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Biodiversity Development Assessment Report

Proposed Manufactured Home Estate

16 Denton Close and 10 River Road, Windella, NSW 2320

Prepared for: Sable Point Unit Trust

C/- Mavid Development Pty Ltd

19 December 2023

BOAMS: 00044197/BAAS18147/23/00044198

AEP Ref: 3154

Revision: 01

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Document Control

Document Name	Biodiversity Development Assessment Report – Proposed Manufactured Home Estate at 16 Denton Close and 10 River Road, Windella, NSW 2320	
Project Number	3154	
Client Name	Sable Point Unit Trust C/- Mavid Development Pty Ltd	
Accredited Assessor	Ian Benson (BAAS 18147)	
AEP Project Team	Ian Benson Edouard Loisance Natalie Black Dennis Neader Kelly Drysdale Brendon Young	Bonni Yare Stephen Curry Byron de Jager Oscar Anderson Warwick Muir Thomas Stephens

Revision

Revision	Date	Author	Reviewed	Approved
Draft	14/12/2023	Edouard Loisance Brendon Young	Ian Benson	Ian Benson
01	19/12/2023	Edouard Loisance Brendon Young	Ian Benson	Ian Benson

Distribution

Revision	Date	Name	Organisation
Draft	14/12/2023	Chris Speek	Mavid Development Pty Ltd
01	19/12/2023	Chris Speek	Mavid Development Pty Ltd

Executive Summary

Anderson Environment & Planning (AEP) was commissioned by Mavid Development Pty Ltd on behalf of Sable Point Unit Trust Pty Ltd (the Proponent) to undertake a Biodiversity Development Assessment Report over land identified as 10 River Road, Windella, NSW (Lot 9 DP553872) and 16 Denton Close, Windella, NSW (Lot 1 DP 245953). The Subject Site is located in the Maitland City Local Government Area (LGA) and is currently zoned RU2 – 'Rural Landscape'.

This report has been prepared to meet the requirements of the Biodiversity Assessment Method (BAM) 2020 established under Section 6.7 of the NSW *Biodiversity Conservation Act 2016*. This assessment utilises methods detailed within the BAM Order 2020 to identify biodiversity values inherent within the Subject Site, including known and potentially occurring threatened species and ecological communities, and quantifies impacts of the proposal upon these values. Further to this, given the history of the site, the report has also utilised Appendix D of BAM Order 2020 to assess Planted Native Vegetation on site.

Native vegetation proposed to be removed as part of this development consists of Plant Community Type (PCT) 3328 *Lower Hunter Red Gum-Paperbark Riverflat Forest* which occurs as two (2) vegetation zones:

- PCT 3328 – Degraded condition
    - This vegetation zone totals 4.47ha in area and consists primarily of a native dominated upper stratum, a near-absent shrub layer and a highly managed and largely exotic or non-endemic lower stratum;
    - It is associated with BC Act listed Endangered Ecological Community *Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions*;
- PCT 3328 – Severely degraded grassland
    - This vegetation zone totals 1.85ha in area and consists primarily of grassland with limited native cover, a near-absent shrub layer and no upper stratum. It occurs to the south and south-west of the dwelling currently located within Lot 9 DP553872;
    - It was not deemed to be associated with any Threatened Ecological Community.

The remainder of the Subject Site comprises the following areas:

- 6.53ha of native planted vegetation, primarily comprising *Cynodon* spp. grassland and ornamental native and exotic shrubs and trees;
- 1.23ha of developed and cleared lands; and
- 0.2ha consisting of an ephemeral dam and a permanent dam, both human-made.

To offset residual impacts of the proposal upon identified vegetation zones, the proposal would require retirement of a total of 71 ecosystem credits of PCT 3328.

Flora and fauna species recorded were typical of those expected in this locality and in this type of degraded habitat with limited connection to larger patches of habitat offsite. Threatened species Grey-headed Flying-fox was recorded on site but was not considered to be utilising the site for breeding purposes. No other threatened species were identified. However, considering that the present report was lodged prior to completion of targeted surveys, five (5) threatened species were assumed present, with credits being incurred as follows:

- Eastern Pygmy-possum (71 credits);
- Large-eared Pied-bat (106 credits);
- Green and Golden Bell Frog (57 credits);
- Green-thighed Frog (18 credits); and
- Squirrel Glider (71 credits).

At time of writing of the present report, surveys were scheduled for the above species, and addenda to the report will be issued upon completion of such surveys, to confirm where the species are indeed present or absent. Where applicable, credit liabilities will also be updated.

Considerations of Avoid & Minimise have been applied with the proposed development being located within predominantly cleared exotic paddocks and degraded remnant woodland. Impacts to native vegetation were deemed to be of minimal consequences due to the very low Vegetation Integrity Score (VIS) for all vegetation zones present onsite. Furthermore, the installation of compensatory habitat in the form of nest boxes to mitigate the removal of hollow-bearing trees will be undertaken where required.

Assessment of the proposal under other relevant environmental policy instruments including *State Environmental Planning Policy Biodiversity and Conservation) 2021 – Chapter 3 Koala Habitat Protection 2020*, *the* NSW Water Management Act 2000 and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* was undertaken. A Controlled Activity Approval under the WM Act was considered likely to be required due to potential impacts proximate to a watercourse adjacent to the south-western boundary of the Subject Site. Furthermore, a referral under the *EPBC Act* was deemed unlikely to be necessary for this development.

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Study Certification and Licensing

The fieldwork was undertaken by staff identified in the table below. The report was written by Edouard Loisance, Dip CALM & MMgt, and Brendon Young, BSc (Fisheries), M Env Mmgt Grad Cert Fish Conservation and Mgmt; and reviewed and certified by Ian Benson, BEng (Civil) and GradDipSc (Ecology) (BAAS:18147) of Anderson Environment & Planning.

Staff	Title/Qualification	Tasks
Ian Benson	Principal Ecologist and Business Manager BEng (Civil); GradDipSc (Ecology) BAAS 18147	Scientific advice Review and Certification
Edouard Loisance	Lead Ecology Works Manager Mmgt, Dip CALM	Report writing, project management, GIS
Natalie Black	Senior Environmental Manager BSc (Hons), Master Planning, TAE, BAppSc (Wildlife Science; Cert III Animal Care BAAS 19076	Technical advice
Dennis Neader	Senior Ecologist BSc (Env Geo)	Habitat assessment, fauna survey
Brendon Young	Ecologist BSc (Fisheries), M Env Mmgt Grad Cert Fish Conservation and Mgmt	Report writing, GIS, fauna and flora survey
Kelly Drysdale	Ecology Project Manager Ass.Dip. App Sc, Grad Cert BA, TAE	Project management
Byron De Jager	Ecologist BSc (Sus Res Mmgt), Cert 3 Lnd Mmgt	Fauna and flora survey
Ben Graham	Ecologist BEnvSc & Mmgt	GIS, report writing
Bonni Yare	Ecologist / Botanist BSc (Natural Resource Mgmt)	BAM Plots, PCT determination
Thomas Stephens	Ecologist / Arboriculture BEnvSc & Mmgt	Tree survey, BAM Plots
Samuel Rayfield	Ecologist Dip Conservation Land Mgt	Fauna and flora survey
Oscar Anderson	Ecologist BEnvSc & Mmgt	Fauna and flora survey
Stephen Curry	Ecologist / Botanist BEnvSc & Management	BAM Plots, PCT determination

Research was conducted under the following licences:

- NSW National Parks and Wildlife Service Scientific Investigation Licence SL101313;
- Animal Research Authority (Trim File No: 14/600(2)) issued by NSW Agriculture; and
- Animal Research Establishment Accreditation Number 53724.

Conflict of Interest:

The BAM assessment and this BDAR have been undertaken in line with the Accredited Assessors Conflict of Interest and professional behaviour code. There are no known conflicts of interest between AEP staff or Directors and the proponent of the development.

Certification:

As the Accredited Assessor, I, Ian Benson, make the following certification:

- This report has been written to comply with the requirements of the BAM 2020 and obligations outlined within the BAM Assessor Code of Conduct and includes, in the opinion of the writer, a true and accurate account of the species recorded, or considered likely to occur within the Subject Site, and inferences of such for biodiversity credit calculations;
- Anderson Environment and Planning have no actual, potential or perceived conflicts of interest with Mavid Development Pty Ltd. Anderson Environment and Planning has received commercial payment for consulting services and assessment by Mavid Development Pty Ltd for this project.
- BAM Assessment methodology, as well as Commonwealth, state and local government policies and guidelines formed the basis of project surveying methodology, unless specified departures from industry standard guidelines are justified for scientific and/or animal ethics reasons;
- All research workers have complied with relevant laws and codes relating to the conduct of flora and fauna research, including the *Animal Research Act 1995*,*BC Act 2016* and the Australian Code of Practice for the Care and Use of Animals for Scientific Purposes.

Reviewer and Certifier:

Ian Benson

Director & Principal Ecologist

Anderson Environment & Planning

BAAS no. 18147

BOAMS Ref: 00044197/BAAS18147/23/00044198 Revision 02

19 December 2023

Glossary of Terms

APZ	Asset Protection Zone
Assessment Area	Area covering a 1500-metre buffer around the Subject Site, as defined in Section 3.1.2 item 1. (b) of the BAM.
BAM	*Biodiversity Assessment Method Order* (2020) that determines: Methodology applicable to quantifying biodiversity values inherent within a development site; Avoid and mitigation efforts required to be employed as part of any development proposal; and Number and class of credits required to offset residual impacts of the proposal upon the biodiversity values therein.
BAM Calculator (BAM-C)	The online tool used to interpret site survey data and regional location information to quantify ecosystem and species credits required / generated at a development / stewardship site.
BC Act	The NSW *Biodiversity Conservation Act 2016.*
Biodiversity Credit Report	Specifies the number and type of biodiversity credits required to offset the impacts of a development.
Biodiversity credits	Ecosystem or Species Credits required to offset the loss of biodiversity values on a development site.
Biodiversity offsets	Specific measures that are put in place to compensate for impacts on biodiversity values.
Biodiversity values	The composition, structure and function of ecosystems, and threatened species, populations and ecological communities, and their habitats.
BVL	Biodiversity Values Land as mapped by DPE in the Biodiversity Values Map and Threshold Tool
BRW	Biodiversity Risk Weighting
BOS	The NSW Biodiversity Offsets Scheme
BV Map	The NSW DPE Biodiversity Values Map
CEEC	Critically Endangered Ecological Community
Council	Maitland City
DAWE	The former Commonwealth Department of Agriculture, Water, and the Environment
DCCEEW	The Commonwealth Department of Climate Change, Energy, the Environment and Water
DECC	The former NSW Department of Environment and Climate Change
DPIE	The former NSW Department of Planning, Industry and Environment
DPE	The NSW Department of Planning and Environment
Ecosystem credit	The class of biodiversity credits created or required for the impact on EECs, CEECs and threatened species habitat for species that can be reliably predicted to occur within a vegetation type.
EEC	Endangered Ecological Community
EPBC Act	The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999.*
IBRA	Interim Biogeographic Regionalisation for Australia
HBT	Hollow-bearing tree as defined by the former DECC (2007)
BC SEPP	State Environmental Planning Policy (Biodiversity and Conservation) 2021 Chapter 3 Koala Habitat Protection 2020

HR SEPP	State Environmental Planning Policy (Hazard and Resilience) 2021 Chapter 2 Coastal Management.
OEH	The former NSW Office of Environment and Heritage.
PFC	Percentage Foliage Cover
Subject Site	The development footprint totalling 14.3h and depicted in **Figure 1** and **Appendix A**. This equates to the entirety of combined Lot 9 DP553872 and Lot 1 DP245953.
Species credit	Class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area based on habitat surrogates.
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community
VIS	Vegetation Integrity Score

1.0 Stage 1 – Biodiversity Assessment

1.1 Introduction

At the request of Mavid Development Pty Ltd on behalf of Sable Point Unit Trust (the proponent), Anderson Environment & Planning (AEP) have undertaken a Biodiversity Development Assessment Report and a Streamlined Biodiversity Development Assessment Report – Planted Native Vegetation (SBDAR - Planted) over land identified as 10 River Road, Windella, NSW (Lot 9 DP553872) and 16 Denton Close, Windella, NSW (Lot 1 DP245953), located within the Maitland City LGA. The Subject Site is currently zoned RU2 – 'Rural Landscape'.

This report has been prepared to meet the requirements of the Biodiversity Assessment Method (BAM) 2020 established under Section 6.7 of the NSW *Biodiversity Conservation Act 2016*. This assessment utilises methods detailed within the BAM Order 2020 to identify biodiversity values inherent within the site, including known and potentially occurring threatened species and ecological communities, and quantifies impacts of the proposal upon these values.

1.1.1 Biodiversity Offset Scheme Threshold Trigger

This BDAR has been triggered as required by Clause 7.1 *Biodiversity Conservation Regulation 2017* by the following threshold:

- 7.2 (1)(a) *the clearing of native vegetation of an area declared by clause 7.2 as exceeding the threshold.*

Therefore, a BDAR is required, an assessment in accordance with Stage 1 and Stage 2 within Biodiversity Assessment Method Order 2020 (BAM Order).

1.1.2 Assessment Scope

The BDAR presented herewith aims to quantify impacts of the proposal upon biodiversity values based on the methods described within the *Biodiversity Assessment Method Order 2020* (BAM Order), including threatened entities listed under the NSW *Biodiversity Conservation Act 2016* (BC Act).

Where applicable, parts of the impact area were assessed using the streamlined assessment – planted native vegetation module of the BAM.

The two assessment pathways have been adopted considering the history of the site and nature of planted vegetation on site and is considered the most appropriate assessment methods for the site.

This report includes:

- **Stage 1 – Biodiversity Assessment** – including area limits, mapping of remnant vegetation communities within the location of previously identified threatened species and their habitats, and a list of threatened species, populations, and communities with a likelihood of occurrence; and
- **Stage 2 – Impact Assessment** – identification of impact avoidance and mitigation measures, and the quantifying of offset requirements in the form of biodiversity credits based upon residual impacts of the proposal.

1.1.3 The Proposal

The proposal is for a Manufactured Home Estate (MHE) within 10 River Road, Windella, NSW (Lot 9 DP553872) and 16 Denton Close, Windella, NSW (Lot 1 DP245953). The development area is currently zoned RU2 – Rural Landscape. The proposed development will require the removal or modification of approx. 6.3ha of native vegetation (including 1.9ha that comprise severely degraded grassland). The proposed development plan is included in **Appendix A**.

1.1.4 General Description of the Subject Site

The Subject Site is located on land currently used for residential and ecotourism purposes, with various domesticated animals kept within fenced paddocks, particularly within Lot 1 DP245953. The Subject Site is adjacent to the New England Highway in the south (zoned SP2 – Classified Road), Maitland Airport to the east (zoned SP1 – Aerodrome), and rural residential properties to the north and west (zoned R5 – Large Lot Residential).

The site generally shows evidence of disturbance through grazing, use as residential backyards, and regular slashing and mowing for landscaping and bushfire hazard management purposes.

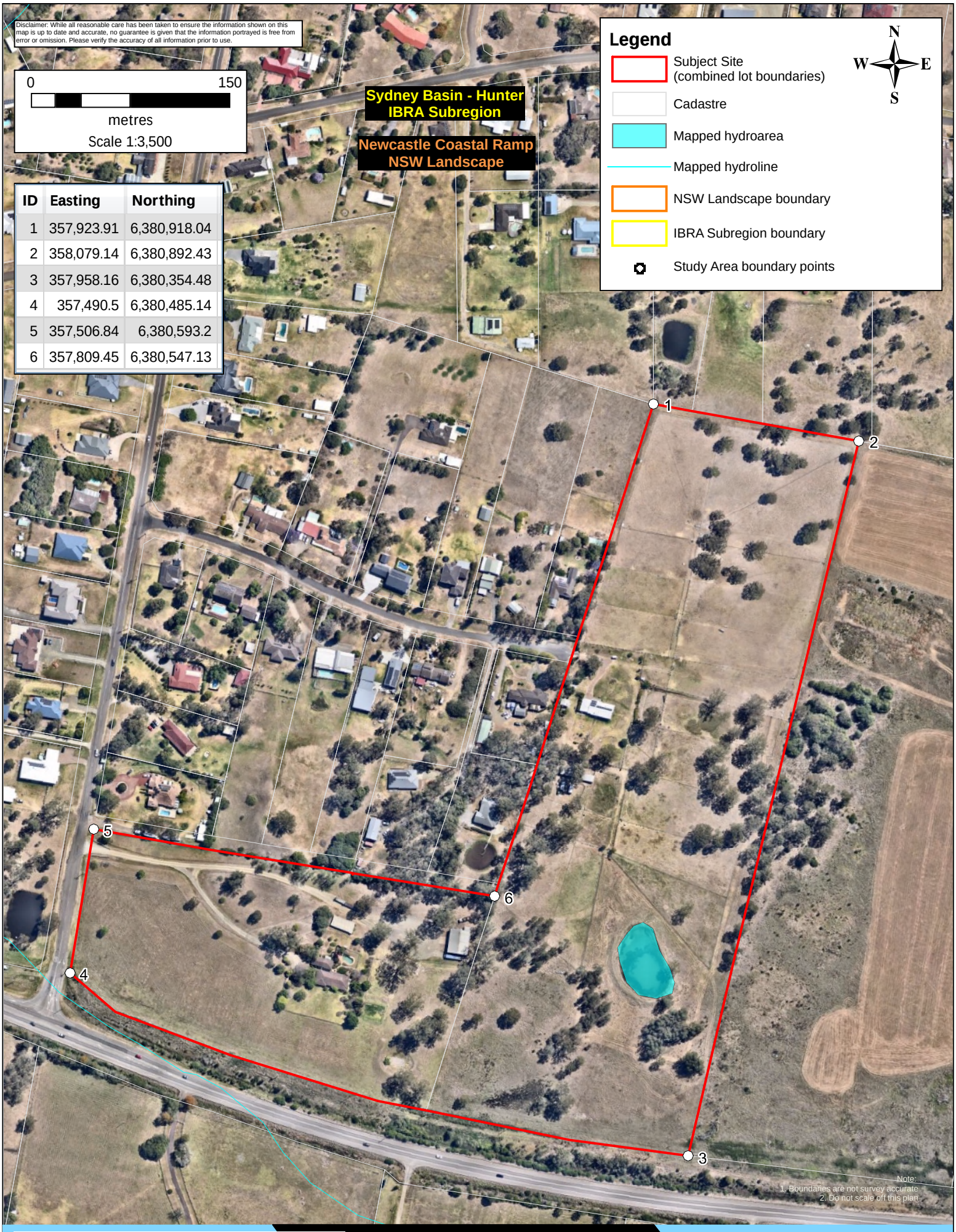
1.1.5 Site Particulars

Refer **Table 1** for site particulars.

Table 1 – Site Particulars

Detail	Comments
Client	Sable Point Unit Trust C/- Mavid Development Pty Ltd
Address	10 River Road and 16 Denton Close, Windella, NSW
Titles	Lot 9 DP553872 and Lot 1 DP245953
Subject Site	Comprises the entirety of Lot 9 DP553872 and Lot 1 DP245953, totalling 14.27ha. The entire property is proposed to be developed.
LGA	Maitland City
Zoning	Under the Maitland Local Environmental Plan 2011 (the LEP) (pub. 10-11-2023), the Subject Site is zoned RU2 – Rural Landscape.
Current Land Use	The Subject Site is currently used for residential and ecotourism purposes. The lot to the west comprises a dwelling, associated residential infrastructure and landscaped gardens. The lot to the east comprises large fenced paddocks with domesticated animals, as well as disturbed remnant woodland.
Surrounding Land Use	Surrounding land comprises the New England Highway to the south (zoned SP2), Maitland Airport to the east (zoned SP1), and rural residential properties to the north and west (zoned R5).

Figure 1 depicts the Subject Site and Subject Site. **Figure 2** depicts the Subject Site and Assessment Area, with associated landscape features.



ID	Easting	Northing
1	357,923.91	6,380,918.04
2	358,079.14	6,380,892.43
3	357,958.16	6,380,354.48
4	357,490.5	6,380,485.14
5	357,506.84	6,380,593.2
6	357,809.45	6,380,547.13

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Figure 1: Site Map

Date: Dec 2023

Location: 16 Denton Close and 10 River Road, Windella

Client: Mavid Development Pty Ltd

BOAMS Ref: 44198
AEP Ref: 3154

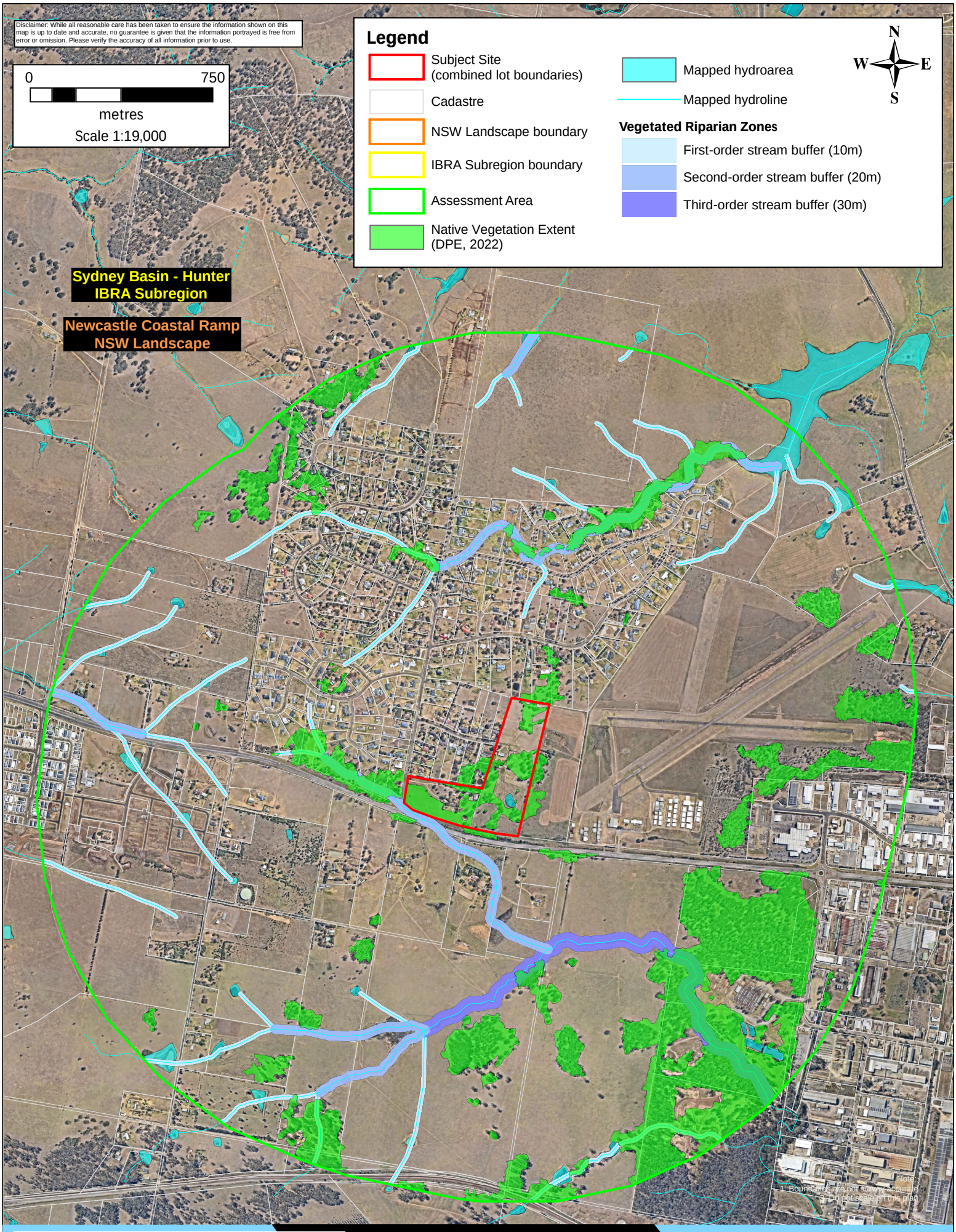

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Figure 2: Location Map

Date: Dec 2023

Location: 16 Denton Close and 10 River Road, Windella

Client: Mavid Development Pty Ltd

BOAMS Ref: 44198
AEP Ref: 3154

1.1.6 Geology and Soils

Reference to the 1:100,000 Sheet Soil Landscapes (eSPADE) of the Subject Site indicates that the site is primarily located within the following Soil Landscapes;

- Branxton Soil Landscape; and
- Lochinvar Soil Landscape.

The Branxton Soil Landscape encompasses the majority of the Subject Site and is characterised as follows:

- Landform – Undulating rises to low hills and creek flats. Elevations range from 50 – 80 m, and slopes from 3 – 5%. Slope lengths are up to 600 m. Local relief is 10 – 40 m. Much of this landscape has drainage lines, spaced at 400 – 1,500 m intervals.
- Soils – Yellow Podzolic Soils (Dy5.41) on midslopes with Red Podzolic Soils (Dr3.21) on crests. Yellow Soloths (Dy4.41, Dy3.41) occur on lower slopes and in drainage lines. Alluvial Soils (sands – Uc1.22) occur in some creeks with Siliceous Sands (Uc4.22) on flats within large valleys.

The Lochinvar Soil Landscape roughly encompasses the western two thirds of Lot 1 DP245953 and is characterised as follows:

- Landform – Undulating rises with elevation ranging from 20 – 80 m. Local relief is around 20 m, with slope gradients of 4 – 6%. Average slope lengths are 800 – 1,000 m. Drainage lines occur at 400 – 800 m intervals.
- Soils – Non-calcic Brown Soils (Db1.12) on the gentle slopes with Brown Podzolic Soils (Db2.11, Db1.41) on the steeper areas. There are Yellow Solodic Soils (Dy2.12) on the mid to lower slopes of the steeper hills and in some drainage lines.

1.1.7 Information Sources

Information and spatial data provided within this BDAR has been compiled from various sources including:

- Aerial Photograph Interpretation (API) of the site and surrounding locality (Google 2023; Nearmap 2023, DCS 2023);
- State Vegetation Type Map (DPE, 2022a);
- Applicable State survey guidelines: DEC 2004, DPIE 2020c, DPIE 2020d, DPE 2022b, OEH 2018;
- DPE Threatened Biodiversity Profiles (https://www.environment.nsw.gov.au/threatenedSpeciesApp/);
- PlantNET NSW (http://plantnet.rbgsyd.nsw.gov.au/);
- Collective knowledge gained from previous ecological surveys and assessments in the locality; and
- Anecdotal records.

In addition, database searches were carried out, namely:

- Review of flora and fauna records held by the DPE BioNet Atlas of NSW Wildlife within a 100km^2 search area with the Subject Site at its centre (December 2023);
- Review of flora and fauna records held by the DCCEEW Protected Matters Search within a 5km radius of the site (December 2023); and
- Review of the Important Habitat Map (DPE, 2023c).

1.2 Landscape Features

1.2.1 Regional Landscapes

The Subject Site was identified as occurring within the following landscape areas:

- *IBRA Bioregion* – Sydney Basin;
- *IBRA Subregion* – Hunter; and
- *NSW Landscape* –Newcastle Coastal Ramp.

Delineation of NSW Landscape areas are shown in the Location Map (**Figure 2**).

1.2.2 Identified Landscape Features

The BAM Calculator identifies nine (9) landscape features that require assessment for their relevance to the Subject Site. These features are outlined in **Table 2**.

Table 2 – Landscape Feature Assessment

Landscape Feature	Assessment
Rivers and Streams	There are two (2) farm dams located within the Subject Site (refer **Figure 1** and **Figure 2**). The dam in the south-east is permanently in use, although formed artificially in the late 1980s as indicated by a review of historical aerial imagery (DCS, 2023). This dam does not bear notable biodiversity values and is largely devoid of native vegetation. A second dam occurs in the western lot, south-east of the dwelling. It is an ephemeral dam that only fills after significant rainfall, as indicated by a review of Nearmap imagery. Historical aerial imagery also indicates it is an artificially made dam.
Wetlands	The Subject Site does not contain wetlands.
Native Vegetation Extent	Approximately 6.3ha of native vegetation occurs within the Subject Site and are proposed to be entirely cleared or modified for APZ purposes. Native vegetation within the Subject Site occurs as PCT 3328 - *Lower Hunter Red Gum-Paperbark Riverflat Forest*, in various conditions, being: Degraded condition, and Severely degraded grassland. The remainder of vegetation on site was deemed to be planted native vegetation, with non-endemic pasture species *Cynodon dactylon* dominating those areas. PCT 3328 is potentially associated with two BC Act listed EECs, namely *Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions* and *River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions*. Under Federal legislation, it is potentially associated with CEEC *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria.* An assessment of vegetation zones against the BC Act scientific determinations of the above TECs is included in **Section 1.4.10**. An assessment under the provisions of the EPBC Act is included in **Appendix H**.
Connectivity Features	The Subject Site lies within a fragmented semi-rural area in Windella. Connectivity to offsite areas of native vegetation is sparse, with woodland in the north-east of the Subject Site connected with a small patch of canopy-only vegetation in the adjacent eastern lot. Disturbed connectivity is also present in the north-west, with a patch of canopy-only vegetation located in adjacent lots in the west. Further west and south, roads interrupt connectivity with vegetation locality. Therefore, connectivity is generally poor and patches of potential habitat near the site are also subject to disturbance and fragmentation.

Landscape Feature	Assessment
	Connectivity to areas of native vegetation outside the Subject Site is shown on **Figure 2**.
Karst, Caves, Crevices, Cliffs, Rock, and other Geological Features of Significance	There are no identified karst, caves, crevices, cliffs, rock, and other geological features of significance within the Subject Site.
NSW Landscape	The site is located within the Newcastle Coastal Ramp landscape. This is depicted in the Site Map (**Figure** 1) and the Location Map (**Figure 2**).
Soil hazard features	None known on site.
Features identified in SEARs for major projects	No SEARs apply to this proposal.
Areas of Outstanding Biodiversity Value (AOBV) under the BC Act:	No AOBV are present on the Subject Site or adjacent lands.

1.3 Site Context Components

1.3.1 Method

Site layout allowed for the landscape values to be determined based upon a site-based method, rather than that of a linear method.

1.3.2 Landscape Native Vegetation Cover

In accordance with Section 3.1.2, item 1. (b) of the BAM, a 1500m buffer was placed around the site, totalling approx. 996.7ha. Of this, approximately 125ha comprises native vegetation as per Section 3.2 of the BAM (**Figure 2**). This equates to approximately 12.5% native vegetation cover and was entered as such within the Calculator.

1.4 Native Vegetation

1.4.1 State Vegetation Type Mapping

A review of DPE's State Vegetation Type Map (2022) was undertaken, and results are shown in **Table 3** and **Figure 3**.

Table 3 – Plant Community Types from the State Vegetation Type Map

Plant Community Type	Area (ha)
Not native vegetation	10.1
3433 - Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest	0.006
3442 - Lower Hunter Lowland Ironbark-Paperbark Forest	4.1
Total	**14.3**

Plant Community Types as mapped by DPE and related profiles informed field survey effort including the ground-truthing of vegetation zones within the Subject Site. Details of the PCT as they were determined on site are presented in **Section 1.4.3**.

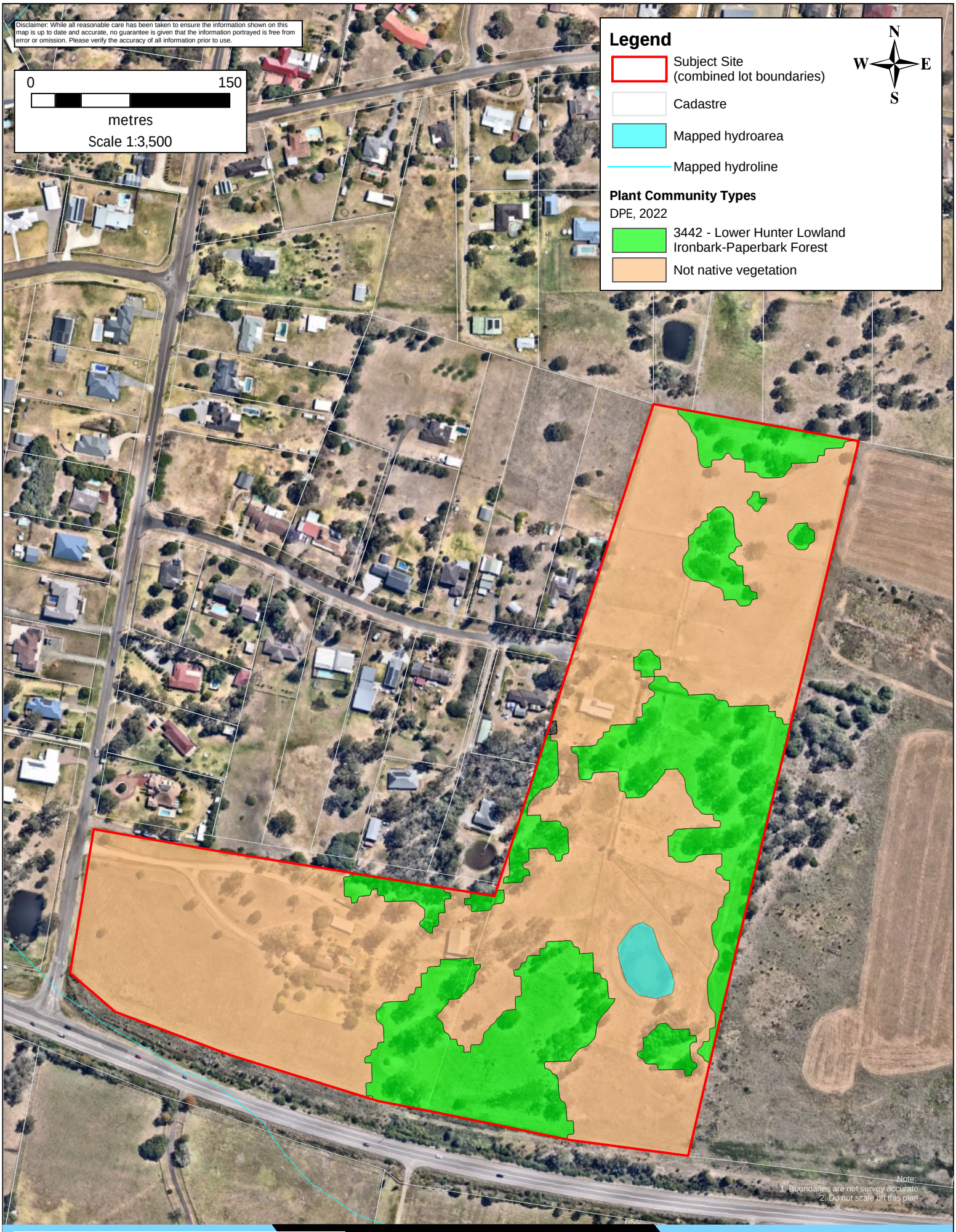

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Figure 3: State Vegetation Type Map

Date: Dec 2023

Location: 16 Denton Close and 10 River Road, Windella

Client: Mavid Development Pty Ltd

BOAMS Ref: 44198
AEP Ref: 3154

1.4.2 Plot Based Floristic Surveys

Plot-based floristic surveys were undertaken by AEP in December 2022 and March 2023 to identify the most likely Plant Community Types within the Subject Site. The surveys were stratified and targeted to assess the expected environmental variation and address any areas with gaps in existing mapping and information. Surveys included:

- Ground-truthing of regional vegetation mapping to identify all vegetation communities present onsite as well as segregate vegetation zones according to condition and current management practices.
- Identification of all vascular plant species encountered during fieldwork. Subject Site coverage was both systematic to ensure all key points of the site were checked, and therein the Random Meander Technique (Cropper 1993) was utilised to maximise species encountered.
- The plot-based floristic vegetation survey is based on a 20m × 20m plot (or 400m^2 equivalent for linear areas). The assessor must assess the plot for the information contained in Table 1 of BAM 2020 and record the data in the BAR.
- Twelve (12) BAM plots were undertaken on site as follows, and are shown on **Figure 4**:
    - Plots 1, 2, 3, 8 and 9 were undertaken in a low-condition variant of PCT 3328, where the understorey is regularly subjected to landscaping, mowing or grazing;
    - Plots 4, 5, 6, 7, 11 and 12 were undertaken in a zone deemed to be largely planted with *Cynodon dactylon* and other ornamental species (particularly in the western lot);
    - Plot 10 was undertaken in a severely degraded grassland variant of PCT 3328.
- All plots were located randomly following a preliminary site inspection. Plot locations were adjusted to consider factors such as ecotones and proximity to disturbed edges.
- Field sheets and tabulated data are provided in **Appendix D**. Survey effort including plot location is depicted in **Figure 4**. A summary of the plot data and a flora list for all flora species is provided in **Appendix B**.

1.4.3 PCT Selection Justification

The BAM requires the identification of the PCT or the most likely PCTs, and all TECs, on the Subject Site. The identification must be in accordance with the NSW PCT classification as described in the BioNet Vegetation Classification system. The identification of TECs must be consistent with the NSW Threatened Species Scientific Committee Final Determination for the TEC.

Diagnostic species recorded on site during fieldwork that support the determination of PCTs are shown in **Tables 5** and **6** below.

As 6.53ha of vegetation present within the Subject Site was classified as 'Planted Native Vegetation', an assessment under the provisions of *Appendix D: Streamlined Assessment Module – Planted Native* of the BAM was undertaken (refer **Sections 1.4.4** and **1.4.5,** and **Table 4**). The Planted Native Vegetation Module may be used in conjunction with the standard BAM to assess parts of the Subject Site under a single Biodiversity Development Assessment Report (BDAR). The Module is divided into the following parts:

- D.1 – Decision-making key – to identify whether a standard BAM or a streamlined assessment is required
- D.2 – Assessment of planted native vegetation for threatened species habitat.

D.1 of the Module is used to assess if D.2 applies. If Questions 1–3 of the decision-making key are not applicable to the planted native vegetation, apply D.2 – Assessment of planted native vegetation for threatened species habitat. Assessment of planted native vegetation for threatened species habitat has

been completed in accordance with appendix D2. This vegetation type is not required to be further assessed using the BAM, and was thus excluded from any credit or offset calculations.

A total of 6.32ha of the native vegetation within the Subject Site is assessed as being disturbed remnant native vegetation and was further assessed using the BAM, with residual impacts to this vegetation incurring biodiversity offsets credits.

1.4.4 Non-endemic vegetation assessment – *Cynodon dactylon*

The Subject Site largely comprises *Cynodon dactylon* groundcover, which illustrates the historic use of both lots for grazing purposes.

PlantNET, 2023 describes *Cynodon Dactylon* as a rhizomatous and/or stoloniferous mat-forming perennial, to 0.3 m high, rooting at the nodes; culms erect or geniculate. Being distributed widespread through all states and very common; widely cultivated as a lawn grass and for pasture. PlantNET does not discuss the origin of the species as it does with many other natives and non-natives. This is likely to the high level of debate that surrounds the species.

The debate of the origins of the species started back in 1810 with Robert Brown describing samples he had collected as an introduced species and also by Woolls in 1867, who wrote, *Cynodon Dactylon* was rapidly replacing the native grass *Themeda australis* in grazing areas, considering the species to be introduced from the East indies (Langdon, 1954). Langdon also presented the case that associated fungal parasites of *Cynodon dactylon* are a rust and a smut, fungi whose arrival in Australia appears in the early 1800's, soil records show it was not present in before this time. Therefore, Langdon (1954) concluded it was introduced as fodder for livestock.

Friedel, 2017, also states that the species was "deliberately introduced into Australia for use in crops, pasture, gardens and horticulture". More recently Identic Pty Ltd, 2016, stated "*the species most probably originated from sub-Saharan Africa and/or on islands in the western parts of the Indian Ocean*".

The Commonwealth Department of the Environment (2023), *The community of native species dependent on natural discharge of groundwater from the Great Artesian Basin in Community and Species Profile and Threats Database, Department of the Environment*, states in Sections 11.1, 11.3 that the *Cynodon dactylon* (non-native):

> *The species has become dominate in most communities even wetlands in the western division of NSW. It can survive in times of drought and other harsh conditions such as saline soils, floods, etc and given it is thought to have been introduced in the 1800s it has replaced other native species that may not have been identified, resulting some species in the western division being dependant on its presence, such as Night Parrot, Dusky Hopping Mouse and Plains Wanderer. Hence the Department of the Environment (2023), provides guidance measures on how to manage the species and return native grasses to these environments with a focus on the Great Artesian Basin.*

The Department of Primary Industries (Agricultural), 2023, Local Land Services and Department of Industry and Investment, promotes the planting / sowing of *Cynodon dactylon* at a rate of 6-10kg on well drained and alluvial soils. The species tolerates saline, heat conditions, drought tolerance, flood tolerant. *Cynodon dactylon* can adapt to all conditions such as shade, full sun and even wetter areas. (Department of Industry and Investment, 2011). The species has great pasture features, such as ability to adapt and high tolerance to a changing environment, it also binds soils and prevents erosion and provides fodder for domestic stock annually and it is readily available. Hence its high use in the Hunter catchment for pasture improvement (Department of Primary Industries, 2023).

Within the Hunter *Cynodon dactylon* is heavily used for turf or lawn. Turf farms throughout the region farm the species. The qualities listed by Department of Primary Industries, 2023, ability to adapt and high tolerance to a changing environment, it binds soils and prevents erosion and its readily available in all forms from seed to turf makes the species highly used. The species is also used in large subdivisions as it is quick growing, it is tough and mat-forming rhizomes which binds the soils, it tolerates heat and full sun and the matting rhizomes limit other species such as weeds colonising the new lots.

Morgan, 1998 has researched the decline in species of *Themeda* species within grasslands, *Cynodon dactylon* and other invasive species were dominating especially in areas of higher soil phosphorus. Morgan, 1998, considered this change as being permanent naturalising these species, recommending management actions to reduce if not eradicate the species due their invasive properties and the

significant reduction in diversity of natives. Such management actions are applied throughout the Hunter Catchment within the Bush Regeneration field. *Cynodon dactylon* is a target species for eradication, it is considered an invasive weed. The species prevents diversity within a community with its ability to matt the top 10cm of topsoil, prohibiting orchids, herbs and forbs from persisting. The reduction in diversity within a Bush Regeneration site results in targets not being achieved and limits fauna use.

AEP recognises the importance of the species in the western division of NSW as listed species have become dependent on the species. However, also supports the Commonwealth decision to list the species as non - native especially in the eastern division of the state with a focus on the Hunter Catchment Area where the species is known to dominate grazing lands and known to invade endemic Plant Community Types (PCTs) reducing biodiversity. Recognising the species as an endemic native, will significantly impact the Regeneration within the Hunter halting the progression to eradicate the species from the communities. AEPs collective knowledge and expertise within the Hunter Catchment Area do not agree with the species being considered a native species within Hunter Catchment Area.

1.4.5 Planted Native Assessment

While *Cynodon dactylon* is considered native under the NSW herbarium, this species is listed as a widely cultivated native species (DPE, 2022) as a lawn and pasture grass. The site has historically been managed for agricultural grazing whereby this species was likely sown and is generally assumed as such east of the Dividing Range. As such, *Cynodon dactylon* (Common Couch) present within the Subject site was classified as 'planted native vegetation' and BAM 2020 Appendix D applied (**Table 4).** This vegetation type is not required to be further assessed using the BAM and was thus excluded from any credit or offset calculations.

It is noted that throughout this BDAR and the PCT determination contained within, the species has been referred to as *Cynodon dactylon*, however within the BAM-C it was entered as *Cynodon Sp.* to delineate that it is a non-endemic species as the only option.

AEP acknowledges that Maitland City Council are reviewing this species for the LGA and until such time as a whole of LGA approach has been developed by Council assessments for the species should be undertaken as a planted native.

This assessment module has been used to assess this site after detailed assessment against the decision-making framework in **Table 4** and historic consultation with Maitland City Council and BAM Support.

Until MCC undertake a whole of Government assessment of this species AEP has used **Appendix D.2** of the BAM 2020. **Appendix D.2** to assess *Cynodon dactylon* present within the Subject Site. It is noted that if the surveys show suitable habitat or record sighting of threatened species the assessor must apply Section 8.4 of the BAM to mitigate and manage impacts as credits are not applied the offset the proposed impacts. The assessor must assess the suitability of the planted native vegetation for use by threatened species and record any incidental sightings or evidence (e.g. scats, stick nests) of threatened species credit species (flora and fauna) using, inhabiting or being part of the planted native vegetation. This species does not represent suitable habitat for any threatened species identified on site and as such no further assessment is required.

Table 4 – Planted native vegetation decision-making key assessment

Item	Standard for Assessment	Options	AEP Assessment
1	Does the planted native vegetation occur within an area that contains a mosaic of planted and remnant native vegetation and which can be reasonably assigned to a PCT known to occur in the same IBRA subregion as the proposal?	**Yes** - The planted native vegetation must be allocated to the best-fit PCT and the BAM must be applied. **No** - Go to 2.	No; all species mapped as planted native were not associated with PCT 3328. All tree/shrub species recorded on site that can be reasonably assigned to a PCT have been. Species such as *Callistemon viminalis, Grevillea* spp., *Cynodon dactylon* and domestic cultivars cannot be reasonably assigned to a PCT. Further to this, these species are common nursery plants or, in the case of *Cynodon dactylon,* a widely cultivated species for pasture purposes, that can be readily acquired. This assisted with determining that the vegetation was planted. It was also evident that the plants had been planted in stands (trees were of similar size and/or were along the driveway or near the dwellings). Consideration was also given to historical imagery (**Refer Appendix K**) suggesting that much was planted or subject to historic pasture use rather than regenerative vegetation. Considering the information above and species composition, these species were not assigned a PCT and classed as Planted Native Vegetation. **NO**
2	Is the planted native vegetation: a. planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.), and b. the primary objective was to replace or regenerate a plant community type or a threatened plant species population or its habitat?	**Yes** - The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM. **No** - Go to 3.	a. Vegetation identified as planted within the Subject Site was not planted for the purpose of environmental rehabilitation or restoration under an existing conservation obligation listed in BAM Section 11.9(2.); and b. the primary objective was not to replace or regenerate a plant community type or a threatened plant species population or its habitat, but to utilise native species for landscaping and pasture purposes. **NO**
3	Is the planted/translocated native vegetation individuals of a threatened species or other native species planted/translocated for the purpose of providing threatened species habitat under one of the following:	**Yes** - The planted native vegetation must be assessed in accordance with Chapters 4 and 5 of the BAM. **No** - Go to 4.	Refer Below

Item	Standard for Assessment	Options	AEP Assessment
3	Is the planted/translocated native vegetation individuals of a threatened species or other native species planted/translocated for the purpose of providing threatened species habitat under one of the following:		
3a	A species recovery project		The planted vegetation within the Subject Site has not been planted / translocated for the purpose of a species recovery project. **NO**
3b	Saving our Species project		The planted vegetation within the Subject Site has not been planted / translocated for the purpose of Saving our Species project. **NO**
3c	Other types of government funded restoration project.		The planted vegetation within the Subject Site has not been planted / translocated for the purpose of other types of government funded restoration project **NO**
3d	Condition of consent for a development approval that required those species to be planted or translocated for the purpose of providing threatened species habitat		The planted vegetation within the Subject Site has not been planted / translocated for the purpose of Condition of consent for a development approval that required those species to be planted or translocated for the purpose of providing threatened species habitat **NO**
3e	Legal obligation as part of a condition or ruling of court. This includes regulatory directed or ordered remedial plantings (e.g., Remediation Order for clearing without consent issued under the BC Act or the Native Vegetation Act)		The planted vegetation within the Subject Site has not been planted / translocated for the purpose of legal obligation as part of a condition or ruling of court. This includes regulatory directed or ordered remedial plantings (e.g., Remediation Order for clearing without consent issued under the BC Act or the Native Vegetation Act). **NO**

Item	Standard for Assessment	Options	AEP Assessment
3f	Ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan.		The planted vegetation within the Subject Site has not been planted / translocated for the purpose of Ecological rehabilitation to re-establish a PCT or TEC that was, or is carried out under a mine operations plan. **NO**
3g	Approved vegetation management plan (e.g., as required as part of a Controlled Activity Approval for works on waterfront land under the NSW Water Management Act 2000).		The planted vegetation within the Subject Site have not been planted / translocated for the purpose of an approved vegetation management plan (e.g., as required as part of a Controlled Activity Approval for works on waterfront land under the NSW Water Management Act 2000). **NO**
4	Was the planted native vegetation (including individuals of a threatened flora species) undertaken voluntarily for revegetation, environmental rehabilitation, or restoration without a legal obligation to secure or provide for management of the native vegetation?	**Yes** - Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied). **No** - Go to 5.	The planted vegetation within the Subject Site has not been planted / translocated for the purpose of a voluntarily revegetation, environmental rehabilitation, or restoration without a legal obligation to secure or provide for management of the native vegetation. **NO**
5	Is the native vegetation (including individuals of a threatened flora species) planted for functional, aesthetic, horticultural or plantation forestry purposes? This includes examples such as: windbreaks in agricultural landscapes, roadside plantings (including street trees, median strips, roadside batters), landscaping in parks, gardens and sport fields/complexes, macadamia plantations or tea tree farms?	**Yes** - Go to D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied). **No** - Go to 6.	The planted vegetation within the Subject Site appears to be planted / translocated for the functional, aesthetic, horticultural or plantation forestry purposes to serve as roadside plantings, landscaping, and pasture improvement. Refer to Section 5.1 D.2 Assessment of planted native vegetation for threatened species habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied). **YES**
6	Is the planted native vegetation a species listed as a widely cultivated native species on a list	**Yes** - Go to D.2 Assessment of planted native vegetation for threatened species	Applying the precautionary principle further assessment pathways were considered despite 6 not being required to be assessed.

Item	Standard for Assessment	Options	AEP Assessment
	approved by the Secretary of the Department (or an officer authorised by the Secretary)?	habitat (the use of Chapters 4 and 5 of the BAM are not required to be applied). **No** - There may be other types of occurrences of planted native vegetation that do not easily fit into the decision-making key above. Assessors should contact the BAM Support mailbox at bam.support@environment.nsw.gov.au for further advice on using the BAM to assess other types of occurrences of planted native vegetation.	The planted vegetation within the Subject Site comprises species identified as being widely cultivated on a list approved by the Secretary of the Department (or an officer authorised by the Secretary, apart from a few species, notably *Callistemon viminalis* (Weeping Bottlebrush) and *Cynodon dactylon* (Common Couch). **YES**
Evidence demonstrating the application of the decision-making key to the areas of planted native vegetation must be provided in the BDAR or BCAR.	The planted native vegetation was assessed against the information provided and it was determined that the planted native vegetation module could be applied to some part of the vegetation across the site. Where applicable vegetation that could be assigned a PCT was assessed within the BAM-C.		

It has been concluded that the assessment of proposed development could be assessed in accordance with **Appendix D.2** of the BAM 2020. **Appendix D.2** requires the assessor to assess the planted native vegetation for the suitability for use by threatened species, recording results. It is noted that if the surveys show suitable habitat or record sighting of threatened species the assessor must apply Section 8.4 of the BAM to mitigate and manage impacts as credits are not applied the offset the proposed impacts. The assessor must assess the suitability of the planted native vegetation for use by threatened species and record any incidental sightings or evidence (e.g., scats, stick nests) of threatened species credit species (flora and fauna) using, inhabiting or being part of the planted native vegetation.

The Subject Site areas that are classified as Planted Native Vegetation, as per the BAM, require no assessment for the percent native vegetation cover when using the planted streamlined assessment method, therefore no Vegetation Integrity Score was required to be determined. However, assessments have been included to further clarify these areas below.

1.4.6 Non-native / Cleared / Existing Infrastructure

The remaining vegetation on site consists of landscaped gardens, dwelling and driveways.

Vegetation in close proximity to the mostly abandoned dwellings, shedding and paddock yards contains ornamental garden plants and planted non endemic native trees as discussed prior. The total area of this zone is 1.23ha. Additionally, approx. 0.2ha are made up of human-made farm dams.

1.4.7 Plant Community Types (PCTs) and Vegetation Zones

The identification of PCTs must be in accordance with the NSW PCT classification as described in the BioNet Vegetation Classification. The identification of TECs must be consistent with the NSW Threatened Species Scientific Committee Final Determination for the TEC.

Diagnostic species recorded on site during field work within the Subject Site and adjoining patches of vegetation that support the determination of PCTs are shown in **Table 5** and **Table 6.** The vegetation zones and relevant information across the Subject Site are detailed in **Table 8**. Ground-truthed vegetation zones are shown in **Figure 4**.

Table 5 – Species Data for Potential PCT Determination

Search Item	Plot 1, 2, 3, 8, 9 and 10
Dominant Native Species	*Eucalyptus moluccana, Casuarina glauca, Callistemon viminalis, Sporobolus creber, Fimbristylis dichotoma*, *Themeda triandra*
Diagnostic species present	*Eucalyptus moluccana, Eucalyptus crebra, Microlaena stipoides, Sporobolus creber, Themeda triandra, Fimbristylis dichotoma*
Potential PCTs	3328, 3431, 3442, 3446, 3490

Table 6 – PCT Determination Workflow

Potential PCTs	3328	3431	3442	3446	3490
PCT Name	Lower Hunter Red Gum-Paperbark Riverflat Forest	Central Hunter Ironbark Grassy Woodland	Lower Hunter Lowland Ironbark-Paperbark Forest	Lower North Foothills Ironbark-Box-Gum Grassy Forest	Hunter Valley Footslopes Slaty Gum Forest
Regional Vegetation	No	No	Yes (part of the Subject Site)	No	No
IBRA Region	Sydney Basin	Sydney Basin	Sydney Basin	Sydney Basin	Sydney Basin
IBRA Subregion	Hunter	Hunter	Hunter	Hunter	Hunter
NSW Landscape	None Listed	None Listed	None Listed	None Listed	None Listed
LGA	Cessnock, Maitland	Cessnock, Muswellbrook, Singleton, Upper Hunter	Cessnock, Dungog, Maitland, Newcastle, Port Stephens, Singleton	Cessnock, Dungog, Maitland, Mid-coast, Newcastle, Port Stephens, Singleton	Muswellbrook, Singleton
Present Key Diagnostic Species within BAM plots	*Eucalyptus moluccana* *Eremophila debilis, Pittosporum undulatum* *Bothriochloa macra, Carex inversa, Chloris truncata, Cymbopogon refractus, Cynodon dactylon, Cyperus gracilis, Eragrostis leptostachya, Eriochloa pseudoacrotricha, Fimbristylis dichotoma, Lachnagrostis filiformis, Lomandra multiflora subsp. multiflora, Microlaena stipoides, Paspalidium distans, Sporobolus creber, Themeda triandra* *Brunoniella australis, Alternanthera denticulata, Arthropodium milleflorum, Asperula conferta, Centella asiatica, Dichondra repens, Lobelia purpurascens, Mentha diemenica, Plantago debilis, Pseuderanthemum variabile, Rumex brownii, Wahlenbergia communis* *Glycine microphylla, Glycine tabacina*	*Eucalyptus crebra, Eucalyptus moluccana, Casuarina glauca* *Eremophila debilis* *Bothriochloa macra, Carex inversa, Chloris truncata, Chloris ventricosa, Cymbopogon refractus, Cynodon dactylon, Cyperus gracilis, Eragrostis leptostachya, Eriochloa pseudoacrotricha, Fimbristylis dichotoma, Lomandra multiflora subsp. multiflora, Microlaena stipoides, Panicum effusum, Paspalidium distans, Rytidosperma fulvum, Sporobolus creber* *Brunoniella australis, Alternanthera denticulata, Arthropodium milleflorum, Asperula conferta, Dichondra repens, Plantago debilis, Rumex brownii, Wahlenbergia communis* *Glycine microphylla, Glycine tabacina*	*Eucalyptus moluccana* *Eremophila debilis, Phyllanthus gunnii, Pittosporum undulatum* *Carex inversa, Cymbopogon refractus, Cynodon dactylon, Cyperus gracilis, Eragrostis leptostachya, Lachnagrostis filiformis, Lomandra multiflora subsp. multiflora, Microlaena stipoides, Panicum effusum, Paspalidium distans, Rytidosperma fulvum, Themeda triandra* *Brunoniella australis, Arthropodium milleflorum, Centella asiatica, Dichondra repens, Lobelia purpurascens, Plantago debilis, Pseuderanthemum variabile, Rumex brownii* *Glycine microphylla, Glycine tabacina*	*Eucalyptus moluccana, Eucalyptus crebra, Casuarina glauca* *Eremophila debilis, Phyllanthus gunnii, Pittosporum undulatum* *Carex inversa, Cymbopogon refractus, Cynodon dactylon, Cyperus gracilis, Fimbristylis dichotoma, Microlaena stipoides, Paspalidium distans, Sporobolus creber, Themeda triandra* *Brunoniella australis, Asperula conferta, Centella asiatica, Dichondra repens, Lobelia purpurascens, Pseuderanthemum variabile* *Glycine tabacina*	*Eucalyptus moluccana, Eucalyptus crebra, Casuarina glauca* *Eremophila debilis, Phyllanthus gunnii* *Bothriochloa macra, Carex inversa, Chloris truncata, Chloris ventricosa, Cymbopogon refractus, Cynodon dactylon, Cyperus gracilis, Dichelachne crinita, Eragrostis leptostachya, Eriochloa pseudoacrotricha, Fimbristylis dichotoma, Lomandra multiflora subsp. multiflora, Microlaena stipoides, Panicum effusum, Paspalidium distans, Rytidosperma fulvum, Sporobolus creber, Themeda triandra* *Brunoniella australis, Alternanthera denticulata, Arthropodium milleflorum, Asperula conferta, Centella asiatica, Dichondra repens, Lobelia purpurascens, Mentha diemenica, Plantago debilis, Pseuderanthemum variabile, Rumex brownii, Wahlenbergia communis* *Glycine microphylla, Glycine tabacina*
Additional Present Key Diagnostic Tree Species within Subject Site	*Eucalyptus canaliculata, Eucalyptus punctata, Eucalyptus tereticornis, Melaleuca* spp.	*Eucalyptus punctata, Eucalyptus tereticornis*	*Eucalyptus canaliculata, Eucalyptus punctata, Eucalyptus tereticornis*	*Eucalyptus canaliculata, Eucalyptus punctata, Eucalyptus tereticornis*	*Eucalyptus punctata, Eucalyptus tereticornis*

Potential PCTs	3328	3431	3442	3446	3490
PCT Description	A tall to very tall sclerophyll open forest with a sub-canopy of Melaleuca trees and a grassy ground layer found on low-lying alluvial soils in the lower Hunter Valley. The tree canopy very frequently includes a high cover of *Eucalyptus amplifolia* which is rarely replaced by *Eucalyptus tereticornis*. Other rarely occurring eucalypts include *Eucalyptus moluccana, Eucalyptus canaliculata*; *Eucalyptus punctata* or *Eucalyptus siderophloia*. The mid-stratum is characterised by a sparse to mid-dense cover of mid-high Melaleuca trees, including commonly, *Melaleuca nodosa*, occasionally *Melaleuca linariifolia* and *Melaleuca styphelioides* and rarely *Melaleuca decora*. A lower layer of shrubs very frequently includes *Bursaria spinosa*, commonly *Breynia oblongifolia* or occasionally *Acacia parvipinnula*. The ground layer has a mid-dense to dense and diverse cover of grasses, forbs, twiners and small ferns. *Cheilanthes sieberi subsp. sieberi* is almost always present, very frequently with *Microlaena stipoides, Oxalis perennans, Glycine tabacina, Themeda triandra* and *Lobelia purpurascens*, commonly with *Aristida ramosa* and *Cymbopogon refractus*. This PCT occurs in drier and warmer environments than coastal river flat eucalypt forests to the east (PCT 4042) which share some structural and species characteristics, however have more mesophyll species because of the higher rainfall. It occurs on creek-lines draining low-elevation Permian sediments, generally at elevations of less than 130 metres asl and is currently restricted to small isolated remnants, or narrow creek flats in larger patches in the Cessnock district. Native vegetation on alluvial soils in the region has been depleted and current remnants are likely to represent a small proportion of the original extent in the wider lower Hunter Valley.	A tall sclerophyll open forest to woodland with a dry mid-stratum and a mid-dense grassy ground layer that occurs between Rothbury, Wybong and Scone on the undulating floor of the Central Hunter Valley to the west of Newcastle, NSW. The canopy very frequently includes Eucalyptus crebra, occasionally associated with *Eucalyptus moluccana* which can be locally prominent, together with a lower small tree layer which commonly includes *Allocasuarina luehmannii*. The mid-stratum is sparse and commonly includes a chenopod and Acacia *species, of which Maireana microphylla, Enchylaena tomentosa, Acacia amblygona, Acacia salicina* and *Acacia falcata* are the most frequent and abundant. The mid-dense ground layer is mainly comprised of grasses and forbs with some graminoids, twiners, hardy ferns, low growing shrubs and sedges, very frequently including *Aristida ramosa, Glycine tabacina, Cymbopogon refractus, Cheilanthes sieberi* subsp. *sieberi* and *Dichondra repens*. This PCT is widespread on Permian sediments, where it primarily occurs in small, often disturbed patches in a landscape dominated by agriculture and coal mining. It occurs in warm, dry environments with a mean annual rainfall typically below 730 mm. This PCT is related floristically to PCT 3314 which occurs further upslope and Eucalyptus moluccana is very frequent in its canopy. PCT 3485 occurs in a similar topographic position however differs in that Eucalyptus dawsonii is very frequent.	A tall sclerophyll open forest with a shrubby mid-stratum of Melaleucas and a ground cover of grasses and graminoids on flats or low rises, mainly between Seaham and Cessnock in the Lower Hunter Valley to the west of Newcastle. A high cover of *Eucalyptus fibrosa* is almost always present in the canopy, commonly accompanied by *Corymbia maculata*. The mid-stratum is layered and includes small trees and shrubs, with one or more Melaleuca and Acacia species almost always present. *Melaleuca nodosa* which typically has a high cover, *Melaleuca decora* and *Acacia parvipinnula* are the most frequent and abundant. The mid-dense ground layer is typically comprised of graminoids, hardy ferns and forbs. *Entolasia* stricta is almost always present with *Cheilanthes sieberi* subsp. *sieberi* and *Lepidosperma laterale* very frequent. Common ground covers include *Microlaena stipoides*, *Aristida vagans*, *Dianella caerulea* and *Vernonia cinerea*. This PCT typically occurs at elevations of below 100 metres asl in a hot, moist climate on Permian sediments, often with a moderately high quartz content. It is floristically related to PCT 3448 which also includes *Eucalyptus fibrosa* and Melaleucas, however occurs on the Cumberland Plain. At higher slope positions, this PCT grades into PCT 3444 in which Melaleucas are typically rare.	A tall sclerophyll open forest with a mid-stratum of dry and soft-leaved species and a grassy ground cover on the foothills of the Lower North Coast and Lower Hunter Valley, from Quorrobolong to Stratford. The canopy very frequently includes *Corymbia maculata* and ironbark eucalypts (*Eucalyptus crebra* or *Eucalyptus paniculata*). The canopy also commonly includes *Eucalyptus tereticornis* and occasionally *Eucalyptus moluccana*, which may be prominent in localised areas. The sparse mid-stratum very frequently includes *Breynia oblongifolia* and taller Acacia species, of which *Acacia falcata* and *Acacia implexa* are the most frequent and abundant. The smaller shrubs *Leucopogon juniperinus* and *Persoonia linearis* are also common in the mid-stratum. The mid-dense ground layer is typically comprised of a diverse suite of grasses, soft-leaved forbs, twiners and a hardy fern. *Cymbopogon refractus*, *Lobelia purpurascens* and *Cheilanthes sieberi* subsp. *sieberi* are almost always present with *Themeda triandra*, *Microlaena stipoides*, *Dichondra repens*, *Lomandra multiflora* subsp. *multiflora* and *Glycine tabacina* very frequent. This PCT typically occurs at elevations of below 250 metres asl in a hot, moist climate on conglomerate or sandstone substrates, less commonly on volcanic substrates. It overlaps floristically with PCT 3329 which differs in that red gums are almost always present, *Corymbia maculata* and ironbarks are rare and it occurs on more fertile substrates on the floor of the rain shadow valleys of the Lower North Coast.	A tall sclerophyll open forest with a mid-stratum with soft-leaved species and patchy, grassy ground layer that occurs on footslopes below the sandstone escarpment in a restricted area from Bulga to Baerami Creek in the Central Hunter Valley to the west of Newcastle, NSW. The canopy very frequently includes a high cover of *Eucalyptus dawsonii*, commonly associated with more scattered *Eucalyptus moluccana*. The mid-dense mid-stratum is comprised of a range of shrub and small trees, almost always including one or more Acacia species, of which *Acacia salicina* and *Acacia cultriformis* are the most frequent and abundant, with scattered *Brachychiton populneus* also commonly occurring. Smaller shrubs include almost always *Olearia elliptica* subsp. *elliptica*, very frequently *Notelaea microcarpa*, with *Bursaria spinosa*, *Abutilon oxycarpum* and *Teucrium junceum* commonly occurring. The sparse to mid-dense ground layer is mainly comprised of grasses and forbs with some twiners, hardy ferns and low growing shrubs, very frequently including *Dichondra repens*, *Desmodium brachypodum* and *Cymbopogon refractus*. This PCT occurs on Permian sediments at the base of Triassic sandstones in a warm, dry environment with a mean annual rainfall typically below 710 mm. It is related floristically to PCT 3314 which occurs nearby on steep Permian sediments however differs in that *Eucalyptus moluccana* is very frequent and *Eucalyptus dawsonii* is rarely present. In a lower rainfall area to the west, it grades into PCT 3497 and in nearby footslopes on undulating terrain on the floor on the Hunter Valley it grades into PCT 3485. *Eucalyptus dawsonii* is very frequent in both PCTs 3497 and 3485. However, their assemblage differs in that *Callitris endlicheri* is common in PCT 3497 and shrubs such as *Bursaria spinosa* and *Teucrium junceum* are rare in PCT 3485.
Vegetation Formation	Grassy Woodlands	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation Class	Coastal Valley Grassy Woodlands	Hunter-Macleay Dry Sclerophyll Forests	Hunter-Macleay Dry Sclerophyll Forests	Hunter-Macleay Dry Sclerophyll Forests	Central Gorge Dry Sclerophyll Forests
Geographical Restrictions	Cessnock district	Between Rothbury, Wybong and Scone	Mainly between Seaham and Cessnock in the Lower Hunter Valley to the west of Newcastle	Lower North Coast and Lower Hunter Valley, from Quorrobolong to Stratford	In a restricted area from Bulga to Baerami Creek in the Central Hunter Valley to the west of Newcastle
Annual Rainfall (mm) (Min, Med, Max)	756, 811, 905	607, 656, 775	747, 826, 1072	736, 990, 1304	612, 645, 779
Annual Mean Temperature (C°) (Min, Med, Max)	17.02, 17.67, 17.82	16.09, 17.11, 17.71	17, 17.55, 17.8	14.68, 16.98, 17.84	15.63, 16.66, 17.31

Potential PCTs	3328	3431	3442	3446	3490
Elevation (m) **(Min, Med, Max)**	13.4, 47.5, 127.4	39, 143.4, 339	8.6, 62.3, 150.1	10, 115.8, 514.5	94, 173.6, 269.4
Elevation (m) **PCT Description**	Less than 130 metres asl	Not specified	Below 100 metres asl	Below 250 metres asl	Not specified
Soil Profiles (BioNet Vegetation Classification)	Permian sediments	Permian sediments	Permian sediments, often with a moderately high quartz content	Conglomerate or sandstone substrates, less commonly on volcanic substrates	Permian sediments at the base of Triassic sandstones
Habitat Restrictions	Currently restricted to small isolated remnants, or narrow creek flats in larger patches	Primarily occurs in small, often disturbed patches in a landscape dominated by agriculture and coal mining. It occurs in warm, dry environments with a mean annual rainfall typically below 730 mm.	Hot, moist climate	Hot, moist climate	Warm, dry environment with a mean annual rainfall typically below 710 mm
PCT Determination	Listed canopy species across the Site is consistent with this PCT. Other recorded species fit diagnostic species and the location is appropriate within the Maitland LGA. **Community is considered to be best fit.**	The PCT floristically offers a good fit, however lacks Melaleuca spp. which occur within the Subject Site. Furthermore, the presence of *Casuarina glauca* on site is most likely a result of past ground disturbance that has enabled the species to colonise a wetter area, rather than evidence of a remnant PCT. Furthermore, the PCT tends to occur further upstream of the Hunter, and as such the Maitland LGA is not listed in the known locations of the PCT. Therefore, this PCT was discounted in favour of PCT 3328.	*Eucalyptus fibrosa* and *Corymbia maculata* are absent from the site, and these are key diagnostic species of the PCT. As such, other PCTs offer a more reliable fit to describe the vegetation assemblage within the Subject Site.	The PCT offers a good fit but key diagnostic species *Corymbia maculata* is not present on site. PCT 3328 was preferred over PCT 3446 on this basis.	The PCT is restricted to an area between Bulga and Baerami Creek, and the Subject Site is not located in or near this area. Therefore, the PCT does not offer a good fit to describe vegetation within the Subject Site.
Result	**PCT 3328**				

BAM Plots	01, 02, 03, 08, 09 and 10
Estimate cleared value of PCT (%)	84
TECs	PCT 3328 is potentially associated with BC Act listed *Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregion* (EEC) and BC Act listed *River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions* (EEC). TEC associations are assessed in **Section 1.4.10.** It is also potentially associated with EPBC Act listed *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria* (CEEC). This is further discussed in **Appendix H**.

Vegetation Zones	
Degraded condition	
PCT 3328 – Degraded condition - description	The vegetation integrity score suggests that the condition is degraded. The upper stratum is dominated by *Eucalyptus moluccana,* with a sparse occurrence of *Eucalyptus crebra,* and stands of *Casuarina glauca* which are considered a colonising species on land that has been subjected to high disturbance, as often encountered in the Maitland and Cessnock LGAs. The shrub layer is largely absent with a PFC well below 1% in a small number of plots, and no PFC in other plots. The groundcover is disturbed, with widely cultivated species *Cynodon dactylon* present throughout the vegetation zone. Other dominant native groundcovers present within the vegetation zone include *Themeda triandra, Microlaena stipoides* and *Sporobolus creber*. However, these native grass species do not occur homogeneously across the zone, and *Cynodon dactylon* is the only grass species that is near omnipresent and dominant across the entirety of the vegetation zone, which illustrates the high level of historic disturbance therein. The vegetation zone covers approx. 4.47ha.

Plate 1: BAM Plot 01

Plate 2: BAM Plot 02

Plate 3: BAM Plot 03

Plate 4: BAM Plot 08

Plate 5: BAM Plot 09

Vegetation Zones	
Severely degraded grassland	
PCT 3328 – Grassland - description	The vegetation integrity score suggests that the condition is severely degraded. The upper and mid-stratum are absent, and this vegetation zone only comprises lower stratum species. The dominant species in descending order of PFC are *Axonopus fissifolius* (exotic), *Sporobolus creber*, *Paspalum dilatatum* (exotic), *Fimbristylis dichotoma*, *Dichanthium sericeum* and *Cynodon* sp. (non-endemic). The vegetation zone is subject to ongoing management and mowing, and covers approx. 1.85ha.

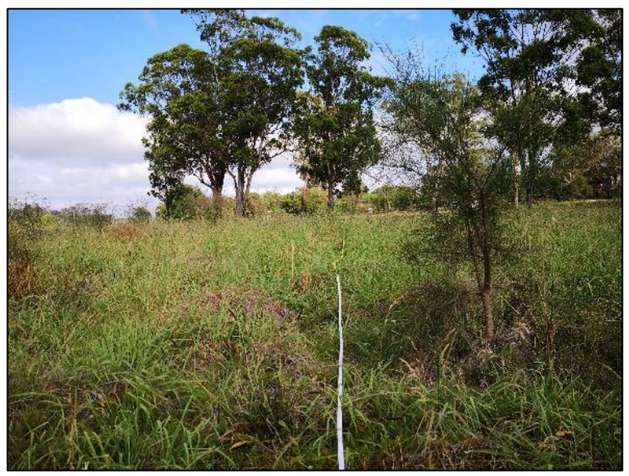


Plate 6: BAM Plot 10

The above assessment of planted native vegetation and disturbed remnant vegetation has concluded that *Cynodon dactylon* occurs as a cultivated pasture species. AEP has entered the species into the BAM – C and all section from here within the BDAR as *Cynodon sp.* to reflect that it is a cultivar. The remainder of the site's native vegetation was assigned to PCT 3328 as best fit based on composition, position in landscape and management history of the site. **Table 7** provides a summary of vegetation zones as entered into the BAM Calculator.

Table 7 – Vegetation Zones and Other Areas

Vegetation zones or areas	PCT 3328 – Degraded condition	PCT 3328 – Severely degraded grassland	Non-endemic native pasture / planted	Cleared / developed	Dams
Description of Vegetation Zone	Managed understory dominated by *Cynodon spp.* Shrub layer largely absent. Canopy dominated by *Eucalyptus moluccana*	Regularly managed grassland with strong exotic component	Managed grassy areas dominated by *Cynodon* spp. and ornamental plantings near dwellings	Driveways, dwellings, sheds and rural infrastructure	One ephemeral dam and one permanent dam. Both are human-made and do show evidence of being linked to watercourses
Area of Vegetation Zone within Subject Site (ha)	4.47	1.85	6.53	1.23	0.2

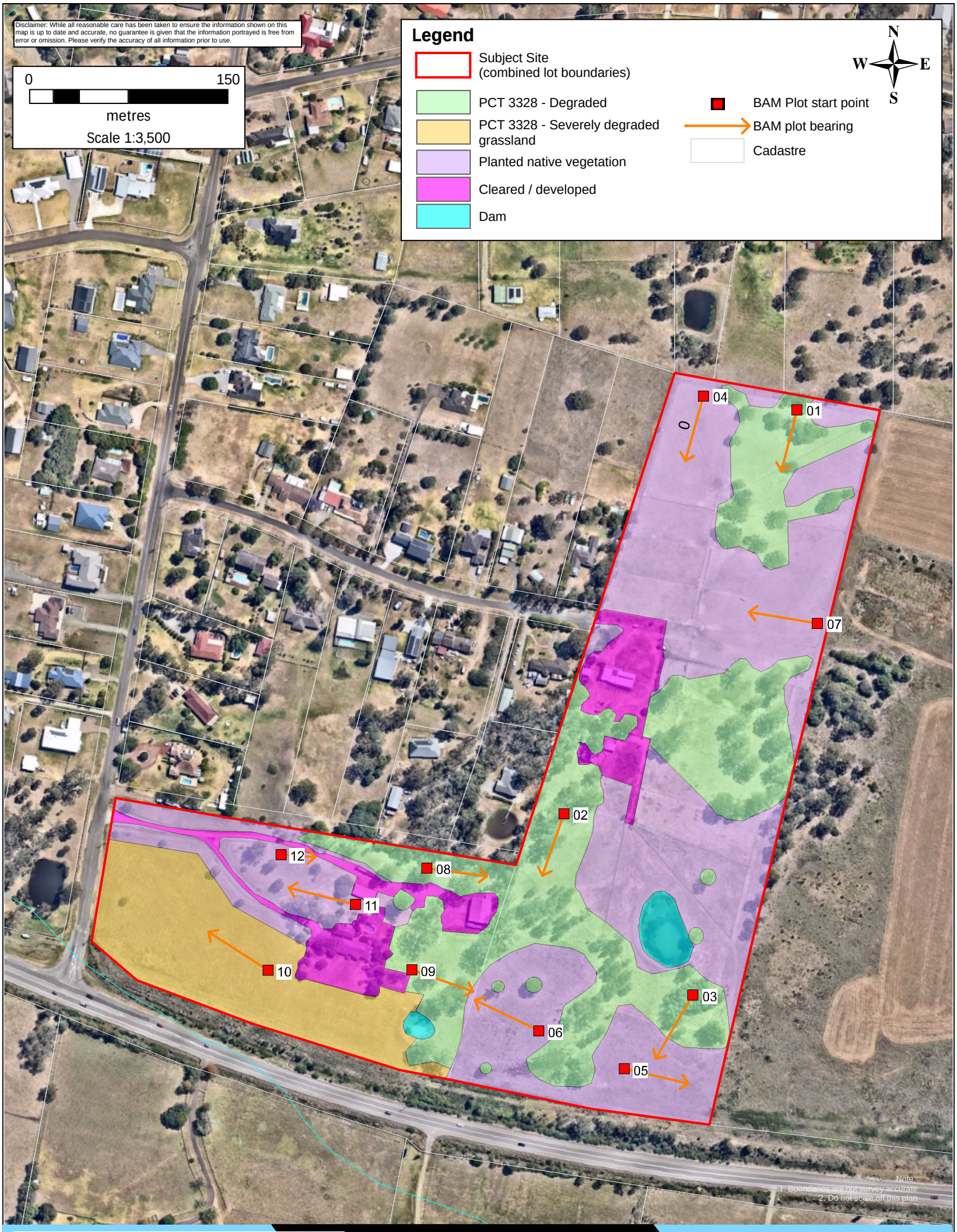
Figure 4 shows the location of these vegetation zones within the Subject Site.

Additional site photographs are included in **Appendix G.**

For the purposes of assessing native vegetation, associated habitat constraints and threatened species, and to comply with the requirements of the BAM, the following Vegetation Zones were entered in the BAM-C.

Table 8 – BAM-C Vegetation Zones

Vegetation Zone	BAM plot IDs	Area (ha)	Associated TEC (Y/N)
PCT 3328 – Degraded	1,2,3,8,9	4.47	Y
PCT 3328 – Severely degraded grassland	10	1.85	N



AEP

Figure 4: Ground-truthed Vegetation Zones

Date: Dec 2023

Location: 16 Denton Close and 10 River Road, Windella

Client: Mavid Development Pty Ltd

BOAMS Ref: 44198
AEP Ref: 3154

1.4.8 Vegetation Integrity Assessment

1.4.8.1 Patch Size

The native vegetation that exists within the Subject Site is relatively fragmented from broader patches of vegetation. Patches of native vegetation within the Subject Site are connected to small patches of vegetation that, as defined by the BAM, are limited to approx. 2 to 3ha depending on the locations. The maximum patch size of '<5ha' is therefore appropriate for each vegetation zone and was entered as such within the Calculator.

1.4.9 Vegetation Integrity Score

Plot data was used to determine the composition, structure, and function condition score of the vegetation zones within the Subject Site, which informed the Vegetation Integrity Score (VIS). Plot data has been tabulated (refer **Table 9**) and includes corresponding condition scores along with the overall vegetation integrity score utilising PCT 3328 for plots 01, 02, 03, 08 and 09. Vegetation Condition Class has been rated using the following percentage bands associated with the VIS's:

- 70 - 100 Good;
- 50 - 69 Moderate;
- 35 - 49 Poor;
- 25 - 34 Degraded;
- 17 - 24 Highly Degraded; and
- <17 Severely Degraded.

Table 9 – Vegetation Integrity Score Table

Site Attribute	PCT 3328 – Degraded	PCT 3328 – Degraded	PCT 3328 – Degraded	PCT 3328 – Degraded	PCT 3328 – Degraded	PCT 3328 – Severely degraded grassland	Non-endemic planted native	Non-endemic planted native	Non-endemic planted native	Non-endemic planted native	Non-endemic planted native	Non-endemic planted native
	1	**2**	**3**	**8**	**9**	**10**	**4**	**5**	**6**	**7**	**11**	**12**
Location	E 358016 N 6380892	E 357845 N 6380586	E 357944 N 6380451	E 357742 N 6380543	E 357732 N 6380466	E 357623 N 6380464	E 357946 N 6380901	E 357893 N 6380395	E 357828 N 6380423	E 358034 N 6380732	E 357689 N 6380515	E 357632 N 6380551
Bearing	170	190	190	82	100	286	183	105	280	275	280	100
Tree (TG)	1	1	1	3	1	0	0	0	0	0	1	0
Shrub (SG)	0	0	0	3	0	1	0	0	0	0	1	1
Grass & grasslike (GG)	1	3	5	14	7	6	5	1	3	6	8	6
Forb (FG)	3	0	3	5	2	2	2	3	2	0	2	5
Fern (EG)	0	0	0	0	0	0	0	0	0	0	0	0
Other (OG)	1	0	0	1	0	1	1	0	0	0	1	1
Composition condition score	**20.4**					**18.7**	**Data not entered in BAM-C**					
Tree (TG)	50	60	65	31.1	30	0	0	0	0	0	10	0
Shrub (SG)	0	0	0	0.7	0	0.1	0	0	0	0	0.1	0.3
Grass & grasslike (GG)	50	3.5	45.6	40.2	2.2	43.1	13.5	0.5	5.2	66.6	67.1	51.5
Forb (FG)	0.3	0	0.7	2.6	0.3	0.5	0.3	0.3	1.1	0	0.6	2.7
Fern (EG)	0	0	0	0	0	0	0	0	0	0	0	0
Other (OG)	0.2	0	0	0.3	0	0.3	0.2	0	0	0	0.1	0.3
Structure condition score	**60**					**38.1**	**Data not entered in BAM-C**					
Regenerating Stems (<5cm DBH)	Y	-	Y	Y	-	-	-	-	-	-	-	-
Stem Classes (cm DBH)	10-19, 20-29	50-79	5-9, 10-19	5-9, 10-19, 20-29, 30-49	50-79	-	-	-	-	-	50-79	-
# Large Trees	-	-	-	-	-	-	-	-	-	-	-	-
Hollow-bearing Trees	0	3	0	2	3	0	0	0	0	0	0	0
Litter Cover (%)	15	15	2	40	26	13	0	0	0	0	20	38
Coarse Woody Debris (m)	0	0	0	6	1	0	0	0	0	0	0	0
High Threat Weed Cover	0.8	0.6	35.1	11.5	30.2	35.5	73.2	90.5	85.1	0.4	14.8	10.5
Function condition score	**26**					**3.9**	**Data not entered in BAM-C**					
Current Vegetation Integrity Score	**31.7**					**14.1**	**Data not entered in BAM-C**					

1.4.10 Assessment of Threatened Ecological Communities

PCT 3328 has two (2) possible TEC associations under the BC Act, namely *Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregion* EEC and *River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions* EEC.

1.4.10.1 Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions

PCT 3328 as it occurs on site, in both its degraded and severely degraded forms, comprises species that are diagnostic of Hunter Lowland Redgum Forest (HLRF) EEC in the upper and lower stratum. A review of the Scientific Determination (DPE, 2021) suggests that these dominant diagnostic species include *Eucalyptus moluccana, Eucalyptus crebra, Microlaena stipoides* var. *stipoides, Themeda triandra, Lobelia purpurascens* and *Brunoniella australis.* No diagnostic shrub species are present within the Subject Site.

Applying the precautionary principle, it was determined that, despite its degraded condition, PCT 3328 presented characteristics that are diagnostic of HLRF.

1.4.10.2 River-flat eucalypt forest on coastal floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions

PCT 3328 as it occurs on site, in both its degraded and severely degraded forms, comprises species that are diagnostic of River-flat Eucalypt Forest on Coastal Floodplain (RFEF) EEC in the upper and lower stratum. A review of the Scientific Determination (DPE, 2023d) suggests that these dominant diagnostic species include *Eucalyptus moluccana, Glycine microphylla, Microlaena stipoides* var. *stipoides, Themeda triandra, Lobelia purpurascens* and *Phyllanthus gunnii.* No diagnostic shrub species are present within the Subject Site.

It is noted that RFEF occurs on lands subject to period inundation and generally describes vegetation subject to waterlogging and moisture. Therefore, it was determined that HLRF offered a better fit than RFEF to describe PCT 3328 as it occurs on site.

Therefore, it was determined that PCT 3328 as it occurs on site is commensurate with a degraded to severely degraded variant of Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions.

1.5 Threatened Species

Under the BAM, threatened species are classified into two types: 'Ecosystem Credit' and 'Species Credit' species, as detailed within the BioNet Atlas Threatened Species Profile Database.

A predicted Ecosystem Credit Species assessment is presented in **Table 10** and a Species Credit Species assessment is presented in **Tables 11** and **12**.

Field surveys were undertaken on site from December 2022 to December 2023. A summary of survey effort within the Subject Site is described in **Section 1.5** and **Table 14**, and species listed are presented in **Appendix B** and **Appendix C.**

Neither Ecosystem credits or Species credits are applicable to 6.53ha of planted native vegetation under the Streamlined Assessment Module of the BAM.

Furthermore a D.2 Assessment of Planted native vegetation for threatened species habitat was conducted. This assessment included walking the length of the planted vegetation and searching for nests, hollows, scats and/or other signs of threatened species utilising the vegetation. The habitat assessment did not record any threatened species or find any evidence that any of the planted vegetation within the proposal site is being utilised by threatened species.

1.5.1 Ecosystem Credit Species

Ecosystem Credit species are associated with PCTs and other habitat surrogates that are used to predict their occurrence on a particular site.

The 'biodiversity risk weighting' (BRW) for a species is based on the 'sensitivity to loss' and 'sensitivity to potential gain' score using criteria listed in Appendix I of the BAM and are used in credit calculations to assess impacts of the proposal on a threatened species. The sensitivity to gain class is listed within the BAM calculator for Ecosystem Credit species.

Those Ecosystem Credit species predicted to occur within the site are provided in **Table 10** below.

Table 10 – Predicted Ecosystem Credit Species

Scientific Name	Common Name	Sensitivity to Gain Class	Recorded within 100km^2 search area (BioNet Atlas 2023) Y/N	Recorded by AEP within site or nearby surrounds Y/N
Anthochaera phrygia	Regent Honeyeater	High	Y	N
Artamus cyanopterus cyanopterus	Dusky Woodswallow	Moderate	Y	N
Callocephalon fimbriatum	Gang-gang Cockatoo	Moderate	N	N
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	High	N	N
Chthonicola sagittata	Speckled Warbler	High	Y	N
Circus assimilis	Spotted Harrier	Moderate	Y	N
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	High	N	N
Daphoenositta chrysoptera	Varied Sittella	Moderate	Y	N
Ephippiorhynchus asiaticus	Black-necked Stork	Moderate	Y	N
Falco subniger	Black Falcon	Moderate	N	N
Glossopsitta pusilla	Little Lorikeet	High	Y	N
Haliaeetus leucogaster	White-bellied Sea-Eagle	High	Y	N
Hieraaetus morphnoides	Little Eagle	Moderate	Y	N
Hirundapus caudacutus	White-throated Needletail	High	Y	N
Lathamus discolor	Swift Parrot	Moderate	Y	N
Lophoictinia isura	Square-tailed Kite	Moderate	Y	N
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Moderate	N	N
Ninox connivens	Barking Owl	High	N	N

Scientific Name	Common Name	Sensitivity to Gain Class	Recorded within 100km^2 search area (BioNet Atlas 2023) Y/N	Recorded by AEP within site or nearby surrounds Y/N
Ninox strenua	Powerful Owl	High	N	N
Pandion cristatus	Eastern Osprey	Moderate	N	N
Petroica boodang	Scarlet Robin	Moderate	N	N

1.5.2 Species Credit Species

Additional threatened fauna species determined by the BAM calculator that have the potential to use the Subject Site as suitable habitat are identified in **Table 11** and candidate species that were excluded from the assessment are presented within **Table 12**.

The flora and fauna species lists for the site are included in **Appendix B** and **Appendix C**.

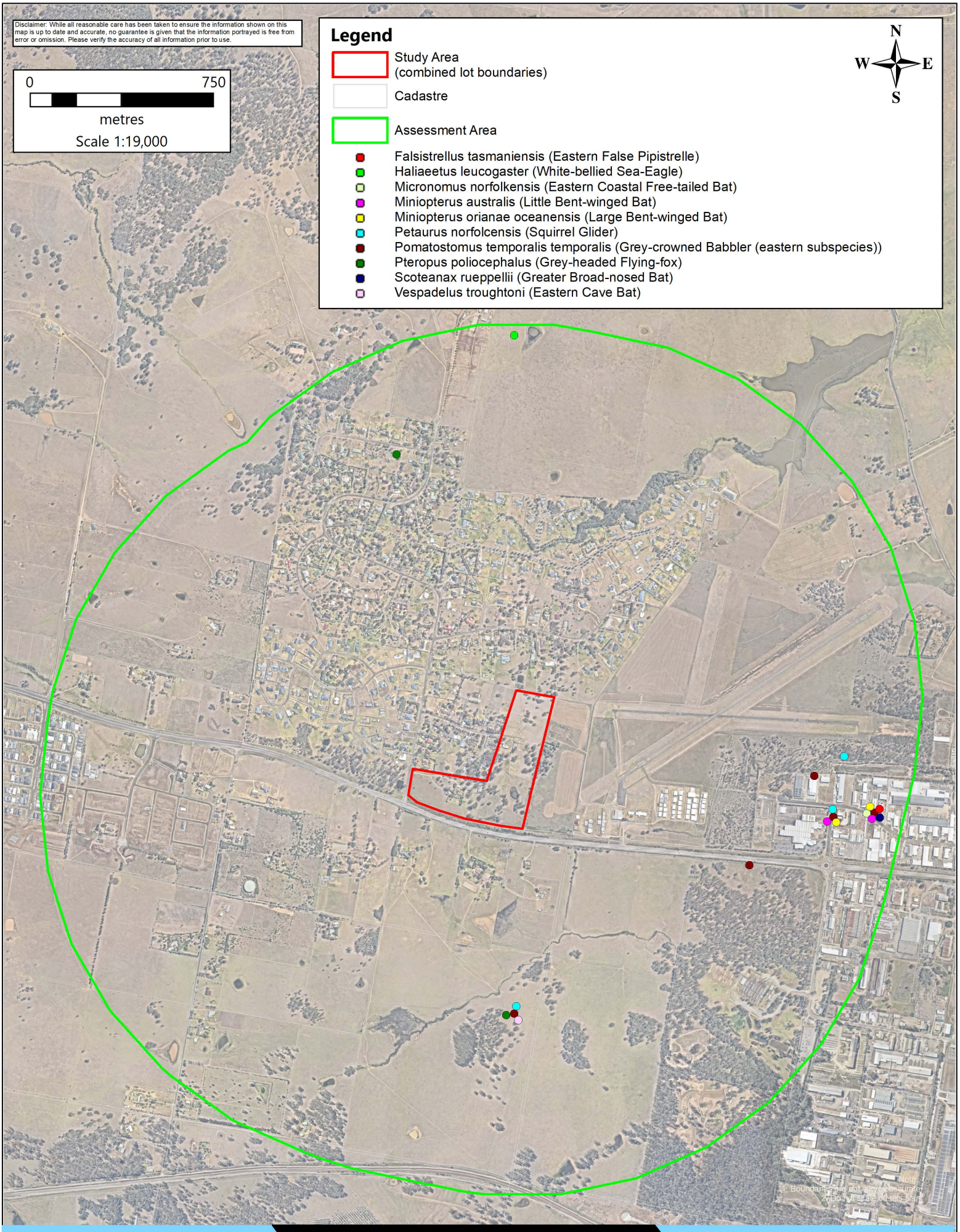
Table 11 – Candidate Species Credit Species Subject to Assessment

Species	Risk Weighting (BRW)	SAII Candidate (Y/N)	Presence assumed (Y/N)	BioNet Records (10km)	Details of BioNet Record	Habitat Requirements / Habitats Searched / General Notes
Flora						
Callistemon linearifolius Netted Bottlebrush	1.5	N	N	Y	One record from 2016 at Cantwell Road near New England Highway	Grows in dry sclerophyll forest on the coast and adjacent ranges. Habitat on site is disturbed with a managed understory.
Persoonia pauciflora North Rothbury Persoonia	3	Y	N	N	N/A	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. Plants are absent from comparable habitat that is grazed and/or frequently burnt or slashed. Habitat within the Subject Site is subject to ongoing management (grazing, mowing) such that it is highly degraded and not favourable to the species. The entire Subject Site was subjected to parallel transect surveys for the species.
Pterostylis chaetophora Pterostylis chaetophora	2	N	N	N	N/A	The preferred habitat is seasonally moist, dry sclerophyll forest with a grass and shrub understorey. The most commonly observed habitat is vegetation characterised 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 siderophloia* or *Eucalyptus crebra*. The Subject Site is largely devoid of a native shrub understorey, and grasslands are largely disturbed and exotic such that it is unlikely to be suitable for the species. Furthermore, the entirety of Subject Site was surveyed for the species.
Fauna						
Burhinus grallarius Bush Stone-curlew	2	N	N	N	N/A	Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber. Nest on the ground in a scrape or small bare patch. The site does not contain forest vegetation and comprises a managed and disturbed understory with fragmented patches of woodland vegetation.
Callocephalon fimbriatum Gang-gang Cockatoo	2	N	N	N	N/A	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. May also occur in sub-alpine Snow Gum (*Eucalyptus pauciflora*) woodland and occasionally in temperate rainforests. Favours old growth forest and woodland attributes for nesting and roosting. Nests are located in hollows that are 7 cm in diameter or larger in eucalypts and 3 metres or more above the ground. Suitable potentially occurs on site in a degraded form, particularly where canopy patches are present in the north-west and north-east.
Calyptorhynchus lathami Glossy Black-Cockatoo	2	N	N	N	N/A	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, *Allocasuarina diminuta*, and *A. gymnanthera*. Belah is also utilised and may be a critical food source for some populations. Dependent on large hollow-bearing eucalypts for nest sites. Suitable habitat in the form of large stands of *Allocasuarina* spp. is largely absent from the site.
Cercartetus nanus Eastern Pygmy-possum	2	N	Y	N	N/A	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred, except in north-eastern NSW where they are most frequently encountered in rainforest. They may occupy small patches of vegetation in fragmented landscapes and although the species prefers habitat with a rich shrub understory, they are known to occur in grassy woodlands and the presence of Eucalypts alone is sufficient to support populations in low densities. Shelters in tree hollows, rotten stumps, holes in the ground, abandoned bird-nests, Ringtail Possum dreys or thickets of vegetation, (e.g. grass-tree skirts); nest-building appears to be restricted to breeding females; tree hollows are favoured but spherical nests have been found under the bark of eucalypts and in shredded bark in tree forks. Suitable potentially occurs on site in a degraded form, particularly where canopy patches are present in the north-west and north-east.
Chalinolobus dwyeri Large-eared Pied Bat	3	Y	Y	Y	One record from 2019-2021 at 134 Station Lane, Lochinvar	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. Females have been recorded raising young in maternity roosts (c. 20-40 females) from November through to January in roof domes in caves, overhangs, mine adits and concrete structures. Found in well-timbered areas containing gullies. No suitable breeding habitat occurs on site. Furthermore, it is unlikely that the site would be used as foraging habitat due to the absence of suitable breeding habitat within 2km of the site.

Species	Risk Weighting (BRW)	SAII Candidate (Y/N)	Presence assumed (Y/N)	BioNet Records (10km)	Details of BioNet Record	Habitat Requirements / Habitats Searched / General Notes
Haliaeetus leucogaster White-bellied Sea-Eagle	2	N	N	Y	Three records in 2002 and 2003, at Anambah Road lagoons and Rutherford	Habitats are characterised by the presence of large areas of open water including larger rivers, swamps, lakes, and the sea. Occurs at sites near the sea or sea-shore, such as around bays and inlets, beaches, reefs, lagoons, estuaries and mangroves; and at, or in the vicinity of freshwater swamps, lakes, reservoirs, billabongs and saltmarsh. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, and forest (including rainforest). Breeding habitat consists of mature tall open forest, open forest, tall woodland, and swamp sclerophyll forest close to foraging habitat. Nest trees are typically large emergent eucalypts and often have emergent dead branches or large dead trees nearby which are used as 'guard roosts.' No suitable habitat was found on site and no nests were sighted.
Hieraaetus morphnoides Little Eagle	1.5	N	N	Y	Two records from 2018 and 2020, in woodland at Gardiner Street, Rutherford, and at Bishops Bridge, respectively	Occupies open eucalypt forest, woodland or open woodland. Sheoak or Acacia woodlands and riparian woodlands of interior NSW are also used. Habitat on site is largely degraded. No evidence of nesting was found.
Litoria aurea Green and Golden Bell Frog	2	N	Y	Y	Several records in 1999, 2000 and 2008, in or near bushland south of Wollombi Road, in Ravensfield	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. There are two (2) dams on site that may provide suitable habitat for the species, particularly the permanent dam to the east. However, the absence of suitable vegetation on the banks of the dam indicate that this would provide suboptimal habitat for the species.
Litoria brevipalmata Green-thighed Frog	1.5	N	Y	N	N/A	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. Breeding occurs following heavy rainfall from spring to autumn, with larger temporary pools and flooded areas preferred. The managed condition of the site and sparse canopy cover indicates that habitat is unlikely to be suitable for the species.
Lophoictinia isura Square-tailed Kite	1.5	N	N	Y	Two records from 2017 and 2018, at Denton Park Rutherford and Gardiner Street, Rutherford, respectively	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses. Potentially suitable habitat is present on site where patches of canopy vegetation occur.
Ninox connivens Barking Owl	2	N	N	N	N/A	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 found on these fertile riparian soils. Roost in shaded portions of tree canopies, including tall midstorey trees with dense foliage such as Acacia and Casuarina species. Requires hollows of large, old trees for breeding. Living eucalypts are preferred though dead trees are also used. Potentially suitable foraging habitat is present on site where patches of canopy vegetation occur. No evidence of hollows used for breeding purposes were found on site.
Ninox strenua Powerful Owl	2	N	N	N	N/A	The Powerful Owl inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats. It roosts by day in dense vegetation comprising species such as Turpentine *Syncarpia glomulifera*, Black She-oak *Allocasuarina littoralis*, Blackwood *Acacia melanoxylon*, Rough-barked Apple *Angophora floribunda*, Cherry Ballart *Exocarpos cupressiformis* and a number of eucalypt species. As most prey species require hollows and a shrub layer, these are important habitat components for the owl. Powerful Owls nest in large tree hollows (at least 0.5 m deep), in large eucalypts (diameter at breast height of 80-240 cm) that are at least 150 years old. Potentially suitable foraging habitat is present on site where patches of canopy vegetation occur. No evidence of hollows used for breeding purposes were found on site.
Pandion cristatus Eastern Osprey	1.5	N	N	N	N/A	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes. Feed on fish over clear, open water. Nests are made high up in dead trees or in dead crowns of live trees, usually within one kilometre of the sea. The site is not located within 1km of the sea and no nest was identified.

Table 12 – Candidate Species Credit Species Excluded and Removed from the BAM-C

Species	Risk Weighting (BRW)	SAII Candidate (Y/N)	Presence assumed (Y/N)	BioNet Records (10km)	Details of BioNet Record	Comments
Flora						
Diuris tricolor - endangered population Pine Donkey Orchid population in the Muswellbrook local government area	2	N	N	N	N/A	The Subject Site is not located within the Muswellbrook LGA. As per Section 5.2.1 (2.) (b). the geographic limitations criterion is not met. Therefore, as per Section 5.2.1. (5.) of the BAM, the Subject Site is unsuitable habitat for the species and no further assessment is required for that species.
Fauna						
Anthochaera phrygia Regent Honeyeater	3	Y	N	Y	Two records in 2011 – location details withheld – in the Windermere locality	The Subject Site does not contain land mapped on the Important Habitat Map (DPE, 2023). As per Section 5.2.1 (2.) (b). the geographic limitations criterion is not met. Therefore, as per Section 5.2.1. (5.) of the BAM, the Subject Site is unsuitable habitat for the species and no further assessment is required for that species.
Dromaius novaehollandiae - endangered population Emu population in the New South Wales North Coast Bioregion and Port Stephens local government area	2	N	N	N	N/A	The Subject Site is not located within the Port Stephens LGA. As per Section 5.2.1 (2.) (b). the geographic limitations criterion is not met. Therefore, as per Section 5.2.1. (5.) of the BAM, the Subject Site is unsuitable habitat for the species and no further assessment is required for that species.
Lathamus discolor Swift Parrot	3	Y	N	Y	One record from 2017 in Farley	The Subject Site does not contain land mapped on the Important Habitat Map (DPE, 2023). As per Section 5.2.1 (2.) (b). the geographic limitations criterion is not met. Therefore, as per Section 5.2.1. (5.) of the BAM, the Subject Site is unsuitable habitat for the species and no further assessment is required for that species.



AEP

Figure 5: BioNet Atlas Records

Date: Dec 2023

Location: 16 Denton Close and 10 River Road, Windella

Client: Mavid Development Pty Ltd

BOAMS Ref: 44198
AEP Ref: 3154

1.5.3 Field Survey Methods

Surveys are deemed to fulfill minimum survey requirement. Where surveys were not completed in time for DA lodgement, and species was not able to be discounted within the BAM rules, species presence was assumed. Targeted surveys for species that were not surveyed, are scheduled to occur post-lodgement and addendum letters outlining survey methods and findings will be issued upon completion of surveys, for consideration by the Consent Authority. Should a DA be issued prior to the revised BDAR or addendum letters, the proponent will either be subject to the credit liability as per the Conditions of Consent or be required to undertake a section 4.55 modification to the DA to revise the credit requirements.

Details of the flora and fauna survey are presented in **Table 13** and **15** and were conducted using relevant guidelines, in particular: *Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method* (DPIE, 2020c), *'Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method* (OEH, 2018), *Koala (Phascolarctos cinereus): Biodiversity Assessment Method Survey Guide* (DPE, 2022), *NSW Survey Guide for Threatened Frogs: A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method* (DPIE, 2020d) and *Threatened biodiversity survey and assessment guidelines for developments and activities (working draft)* (DEC, 2004). Flora and fauna survey effort is shown in **Figures 6, 7** and **8**.

Field sheets are provided in **Appendix D**, and flora and fauna species list for those species recorded during field surveys are provided in **Appendix B** and **Appendix C**.

1.5.3.1 Habitat Features

An assessment of the relative habitat values present within the Subject Site was undertaken. This assessment focused primarily on the identification of specific habitat types and resources within the Subject Site favoured by known threatened species listed in **Section 1.5.2.** The assessment also considered the potential value of the Subject Site (and surrounding areas) for all major guilds of native flora and fauna. The assessment was based on the specific habitat requirements of each threatened fauna species in regards to home range, feeding, roosting, breeding, movement patterns and corridor requirements.

Consideration was given to contributing factors including topography, soil, light and hydrology for threatened flora and assemblages. In particular, focus was put on documenting the presence of key habitat features such as tree hollows. Hollows are an important resource utilised by a variety of forest fauna, and are particularly relevant for several of the likely key threatened species in this locality (**refer Section 1.5.4** for details on HBTs found on site.

HBTs were mapped within the Subject Site utilising the methodology of tree hollow identification set by OEH in the BioBanking field plot methodology (Feb 2009), namely:

> *"A hollow is only recorded if: (a) the entrance can be seen; (b) the minimum entrance width is at least 5 cm across; (c) the hollow appears to have depth (i.e., you cannot see solid wood beyond the entrance); and (d) the hollow is at least 1 m above the ground (this omits hollows in cut stumps or at the base of trees)".*

1.5.3.2 Flora Field Survey

All required flora survey techniques were utilised for targeted survey of the species listed in **Table 11** above and guided by the *Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method* (DPIE, 2020c).

The following survey methods were undertaken to record the presence of threatened species on site:

- Ground-truthing of vegetation mapping to identify all vegetation communities present onsite as well as segregate vegetation zones according to condition and current management practices**;**
- Seasonal threatened flora surveys utilising the two-phase grid-based systematic approach, targeting a range of threatened flora**;**

- Identification of all vascular plant species encountered during fieldwork. Subject Site coverage was both systematic to ensure all key points of the site were checked, and therein the Random Meander Technique (Cropper 1993) was utilised to maximise species encountered**;**
- Six (6) BAM plots were undertaken in accordance with the BAM**;** and
- Updated/Refined Vegetation Community Mapping involving traversal over the entire Subject Site, concentrating particularly on mapping the boundaries between the identified Biometric Vegetation Types and refining the original mapping which involved a larger number of vegetation units.

1.5.3.3 Fauna Field Surveys

All required fauna survey techniques were utilised for targeted survey of the species listed in **Table 11** and guided by various sets of guidelines, including: *'Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method* (OEH, 2018), *Koala (Phascolarctos cinereus): Biodiversity Assessment Method Survey Guide* (DPE, 2022), *NSW Survey Guide for Threatened Frogs: A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method* (DPIE, 2020d) and *Threatened biodiversity survey and assessment guidelines for developments and activities (working draft)* (DEC, 2004). Fauna survey effort is shown in **Figure 6**.

1.5.3.4 Incidental Observations

Incidental records of any fauna species observed during fieldwork were noted. This included opportunistic sightings of secondary indications (scratches, scats, diggings, tracks, etc.) of any resident or migratory species. Searches were also conducted for whitewash, regurgitation pellets and prey remain from Owls, chewed Casuarina cones from Black-Cockatoos, chewed fruit remains from frugivorous birds, etc.

These surveys are deemed to fulfill minimum survey requirement. Details of the flora and fauna survey are presented in **Table 13** and **15** and depicted in **Figures 6, 7** and **8.**

Field sheets are provided in **Appendix D**, and flora and fauna species list for those species recorded during field surveys are provided in **Appendix B** and **Appendix C.**

1.5.4 Survey Effort Results

The survey methods above were utilised across the Subject Site and undertaken on site from December 2022 to December 2023, with further fieldwork scheduled but not undertaken yet at time of writing of the present report. **Table 13** outlines provides a summary of field surveys.

Table 13 – Field Survey Periods

Date	Time stamp	Duration	Field activity	Targeted Species	No. of Persons on Site	Staff	Rainfall (mm, 24h to 9am)
13/12/2022	08:00-21:45	13h45	Preliminary site inspection, habitat assessment, Koala Spot Assessment Technique surveys, diurnal bird survey (Bush Stone-curlew), flora transects, nocturnal spotlighting survey (Eastern Pygmy-possum, Bush Stone-curlew), arboricultural assessment, BAM floristic plots	*Callistemon linearifolius, Persoonia pauciflora,* Eastern Pygmy-possum, Grey-headed Flying-fox	3	Samuel Rayfield Stephen Curry Thomas Stephens	4.6
30/12/2022	08:00-14:15	6h15	BAM floristic plots		1	Stephen Curry	0
23/03/2023	09:20-15:30	6h10	BAM floristic plots, arboricultural assessment, flora transects	*Persoonia pauciflora*	3	Brendon Young Bonni Yare Thomas Stephens	0.2
10/07/2023	15:00-19:40	4h40	Nocturnal survey, flora transects, Koala Spot Assessment Technique surveys, deployment of songmeter, bird survey	*Persoonia pauciflora* Powerful Owl Barking Owl Eastern Osprey	1	Brendon Young	0
11/07/2023	13:30-19:00	5h30	Nocturnal survey, flora transects, Koala Spot Assessment Technique surveys, bird survey	*Persoonia pauciflora* Powerful Owl Barking Owl Eastern Osprey	1	Brendon Young	0
25/07/2023			Retrieval of songmeter, bird survey		1	Brendon Young	0
13/11/2023	09:30-16:30	7h	Flora transects, bird survey	*Pterostylis chaetophora* *Callistemon linearifolius* Square-tailed Kite Eastern Osprey	1	Byron De Jaeger	0
14/11/2023	07:50-12:30	4h40	Flora transects, bird survey	*Pterostylis chaetophora* *Callistemon linearifolius* Square-tailed Kite Eastern Osprey	1	Byron De Jaeger	0
12/12/2023	09:00-11:00	2h	Deployment of Anabat, HBT re-inspection, incidental bird survey	Large-eared Pied-bat	1	Brendon Young	0

Date	Time stamp	Duration	Field activity	Targeted Species	No. of Persons on Site	Staff	Rainfall (mm, 24h to 9am)
13/12/2023	08:00-10:00	2h	Field data verification, incidental bird survey		1	Brendon Young	0
20/12/2023	*TBC*	*TBC*	*Scheduled deployment of motion-sensing camera traps*	*Eastern Pygmy-possum*	2	*TBC*	*TBC*
To be undertaken post-DA lodgement	*To be undertaken post-DA lodgement*	*To be undertaken post-DA lodgement*	*Retrieval of Anabat and motion-sensing camera traps*	*Large-eared Pied-bat, Eastern Pygmy-possum*	*To be confirmed*	*To be confirmed*	*To be confirmed*
To be undertaken post-DA lodgement	*To be undertaken post-DA lodgement*	*To be undertaken post-DA lodgement*	*Survey for threatened amphibian species*	*Green and Golden Bell Frog Green-thighed Frog*	*To be confirmed*	*To be confirmed*	*To be confirmed*

1.5.4.1 Habitat Trees

Twenty-four (24) hollow-bearing trees (HBTs) were present within the Subject Site. Details of the HBT survey is provided in **Table 14** below. Hollow-bearing tree locations are presented in **Figure 6**. One small stick nest was noted in a *Eucalyptus crebra* (Narrow-leaved Ironbark) tree and another within a *Eucalyptus moluccana* (Grey Box).

Table 14 – Habitat Tree Detail

ID	Species	DBH (cm)	Hollows					Vegetation Zone	Proposed for retention or removal
			XS	S	M	L	XL		
60	*Eucalyptus crebra*	48		1				PCT 3328 - Degraded	Remove
61	*Eucalyptus crebra*	106		1				PCT 3328 - Degraded	Remove
62	*Eucalyptus crebra*	60		1	1			PCT 3328 - Degraded	Remove
63	*Eucalyptus crebra*	60		1	3			PCT 3328 - Degraded	Remove
64	*Eucalyptus moluccana*	80				1		PCT 3328 - Degraded	Remove
66	*Eucalyptus moluccana*	90	1					PCT 3328 - Degraded	Remove
65	*Eucalyptus tereticornis*	91		1	3	2		PCT 3328 - Degraded	Remove
68	*Eucalyptus moluccana*	61	2	1				PCT 3328 - Degraded	Remove
84	*Eucalyptus moluccana*	81		2	1			PCT 3328 - Degraded	Remove
101	*Eucalyptus crebra*	56	1	1	1			PCT 3328 - Degraded	Remove
142	*Eucalyptus moluccana*	110		3	3	1		PCT 3328 - Degraded	Retain
143	*Eucalyptus moluccana*	85		1	5			PCT 3328 - Degraded	Retain
144	*Eucalyptus moluccana*	66			2	1		PCT 3328 - Degraded	Retain
145	*Eucalyptus moluccana*	97			3	1		PCT 3328 - Degraded	Remove
161	*Eucalyptus moluccana*	77		1				PCT 3328 - Degraded	Remove
163	*Eucalyptus moluccana*	56			1			PCT 3328 - Degraded	Remove
164	*Eucalyptus moluccana*	55		1				PCT 3328 - Degraded	Remove
193	*Eucalyptus moluccana*	103		3				PCT 3328 - Degraded	Remove
194	*Eucalyptus moluccana*	71		2				PCT 3328 - Degraded	Remove
195	*Eucalyptus moluccana*	84		2				PCT 3328 - Degraded	Remove
202	*Eucalyptus moluccana*	117		3				PCT 3328 - Degraded	Retain
213	*Eucalyptus moluccana*	125		5				PCT 3328 - Degraded	Remove
226	*Eucalyptus punctata*	112	3					PCT 3328 – Landscaped	Remove
227	*Eucalyptus punctata*	121		4				PCT 3328 – Landscaped	Remove
Sub-total			**7**	**34**	**23**	**6**	**0**		
Total			**70**						

Notes for hollow size: XS <5cm, S 5-10cm, M 10-15cm, L 15-20cm, XL >20cm, DBH - diameter at breast height

1.5.4.2 Water Features

The Subject Site contains one farm dam. Vegetation adjacent to the dam is managed and regularly mown exotic-dominated grassland. The dam presents limited fauna habitat features, with no *Typha* spp. or *Eleocharis* spp. type vegetation that would be suitable for amphibians.

Another ephemeral dam is present in the south-west. However, there has been no evidence of its being filled with water since December 2022.

Furthermore, a review of historical imagery (DCS, 2023 and Nearmap, 2023) suggests that both dams are human-made rather the result of nature hydrological processes.

No other water features, including watercourses, are present on site.

1.5.5 Species Credit Species Survey Results

Overall survey effort within the Subject Site (for plots, targeted searches, and habitat assessments) and within the Subject Site (from past surveys, including plots, targeted searches, habitat assessments) are detailed in **Table 13**, and was conducted using relevant guidelines. Survey periods are shown in **Table 16** and survey effort is shown in **Figures 6, 7** and **8**.

Table 15 – Species Credit Species

Species	Specified Survey Period (BAM – C)	Survey Guidelines	Surveyed in Season (Y/N)	Survey Method Undertaken	Date Surveyed	Habitat (Present / Condition)	Records from Deployed Equipment	Observed Within 10km (NSW BioNet Atlas) (Y/N)	Observed within Subject Site (Y/N)	Assumed Present (Y/N)	Species Credits Apply (Y/N)
Flora											
Callistemon linearifolius Netted Bottlebrush	Oct-Jan	Parallel walking transects – Maximum distance between transects 20m in open, 10m in dense vegetation.	Y	Parallel walking transects – Maximum distance between transects 20m in open, 10m in dense vegetation.	13-14/11/2023	Habitat present in degraded form	N/A	Y	N	N	N
Persoonia pauciflora North Rothbury Persoonia	All year	Parallel walking transects – Maximum distance between transects 20m in open, 10m in dense vegetation.	Y	Parallel walking transects – Maximum distance between transects 20m in open, 10m in dense vegetation.	10-11/07/2023	Habitat present in degraded form	N/A	N	N	N	N
Pterostylis chaetophora Pterostylis chaetophora	Sep-Nov	Parallel walking transects – Maximum distance between transects 10m in open, 5m in dense vegetation.	Y	Parallel walking transects – Maximum distance between transects 10m in open, 5m in dense vegetation.	13-14/11/2023	Habitat present in degraded form	N/A	N	N	N	N
Fauna											
Burhinus grallarius Bush Stone-curlew	All year	Diurnal bird census – Flushing by walking through potential habitat Spotlighting by foot or from a vehicle driven in first gear. Call playback - Sites for Bush Stone-curlew surveys should be 2-4km apart and conducted during the breeding season.	Y	Diurnal bird census	13/12/2022 30/12/2022 23/03/2023 10-11/07/2023 13-14/11/2023 12/12/2023	Habitat present in degraded form	N	N	N	N	N
				Spotlighting by foot	13/12/2022 10-11/07/2023						
				Call playback	13/12/2022 10-11/07/2023						
Callocephalon fimbriatum Gang-gang Cockatoo	Oct-Jan	Area based survey methods	Y	Diurnal bird census	13-14/11/2023 12/12/2023		N	N	N	N	N
Calyptorhynchus lathami Glossy Black-Cockatoo	Jan-Sep	Area based survey methods	Y	Diurnal bird census	23/03/2023 10-11/07/2023		N	N	N	N	N
Cercartetus nanus Eastern Pygmy-possum	Oct-Mar	Spotlighting, motion-sensing camera trapping	N	Camera trap deployment	20/12/2023	Habitat present in degraded form	N/A	N	TBD	**Y**	**Y**
Chalinolobus dwyeri Large-eared Pied Bat	Nov-Jan	16 trap nights minimum Minimum 4 nights of harp trapping or acoustic detectors placed close to exits of caves, mines or tunnels. Four traps per night over two nights, repeated at least two weeks later is required Roost search as required (Breeding only)	N	*Survey scheduled post-lodgement of DA*	Deployment of Anabat on 12/12/2023	Breeding habitat absent Foraging habitat values are negligible	N/A	Y	TBD	**Y**	**Y**
Haliaeetus leucogaster White-bellied Sea-Eagle	Jul-Dec	Area based survey methods, Habitat assessment – 30 minutes searching each relevant habitat.	Y	Diurnal bird census Search for suitable habitat in areas of canopy vegetation	13/12/2022 30/12/2022 10-11/07/2023	No suitable habitat in the form of large stick nests present on site.	N	Y	N	N	N

Species	Specified Survey Period (BAM – C)	Survey Guidelines	Surveyed in Season (Y/N)	Survey Method Undertaken	Date Surveyed	Habitat (Present / Condition)	Records from Deployed Equipment	Observed Within 10km (NSW BioNet Atlas) (Y/N)	Observed within Subject Site (Y/N)	Assumed Present (Y/N)	Species Credits Apply (Y/N)
					13-14/11/2023 12/12/2023						
Hieraaetus morphnoides Little Eagle	Aug-Oct	Habitat assessment – 30 minutes searching each relevant habitat.	N	Diurnal bird census Search for suitable habitat in areas of canopy vegetation	13-14/11/2023	No suitable habitat in the form of large stick nests present on site.	N/A	Y	N	N	N
Litoria aurea Green and Golden Bell Frog	Nov-Mar		N	*Survey scheduled post-lodgement of DA*			N/A	Y	TBD	**Y**	**Y**
Litoria brevipalmata Green-thighed Frog	Sep-Apr		N	*Survey scheduled post-lodgement of DA*			N/A	N	TBD	**Y**	**Y**
Lophoictinia isura Square-tailed Kite	Sep-Jan	Habitat assessment – 30 minutes searching each relevant habitat.	Y	Diurnal bird census Search for suitable habitat in areas of canopy vegetation	13/12/2022 30/12/2022 13-14/11/2023 12/12/2023		N/A	Y	N	N	N
Ninox connivens Barking Owl	May-Dec	Call playback - Sites should be separated by 800 metres – 1km, and each site must have the playback session repeated as follows: at least 5 visits per site, on different nights. Day habitat search: Search habitat for pellets, and likely hollows. Stag-watching: Observing potential roost hollows for 30mins prior to sunset and 60mins following sunset.	Y	Search for potentially suitable hollows	13/12/2022 23/03/2023	A few large hollows present on site that may be suitable. However, foraging habitat is disturbed and in a rural residential landscape.	N	N	N	N	N
				Call playback, spotlighting, during two (2) nights	10-11/07/2023						
				Songmeter deployment (15 nights)	10-25/07/2023						
Ninox strenua Powerful Owl	May-Aug	Call playback - Sites should be separated by 800 metres – 1km, and each site must have the playback session repeated as follows: at least 5 visits per site, on different nights. Day habitat search: Search habitat for pellets, and likely hollows. Stag-watching: Observing potential roost hollows for 30mins prior to sunset and 60mins following sunset.	Y	Search for potentially suitable hollows	13/12/2022 23/03/2023	A few large hollows present on site that may be suitable. However, foraging habitat is disturbed and in a rural residential landscape.	N	N	N	N	N
				Call playback, spotlighting, during two (2) nights	10-11/07/2023						
				Songmeter deployment (15 nights)	10-25/07/2023						
Petaurus norfolcensis Squirrel Glider	All year	Effort per stratification unit up to 50 hectares: Spotlighting on foot - 2 x 1 hour and 1km up to 200 hectares of stratification unit, walking at approximately 1km per hour on 2 separate nights. Stagwatching - Observing potential roost hollows for 30 minutes prior to sunset and 60 minutes following sunset	N	Camera trap deployment	20/12/2023		N/A	Y	TBD	**Y**	**Y**
Pandion cristatus Eastern Osprey	Apr-Nov	Area based survey methods. Habitat assessment – 30 minutes searching each relevant habitat.	Y	Diurnal bird census Search for suitable habitat in areas of canopy vegetation	10-11/07/2023 13-14/11/2023	Site is not proximate to the sea and does not constitute suitable foraging habitat	N/A	N	N	N	N

Species	Specified Survey Period (BAM – C)	Survey Guidelines	Surveyed in Season (Y/N)	Survey Method Undertaken	Date Surveyed	Habitat (Present / Condition)	Records from Deployed Equipment	Observed Within 10km (NSW BioNet Atlas) (Y/N)	Observed within Subject Site (Y/N)	Assumed Present (Y/N)	Species Credits Apply (Y/N)
Pteropus poliocephalus Grey-headed Flying-fox	Oct-Dec	Spotlighting on foot – 2 x 1 hour and 1km up to 200 hectares of stratification unit, walking at approximately 1km per hour on 2 separate nights	Y	Spotlighting on foot in areas of suitable habitat	13/12/2022	Habitat is degraded and there is no evidence of a breeding colony on site	Y	Y	Y (foraging)	N	N
				Diurnal walkaround	13/12/2023						

1.5.6 Summary Survey Results

Given the survey works conducted on the development site and adjacent lands as detailed in **Table 15,** with results summarised in **Appendices B** and **C**, it is considered that sufficient information exists to determine that there are no threatened species present within the Subject Site noting that presence has been assumed for a small number of species.

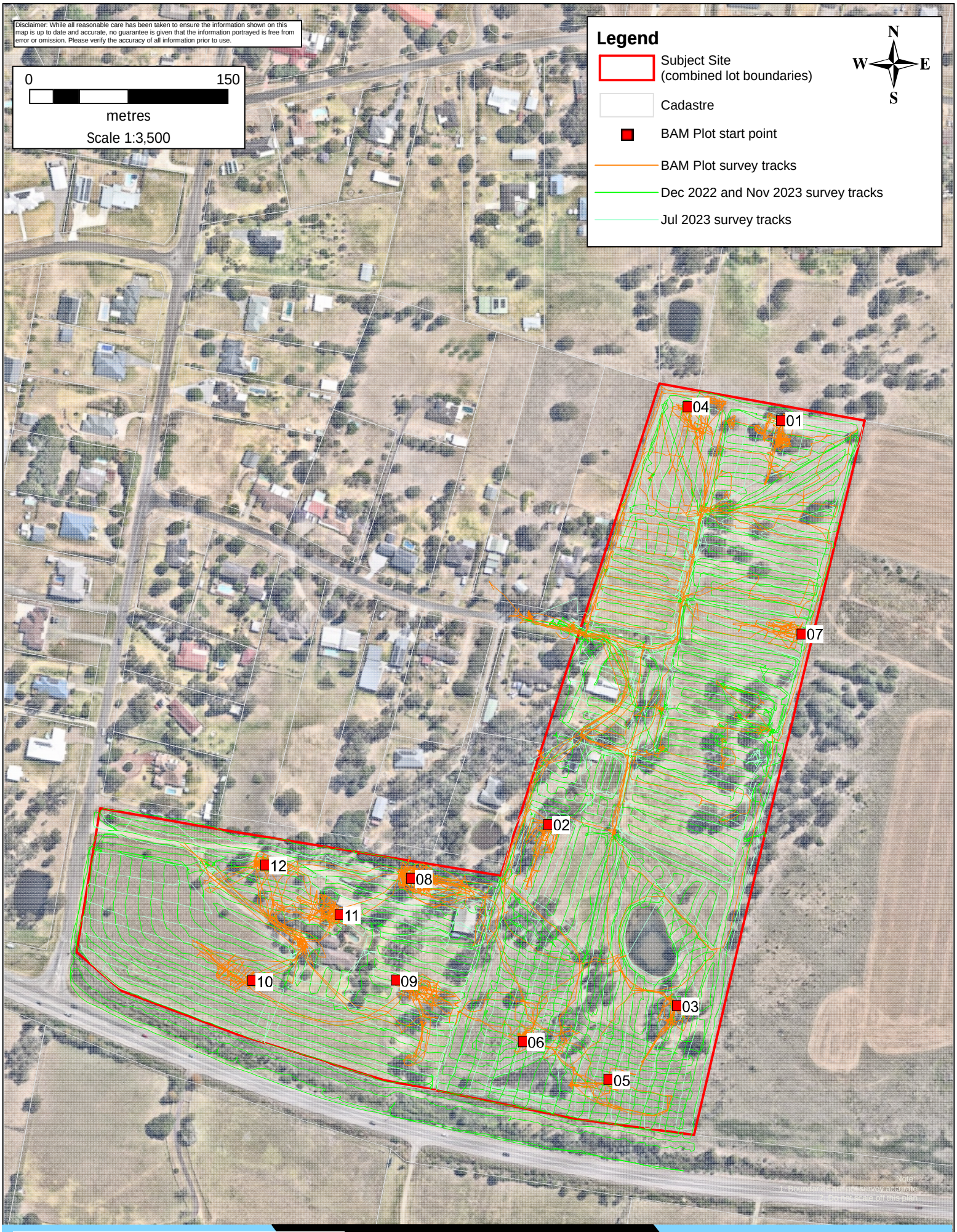


Figure 6: Flora Survey and BAM Plot Effort

Date: Dec 2023

Location: 16 Denton Close and 10 River Road, Windella

Client: Mavid Development Pty Ltd

BOAMS Ref: 44198
AEP Ref: 3154

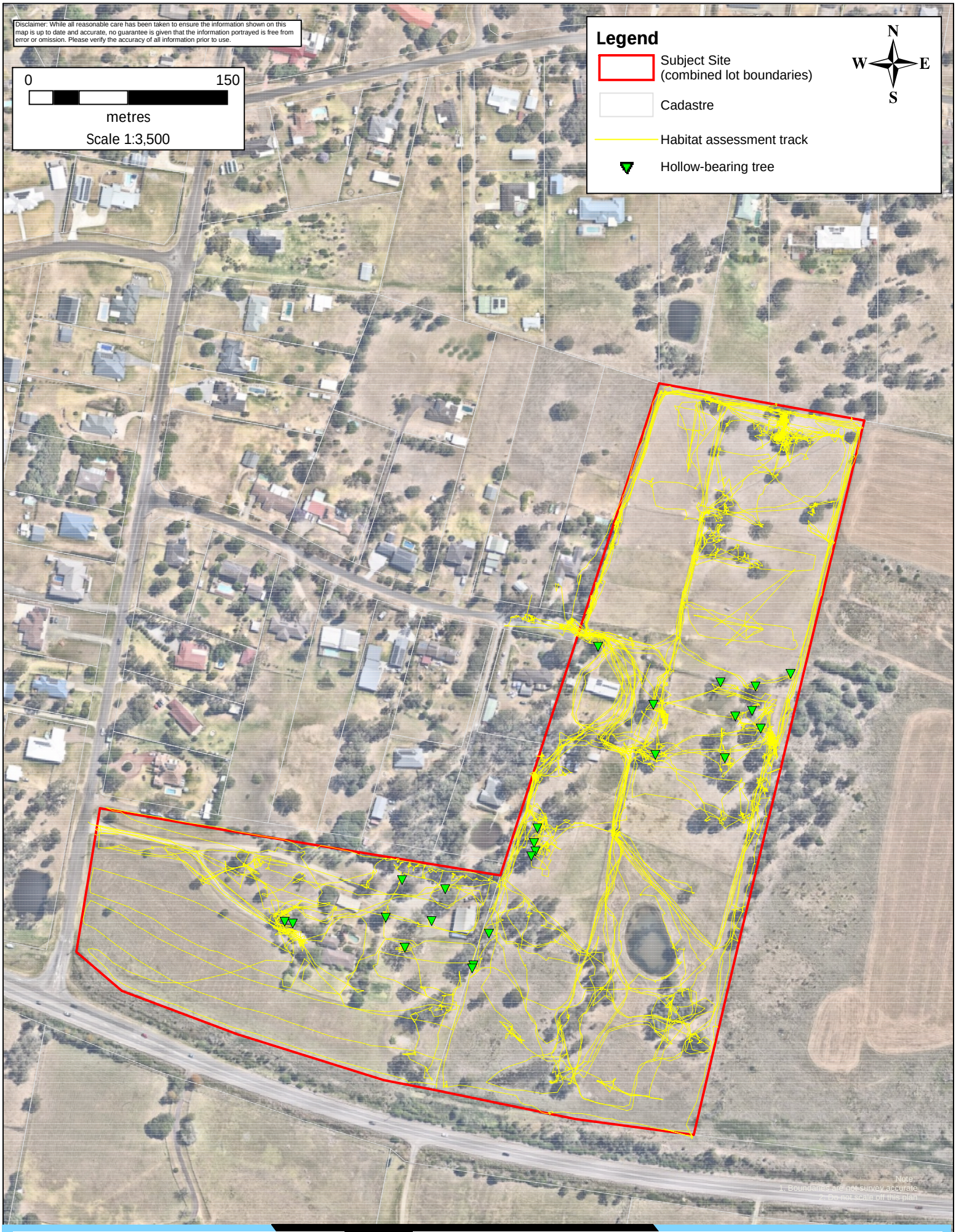


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Figure 7: Habitat Assessment

Date: Dec 2023

Location: 16 Denton Close and 10 River Road, Windella

Client: Mavid Development Pty Ltd

BOAMS Ref: 44198
AEP Ref: 3154

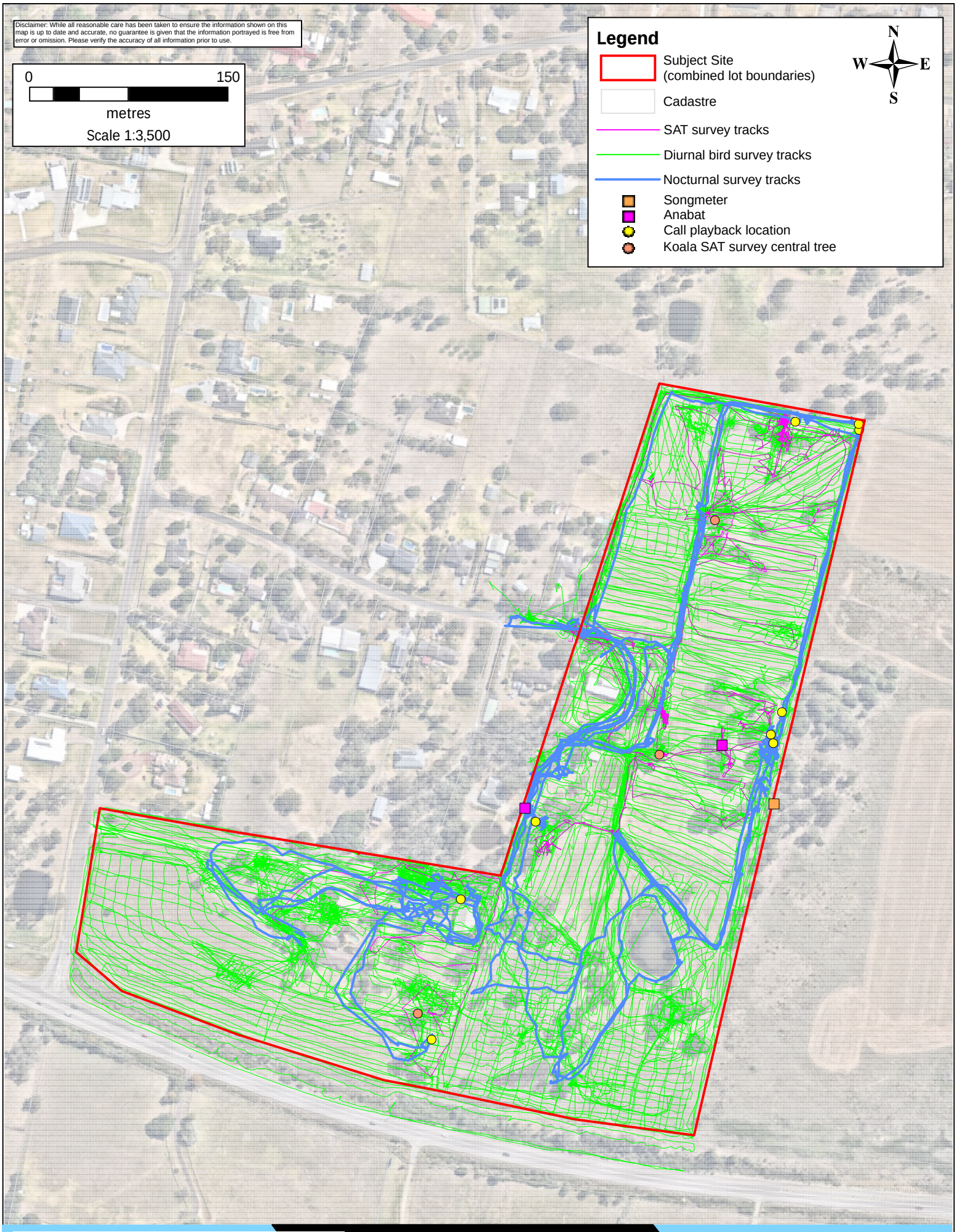

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Figure 8: Fauna Survey Effort

Date: Dec 2023

Location: 16 Denton Close and 10 River Road, Windella

Client: Mavid Development Pty Ltd

BOAMS Ref: 44198
AEP Ref: 3154

2.0 Stage 2 – Impact Assessment (Biodiversity Values)

2.1 Avoid and Minimise Summary

Section 7 of the BAM provides a list of measures that need to be taken into consideration during project planning and design to minimise impacts upon native vegetation, habitat, and other prescribed biodiversity values. Applicable measures taken as part of this project to minimise impacts are provided below.

The avoid and minimise strategy for this development (in accordance with Section 7 of the BAM), is discussed in greater detail in **Table 16** below. The impact assessment and mitigation measures (in accordance with Section 9 of the BAM) are included in **Tables 17, 20, 21, 22** and **23**.

The following measures in **Section 2.2** have been provided to help mitigate the impacts of construction and the ongoing operation of the proposed development on the biodiversity values identified within the Subject Site and surrounds.

2.2 Project Design Avoidance Measures

The Subject Site is located within a semi-rural landscape within the suburb of Windella, which lies to the north of the New England Highway in the Maitland LGA.

Considerations of Avoid & Minimise has been applied with the proposed development being located within predominantly cleared and underscrubbed paddocks. Impacts to native vegetation were deemed to be of minimal consequences due to the very low VIS for the PCT present onsite. The proposed development footprint and associated civil works have been positioned within RU2 – Rural Landscape zoned lands. Native vegetation impacted includes 4.47ha of PCT 3328 in degraded condition and 1.85ha of PCT 3328 in a severely degraded grassland form within the Subject Site.

Further to this, approximately 113 trees will be retained from PCT 3328 vegetation throughout the Study Area and incorporated within landscaping and supplemented with plantings of species associated with PCT 3328. This will assist in maintaining connectivity for local flora and fauna in the area and reduce impacts to PCT 3328 and the associated EEC. Furthermore, the installation of compensatory habitat in the form of nest boxes to mitigate the removal of hollow-bearing trees will be undertaken.

2.3 Water quality and Hydrology

- A Concept Erosion and Sedimentation Strategy (ESS) has been prepared for the proposal following guidelines from Landcom (2004);
- A Stormwater Management Strategy (SMS) has been prepared with modelling to meet Maitland City Council Stormwater management targets;
- Best practice erosion and sedimentation controls should be put in place to limit offsite movement of materials into the adjacent vegetation to the north; and
- Erosion and sedimentation controls should be checked daily and maintained in working order especially after rain events.

2.4 Fencing, Services and Vehicular Access

Opportunity for fauna movement is likely to be minimal for all but highly mobile species (i.e., birds) due to the limited vegetation availability and poor connectivity to wider tracts of forest. The New England Highway provides a barrier to fauna movement to the south and vegetation cover in the north is primarily floodplain grassland and sparse remnant canopy, largely associated with urban development. Maitland Airport is located east of the Subject Site.

Hydrants are available along Denton Close for the replenishment of attending fire services. The hydrant system will be extended along the new internal roads to service the proposed residential allotments.

The sizing, spacing and pressures of this system must comply with AS2419.1-2021. Recommendations will be included within the Statement of Environmental Effects (SEE) to ensure compliance with the electricity and gas services requirements.

Furthermore, speed limits of up to 50km/h are expected to be enforced throughout the development, thus limiting the risk of collision with fauna.

2.5 General Construction & Operation

Site specific avoid and minimise measures (in accordance with Section 8 of the BAM) are discussed in **Table 16** while **Tables 17** to **23** assess the direct, prescribed, indirect and residual impacts associated with the development and how they are to be mitigated.

- For the clearing phase, retained trees will be delineated by safety bunting flags, fencing and signage indicating environmental protection zone, which will still allow fauna to egress the development area as needed. Following the completion of clearing works, permanent delineation features such as logs should be installed to protect the retained vegetation during operational phase of the development;
- Plantings incorporated in the landscape design of the proposed development site to provide future resources for native fauna in the area.
- Vegetation clearing is to be timed to avoid cold weather periods where overnight temperatures are forecast to be less than 12°C. Cold weather is likely to make it difficult for resident hollow dependent fauna to successfully relocate. This is particularly relevant for low body-weight species such as microbats;
- In order to mitigate potential impact on fauna inhabiting the artificial structures onsite the following mitigation measures must be put in place during dismantlement: Dismantlement is to be timed to avoid cold weather periods where overnight temperatures are forecast to be less than 12°C;
- Potential microbat habitat will need to be dismantled carefully under the supervision of a qualified ecologist;
- The roof structure of any building should be removed carefully using machinery to render the building unhabitable for microbats;
- Microbat boxes should be installed in the vicinity of demolition works two weeks prior to provide alternative habitat for the bats to relocate, and then removed and placed in retained land if being used.
- Prior to clearing of any vegetation, an Ecologist is to inspect the area for any signs of resident fauna requiring attention, and in particular nesting birds. Where such is identified, appropriate strategies are to be developed and instigated to minimise impacts. Pre-clearance surveys to include diurnal surveys, stagwatching and nocturnal surveys;
- A staged approach to clearing is to be undertaken to provide fauna the opportunity to disperse outside the area of impact. Staging to include;
    - Phase 1 Clearing: Underscrubbing;
    - Phase 2 Clearing: Removal of non-habitat trees; and
    - Phase 3 Clearing: Removal of habitat and connecting trees;
- All clearing works comprising Phase 1, 2 and 3 are to be undertaken under the supervision of the Project Ecologist;
- Clearing should occur in a direction from previously disturbed lands towards retained lands;
- Implement clearing protocols, including pre-clearance surveys to identify habitat and vegetation to be retained;
- All clearing works to be attended by a suitable equipped and experienced ecologist to deal appropriately with any displaced fauna species;

- All hollow bearing features will be sectionally lowered by tree climbers (where safe to do so);
- Any fauna rescued during vegetation clearing is to be assessed for injuries, and subsequently released to a suitable nearby location; this may require holding fauna until dusk for release in accordance with relevant animal ethics licencing and standards;
- If any fauna is injured during vegetation clearing, they are to be taken promptly to a nearby veterinarian or suitable wildlife carer contact;
- Civil Construction staff to be inducted into pre-clearing and clearing protocols, and to identify environmental features for protection;
- Any suitable hollows recovered during clearing works should be reconditioned into suitable hollows and installed in retained lands in addition to the manufactured nest boxes;
- All manufactured boxes are to be industry best practice including either marine or hardwood plywood with a minimum thickness of 15mm. Boxes will not have hinged lids to ensure longevity of the boxes and installation methods will not inhibit growth of the host tree;
- All cleared vegetation is to be mulched on site and spread to help stabilise any exposed soil and minimise offsite movement of biomass. Fallen timber and hollow logs identified to be retained to be relocated in areas where trees are being retained;
- Implement hygiene protocols for machinery to prevent the spread of weeds outside the development site;
- Protocols within the Construction Environmental Management Plan (CEMP) that incorporates pre, during and post construction mitigation measure to reduce both direct and indirect impacts, such as lighting, vehicle strike, runoff etc.; and
- Incorporation of Water Sensitive Urban Design (WSUD) principles within stormwater infrastructure is to occur to minimise downstream hydrology changes.

No further site-specific avoidance measures (as listed within Section 8.1 and 9.3 of the BAM) are proposed for the project.

2.5.1.1 Management of Vegetation for Bush Fire Protection

APZs are within the boundary of the Subject Site abounding forest vegetation to the east and grassland to the north and south. The Subject Site will be managed as an Inner Protection Area as per the provisions of NSW RFS *Planning for Bushfire Protection 2019* guidelines.

2.5.1.2 Landscaping

- Where possible, landscaping is to provide some future resources for native fauna in the area, particularly along the western boundary;
- Landscaping is to incorporate the 113 trees identified for retention;
- Landscaping areas are to incorporate plantings with species that occur within the vegetation communities that have been ground-truthed during site surveys of PCT 3328. A comprehensive list of species available for the planting palette to be considered within the Landscape Plan has been recommended to the client which provides a more comprehensive list of associated species within the PCT via the Bionet Vegetation Classification.

Table 16 – Avoid and Minimise Impacts on Biodiversity Values

Objectives/Requirements	Evidence of compliance
Locating a Project to Avoid and Minimise Impacts on Native Vegetation and Habitat	
Knowledge of biodiversity values should inform decisions about the location of the proposal. The initial assessment of biodiversity values from Stage 1 may be used to inform the early planning of the route or location of a proposal.	The Subject Site lies within a fragmented semi-rural area in Windella. Existing land use covers two large rural-residential lots consisting of managed paddocks, historically cleared understorey and sparse remnant canopy and paddock trees. The proposed Manufactured Home Estate design is the result of an iterative process which has sought to avoid impacts to biodiversity values by selecting a location with lower biodiversity value and retaining features likely to maintain biodiversity value.
Selecting a final proposal location may be an iterative process. Decisions may need to be revisited after all field surveys have been completed.	The final proposal is the result of an iterative design process undertaken in consultation with bushfire consultants, architects, town planners, landscapers, civil engineers, arboricultural consultants and project ecologists to determine the optimal location of the footprint while considering potential biodiversity values and bushfire risk management requirements. As a result, the final proposal will retain 113 trees determined to be commensurate with PCT 3328 and planted native vegetation as described in **Section 1.4** of the present report.
Impacts from clearing native vegetation and threatened species habitat can be avoided or minimised by locating the proposal in areas: *a. lacking biodiversity values* *b. where the native vegetation or threatened species, habitat is in the poorest condition (i.e., areas that have a low vegetation integrity score)* *c. that avoid habitat for species with a high biodiversity risk weighting or land mapped on the important habitat map, or native vegetation that is a TEC or a highly cleared PCT.* *d. outside of the buffer area around breeding habitat features such as nest trees or caves.*	a. The Subject Site contains moderate biodiversity values due to the number hollow-bearing trees therein. Due to the highly managed nature of the site and limited broader connectivity. It is considered that the project has selected an appropriate location for development that will minimise impact to biodiversity in the area. As described above,113 trees will be retained within the Subject Site, providing connectivity to habitat in the broader surrounds, and a fauna corridor through the Subject Site. This demonstrates the project has taken appropriate steps to avoid areas of higher biodiversity value land and maintain connectivity for local flora and fauna in the area. b. Vegetation proposed for removal that has been assessed for credits within the BAM-C was determined to have a VIS of 37.1 (degraded zone) and 14.3 (severely degraded grassland zone). The planted native vegetation component although not being assessed in the BAM-C occurred in a generally degraded condition. As such it is considered that the proposed development has been located within areas of lowest quality vegetation and has avoided areas of higher biodiversity value through the retention of trees within the Subject Site. c. While PCT 3328 on site was considered to be associated *Hunter Lowland Redgum Forest of the Sydney Basin and New South Wales North Coast Bioregions*, the vegetation on site is degraded to severely degraded and unlikely to truly represent TECs in the area. Further to this, the degraded and fragmented condition of native vegetation on site means that biodiversity values are limited. No threatened species or potential SAII candidate species have been identified on site and a total of 113 are proposed to be retained. Actual potential TEC coverage on site is thus limited to approx. 6.32ha in a degraded condition. Therefore,

Objectives/Requirements	Evidence of compliance
	avoidance of TECs is considered acceptable in the context of the highly disturbed and fragmented nature of the site, and its location within a rural residential landscape. d. It is proposed to remove 20 hollow-bearing trees (or 51 hollows) and compensate the impacts with the installation of nest boxes and other tree habitat features within retained trees.
When selecting a proposal's location, all of the following should be analysed. Justification for the decisions in determining the final location must be based on consideration of: *a. alternative modes or technologies that would avoid or minimise impacts on biodiversity values* *b. alternative routes that would avoid or minimise impacts on biodiversity values* *c. alternative locations that would avoid or minimise impacts on biodiversity values* *d. alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values.*	a. The development footprint is predominantly located within a highly managed paddock and is avoiding areas of higher biodiversity value (notably retaining 113 trees commensurate with PCT 3328) within the Subject Site. An Arborist was consulted to undertake a tree impact assessment and determine protection measures for the retention of 113 trees within the Subject Site. Considering the proposal is for MHE development and the lack of high biodiversity value land within the Study Area, considerations of alternative modes and technologies to minimise impact were deemed to satisfy this requirement. b. The proposed development will utilise the existing road network. Internal roads to facilitate movement of vehicles in the area were informed by an Arborist tree impact assessment and protection measures were determined for the retention of 113 trees within the Subject Site. As such, no alternative modes are to be considered and impacts will be minimised as a result of servicing of the proposed MHE. c. The Subject Site lies within a fragmented semi-rural area in Windella. Existing land use covers two large rural-residential lots consisting of managed paddocks, historically cleared understorey and sparse remnant canopy and paddock trees. The proposed Manufactured Home Estate design is the result of an iterative process which has sought to avoid impacts to biodiversity values by selecting a location with lower biodiversity value and retaining features likely to maintain biodiversity value. The proposal location was chosen due to its poor biodiversity values within the wider locality, thereby avoiding and minimising impacts. d. An Arborist was consulted to undertake a tree impact assessment and determine protection measures for the retention of 113 trees within the Subject Site.
The proposal may also list and map site constraints, such as: *a. bushfire protection requirements, including clearing for asset protection zones* *b. flood planning levels* *c. servicing constraints.*	The impacts to native vegetation expected as a result of the proposed works consisting in the clearing of 6.32ha. All mitigation measures for fire, floods and services have been factored into the impact area while meeting the required standards. a. Asset Protection Zones (APZs) have been recommended for the site and have been incorporated into the design process and included within the Subject Site. b. Stormwater management and Water Sensitive Urban Design has been considered and incorporated as part of the development. Refer to the Storm Water Management Plan as lodged with the DA for flood planning levels and associated works. Detention basins have also been incorporated within the site design, in the south-east and north-east. c. Servicing has been considered and will be provided to the properties.

Objectives/Requirements	Evidence of compliance
In the BDAR or BCAR, the assessor must document and justify any actions taken to avoid or minimise impacts through careful location of the proposal.	As detailed above the Subject Site's location is the most feasible option to enable the project to progress due to poor habitat condition while it is acknowledged that a moderate number of hollow-bearing trees will be impacted. Considering the location of the project in the context of the locality, the proposed DA footprint has the least impact to biodiversity values, native vegetation, connectivity routes and fauna movements whilst still being located in an appropriate location with regards to access.
Designing a Project to Avoid and Minimise Impacts on Native Vegetation and Habitat	
The BDAR or BCAR must document the reasonable measures taken by the proponent to avoid or minimise clearing of native vegetation and threatened species habitat during proposal design, including placement of temporary and permanent ancillary construction and maintenance facilities. The types of measures that can be used to demonstrate this include: *a. reducing the proposal's clearing footprint by minimising the number and type of facilities* *b. locating ancillary facilities in areas that have no biodiversity values* *c. locating ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e., areas with the lowest vegetation integrity scores)* *d. locating ancillary facilities in areas that avoid habitat for species and vegetation that has a high threat status (e.g., an endangered ecological community (EEC) or critically endangered ecological community (CEEC) or is an entity at risk of a serious and irreversible impact (SAII)* *e. actions and activities that provide for rehabilitation, ecological restoration and/or ongoing maintenance of retained areas of native vegetation, threatened species, threatened ecological communities and their habitat on the subject land.*	a-d. The proposed design of the development is such that it maximises use of existing cleared land and minimises impact to native vegetation, retaining 113 trees commensurate with PCT 3328 subject to an Arboricultural Impact Assessment and tree protection measures. Due to the highly managed nature of the site and limited broader connectivity. It is considered that the project has selected an appropriate location for development that will limit impacts to biodiversity in the area. As described above, 113 trees of PCT 3328 will be retained with tree protection measures. Thus, demonstrating the project has taken appropriate steps to minimise impact to areas of higher biodiversity value land and maintain any available connectivity for local flora and fauna in the area. Furthermore, the VIS for the degraded condition zone is 37.1 and the VIS for the severely degraded grassland zone is 14.3, such that the development altogether will impact vegetation in poor condition. While the PCT on site were considered under the precautionary principle to be associated with a TEC as described in **Section 1.4.10** of the present report, the vegetation on site is degraded and managed and unlikely to truly represent TECs in the area. Further to this, the highly degraded and fragmented condition of native vegetation on site means that biodiversity values are limited. No threatened species or potential SAII candidate species have been identified on site. The majority of the development footprint is located within disturbed, exotic dominated and cleared lands, with only 6.32ha of vegetation somewhat associated with PCT 3328 proposed to be cleared. Therefore, avoidance of TECs is considered acceptable in the context of the highly disturbed and fragmented nature of the site, and its location within an urban landscape. e. The proposed impacts will not affect larger ecosystem connectivity and have a relatively minor impact on local connectivity as the majority of the development adjoins existing cleared areas. Consideration should be given to utilising endemic native species in any landscaping associated with the development, to provide future supplementary resources and connectivity for mobile fauna.

Objectives/Requirements	Evidence of compliance
The BDAR or BCAR must document and justify efforts to avoid or minimise impacts through design.	As discussed above, the development and its subsequent impacts were deemed unavoidable to meet the development standards. **Section 2.0** of the BDAR explains in detail how the 'avoid and minimise principles' have been implemented as part of the biodiversity impact assessment for the project. Measures include fencing, undergrounding power and erosion and sedimentation controls to limit indirect impacts on adjacent lands, and clearing under the supervision of a Project Ecologist, conducted in such a way as to reduce harm to fauna and facilitate dispersal into retained vegetation zones.

Table 17 - Prescribed Impact Avoidance and Minimisation

Objectives/Requirements	Evidence of compliance
Avoiding and Minimising Prescribed Biodiversity Impacts during Project Planning	
The timing and extent of a prescribed impact on the habitat of threatened entities can be difficult to assess and adequately offset through the provision of biodiversity credits. Prescribed impacts may occur on habitat features that are not native vegetation, e.g., caves, rocky outcrops, and flyways. Because these types of features cannot be readily replaced or offset, it is important that measures to avoid or minimise impacts are undertaken and are clearly documented in the BDAR or BCAR.	No biodiversity values in addition to those noted in the BDAR i.e., direct and indirect impacts to biodiversity were identified for the Subject Site. Direct and indirect impacts are considered in **Tables 20, 21** and **22** of the BDAR. No prescribed impacts, other than those detailed below in this table, were identified as likely to occur as a result of the proposal.
Locating a Project to Avoid and Minimise Prescribed Biodiversity Impacts	
To avoid or minimise prescribed biodiversity impacts, the proponent must consider how to: *a. locate surface works to avoid direct impacts on the habitat features identified in Chapter 6* *b. locate subsurface works, in both the horizontal and vertical planes, to avoid and minimise operations beneath the habitat features identified in Chapter 6. For example, locating longwall panels away from geological features of significance, groundwater-dependent plant communities and their supporting aquifers* *c. locate the proposal to avoid severing or interfering with corridors connecting different areas of habitat and migratory flight paths, to important habitat or local movement pathways* *d. optimise the proposal layout to minimise interactions with threatened entities; for example, design a wind farm that has:* *i. 100 m turbine-free buffers around features that attract and support aerial species, such as forest edges, riparian corridors, wetlands, ridgetops, and gullies* *ii. turbine-free corridors in zones of regular movement for species of concern, to avoid a barrier effect* *e. locates the proposal to avoid impacts on water bodies or hydrological processes*	a. The Subject Site: i. Does not contain karsts, caves, crevices, cliffs. No other features of geological significance supporting threatened species and ecological communities are present; ii. Does not contain rocks etc, which may support habitat for threatened species; iii. Contains some human made structures. However, no evidence of use by threatened microbats was identified. Precautionary measures will be taken at demolition stage to check these features prior to clearing, in case activity was not detected at survey time; iv. Does not contain non-native vegetation supporting threatened species; v. Wind turbines are not a feature of the proposed development. vi. Given that the development will be for local roads with a maximum speed limit of 50km/hr, the likelihood of vehicle strike is considered much lower than higher speed roads. Surface works are predominantly located within areas of existing paddocks and impacts to native vegetation are considered to be negligible. b. As discussed previously the development footprint has been designed to be contained primarily within paddocks and will retain 113 trees with tree protection measures, as part of proposed parkland and perimeter lands. c. The land on which the development is proposed would only provide connectivity between different areas of habitat for highly mobile species as the site is fragmented from other areas of vegetation. The significant area of retention within the Subject Site will continue to provide habitat and connectivity to highly mobile species.

Objectives/Requirements	Evidence of compliance
	d. Discussed above. A second order watercourse is mapped adjacently to the Subject Site and located between the south west corner of the Subject Site and the New England Highway. Further assessment will determine whether a Controlled Activity Approval is required to be obtained if impacts are proposed within waterfront land. Any further impacts to TEC's and incorporation of flood planning modelling for the site have been considered.
When locating a proposal, the following need to be analysed and justification should be provided for each alternative selected: *a. alternative modes or technologies that would avoid or minimise prescribed impacts* *b. alternative routes that would avoid or minimise prescribed impacts* *c. alternative locations that would avoid or minimise prescribed impacts* *d. alternative sites within a property on which the proposal is located that would avoid or minimise prescribed impacts.*	As described above, the potential for prescribed impacts as a result of the proposal is limited to the removal of 6.53ha of planted native vegetation, exotic trees and paddocks, and human-made structures. No other feature of note was identified which would justify considering alternative modes, technologies, routes, locations, or sites within the property. Overall, the proposed plan, being the result of an iterative design process undertaken in consultation with bushfire consultants, architects, landscapers, civil engineers, town planners, arboricultural consultants and project ecologists, seeks to limit impacts to habitat values within the site, by locating the proposal within land zoned for residential development and within cleared and exotic-dominated lands.
Justifications for a proposal's location should identify any other site constraints that the proponent has considered in determining the location and design of the proposal, such as: *a. bushfire protection requirements, including clearing for asset protection zones* *b. flood planning levels* *c. servicing constraints.*	No prescribed impacts other than the potential ones listed above are considered as likely to be incurred by the implementation of an APZ. Other considerations of flood planning levels and servicing constraints have been incorporated in the design of the project.
The assessor must document and justify in the BDAR or BCAR all efforts to avoid, or the reasonable measures proposed to minimise, prescribed impacts when choosing the proposal's location.	As discussed above, the potential for prescribed impacts to be incurred by the proposal has been considered. It was deemed that there is limited to no such impact to be expected, with only small impacts to native vegetation presenting some potential to provide habitat values and therefore potentially being subjected to prescribed impacts. Further field assessment concluded that the removal of native vegetation will not reduce biodiversity values on site to any notable degree.
Designing a Project to Avoid and Minimise Prescribed Biodiversity Impacts	
Design measures that can avoid or minimise prescribed impacts include: *a. Engineering solutions, such as proven techniques to* *i. minimise fracturing of bedrock underlying features of geological significance, or groundwater-dependent communities and their supporting aquifers* *ii. restore connectivity and movement corridors*	a. i. It is not envisaged that any works will impact on features of geological significance, groundwater dependent communities or supporting aquifers. ii. Connectivity within the Subject Site is limited to predominantly scattered trees within cleared and managed paddocks and the proposal is unlikely to further reduce connectivity. A number of trees commensurate with PCT 3328 will be retained as a result of the proposal. The retention of this vegetation will ensure areas of higher biodiversity value, fauna refuge

Objectives/Requirements	Evidence of compliance
b. Design elements that minimise interactions with threatened entities, such as: *i. designing turbines to dissuade perching and minimise the diameter of the rotor swept area* *ii. designing fencing to prevent animal entry to transport corridors* *iii. providing vegetated buffers rehabilitated with native species* *c. Maintaining environmental processes that are critical to the formation and persistence of habitat features not associated with native vegetation* *d. Maintaining hydrological processes that sustain threatened entities* *e. Controlling the quality of water released from the site, to avoid or minimise downstream impacts on threatened entities.*	and connectivity are maintained. Mitigation measures in the form of landscaping trees commensurate with PCTs on site is proposed to minimise impacts resulting from the proposal. b. It is recommended that powerlines be buried rather than overhead so that flight paths for threatened fauna in the locality are maintained and avoid impacts such as powerline strike. A rural style 'post and rail' fence placed at the edge of the proposed development is recommended along with a low-speed limit within the development will mean that even if animals enter the Subject Site, they are unlikely to be struck by vehicles. Native endemic species have been recommended to be incorporated into the landscape design process. However, this will be limited to what is acceptable whilst ensuring compliance with bushfire risk management requirements. While non-native vegetation occurs on site, it was concluded its habitat values are very limited. As such, it was not considered necessary to preserve such vegetation. c-d. The Stormwater Management Plan prepared by Northrop, December 2023, indicates that the proposed development will achieve a significant reduction in pollutant loads hence improving the water quality throughout the catchment area. The MUSIC modelling in the Water Management Plan shows pollutant loads at the discharge location as: • *"Gross pollutants will achieve 100.0% in Stage A and Stage B* (exceeds Maitland Councils target of 70%); • *Total Suspended Solids will achieve 82.2% in Stage A and 80.6% in Stage B* (exceeds Maitland Councils target of 80%); • *Total Phosphorus will achieve 66.5% in Stage A and 63.8% in Stage B* (exceeds Maitland Councils target of 45%); and • *Total Nitrogen will achieve 49.1% in Stage A and 47.4% in Stage B (exceeds Maitland Councils target of 45%).* The Stormwater Management Plan prepared by Northrop, December 2023, concludes: *The results shown in the above table demonstrate that the proposed stormwater treatment train is effective, for both proposed stages of developments, in providing pollutant removal in accordance with Council's requirements.* e. The project design process incorporates MUSIC (Model for Urban Stormwater Improvement Conceptualisation) water quality modelling to determine stormwater treatments to ensure post-development water quality at least maintains pre-development conditions.
The proposed measures must be evidence-based and directed towards the threatened entities identified in Chapter 6. The BDAR or BCAR must document the designs that are proposed to avoid or minimise prescribed impacts	Refer to **Section 2.0** of the BDAR.

2.6 Assessment of Impacts

Section 8 of the BAM states that the BDAR "*must assess the impacts of the project on native vegetation and habitat*". In addition to this, Sections 9.1.4 and 9.2 require that further assessment be produced for any impact, including biodiversity impacts, expected in land surrounding the Subject Site. **Tables 23** to **26** provide a summary of measures proposed to avoid and minimise direct, indirect, and residual impacts on biodiversity.

Table 18 – Risk Matrix

Maximum reasonable consequence	Probability A	B	C	D	E
1	CR	CR	HR	HR	MR
2	CR	HR	HR	MR	LR
3	HR	HR	MR	LR	LR
4	HR	MR	LR	LR	LR
5	MR	LR	LR	LR	LR

CRITICAL	CR
HIGH RISK	HR
MEDIUM RISK	MR
LOW RISK	LR

Table 19 – Assessment Criteria

Consequence criteria: Impacts on threatened species and/or threatened species habitat
1. CRITICAL
Impact – Severe; Spatial scale – Widespread; Time scale – Long-term.
Requires consideration of whether impacts may result in a Serious and Irreversible Impact that may lead to local extinction.
2. MAJOR
Impact – Moderate; Spatial scale – Moderate to widespread; Time scale – Mid- to long-term.
May result in temporary or long-term damage.
3. MODERATE
Impact – Moderate; Spatial scale – Local to moderate; Time scale – Short- to mid-term.
May result in a moderate, temporary impact. However, it may be difficult to rehabilitate impact and may have negative implications on the ecosystem
4. MINOR
Impact – Minor; Spatial scale – Local; Time scale – Short-term.
May result in minor impacts that are relatively easily rehabilitated. Not likely to have negative implications on the ecosystem.
5. NEGLIGIBLE
Impact – Minor; Time scale – Short-term with no lasting effect.
Likelihood criteria
A. ALMOST CERTAIN
Very high or certain probability that impact will occur, or event is of a continuous nature.
B. LIKELY
Likely probability that impact will occur, or event is frequent (frequency 1-5 years).
C. MODERATE
Moderate probability that impact will occur, or event is infrequent (frequency 5-20 years).
D. UNLIKELY
Low probability that impact will occur, or event is very infrequent (frequency 100 years).
E. REMOTE
Very low probability that impact will occur or may occur under extenuating circumstances. Event is very rare or stochastic in nature (frequency 1000 years)

Table 20 – Direct Impact Assessment

Aspect	Project Phase	Potential Impact	Mitigation	Timing	Responsibility	Risk before mitigation	Risk after mitigation
Native vegetation	Construction and Operation	Removal of approx. 6.32ha of native vegetation.	Landscaping within the development will utilise endemic native species suitable for future fauna use. Development will primarily occur on cleared and non-endemic or exotic-dominated land.	Post-development	Council Project coordinator Ecologists	MR	LR
Threatened native vegetation	Pre-Construction and Construction	No threatened flora species have been identified on site, hence no impact.	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Habitat in the form of tree hollows	Pre-construction and Construction	20 trees containing hollows are proposed to be removed.	Compensatory habitat in the form of nest boxes is proposed to be installed at a ratio of one (1) nest box for every hollow removed, in retained trees within the Subject Site. Nest boxes are to be installed by qualified ecologists and according to the Habisure system (Franks & Franks 2006) or similar.	Not applicable	Project coordinator Ecologists	Not applicable	Not applicable
Fauna home range and connectivity	Pre-Construction and Construction	Disturbance to fauna habitat during clearing and construction operations	Presence of a project ecologist before and during clearing works to ensure any fauna present on site is safely relocated. Protective fencing to be installed to reduce likelihood of fauna incursion into construction site. Staff induction to raise awareness of potential fauna presence.	Pre-, during and post-development	Project coordinator Construction staff Site manager Project Ecologist	MR	LR
Fauna home range and connectivity	Operation	Reduction in connectivity by removal of 6.32ha of native vegetation.	Retention of 113 trees and landscape tree planting commensurate with PCTs on site will provide compensatory resource where practicable.	Post-development	Council Project coordinator Ecologists	LR	LR
Reduction of biodiversity values	Operation and Post Operation	Removal of remnant vegetation present on site	6.32ha of degraded to severely degraded native vegetation associated with PCT 3328 are proposed to be removed.	Pre-, construction and during-development	Project coordinator Construction staff Site manager	HR	LR

Aspect	Project Phase	Potential Impact	Mitigation	Timing	Responsibility	Risk before mitigation	Risk after mitigation
					Project Ecologist		
	Construction	Sediment run-off into retained vegetation area	Best practice erosion and sedimentation (ERSED) control methods to be adopted, enforced, and maintained throughout vegetation works, so as to avoid any movement of sediment resulting from clearing and construction into the retained vegetation lands.	During development	Project coordinator Construction staff Site manager Project Ecologist	HR	LR
		Changes to stormwater evacuation	Incorporation of Water Sensitive Urban Design (WSUD) principles within stormwater infrastructure is to occur to minimise hydrology changes.	During development and Operational	Project coordinator Construction staff Site manager Project Ecologist	HR	LR

Table 21 – Prescribed Impact Assessment

Subject of Prescribed Impact	Project Phase	Mitigation	Timing	Responsibility	Risk before mitigation	Risk after mitigation
Habitat of threatened species or ecological communities associated with: (i) Karst, caves, crevices, cliffs, and other geological features of significance or (ii) rocks, or (iii) human made structures, or (iv) non-native vegetation	Not applicable	Human-made structures are proposed to be removed. However, targeted fauna surveys concluded that they are not in use. Further mitigation measures in the form of pre-construction inspects are proposed to ensure no impacts are incurred, should any species be using those structures when demolition works commence.	Not applicable	Not applicable	Not applicable	Not applicable
Connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	Construction and operation	Reduction in connectivity will be negligible as only 6.32ha of native in degraded to severely degraded condition will be impacted. Vegetation on site is already fragmented and heavily managed. Retention of trees along the western and eastern boundaries will support connectivity to offsite areas of canopy vegetation, noting these occur in a highly managed rural residential landscape, with limited biodiversity value.	Not applicable	Not applicable	Not applicable	Not applicable
Movement of threatened species that maintains their lifecycle	Pre-operational	No threatened species were identified that would significantly be impacted by the proposed development. Compensatory habitat is proposed to be installed in the form of nest boxes and similar features where trees are being retained.	Not applicable	Not applicable	Not applicable	Not applicable
Water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities	Not applicable	No threatened species were identified to be using the waterbodies on site and no further consideration is required.	Not applicable	Not applicable	Not applicable	Not applicable
Wind turbine strikes on protected animals	Not applicable	No wind turbines will be installed on site.	Not applicable	Not applicable	Not applicable	Not applicable

Subject of Prescribed Impact	Project Phase	Mitigation	Timing	Responsibility	Risk before mitigation	Risk after mitigation
Vehicle strikes on threatened species or on animals that are part of a TEC	Construction, operation	Civil Construction staff to be inducted into pre-clearing and clearing protocols, and to identify environmental features for protection. During operation, such impacts will be mitigated through the introduction of low-speed limits as well as speed limiting devices on the facilities' roads.	Pre- and during development	Project coordinator Construction staff Site manager Project Ecologist	HR	MR

Table 22 – Indirect Impact Assessment

Aspect	Project Phase	Potential Impact	Mitigation	Timing	Responsibility	Risk before mitigation	Risk after mitigation
Noise	Construction	Noise during construction due to construction works and construction traffic. Potential disturbance to threatened species or reduced viability of adjacent retained habitat zone.	Timing of construction operations will be optimised as per an approved Construction Environmental Management Plan (CEMP) which will include a Noise Mitigation Plan. Tree protection and site fencing to prevent incursions into adjacent lands.	During development	Project coordinator Construction staff Site manager	HR	MR
	Operation	Noise due to traffic. Potential disturbance to threatened species within the surrounding area.	The proposal is unlikely to significantly increase the noise currently present at the Subject Site, which is already located adjacent the New England Highway and Maitland Airport, with adjoining urban development.	During operations and Operational	Civil Contractor	HR	MR
Vibration	Construction	Disturbance to fauna which may lead to displacement to adjacent areas.	Conditions of construction operations will be optimised as per an approved Construction Environmental Management Plan (CEMP).	During construction	Project coordinator Site manager Construction staff	HR	MR
Dust	Construction	Dust deposits on native flora and fauna habitat, resulting in disturbance to and reduced viability of adjacent habitat.	Dust levels during operations managed according to an approved CEMP: • Daily monitoring of dust generated by construction activities; and • Dust suppression measures (setting maximum speed limits and application of dust suppressants) will be implemented	During construction	Project coordinator Site manager Construction staff	LR	LR

Aspect	Project Phase	Potential Impact	Mitigation	Timing	Responsibility	Risk before mitigation	Risk after mitigation
			during construction works to limit dust on site.				
Light spill	Construction	Disturbance to nocturnal fauna, thus reducing viability of the adjacent habitat.	Optimal construction methods as per an approved CEMP will reduce instances of light spill. Such measures will include limiting use of lights where necessary and directing lights in such a way as to limit impact on adjacent vegetated lands.	During construction	Project coordinator Site manager Construction staff	LR	LR
	Operation	Disturbance to nocturnal fauna, thus reducing viability of adjacent retained habitat zone.	Provision of lighting will be in accordance with an approved CEMP. Permanent lighting shall be designed to minimise light spill into surrounding vegetation.	During operations	Civil Contractor	LR	LR
Non-native vegetation	Construction	Soil disturbance may lead to proliferation of exotic flora (including invasive weeds) through seeds and vegetation fragments.	As per an approved CEMP: • Appropriate handling of mulch created from the removal of exotic vegetation; • Appropriate cleaning of all construction equipment to limit the risk of weed seed and fragments to adjacent retained areas; and • Chemical and manual treatment of weeds where applicable. • Appropriate management of weeds within landscaping areas.	During construction	Project coordinator Site manager Construction staff	MR	LR
Visual amenity	Construction	Rubbish and waste retained onsite attracting native fauna.	Activities on the Site will be managed in accordance with an approved CEMP and designed to limit the amount of rubbish and waste onsite through good housekeeping practices.	During construction	Project coordinator Site manager Construction staff	LR	LR
	Operation	Rubbish and waste retained onsite attracting native fauna.	Suitable fencing to be installed and maintained between development and surrounding natural areas to prevent access and degradation of surrounding vegetation.	During operations	Civil Contractor	LR	LR

Table 23 – Residual Impact Assessment

Aspect	Project Phase	Residual Impact Description	Mitigation / Minimisation	Impact to be offset
Reduction of biodiversity values	Construction Operation	6.32ha of PCT 3328, including 4.47ha in degraded condition and 1.85ha occurring as severely degraded grassland	Retention of 113 trees that will maintain a level of connectivity and foraging habitat within the Subject Site. Installation of compensatory nestboxes and similar habitat features in retained trees.	6.32ha of PCT 3328
Noise, dust, light spill	Construction	Noise, dust, and light spill will still occur but at a low magnitude, thus keeping the impact on local fauna to a low level	Application of CEMP as mentioned above	Not applicable

2.7 Impact Summary

Biodiversity Offsets Credits are required for the removal of 6.32ha of native vegetation occurring as follows:

- 4.47ha of PCT 3328 in degraded condition;
- 1.85ha of PCT 3328 in severely degraded grassland condition.

Furthermore, 6.53ha of vegetation present within the Subject Site was classified as 'planted native vegetation' and BAM 2020 Appendix D applied (Table 2). This vegetation type is not required to be further assessed using the BAM, and was thus excluded from any credit or offset calculations.

2.7.1 Serious and Irreversible Impacts (SAIIs)

Species at risk of SAII as a result of development are determined by decision makers (i.e., Council) for each particular threatened species / community based upon four (4) principles listed within the Guidance and criteria to assist a decision maker to determine a serious and irreversible impact (DPIE 2019).

The following flora and fauna SAII candidate species were predicted as potentially occurring within the Subject Site in the BAM-C. The potential for these species to occur within the Subject Site was based on both the candidate species predicted by the BAM-C for the PCTs present on site as well as BioNet Atlas records from the locality and where potential habitat was present within or near the Subject Site.

Persoonia pauciflora (North Rothbury Persoonia) was identified as a Candidate Species within the BAM-Calculator that required surveys. Surveys were undertaken for this species and it was not detected on site. Therefore, no further SAII considerations apply for this species.

Swift Parrot *(Lathamus discolor)* was also identified within the BAM-Calculator as Candidate Species; however, this species was removed from the candidate species list as the site is not mapped as containing important habitat and no further assessment for these species was required.

Large-eared Pied Bat *(Chalinolobus dwyeri)* was identified on the Candidate Species list and within the 1500m BioNet search area. However, no suitable breeding habitat occurs within the site or in close proximity to it. Therefore, no further SAII considerations apply for this species.

2.7.2 Impacts requiring offset

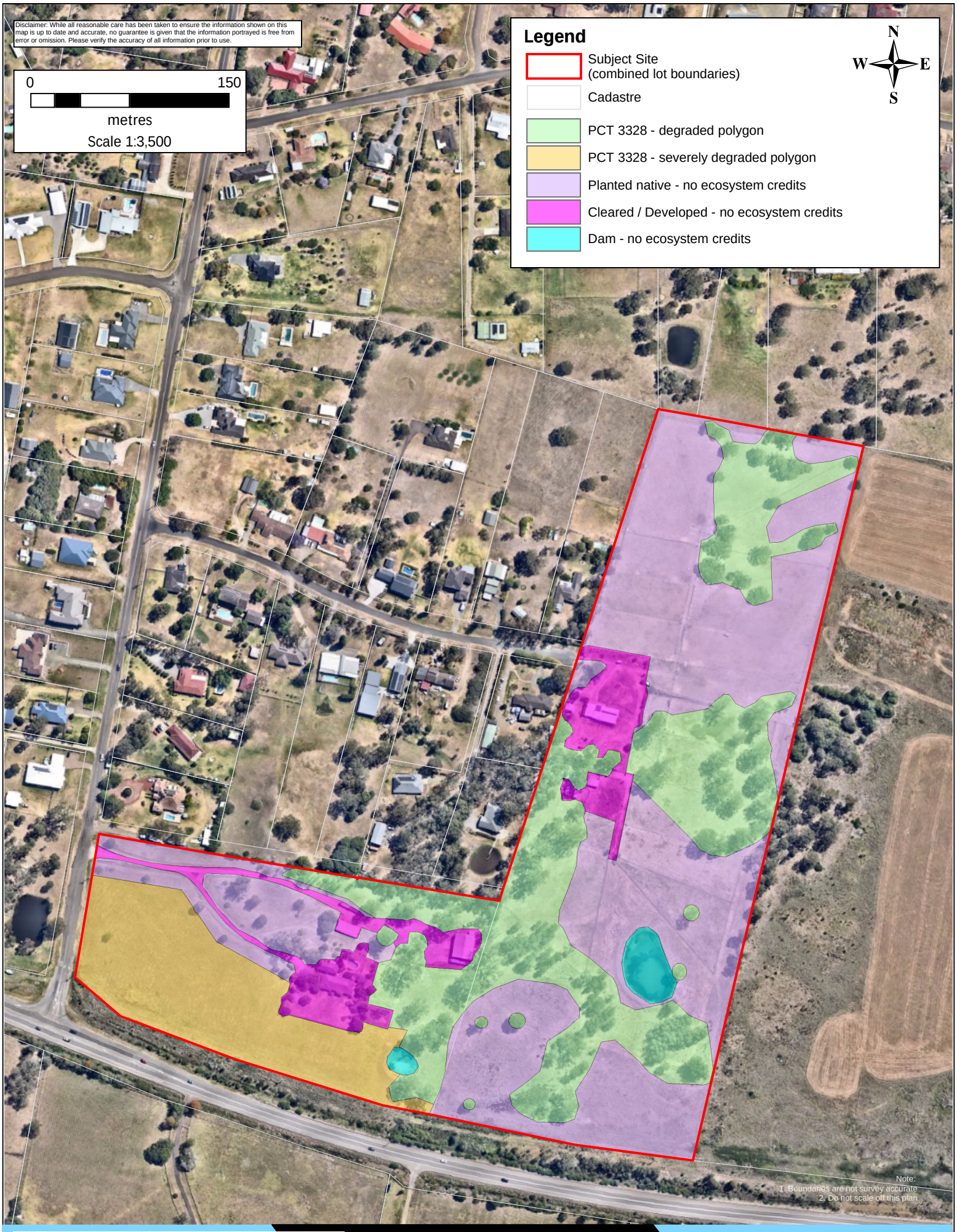
2.7.2.1 Ecosystem Credits

As per Section 10.3 of the BAM, the removal of native vegetation within the site will require offsetting to achieve the 'no net loss standard' detailed within Section 11 of the BAM. To calculate the required offsets in the form of ecosystem credits, the BAM Calculator has taken into consideration the impact area and the projected loss in vegetation integrity score along with the biodiversity risk weighting of the PCT. Details of the required ecosystem credit outputs is provided in **Table 24**. A total of 71 Ecosystem Credits are required to offset the proposed development.

Table 24 – Ecosystem Credit Requirements

Vegetation zone	Impact Area (ha)	Future VIS	VIS Loss	BRW	Credit Requirements
3328 – Degraded	4.47	0	31.7	2	71
3328 – Severely degraded grassland	1.85	0	14.3	2	0
				Total	**71**

Ecosystem credit polygons are shown in **Figure 9.**



AEP

Figure 9: Ecosystem Credits Polygons

Date: Dec 2023

Location: 16 Denton Close and 10 River Road, Windella

Client: Mavid Development Pty Ltd

BOAMS Ref: 44198
AEP Ref: 3154

2.7.2.2 Species Credit

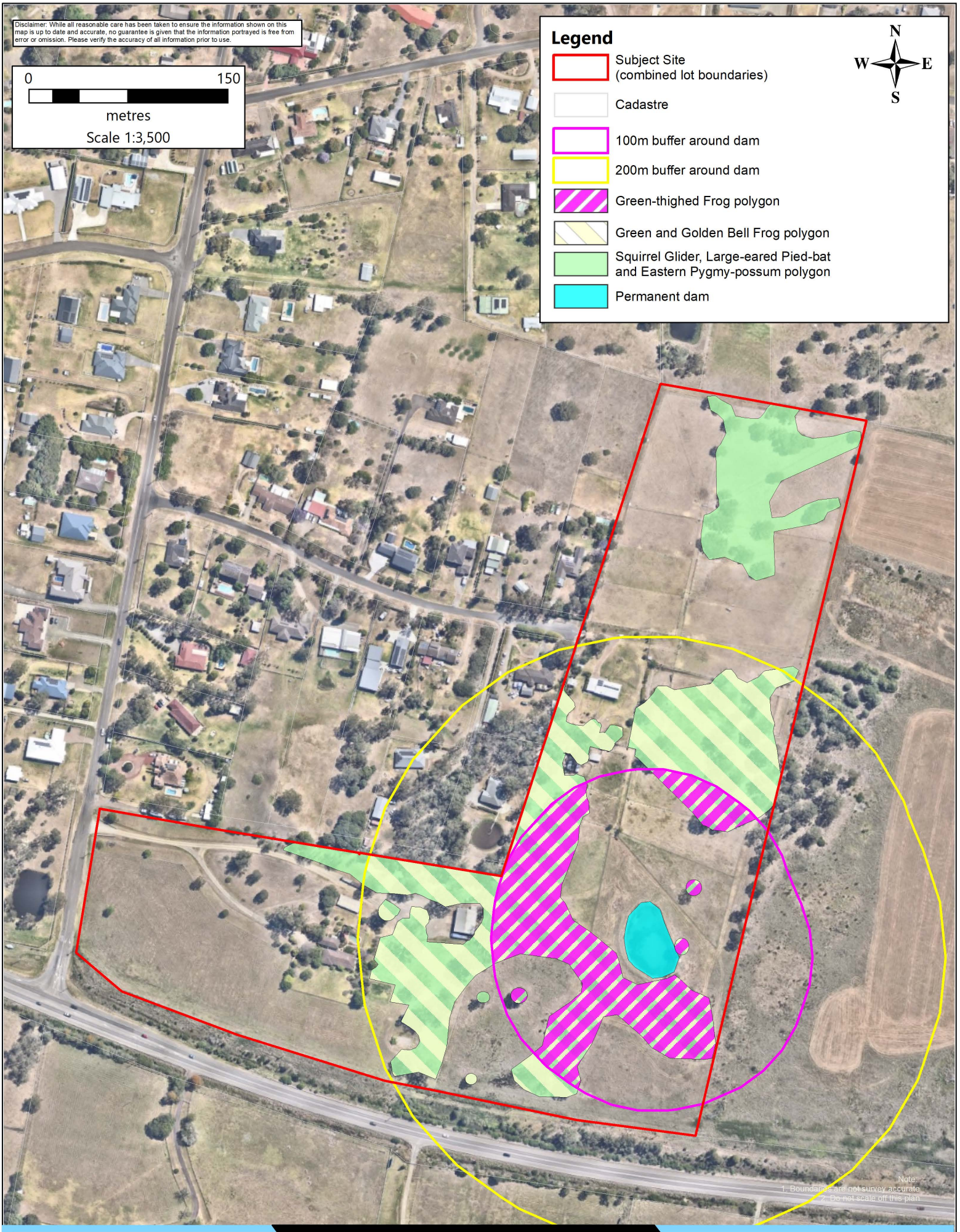
If a Species Credit species is either identified on the site during survey, assumed to be present, or confirmed present within an expert report, a 'species polygon' is required to be produced for the area of suitable habitat within the site for the species. No threatened species were identified on site during targeted surveys.

However, all required targeted surveys were not able to be completed prior to the lodgement of the present report. Therefore, selected species were assumed present and credits incurred as per **Table 25**. Targeted surveys for species assumed present are scheduled to be completed as per recommended survey guidelines, and relevant addenda to the present report will be issued for consideration by Council upon completion.

Table 25 – Assumed Present Species Credit Requirements

Scientific name	Common name	Species polygon definition	Impact Area (ha)	BRW	Credit Requirements
Cercatetus nanus	Eastern Pygmy-possum	Entire PCT 3328 degraded vegetation zone	4.47	2	71
Chalinolobus dwyeri	Large-eared Pied-bat	Entire PCT 3328 degraded vegetation zone	4.47	3	106
Litoria aurea	Green and Golden Bell Frog	PCT 3328 degraded vegetation zone with 200m of the bank of top of bank of the permanent dam in the south-east	3.6	2	57
Litoria brevipalmata	Green-thighed Frog	PCT 3328 degraded vegetation zone with 100m of the bank of top of bank of the permanent dam in the south-east	1.5	1.5	18
Petaurus norfolcensis	Squirrel Glider	Entire PCT 3328 degraded vegetation zone	4.47	2	71
				Total	**323**

Species credit polygons are shown in **Figure 10.**



AEP

Figure 10: Species Credits Polygons

Date: Dec 2023

Location: 16 Denton Close and 10 River Road, Windella

Client: Mavid Development Pty Ltd

BOAMS Ref: 44198
AEP Ref: 3154

2.7.3 Areas not requiring assessment

The entire Subject Site was assessed, as this was deemed necessary to exactly determined areas that could be deemed to be largely exotic, cleared or constructed. Therefore, it was concluded that 1.43ha comprised land that was developed, cleared, consisting of dams or largely exotic, such that its clearing would not incur credits. Furthermore, 6.53ha of land were deemed to comprise planted native vegetation such that the clearing of this area would not incur credits either.

2.8 Biodiversity Credit Report

The Biodiversity Credit Report generated within the BAM Calculator is provided in **Appendix F** and includes potential offset variations that are applicable to the proposal.

3.0 Conclusion

Application of the BAM against the proposal has quantified current biodiversity values within the site and calculated offset requirements for residual impacts following impact avoidance and minimisation efforts.

The native vegetation within the proposed impact area was found to be commensurate with PCT 3328, occurring in two forms: 4.47ha of degraded PCT 3328 with a degraded understory, near-absent shrub layer and native canopy; and 1.85ha of severely degraded PCT 3328 occurring as grassland with a near-absent shrub layer and no trees. The remainder of the Subject Site is predominantly comprised of exotic or non-endemic native vegetation, cleared lands and existing infrastructure.

The proposal will require impact to 6.32ha of native vegetation associated with PCT 3328 which will incur 71 ecosystem credits. Furthermore, five (5) threatened species were assumed present due to surveys not being completed prior to lodgement, which will incur a combined total of 323 credits, until otherwise proved to be absent.

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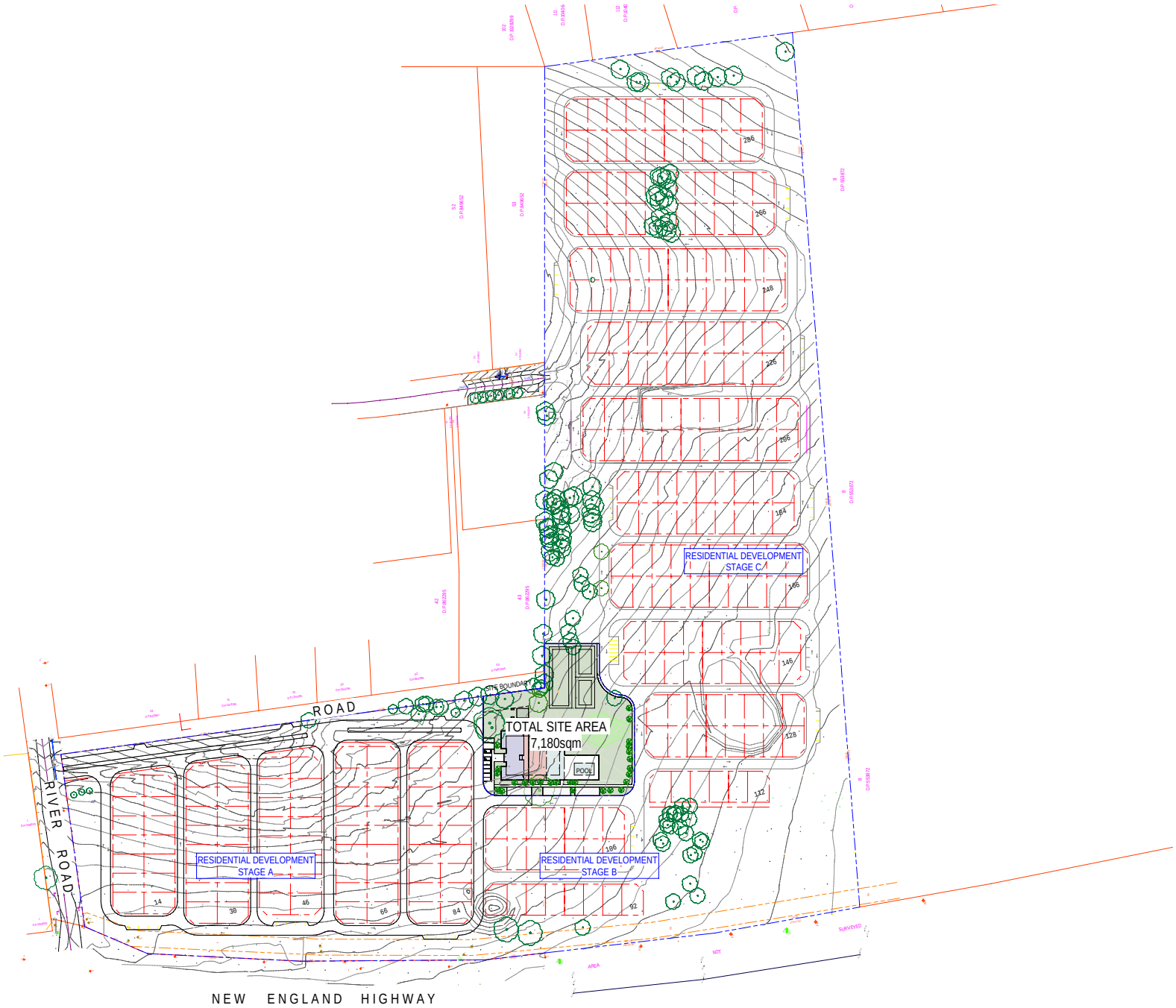
Appendix A – Development Plan



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A	TOWN PLANNING ISSUE	12.12.23

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16 DENTON CLOSE, WINDELLA

PROPOSED OVERALL SITE PLAN

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Job No. 3239 Scale@A1 1 : 1250

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TP 010 A

Appendix B – Flora Species List

FLORA SPECIES LIST

The following list includes all species of vascular plants observed on site during fieldwork. It should be noted that such a list cannot be considered comprehensive, but rather indicative of the flora present on the site. It can take many years of flora surveys to record all of the plant species occurring within any area, especially plant species that are only apparent in some seasons such as Orchids.

A number of species cannot always be accurately identified during a brief survey, generally due to a lack of suitable flowering and/or fruiting material. Any such species are identified as accurately as possible, and are indicated in the list as thus:

- specimens that could only be identified to genus level are indicated by the generic name followed by the abbreviation “sp.”, indicating an unidentified species of that genus;
- specimens for which identification of the genus was uncertain are indicated by a question mark (“?”) placed in front of the generic, which is followed by the abbreviation “sp.” and;
- specimens that could be accurately identified to genus level, but could be identified to species level with only a degree of certainty are indicated by a (“?”) placed in front of the epithet.

Authorities for the scientific names are not provided in the list. These follow the references outlined below.

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Names of families and higher taxa follow a modified Cronquist System (1981).

Introduced species are indicated by an asterisk “*”.

Threatened species listed under the *Biodiversity Conservation Act 2016* (BC Act) or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) are indicated in **bold font.**

Family	Scientific Name	Common Name
Acanthaceae	*Brunoniella australis*	Blue Trumpet
Acanthaceae	*Pseuderanthemum variabile*	Pastel Flower
Alliaceae	*Nothoscordum borbonicum**	Onion Weed
Amaranthaceae	*Alternanthera denticulata*	Lesser Joyweed
Anacardiaceae	*Schinus spp.**	
Anthericaceae	*Arthropodium milleflorum*	Pale Vanilla Lily
Apiaceae	*Centella asiatica*	Swamp Pennywort
Asphodelaceae	*Aloe spp.**	
Asteraceae	*Aster subulatus**	Wild Aster
Asteraceae	*Cirsium vulgare**	Spear Thistle
Asteraceae	*Conyza bonariensis**	Flax-leaf Fleabane
Asteraceae	*Gamochaeta americana**	Cudweed
Asteraceae	*Gamochaeta antillana**	
Asteraceae	*Hypochaeris radicata**	Flatweed
Asteraceae	*Onopordum acanthium subsp. Acanthium**	Scotch Thistle
Asteraceae	*Senecio madagascariensis**	Fireweed
Asteraceae	*Sonchus oleraceus**	Common Sow-thistle
Boraginaceae	*Heliotropium amplexicaule**	Blue Heliotrope
Campanulaceae	*Wahlenbergia communis*	Tufted Bluebell
Caryophyllaceae	*Paronychia brasiliana**	Brazilian Whitlow
Casuarinaceae	*Casuarina glauca*	Swamp Oak
Chenopodiaceae	*Einadia nutans subsp. nutans*	Climbing Saltbush
Convolvulaceae	*Dichondra repens*	Kidney Weed
Cyperaceae	*Carex inversa*	Knob Sedge
Cyperaceae	*Cyperus brevifolius**	Mullumbimby Couch
Cyperaceae	*Cyperus eragrostis**	Umbrella Sedge
Cyperaceae	*Cyperus gracilis*	Slender Flat Sedge
Cyperaceae	*Fimbristylis dichotoma*	Common Fringe-rush
Cyperaceae	*Schoenus ericetorum*	Heath Bog-rush
Euphorbiaceae	*Euphorbia prostrata**	Red Caustic Weed
Fabaceae	*Glycine microphylla*	Small-leaf Glycine
Fabaceae	*Glycine tabacina*	Twining Glycine
Fabaceae	*Lotus corniculatus**	
Fabaceae	*Trifolium spp.**	A Clover
Gentianaceae	*Centaurium erythraea**	Common Centaury
Gentianaceae	*Centaurium tenuiflorum**	Branched Centaury, Slender centaury

Family	Scientific Name	Common Name
Haloragaceae	*Gonocarpus chinensis subsp. verrucosus*	
Juncaceae	*Juncus cognatus**	
Juncaceae	*Juncus spp.*	
Lamiaceae	*Mentha diemenica*	Slender Mint
Lobeliaceae	*Lobelia concolor*	Poison Pratia
Lobeliaceae	*Lobelia purpurascens*	Whiteroot
Lomandraceae	*Lomandra multiflora subsp. multiflora*	Many-flowered Mat-rush
Malaceae	*Photinia glabra**	Japanese Photinia
Malvaceae	*Modiola caroliniana**	Red-flowered Mallow
Malvaceae	*Sida rhombifolia**	Paddy's Lucerne
Myoporaceae	*Eremophila debilis*	Winter Apple
Myrtaceae	*Callistemon viminalis*	Weeping Bottlebrush
Myrtaceae	*Eucalyptus crebra*	Narrow-leaved Ironbark
Myrtaceae	*Eucalyptus moluccana*	Grey Box
Oleaceae	*Olea europaea subsp. cuspidata**	African Olive
Oleaceae	*Olea europaea subsp. europaea**	Common Olive Tree
Oxalidaceae	*Oxalis corniculata**	
Oxalidaceae	*Oxalis spp.*	
Phormiaceae	*Dianella spp.*	
Phyllanthaceae	*Phyllanthus gunnii*	Scrubby Spurge
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum
Plantaginaceae	*Plantago debilis*	Slender Plantain
Plantaginaceae	*Plantago lanceolata**	Ribwort
Poaceae	*Aristida lignosa*	
Poaceae	*Arrhenatherum elatius**	Bulbous Oatgrass
Poaceae	*Axonopus fissifolius**	Narrow-leaved Carpet Grass
Poaceae	*Bothriochloa bladhii subsp. bladhii*	Forest Bluegrass
Poaceae	*Bothriochloa macra*	Red Grass
Poaceae	*Briza subaristata**	
Poaceae	*Bromus catharticus**	Prairie Grass
Poaceae	*Bromus hordeaceus**	Soft Brome
Poaceae	*Cenchrus clandestinum**	Kikuyu
Poaceae	*Chloris truncata*	Windmill Grass
Poaceae	*Chloris ventricosa*	Tall Chloris
Poaceae	*Chloris virgata**	Feathertop Rhodes Grass
Poaceae	*Cymbopogon refractus*	Barbwire Grass

Family	Scientific Name	Common Name
Poaceae	*Cynodon dactylon*	Common Couch
Poaceae	*Cynodon spp.**	
Poaceae	*Dichanthium aristatum**	Angleton Grass
Poaceae	*Dichanthium sericeum*	Queensland Bluegrass
Poaceae	*Dichelachne crinita*	Long-hair Plume Grass
Poaceae	*Ehrharta erecta**	Panic Veldtgrass
Poaceae	*Eragrostis leptostachya*	Paddock Lovegrass
Poaceae	*Eriochloa pseudoacrotricha*	Early Spring Grass
Poaceae	*Lachnagrostis filiformis*	Blown Grass
Poaceae	*Lolium perenne**	Perennial Ryegrass
Poaceae	*Microlaena stipoides*	Weeping Grass
Poaceae	*Panicum effusum*	Hairy Panic
Poaceae	*Paspalidium distans*	
Poaceae	*Paspalum dilatatum**	Paspalum
Poaceae	*Rytidosperma fulvum*	Wallaby Grass
Poaceae	*Rytidosperma longifolium*	Long-leaved Wallaby Grass
Poaceae	*Setaria parviflora**	Slender Pigeon Grass
Poaceae	*Setaria pumila**	Pale Pigeon Grass
Poaceae	*Sporobolus africanus**	Parramatta Grass
Poaceae	*Sporobolus creber*	Slender Rat's Tail Grass
Poaceae	*Sporobolus spp.**	Rat's Tail Couch
Poaceae	*Themeda triandra*	Kangaroo Grass
Poaceae	*Vulpia spp.**	Rat's-tail Fescue
Polygonaceae	*Rumex brownii*	Swamp Dock
Rubiaceae	*Asperula conferta*	Common Woodruff
Sapindaceae	*Cupaniopsis anacardioides*	Tuckeroo
Sterculiaceae	*Brachychiton australis**	
Strelitziaceae	*Strelitzia nicolai**	
Thymelaeaceae	*Pimelea glauca*	Smooth Rice-flower
Verbenaceae	*Duranta erecta**	Sky Flower
Verbenaceae	*Lantana camara**	Lantana
Verbenaceae	*Verbena bonariensis**	Purpletop
Verbenaceae	*Verbena litoralis**	
Verbenaceae	*Verbena rigida var. rigida**	Veined Verbena
Verbenaceae	*Verbena spp.**	
Violaceae	*Viola hederacea*	Ivy-leaved Violet

Appendix C – Fauna Species List

FAUNA SPECIES LIST

The following list includes fauna species that could be reasonably expected to occur on or over the study site at some point, given site attributes and location.

"●"- species observed or indicated by scats, tracks, etc. on, over or near the site during the various field investigations undertaken by AEP (2022 & 2023).

* - Introduced species

? - Unconfirmed record, anecdotal records, etc.

A - NSW Atlas of Wildlife record of threatened species for the site.

Surveyed Observations; Observed (O), Heard (W), Scat (P), Miscellaneous (M), Track/scratchings (F), Nest (E), Burrow (FB)

Bat Records; Observed (O), Definitely (D) Possible or within Species Group (P) Likely (L)

Survey Equipment; Anabat (U), Songmeter (AR), Camera Trap (Q)

Threatened species listed under the *Biodiversity Conservation Act 2016* (BC Act) or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) are as indicated; V: Vulnerable; E: Endangered; CE: Critically Endangered.

Scientific name	Common Name	NSW status	Comm. status	BioNet Atlas Records	Surveyed Observations	Survey Equipment
Amphibians						
Crinia signifera	Common Eastern Froglet			49	W	AR
Litoria verreauxii	Verreaux's Frog			8	W	AR
Anas superciliosa	Pacific Black Duck			99	O	
Chenonetta jubata	Australian Wood Duck			98	O	
Ocyphaps lophotes	Crested Pigeon			65	O	
*Spilopelia chinensis**	Spotted Turtle-Dove			43	W	
Bubulcus ibis	Cattle Egret			46	O	
Egretta novaehollandiae	White-faced Heron			52	O	
Gallinula tenebrosa	Dusky Moorhen			38	O	
Vanellus miles	Masked Lapwing			81	O	
Cacatua tenuirostris	Long-billed Corella			12	O,W	
Eolophus roseicapilla	Galah			106	O, W	AR
Platycercus eximius	Eastern Rosella			82	O	
Trichoglossus haematodus	Rainbow Lorikeet			136	O	
Eudynamys orientalis	Eastern Koel			7	O,W	
Dacelo novaeguineae	Laughing Kookaburra			79	O	

Scientific name	Common Name	NSW status	Comm. status	BioNet Atlas Records	Surveyed Observations	Survey Equipment
Eurystomus orientalis	Dollarbird			23	O	
Malurus cyaneus	Superb Fairy-wren			95	O, W	AR
Pardalotus striatus	Striated Pardalote			25	O,W	AR
Entomyzon cyanotis	Blue-faced Honeyeater			10	W	
Manorina melanocephala	Noisy Miner			98	O,W	
Myzomela sanguinolenta	Scarlet Honeyeater			11	W	AR
Ptilotula penicillata	White-plumed Honeyeater			22	O	
Coracina novaehollandiae	Black-faced Cuckoo-shrike			55	O	
Sphecotheres vieilloti	Australasian Figbird			6	W	AR
Cracticus nigrogularis	Pied Butcherbird			60	O	
Gymnorhina tibicen	Australian Magpie			254	O	
Rhipidura albiscapa	Grey Fantail			57	O,W	AR
Rhipidura leucophrys	Willie Wagtail			94	O	
Corvus coronoides	Australian Raven			96	O	
Grallina cyanoleuca	Magpie-lark			131	O	
Petrochelidon ariel	Fairy Martin			18	O	

Scientific name	Common Name	NSW status	Comm. status	BioNet Atlas Records	Surveyed Observations	Survey Equipment
*Turdus merula**	Eurasian Blackbird			3	O	
*Acridotheres tristis**	Common Myna			55	O	
Zosterops lateralis	Silvereye			31	W	AR
Stizoptera bichenovii	Double-barred Finch			13	O	
Numididae sp.*	Guinea Fowl (Domestic)				O	
Meleagris sp.*	Turkey (Domestic)				O	
Mammals						
Trichosurus vulpecula	Common Brushtail Possum			25	O	
Pteropus poliocephalus	Grey-headed Flying-fox	V	V	130	O	
*Felis catus**	Cat (Domestic)			1	O	
*Oryctolagus cuniculus**	Rabbit			20	O	
Lepus sp.*	Hare				O	
*Bos taurus**	European cattle (Domestic)			8	O	
*Ovis aries**	Sheep (Domestic)				O	
Camelus sp.*	Camel (Domestic)				O	
*Vicugna pacos**	Alpaca (Domestic)				O	
*Equus asinus**	Donkey (Domestic)				O	

Appendix D – BAM Tabulated Data

Family	Scientific Name	Common Name	NSW Status	Comm Status	BAM Growth Form	BAM Growth Form Code	BAM Growth Form Group	HTE	HTW V3	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 9	Plot 10	Plot 11	Plot 12
Acanthaceae	Brunoniella australis	*Blue Trumpet*			*Forb*	*F*	*Forb (FG)*					0.1									0.1
Acanthaceae	Pseuderanthemum variabile	*Pastel Flower*			*Forb*	*F*	*Forb (FG)*										0.1				
Alliaceae	Nothoscordum borbonicum*	*Onion Weed*			*nil - exotic*						0.1		0.1								
Amaranthaceae	Alternanthera denticulata	*Lesser Joyweed*			*Forb*	*F*	*Forb (FG)*										0.1				
Anacardiaceae	Schinus spp.*				*nil - exotic*															8	
Anthericaceae	Arthropodium milleflorum	*Pale Vanilla Lily*			*Forb*	*F*	*Forb (FG)*			0.1											
Apiaceae	Centella asiatica	*Swamp Pennywort*			*Forb*	*F*	*Forb (FG)*			0.1				0.1	0.1						
Asphodelaceae	Aloe spp.*				*nil - exotic*															0.1	
Asteraceae	Aster subulatus*	*Wild Aster*			*nil - exotic*														0.4		
Asteraceae	Cirsium vulgare*	*Spear Thistle*			*nil - exotic*												0.1	0.3			0.3
Asteraceae	Conyza bonariensis*	*Flax-leaf Fleabane*			*nil - exotic*								0.1				0.2		0.2	0.1	0.2
Asteraceae	Gamochaeta americana*	*Cudweed*			*nil - exotic*												0.2				0.3
Asteraceae	Gamochaeta antillana*				*nil - exotic*											0.2					
Asteraceae	Hypochaeris radicata*	*Flatweed*			*nil - exotic*					0.1	0.1		0.3	0.2		0.2	0.1	0.1	0.5	0.2	0.3
Asteraceae	Onopordum acanthium subsp. Acanthium*	*Scotch Thistle*			*nil - exotic*					0.1	0.1				0.1						
Asteraceae	Senecio madagascariensis*	*Fireweed*			*nil - exotic*			*Y*	High Threat Weed - not manageable	0.1	0.2		0.2	0.5			0.1	0.1			
Asteraceae	Sonchus oleraceus*	*Common Sow-thistle*			*nil - exotic*										0.1						
Boraginaceae	Heliotropium amplexicaule*	*Blue Heliotrope*			*nil - exotic*			*Y*	High Threat Weed - not manageable											0.3	
Campanulaceae	Wahlenbergia communis	*Tufted Bluebell*			*Forb*	*F*	*Forb (FG)*										0.1				
Caryophyllaceae	Paronychia brasiliana*	*Brazilian Whitlow*			*nil - exotic*															0.3	
Casuarinaceae	Casuarina glauca	*Swamp Oak*			*Tree*	*T*	*Tree (TG)*					65									
Chenopodiaceae	Einadia nutans subsp. nutans	*Climbing Saltbush*			*Forb*	*F*	*Forb (FG)*										0.3				
Convolvulaceae	Dichondra repens	*Kidney Weed*			*Forb*	*F*	*Forb (FG)*					0.1	0.2				2	0.2		0.5	2
Cyperaceae	Carex inversa	*Knob Sedge*			*Sedge*	*V*	*Grass & grasslike (GG)*											0.1	0.1	0.2	2
Cyperaceae	Cyperus brevifolius*	*Mullumbimby Couch*			*nil - exotic*					0.1			0.1						0.3		
Cyperaceae	Cyperus eragrostis*	*Umbrella Sedge*			*nil - exotic*			*Y*	High Threat Weed - not manageable						0.1						
Cyperaceae	Cyperus gracilis	*Slender Flat Sedge*			*Sedge*	*V*	*Grass & grasslike (GG)*										0.3	0.2		0.5	
Cyperaceae	Fimbristylis dichotoma	*Common Fringe-rush*			*Sedge*	*V*	*Grass & grasslike (GG)*										0.1		15		
Cyperaceae	Schoenus ericetorum	*Heath Bog-rush*			*Sedge*	*V*	*Grass & grasslike (GG)*									0.1					
Euphorbiaceae	Euphorbia prostrata*	*Red Caustic Weed*			*nil - exotic*												0.2			0.1	
Fabaceae	Glycine microphylla	*Small-leaf Glycine*			*Vine*	*L*	*Other (OG)*										0.3		0.3	0.1	0.3
Fabaceae	Glycine tabacina	*Twining Glycine*			*Vine*	*L*	*Other (OG)*			0.2			0.2								
Fabaceae	Lotus corniculatus*				*nil - exotic*								0.1								
Fabaceae	Trifolium spp.*	*A Clover*			*nil - exotic*														0.1		
Gentianaceae	Centaurium erythraea*	*Common Centaury*			*nil - exotic*														0.2		

Family	Scientific Name	Common Name	NSW Status	Comm Status	BAM Growth Form	BAM Growth Form Code	BAM Growth Form Group	HTE	HTW V3	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 9	Plot 10	Plot 11	Plot 12
Gentianaceae	Centaurium tenuiflorum*	*Branched Centaury, Slender centaury*			*nil - exotic*									0.1		0.2					
Haloragaceae	Gonocarpus chinensis subsp. verrucosus													0.1							
Juncaceae	Juncus cognatus*				*nil - exotic*												0.1				
Juncaceae	Juncus spp.				*Rush*	*R*	*Grass & grasslike (GG)*					0.1									
Lamiaceae	Mentha diemenica	*Slender Mint*			*Forb*	*F*	*Forb (FG)*														0.2
Lobeliaceae	Lobelia concolor	*Poison Pratia*			*Forb*	*F*	*Forb (FG)*							0.1							
Lobeliaceae	Lobelia purpurascens	*Whiteroot*			*Forb*	*F*	*Forb (FG)*					0.5									
Lomandraceae	Lomandra multiflora subsp. multiflora	*Many-flowered Mat-rush*			*Rush*	*R*	*Grass & grasslike (GG)*										0.2				
Malaceae	Photinia glabra*	*Japanese Photinia*			*nil - exotic*															4	
Malvaceae	Modiola caroliniana*	*Red-flowered Mallow*			*nil - exotic*															2	
Malvaceae	Sida rhombifolia*	*Paddy's Lucerne*			*nil - exotic*					0.1		0.2	0.2		0.1		0.1	0.2			
Myoporaceae	Eremophila debilis	*Winter Apple*			*Shrub*	*S*	*Shrub (SG)*										0.3				
Myrtaceae	Callistemon viminalis	*Weeping Bottlebrush*			*Tree*	*T*	*Tree (TG)*													10	
Myrtaceae	Eucalyptus crebra	*Narrow-leaved Ironbark*			*Tree*	*T*	*Tree (TG)*										6				
Myrtaceae	Eucalyptus moluccana	*Grey Box*			*Tree*	*T*	*Tree (TG)*			50	60						25	30			
Oleaceae	Olea europaea subsp. cuspidata*	*African Olive*			*nil - exotic*			*Y*		0.1		35					10				
Oleaceae	Olea europaea subsp. europaea*	*Common Olive Tree*			*nil - exotic*			*Y*												10	
Oxalidaceae	Oxalis corniculata*				*nil - exotic*											0.1					
Oxalidaceae	Oxalis spp.																0.1	0.1	0.1	0.3	0.1
Phormiaceae	Dianella spp.				*Forb*	*F*	*Forb (FG)*			0.1											
Phyllanthaceae	Phyllanthus gunnii	*Scrubby Spurge*			*Shrub*	*S*	*Shrub (SG)*										0.1		0.1	0.1	0.3
Pittosporaceae	Pittosporum undulatum	*Sweet Pittosporum*			*Shrub*	*S*	*Shrub (SG)*										0.3				
Plantaginaceae	Plantago debilis	*Slender Plantain*			*Forb*	*F*	*Forb (FG)*													0.1	
Plantaginaceae	Plantago lanceolata*	*Ribwort*			*nil - exotic*					0.1			0.5	0.2	0.2		0.5	0.5	2	2	1
Poaceae	Aristida lignosa				*Tussock Grass*		*Grass & grasslike (GG)*										3			0.4	
Poaceae	Arrhenatherum elatius*	*Bulbous Oatgrass*			*nil - exotic*					0.1											
Poaceae	Axonopus fissifolius*	*Narrow-leaved Carpet Grass*			*nil - exotic*			*Y*	High Threat Weed - not manageable										20		
Poaceae	Bothriochloa bladhii subsp. bladhii	*Forest Bluegrass*					*Grass & grasslike (GG)*											0.2			0.5
Poaceae	Bothriochloa macra	*Red Grass*			*Tussock Grass*	*G*	*Grass & grasslike (GG)*										0.3		2	0.1	0.5
Poaceae	Briza subaristata*				*nil - exotic*			*Y*	High Threat Weed - not manageable	0.1	0.1	0.1	65	80	15	0.2		0.1	0.5		0.5
Poaceae	Bromus catharticus*	*Prairie Grass*			*nil - exotic*										2						
Poaceae	Bromus hordeaceus*	*Soft Brome*			*nil - exotic*						0.1	0.1									
Poaceae	Cenchrus clandestinum*	*Kikuyu*			*nil - exotic*			*Y*		0.5						0.2		10		0.5	
Poaceae	Chloris truncata	*Windmill Grass*			*Tussock Grass*	*G*	*Grass & grasslike (GG)*									0.2	1			0.3	

Family	Scientific Name	Common Name	NSW Status	Comm Status	BAM Growth Form	BAM Growth Form Code	BAM Growth Form Group	HTE	HTW V3	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 9	Plot 10	Plot 11	Plot 12
Poaceae	Chloris ventricosa	*Tall Chloris*			*Tussock Grass*	*G*	*Grass & grasslike (GG)*				2	0.2					0.5				
Poaceae	Chloris virgata*	*Feathertop Rhodes Grass*			*nil - exotic*												0.2				
Poaceae	Cymbopogon refractus	*Barbwire Grass*			*Tussock Grass*	*G*	*Grass & grasslike (GG)*											0.1	1		0.5
Poaceae	Cynodon spp.*				*nil - exotic*						70	0.2	3	0.5	5	65	10	40	5	65	40
Poaceae	Dichanthium aristatum*	*Angleton Grass*			*nil - exotic*														0.5		
Poaceae	Dichanthium sericeum	*Queensland Bluegrass*					*Grass & grasslike (GG)*				0.5	0.2	0.2			0.2	3	0.5	5	0.3	
Poaceae	Dichelachne crinita	*Long-hair Plume Grass*			*Tussock Grass*	*G*	*Grass & grasslike (GG)*				1		10		0.1						
Poaceae	Ehrharta erecta*	*Panic Veldtgrass*			*nil - exotic*			*Y*	High Threat Weed - not manageable		0.1						0.3			1	
Poaceae	Eragrostis leptostachya	*Paddock Lovegrass*			*Tussock Grass*	*G*	*Grass & grasslike (GG)*										0.5				
Poaceae	Eriochloa pseudoacrotricha	*Early Spring Grass*			*Tussock Grass*	*G*	*Grass & grasslike (GG)*										5				
Poaceae	Lachnagrostis filiformis	*Blown Grass*			*Tussock Grass*	*G*	*Grass & grasslike (GG)*									0.1					
Poaceae	Lolium perenne*	*Perennial Ryegrass*			*nil - exotic*						0.1										
Poaceae	Microlaena stipoides	*Weeping Grass*			*Other Grass*		*Grass & grasslike (GG)*					45									
Poaceae	Panicum effusum	*Hairy Panic*			*Tussock Grass*	*G*	*Grass & grasslike (GG)*										0.5				
Poaceae	Paspalidium distans				*Tussock Grass*	*G*	*Grass & grasslike (GG)*										0.5				
Poaceae	Paspalum dilatatum*	*Paspalum*			*nil - exotic*			*Y*	High Threat Weed - not manageable		0.2		8	10	70		1	20	15	3	10
Poaceae	Rytidosperma fulvum	*Wallaby Grass*			*Tussock Grass*	*G*	*Grass & grasslike (GG)*										0.3	0.1		0.3	
Poaceae	Rytidosperma longifolium	*Long-leaved Wallaby Grass*					*Grass & grasslike (GG)*					0.1									
Poaceae	Setaria parviflora*	*Slender Pigeon Grass*			*nil - exotic*							0.1					0.7	0.3			
Poaceae	Setaria pumila*	*Pale Pigeon Grass*			*nil - exotic*										0.2	0.1					
Poaceae	Sporobolus africanus*	*Parramatta Grass*			*nil - exotic*													0.3			
Poaceae	Sporobolus creber	*Slender Rat's Tail Grass*			*Tussock Grass*	*G*	*Grass & grasslike (GG)*						0.1		0.1	1	25	1	20		8
Poaceae	Sporobolus spp.*	*Rat's Tail Couch*			*nil - exotic*					0.1											
Poaceae	Themeda triandra	*Kangaroo Grass*			*Tussock Grass*	*G*	*Grass & grasslike (GG)*			50			0.2								
Poaceae	Vulpia spp.*	*Rat's-tail Fescue*			*nil - exotic*											0.5					
Polygonaceae	Rumex brownii	*Swamp Dock*			*Forb*	*F*	*Forb (FG)*											0.1	0.1		
Rubiaceae	Asperula conferta	*Common Woodruff*			*Forb*	*F*	*Forb (FG)*						0.1	0.1	1				0.4		0.1
Sapindaceae	Cupaniopsis anacardioides	*Tuckeroo*			*Tree*	*T*	*Tree (TG)*										0.1				
Sterculiaceae	Brachychiton australis*				*nil - exotic*															1	
Strelitziaceae	Strelitzia nicolai*				*nil - exotic*															2	

Family	Scientific Name	Common Name	NSW Status	Comm Status	BAM Growth Form	BAM Growth Form Code	BAM Growth Form Group	HTE	HTW V3	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	Plot 7	Plot 8	Plot 9	Plot 10	Plot 11	Plot 12
Thymelaeaceae	Pimelea glauca	*Smooth Rice-flower*											0.1								
Verbenaceae	Duranta erecta*	*Sky Flower*			*nil - exotic*															5	
Verbenaceae	Lantana camara*	*Lantana*			*nil - exotic*			*Y*	High Threat Weed - manageable								0.1				
Verbenaceae	Verbena bonariensis*	*Purpletop*			*nil - exotic*							1	0.5	0.5	0.5	0.1					
Verbenaceae	Verbena litoralis*				*nil - exotic*														1		0.5
Verbenaceae	Verbena rigida var. rigida*	*Veined Verbena*			*nil - exotic*					0.2			0.1						0.5	0.3	2
Verbenaceae	Verbena spp.*				*nil - exotic*													0.1			
Violaceae	Viola hederacea	*Ivy-leaved Violet*			*Forb*	*F*	*Forb (FG)*														0.3

Appendix E – BAM Field Sheets

Plot 01

Job:	Windella	**Job number:**	3154	**Date:**	13/12/2022	**Observers:**	**DN, SR, SJC**	
Mapped Vegetation community:								
Upper stratum	**C [1]**	**Ab [2]**	**Mid stratum**	**C [3]**	**Ab [4]**	**Lower stratum**	**C [5]**	**Ab [6]**
Eucalyptus moluccana	50	6	Glycine tabacina sample	0.2	70	Themeda triandra	50	>100
Eucalyptus crebra (2 specimens outside of plot)		2	Olea europaea subsp. cuspidata	0.1	1	Pennisetum clandestinum	0.5	3
						Centella asiatica	0.1	15
						Plantago lanceolata	0.1	5
						Senecio madagascariensis	0.1	5
						Sida rhombifolia	0.1	3
						Verbena rigida	0.2	53
						Arrhenatherum elatus	0.1	
						Briza subaristata	0.1	
						Sporobolos sample	0.1	
						Dianella sp	0.1	
						Hypocharis radiata	0.1	
						Olive sample	0.2	
						Cyperus brevifolius	0.1	
						Arthopodium milefloru	0.1	
						Onopordum acanthium	0.1	
Total Cover DO FIRST								
20mx20m plot = 400m2 Note: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% = 2x2m, 5% = 4x5m, 25% = 10x10m								

Plot 01

Arrival time:		**Departure time:**	18.14	**Weather:**		**TWO transect photos (one landscape, one portrait) taken**	☑	**Transect GPS points taken**	☑
Start easting/northing:			**End easting/northing:**			**Zone:**		**Bearing:**	172

Tree Stem Size Class at DBH [1]	**Presence/Absence**	**Count of Hollow Bearing Trees**	**Leaf Litter Cover within 5 x 1m2 sub-plots [2]**						
< 5 cm [3]	☑			**Leaf litter**	**Live vegetation**	**Bare ground**	**Rocks**	**Other**	**Total**
5 - 9 cm	☐		**1**	15	75	10			**100**
10 – 19 cm	☑	0	**2**	45	55	5			**105**
20 – 29 cm	☑	**Length of logs (m) [4]**	**3**	5	75	10			**90**
30 – 49cm			**4**	5	90	5			**100**
50 -79cm		0	**5**	5	90	5			**100**
>80cm			**Average**						**0**

Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)

Paddock clearly grazed. Sheep present. Sections of high Themeda density. Themeda decreases to the south.

Habitat features, comments and incidental fauna observations:

Sheep in paddock

Plot 02

Job:	Windella	**Job number:**	3154	**Date:**	13/12/2022	**Observers:**	**DN, SR, SJC**	
Mapped Vegetation community:								
Upper stratum	**C [1]**	**Ab [2]**	**Mid stratum**	**C [3]**	**Ab [4]**	**Lower stratum**	**C [5]**	**Ab [6]**
Eucalyptus moluccana	60	4				Ehrharta erecta	0.1	
						Paspalum diatatum	0.2	
						Cynodon sp	70	100+
						Chloris ventricosa	2	
						Dichelachne crinata	1	100+
						Lolium perrene	0.1	
						Bromus hordeaceus	0.1	
						Dichelachne subaqueglumis	0.1	
						Dicanthium sericeum	0.5	
						Nothoscordum borbonicum	0.1	
						Hypochaeris radicata	0.1	
						Briza subaristata	0.1	
						Senecio madagascariensis	0.2	
						Onopordum acanthium	0.1	
Total Cover DO FIRST								
20mx20m plot = 400m2 Note: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% = 2x2m, 5% = 4x5m, 25% = 10x10m								

Plot 02

Arrival time:		**Departure time:**	18.14	**Weather:**		**TWO transect photos (one landscape, one portrait) taken**	☑	**Transect GPS points taken**	☑
Start easting/northing:			**End easting/northing:**			**Zone:**		**Bearing:**	190

Tree Stem Size Class at DBH [1]	**Presence/Absence**	**Count of Hollow Bearing Trees**	**Leaf Litter Cover within 5 x 1m2 sub-plots [2]**						
< 5 cm [3]	☐			**Leaf litter**	**Live vegetation**	**Bare ground**	**Rocks**	**Other**	**Total**
5 - 9 cm	☐		**1**	10	90				**100**
10 – 19 cm	☐	3	**2**	20	80				**100**
20 – 29 cm	☐	**Length of logs (m) [4]**	**3**	20	80				**100**
30 – 49cm	#		**4**	15	80	5			**100**
50 -79cm	1	0	**5**	10	40	50			**100**
>80cm	3		**Average**						**0**

Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)

Highly disturbed plot. Contains 3 HBT's

Habitat features, comments and incidental fauna observations:

Alpacas in adjacent paddocks, may be used for grazing purposes

Plot 03

Job:	Windella	**Job number:**	3154	**Date:**	13/12/2022	**Observers:**	**DN, SR, SJC**	
Mapped Vegetation community:								
Upper stratum	**C [1]**	**Ab [2]**	**Mid stratum**	**C [3]**	**Ab [4]**	**Lower stratum**	**C [5]**	**Ab [6]**
Casuarina glauca	65	50	Olea europaea subsp. cuspidata	35	20	Microlaena stipoides	45	100+
						Briza subaristata	0.1	5
						Bromus hordaceus	0.1	3
						Dicanthium sericeum	0.2	10
						Cynodon sp.	0.2	10
						Lobelia purpurescens	0.5	
						Verbena bonariensis	1	
						Sida rhombifolia	0.2	
						Juncus sp.	0.1	
						Brunoniella australis	0.1	
						Dichondra repens	0.1	
						Chloris ventricosa	0.2	
						Setaria parviflora	0.1	
						Rytidosperma longifolium	0.1	
Total Cover DO FIRST								
20mx20m plot = 400m2 Note: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% = 2x2m, 5% = 4x5m, 25% = 10x10m								

Plot 03

Arrival time:		**Departure time:**		**Weather:**		**TWO transect photos (one landscape, one portrait) taken**	☑	**Transect GPS points taken**	☑
Start easting/northing:			**End easting/northing:**			**Zone:**		**Bearing:**	190

Tree Stem Size Class at DBH [1]	**Presence/Absence**	**Count of Hollow Bearing Trees**	**Leaf Litter Cover within 5 x 1m2 sub-plots [2]**						
< 5 cm [3]	☑			**Leaf litter**	**Live vegetation**	**Bare ground**	**Rocks**	**Other**	**Total**
5 - 9 cm	☑		**1**						**0**
10 – 19 cm	☑	0	**2**	10	90				**100**
20 – 29 cm	☐	**Length of logs (m) [4]**	**3**		100				**100**
30 – 49cm	#		**4**		100				**100**
50 -79cm	0	0	**5**		100				**100**
>80cm	0		**Average**						**0**

Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)

Highly disturbed plot. Mainly microlaena in centre of plot, exotic mix as canopy cover disappears. Potentially grazed in the past. Shrub layer consists soley of olive.

Habitat features, comments and incidental fauna observations:

Camels and alpacas in adjacent paddocks. Likely used for grazing historically, potentially still used occasionally.

Plot 04

3154	Windella	Job number:	3154	Date:	30/12/2022	Observers:	SJC	
Mapped Vegetation community:								
Upper stratum	C [1]	Ab [2]	Mid stratum	C [3]	Ab [4]	Lower stratum	C [5]	Ab [6]
						Briza subaristata	65	
						Plantago lanceolata	0.5	
						Paspalum diatatum	8	
						Verbena rigida	0.1	
						Verbena bonariensis	0.5	
						Dichondra repens	0.2	
						Senecio madagascariensis	0.2	
						Hypochaeris radiata	0.3	
						Glycine tabacina	0.2	
						Dicanthium sericium	0.2	
						Dichelachne crinita	10	
						Nothoscordum borbonicum	0.1	
						Sida rhombifolia	0.2	
						Conyza bonariensis	0.1	
						Pimelia glauca	0.1	
						Lotus cornicalatus	0.1	
						Cynodon dactylon	3	
						Themeda triandra	0.2	
						Asperula conferta	0.1	
						Cyperus brevifolius	0.1	
						Sporobolis creber	0.1	
Total Cover DO FIRST							85-90	
20mx20m plot = 400m2 Note: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% = 2x2m, 5% = 4x5m, 25% = 10x10m								

Plot 04

Arrival time:	09:05	**Departure time:**	10:21	**Weather:**	Cloudy	**TWO transect photos (one landscape, one portrait) taken**	☑	**Transect GPS points taken**	☑
Start easting/northing:	357,946	6380901	**End easting/northing:**	**357,933**	**6380852**	**Zone:**	56	**Bearing:**	183

Tree Stem Size Class at DBH [1]	**Presence/Absence**	**Count of Hollow Bearing Trees**	**Leaf Litter Cover within 5 x 1m2 sub-plots [2]**						
< 5 cm [3]	☐			**Leaf litter**	**Live vegetation**	**Bare ground**	**Rocks**	**Other**	**Total**
5 - 9 cm	☐		**1**		95	5			**100**
10 – 19 cm	☐	0	**2**		90	10			**100**
20 – 29 cm	☐	**Length of logs (m) [4]**	**3**		90	10			**100**
30 – 49cm	#		**4**		100				**100**
50 -79cm	0	0	**5**		95	5			**100**
>80cm	0		**Average**						**0**

Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)

Mostly pasture. Semi regularly grazed. Matches composition with surrounding paddocks

Habitat features, comments and incidental fauna observations:

Plot 05

Job:	Windella	**Job number:**	3154	**Date:**	30/12/2022	**Observers:**	**SJC**	
Mapped Vegetation community:								
Upper stratum	**C [1]**	**Ab [2]**	**Mid stratum**	**C [3]**	**Ab [4]**	**Lower stratum**	**C [5]**	**Ab [6]**
						Briza subaristata	80	
						Verbena bonariensis	0.5	
						Paspalum diatatum	10	
						Lobelia concolor	0.1	
						Hypochaeris radiata	0.2	
						Plantago lanceolata	0.2	
						Gonocapus chinensis	0.1	
						Asperula conferta	0.1	
						Senecio madagascariensis	0.5	
						Cynodon dactylon	0.5	
						Centaurium tenuiflorum	0.1	
						Centella asiatica	0.1	
Total Cover DO FIRST							90-95	
20mx20m plot = 400m2 Note: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% = 2x2m, 5% = 4x5m, 25% = 10x10m								

Plot 05

Arrival time:	11:03	**Departure time:**	12:06	**Weather:**	Cloudy/windy	**TWO transect photos (one landscape, one portrait) taken**	☑	**Transect GPS points taken**	☑
Start easting/northing:	357,893	6380395	**End easting/northing:**	**357,942**	**6380385**	**Zone:**	56	**Bearing:**	105

Tree Stem Size Class at DBH [1]	**Presence/Absence**	**Count of Hollow Bearing Trees**	**Leaf Litter Cover within 5 x 1m2 sub-plots [2]**						
< 5 cm [3]	☐			**Leaf litter**	**Live vegetation**	**Bare ground**	**Rocks**	**Other**	**Total**
5 - 9 cm	☐		**1**		100				**100**
10 – 19 cm	☐	0	**2**		100				**100**
20 – 29 cm	☐	**Length of logs (m) [4]**	**3**		100				**100**
30 – 49cm	#		**4**		100				**100**
50 -79cm	0	0	**5**		100				**100**
>80cm	0		**Average**						**0**

Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)

Heavily weedy site. Evidence of periodic inundation.

Habitat features, comments and incidental fauna observations:

Plot 06

Job:	Windella	**Job number:**	3154	**Date:**	30/12/2022	**Observers:**	**SJC**	
Mapped Vegetation community:								
Upper stratum	**C [1]**	**Ab [2]**	**Mid stratum**	**C [3]**	**Ab [4]**	**Lower stratum**	**C [5]**	**Ab [6]**
Casuarina glauca	0.2	3				Paspalum diatatum	70	
						Briza subaristata	15	
						Bromus catharticus	2	
						Asperula conferta	1	
						Verbena bonariensis	0.5	
						Setaria pumila	0.2	
						Cynodon dactylon	5	
						Sida rhombifolia	0.1	
						Plantago lanceolata	0.2	
						Sporobolus creber	0.1	
						Dichelachne crinita	0.1	
						Sonchus oleraceus	0.1	
						Onopordium acanthium	0.1	
						Centella asiatica	0.1	
						Cyperus eragrostis	0.1	
Total Cover DO FIRST							90-95	
20mx20m plot = 400m2 Note: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% = 2x2m, 5% = 4x5m, 25% = 10x10m								

Plot 06

Arrival time:		**Departure time:**		**Weather:**		**TWO transect photos (one landscape, one portrait) taken**	☐	**Transect GPS points taken**	☐
Start easting/northing:			**End easting/northing:**			**Zone:**		**Bearing:**	

Tree Stem Size Class at DBH [1]	**Presence/Absence**	**Count of Hollow Bearing Trees**	**Leaf Litter Cover within 5 x 1m2 sub-plots [2]**						
< 5 cm [3]	☐			**Leaf litter**	**Live vegetation**	**Bare ground**	**Rocks**	**Other**	**Total**
5 - 9 cm	☐		**1**		100				**100**
10 – 19 cm	☐	0	**2**		100				**100**
20 – 29 cm	☐	**Length of logs (m) [4]**	**3**		100				**100**
30 – 49cm	#		**4**		100				**100**
50 -79cm	0	0	**5**		100				**100**
>80cm	0		**Average**						**0**

Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)

Highly weedy. Slight variation from previous plot. Higher paspalum density, lower biodiversity

Habitat features, comments and incidental fauna observations:

Plot 07

Job:	Windella	**Job number:**	3154	**Date:**	30/12/2022	**Observers:**	**SJC**	
Mapped Vegetation community:								
Upper stratum	**C [1]**	**Ab [2]**	**Mid stratum**	**C [3]**	**Ab [4]**	**Lower stratum**	**C [5]**	**Ab [6]**
						Lachnagrostis filiformis	0.1	
						Vulpia sample	0.5	
						Centaurium tenuiflorum	0.2	
						Cynodon dactylon	65	
						Oxalis corniculata	0.1	
						Setaria pumilia	0.1	
						Sporobolus creber	1	
						Verbena bonariensis	0.1	
						Hypochaeris radiata	0.2	
						Briza subaristata	0.2	
						Chloris truncata	0.2	
						Gamochaeta antillana	0.2	
						Schoenus erecitorum	0.1	
						Cenchus clandestina	0.2	
						Dicanthium sericium	0.2	
Total Cover DO FIRST							65-70	
20mx20m plot = 400m2 Note: 0.1% = 63x63cm, 0.5% = 1.4x1.4m, 1% = 2x2m, 5% = 4x5m, 25% = 10x10m								

Plot 07

Arrival time:		**Departure time:**		**Weather:**		**TWO transect photos (one landscape, one portrait) taken**	☑	**Transect GPS points taken**	☑
Start easting/northing:			**End easting/northing:**			**Zone:**		**Bearing:**	

Tree Stem Size Class at DBH [1]	**Presence/Absence**	**Count of Hollow Bearing Trees**	**Leaf Litter Cover within 5 x 1m2 sub-plots [2]**						
< 5 cm [3]	☐			**Leaf litter**	**Live vegetation**	**Bare ground**	**Rocks**	**Other**	**Total**
5 - 9 cm	☐		**1**		80	20			**100**
10 – 19 cm	☐	0	**2**		75	25			**100**
20 – 29 cm	☐	**Length of logs (m) [4]**	**3**		70	30			**100**
30 – 49cm	#		**4**		90	10			**100**
50 -79cm	0	0	**5**		80	20			**100**
>80cm	0		**Average**						**0**

Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)

Paddock grazed frequently. Patches of bare soil. Cracks present.

Habitat features, comments and incidental fauna observations:

Plot no:	8		Job:	3154 Windella		Job no:		Date:	23/03/23	Observers:	BY & BYO
Mapped Vegetation community:											

Upper stratum	Unknown (Comment)	C [1]	Ab [2]	Mid stratum	Unknown (Comment)	C [3]	Ab [4]	Lower stratum	Unknown (Comment)	C [5]	Ab [6]
Eucalyptus moluccana	Eucalyptus moluccana	25	2	Olea europaea subsp. cuspidata*	African olive	10	20	Cynodon dactylon		10	25
Eucalyptus crebra	Eucalyptus crebra	6	5	Pittosporum undulatum		0.3	1	Setaria parviflora*		0.7	30
								Plantago lanceolata*		0.5	30
								Cyperus gracilis		0.3	25
								Dichondra repens		2	50
								Paspalidium distans		0.5	25
								Einadia nut…	Nutans?	0.3	20
								Eremophila…		0.3	15
								Oxalis spp.		0.1	5
								Alternanth…	Alternanthera sp	0.1	10
								Dichanthiu…	Dichanthium sp	3	30
								Panicum ef…	Panicum effusun	0.5	5
								Aristida lig…	Aristida sp	3	50
								Glycine mi…	Glycine sp	0.3	5
								Sporobolus…	Sporobolus creb	25	150
								Sida rhom…		0.1	5
								Ehrharta er…		0.3	25
								Eriochloa p…	Eriochloa sp	5	50
								Chloris tru…		1	50
								Chloris ven…		0.5	20
								Eragrostis l…	Eragrostis leptos	0.5	20
								Euphorbia …	Euphorb sp	0.2	15
								Paspalum …		1	20
								Rytidosper…	Rytidosperma sp	0.3	10
								Conyza bo…	Conyza sp	0.2	15
								Gamochae…	Gamochaeta am	0.2	20
								Fimbristylis…	Fimbristylis dich	0.1	5
								Phyllanthu…	Phyllanthus sp	0.1	10
								Senecio m…	Senecio madaga	0.1	5
								Chloris virg…	Feathertop rodes	0.2	3
								Wahlenber…	Wahlenbergia sp	0.1	1
								Cirsium vul…	Cirsium vulgare	0.1	5
								Bothriochlo…	Bothriochloa sp	0.3	10
								Cyanthilliu…	Cyanthillium cine	0.1	5
								Hypochaeri…	Hypochaeris?	0.1	5
								Cupaniopsi…	Tuckeroo sp	0.1	3
								Pseuderan…	Pseuderanthenu	0.1	5
								Lomandra …	Lomandra multif	0.2	3
								Lantana ca…	Lantana camara	0.1	1
								Juncus cog…	Juncus cognatus	0.1	3

Arrival time:	09:40		**Departure time:**	11:00	**Weather:**	Sunny/light over	**TWO transect photos (one landscape, one portrait) taken**	☑	**Transect GPS points taken**	☑
Start easting/northing:	357,742	6380543		**End easting/northing:**	**357,787**	**6380537**	**Zone:**	56	**Bearing:**	82

Tree Stem Size Class at DBH [1]	**Presence/Absence**	**Number**	**Count of Hollow Bearing Trees**	**Leaf Litter Cover within 5 x 1m2 sub-plots [2]**						
< 5 cm [3]	☑	[redacted]	2		**Leaf litter**	**Live vegetation**	**Bare ground**	**Rocks**	**Other**	**Total**
5 - 9 cm	☑		[redacted]	**1**	40	60	0	0	0	**100**
10 – 19 cm	☑			**2**	35	60	5	0	0	**100**
20 – 29 cm	☑		**Length of logs (m) [4]**	**3**	30	70	0	0	0	**100**
30 – 49cm	☑		6	**4**	45	53	2	0	0	**100**
50 -79cm	☐	0	[redacted]	**5**	50	50	0	0	0	**100**
>80cm	☑	3		**Average**	40	58.6	1.4	0	0	**100**

Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)

Managed grass/groundcover. Some planted exotics. A rubbish pile.

Habitat features, comments and incidental fauna observations:

2x HBTs, possibly a third. Some regen occurring.

Plot no:	9		Job:	3154		Job no:		Date:		Observers:	By byo
Mapped Vegetation community:				Modified plot 15x35 florist is							

Upper stratum	Unknown (Comment)	C [1]	Ab [2]	Mid stratum	Unknown (Comment)	C [3]	Ab [4]	Lower stratum	Unknown (Comment)	C [5]	Ab [6]
Eucalyptus m…	Eucalyptus moluccana	30	3					Paspalum dilatatum*	Paspalum dilatatum	20	150
								Sporobolus…	Sporobolus creb	1	30
								Dichondra repens	Dichondra repens	0.2	15
								Plantago la…	Plantago lanceol	0.5	50
								Cirsium vulgare*	Cirsium vulgare	0.3	10
								Cynodon s…	Cynodon dactylo	40	250
								Sporobolus…	Sporobolus Afric	0.3	10
								Dichanthiu…	Dichanthium sp	0.5	25
								Carex inve…	Carex sp	0.1	5
								Verbena sp…	Verbena sp	0.1	3
								Briza subar…	Briza sub	0.1	1
								Cyperus gr…	Cyperus gracilis	0.2	5
								Sida rhom…	Sida rhombifolia	0.2	5
								Bothriochlo…	Bothriochloa sp?	0.2	10
								Hypochaeri…	Sonchus?	0.1	2
								Senecio m…	Senecio mad	0.1	2
								Cymbopog…	Cymbopogon ref	0.1	2
								Dichondra …	Dichondra repen	0.1	5
								Setaria par…	Setaria parviflora	0.3	10
								Rytidosper…	Rytidosperma sp	0.1	5
								Cenchrus c…	Kikuyu	10	200
								Oxalis spp.	Oxalis	0.1	3
								Rumex bro…	rumex brownii	0.1	5

Arrival time:	12:10		**Departure time:**	12:30	**Weather:**	Sunny, slight ove	**TWO transect photos (one landscape, one portrait) taken**	☑	**Transect GPS points taken**	☑
Start easting/northing:	357,732	6380466		**End easting/northing:**	**357,778**	**6380451**	**Zone:**	56	**Bearing:**	100

Tree Stem Size Class at DBH [1]	**Presence/Absence**	**Number**	**Count of Hollow Bearing Trees**	**Leaf Litter Cover within 5 x 1m2 sub-plots [2]**						
< 5 cm [3]	☐	[redacted]	3		**Leaf litter**	**Live vegetation**	**Bare ground**	**Rocks**	**Other**	**Total**
5 - 9 cm	☐	[redacted]	[redacted]	**1**	10	75	15	0	0	**100**
10 – 19 cm	☐	[redacted]	[redacted]	**2**	20	80	0	0	0	**100**
20 – 29 cm	☐	[redacted]	**Length of logs (m) [4]**	**3**	30	70	0	0	0	**100**
30 – 49cm	☐	[redacted]	1	**4**	50	40	10	0	0	**100**
50 -79cm	☑	2	[redacted]	**5**	20	80	0	0	0	**100**
>80cm	☑	2	[redacted]	**Average**	26	69	5	0	0	**100**

Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)

Managed ground cover. Midstory absent.

Habitat features, comments and incidental fauna observations:

2x cows. Wire between 2 trees, has killed the man trunk in each, significant deadwood, otherwise relatively healthy.

Plot no:	10		Job:	Windella		Job no:	3154	Date:	23/03/23	Observers:	BY & BYO
Mapped Vegetation community:											

Upper stratum	Unknown (Comment)	C [1]	Ab [2]	Mid stratum	Unknown (Comment)	C [3]	Ab [4]	Lower stratum	Unknown (Comment)	C [5]	Ab [6]
								Plantago lanceolata*	Plantago lanceolata	2	50
								Paspalum …	Paspalum dilatat	15	200
								Sporobolus creber	Sporobolus creber	20	300
								Dichanthiu…	Dichanthium sp	5	50
								Cynodon dactylon	Cynodon dactylon	5	50
								Fimbristylis…	Fimbristylis dich	15	500
								Cymbopog…	Cymbopogon ref	1	20
								Hypochaeri…	Hypochaeris rad	0.5	50
								Verbena ri…	Verbena rigida	0.5	10
								Verbena lit…	Verbena littoralis	1	20
								Bothriochlo…	Bothriochloa ma	2	50
								Asperula c…	Asperula confert	0.4	10
								Glycine mi…	Glycine sp	0.3	5
								Briza subar…	Briza sub	0.5	25
								Phyllanthu…	Phyllanthus sp	0.1	10
								Aster subul…	Aster subbiflorus	0.4	50
								Rumex bro…	Rumex brownii	0.1	5
								Dichanthiu…	Grass sp	0.5	25
								Cyperus br…	Cyperus brevifol	0.3	30
								Conyza bo…	Conyza sum	0.2	10
								Centauriu…	Centaurium eryth	0.2	5
								Axonopus f…	Axonopus fuss	20	200
								Trifolium s…	Trifolium sp	0.1	5
								Carex inve…	Carex sp	0.1	5
								Oxalis spp.	Oxalis sp	0.1	5

Arrival time:	12:45		**Departure time:**	01:20	**Weather:**		**TWO transect photos (one landscape, one portrait) taken**	☑	**Transect GPS points taken**	☑
Start easting/northing:	357,623	6380464		**End easting/northing:**	**357,578**	**6380492**	**Zone:**	56	**Bearing:**	286

Tree Stem Size Class at DBH [1]	**Presence/Absence**	**Number**	**Count of Hollow Bearing Trees**	**Leaf Litter Cover within 5 x 1m2 sub-plots [2]**						
< 5 cm [3]	☐	[redacted]	0		**Leaf litter**	**Live vegetation**	**Bare ground**	**Rocks**	**Other**	**Total**
5 - 9 cm	☐		[redacted]	**1**	10	90	0	0	0	**100**
10 – 19 cm	☐			**2**	10	90	0	0	0	**100**
20 – 29 cm	☐		**Length of logs (m) [4]**	**3**	15	85	0	0	0	**100**
30 – 49cm	☐		0	**4**	15	85	0	0	0	**100**
50 -79cm	☐	0	[redacted]	**5**	15	85	0	0	0	**100**
>80cm	☐	0		**Average**	13	87	0	0	0	**100**

Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)

Disturbed paddock.

Habitat features, comments and incidental fauna observations:

Plot no:	11		Job:			Job no:	3154	Date:	23/03/23	Observers:	BY & BYO
Mapped Vegetation community:											

Upper stratum	Unknown (Comment)	C [1]	Ab [2]	Mid stratum	Unknown (Comment)	C [3]	Ab [4]	Lower stratum	Unknown (Comment)	C [5]	Ab [6]
				Callistemon viminalis	Callistemon viminalis	10	1	Cynodon dactylon	Cynodon dactylon	65	500
				Schinus spp.*	Peruvian pepper	8	1	Conyza bo…	Conyza bonarien	0.1	5
				Photinia glabra*	Photinia glabrata	4	1	Modiola caroliniana*	Modiola caroliniana	2	50
				Duranta erecta*	Durante erecta	5	1	Plantago la…	Plantago lanceol	2	50
				Strelitzia nicolai*	Strizlitsea Nicolas	2	1	Oxalis spp.	Oxalis sp	0.3	30
				Olea europae…	Olea Europa	10	3	Dichondra …	Dichondra repen	0.5	25
				Brachychiton …	Brachychiton rup	1	2	Ehrharta er…	Ehrharta erecta	1	30
								Carex inve…	Carex sp	0.2	5
								Paspalum …	Paspalum dilatat	3	40
								Hypochaeri…	Hypochaeris rad	0.2	20
								Paronychia…	Paronychia sp	0.3	5
								Cenchrus c…	Kikuyu	0.5	25
								Cyperus gr…	Cyperus gracilis	0.5	50
								Glycine mi…	Glycine sp	0.1	2
								Euphorbia …	Euphorb	0.1	5
								Verbena ri…	Verbena rigida	0.3	10
								Bothriochlo…	Bothriochloa sp	0.1	3
								Rytidosper…	Rytidosperma sp	0.3	5
								Chloris tru…	Chloris truncate	0.3	5
								Dichanthiu…	Dichanthium sp	0.3	15
								Aristida lig…	Aristida sp	0.4	10
								Plantago d…	Plantago debilis	0.1	1
								Aloe spp.*	Aloe sp	0.1	3
								Phyllanthu…	Phyllanthus	0.1	3
								Heliotropiu…	Purple flower	0.3	3

Arrival time:	01:45		**Departure time:**	02:30	**Weather:**	Sunny. 28 degrees	**TWO transect photos (one landscape, one portrait) taken**	☑	**Transect GPS points taken**	☑
Start easting/northing:	357,689	6380515		**End easting/northing:**	**357,639**	**6380526**	**Zone:**	56	**Bearing:**	280

Tree Stem Size Class at DBH [1]	**Presence/Absence**	**Number**	**Count of Hollow Bearing Trees**	**Leaf Litter Cover within 5 x 1m2 sub-plots [2]**						
< 5 cm [3]	☐	[redacted]	0		**Leaf litter**	**Live vegetation**	**Bare ground**	**Rocks**	**Other**	**Total**
5 - 9 cm	☐		[redacted]	**1**	50	45	5	0	0	**100**
10 – 19 cm	☐			**2**	15	85	0	0	0	**100**
20 – 29 cm	☐		**Length of logs (m) [4]**	**3**	10	89	1	0	0	**100**
30 – 49cm	☐		0	**4**	10	90	0	0	0	**100**
50 -79cm	☑	2	[redacted]	**5**	15	85	0	0	0	**100**
>80cm	☐	0		**Average**	20	78.8	1.2	0	0	**100**

Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)

Mown lawn. Planted garden.

Habitat features, comments and incidental fauna observations:

Plot no:	12		Job:			Job no:	3154	Date:	23/03/23	Observers:	BY & BYO
Mapped Vegetation community:				Modified 10x25 mini bam							
Upper stratum	Unknown (Comment)	C [1]	Ab [2]	Mid stratum	Unknown (Comment)	C [3]	Ab [4]	Lower stratum	Unknown (Comment)	C [5]	Ab [6]
								Paspalum dilatatum*	Paspalum dilatatum	10	
								Asperula conferta	Asperula confert	0.1	3
								Plantago lanceolata*	Plantago lanceolata	1	30
								Dichondra repens	Dichondra repen	2	50
								Cynodon dactylon	Cynodon dactylon	40	
								Cymbopogon refractus	Cymbopogon ref	0.5	20
								Phyllanthus gunnii	Phyllanthus sp	0.3	10
								Mentha diemenica	Mentha sp	0.2	10
								Carex inversa	Carex sp	2	50
								Briza subaristata*	Briza sub	0.5	30
								Verbena rigida var. ri…	Verbena rigida	2	20
								Brunoniella australis	Brunonelia	0.1	5
								Hypochaeris radicata*	Hypochaeris rad	0.3	10
								Verbena litoralis*	Verbena sp	0.5	10
								Bothriochloa bladhii …	Bothriochloa ? Ir	0.5	15
								Glycine microphylla	Glycine	0.3	5
								Cirsium vulgare*	Cirsium vulgare	0.3	5
								Bothriochloa macra	Bothriochloa ma	0.5	30
								Conyza bonariensis*	Conyza bon	0.2	10
								Oxalis spp.	Oxalis sp	0.1	5
								Gamochaeta americ…	Gamochaeta am	0.3	15
								Viola hederacea	Viola hederacea	0.3	20
								Sporobolus creber	Sporobolus creb	8	

Arrival time:	02:50		**Departure time:**		**Weather:**	Sunny. 29 degrees	**TWO transect photos (one landscape, one portrait) taken**	☑	**Transect GPS points taken**	☑
Start easting/northing:	357,632	6380551		**End easting/northing:**	**357,658**	**6380550**	**Zone:**	56	**Bearing:**	100

Tree Stem Size Class at DBH [1]	**Presence/Absence**	**Number**	**Count of Hollow Bearing Trees**	**Leaf Litter Cover within 5 x 1m2 sub-plots [2]**						
< 5 cm [3]	☐	[redacted]	0		**Leaf litter**	**Live vegetation**	**Bare ground**	**Rocks**	**Other**	**Total**
5 - 9 cm	☐	[redacted]	[redacted]	**1**	40	60	0	0	0	**100**
10 – 19 cm	☐	[redacted]	[redacted]	**2**	35	65	0	0	0	**100**
20 – 29 cm	☐	[redacted]	**Length of logs (m) [4]**	**3**	40	60	0	0	0	**100**
30 – 49cm	☐	[redacted]	0	**4**	30	70	0	0	0	**100**
50 -79cm	☐	0	[redacted]	**5**	45	50	5	0	0	**100**
>80cm	☐	0	[redacted]	**Average**	38	61	1	0	0	**100**

Plot Disturbance: (weediness, clearing, erosion, edge effects, grazing, fire, other)

Mowed/managed Lawn

Habitat features, comments and incidental fauna observations:

Appendix F – Biodiversity Offsets Credits Report

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00044197/BAAS18147/23/00044198

Proposal Name
Windella MHE

BAM data last updated *
22/06/2023

Assessor Name
Ian Douglas Benson

Assessor Number
BAAS18147

BAM Data version *
61

Proponent Names

Report Created
19/12/2023

BAM Case Status
Finalised

Assessment Revision
2

Assessment Type
Part 4 Developments (General)

Date Finalised
19/12/2023

BOS entry trigger
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.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		

Species
Chalinolobus dwyeri / Large-eared Pied Bat

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3328-Lower Hunter Red Gum-Paperbark Riverflat Forest	Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	6.3	71	0	71

BAM Biodiversity Credit Report (Like for like)

3328-Lower Hunter Red Gum-Paperbark Riverflat Forest

Like-for-like credit retirement options

Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions This includes PCT's: 1603, 1605, 1691, 1692, 3328, 3446, 3634	-	3328_Grassland	No	0	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions This includes PCT's: 1603, 1605, 1691, 1692, 3328, 3446, 3634	-	3328_Low	Yes	71	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

BAM Biodiversity Credit Report (Like for like)

Species	Vegetation Zone/s	Area / Count	Credits
Cercartetus nanus / Eastern Pygmy-possum	**3328_Low**	4.5	71.00
Chalinolobus dwyeri / Large-eared Pied Bat	**3328_Low**	4.5	106.00
Litoria aurea / Green and Golden Bell Frog	**3328_Low**	3.6	57.00
Litoria brevipalmata / Green-thighed Frog	**3328_Low**	1.5	18.00
Petaurus norfolcensis / Squirrel Glider	**3328_Low**	4.5	71.00

Credit Retirement Options

Like-for-like credit retirement options

Cercartetus nanus / Eastern Pygmy-possum	Spp	IBRA subregion
	Cercartetus nanus / Eastern Pygmy-possum	Any in NSW
Chalinolobus dwyeri / Large-eared Pied Bat	Spp	IBRA subregion
	Chalinolobus dwyeri / Large-eared Pied Bat	Any in NSW
Litoria aurea / Green and Golden Bell Frog	Spp	IBRA subregion
	Litoria aurea / Green and Golden Bell Frog	Any in NSW
Litoria brevipalmata / Green-thighed Frog	Spp	IBRA subregion
	Litoria brevipalmata / Green-thighed Frog	Any in NSW

Petaurus norfolcensis / Squirrel Glider	Spp	IBRA subregion
	Petaurus norfolcensis / Squirrel Glider	Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id
00044197/BAAS18147/23/00044198

Proposal Name
Windella MHE

BAM data last updated *
22/06/2023

Assessor Name
Ian Douglas Benson

Assessor Number
BAAS18147

BAM Data version *
61

Proponent Name(s)

Report Created
19/12/2023

BAM Case Status
Finalised

Assessment Revision
2

Assessment Type
Part 4 Developments (General)

Date Finalised
19/12/2023

BOS entry trigger
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.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		

Species
Chalinolobus dwyeri / Large-eared Pied Bat

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3328-Lower Hunter Red Gum-Paperbark Riverflat Forest	Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	6.3	71	0	71.00

3328-Lower Hunter Red Gum-Paperbark Riverflat Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions This includes PCT's: 1603, 1605, 1691, 1692, 3328, 3446, 3634	-	3328_Grassland	No	0	Hunter,Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions This includes PCT's: 1603, 1605, 1691, 1692, 3328, 3446, 3634	-	3328_Low	Yes	71	Hunter,Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Variation options					
Formation	Trading group	Zone	HBT	Credits	IBRA region
Grassy Woodlands	Tier 3 or higher threat status	3328_Grassland	No	0	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Grassy Woodlands	Tier 3 or higher threat status	3328_Low	Yes (including artificial)	71	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Cercartetus nanus / Eastern Pygmy-possum	**3328_Low**	4.5	71.00
Chalinolobus dwyeri / Large-eared Pied Bat	**3328_Low**	4.5	106.00
Litoria aurea / Green and Golden Bell Frog	**3328_Low**	3.6	57.00
Litoria brevipalmata / Green-thighed Frog	**3328_Low**	1.5	18.00
Petaurus norfolcensis / Squirrel Glider	**3328_Low**	4.5	71.00

Credit Retirement Options

Like-for-like options

Cercartetus nanus/ Eastern Pygmy-possum	Spp		IBRA region
	Cercartetus nanus/Eastern Pygmy-possum		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Chalinolobus dwyeri/ Large-eared Pied Bat	Spp		IBRA region
	Chalinolobus dwyeri/Large-eared Pied Bat		Any in NSW
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region

	Fauna	Vulnerable	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Litoria aurea/ Green and Golden Bell Frog	Spp	IBRA region	
	Litoria aurea/Green and Golden Bell Frog	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Endangered	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Litoria brevipalmata/ Green-thighed Frog	Spp	IBRA region	
	Litoria brevipalmata/Green-thighed Frog	Any in NSW	
	Variation options		

	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Petaurus norfolcensis/ Squirrel Glider	Spp	IBRA region	
	Petaurus norfolcensis/Squirrel Glider	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Appendix G – Site Photographs

Above: Evidence of site disturbance
Below: Paddock vegetation and fragmented woodland

Above: Patch of invasive Juncus acutus in the south of the Subject Site
Below: Farm sheds and infrastructure

Above: Example hollow-bearing tree within Subject Site

Appendix H – Other Legislation

EPBC Act Assessment

A Protected Matters Search within a 5km radius of the Subject Site was conducted in December 2023 for Matters of National Environmental Significance as relevant to the *Environment Protection & Biodiversity Conservation Act 1999* (EPBC Act). The following Matters of National Significance are considered in this assessment.

World Heritage Properties:

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

National Heritage Places:

The site is not a National Heritage place, and it is not in close proximity to any such place.

Wetlands of International Significance (declared Ramsar wetlands):

The site is not a Wetlands of International Significance but is in close proximity being 20-30km upstream to the Hunter estuary wetlands.

Great Barrier Reef Marine Park:

The site is not part of, or within close proximity to, the Great Barrier Reef Marine Park.

Commonwealth Marine Areas:

The site is not part of, or within close proximity to, any Commonwealth Marine Area.

Threatened Ecological Communities:

The Protected Matters Search indicates that nine (9) listed Threatened Ecological Communities (TECs) are considered likely to occur within 5km of the Subject Site.

Four (4) Endangered Ecological Communities:

- *Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community*;
- *Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland;*
- *Kurri Sand Swamp Woodland of the Sydney Basin Bioregion;* and
- *Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions*

Five (5) Critically Endangered Ecological Community

- *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria;*
- *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland;*
- *Lowland Rainforest of Subtropical Australia;*
- *Hunter Valley Weeping Myall (Acacia pendula) Woodland;* and
- *Central Hunter Valley eucalypt forest and woodland.*

A review of vegetation zones was undertaken against the Conservation Advices for *Central Hunter Valley eucalypt forest and woodland* and *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria.*

Central Hunter Valley eucalypt forest and woodland.

Review of the *Approved Conservation Advice (including listing advice) for the Central Hunter Valley eucalypt forest and woodland ecological community* (DoE, 2015) for the potential association with PCT 3328 within the Subject Site indicates that: "*in order to be considered a Matter of National Environmental*

Significance under the EPBC Act, areas of the ecological community must meet: the Key diagnostic characteristics (in Section 1.5.1); AND at least the minimum Condition thresholds for Moderate quality (i.e. for class C or D, in Section 1.5.3). Key diagnostic characteristics are assessed in **Table A** and minimum condition thresholds are assessed in **Table B.**

Table A – *Central Hunter Valley eucalypt forest and woodland* CEEC key diagnostic characteristics

Key diagnostic characteristics (must all be met)	AEP commentary
It occurs in the Hunter River catchment (typically called the Hunter Valley region);	Yes – characteristic met
It typically occurs on lower hillslopes and low ridges, or valley floors in undulating country; on soils derived from Permian sedimentary rocks;	Yes – characteristic met
It does not occur on alluvial flats, river terraces, aeolian sands Triassic sediments, or escarpments	Yes – characteristic met
It is woodland or forest, with a projected canopy cover of trees of 10% or more; or with a native tree density of at least 10 native tree stems per 0.5 ha (at least 20 native tree stems/ha) that are at least one metre in height	Yes – characteristic met
The canopy of the ecological community is dominated by one or more of the following four eucalypt species: *Eucalyptus crebra* (Narrow-leaved Ironbark), *Corymbia maculata* (syn. E. maculata) (Spotted Gum), *E. dawsonii* (Slaty Gum) and *E. moluccana* (Grey Box); OR a fifth species, *Allocasuarina luehmannii* (Bulloak, Buloke) dominates in combination with one or more of the above four eucalypt species, in sites previously dominated by one or more of the above four eucalypt species	Yes – characteristic met. Canopy vegetation dominated by *Eucalyptus moluccana*
Allocasuarina torulosa (forest oak/ she-oak, rose she-oak/oak), *Eucalyptus acmenoides* (white mahogany) and *E. fibrosa* (red/broad-leaved ironbark) are largely absent from the canopy of a patch	Yes – characteristic met
A ground layer is present (although it may vary in development and composition), as a sparse to thick layer of native grasses and other native herbs and/or native shrubs.	Ground layer of natives was sparse / predominantly managed comprising mostly exotic species across the site. Some native grasses were present.
Conclusion: PCT 3328 as it occurs on site meets key diagnostic characteristics of the TEC.	

Table B – *Central Hunter Valley eucalypt forest and woodland* condition thresholds

Category and rationale	Thresholds	AEP commentary
Class A. High quality condition e.g. A larger patch with good quality native understorey	• Patch size is ≥ 5 ha; AND • ≥ 50% of perennial understorey vegetative cover is native; AND the patch contains at least 12 native understorey species.	Each patch of PCT 3328 within the Subject Site and adjacent lands is under 5ha. **Class A thresholds are not met.**
Class B. High quality condition e.g. A patch with high quality native understorey	• Patch size is ≥ 0.5 ha AND • ≥ 70% of perennial vegetative cover in each layer present is native; AND • The patch contains at least 12 native understorey species.	Patch sizes are ≥ 0.5ha. However, there isn't a minimum of 70% of native perennial vegetative cover in each layer. **Class B thresholds are not met.**
Class C. Moderate quality condition e.g. A patch with good quality native understorey	• Patch size is ≥ 0.5 ha; AND • ≥ 50% of perennial understorey vegetative cover is native; AND • The patch contains at least 12 native understorey species.	Patch sizes are ≥ 0.5ha. However, excluding *Cynodon dactylon* which was deemed to be non-native in eastern NSW, native perennial understorey vegetative cover is below 50%. **Class C thresholds are not met.**
Class D. Moderate quality condition e.g. A moderate to large sized patch with: connectivity to a native vegetation area; or a mature tree; or a tree with hollows.	• Patch size is ≥ 2 ha; AND • ≥ 50% of perennial understorey vegetative cover is native; AND • The patch is contiguous with another patch of native woody vegetation ≥ 1 ha in area OR the patch has at least one large locally indigenous tree (≥ 60 cm dbh), or at least one tree with hollows.	One patch is ≥ 2ha. However, excluding *Cynodon dactylon* which was deemed to be non-native in eastern NSW, native perennial understorey vegetative cover is below 50%. **Class D thresholds are not met.**
Conclusion: PCT 3328 as it occurs within the Subject Site does not meet the condition thresholds of the TEC		

As assessed in **Tables A** and **B**, while PCT 3328 as it occurs within the Subject Site presents the key diagnostic characteristics of *Central Hunter Valley eucalypt forest and woodland* **C**EEC, but does not meet the condition thresholds of the TEC.

Therefore, the proposal will not impact *Central Hunter Valley eucalypt forest and woodland CEEC*.

River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria;

Review of the *Conservation Advice for the River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria* (DAWE, 2020) for the potential association with PCT 3328 within the Subject Site indicates that: "*In order to be protected as a matter of national environmental significance areas of the ecological community must meet both: The key diagnostic characteristics (Section 5.1.1); AND least the minimum condition thresholds (Section 5.2.1).*

Key diagnostic characteristics are assessed in **Table C** and minimum condition thresholds are assessed in **Table D.**

Table C – *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria* key diagnostic characteristics

Key diagnostic characteristics (must all be met)	AEP commentary
Occurs in the South East Corner and Sydney Basin IBRA Bioregions, in eastern Victoria and south eastern New South Wales.	Yes – characteristic met
Occurs within catchments of the eastern and southern watershed of the Great Dividing Range.	Yes – characteristic met
Occurs at elevations up to 250 metres above sea-level (ASL), but most typically below 50 metres ASL.	Yes – characteristic met
Occurs on alluvial landforms related to coastal river floodplains and associated sites where transient water accumulates, including floodplains, river-banks, riparian zones, lake foreshores, creek lines (including the floors of tributary gullies), floodplain pockets, depressions, alluvial flats, fans, terraces, and localised colluvial fans.	Yes – characteristic met
Occurs on alluvial soils of various textures including silts, clay loams, sandy loams, gravel and cobbles. Does not occur on soils that are primarily marine sands, or aeolian sands.	Yes – characteristic met
Occurs as a tall closed-forest, tall open-forest, closed forest, open forest, tall woodland, or woodland. The canopy has a crown cover of at least 20 percent.	Yes – characteristic met
Has a canopy dominated by one or a combination of the following species: *Angophora floribunda, A. subvelutina, Eucalyptus amplifolia, E. baueriana, E. benthamii, E. bosistoana, E. botryoides, E. botryoides x E. saligna, E. elata, E. grandis, E. longifolia, E. moluccana, E. ovata, E. saligna, E. tereticornis, E. viminalis.*	Yes – characteristic met. *Eucalyptus moluccana* is the dominant canopy species.
Conclusion: PCT 3328 as it occurs on site meets key diagnostic characteristics of the TEC.	

Table D was extracted from the Conservation Advice for the TEC. Commentary is provided hereafter.

Table D – *River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria* condition and classes thresholds

Patch size thresholds → / Biotic thresholds ↓	Large patch Patch size ≥ 2 ha	Small contiguous[7] patch Patch size ≥ 0.5 ha within a larger area of native vegetation ≥ 5 ha	Small patch Patch size ≥ 0.5 ha
High condition ≥ 80% of its total perennial understorey vegetation cover[1] is comprised of native species AND Ground cover richness[2] ≥ 10 native species per sample plot AND ≥ 20 large trees[3] per ha	CLASS A1 Large or contiguous patch in high condition		CLASS B1 Small patch in high condition
Good condition with arboreal mammals ≥ 50% of its total perennial understorey vegetation cover[1] is comprised of native species AND Ground cover richness[2] ≥ 6 native species per sample plot AND At least 10 large trees[3] per ha AND Evidence of 4 or more species of arboreal mammals[4] detected[5] in the patch	CLASS A2 Large or contiguous patch in good condition with arboreal mammals		CLASS B2 Small patch in good condition with arboreal mammals
Good condition ≥ 50% of its total perennial understorey vegetation cover[1] is comprised of native species AND Ground cover richness[2] ≥ 6 native species per sample plot AND At least 10 large trees[3] per ha	CLASS B3 Large or contiguous patch in good condition		CLASS C1 Small patch in good condition
Moderate condition ≥ 30% of its total perennial understorey vegetation cover[1] is comprised of native species AND Ground cover richness ≥ 4 native species per sample plot[2]	CLASS C2 Large or contiguous patch in moderate condition		

[1] Perennial understorey vegetation cover includes vascular plant species of all layers below the canopy with a life-cycle of more than two growing seasons. It includes herbs (graminoids and forbs), grasses, shrubs and juvenile plants of canopy species, but does not include annual plants, cryptogams, plant litter or exposed soil.

[2] Ground cover richness includes combined species richness of native grasses, forbs, ferns and sedges per 0.04 ha (20 x 20 m sample plot).

[3] Large eucalypt trees are greater than 45 cm [diameter at breast height (dbh)]. This is used as a surrogate for tree hollows and habitat values.

[4] Excluding micro-bats (Microchiroptera).

[5] Survey guidelines (DSEWPC 2011).

[7] Contiguous means the patch is connected to, or in close proximity to (i.e. within 30 m of), another area of native vegetation (i.e. an area where the total perennial vegetation cover is dominated (50 percent or more) by native plant species).

In reference to **Table D**, one patch within the Subject Site qualifies as a “large patch” and other patches are best described as “small patches”. The perennial understory vegetation cover does not exceed 50% in any sample plot, except in Plot 01 where native cover totals approx. 50.5% but there are less than 6 native groundcover species records.

BAM Plots 02 and 08 suggest that the large patch (≥2ha) in the west, that extends mostly offsite, comprises on average 27% native vegetation cover, such that it does not qualify as the protected TEC.

Therefore, while key diagnostic characteristics are met, conditions thresholds are not wholly met for neither of the patches identified on site.

Other TECs listed as likely to occur in the locality were deemed unlikely to be present on site due to the composition and structure of vegetation within the Subject Site. Therefore, no EPBC Act listed TEC will be impacted by the proposal.

Threatened Species:

Threatened species listed under the EPBC Act considered likely to occur on site were assessed from field inspections, Bird Data and using the BioNet Atlas search tool within a 100km^2 search area with the Subject Site at its centre.

While listed species Grey-headed Flying-fox was sighted incidentally, habitat assessment and targeted surveys did not identify suitable breeding habitat, and the site was deemed to constitute only marginal foraging habitat for the species. As such, no significant impacts are expected. Furthermore, no other EPBC Act listed species were identified on site or considered likely to be significantly impacted by the proposal.

Migratory Species:

A number of EPBC listed migratory species have the potential to utilise the site on an irregular basis. The limited number and sporadic nature of records close to the Subject Site appear to reflect opportunistic rather than regular use of any habitat considered of importance to any threatened species.

It is not considered that the development of this land is likely to significantly affect the availability of potential habitat for such mobile species, or disrupt migratory patterns.

EPBC Act Assessment Conclusion:

While PCT 3328 was identified on site as having the potential to be associated with EPBC Act listed TECs, further assessment confirmed that its occurrence within the Subject Site is not commensurate with any TEC. Furthermore, no significant impacts on threatened species are expected as a result of the proposal.

Therefore, an EPBC Act Referral is not considered as necessary for this proposal.

Water Management Act 2000

DPE (Water) administers the *Water Management Act 2000* (WM Act) and is required to assess activities carried out on waterfront land. An object of the WM Act is to provide for the sustainable and integrated management of the water sources of the State for the benefit of both past and future generations in particular:

- to protect, enhance and restore water sources, their associated ecosystems, ecological processes and biological diversity and their water quality,
- to recognise the role of the community, as a partner with government, in resolving issues relating to the management of water sources,
- to encourage best practice in the management of use of water.

Under the WM Act, an approval is required to undertake controlled activities on waterfront land, unless that activity is exempt (section 91E). The proposed development is not exempt.

Waterfront land includes the bed and bank of any river, lake or estuary and all land within 40 meters of the highest bank of the river, lake or estuary. Certain activities within this land are defined as a 'controlled activity' and requires approval from the Office of Water. Controlled activities include the carrying out of building work, such as erecting buildings and other structures, and the installation of infrastructure. They also include excavating or depositing material.

An unnamed second-order watercourse occurs adjacently to the south-western boundary of the Subject Site, flowing from the west-north-west towards the east-south-east along the northern edge of the New England Highway. Preliminary assessment suggests that the watercourse features a defined bed and bank.

Works within 40m of waterfront land require a Controlled Activity Approval (CAA). The development as proposed will undertake works within 40m of a second-order stream, and as such a CAA will need to be applied for before any works within these areas can begin. In particular, proposed landscaping works in the south are such that they may encroach within 20m of the offsite swale. As part of a CAA, impacts to Vegetated Riparian Zones (VRZs) are required to be offset under the averaging rule and a Vegetation Management Plan (VMP) is to be prepared in accordance with the CAA for VRZ management.

State Environmental Planning Policy (Biodiversity and Conservation) 2021

Chapter 3 Koala Habitat Protection 2020

The Subject Site occurs on land zoned RU2 within the Maitland LGA and comprises more than one (1) hectare. Therefore, potential impacts to Koala must be assessed under the provisions of *State Environmental Planning Policy (Biodiversity and Conservation) 2021 – Chapter 3 Koala Habitat Protection 2020 – Part 3.2 Development controls for Koala habitat* as follows.

3.6 Step 1—Is the land potential koala habitat?

"(1) Before a council may grant consent to a development application for consent to carry out development on land to which this Part applies, the council must be satisfied as to whether or not the land is a potential koala habitat.

(2) The council may be satisfied as to whether or not land is a potential koala habitat only on information obtained by it, or by the applicant, from a person who is qualified and experienced in tree identification.

(3) If the council is satisfied—

(a) that the land is not a potential koala habitat, it is not prevented, because of this Chapter, from granting consent to the development application, or

(b) that the land is a potential koala habitat, it must comply with section 3.7."

Under section *3.2 Definitions* of *State Environmental Planning Policy (Biodiversity and Conservation) 2021 Chapter 3 Koala Habitat Protection 2020* (BC SEPP): "*potential koala habitat means areas of native vegetation where trees of the types listed in Schedule 1 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component*".

The dominant tree species on site are *Eucalyptus moluccana* and *Eucalyptus crebra*, with no other tree species accounting for at least 15% of the total number of trees in the upper or lower strata of the tree component. Neither of the above-listed species are designated in Schedule 1 of the BC SEPP as being Koala feed tree species.

Therefore, the land is not potential koala habitat and no further provisions of the BC SEPP Ch.3 apply to the proposal.

Appendix I – BDAR Checklist

BAM Reference	Information	BDAR Section	Completed
Report			
Introduction - Chapters 2 and 3	Introduction to the biodiversity assessment including: • brief description of the proposal • identification of subject land boundary, including: • operational footprint (if BDAR) • construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure (if BDAR) • land proposed for biodiversity certification (if BCAR) • general description of the subject land • sources of information used in the assessment, including reports and spatial data	1.1 Introduction 1.1.1 Biodiversity Offset Scheme Threshold Trigger 1.1.2 Assessment Scope 1.1.3 The Proposal 1.1.4 General Description of the Subject Site 1.1.5 Site Particulars 1.1.6 Geology and Soils 1.1.7 Information Sources Figure 1 Site Map Figure 2 Location Map Appendix A Development Plan Appendix H Other Legislation	Completed
Landscape - Section 3.1, 3.2 and Appendix E	Identification of site context components and landscape features, including; General description of subject land topographic and hydrological setting, geology and soils	1.2 Landscape Features 1.2.1 Regional Landscapes 1.2.2 Identified Landscape Features Figure 2 Location Map	Completed
	Percent native vegetation cover in the assessment area (as described in BAM Subsection 3.2).	1.2.2 Identified Landscape Features 1.3.2 Landscape Native Vegetation Cover	Completed
	IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))	1.2.1 Regional Landscapes	Completed
	Rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3(3.) and Appendix E)	1.2.2 Identified Landscape Features Table 2 – Landscape Feature Assessment	
	Wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3(3.))	1.2.2 Identified Landscape Features Table 2 – Landscape Feature Assessment	

BAM Reference	Information	BDAR Section	Completed
	Connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6.))	1.2.2 Identified Landscape Features Table 2 – Landscape Feature Assessment	
	Karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(12.)	1.2.2 Identified Landscape Features Table 2 – Landscape Feature Assessment	
	Areas of geological significance and soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(8-9.))	1.2.2 Identified Landscape Features Table 2 – Landscape Feature Assessment	
	Any additional landscape features identified in any SEARs for the proposal	1.2.2 Identified Landscape Features Table 2 – Landscape Feature Assessment	
	NSW (Mitchell) landscape on which the subject land occurs	1.2.1 Regional Landscapes	Completed
Native vegetation, Chapter 4, Appendix A and Appendix H	Identify native vegetation extent within the subject land, including cleared areas and evidence to support differences between mapped vegetation extent and aerial imagery (as described in BAM Section 4.1(1–3.) and Subsection 4.1.1)	1.4 Native Vegetation 1.4.1 State Vegetation Type Mapping Figure 3 – State Vegetation Type Map Figure 4 – Ground-truthed Vegetation Map Appendix G Site Photographs	Completed
	Provide justification for all parts of the subject land that do not contain native vegetation (as described in BAM Subsection 4.1.2)	1.4 Native Vegetation 1.4.3 PCT Selection Justification Figure 3 – State Vegetation Type Map Table 3 – Plant Community Types from the State Vegetation Type Map	Completed
	Review of existing information on native vegetation including references to previous vegetation maps of the subject land and assessment area (described in BAM Section 4.1(3.) and Subsection 4.1.1)	1.4.1 State Vegetation Type Mapping	Completed

BAM Reference	Information	BDAR Section	Completed
	Describe the systematic field-based floristic vegetation survey undertaken in accordance with BAM Section 4.2	1.4 Native Vegetation Figures 6, 7 and 8 Table 9 – Vegetation Integrity Score Appendix D BAM Plot Data Appendix G Site Photographs	Completed
	Where relevant, describe the use of more appropriate local data, provide reasons that support the use of more appropriate local data and include the written confirmation from the decision-maker that they support the use of more appropriate local data (as described in BAM Subsection 1.4.2 and Appendix A)	N/A	
	For each PCT within the subject land, describe: vegetation class extent (ha) within subject land evidence used to identify a PCT including any analyses undertaken, references/sources, existing vegetation maps (BAM Section 4.2(1–3.)) plant species relied upon for identification of the PCT and relative abundance of each species if relevant, TEC status including evidence used to determine vegetation is the TEC (BAM Subsection 4.2.2(1–2.)) estimate of percent cleared value of PCT (BAM Subsection 4.2.1(5.))	1.4.7 Plant Community Types (PCTs) and Vegetation Zones 1.4.3 PCT Selection Justification Table 5 – Species Data for Potential PCT Determination Table 6 – PCT Determination Figure 4 – Ground-truthed Vegetation Map	Completed

BAM Reference	Information	BDAR Section	Completed
	Describe the vegetation integrity assessment of the subject land, including: identification and mapping of vegetation zones (as described in BAM Subsection 4.3.1) assessment of patch size (as described in BAM Subsection 4.3.2) survey effort (i.e., number of vegetation integrity survey plots) as described in BAM Subsection 4.3.4(1–2.) use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsection 4.3.3(5.))	1.3.1 Method 1.4.8 Vegetation Integrity Assessment 1.4.8.1 Patch Size 1.4.9 Vegetation Integrity Score Table 7 – Summary of Vegetation Zones Areas Table 9 – Vegetation Integrity Score 1.4.2 Plot Based Floristics Surveys Figure 4 – Ground-truthed Vegetation Map Figures 6, 7 and 8	Completed
	Where use of more appropriate local benchmark data is proposed (as described in BAM Subsection 1.4.2, BAM Subsection 4.3.3(5.) and BAM Appendix A): identify the PCT or vegetation class for which local benchmark data will be applied identify published sources of local benchmark data (if benchmarks obtained from published sources) describe methods of local benchmark data collection (if reference plots used to determine local benchmark data) provide justification for use of local data rather than BioNet Vegetation Classification benchmark values provide written confirmation from the decision-maker that they support the use of local benchmark data	Figure 3 – State Vegetation Type Map Figure 4 – Ground truthed Vegetation Figures 6, 7 and 8 1.5.4 Survey Effort Results Table 14 – Habitat Tree Detail 1.5.3 Field Survey Methods Appendix D BAM Plot Data	Completed

BAM Reference	Information	BDAR Section	Completed
Threatened Species, Chapter 5	Identify ecosystem credit species likely to occur on the subject land, including: list of ecosystem credit species derived from the BAM-C (as described in BAM Subsection 5.1.1 and Section 5.2(1.)) justification and supporting evidence for exclusion of any ecosystem credit species based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2) justification for addition of any ecosystem credit species to the list	1.5 Threatened Species 1.5.1 Ecosystem Credit Species Table 10 – Predicted Ecosystem Credit Species Figure 5 – NSW BioNet Atlas Records Appendix F – Biodiversity Credit Report	Completed
	Identify species credit species likely to occur on the subject land, including: list of species credit species derived from the BAM-C (as described in BAM Subsection 5.1.1) justification and supporting evidence for exclusions based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2) justification and supporting evidence for exclusions based on degraded habitat constraints and/or microhabitats on which the species depends (as described in BAM Subsection 5.2.2) justification for addition of any species credit species to the list	1.5 Threatened Species 1.5.2 Species Credit Species Figure 5 – NSW BioNet Atlas Records Tables 11 and 12 1.5.3 Field Survey Methods Appendix C Fauna Species List	Completed
	From the list of candidate species credit species, identify: species assumed present within the subject land (if relevant) (as described in BAM Subsection 5.2.4(2. a.)) species present within the subject land on the basis of being identified on an important habitat map for a species (as described in BAM Subsection 5.2.4(2. d.)) species for which targeted surveys are to be completed to determine species presence (Subsection 5.2.4(2. b.)) species for which an expert report is to be used to determine species presence (Subsection 5.2.4(2. c.))	Table 6 PCT Determination Tables Table 10 Predicted Ecosystem Credit Species Table 11 Potential Species Credit Species Table 15 Species Credit Species Appendix - H Other Legislation	Completed

BAM Reference	Information	BDAR Section	Completed
	Present the outcomes of species credit species assessments from: threatened species survey (as described in BAM Section 5.2.4) expert reports (if relevant) including justification for presence of the species and information used to make this determination (as described in BAM Section 5.2.4 and 5.3, Box 3)	Table 11 – Potential Species Credit Species Figures 6, 7, 8 Appendix B Flora Species List Appendix C Fauna Species List Appendix F Biodiversity Credit Report Appendix G Site Photographs	Completed
	Where survey has been undertaken include detailed information on: survey method and effort, (as described in BAM Section 5.3) justification of survey method and effort (e.g., citation of peer-reviewed literature) if approach differs from the Department's taxa-specific survey guides or where no relevant guideline has been published timing of survey in relation to requirements in the TBDC or the Department's taxa-specific survey guides. Where survey was undertaken outside these guides include justification for the timing of surveys survey personnel and relevant experience describe any limitations to surveys and how these were addressed/overcome	1.5.3 Field Survey Methods 1.5.4 Survey Effort 1.5.5 Species Credit Species Survey Results Table 11 – Species Credit Species Figures 6, 7, 8 Appendix D – BAM Plot Data Appendix J CVs	Completed
	Where an expert report has been used in place of survey (as described in BAM Section 5.3, Box 3), include: justification of the use of an expert report identify the expert, provide evidence of their expert credentials and Departmental approval of expert status all requirements of Box 3 have been addressed in the expert report	N/A	

BAM Reference	Information	BDAR Section	Completed
	Where use of local data is proposed (BAM Subsection 1.4.2): identify relevant species identify data to be amended identify source of information for local data, e.g., published literature, additional survey data, etc. justify use of local data in preference to VIS Classification or TBDC data provide written confirmation from the decision-maker that they support the use of local data	N/A	
	Species polygon completed for species credit species present within the subject land (assumed present or determined on the basis of survey, expert report or important habitat map) ensuring that: the unit of measure for each species is documented for species assessed by area: the polygon includes the extent of suitable habitat for the target species within the subject land (as described in BAM Subsection 5.2.5) a description of, and evidence-based justification for, the habitat constraints, features or microhabitats used to map the species polygon including reference to information in the TBDC for that species and any buffers applied for species assessed by counts of individuals: the number of individual plants present on the subject land (as described in BAM Subsection 5.2.5(3.)) the method used to derive this number (i.e., threatened species survey or expert report) and evidence-based justification for the approach taken the polygon includes all individuals located on the subject land with a buffer of 30 m around the individuals or groups of individuals on the subject land Identify the biodiversity risk weighting for each species credit species identified as present within the subject land (as described in BAM Section 5.4)	Figures 9 and 10	

BAM Reference	Information	BDAR Section	Completed
Prescribed impacts - Chapter 6	Identify potential prescribed biodiversity impacts on threatened entities, including: karst, caves, crevices, cliffs, rocks and other geological features of significance (as described in BAM Subsection 6.1.1) occurrences of human-made structures and non-native vegetation (as described in BAM Subsection 6.1.2) corridors or other areas of connectivity linking habitat for threatened entities (as described in BAM Subsection 6.1.3) water bodies or any hydrological processes that sustain threatened entities (as described in BAM Subsection 6.1.4) protected animals that may use the proposed wind farm development site as a flyway or migration route (as described in BAM Subsection 6.1.5) where the proposed development may result in vehicle strike on threatened fauna or on animals that are part of a threatened ecological community (as described in BAM Subsection 6.1.6)	1.2.2 Identified Landscape Features 2.1 Avoid and Minimise Summary Table 15 Prescribed Impact Avoidance and Minimisation Tables 16-23	Completed
	Identify a list of threatened entities that may be dependent upon or may use habitat features associated with any of the prescribed impacts	Table 11	Completed
	Describe the importance of habitat features to the species including, where relevant, impacts on life-cycle or movement patterns (e.g., Subsection 6.1.3)	1.2 Landscape Features Table 14 Habitat Tree Detail Table 11 Potential Species Credit Tables 16 & 17 Impact Avoidance and Minimisation	Completed

BAM Reference	Information	BDAR Section	Completed
	Where the proposed development is for a wind farm: identify a candidate list of protected animals that may use the development site as a flyway or migration route, including: resident threatened aerial species, resident raptor species and nomadic and migratory species that are likely to fly over the proposal area (as described in BAM Subsection 6.1.5) provide details of targeted survey for candidate species of wind farm developments undertaken in accordance with BAM Subsection 6.1.5(2–3.) predict the habitual flight paths for nomadic and migratory species likely to fly over the subject land and map the likely habitat for resident threatened aerial and raptor species (BAM Subsection 6.1.5(4.))	N/A	
Maps			
Introduction – Chapters 2 and 3	Map of the subject land boundary showing the final proposal footprint, including the construction footprint for any clearing associated with temporary/ancillary construction facilities and infrastructure (if BDAR)	Figure 1 Site Map Figure 2 Location Map Appendix A - Development Plan	Completed
Landscape - Section 3.1, 3.2 and Appendix E	Site Map Boundary of subject land Cadastre of subject land Landscape features identified in BAM Subsection 3.1.3	Figure 1 Site Map Figure 2 Location Map	Completed

BAM Reference	Information	BDAR Section	Completed
	Location Map Digital aerial photography at 1:1,000 scale or finer Boundary of subject land Assessment area (i.e., the subject land and either 1500 m buffer area or 500 m buffer for linear development) Landscape features identified in BAM Subsection 3.1.3 Additional detail (e.g., local government area boundaries) relevant at this scale	Figure 1 Site Map Figure 2 Location Map	Completed
	Landscape features identified in BAM Subsection 3.1.3 and to be shown on the Site Map and/or r Location map include: IBRA bioregions and subregions rivers, streams and estuaries wetlands and important wetlands connectivity of different areas of habitat karst, caves, crevices, cliffs, rocks and other geological features of significance and if required, soil hazard features areas of outstanding biodiversity value occurring on the subject land and assessment area any additional landscape features identified in any SEARs for the proposal NSW (Mitchell) landscape on which the subject land occurs	Figure 1 Site Map Figure 2 Location Map	Completed
Native vegetation, Chapter 4, Appendix A and Appendix H	Map of native vegetation extent within the subject land at scale not greater than 1:10,000 including identification of cleared areas (as described in BAM Section 4.1(1–3.)) and all parts of the subject land that do not contain native vegetation (BAM Subsection 4.1.2)	Figure 1 Site Map Figure 2 Location Map Figure 3 State Vegetation Type Map	Completed
	Map of PCTs within the subject land (as described in BAM Section 4.2(1.))	Figure 3 State Vegetation Type Map Figure 4 Ground-truthed Vegetation	Completed

BAM Reference	Information	BDAR Section	Completed
	Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCTs boundaries	Figure 3 State Vegetation Type Map Figure 4 Ground-truthed Vegetation Figures 6, 7 and 8	Completed
	Map of TEC distribution on the subject land and table of TEC listing, status and area (ha)	Figure 3 State Vegetation Type Map	Completed
	Map of patch size locations for each native vegetation zone and table of patch size areas (as described in BAM Subsection 4.3.2)	1.4 Native Vegetation Figure 2 Location Map Table 6 PCT Determination Table 7 Summary of Vegetation Zones Areas	Completed
Prescribed impacts Chapter 6	Map showing location of any prescribed impact features (i.e., karst, caves, crevices, cliffs, rocks, human-made structures, etc.)	N/A	
	Maps of habitual flight paths for nomadic and migratory species likely to fly over the site and maps of likely habitat for threatened aerial species resident on the site (for wind farm developments only)	N/A	
Tables			
Native vegetation, Chapter 4, Appendix A and Appendix H	Table of current vegetation integrity scores for each vegetation zone within the site and including: composition condition score structure condition score function condition score presence of hollow bearing trees	Table 3 State Vegetation Type Mapping Results Table 7 Summary of Vegetation Zones Areas Table 9 Vegetation Integrity Score Table 14 Habitat Tree Detail	Completed
Threatened Species, Chapter 5	Table showing ecosystem credit species in accordance with BAM Section 5.1.1, and identifying: the ecosystem credit species removed from the list the sensitivity to gain class of each species	Table 10 Predicted Ecosystem Credit Species Table 11 Potential Species Credit Species Table 15 Species Credit Species Tables 20-23 Tables 24 - 25 Credit Requirements	Completed

BAM Reference	Information	BDAR Section	Completed
	Table detailing species credit species in accordance with BAM section 5.2 and identifying: the species credit species removed from the list of species because the species is considered vagrant, out of geographic range or the habitat or micro habitat features are not present the candidate species credit species not recorded on the subject land as determined by targeted survey, expert report or important habitat map	Table 11 Potential Species Credit Species Table 16 Avoid and Minimise Impacts on Biodiversity Values Table 17 Prescribed Impact Avoidance and Minimisation	Completed
	Table detailing species credit species recorded or assumed as present within the subject land, habitat constraints or microhabitats associated with the species, counts of individuals (flora)/extent of suitable habitat (flora and fauna) (as described in BAM Subsection 5.2.6) and biodiversity risk weighting (BAM Section 5.4)	Table 11 Predicted Ecosystem Credit Species Table 15 Species Credit Species Tables 24 - 25 Credit Requirements	Completed
Prescribed impacts Chapter 6	No table		
Data			
Landscape - Section 3.1, 3.2 and Appendix E	All report maps as separate jpeg files / Individual digital shape files of: subject land boundary assessment area ((i.e., subject land and 1500 m buffer area) boundary cadastral boundary of subject land areas of native vegetation cover landscape features	Attached files	Completed
Native vegetation, Chapter 4, Appendix A and Appendix H	All report maps as separate jpeg files Plot field data (MS Excel format) Plot field data sheets		

BAM Reference	Information	BDAR Section	Completed
	Digital shape files of: PCT boundaries within subject land TEC boundaries within subject land vegetation zone boundaries within subject land floristic vegetation survey and vegetation integrity plot locations		Completed
Threatened Species, Chapter 5	Digital shape files of suitable habitat identified for survey for each candidate species credit species		Completed
	Survey locations including GPS coordinates of any plots, transects, grids		Completed
	Digital shape files of each species polygon including GPS coordinates of located individuals		Completed
	Species polygon map in jpeg format		Completed
	Expert reports and any supporting data used to support conclusions of the expert report		N/A
	Field data sheets detailing survey information including prevailing conditions, date, time, equipment used, etc		Completed
Prescribed impacts Chapter 6	Digital shape files of prescribed impact feature locations Prescribed impact features map in jpeg format		N/A

Appendix J – CVs

Ian Benson

Curriculum Vitae

Ian works with AEP in the role of Director and Principal Ecologist. He is an experienced field ecologist, bird watcher and a regular participant in wader surveys. Ian has previously had a successful career as a project manager with a local geotechnical engineering firm. His background in project management and soil sciences combined with his ecological knowledge is utilised in a diverse array of applications in his current role.

Qualifications

- Graduate Diploma in Science (Ecology) University of New England (2014)
- Bachelor Engineering (Civil) University of Newcastle (2008)

Further Education & Training

- Biodiversity Accredited Assessor System (BAAS 18147)
- Advanced Plant Identification (University of New South Wales)
- NSW Class C Driver's Licence. Experienced 4WD operator
- Occupational Health & Safety Training
- Remoted Piloted Aircraft Excluded Category Training with Aviassist Pty Ltd
- Rail Industry Worker
- ARTC Safety Induction for Contractors (NSW)
- ARTC Hunter Bulk Terminal Induction

Fields of Competence

- Biobanking & Biodiversity Offset Commissions – initial scoping and feasibility, BAM impact assessments and BDAR reporting, biobank calculations, Stewardship site creation
- Detailed knowledge of environmental legislation and approval pathways
- Ecological field survey and habitat assessment covering terrestrial and aquatic flora and fauna. Experienced in camera trap methods particularly targeting cryptic and difficult to identify mammal species.
- Highly proficient at avifauna surveys, including challenging wetland and shorebird environs
- High level of experience undertaking nocturnal survey of arboreal mammals and nocturnal birds
- Project Management

Relevant Employment History

2022 – Present — **Director & Principal Ecologist**
Anderson Environment & Planning, Newcastle

Ian is a Director of Anderson Environment & Planning whilst continuing in the role of Principal Ecologist overseeing a team of approx. 35 professional ecology staff and all aspects of the business including training and management of field and office staff undertaking ecology and bushfire works to assist in the provision of consulting services to land, property, mining industry, legal and government sectors. Covering ecological, project management, environmental, planning services, advices, strategy and representation.

2019 – 2022 — **Principal Ecologist**
Anderson Environment & Planning, Newcastle

2018-2019 — **Senior Ecologist**
Anderson Environment & Planning, Newcastle

2016-2018 — **Ecologist**
Anderson Environment & Planning Newcastle

2012 – 2016 — **Project Manager**
Douglas Partners, Newcastle

As a project manager with Douglas Partners Ian was responsible for proposal and tender preparation, planning, implementation and reporting of geotechnical and geo-environmental investigations for a broad range of projects including site classification, foundations, pavements, bridges and slope stability. Ian was required to liaise with clients regarding project requirements, project goals and deadlines. He was responsible for the development and implementation of Work Health and Safety Plans as well as Environmental Plans and documentation. This included the development of safe work procedures, safety inspections on site and implementing improved safety procedures with staff. Ian was responsible for ensuring projects were completed on time and on budget whilst meeting the clients' expectations and achieving quality assurance standards.

2008-2012 — **Geotechnical Engineer**
Douglas Partners, Newcastle

2013-Current — **Bird Surveyor**
Hunter Bird Observers Club

Volunteer survey work for Hunter Bird Observers Club for regular wader and water bird counts and Tomago and Kooragang Island.

2017-Current — **Birddata Moderator**
BirdLife Australia

Volunteer moderating and vetting bird surveys from Birdata which is the Birdlife Australia Atlas to ensure a robust database for both the Hunter Valley and Central Coast reporting areas totalling approximately 5000 surveys per year.

Key Project Experience

- Targeted surveys for *Dichanthium setosum* in Glen Innes Region;
- Target surveys for Eucalyptus cannonii, Western Rail Coal Unloader, Pipers Flat;
- White-bellied Sea-Eagle nest locating and monitoring Glenning Valley and Chisholm;
- Powerful Owl nest locating and monitoring: Salamander Bay, Soldiers Point, Anna Bay North, Wallsend, Cameron Park and Edgeworth;
- Accredited Assessor for approved Biodiversity Development Assessment Reports:
    - Berkeley Vale Road, Glenning Valley;
    - Railway Road, Warnervale;
    - Barden Ridge Townhouses;
    - McFarlane's Road, Chisholm;
    - Fairlands Road, Medowie;
    - Rosella Rise, Warnervale;
    - Carr's Road, Neath;
    - Jack Grant Avenue, Warnervale;
    - Minnesota Road, Hamlyn Terrace;
    - Bellbird North;
    - Waterford, Chisholm;
- Ecological Assessment Report for Proposed Modification To Approved Western Rail Coal Unloader At Pipers Flat;
- Spot Analysis Techniques surveys: Nelsons Plains, Wallsend, Anna Bay, Boat Harbour, Salamander Bay, North Arm Cove, Warnervale, Hamlyn Terrace, Kincumber, Palmdale, Wyee, Charlestown, Chisholm, Gillieston Heights, Mount Vincent, Radford Park, Cessnock
- Infrastructure;
    - Gwandalan Recycled Water Main;
    - Lower Belford Water Main;
    - Raymond Terrace Rising Main;
    - Astra Street Landfill Rehabilitation Assessment;
- Cat Tracker Pilot Program Associated With The Hunter Estuary Wetlands for Hunter Local Land Services;
- Surveys for Squirrel Glider (*Petaurus norfolcensis*) Warnervale Area June 2020

- Biodiversity Stewardship Agreements including:
    - • Bobs Farm (approved);
    - • Cedar Brush Creek (ready for signing);
    - • Girvan (final assessment);
    - • Mardi (under assessment);
    - • Wallsend (report being drafted);
    - • Ellalong (report being drafted);
    - • Blueys Beach (surveys continuing);
    - • South-West Rocks (surveys continuing).

Natalie Black

Curriculum Vitae

Natalie works with AEP in the role of Senior Environmental Manager. She has extensive knowledge in environmental management, environmental planning, and report writing and assessment. With a detail understanding of planning, catchment management, coastal management and rehabilitation. Natalie has had a successful career with both state and local government in conservation, planning and field investigation roles. Natalie has also gained extensive communication skills and project management through her previous career in lecturing. Her background and experience in the ecological and planning fields is utilised in a diverse array of application in her current role.

Qualifications

- B.Sc (Hons), University of Newcastle, 2002 Sustainable Resource Management and Marine Science.
- Master Planning, University of Technology Sydney 2007.
- Certificate IV Training and Assessment at NSW TAFE 2012.
- BAM Assessor; accreditation number: BAAS19076.

Further Education & Training

- Evidence Gathering and Legal Process (Australian Institute of Environmental Health).
- Conflict Resolution Course (LGSA).
- Report Writing Course (LGSA).
- Powerful Presentation (LGSA).
- NSW Rural Fire Services Bush Fire Assessment
- Relocation of Threatened Species (Botanical Gardens Sydney).
- Sustainable Home Assessment Reduction Revolution.
- Flora and Fauna Survey Assessments Niche Environment and Heritage.
- First Aid TAFE.

Fields of Competence

- Environmental Planning
- Environmental Management and rehabilitation of catchments coastal waterways. Statement of Environmental Effects (preparation and assessing).
- Fish Passage
- Marine ecosystems including; mangroves, seagrasses, algae, Fauna and habitat assessment.
- vegetation.
- Communicating with a wide range of stakeholders.
- Development Application.
- Education in both Environmental and Planning industries.
- Koala Plans of Management.
- Policy Development.

Relevant Employment History

2019 – Present	**Senior Environmental Manager**
	Anderson Environment & Planning, Newcastle
2010 - 2019	**Principal Environmental Planner**
	Black Earth
2003-2010	**Natural Resource Manager and**
	Development Assessment Officer
	Lismore City
2002- 2003	**Jervis Bay Indigenous Fishing Strategy**

Edouard Loisance

Curriculum Vitae

Edouard works with AEP in the role of Ecologist. He completed a Diploma of Conservation and Land Management and holds a Master in Management. He has extensive experience in business development and corporate strategy consulting, including report writing, and started specialising in ecology in 2018, after acquiring experience in bush regeneration and fauna observation. He is now working towards gaining BAM Accreditation.

Qualifications

- Diploma of Conservation and Land Management, Tocal Agricultural College, Paterson, NSW (2021)
- Master of Management, ESCP Europe Business School, Paris, France (2007)

Further Education & Training

- NSW Driver's Licence.
- Current Senior First Aid.

Fields of Competence

- Field assessment including: targeted fauna and flora surveys, BAM plots, Koala Spot Assessment Technique (SAT) surveys and tree surveys
- Assessment of sites using the Biodiversity Assessment Method (BAM) under the Biodiversity Offsets Scheme, production of Biodiversity Development Assessment Reports and Ecological Assessment Reports
- Production of assessments against various legal instruments such as EPBC Act fauna and flora assessments, comprehensive Koala plans of management and SEPP 44 and SEPP Koala Habitat Protection assessments
- Bushfire threat analysis and reporting
- Advanced GIS user (MapInfo)

Relevant Employment History

2018 – Present	**Lead Ecology Works Manager** Anderson Environment & Planning, Newcastle
2014 - 2018	**Lead Consultant** Quantium, Sydney
2012 - 2014	**Account Director** Catalina Marketing, Leeds UK
2011 – 2012	**Business Development Director** Catalina Marketing, Paris France
2009 - 2011	**Account Executive** Procter and Gamble, Paris France

2005 - 2006 **Assistant Business Manager**
Procter and Gamble, Weybridge UK

Volunteer Experience

- Bush Regeneration Volunteer, Hunter Wetlands Centre Australia, Shortland
- Bush Regeneration Volunteer, National Parks and Wildlife Service jointly with Blue Mountains City Council (various sites in Wentworth Falls and Blackheath, NSW)

Dennis Neader Curriculum Vitae

Dennis works with AEP in the role of senior ecologist. He is an experienced bird watcher and a regular participant in Hunter Bird Observers' Club (HBOC) Bird Surveys in the wider Hunter Valley. Dennis has previously had a varied career as an environmental scientist, contaminated land consultant and bush regenerator with local firms. His background in birdwatching, post-approval project management and bush regeneration, combined with his ecological knowledge is utilised in a diverse array of applications in his current role.

Qualifications

Bachelor of Science (Environmental Geoscience) University of Newcastle (2011).

Further Education & Accreditations

- NSW Class HR Driver's Licence, experienced 4WD operator.
- Current Senior First Aid, ChemCert, EWP, Rigging, Chainsaw Operation and Maintenance, Light Forklift Truck.
- Open Water PADI Dive Certificate.
- Non-Friable Asbestos Removal.

Fields of Competence

- Ecological field survey, covering terrestrial and aquatic flora and fauna.
- Avifauna surveys, including challenging wetland and bushland environs.
- Native plant ID and seed collection.
- Field transects survey for cryptic flora species, Native plant ID and seed collection.
- Field survey for terrestrial fauna species including bird and reptile survey, koala habitat and SAT assessment, microbat, mammal track, scat identification and herpetological survey.
- Spotlighting, call playback, and stag watch for arboreal mammal species, including Forest Owls, Squirrel Glider and Koala.
- Trapping and translocation work with mammals, reptiles and amphibians.
- Remote trapping including SongMeter and camera trapping emplacement and analysis.
- Post-approval Project management including Fauna Welfare.
- Bush regeneration.
- Contaminated Land – Asbestos Identification and Removal.

Relevant Employment History

- 2016 – Present Senior Ecologist, Anderson Environment & Planning
- 2014 - 2016 Env. Scientist, JM Environments, Newcastle
- 2010 - 2014 Env. Technician, AECOM, GIS Technician, Geodata, Newcastle
- 2006 – 2010 Coal Superintending, ALS & SGS Newcastle

Relevant Ecological Experience

- Bird Surveys Hunter Bird Observers Club. Avifauna Baseline Surveys Broughton Is, targeted surveys.
- NPWS - Population Surveys Gould's Petrel Cabbage Tree Island Port Stephens.
- Bush Regeneration, Plant ID and Seed Collection, Dune Care, Coral Reef Research Lady Elliot Island

Professional Affiliations / Memberships

- Birdlife Australia, Society for Growing Australian Plants, Australian Assoc. of Bush Regenerators.

Kelly Drysdale

Curriculum Vitae

Kelly works with AEP in the role of Ecology Project Manager. She has extensive experience in various land management operations in several regions, with both small and large enterprises, in Australia and internationally. Her strong environmental stewardship knowledge, lateral thinking, project and change management, business development, strategic planning and human resource management skills are adding value to the AEP team.

Qualifications

- Certificate IV in Training and Assessment TAE40110, TAFE Hunter Institute, NSW 2016
- Graduate Certificate in Business Administration (with honours), Newcastle University, Newcastle, NSW 2013
- Associate Diploma of Applied Science (VITICULTURE), Charles Sturt University, Wagga Wagga, NSW 1992

Further Education & Training

- Australian Rural Leadership Foundation Program, Fellow 2011
- Class C NSW Drivers Licence Class, Defensive Driving, FL & experienced 4WD operator
- First Aid Certificate inc CPR 2021
- SafeWork NSW Construction White Card CGI1713214SEQ01
- Farm Chemical User Accreditation Certificate III (ChemCert Australia)
- Negotiation skills (Rogen International), Crucial conversations (ME Consulting)
- Media Training (Doyle Media Services*)*
- Various WHS management training, legislation and compliance courses, EEO, cultural competency and diversity in the workplace
- Workplace Trainer and Workplace Assessor
- Open Water PADI Dive Certificate

Fields of Competence

- Field assessment including: targeted fauna and flora surveys, BAM plots, Koala Spot Assessment Technique (SAT) surveys, tree surveys, HBT and nest box inspections.
- Assessment of sites using the Biodiversity Assessment Method (BAM) under the Biodiversity Offsets Scheme, production of Biodiversity Development Assessment Reports and Ecological Assessment Reports
- Production of assessments against various legal instruments such as EPBC Act fauna and flora assessments, State Environmental Planning Policy Biodiversity and Conservation) 2021 – Chapter 4 Koala Habitat Protection 2021, State Environmental Planning Policy (Resilience and Hazards) 2021 – Chapter 2 Coastal Management, Water Management Act 2000 and the Environment Protection and Biodiversity Conservation Act 1999
- Bushfire threat analysis and reporting
- Liaison with clients/site/company/government representatives

Relevant Employment History

Feb 2021- Current **Ecology Project Manager**- Anderson Environment & Planning, Newcastle, NSW

Assisting in the provision of consulting services to land, property, mining industry, legal and government sectors. Covering ecological, project management, environmental, planning services, advices, strategy and representation.

Aug 2019 - July 2021 **Business Development Manager** - RLF

Business development and strategic targeting of corporate and larger enterprises leveraging a vast network of contacts in the Australian Wine Industry and Agricultural sector to add value to farming systems with agronomic and fertiliser solutions.

Jul 2015 - Aug 2019 **Viticultural & Trade Resource Manager**- Hope Estate, Pokolbin, NSW

Operational and strategic management of five estate owned vineyards in NSW, WA & VIC. CRM & BDM of wine and beer portfolio of on/off premise sales on >1,800 customer base with PR responsibilities and hosting of events.

Jul 2017 - Aug 2019 **Casual teacher in Viticulture & Wine** - Kurri Kurri Tafe NSW

Revising, formulating and developing resources for and delivering all units of competency in the AHC51516 Diploma of Viticulture and strengthening relationships within the Hunter wine region.

Jul 2014 – July 2015 **Sales Acquisition Agent** – Wine Selectors & Choice, NSW

Wine appraisals, wine sales, developing staff training manuals, exceeding sales targets.

Jan 2004 - May 2010 **Viticultural Manager** – Casella Family Brands, Yenda NSW

Primarily responsible for the effective and efficient viticultural, land management operations and programs reporting to the company directors on 1,800ha with up to 160 staff. Primarily viticulture but also managed a large prune/plum orchard, broad acre cropping-dry and pivot, cattle, biodiversity tree planting program, compost making, winery waste water treatment plant and traded water.

June 2002 - Jan 2004 **Viticulturist** - Brown Brothers**,** Milawa VIC

Grower liaison for 84 growers and 5 diverse company owned vineyards; strategic plan development, asset assessments and evaluations.

June 2001 - June 2002 **One-year overseas travel - study/work tour**

Studied wine and agricultural markets in Asia and London, travelled through Italy, Switzerland and Spain's wine regions and worked vintage periods in Portugal, France and mostly in South Africa- Flagstone Wines, Cape Town, sourcing fruit from 48 vineyards across the Western Cape.

May 2000 - June 2001 **Viticultural Projects Manager** – Nepenthe**,** Adelaide Hills

Viticultural consultancy, contract management, development and management of investment projects, costing systems, reporting and management protocols.

Jan 1998 - May 2000 **General Manager –** Pertaringa Wines, McLaren Vale, SA

Strategic operational and financial planning for company land portfolio and brand development, including contract management for clients and winery liaison with 15 customer wineries.

Dec 1992 - Jan 1998 **Viticulturist** –Southcorp Wines, SA

Grower Liaison in McLaren Vale, Technical Officer in Barossa/Clare/Adelaide Hills and Riverland, Greenfield Vineyard Development in Barooga and Robe, and Vine Propagation Manager for the group successively.

1993 - Vintages **Cellar hand** - Murphy-Goode Estate Winery- Alexander Valley, California USA and Willamette Valley Vineyards- Willamette Valley, Oregon USA and CSUR, Wagga Wagga, NSW

BONNI YARE

Curriculum Vitae

Bonni works with AEP in the role of Ecologist has a Bachelor of Science, majoring in Natural Resource Management. Bonni has experience in a variety of environmental work, in a professional and volunteer capacity, including flora, fauna and aquatic field surveys, reporting, GIS and mapping, habitat restoration and community volunteering.

Qualifications

- Bachelor of Science (Natural Resource Management) University of Newcastle, completed in November, 2020

Further Education & Training

- Bush Regeneration Training
- NSW Driver's Licence: Car (Class "C").
- Chemqual (RTO 70207)
- First Aid (Provide first aid HLTAID003)

Fields of Competence

- Ecological field surveys, covering terrestrial and aquatic flora and fauna
- Growing proficiency at botanical surveys

Relevant Employment History

2019 – Present **Ecologist**

Anderson Environment & Planning, Newcastle

Currently employed by Anderson Environment & Planning to assist in the provision of consulting services to land, property, legal and government sectors. Covering ecological, project management, environmental, planning services, advices, strategy and representation.

2015 - 2016 **Green Army Participant**

Bush regeneration / supporting local land care groups

Supported local land care groups and reserve areas in weed removal and site restoration, including tree planting, seed collection and nursery work. Bird surveying and koala surveys were also carried out.

Relevant Ecological Experience

2018 – present **Field assistance**

Participated as a volunteer in various PhD and Honours projects with the University of Newcastle and University of Technology Sydney. I have experience with small mammal trapping for squirrel gliders, nest box construction, aquatic surveys, infaunal sampling and mark recapture population surveys for *Litoria aurea* (Green and Golden Bell Frog).

2019 **Undergraduate Research Project associated with NPWS**

Undertook flora and habitat surveys for a locally threatened orchid, *Diuris praecox*, supervised volunteers, data analysis and project write up.

2019 **Volunteer Botanical Training Program**
Australian National Herbarium

Understanding of Herbarium practices, including fieldwork, use of databases, maps and GPS, botanical terminology and up to date taxonomic information, curatorial experience including identification and processing of specimens.

2018 **Stream sampling using macroinvertebrates as bioindicators**
Newcastle Council

Contracted to finish stream sampling for the community program, Waterbug Blitz, which involved water quality testing of Newcastle's urban streams.

Brendon Young

Curriculum Vitae

Brendon works with AEP in the role of Ecologist. He graduated with a Bachelor of Applied Science (Honours) and a Masters in Environmental Management, majoring in fish conservation and management. Brendon has previously worked in large retail operations in staff and budget/data management, reporting and quality assurance which adds to the experience that he currently contributes to the AEP team.

Qualifications

- CPR and First Aid (Completed on 30/11/21)
- White Card (Completed on 11/02/22)

Further Education & Training

- Master of Environmental Management (Natural Resources)
- Graduate Certificate of Fish Conservation and Management (Charles Sturt University)
- Bachelor of Applied Science (Fisheries) with Honours

Fields of Competence

- Training with aquatic sampling techniques such as seine nets, gill nets and fyke nets.
- Training in the use of mist netting, bat harp traps, Elliot traps, pitfall traps and camera traps.
- Experience identifying fish, reptiles, insects, and plants to species level through honours research and other projects while studying.

Relevant Employment History

2022 – Present **Ecologist**
Anderson Environment & Planning, Newcastle

2013-2022 **Department Manager**
Woolworths Pty Ltd

Provision of leadership and coaching for a team of 5 to 20 members. Coach and guide daily activities to a high standard and achieve key performance indicators. Manage wage, sales, and wastage budgets. Plan for periodical events and long-term direction of the department.

March 2019-Oct 2019 **Produce Quality Control Officer**
Woolworths Pty Ltd

Inspection of produce as it arrives at the warehouse to ensure the required specifications for quality, size, weight and ripeness were met. Rejection of stock that did not meet company specification.

THOMAS STEPHENS

Curriculum Vitae

Thomas works with AEP in the role of Ecologist. He is a graduate of environmental science and management, and has industry experience in environmental fields, involving fauna and flora surveying, consultancy projects and natural resource management. His background in environmental fields with his growing ecological knowledge is utilised in a diverse array of applications in his current role.

Qualifications

- Bachelor of Environmental Science and Management (Sustainability), The University of Newcastle (2021)

Further Education & Training

- Class C NSW Driver's License
- Work Health & Safety General Construction Induction
- Senior First Aid
- Work Safely at Heights
- Tree Access Systems Level 1

Fields of Competence

- Ecological field surveys
- Fauna surveys and trapping
- Natural resource management
- Nest box installation
- Adept experience in operating 4x4 vehicles

Relevant Employment History

March 2022 - Present — **Ecologist**
Anderson Environment & Planning, Newcastle

Currently employed by Anderson Environment & Planning to assist in the provision of consulting services to land, property, legal and government sectors. Covering ecological, project management, environmental, planning services, advices, strategy and representation. Expanding knowledge of field survey methodology, report writing, mapping and data manipulation.

January 2022 – April 2022 — **Ecologist**
Active Green Services, NSW

August 2021 – January 2022 — **Ecologist and Bushfire Consultant**
Firebird ecoSultants, Newcastle

Relevant Volunteer Experience

- Industry Placement (National Parks and Wildlife Service, 2020-2021)

Ben Graham

Curriculum Vitae

Ben works with AEP in the role of Ecologist. He is expected to graduate with a Bachelor of Environmental Science and Management (Ecology and Conservation) in November 2023. Ben's studies and past experience in a variety of roles developing data analysis, reporting, land rehabilitation, biodiversity offset management, leadership and WHS skills add to his growing ecological knowledge and experience.

Qualifications

- Currently undertaking a Bachelor of Environmental Science and Management (Ecology and Conservation) Charles Sturt University; to be completed November 2023
- Bachelor of Engineering (Chemical) University of Newcastle (2015)

Further Education & Training

- First Aid and CPR (HLTAID001, HLTAID002, HLTAID003) (Completed on 10/02/2021)
- C-Class Driver's License NSW

Fields of Competence

- Training in the use of mist netting, bat harp traps, Elliot traps, pitfall traps and camera traps.
- High proficiency in written and verbal communication skills
- Data management and analysis (Excel)
- Growing proficiency in GIS mapping
- Growing proficiency in floristic surveying

Relevant Employment History

Feb 2023 – Present **Ecologist**
Anderson Environment & Planning, Newcastle

Oct 2022 – Jan 2023 **Environment and Community Vacation Student**
Glencore Coal Assets Australia
Undertook biodiversity offset management, land rehabilitation actions and rehabilitated land certification assessment.

Oct 2021 – Oct 2022 **Store Manager**
Frame today
Lead and coached a team of 3 to 6 members. Provided guidance for daily activities to a high standard to achieve key performance indicators. Managed rostering, sales, customer service, quality control, workplace safety, and training.

Ma7 2016 – Sep 2018 **Junior Project Engineer**
Granite Power
Worked independently and as part of a team to carry out commissioning operations on waste heat to energy systems, including data analysis, reporting, maintenance, process control, and safety while adhering to relevant standards/regulations/procedures.

BYRON DE JAGER
Curriculum Vitae

Byron works with AEP in the role of Ecologist has a Bachelor of Science, majoring in Natural Resource Management. Byron has experience in a variety of environmental work, in a professional and volunteer capacity, including flora, and field surveys, reporting and mapping, habitat restoration and community volunteering.

Qualifications

- Certificate III Conservation and Land Management, Ryde TAFE 2017
- Bachelor of Science, Sustainable Resource Management (GPA 5.1)

  University of Newcastle

  Relevant courses: Australian Flora, Restoration Ecology, Land Management, Catchment and Water Resource Management, Environmental Legislation. 2011-2015

Further Education & Training

- Certificate II in Public Safety, through State Emergency Service (SES)
- Leadership fundamentals, SES
- Storm and Water Damage Operations, SES
- AQF3 Chemical user Certificate
- Chainsaw use statement of attainment: Feel small trees. Trim and cut felled trees
- First Aid Certificate, SES
- C-class Driver's License
- Cert IV Digital Media
- Cert II Office Applications for the Office TAFE Northern Sydney Institute

Relevant Employment History

October 2022- Present	**Ecologist** Anderson Environmental & Planning, Newcastle
October 2019-present	**Supervisor; Bush Regenerator** Toolijooa Hunter Valley Special Projects Division Supervisor
Mar – May 2014	**Bushcare, Blackwall Mountain Landcare**

Relevant Ecological Experience

Oct- Dec 2015 **Trees in Newcastle, Environmental Sector Placement**

- Researched more water and power efficient irrigation specifically suitable to upgrading the nursery.
- Created a guide to help improve the existing system and installing the most efficient system possible in the new site including budget information
- Wrote a five-page report and presented findings to the Board

Jun – Sept 2014 **Research assistant, Kooragang Island**.

- Assisted PhD Student with collecting data on frogs at night.
- Collected and identified frog species with careful hygiene and consideration to prevent transfer of pathogens
- Marked location using GPS releasing the frogs in the same place after tagging.

Jun- Aug 2016 **Hunter Water; Catchment Management department**

- Database management including data entry, graphing and interpretation
- Imported Data from Lab Data program to Excel
- Explore and interpret data using Excel using graphs tables and formulas
- Updated procedures to latest format and information.
- WH & Safety induction including appropriate PPE, Take 5, incident reporting
- Water sample collecting from various sites around the catchment including drinking water in various locations in the catchment, supply test points and wastewater areas affected by high volumes of stormwater
- Introduction to water supply network including catchments, pumping stations, drinking treatment plants, reservoirs, wastewater treatment plants and recycling or disposal systems
- Learned to navigate and understand GIS data regarding the network

Samuel V. Rayfield

Curriculum Vitae

Samuel works with AEP in the role of Ecologist. He graduated with a Bachelor of Communication and is working towards completion of a Diploma in Conservation and Ecosystems Management. Samuel has previously worked in ecological restoration and land management before coming to AEP. Samuel has experience in a variety of environmental work, both paid and unpaid, including flora and fauna terrestrial and aquatic field surveys, weed management, reporting, GIS and mapping and habitat restoration. His background in ecological surveying projects and growing flora knowledge and experience is utilised in a diverse array of applications in his current role.

Qualifications

- Working at Heights Certificate
- First Aid & CPR Cert – HLTAID003
- Driver Licence – Class C, unrestricted
- National Police Check
- Working with Children Check

Further Education & Training

2020	**Introduction to Anatomy & Physiology; Individual Determinants of Health** Latrobe University
2017	**Diploma in Conservation and Land Management** Hunter TAFE – partial completion
2012 –2016	**Bachelor of Communication** University of Newcastle

Relevant Employment History

2022 – Present	**Ecologist** Anderson Environment and Planning, Newcastle
2020	**Bush Regenerator** Litoria Ecological Restoration Services
2018 – 2020	**Bush Regenerator** Toolijooa Environmental Restoration
2016 – 2017	**Bush Regenerator** Newcastle City Council

Stephen Curry

Curriculum Vitae

Stephen Currently works as an Ecologist for AEP. He has completed a Certificate III and Diploma in Conservation and Land Management at Hunter TAFE and is currently studying a Bachelor of Environmental Science and Management at The University of Newcastle. Stephen has worked as a Bush Regenerator for over four years and maintains an additional role Supervising Bushcare Volunteers for Central Coast Council. These experiences have enabled Stephen to develop skills in native fauna and flora identification and surveys, ecological restoration and report writing.

Qualifications

- Bachelor of Environmental Science & Management (Ecosystems and Biodiversity Major), University of Newcastle, Expected Completion 2023
- Diploma of Conservation and Land Management, Hunter TAFE, 2018
- Certificate III in Conservation and Land Management, Hunter TAFE, 2017
- Bachelor of Education Studies, University of Newcastle, 2016

Further Education and Training

- NSW Driver's Licence - Class C
- QLD Construction White Card
- Apply First Aid
- AQF3 Chemical Accreditation

Fields of Competence

- Flora and Fauna terrestrial surveys
- Developing proficiency in botanical surveying and Biodiversity Assessment Method

Relevant Employment History

2022 – Present **Ecologist**

Anderson Environment and Planning, Newcastle

Currently employed by Anderson Environment & Planning to assist in the provision of consulting services to land, property, legal and government sectors. Covering ecological, project management, environmental, bushfire, planning services, advices, strategy and representation. Expanding knowledge of field survey methodology, report writing and data manipulation.

2022 – Present **Bushcare Volunteer Supervisor**

Central Coast Council, Gosford

2018 – 2022 **Bush Regenerator**

Community Environment Network, Ourimbah