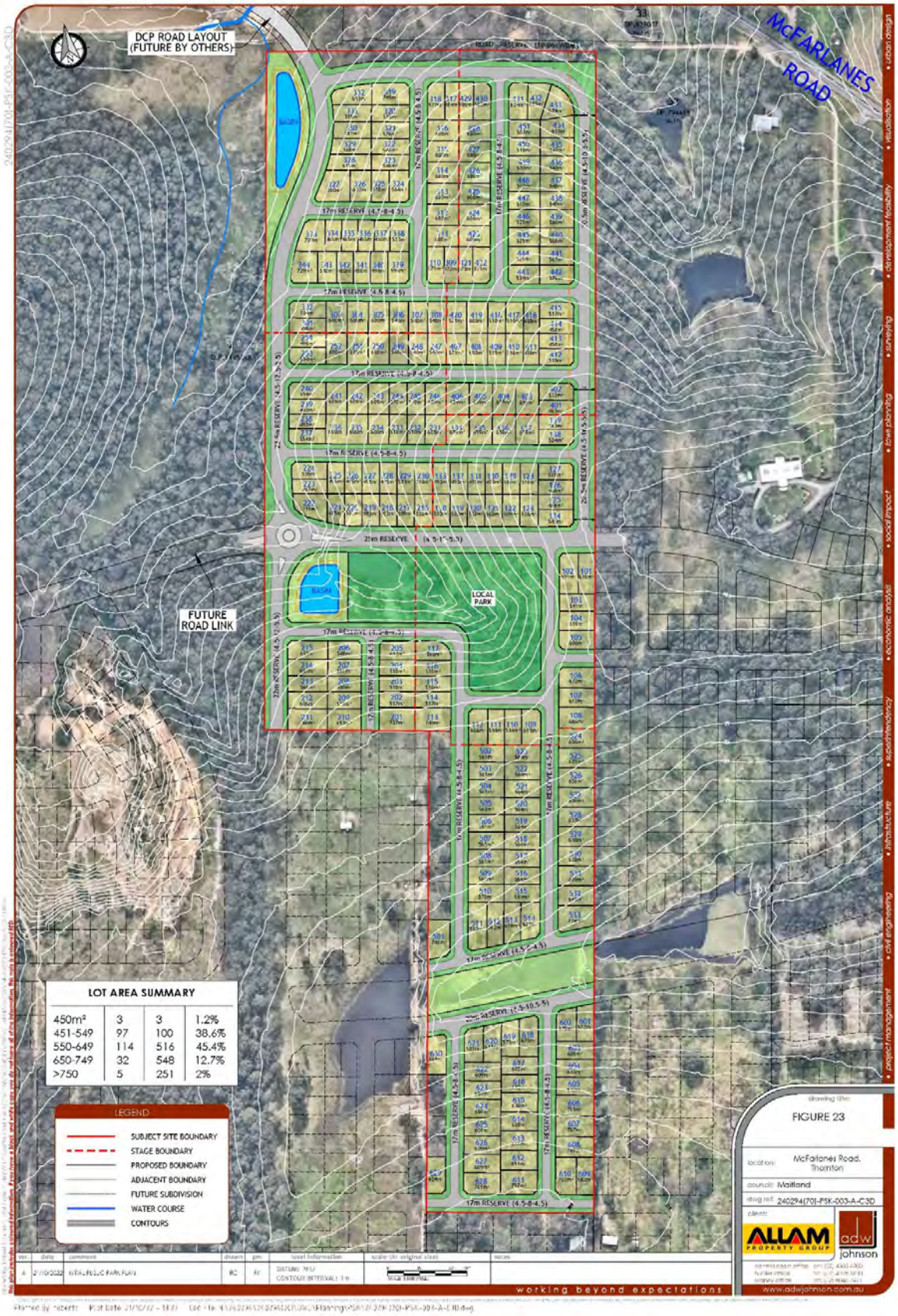
Retention of existing vegetation is a balance between ecological outcomes and achieving government dwelling supply and affordability targets. The strategies employed to avoid and minimise biodiversity impact in our masterplan come at a cost to the developer, in some cases the future home owner and impact developable land and dwelling supply as follows;

- Relinquishment of 12,136 m^2 of developable R1 zoned land;
- Resultant loss of yield and revenue in the order of -$2,580,000;
- Introduction of 1,115 m^2 of additional pavement to create a "perimeter road" around vegetated open space which will constitute a bushfire risk;
- Resultant increase in civil construction cost in the order of $800,000;
- Resultant increase in housing cost in the order of $570,00 due to 19 additional lots with a minimum BAL-29 construction rating.

We have incorporated strategies to meaningfully avoid and minimise biodiversity impact alongside best practice greenfield subdivision urban design principles within our masterplan to strike a balance between ecological outcomes and efficient development of the urban environment. The following figures show the final masterplan in the context of the TNURA and as a plan of subdivision for DA. Based on the above, we consider that the masterplan satisfies the requirements of Clause 6.12 of the Biodiversity Conservation Act.


Completed Development
1
2
3
Approved Development
Completed Development

FIGURE 22


DCP ROAD LAYOUT (FUTURE BY OTHERS)
McFARLANES ROAD
FUTURE ROAD LINK
LOCAL PARK
LOT AREA SUMMARY
450m² 3 3 1.2%
451-549 97 100 38.6%
550-649 114 516 45.4%
650-749 32 548 12.7%
>750 5 251 2%
LEGEND
SUBJECT SITE BOUNDARY
STAGE BOUNDARY
PROPOSED BOUNDARY
ADJACENT BOUNDARY
FUTURE SUBDIVISION
WATER COURSE
CONTOURS
FIGURE 23
McFarlanes Road, Thornton
Maitland
240294(70)-PSK-003-A-C3D
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LIST OF FIGURES

1.0 Introduction

We provide this report in support of the Development Application (DA) for a 251 lot subdivision of parent lots 3 and 31 in DP778111 (the site). The purpose of this report is to demonstrate how the principles of "avoid and minimise" with regard to biodiversity impact have been observed in the development of the site masterplan.

It is a requirement of the Biodiversity Conservation Act 2016 (BC Act) to address the principles of avoid and minimise, Clause 6.12 of the BC Act states that:

> *For the purposes of the biodiversity offsets scheme, a biodiversity development assessment report is a report prepared by an accredited person in relation to proposed development or activity that would be authorised by a planning approval, or proposed clearing that would be authorised by a vegetation clearing approval, that—*
>
> *(a) assesses in accordance with the biodiversity assessment method (BAM) the biodiversity values of the land subject to the proposed development, activity or clearing, and*
>
> *(b) assesses in accordance with that method the impact of proposed development, activity or clearing on the biodiversity values of that land, and*
>
> *(c) **sets out the measures that the proponent of the proposed development, activity or clearing proposes to take to avoid or minimise the impact of the proposed development, activity or clearing**, and*
>
> *(d) specifies in accordance with that method the number and class of biodiversity credits that are required to be retired to offset the residual impacts on biodiversity values of the actions to which the biodiversity offsets scheme applies.*

The Statement of Environmental Effects (SoEE) for the DA includes a Biodiversity Development Assessment Report (BDAR) prepared by MJD Environmental to address Clause 6.12 of the BC ACT. This report supplements the BDAR with a specific focus on urban design and engineering.

2.0 Background

2.1 REZONING

The site sits within Stage 2 of the Thornton North Urban Release Area (TNURA). The site was rezoned through amendment to the Maitland Local Environmental Plan (LEP) in 2011. The Maitland City Council (MCC) TNURA Stage 2 Planning Proposal supporting the rezoning included *Section C – Environmental, Social & Economic Impact* which states that;

> *DECCW supports the rezoning in principle as it is consistent with the objectives of the Lower Hunter Regional Strategy and the Thornton North Structure Plan, however considers that it is "unlikely to achieve an "improve or maintain" outcome for biodiversity values." Whilst it is preferable to deal with these matters at a rezoning stage, DECCW considers that "outstanding biodiversity offsetting matters could be dealt with post gazettal of the LEP through subsequent development applications under Part 4 of the EP&A Act." This would be through Section 798 of the EPA Act, which states that*
>
> > *(3) Development consent cannot be granted for:*
> > *(a) development on land that is, or is a part of, critical habitat, or*
> > *(b) development that is likely to significanUy affect a threatened species, population, or ecological community, or its habitat,*
> > *without the concurrence of the Director-General of the Department of Environment, Climate Change and Water or, if a Minister is the consent authority, unless the Minister has consulted with the Minister administering the Threatened Species Conservation Act 1995.*
>
> ***Amendments have been made to the draft rezoning plan in response to DECCW's suggestions for minimising potential impacts on biodiversity, including retaining larger areas of the highest condition vegetation and broadening the connectivity of the environmental corridor running north-south through the site**. This corridor will be reinforced by reference (including mapping) and provisions in the Thornton North Area Plan (DCP). A plan showing the habitat condition and the proposed environmental protection zoning is included as Appendix 8 - Conservation zoning.*
>
> *Therefore it is considered that the objectives of this planning proposal to protect areas of high ecological significance can be achieved, **whilst ensuring that suitable biodiversity offsets will be achieved through the assessment and determination of future development applications.***

It is noted that;

- DECCW considered that the outstanding matters to be addressed at DA, post gazettal of the LEP, related specifically to "offsetting matters";
- Amendments were made to the draft rezoning plan in consultation with DECCW during the Planning Proposal process to minimise potential impacts by "retaining larger areas of the highest condition vegetation and broadening the connectivity of the environmental corridor running north-south through the site"; and
- DECCW considered that the outcomes of the planning proposal "protect areas of high ecological significance whilst ensuring that suitable biodiversity offsets will be achieved through the assessment and determination of future development applications"

The land use zoning map, the subject of the above rezoning process is shown at **Figure 1**. The site is also shown in context.

150101(80)-PSK-015-D

MORPETH ROAD
METFORD ROAD
MCFARLANES ROAD
HINTON ROAD
PACIFIC HIGHWAY (A43)
RAYMOND TERRACE ROAD
GOVERNMENT ROAD
WOODBERRY ROAD

LEGEND

ALLAMS DEVELOPMENT SITES
EXISTING CADASTRE (DCDB)

Zone

B1	Neighbourhood Centre
B2	Local Centre
B3	Commercial Core
B4	Mixed Use
B5	Business Development
B6	Enterprise Corridor
E2	Environmental Conservation
E3	Environmental Management
E4	Environmental Living
R1	General Residential
R5	Large Lot Residential
RE1	Public Recreation
RE2	Private Recreation
RU1	Primary Production
RU2	Rural Landscape
RU5	Village
SP1	Special Activities
SP2	Infrastructure
W2	Recreational Waterways

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ver.	date	comment	drawn	pm
D	5/10/2022	AMENDED ISSUE	LS	RK

level information: DATUM: AHD; CONTOUR INTERVAL: 1m

scale (A1 original size): A1 1:15,000 — 0 300 600 750m — A3 1:30,000

notes

Sheet 9 of 9 sheets

drawing title: FIGURE 1

location: RAYMOND TERRACE ROAD CHISHOLM, NSW

council: MAITLAND CITY COUNCIL

dwg ref: 150101(80)-PSK-015-D

client: ALLAM

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2.2 PRECINCT PLAN

The site sits within precinct 7 of the TNURA. The Precinct 7 plan was adopted at Councils meeting of 22nd March 2022 and is shown at **Figure 2**. It is noted that the Planning Proposal considered the north-south biodiversity corridor would be reinforced by reference (including mapping) and provisions in the Thornton North Area Plan (DCP). The north-south biodiversity corridor is shown on the TNURA DCP Structure Plan and is reiterated in the Precinct 7 plan, both show the corridor through adjacent Lot 4 DP1145348.

It is noted that there are no environmental corridors shown through the site within the TNURA DCP Structure Plan or Precinct Plan.

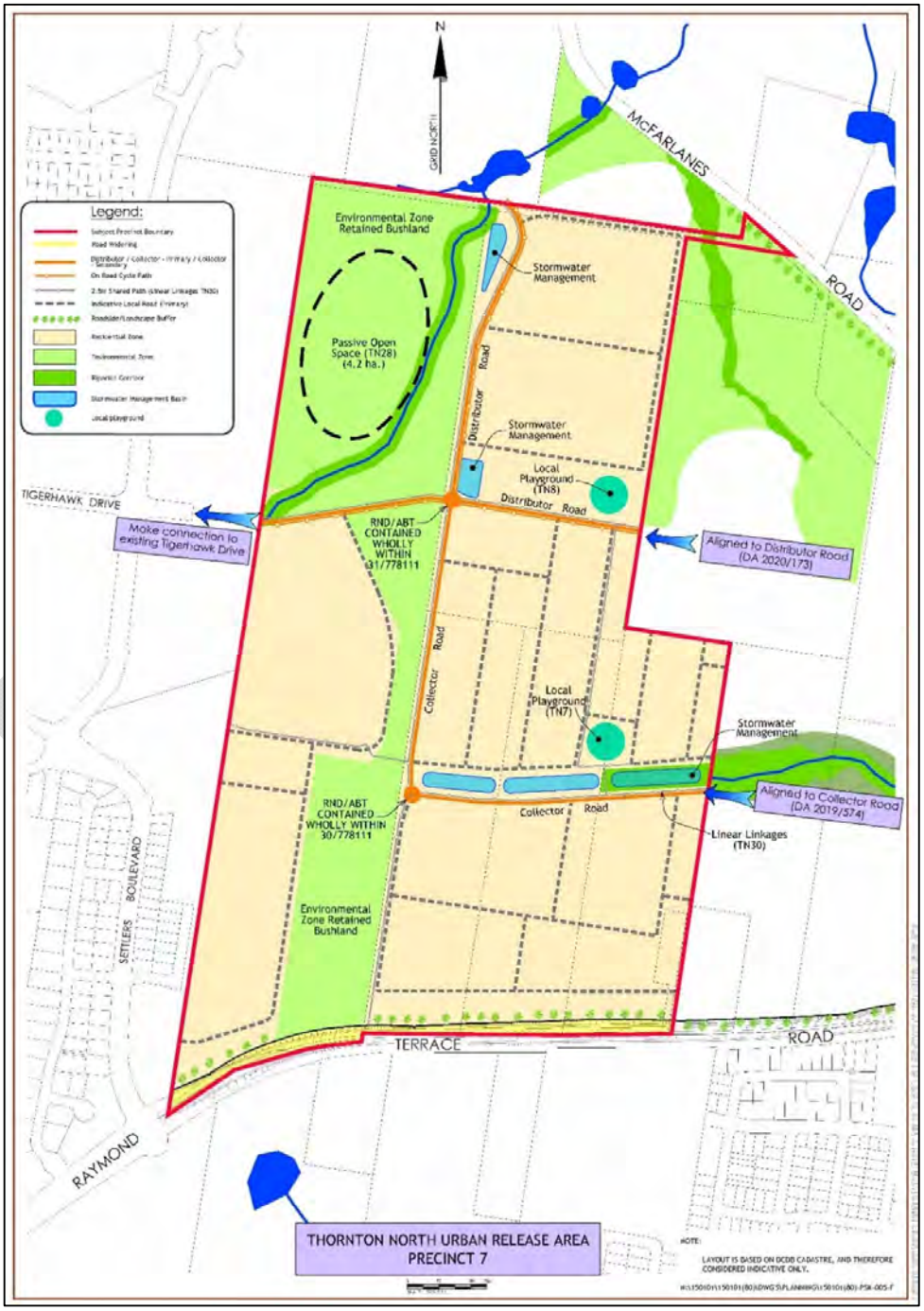

Figure 2 – TNURA Precinct 7 Plan.

2.3 LOCAL STRATEGIC PLANNING STATEMENT (LSPS)

The Maitland LSPS Figure 4.2 (Structure Plan) shows the URA with acknowledged biodiversity corridors overlain. It is noted that the north-south biodiversity corridor referenced within the Planning Proposal and TNURA DCP is shown running through adjacent Lot 4 DP1145348. No other acknowledged biodiversity corridors run through the site.

2.4 ADHERENCE TO PLANNING POLICY

We consider that the planning proposal process avoided and minimised impacts on the vegetation of highest ecological significance by creating a north-south corridor through the area zoned C3 on adjacent Lot 4 DP1145348 and that DECCW envisaged that only ecological offsetting would be addressed during the DA process (not further avoidance or minimisation) at the time of rezoning.

The site is not encumbered by any biodiversity corridor outlined within the Planning Proposal, LSPS or DCP.

3.0 Subdivision Design Development

3.1 MACRO CONNECTIVITY

Figure 3 shows the site in the context of the land use zoning map with the LSPS biodiversity corridors overlain. It can be seen that there is clear and deliberately planned biodiversity connectivity at the macro-scale around the site with no connectivity through the site. On this basis there is no opportunity to provide macro-connectivity through the site and as such the focus of our design work is to create micro connections at the landscape scale.

3.2 EXISTING SITE CONSTRAINTS

Figure 4 shows that the site is bookended by the C3 zoned, north-south corridor in the west and by existing approved development in the east. It is noted that all development to the east was approved under the previous biodiversity legislation rather than the BC Act which did not include reference to the principles of avoid and minimise. On this basis the full R1 zoned footprint (with the exception of riparian zones) has been, or is approved to be developed.

It is necessary to develop residential zoned land in the manner employed to date in the TNURA to adhere to MCC's Manual of Engineering Standards (MOES) and to carry out efficient development which assists in achieving local and state government dwelling supply and affordability targets. That is, creating an urban environment where the following design principles must be observed;

- No trees in road reserves can be retained due to regrade and service trenching.
- No trees on fence lines can be retained.
- No trees within 6m of a future building platform can be retained.
- No trees in any area of site regrade can be retained.
- Trees can be retained in undisturbed open space areas only.
- To achieve a range of diverse dwelling types with services on level pads that lead to affordable built form solutions it is necessary to perform bulk earthworks across the site.

We believe that this approach was acknowledged in the zoning of land R1(General Residential) and biodiversity corridors C3 (Environmental Management) at rezoning.

The development approach to date in the TNURA has left limited opportunity for biodiversity connection at the landscape scale. The following sections of this report outline the way in which the proposed masterplan maximises the limited opportunity remaining to preserve meaningful ecological habitat.

3.3 LANDSCAPE CONNECTION STRATEGIES

Figure 5 shows three biodiversity connection opportunities as follows;

4. Connection of the *Forest Red Gum Grassy Open Forest on Floodplains* Endangered Ecological Community (EEC) via an existing unnamed road reserve at the north of the site;
5. Connection of *Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland* EEC through strategic location of open space in the centre of Lot 32 DP778111 aligned to the C3 zones on adjacent lots 4 DP1145348 and 33 DP794448;

2a. Ancillary connection from item 2 along the proposed east-west distributor road to the riparian corridor on Lot 11 DP 1283071; and

6. Connection along the east-west riparian corridor via removal of the existing farm dam and reinstatement of riparian vegetation befitting the Ironbark – Spotted Gum EEC.

Figure 6 shows these opportunities in the context of the ecological survey mapping conducted on the site by MJD Environmental.

It is noted that these strategies influence the subject DA as well as DA/2020/173 on adjacent lot 33 DP794448 which is also owned by the proponent. As such lot 33 DP794448 is included in the strategy figures.

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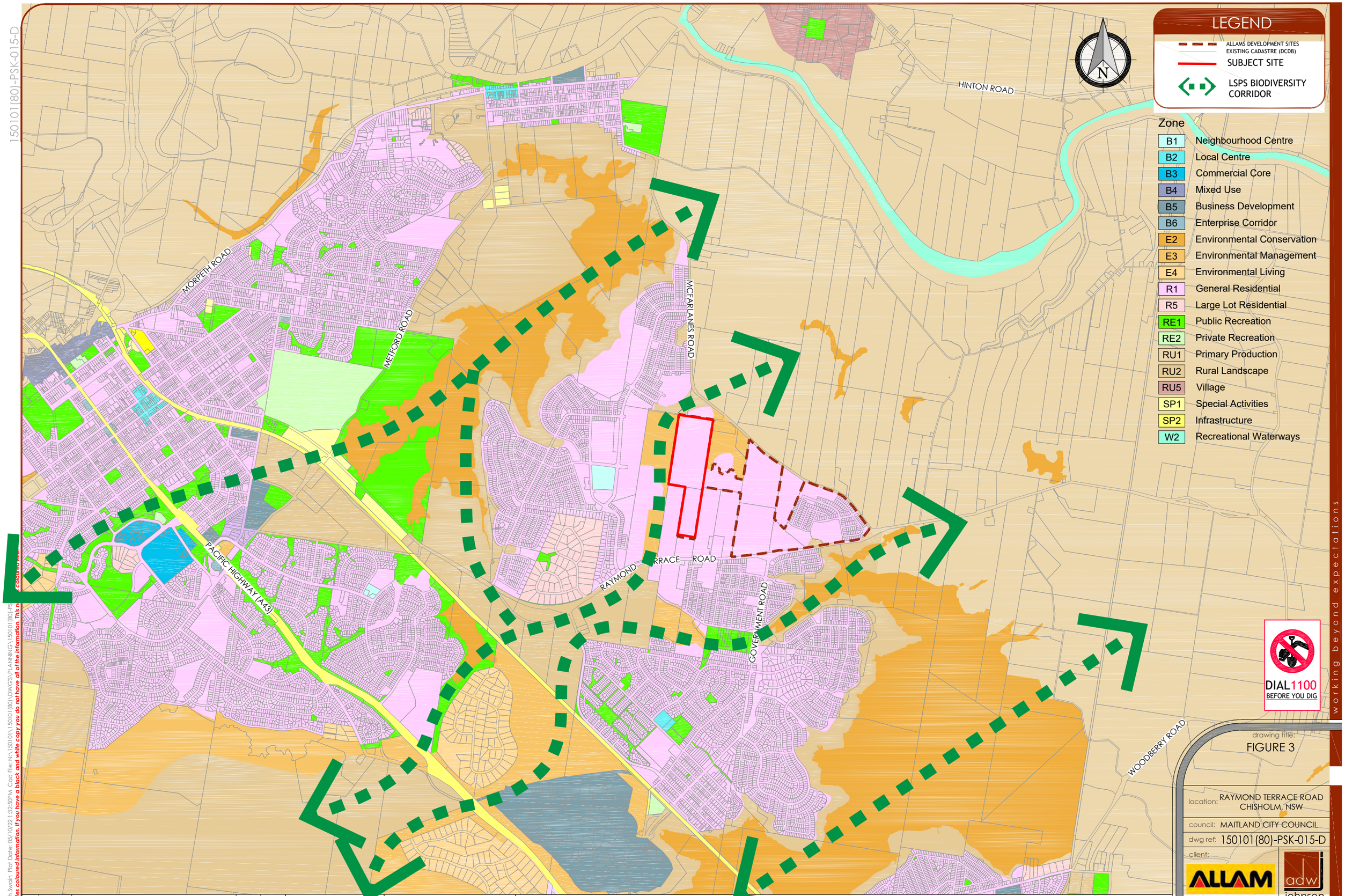

LEGEND

- ALLAMS DEVELOPMENT SITES
- EXISTING CADASTRE (DCDB)
- SUBJECT SITE
- LSPS BIODIVERSITY CORRIDOR

Zone

B1	Neighbourhood Centre
B2	Local Centre
B3	Commercial Core
B4	Mixed Use
B5	Business Development
B6	Enterprise Corridor
E2	Environmental Conservation
E3	Environmental Management
E4	Environmental Living
R1	General Residential
R5	Large Lot Residential
RE1	Public Recreation
RE2	Private Recreation
RU1	Primary Production
RU2	Rural Landscape
RU5	Village
SP1	Special Activities
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working beyond expectations

drawing title:
FIGURE 3

location: RAYMOND TERRACE ROAD CHISHOLM, NSW

council: MAITLAND CITY COUNCIL

dwg ref: 150101(80)-PSK-015-D

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ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
D	5/10/2022	AMENDED ISSUE	LS	RK	DATUM: AHD CONTOUR INTERVAL: 1m	A1 1:15,000 — 0 300 600 750m — A3 1:30,000	Sheet 9 of 9 sheets

• project management • civil engineering • infrastructure • superintendency • social impact • town planning • surveying • development feasibility • visualisation • urban design

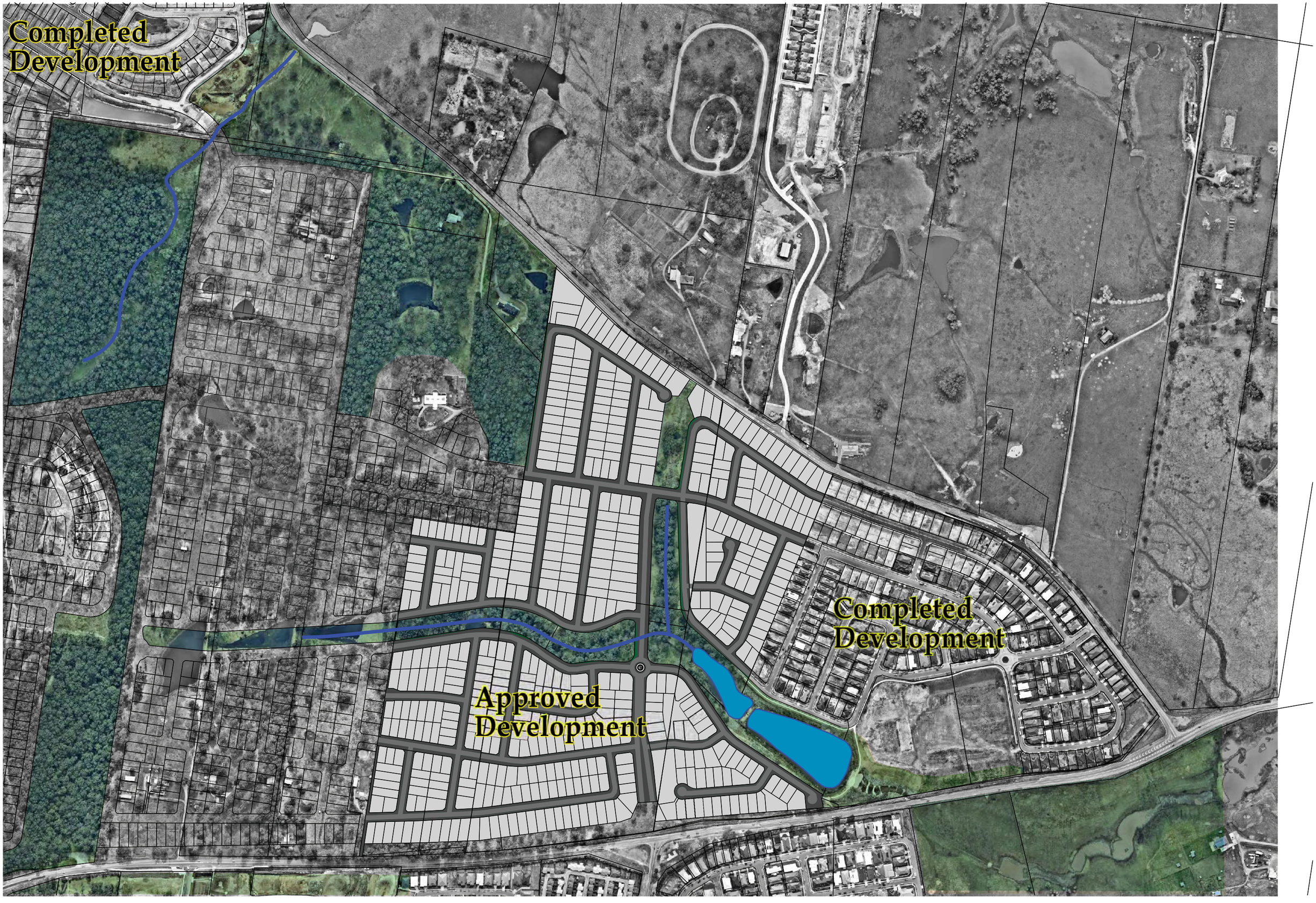
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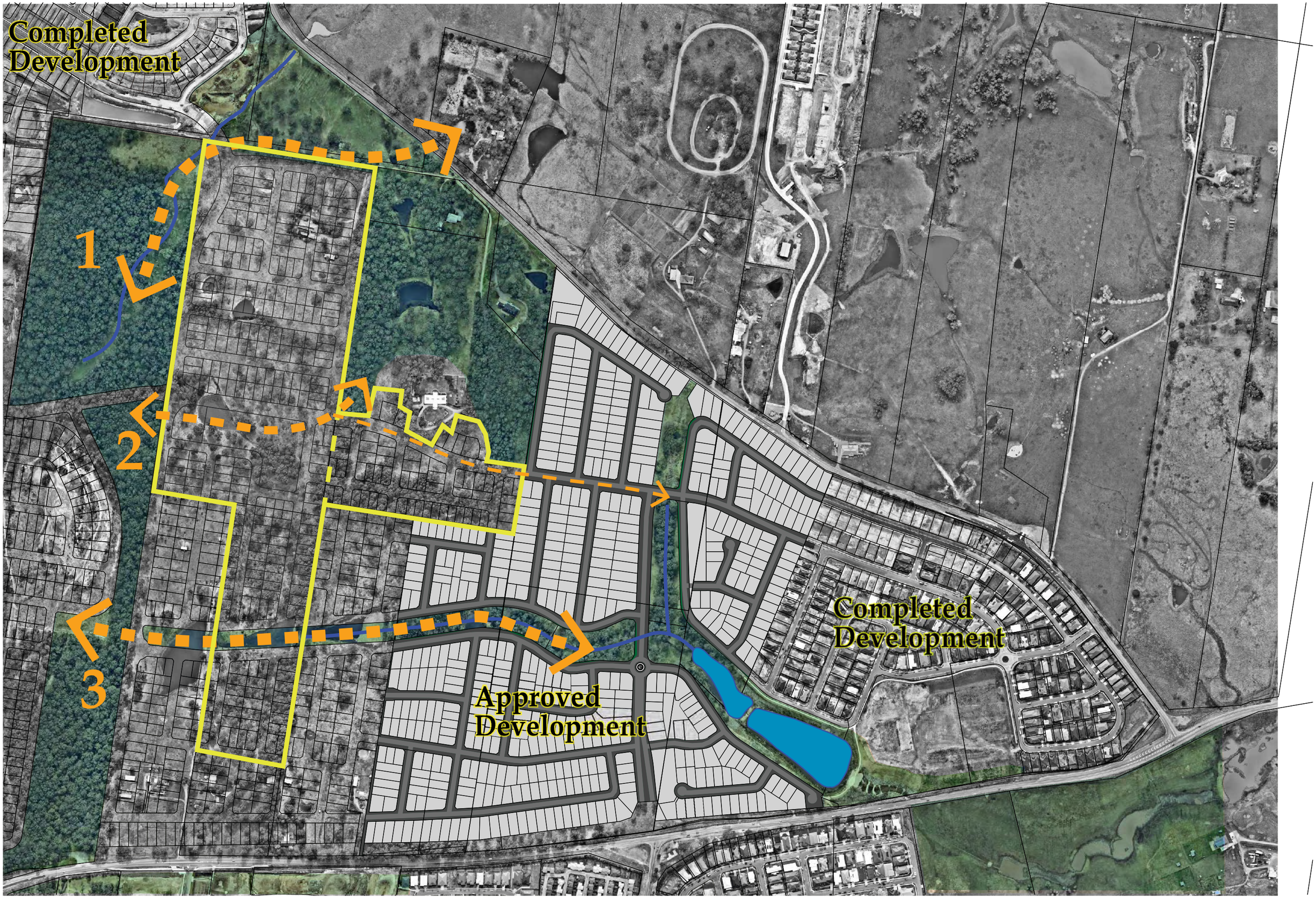
FIGURE 4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Development
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Completed
Development

FIGURE 5

173 MCFARLANES, CHISHOLM

FIGURE 3: FLORA AND FAUNA RESULTS

FIGURE 6

Legend

-) Hollow Bearing Tree
- Babblers
- Little lorikeet
- (Stick nest
- Roads
- Watercourse
- Contours (2m)
- Site
- Cadastral Boundaries
- Vegetation Zones

Plant Community Type

- PCT 1598 Forest Red Gum grassy open forest on floodplains (Moderate
- PCT 1604 Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland (Moderate
- PCT 1604 Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland (Pasture - Native and Exotic)
- PCT 1604 Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland (Scattered Trees w/ Native Ground Cover)
- PCT 1604 Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland

0 30 60 120

Meters

1:2,200

MJD Environmental

Aerial: Nearmap (2020) | Data: MJD Environmental, NSW Spatial Services (2020) | Datum/Projection: GDA 2020 MGA Zone 56 | Date: 7/10/2020| Version 1 | GIS\20039 - 173 Mcfarlanes Road, Chisholm | This plan should not be relied upon for critical design dimensions.

4.0 Avoid and Minimise Strategies

Detailed descriptions of the proposed avoid an minimise strategies are as follows;

4.1 STRATEGY 1 – NORTHERN FOREST RED GUM CONNECTION

Strategy 1 is shown at **Figure 7** and includes the following design principles;

- The existing 10m unnamed road reserve including existing mature canopy vegetation will be maintained;
- An additional 10m has been allowed as an extended verge to our northernmost road. The result is a 2m formal verge plus an additional 10m of maintained mature vegetation in Council ownership. Survey of the proposed trees to be maintained has been undertaken and the result is shown at **Figure 8**. It is important to note that the 2m formal verge and the additional 10m offset have been deliberately chosen to avoid deleterious impact of earthworks/roadworks on trees within their drip/root zone and to provide a total corridor width of 20m to promote fauna movement;
- An image of the vegetation to be maintained under Strategy 1 is shown at **Figure 9**; and
- While no myotis were observed on site during ecological surveys, there is potential to disturb myotis foraging habitat through removal of two existing farm dams on the site. We propose to construct a wet stormwater management basin in accordance with Maitland Manual of Engineering Standards (MOES) to replace potential myotis foraging habitat.

Figure 7 – Avoid & Minimise Strategy 1.

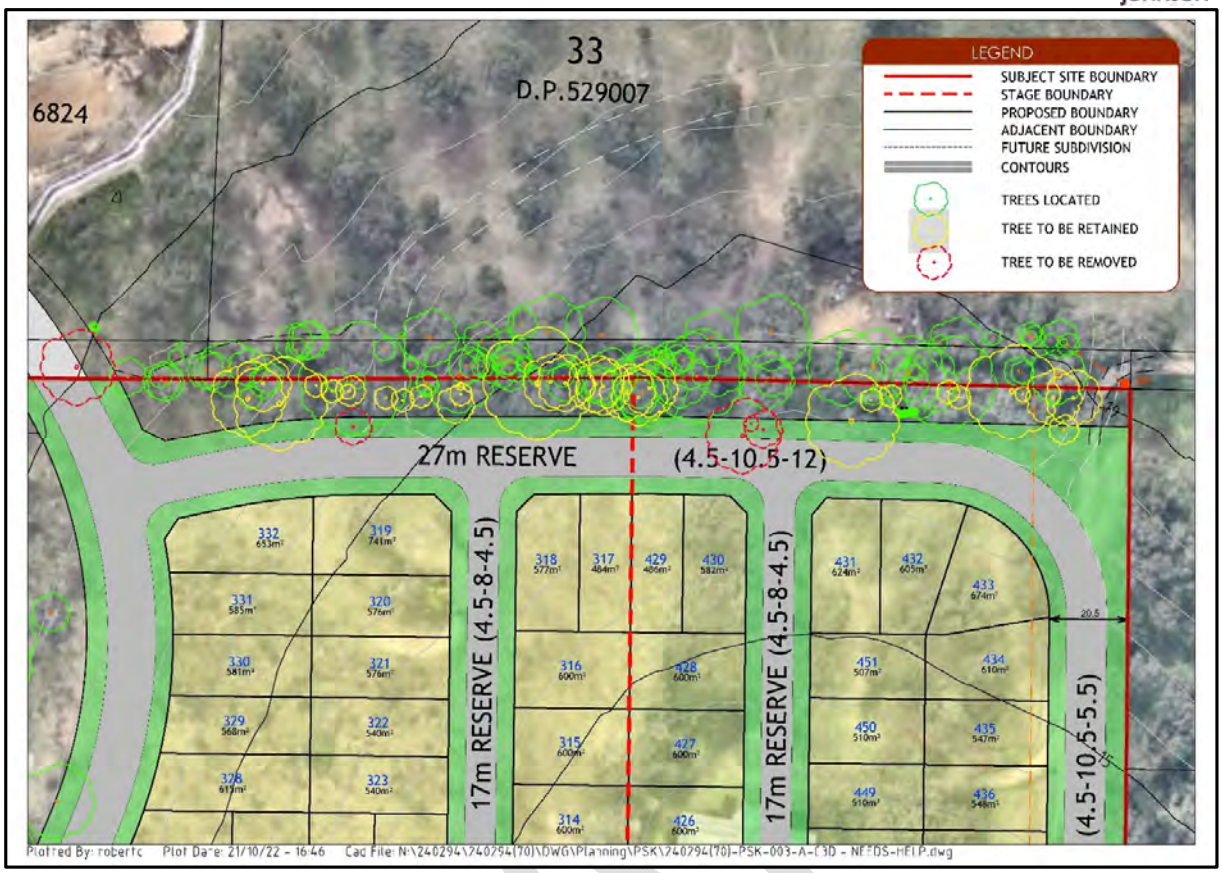

Figure 8 – Strategy 1 Tree Survey.

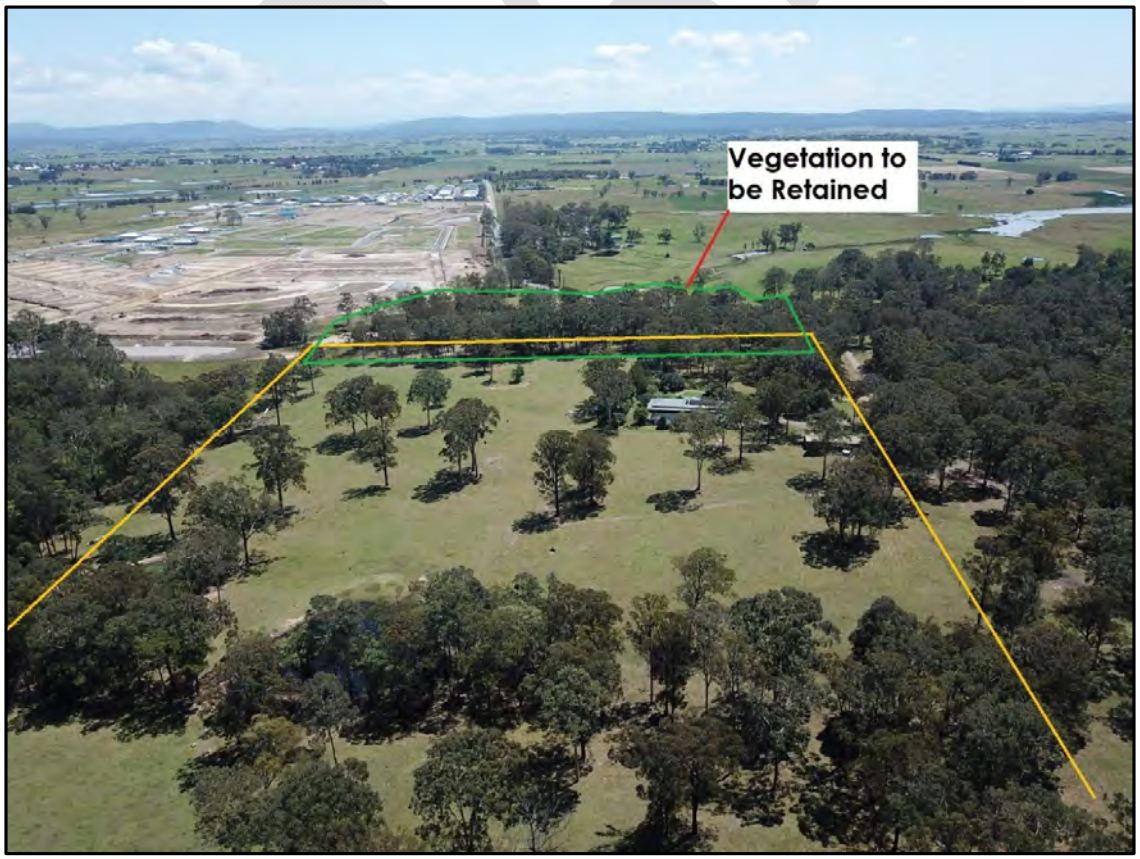

Figure 9 – Strategy 1 Vegetation to be Maintained.

4.2 STRATEGY 2 – CENTRAL NARROW-LEAVED IRONBARK – GREY BOX - SPOTTED GUM CONNECTION

Strategy 2 is shown at **Figure 10** and includes the following design principles;

- Locate the proposed active open space for the site over a stand of existing mature Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland EEC;
- The open space would run the width of the site and be in the order of 16,000m^2 excluding the proposed stormwater basin. The open space would be located directly between the C3 zones on adjacent lots 4 DP1145348 and 33 DP794448;
- An image of the vegetation to be retained under Strategy 2 is shown at **Figure 11**;
- It is proposed to consolidate two neighbourhood parks (TN7 and TN8) shown within the Thornton North Contributions Plan 2008. The walking catchments related the contributions plan layout are shown at **Figure 12** and the walking catchments related to our proposal are shown at **Figure 13.** It can be seen that no residents are disadvantaged by the proposed approach and Council's maintenance liability is limited to a single location. It is apparent that some open space was envisaged by Council to be provided by passive recreation in the riparian areas (item TN29 in the contributions plan).
- The proposed open space arrangement is a premium urban design outcome on the following basis:
  - Maintains an area of existing mature veg aimed at nature-play alongside a formal active open space;
  - The open space is located near the hilltop;
  - The open space area is 1.67ha befitting a regional park;
  - The open space is located on the development distributor road with multiple opportunities for parking away from the distributor;
  - The topography is such that keeping the vegetation necessitates a natural drainage swale within the open space and intertwining of the blue and green grid; and
  - The length and shape of the park creates opportunity for maximum park-front lots.
- The proposed open space arrangement introduces a bushfire risk to the heart of the development. To avoid the bushfire risk, we would be required to leave a 100m buffer between the retained vegetation and C3 zones, counteracting the ecological connection we seek to create. In the absence of a 100m buffer, the options to address the bushfire risk are:
  - Ensure the open space is managed as an Asset Protection Zone (APZ) by Council in perpetuity under a Plan of Management; or
  - Introduce "perimeter roads" around the park in accordance with Planning for Bushfire Protection 2019 and constructing the adjacent dwellings to the appropriate Bushfire Attack Level (BAL), nominally BAL 29.
- An ancillary benefit of Strategy 2 is the opportunity to extend the biodiversity corridor to the north-south riparian corridor on Lot 11 DP 1283071 via select street tree planting to encourage fauna movements. Ecological advice at this stage is to utilise a winter flowering native such as Spotted Gum (*Corymbia maculate)*

Figure 10 – Avoid & Minimise Strategy 2.

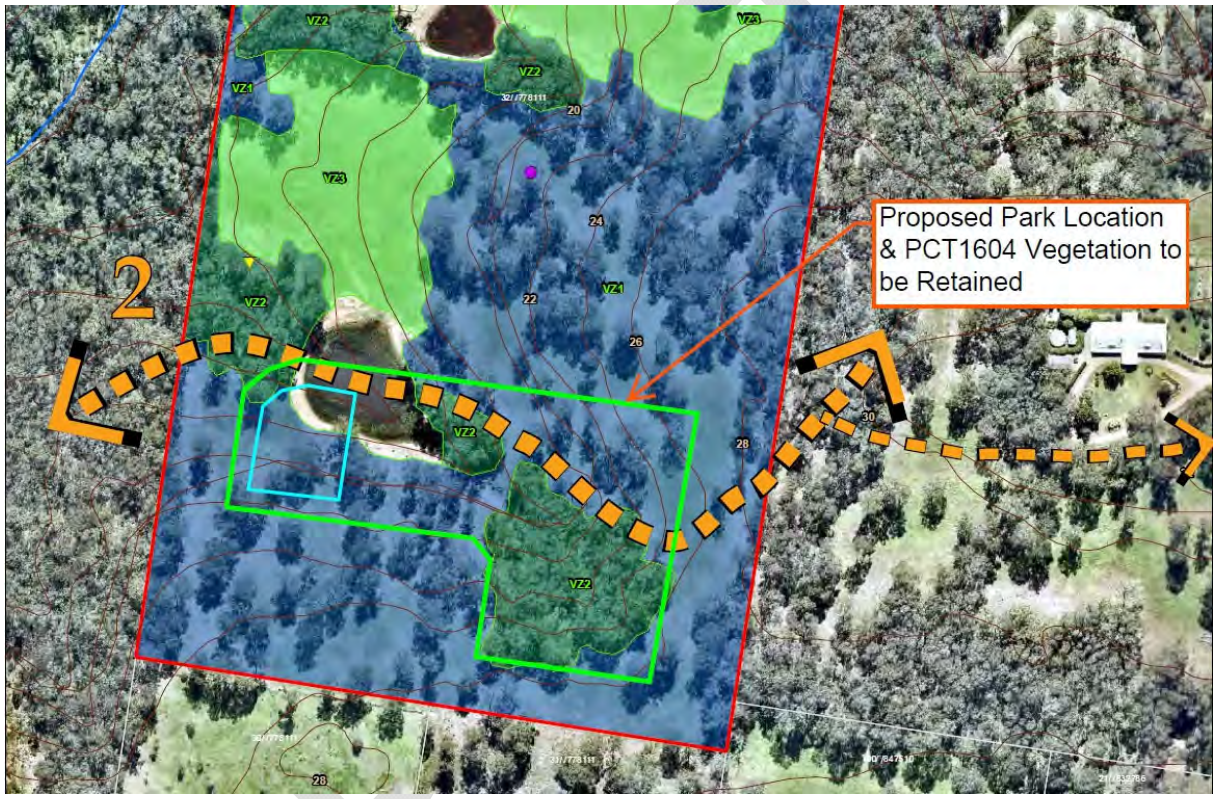

Figure 11 – Strategy 2 Vegetation to be Retained.

150101(80)-PSK-018-A

DA-18-1146

DA-18-626

LIMIT OF ROADWORKS (BY OTHERS)

McFARLANES

ROAD

RAYMOND TERRACE

Lot 32 DP778111

TN8 LOCAL PARK

Lot 33 DP79448

DA 2020-173

Lot 1 DP198776

DA 2019-653

Lot 4 DP1145348

TN7 LOCAL PARK

TN29 PASSIVE OPEN SPACE

Lot 18 DP999725

DA 2016-2377:1

Sophia Waters 1A-3A Development

DA 2016-432.3

Lot 30 DP778111

Lot 31 DP778111

Lot 100 DP847510

Lot 21 DP832786

DA 2019-574

Lot 1 DP1032753

DA 2019-652

TN16 NEIGHBOURHOOD PARK & PLAYGROUND

Sophia Waters 3B Development

DA 2016-2890

Lot 20 DP832786

DA 2019-573

ROAD

N

Zone

B1	Neighbourhood Centre
E2	Environmental Conservation
E3	Environmental Management
E4	Environmental Living
R1	General Residential
R2	Low Density Residential
R3	Medium Density Residential
RE1	Public Recreation
RU2	Rural Landscape

LEGEND

- ALLAMS DEVELOPMENT SITES
- SUBJECT SITE BOUNDARY
- UNDEVELOPED PARCELS
- EXISTING LOTS
- PROPOSED FUTURE LOTS
- MAJOR CONTOURS
- MINOR CONTOURS
- WATERCOURSE
- PARK OFFSET 400m (FROM EDGE)
- PASSIVE OPEN SPACE OFFSET 400m (FROM EDGE)
- PASSIVE OPEN SPACE

DIAL1100 BEFORE YOU DIG

working beyond expectations

drawing title:
THORNTON NORTH URA

FIGURE 12

location: RAYMOND TERRACE ROAD CHISHOLM, NSW

council: MAITLAND CITY COUNCIL

dwg ref: 150101(80)-PSK-018-A

client: ALLAM

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
A	28/10/2022	INITIAL ISSUE	RC	RK	DATUM: AHD CONTOUR INTERVAL: 1m	A1 1:3000 — 0 60 120 150m — A3 1:6000	Sheet 1 of 4 sheets

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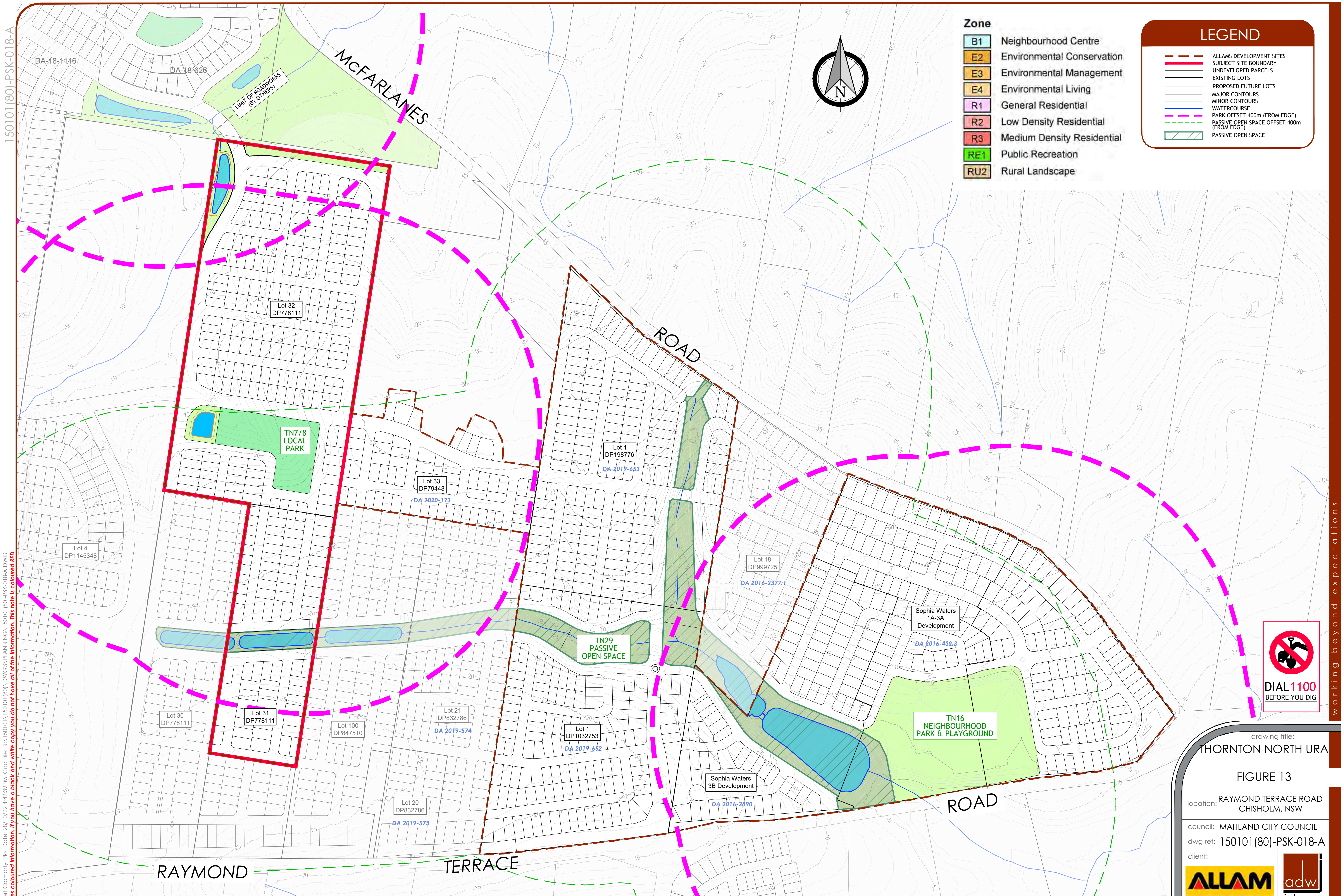

150101(80)-PSK-018-A

drawing title: THORNTON NORTH URA

FIGURE 13

location: RAYMOND TERRACE ROAD CHISHOLM, NSW

council: MAITLAND CITY COUNCIL

dwg ref: 150101(80)-PSK-018-A

client: ALLAM

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ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
A	28/10/2022	INITIAL ISSUE	RC	RK	DATUM: AHD CONTOUR INTERVAL: 1m	A1 1:3000 0 60 120 150m A3 1:6000	

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4.3 STRATEGY 3 – RIPARIAN REVEGETATION

Strategy 3 is shown at **Figure 14** and includes the following design principles;

- It is proposed to carry out stormwater management in a downstream basin on lot 12 DP1283071 (also owned by the proponent) as outlined in the Stormwater Management Plan accompanying the DA;
- The above stormwater management approach avoids the need to construct engineered basins in the existing gully, limiting the number of basins in the URA and Council's maintenance liability;
- Engineered basins require defined batters within which, canopy vegetation cannot be planted due to the risk of tree roots destabilising the basin. Avoiding an engineered basin within the existing gully generates possibility to revegetate the gully under a Vegetation Management Plan (VMP) and create a connective corridor within the east-west riparian zone; and
- An image showing the opportunity for riparian revegetation under Strategy 3 is shown at **Figure 15.** It is noted that the remainder of this parcel is vegetated, however this portion of the site has been avoided and is not included in the DA**.** It is also noted that this parcel is a disconnected island of vegetation with cleared pastureland to the east and west as well as completed development to the north. Conversely, the riparian corridor offers opportunity to create a connected ecological corridor of much greater biodiversity value.

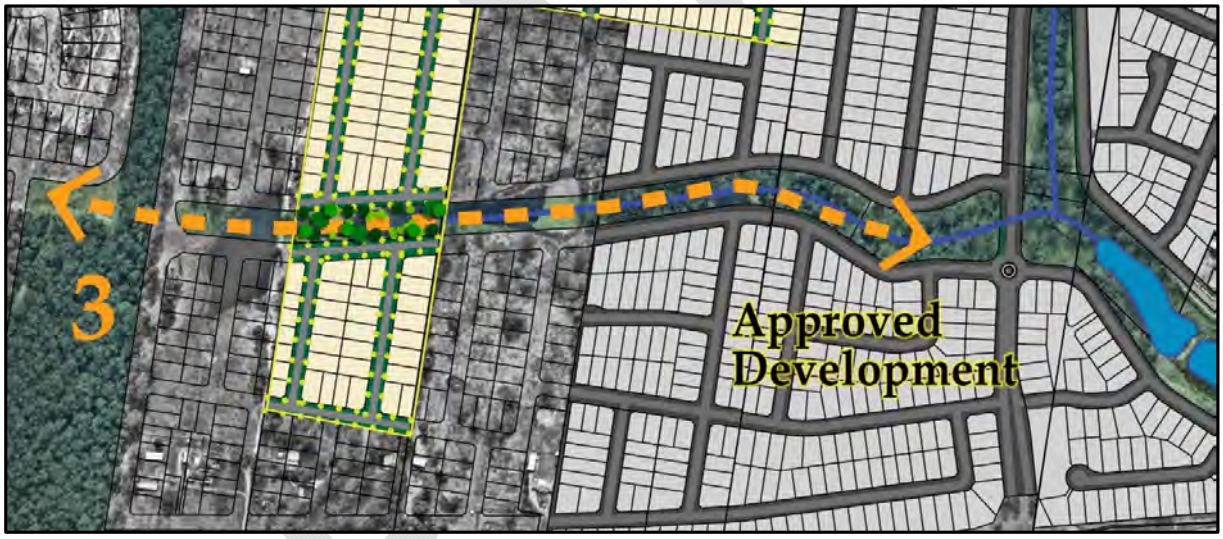

Figure 14 – Avoid and Minimise Strategy 3.

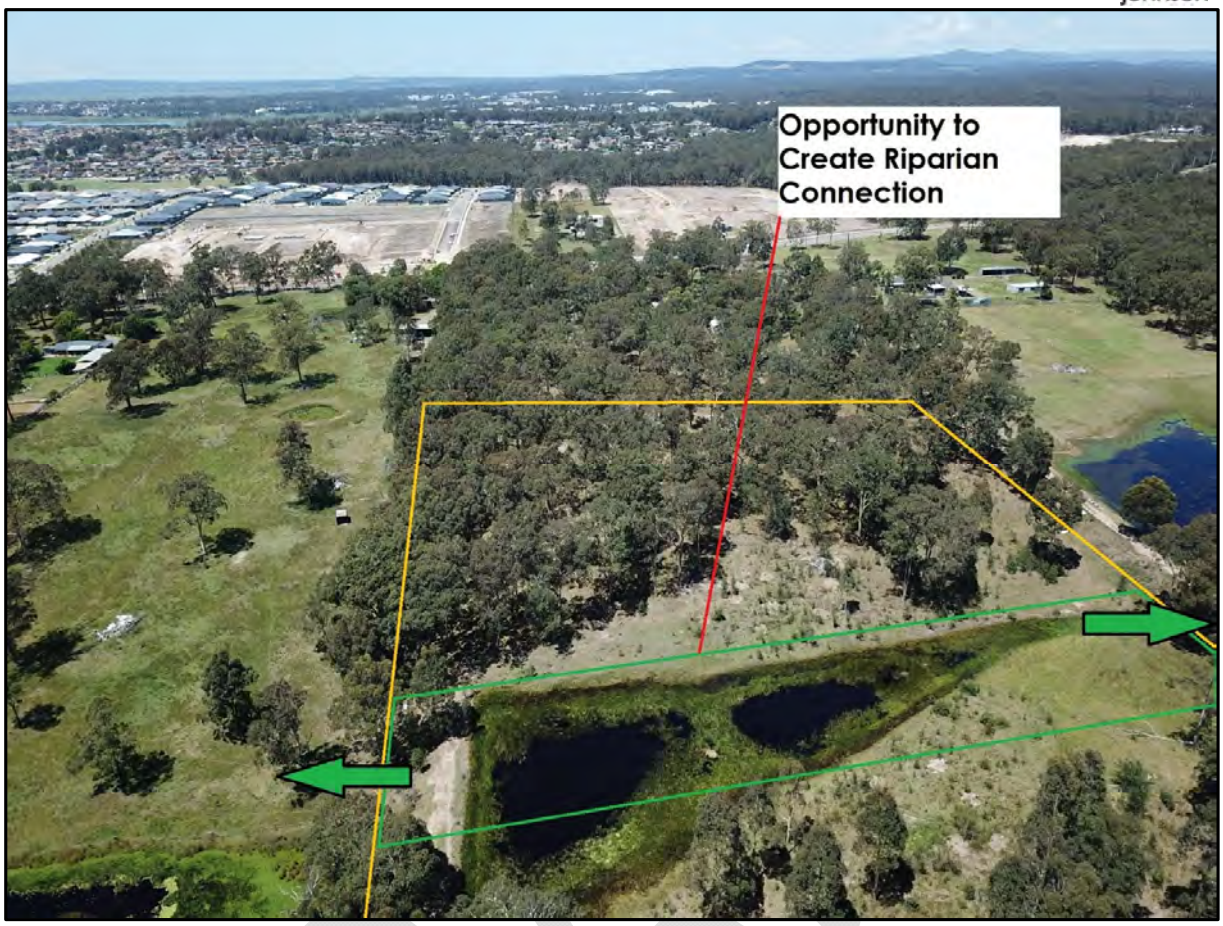

Figure 15 – Strategy 3 Opportunity for Riparian Revegetation.

5.0 Redundant strategies

In the development of the masterplan, we considered a number of strategies that were found to be suboptimal for various reasons. We provide an overview of these redundant avoid and minimise strategies with justification for their abandonment to assist in demonstrating the evolution of the masterplan.

The masterplanning process commenced in May 2020 and has been a two-and-a-half-year process including a rigorous options analysis of over 30 options and revisions. While many of the options related to lot yield, lot mix and road alignment, we focus on four core layout fundamentals within this section.

5.1 MAXIMUM YIELD

The site was acquired based on a May 2020 layout which was seen to be the most efficient development of the site and achieved maximum yield. The layout is shown at **Figure 16**. This layout is aligned to the intent of the rezoning process and satisfies the LSPS and DCP as well as being in accordance with the approach applied to all previous DA approvals in the LGA. However, it is the proponent's intention to provide some ecological connectivity through the site and as such the maximum yield layout was discounted.

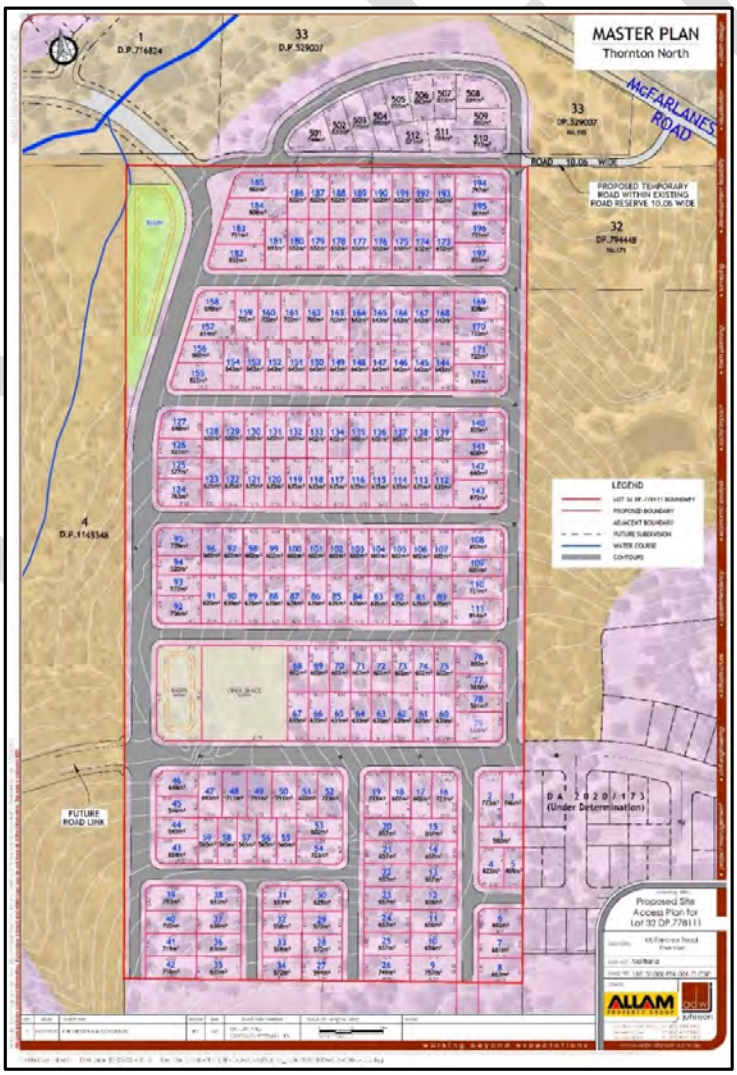

Figure 16 – Maximum Yield Layout.

5.2 SPLIT NORTHERN CARRIAGEWAY

To maintain the existing mature vegetation in the unnamed road reserve at the north of the site we considered a split carriageway with a wide centre median as shown at **Figure 17**.

Survey of the trees in the area was undertaken to assist in the assessment of road alignment and vegetation that could be retained. The surveyed trees are shown in **Figure 17**.

This approach would not satisfy MOES in terms of road cross section and was found to hinder the developability of the R1 zoned portion of Lot 33 DP 529007 to the north. After considering the layout and walking the site, this strategy was discounted.

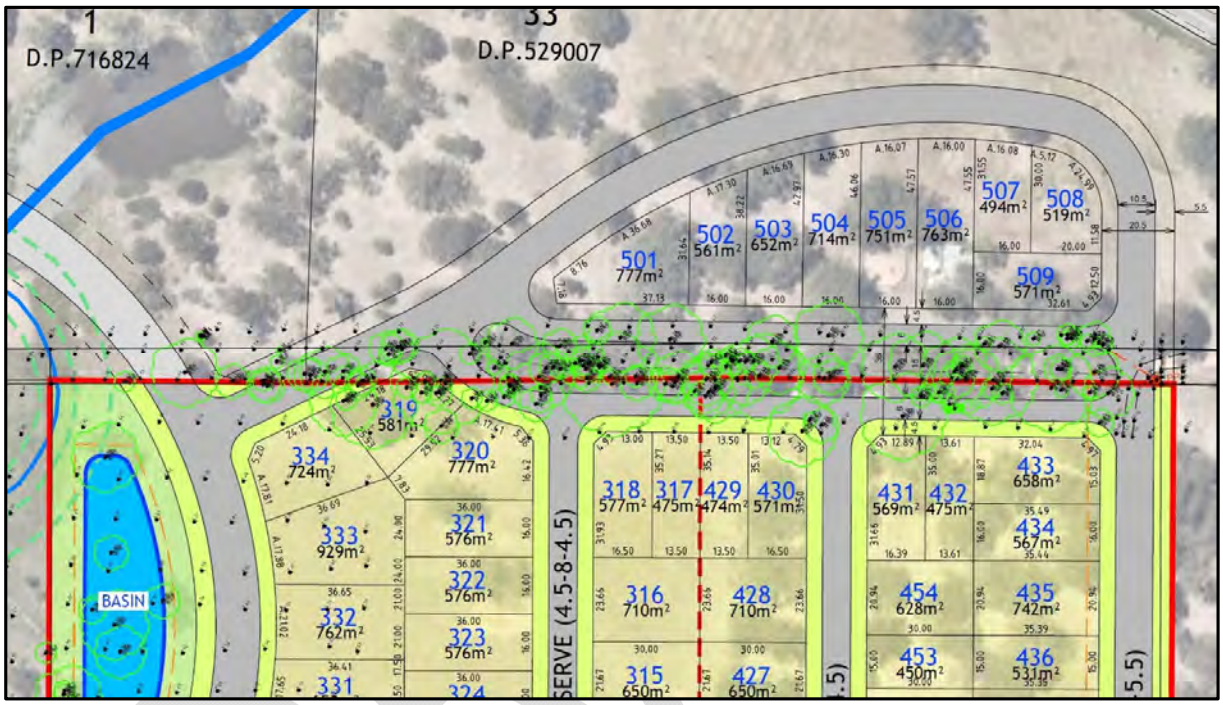

Figure 17 – Split Northern Carriageway.

5.3 INTERMEDIATE TREE CONNECTIVITY

There is a line of existing vegetation following a fence line which currently links the C3 zoned land on the adjacent lots. A layout to maintain this vegetation was considered which, after some deliberation, sought to place the vegetation in the front setback of residential lots. It was posited that the trees could be protected in perpetuity under a "Restriction as to Use" on the property title that would prevent their removal. The layout maintaining this existing vegetation is shown at **Figure 18**.

Survey of the trees in the area and pegging of the proposed lot boundaries was undertaken to assist in assessment of;

- Vegetation that could be retained
- Topography and its potential to affect road grading
- The ability to thread driveways for each lot through the retained vegetation.

The trees and lot boundaries as surveyed are shown at **Figure 19**.

After the lots were pegged, we walked the site with the proposed layout and found that;

- There were few trees that were healthy and of a size that warranted retention; and
- Significant regrading adjacent a portion of the vegetation would be required to fill the existing farm dam. This fill operation would require clearing of the trees or harm to the

trees via earthworks within their drip zone.

Based on the above it was considered that very little vegetation could be retained and that connectivity between the C3 zones would not be maintained under this strategy. The strategy was discounted on this basis.

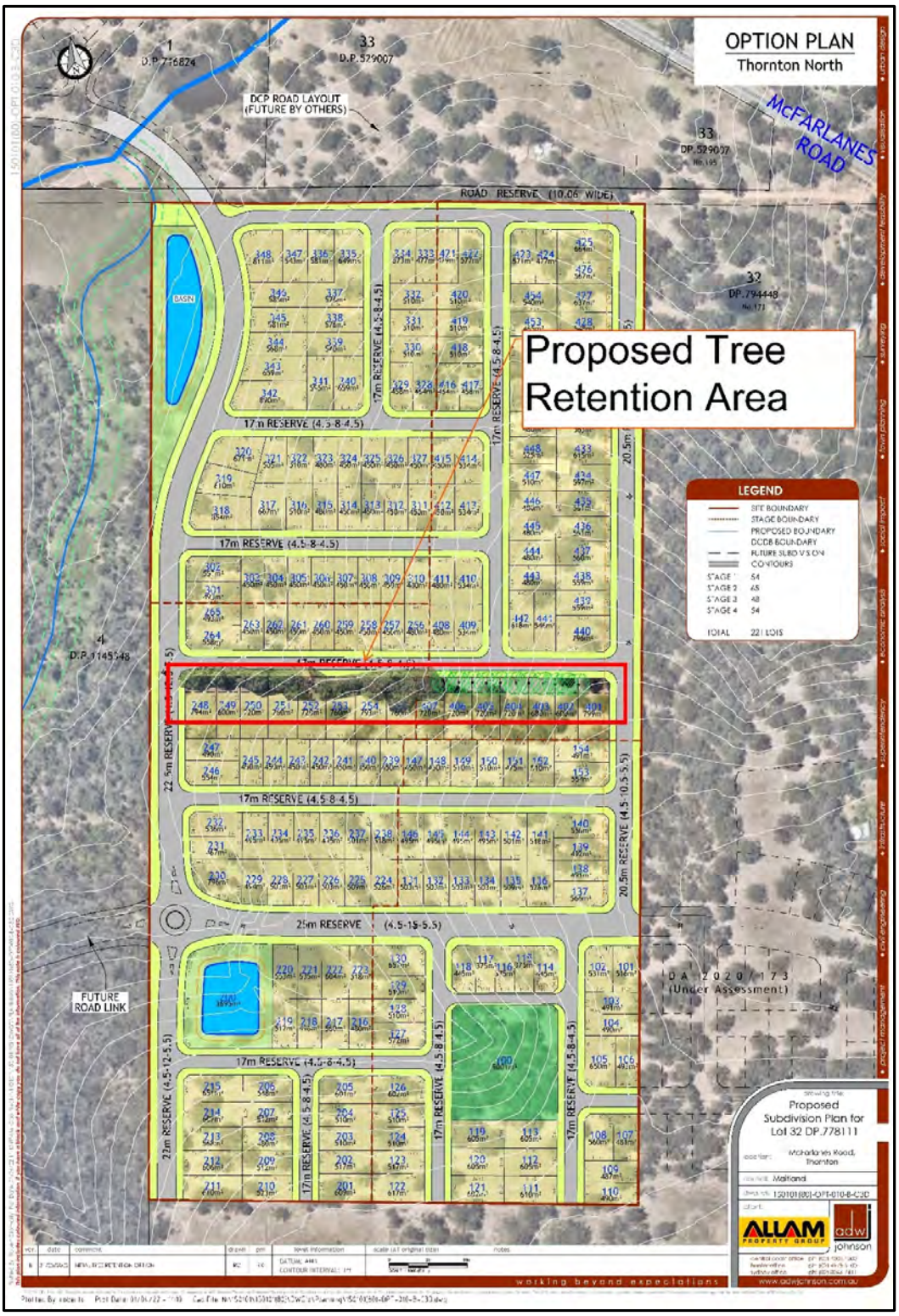

Figure 18 – Intermediate Tree Connectivity.

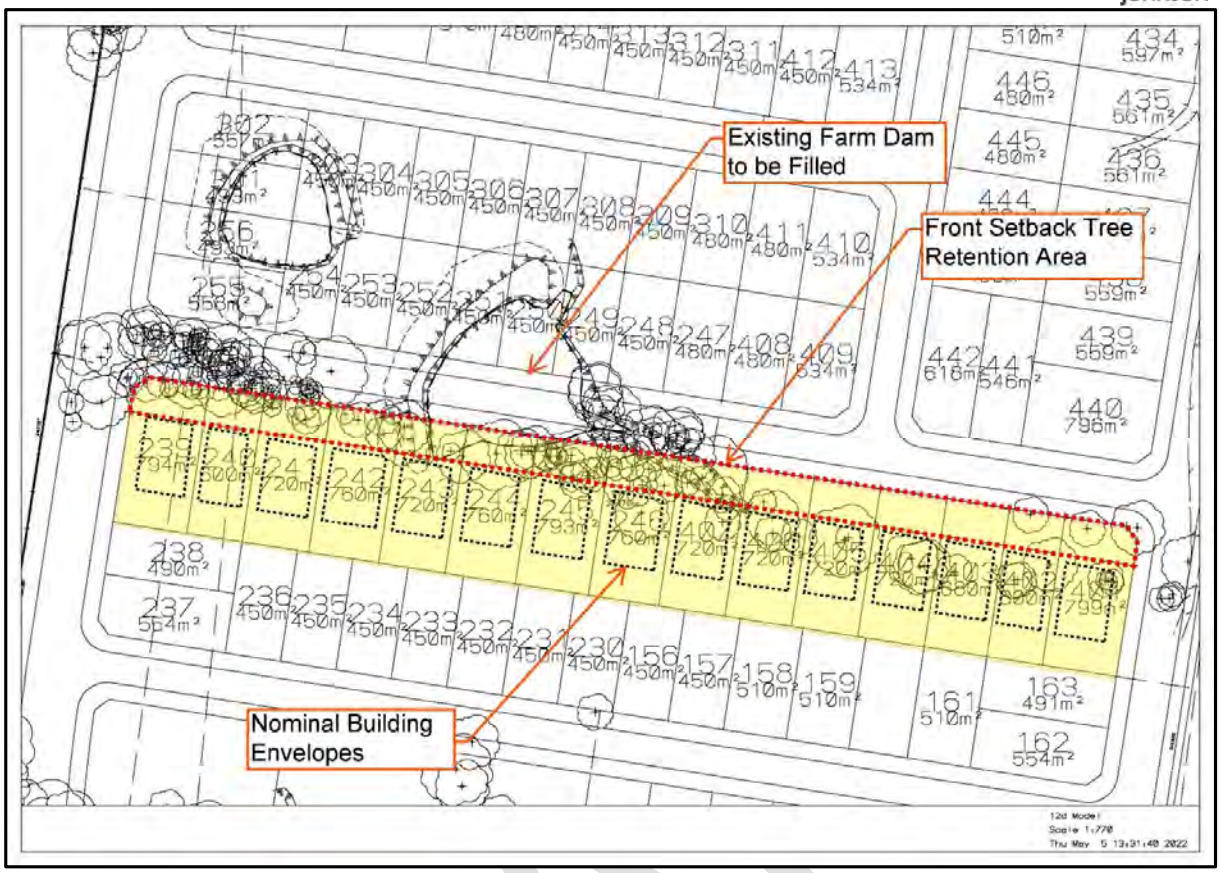

Figure 19 – Intermediate Tree Connectivity Survey.

5.4 C3 CONNECTION VIA OPEN SPACE

Multiple options were explored to connect the two C3 zones on adjacent lots 4 DP1145348 and 33 DP794448, two such options are shown at **Figure 20 and Figure 21**. These options appeared beneficial at first as they kept the open space on the ridgeline but were discounted as they provided very limited biodiversity value on the following basis;

- They maintained very little existing vegetation and required planting of new vegetation which would require many years to mature;
- They did not utilise the existing mature Narrow-leaved Ironbark - Grey Box - Spotted Gum shrub - grass woodland EEC south of the distributor road and as such the mature vegetation is lost and no connectivity is created. In this way our proposed Strategy 2 outlined at **Section 4.2** is superior and was the preferred option

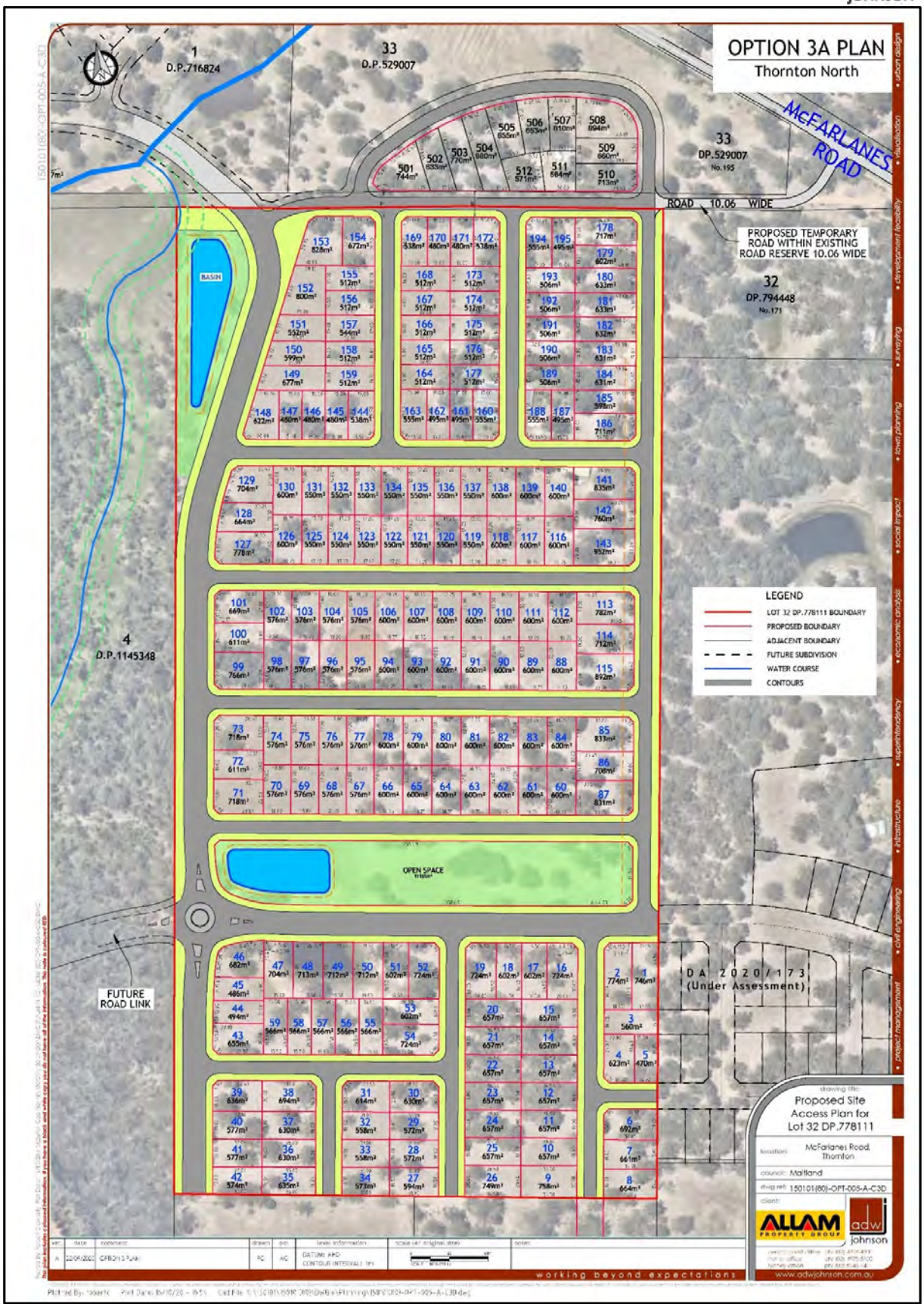

Figure 20 – Redundant Park Connection Strategy 1.

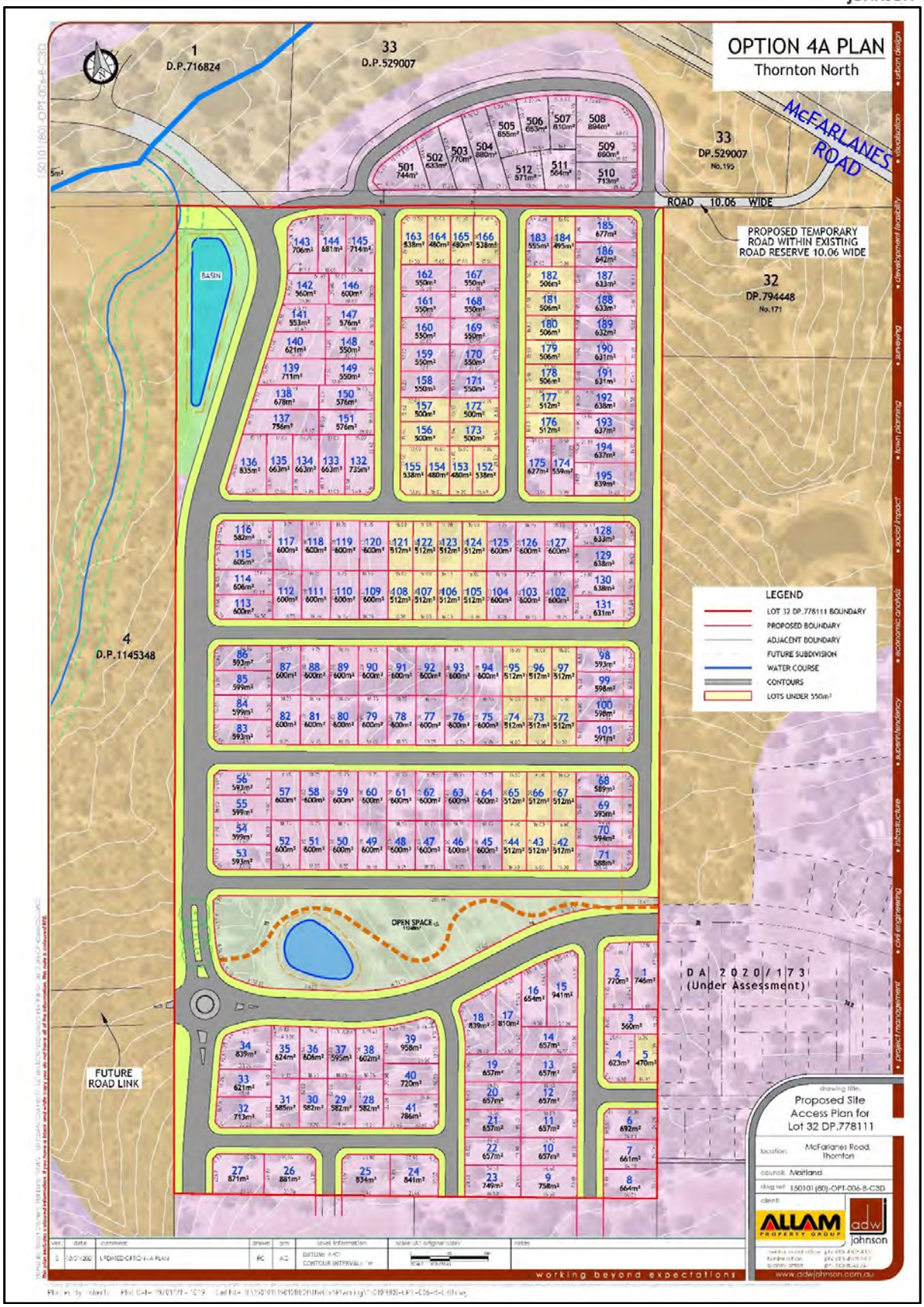

Figure 21 – Redundant Park Connection Strategy 2.

6.0 Opportunity Cost

Employing the avoid and minimise strategies outlined in **Section 4** has the following effects on yield and housing affordability;

- Relinquishment of developable R1 zoned land:
  - Northern Corridor = 5,408 0m^2;
  - Additional Open Space Area = 6,728m^2; and
  - **Total R1 zoned land relinquished = 12,136 m^2.**
- Loss of Yield
  - Lot 3 DP778111 = Loss of 10 lots
  - Lot 31 DP778111 = Increase of 4 lots
  - **Total Loss of Revenue = -$2,580,000**
- Introduction of additional pavement to create a "perimeter road" around the open space = 1,115 m^2;
  - **Total Increase in Construction Cost = $800,000** (accounts for reduction in S7.11 due to loss of yield)
- Additional lots with a BAL-29 construction rating = 19.
  - Nominal cost to upgrade construction to BAL-29 is $30,000 per lot).
  - **Total Cost to Future Home Builders = $570,000**

The above effects on the developability of the site are not incidental. At the time of purchase, it was a reasonable expectation that the maximum yield layout outlined at **Section 5.1** could be achieved as full development of the R1 zoned land (with the exception of riparian corridors) had been achieved on all sites within the TNURA to date.

The need to address the principles of avoid and minimise have arisen unexpectedly, this report demonstrates that we have made a considered and genuine attempt to incorporate them into our development layout over a two-and-a-half-year process which included;

- Ecological Survey and Input;
- Bushfire Input;
- Town Planning & Urban Design Input;
- Engineering Input;
- Location and Ground Truthing of Site Features with Regard to Various Layouts.

It must be stated that the proposed ecological outcomes come at a cost to the developer, in some cases the future home owner and they reduce the capacity to deliver housing supply on residential zoned land in the Maitland LGA to address the needs of population growth and housing affordability.

7.0 Proposed Masterplan

The three avoid and minimise strategies outlined in Section 4.0 have been incorporated into the masterplan alongside our normal greenfield subdivision urban design principles to arrive at the layout shown at Figure 20. This layout forms the basis of the Development Application, the DA subdivision drawing is included at Figure 21 and we consider that it satisfies the requirements of Clause 6.12 of the Biodiversity Conservation Act.


Completed
Development
1
2
3
Approved
Development
Completed
Development

FIGURE 22

240294(70)-PSK-003-A-C3D

DCP ROAD LAYOUT (FUTURE BY OTHERS)

ROAD RESERVE (10.06 WIDE)

McFARLANES ROAD

33 DP.529007 No.195

32 DP.794448 No.171

4 D.P.1145748

BASIN

17m RESERVE (4.5-8-4.5)

22.5m RESERVE (4.5-12.5-5.5)

20.5m RESERVE (4.5-10.5-5.5)

25m RESERVE (4.5-15-5.5)

22m RESERVE (4.5-12-5.5)

LOCAL PARK

FUTURE ROAD LINK

LOT AREA SUMMARY

450m²	3	3	1.2%
451-549	97	100	38.6%
550-649	114	516	45.4%
650-749	32	548	12.7%
>750	5	251	2%

LEGEND

- SUBJECT SITE BOUNDARY
- STAGE BOUNDARY
- PROPOSED BOUNDARY
- ADJACENT BOUNDARY
- FUTURE SUBDIVISION
- WATER COURSE
- CONTOURS

ver.	date	comment	drawn	pm	level information	scale (A1 original size)	notes
A	21/10/2022	INITIAL PUBLIC PARK PLAN	RC	RK	DATUM: AHD CONTOUR INTERVAL: 1m	0 30 60 75m SCALE: 1:1500 (FULL)	

drawing title:

FIGURE 23

location: McFarlanes Road, Thornton

council: Maitland

dwg ref: 240294(70)-PSK-003-A-C3D

client: ALLAM PROPERTY GROUP

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Appendix I BAM Credit Report Summary

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00020497/BAAS17044/20/00020498	20039 - 173 McFarlanes Rd 507 Raymond Terrace Chisholm_20230518	14/04/2023
Assessor Name	**Report Created**	**BAM Data version ***
Matt Doherty	08/06/2023	58
Assessor Number	**BAM Case Status**	**Date Finalised**
BAAS17044	Finalised	08/06/2023
Assessment Revision	**Assessment Type**	**BOS entry trigger**
2	Part 4 Developments (General)	BOS Threshold: Area clearing threshold

* 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.

Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits

Forest Red Gum grassy open forest on floodplains of the lower Hunter												
1	1598_Moderate	Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	55.8	55.8	0.62	PCT Cleared - 0%	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		17
											Subtotal	**17**
Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter												
2	1600_ScatteredTrees01	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	51.5	51.5	10.2	PCT Cleared - 71%	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		262
3	1600_Moderate01	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	64.4	64.4	5	PCT Cleared - 71%	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		161

5	1600_Regenerating	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	52.5	52.5	2.5	PCT Cleared - 71%	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		66
											Subtotal	**489**
Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter												
4	1600_Pasture	Not a TEC	8.5	8.5	6.3	PCT Cleared - 71%	High Sensitivity to Gain			2.00		0
											Subtotal	**0**
											Total	**506**

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

Appendix J Personnel Qualifications

Name	Title	Qualifications	Roles
Matt Doherty	Director	▪ BAM Assessor (#BAAS17044) ▪ B. Landscape Management and Conservation (Soil and Water Management) ▪ Bush Regeneration Cert IV	Review and Approval of Biodiversity Inventory Report. BAM-C
Josh Smart	Ecologist	▪ B. Environmental Science and Management (Honours)	Field work including threatened flora & fauna surveys. BDAR production Targeted field survey methodology determination
Phoebe Smith	Ecologist	• B. Environmental Science and Management (Honours) ▪ Master Environmental Management & Sustainability	Undertake BAM assessment. Undertake BAM calculator assessment. Field work including PCT identification, vegetation mapping, and threatened flora & fauna surveys.
Coral Pearce	Senior Ecologist	▪ BAM Assessor (#BAAS21024) ▪ M. Sc – Mammal Ecology • B. App. Science (Ecology)	BDAR production Undertake BAM Calculator assessment
Chris Spraggon	Senior Ecologist	▪ B. Science (Hons.I) ▪ Cert 3 Conservation Land Management	Field work
Laidlaw Puha	GIS Analyst	▪ B. Science (Earth Sciences)	Produce figures for BIR and Spatial Data Management for Project
Ellen Saxon	GIS Coordinator	▪ B. Environmental Science and Management ▪ Diploma Conservation & Land Management	Produce figures for BIR and Spatial Data Management for Project
Maddy Walsh	Senior Ecologist	▪ B. Environmental Biology (Hons) ▪ BAM Assessor (#BAAS21010)	Field work
Ali Bragg	Field Ecologist	▪ B. Animal Science (Hons)	Field work
Robert Fay	Field Ecologist	▪ B. Environmental Science and Management	Field work
Max Manion-Sharrock	Field Ecologist	▪ B. Environmental Science and Management	Field work
Tom Fletcher	Field Ecologist	▪ B. Environmental Science and Management	Field work
Ross Duncan	Senior Environmental Consultant	▪ B. of Enviro Science & Ecosystem Rehabilitation	Field work Conducted targeted threatened fauna searches