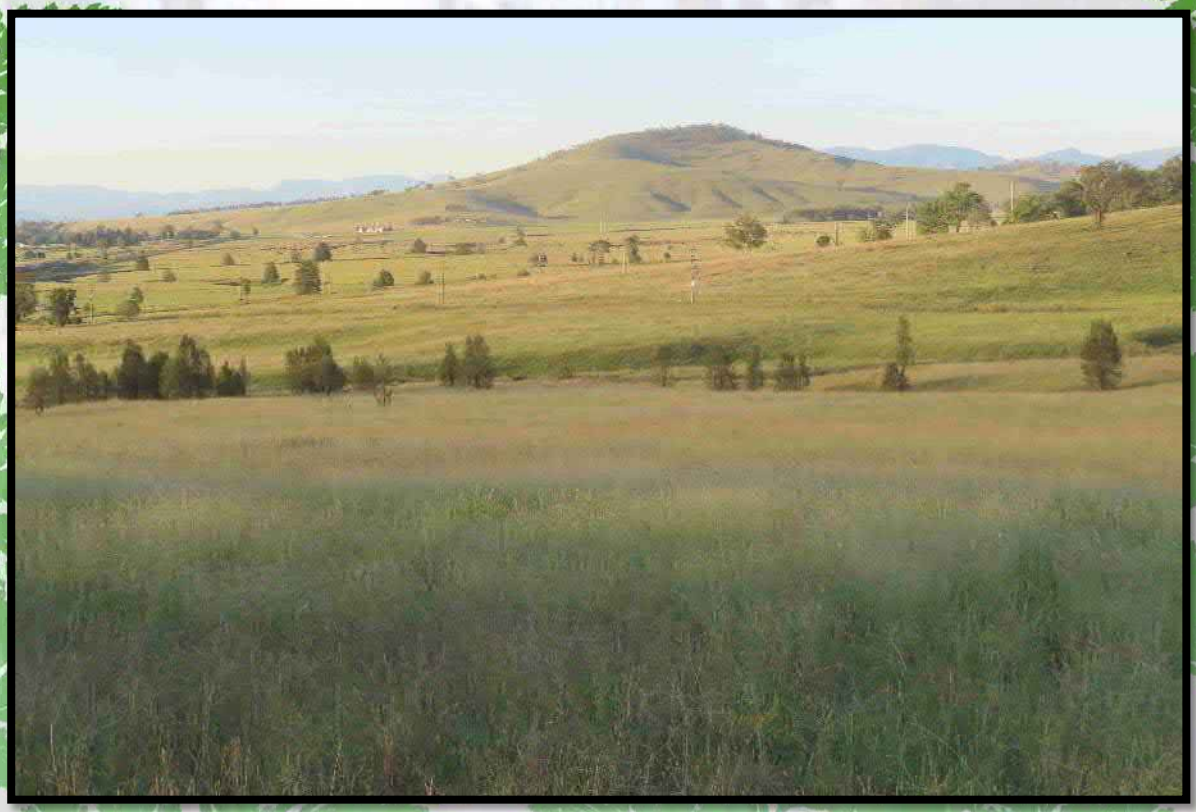
Biodiversity Development Assessment Report

for Stages 6 and 7 of a proposed subdivision at

Lot 446 DP 1278895

Northview Estate

MUSWELLBROOK NSW



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Document control

Version	Date	Author	Details
1	26/11/2024	Nicola Mohr	BDAR for Stages 6 & 7 of proposed subdivision at Lot446 DP 1278895 Northview Estate, Muswellbrook NSW.

Summary

Wildthing Environmental Consultants were engaged to undertake a Biodiversity Development Assessment Report (BDAR) for the proposed residential subdivision of Lot 446 DP 1278895 Northview Estate, Muswellbrook NSW. This report has been prepared in accordance with the Biodiversity Assessment Method (BAM) to assess the biodiversity impact and offsetting obligation of the proposal under the Biodiversity Conservation Act 2016 (BC Act) and Biodiversity Conservation Regulation (BC Regulation).

The 26.00ha study area consisted of the portion of Lot 446 DP 1278895 Northview Estate, north of the earlier stages already under construction. The southern third of the study area is zoned R1 General Residential while the remainder is zoned R5 Large Lot Residential. The study area had been subject to previous disturbance from agricultural practices, past cattle grazing, weed incursion and ongoing slashing over a large area. Native vegetation was present throughout the majority of the study area in the form of one Plant Community Type (PCT) 3431 Central Hunter Ironbark Grassy Woodland. The majority of this PCT 3431 within the subject land was largely void of trees and was composed of derived grassland. Smaller areas of PCT 3431 in the far south contained remnant trees and areas of younger regrowth. The dominant canopy species was *Eucalyptus crebra* (Narrow-leaved Ironbark).

The proponent proposes to subdivide the subject land into 58 lots in total. The proposed subdivision will include three interior roads and an APZ along the north-west, east and south sides of the development (16m along the north-west, 20m along the east and 15m along the south). Internal roads have been designed to run along the southern and eastern boundary of the subject land such that they overlap with required APZs. As a result, a large portion of the APZs will be completely cleared for the roads.

Stage 6 with include the construction of 35 residential lots ranging in size from 700m^2 to 1030m^2. Two internal roads will be constructed and a road that connects this stage to existing subdivision south of the subject land. This connection will run across the creek line in the south of the subject land.

Stage 7 will include the construction of 23 larger residential lots ranging in size from 4000m2 to 6ha. The two largest lots will each contain one of the PADs. An internal road from stage 6 will extend through stage 7 and Queen Street will extend into the subdivision to connect with internal roads.

The majority of the subject land including the study area was mostly covered in derived native grassland with smaller areas of native trees. Areas of non-native vegetation were present in the far north-west of the subject land where a residence was once located. One Plant Community Type (PCT) PCT 3431 Central Hunter Ironbark Grassy Woodland was identified within the subject land (Table E1). This PCT was consistent with the State listed Endangered Ecological Community Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions. Smaller areas in far south were also consistent with the Nationally listed Critically Endangered Ecological Community Central Hunter Valley eucalypt forest and woodland. Areas of native derived grassland were excluded from this CEEC.

Table E.1 PCTs and EECs identified within the subject land

PCT ID	PCT name	TEC	Subject land area (ha)
PCT 3431	Central Hunter Ironbark Grassy Woodland	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	8.37
Total area			8.37

Threatened Species

Targeted threatened species surveys identified three threatened species listed under the BC Act within the subject land:

- *Miniopterus orianae oceanensis* (Large Bent-winged Bat) was recorded during bat call surveys. This species is being offset as ecosystem credit species but not as an ecosystem credit species because no breeding habitat or signs of a breeding were present on site or within 2km.
- *Petaurus norfolcensis* (Squirrel Glider) was found to occur within the southern area of the subject land and will require offsetting as a Species Credit Species. Species Polygon includes all vegetation zones containing suitable canopy species (PCT 3431_Moderate and PCT 3431_Remnant Trees). The area of the species polygon for Squirrel Glider is 2.37ha.
- *Delma vescolineata* (Hunter Valley Delma) was recorded in the subject land and will require offsetting as a Species Credit Species. This species has recently been listed as Endangered under the BC Act and EPBC Act. This species has recently been described and identified as a separate species from the species credit species *Delma impar* (Striped Legless Lizard). However, under the BAM-Credit Calculator this species is still offset as *Delma impar* (Striped Legless Lizard) as of 26 November 2024.

Serious and irreversible impacts (SAII)

One candidate SAII entities *Miniopterus orianae oceanensis* was recorded within the subject land; however no preferred breeding habitat was present on site or within 2km. Therefore, the proposal was not found to impact these SAII entities. No other candidate SAII entities were found to be present within the study area thus no obligation for proposal refusal would be applicable to this proposed subdivision area from relevant regulatory bodies.

Commonwealth Environment Protection and Biodiversity Conservation Act 1999 & Matters of National Environmental Significance

Considerations have been made under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 & Matters of National Environmental Significance. The nationally listed Endangered Ecological Community Central Hunter Valley eucalypt forest and woodland was found to occur in the subject land and one nationally listed species *Delma vescolineata* (Hunter Valley Delma) was found to occur on site due to targeted surveys.

Taking into consideration the retention of areas of Central Hunter Valley eucalypt forest and woodland in the south of the study area, mitigation measures to protect the retained vegetation from edge effect and recommended rehabilitation of vegetation under a VMP, the removal of 1.91ha of TEC for the proposal is unlikely to significantly impact the community.

Taking into consideration that the proposal will retain 11.40ha of habitat for *Delma vescolineata* (Hunter Valley Delma) and the presence of large areas of habitat for this species to the east and north of the study area, the removal of 8.37ha of native vegetation is not likely to have a significant impact on the Hunter Valley Delma.

It was therefore concluded that it is unlikely that any of the nationally addressed or migratory listed species will be significantly impacted by the proposal.

Koala

The subject land was found to fall under 'Chapter 4 Koala Habitat Protection 2021' of the SEPP (Biodiversity and Conservation) 2021. The majority of the canopy species within the subject land were *Eucalyptus crebra* (Narrow-leaved Ironbark) which is considered a koala use trees species in the Central Coast Koala Management Area under Schedule 3 of SEPP (Biodiversity Conservation) 2021. Therefore the treed areas of the subject land meet the criteria for highly suitable habitat. Given that there is suitable koala habitat and a valid koala record within 2.5km of the subject land the site is

considered to constitute Core Koala Habitat. Based on this information, a Koala Assessment Report is likely required.

Direct impacts requiring offsetting

Table E2 lists Ecosystem Credit Species requiring offsetting as a result of the proposal and Table E3 lists Species Credit Species requiring offsetting as a result of the proposal.

Table E2 Impacts that require an offset – ecosystem credits

PCT	TEC/EC	Impact area (ha)	Number of ecosystem credits required
PCT 3431-Central Hunter Ironbark Grassy Woodland	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	8.37	88

Table E3 Impacts that require an offset – species credits

Common name	Scientific name	Loss of habitat (ha) or individuals	Number of species credits required
Striped Legless Lizard	*Delma impar*	8.37ha	67
Squirrel Glider	*Petaurus norfolcensis*	2.03ha	32

A number of mitigation measures have been given for the construction and operational phase including:

- Clearing limits will be clearly marked to prevent unnecessary clearing beyond the extent of the development footprint. Tree clearing and disturbance will be limited to the development site
- A suitably qualified and experienced ecologist should be engaged to supervise removal of all significant habitat features (habitat trees, dams, ground habitat)
- Habitat salvage within the development footprint should be undertaken prior to and during clearance activities to create a net positive increase of squirrel glider nesting habitat within the locality, a retention of key connections.
- Timing of vegetation clearance should also occur outside of the bird nesting season (late August - December) to avoid critical life cycle events such as breeding for avifauna species.
- A VMP has been recommended for the retained vegetation in the study area. It will prioritize the ongoing ecological viability of the retained areas of vegetation by protecting the ecological biodiversity and habitat values of the land and provide compensatory vegetation planting to retain and improve the quality of the vegetation corridor in the east of the study area

Contents

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Shortened forms

APZ	Asset Protection zone
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BC Act	Biodiversity Conservation Act 2016 (NSW)
BC Regulation	Biodiversity Conservation Regulation 2017 (NSW)
BDAR	Biodiversity Development Assessment Report
BCAR	Biodiversity Certification Assessment Report
BOAMS	Biodiversity Offsets and Agreement Management System
BOS	Biodiversity Offsets Scheme
CEEC	Critically Endangered Ecological Community
CKPoM	Comprehensive Koala Plan of Management
DCCEEW	Department of Climate Change, Energy the Environment and Water
DBH	Diameter at Breast height over bark
DPE	Department of Planning and Environment
EC	Ecological Community listed under the EPBC Act
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EP&A Act	Environmental Planning and Assessment Act 1979 (NSW)
EEC	Endangered Ecological Community
HTW	High Threat Weed
IBRA	Interim Biogeographic Regionalisation for Australia
LLS Act	Local Land Services Act 2013 (NSW)
MNES	Matters of National Environmental Significance
MSC	Muswellbrook Shire Council
NPW Act	National Parks and Wildlife Act 1974 (NSW)
NSW	New South Wales
PAD	Potential Archaeological Discovery
PCT	Plant Community Type
SAII	Serious and Irreversible Impact
SEARs	Secretary's Environmental Assessment Requirements
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community
VEC	Vulnerable Ecological Community
VMP	Vegetation Management Plan
Vegetation SEPP	State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017 (NSW)

Declarations

i. Certification under clause 6.15 *Biodiversity Conservation Act 2016*

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

Signature: 

Date: 26/11//2024

BAM Assessor Accreditation no: BAAS23007

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

The lead or responsible assessor for the project must certify in the BDAR that the report has been prepared on the basis of the requirements of, and information provided under the BAM as at a specified date, and that date is within 14 days of the date the report is submitted to the decision-maker.

ii. Details and experience of author/s and contributors

Authors and contributors

Name	BAM Assessor Accreditation no. (if relevant)	Position/Role	Tasks performed	Relevant qualifications
Daryl Harman	BAAS17074	Senior Ecologist	Targeted threatened species surveys Targeted threatened flora surveys BAM plot surveys Report preparation	BEnvSc
Dr Kylie Bridges	BAAS20005	Ecologist	Targeted threatened species surveys. Targeted threatened flora surveys Report preparation	BEnvSc Hons PhD
Nicola Mohr	BAAS23007	Ecologist	Targeted threatened species surveys BAM plot surveys BAM-C data entry and analysis Figure preparation Targeted threatened flora surveys Report preparation	BSc & MSc
Mungo Worth	N/A	Ecologist	Bat Call Analysis	

iii. Conflict of interest

I declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest OR I wish to openly declare the following actual, perceived or potential conflict of interest and the management strategies employed:

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

Signature: 

Date: 26/11//2024

BAM Assessor Accreditation no: BAAS23007

Stage 1: Biodiversity Assessment

1.0 Introduction

1.1 Proposed development

1.1.1 Development overview

It is proposed that Stages 6 and 7 of the Northview Estate subdivision be constructed within the north portion of Lot 446 DP 1278895 Northview Estate, Muswellbrook NSW. This assessment forms part of a development application that requires consent under Part 4 of the NSW Environmental Planning and Assessment Act 1979 (EPA Act).

1.1.2 Location and Description of the Study Area and Subject Land

The study area consisted of the portion of Lot 446 DP 1278895 Northview Estate, north of the earlier stages already under construction. It had a total area of 26.83ha. Residential development is planned to be constructed within the majority of the study area. The southern third of the study area is zoned R1 General Residential while the remainder is zoned R5 Large Lot Residential.

The study area had been subject to historic disturbance from agricultural practices such as past cattle grazing, weed incursion and ongoing slashing over a large area. Native vegetation was present throughout the majority of the study area in the form of one Plant Community Type (PCT) 3431 Central Hunter Ironbark Grassy Woodland. The majority of this PCT 3431 within the study area was composed of derived grassland. Smaller areas of PCT 3431 in the far south contained remnant trees and areas of younger regrowth. The dominant canopy species were specimens of *Eucalyptus crebra* (Narrow-leaved Ironbark).

The study area is located on undulating ground with a high point in the middle of the lot with ground sloping downwards to the south and north. A first order prescribed stream runs along the southern boundary of the study area while a third order prescribed stream runs east to west through the north of the study area. The third order prescribed stream is located in a defined channel and was ephemeral in nature. Surface water was only ever observed once in the channel. Two areas of Potential Archaeological Deposits (PAD) have been identified within the north of the subject land. No works are proposed to occur in these areas.

The subject land (impact area) covered an area of 8.80ha and included the southern third of the study area with the exception of part of a riparian area around the first order prescribed stream in the far south of the study area. The subject land also includes parts of remaining areas in the centre and north of study area for roads, APZ and building envelopes in Stage 7.

A location map and aerial photo of the study area and subject land has been provided in Figures 1.1 and 1.2.

Figure 1.1 Location Map

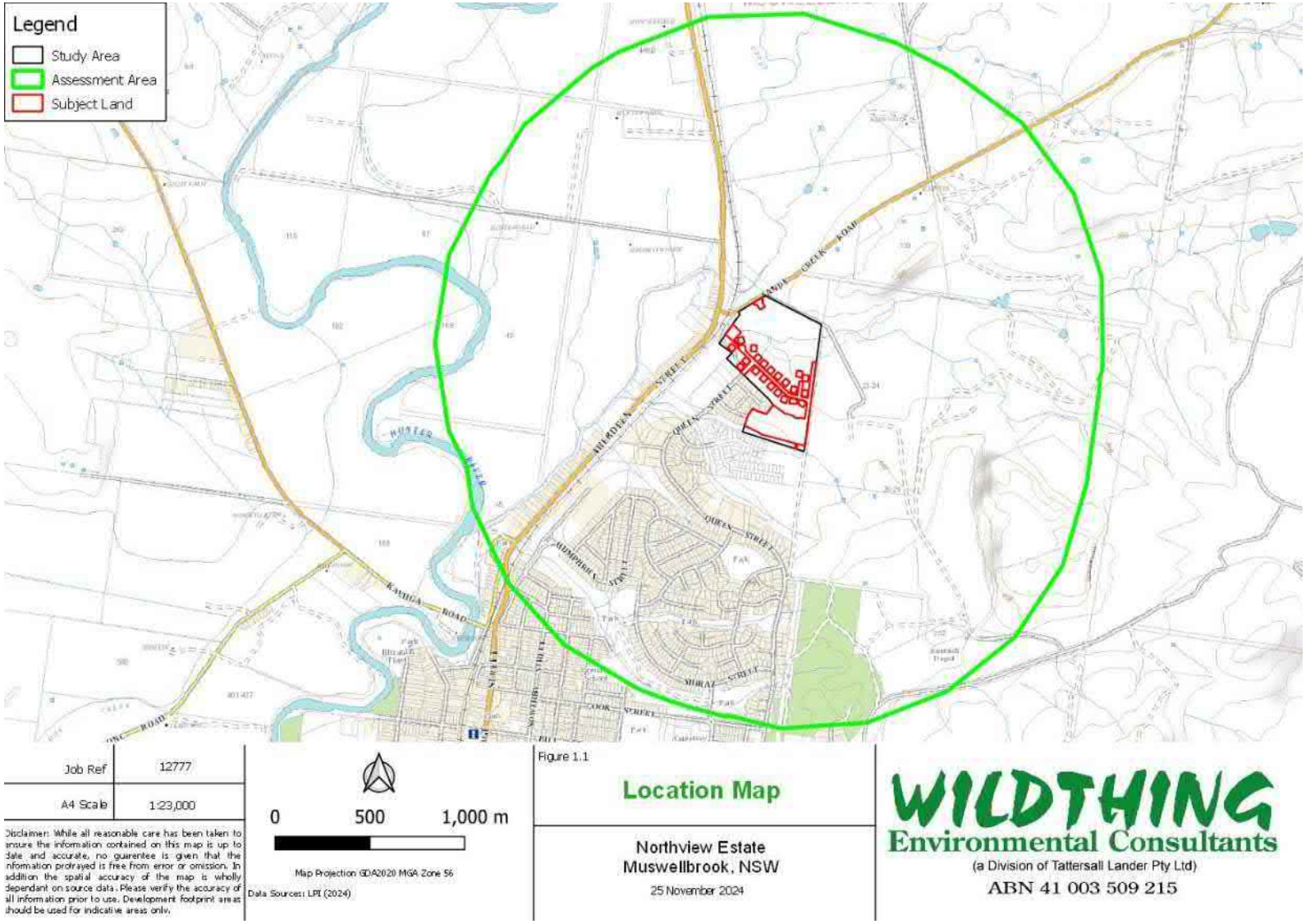
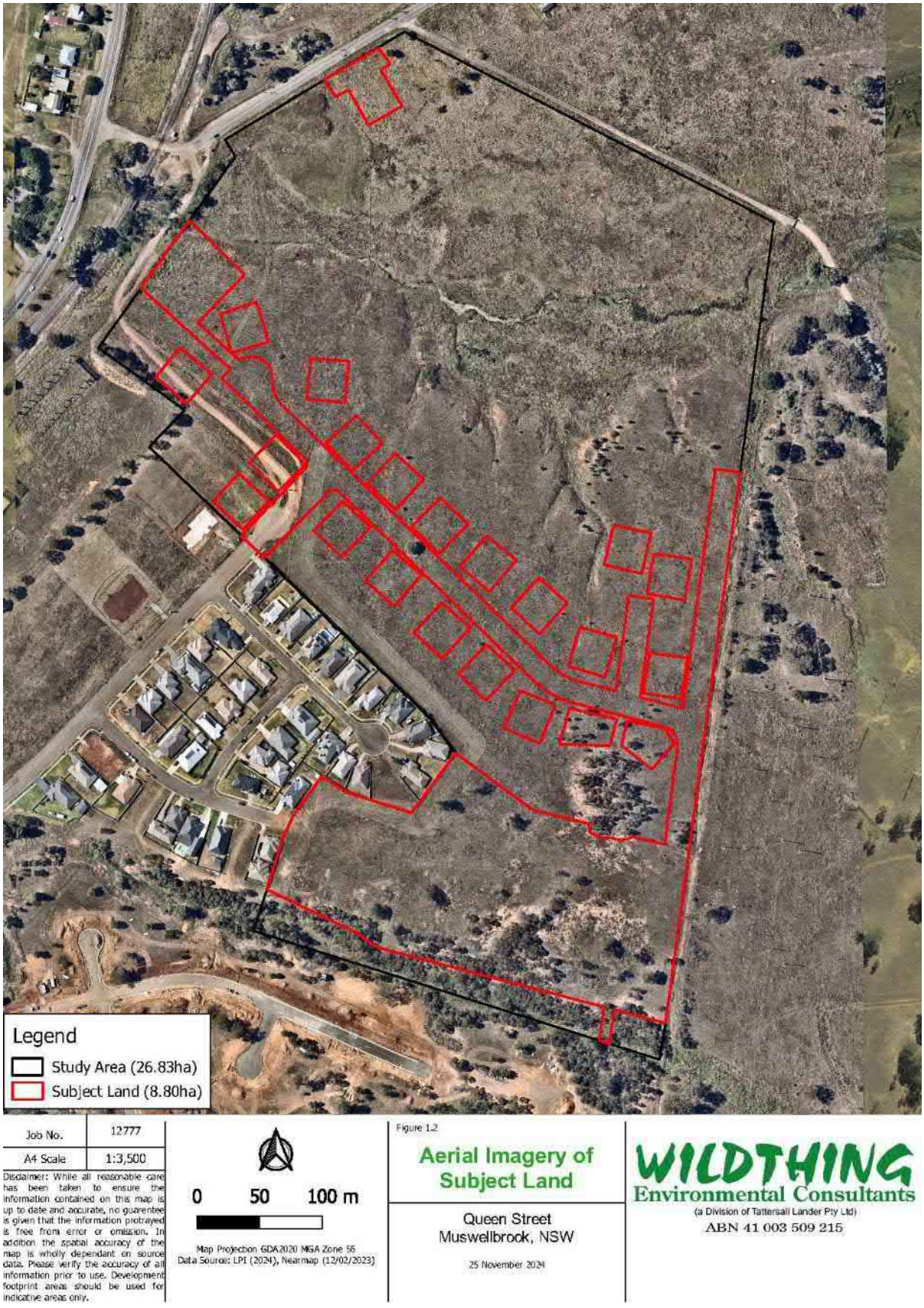


Figure 1.2 Aerial Image of Subject Land



1.1.3 Development Description

The proponent proposes to subdivide the subject land into 58 lots in total. The proposed subdivision will include three interior roads and an APZ along the north-west, east and south sides of the development (16m along the north-west, 20m along the east and 15m along the south). Internal roads have been designed to run along the southern and eastern boundary of the subject land such that they overlap with required APZs. As a result, a large portion of the APZs will be completely cleared for the roads.

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Stage 7 will include the construction of 23 larger residential lots ranging in size from 4000m^2 to 6ha. Each lot contains a 1,000m^2 building envelope. The two largest lots will each contain one of the PADs. An internal road from stage 6 will extend through stage 7 and Queen Street will extend into the subdivision to connect with internal roads.

Development plans have been provided in Figure 1.3 & 1.4.

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Figure 1.3 Design Plans

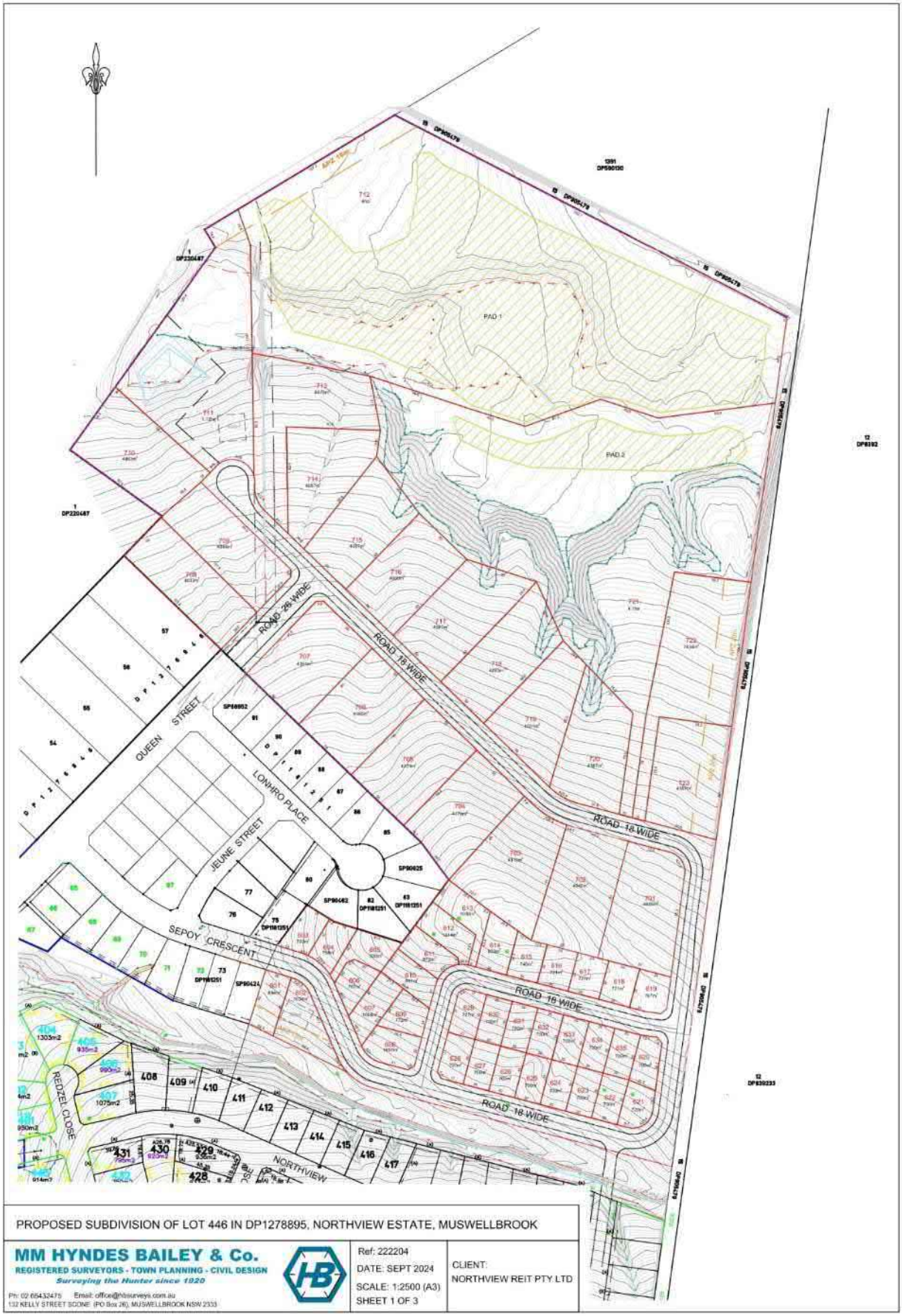
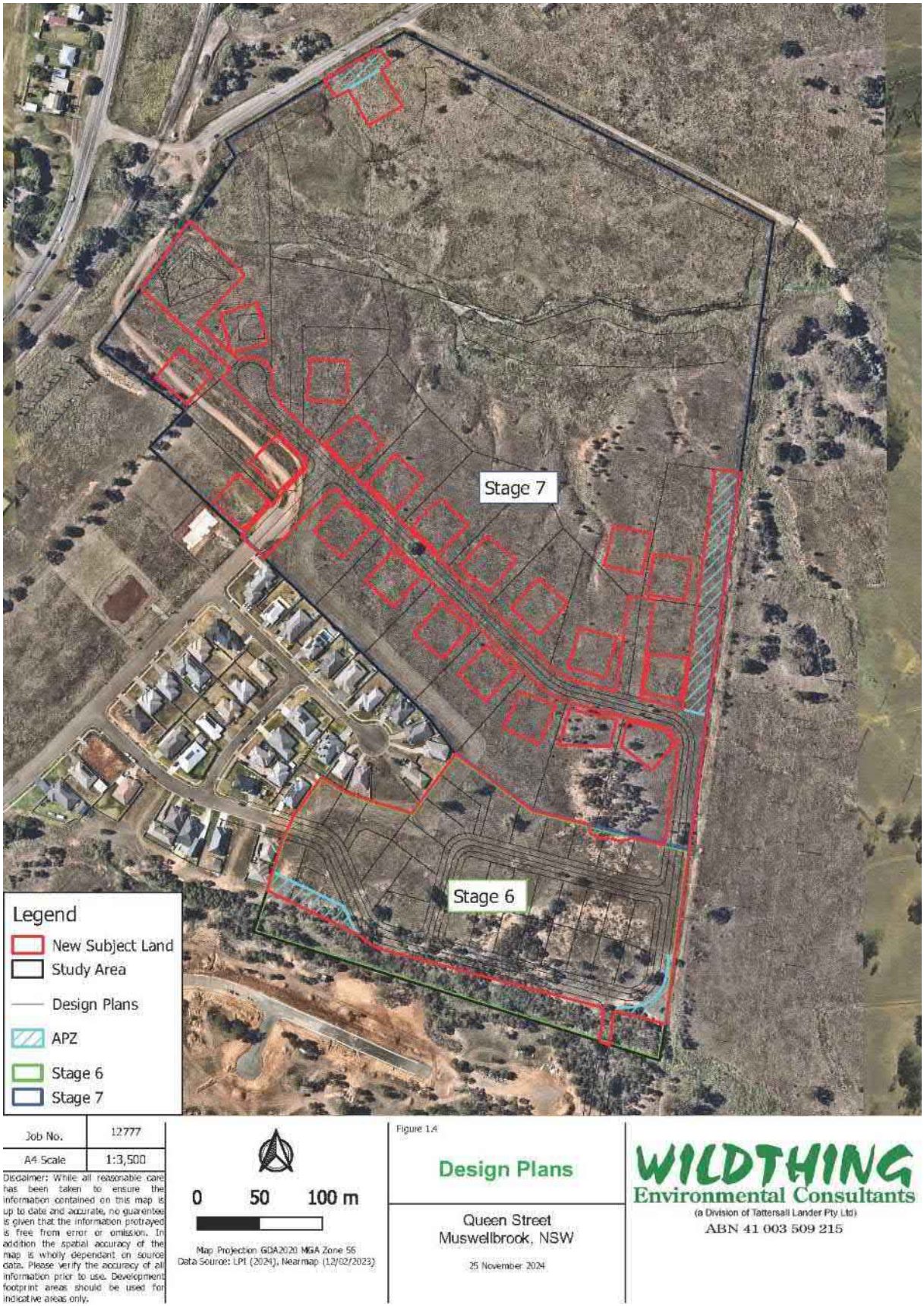


Figure 1.4 Design Plans over Aerial Imagery



1.2 Legislative Context

1.2.1 NSW Environmental Planning and Assessment Amendment Act 2017

The Environmental Planning & Assessment Act 1979 (EP&A Act) was legislated to require the consideration and management of impacts of proposed development and land use change on the environment and the community.

- Part 1 Section 1.7 of the EP&A Act requires consideration of the proposed development under Part 7 of the Biodiversity Conservation Act 2016 (BC Act).
- The EP&A Act is also supported by other statutory environmental planning instruments, including State Environmental Planning Policies (SEPPs).

1.2.2 NSW Biodiversity Conservation (BC) Act 2016 & Biodiversity Offsets Scheme entry

In accordance with the BC Act, the Biodiversity Assessment Method (BAM) (DPIE 2020a) and entry into the Biodiversity Offsets Scheme (BOS) is applicable to certain development activities based on specific criteria. Preparation of a Biodiversity Development Assessment Report (BDAR) is required for a development application that meets any of the following criteria:

- Part 4 development activities deemed to be 'State Significant' under the NSW Environmental Planning and Assessment Act 1979 (NSW EP&A Act);
- Development activities that have the potential to impact Areas of Outstanding Biodiversity Value (AOBV) as listed under Part 3 of the BC Act.
- Development activities that have the potential to cause a significant impact on a threatened species, population or ecological community, listed under Schedules 1 and 2 of the BC Act, as determined by application of a five-part-test of significance in accordance with Section 7.3 of the BC Act;
- Development activities that have the potential to impact areas mapped as having 'high biodiversity value' as indicated by the NSW Biodiversity Values Map (BV Map); and
- Development activities that involve clearing of native vegetation that exceeds the Biodiversity Offset Scheme thresholds (BOS thresholds) as determined by the NSW BC regulation.

The NSW Biodiversity Values map showed Biodiversity Values to occur within the subject land. The BOS clearing threshold for the subject land was 0.25ha. The area of the construction and operational footprint exceeds this threshold. The criteria in relation to the proposal's entry into the Biodiversity Offsets Scheme is shown in Table 1.1. A map of the subject land showing the location of areas of Biodiversity Value is shown in Figure 1.6.

1.2.3 Serious and Irreversible Impacts

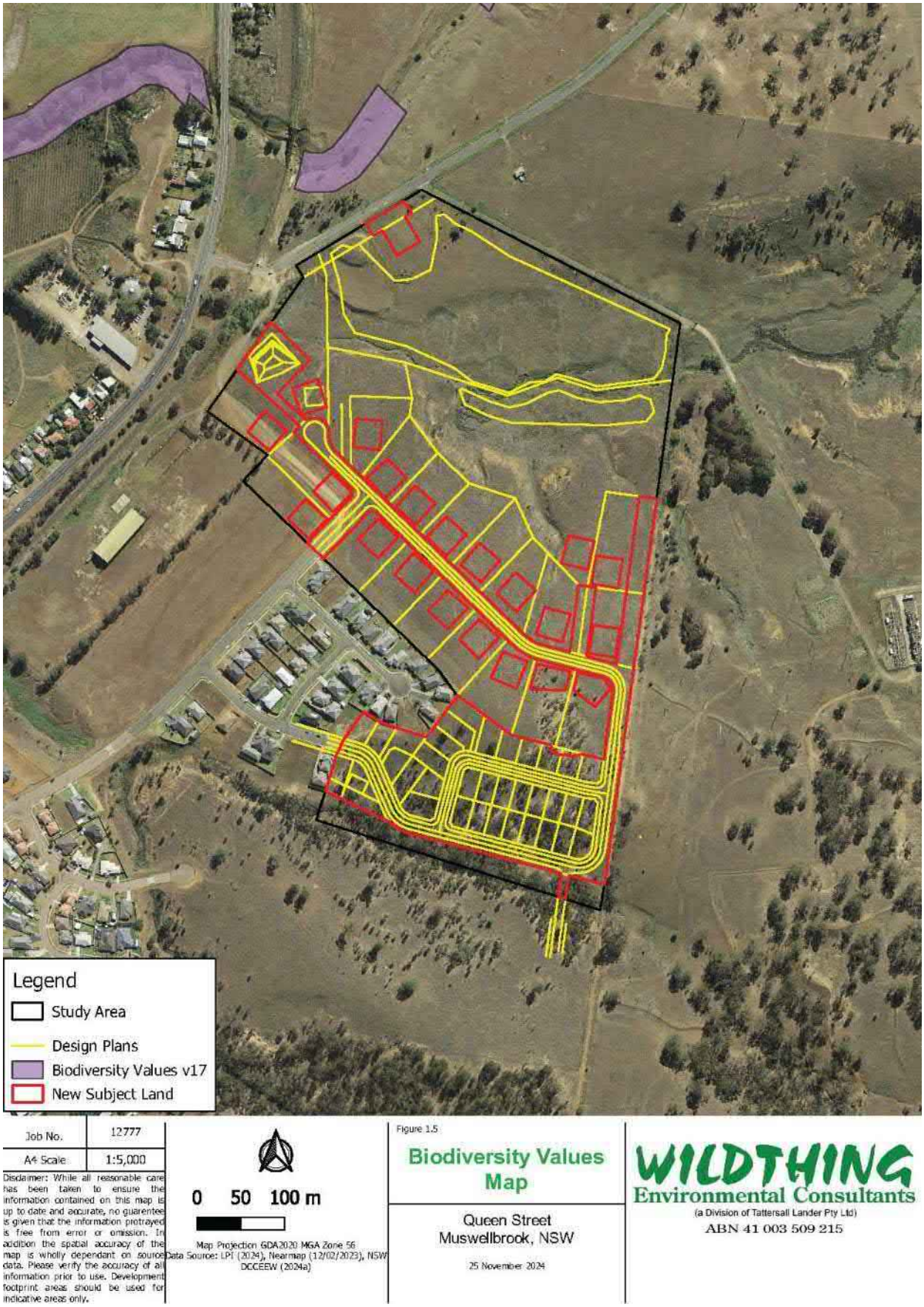
The BC Act also imposes various obligations on determining authorities in relation to impacts on biodiversity values that are serious and irreversible. For applications for development consent under Part 4 of the EP&A Act these obligations generally require a decision-maker to refuse to grant development consent. In order to provide clarity regarding what could be considered a serious and irreversible impact a guidance document has been released (NSW Gov 2017) which identifies the species and ecological communities (SAII entities) that are likely to be the subject of serious and

irreversible impacts. One candidate SAII entities *Miniopterus orianae oceanensis* was recorded within the subject land, however no preferred breeding habitat was present. Therefore, the proposal was not found to impact these SAII entities. No other candidate SAII entities were found to be present within the study area thus no obligation for proposal refusal would be applicable to this proposed subdivision area from relevant regulatory bodies.

Table 1.1: Criteria for entry into the Biodiversity Offsets Scheme in relation to the proposal.

Criteria For Entry into The Biodiversity Offsets Scheme (BOS)	Section Criteria Addressed	Assessment Of Criteria
Part 4 development activities deemed to be 'State Significant' under the NSW Environmental Planning and Assessment Act 1979 (NSW EP&A Act)		The proposal is not recognised as State Significant
Development activities that have the potential to impact Areas of Outstanding Biodiversity Value (AOBV) as listed under Part 3 of the BC Act.		No declared areas of outstanding biodiversity value were located within or in proximity to the subject land.
Development activities that have the potential to cause a significant impact on a threatened species, population or ecological community, listed under Schedules 1 and 2 of the BC Act, as determined by application of a five-part-test of significance in accordance with Section 7.3 of the BC Act;		No five-part test was undertaken.
Development activities that have the potential to impact areas mapped as having 'high biodiversity value' as indicated by the NSW Biodiversity Values Map (BV Map).	Section 1.2.2 Figure 1.5	The NSW Biodiversity Values Map Version 17 was first consulted on the 16 October 2024 it was found that no mapped Biodiversity Values occur within subject land. Consequently, the proposed development will not exceed the biodiversity offsets scheme threshold in regard to Section 7.2(b) of the BC Act.
Development activities that involve clearing of native vegetation that exceeds the Biodiversity Offset Scheme thresholds (BOS thresholds) as determined by the NSW BC regulation.		According to the BMAT Report, the clearing threshold for the subject land is 0.25ha. Up to 8.37ha of native vegetation will require clearing. Consequently, the proposed development will exceed the biodiversity offsets scheme threshold in regard to Section 7.2(b) of the BC Act therefore a BDAR is required.

Figure 1.5 Biodiversity Values



1.2.4 State Environmental Planning Policy (Biodiversity and Conservation) 2021

The State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP) consolidates transfers and repeals provisions of the following 11 SEPPs (or deemed SEPPs):

1. SEPP (Vegetation in Non-Rural Areas) 2017 (Vegetation SEPP)
2. SEPP (Koala Habitat Protection) 2020 (Koala SEPP 2020)
3. SEPP (Koala Habitat Protection) 2021 (Koala SEPP 2021)
4. Murray Regional Environmental Plan No 2—Riverine Land (Murray REP)
5. SEPP No 19—Bushland in Urban Areas (SEPP 19)
6. SEPP No 50—Canal Estate Development (SEPP 50)
7. SEPP (Sydney Drinking Water Catchment) 2011 (Sydney Drinking Water SEPP)
8. Sydney Regional Environmental Plan No 20 – Hawkesbury – Nepean River (No 2 – 1997) (Hawkesbury–Nepean River SREP)
9. Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 (Sydney Harbour Catchment SREP)
10. Greater Metropolitan Regional Environmental Plan No 2 – Georges River Catchment (Georges River REP)
11. Willandra Lakes Regional Environmental Plan No 1 – World Heritage Property (Willandra Lakes REP).

Each consolidated SEPP now makes up a chapter in the SEPP (Biodiversity and Conservation) 2021.

The following Chapters are relevant to Ecological Assessment reports:

- Chapter 4 Koala Habitat Protection 2021

1.2.4.1 Chapter 4 Koala Habitat Protection 2021

This Chapter aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline.

Land to which Chapter applies

(1) This Chapter applies to each local government area listed in Schedule 2.

(2) The whole of each local government area is—

(a) in the koala management area specified in Schedule 2 opposite the local government area, or

(b) if more than 1 koala management area is specified, in each of those koala management areas.

(3) Despite subsection (1), this Chapter does not apply to—

(a) land dedicated or reserved under the National Parks and Wildlife Act 1974, or acquired under Part 11 of that Act, or

(b) land dedicated under the Forestry Act 2012 as a State Forest or a flora reserve, or

(c) land on which biodiversity certification has been conferred, and is in force, under Part 8 of the Biodiversity Conservation Act 2016, or

(d) land in the following land use zones, or an equivalent land use zone, unless the zone is in a local government area marked with an * in Schedule 2—

(i) Zone RU1 Primary Production,
(ii) Zone RU2 Rural Landscape,
(iii) Zone RU3 Forestry.

This Chapter applies to land use zones RU1, RU2 and RU3 (or an equivalent land use zone) in LGAs specified in the SEPP (Biodiversity and Conservation) 2021, which includes the Muswellbrook LGA. This Chapter has been addressed in Section 13 of this report.

1.2.5 NSW Biosecurity Act 2015

The NSW Biosecurity Act 2015 (BS Act), amongst other considerations, provides regulatory controls and powers to manage priority weeds in NSW. For weed management, this Act divides NSW into regions based on combined LGAs and priority weeds for a region are listed. Some weeds are managed at a state level as they form part of a broader containment strategy. The legislation compliments listed Weeds of National Significance (WoNS). Further information on this matter is provided in Section 14 of this report.

1.2.6 Commonwealth Environment Protection and Biodiversity Conservation Act 1999 & Matters of National Environmental Significance

The purpose of the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) is to ensure that actions likely to cause a significant impact on Matters of National Environmental Significance (MNES) undergo a process of assessment. Under the EPBC Act, an action includes a project, undertaking, development or activity that may impact MNES. An action that 'has, will have or is likely to have a significant impact on a MNES' is deemed to be a 'controlled action' and may not be undertaken without prior approval from the commonwealth minister for the Department of Climate Change, Energy the Environment and Water (DCCEEW). MNES categories listed under the EPBC Act are:

- world heritage properties;
- national heritage places;
- wetlands of international importance (Ramsar wetlands);
- threatened species and ecological communities (Section 18 and 18A);
- migratory species;
- commonwealth marine areas;
- nuclear actions (including uranium mining); and
- a water resource, in relation to coal seam gas development and large coal mining development.

Initially, MNES protected under the EPBC Act are assessed in accordance with the Significant Impact Guidelines 1.1 - Matters of National Environmental Significance (DoE 2013). This is performed to determine if there is likelihood for an action to have a significant impact on MNES. An action will require referral to, and may require the approval of, the commonwealth minister for the Environment

(in addition to any local or state government consent or approval) if that action will have, or is likely to have, a significant impact on the environment or on a MNES.

1.3 Excluded impacts

No excluded impacts (i.e., category 1-exempt land) were identified within the subject land.

1.4 Information sources

A list of the resources used to inform this BCAR, the date they were accessed and the spatial extent captured, where relevant, is provided in Table 1.2.

Table 1.2 Desktop Resources

Resource	Date Reviewed	Spatial Extent
Zoning and Regulatory Maps		
Muswellbrook Local Environmental Plan (2009)	Various dates	Entire study area
Biodiversity Values and Landscape Maps		
NSW Biodiversity Values Map (NSW DCCEEW 2024a)	16 October 2024	Entire subject land
SIX Maps -Base Map - LPI 1:25,000 digital topographic databases (DTDB) (LPI 2024) -Cadastral data LPI digital cadastral database (DCDB) (LPI 2024)	Various dates	Entire subject land
NSW SEED Mapping (NSW Gov 2024)	Various dates	Entire subject land
BioNet NSW (Mitchell) Landscapes – Version 3.1 (NSW DCCEEW 2016)	16 October 2024	Entire subject land
NSW Interim Biogeographic Regions of Australia (IBRA region and sub-regions) – Version 7 (DCCEEW 2024c)	16 October 2024	Entire subject land
Atlas of Groundwater Dependent Ecosystems (DPE – Water 2024)	16 October 2024	Entire subject land
Nearmap (Nearmap 2023)	12 February 2023	
Threatened Species, Vegetation and Landscape Databases		
BioNet Atlas of NSW Wildlife (BioNet) (NSW DCCEEW 2024b)	16 October 2024	10x10km radius of subject land
Commonwealth Protected Matters Search Tool (PMST) (DCCEEW 2024a)	16 October 2024	10x10km radius of subject land
Commonwealth species profiles and threats database (SPRAT) (DCCEEW 2024b)	16 October 2024	-
NSW BioNet Threatened Biodiversity Profile Data Collection (NSW DCCEEW 2024b)	16 October 2024	
BioNet vegetation classification database	16 October 2024	-

Resource	Date Reviewed	Spatial Extent
(NSW DCCEEW 2024c)		
PlantNET NSW (PlantNET 2024).	16 October 2024	-
Directory of Important Wetlands in Australia (DIWA) (DoE 2015)	16 October 2024	-
Geological sites of NSW (Cartoscope 2024)	16 October 2024	-
Important habitat maps for a threatened species (NSW DCCEEW 2024d)	October 2024	
Survey and Reporting Methodology		
Biodiversity Assessment Method (BAM) (DPIE 2020a)	Various dates	-
Biodiversity Assessment Method Operational Manual – Stage 1 (DPIE 2020b)	Various dates	-
Biodiversity Assessment Method – Operational Manual – Stage 2 (DPIE 2019)	Various dates	-
Biodiversity Assessment Method – Operational Manual – Stage 3 (DPIE, 2020c)	Various dates	-
Threatened species survey and assessment guidelines: field survey methods for fauna – amphibians (DECC 2009)	Various dates	-
DPE Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide (DPE 2022)	Various dates	
NSW Survey Guide for Threatened Frogs (DPIE 2020d)	Various dates	-
DPIE Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method (DPIE 2020)	Various dates	
NSW Guide to Surveying threatened plants and their habitats (DPIE 2020e)	Various dates	-
OEH Threatened Biodiversity Survey and Assessment Guidelines. Guidelines for Developments and Activities (DEC 2004)	Various dates	-
Biodiversity Assessment Method Credit Calculator (BAM-CC) (DPIE 2022f)	January 2024	-
Climactic Data		
BOM - Scone Airport Weather Station (Commonwealth of Australia 2024)	Various dates	-

2.0 Methods

2.1 Site context methods

2.1.1 Landscape features

Landscape feature extent within the subject land were determined by undertaking searches of external resources such as NSW SEED Mapping (2024), LPI (2024), and NSW Planning Portal (2024). Field reconnaissance was also undertaken (Table 2.1) to determine the condition and extent of landscape features (Section 3.2) within the subject land and surrounding locality.

2.1.2 Native vegetation cover

The Biodiversity Assessment Method Operational Manual Stage 1 (DPIE, 2020b) defines 'Native Vegetation Cover' as:

The amount of native vegetation (woody and non-woody vegetation including regrowth and plantations comprised of plants native to New South Wales) that is estimated to remain in the landscape proximal to the assessment area. It is used:

- as a filter by the Calculator to predict threatened species likely to occur or use habitat on a site; and
- to define the intrinsic rate of increase in species richness and plant cover as part of the assessment of future vegetation condition on a biodiversity stewardship site

The percent native vegetation cover is assessed by applying a 1500 metre buffer around the edge of the subject land and digitising all native vegetation within, using GIS editing tools and recent aerial photography. The total area of native vegetation is calculated across the assessment area.

2.2 Native vegetation, threatened ecological communities and vegetation integrity methods

2.2.1 Existing information

Searches were undertaken of the BioNet VIS Database (NSW DCCEEW 2024c) and NSW SEED mapping.

2.2.2 Mapping native vegetation extent

Based on the results of the review of existing information and the requirements of the BAM with respect to this BDAR, appropriate surveys were designed for the subject land. Supplementary iterations and amendments were made to the base map throughout the fieldwork period, in accordance with Section 5.2 of the BAM, via hand-held GPS units and aerial photo interpretation. Iterations to the base map were based on observation of broad vegetation composition, landform, physiography and on quantitative data collection through identification of all plants encountered to the species level.

The vegetation types observed were compared to the base map and cross-referenced with the community profile descriptors (and diagnostic species tests) held within the BioNet VIS Database (NSW DCCEEW 2024c) with an assessment of consistency being conducted.

2.2.3 Plot-based vegetation survey and Vegetation integrity survey

Detailed floristic surveys were undertaken in November 2023, January 2024 and February 2024. These surveys included the establishment of three plot-based vegetation and vegetation integrity plots. Data was collected in accordance with BAM Subsection 4.2.1 and 4.3.4 (BAM, 2020b) by persons trained in the BAM and under the direction of persons accredited under the BAM (see Section 4.3.1). The field data collected during the vegetation integrity assessment can be found in Appendix D along with photos of the BAM plots. Survey plot location was selected such that it included all functional attributes relevant to the PCT and vegetation zone. Figure 2.1 demonstrates the layout of a plot and details the survey methodology.

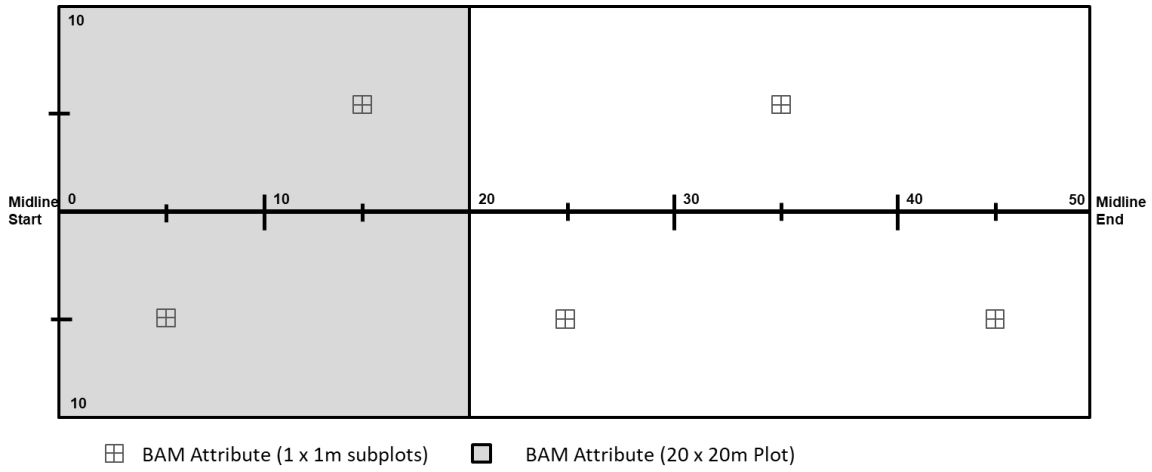


Figure 2.1: Plot Survey Design

The following site attributes were recorded at each site while conducting survey plots:

- Midline start and end points (easting – northing grid type MGA 2020, Zone 56);
- Vegetation structure and dominant species and vegetation condition.

1. Composition attributes (in 20 x 20m plot)
   - All native species
   - All introduced species (including high threat weeds)
2. Structure attributes (in 20 x 20m plot)
   - Estimate of foliage cover of every native and introduced species recorded. Foliage cover is defined as the percentage of the plot covered by a vertical projection of all attached plant material, regardless of whether it appears alive or dead, of all individuals of a species.
3. Function attributes (in 50 x 20m plot)
   - Presence or absence of each tree stem size class (diameter at breast height, over bark and measured at 1.3 metres above ground level). Classes include 5–9cm, 10–19cm, 20–29cm, 30–49cm
   - Tally and DBH of large trees where DBH is between 50-79cm or equal to or above 80cm
   - Tally and DBH of regenerating trees with a DBH below 5cm
   - Length of all fallen logs. Fallen logs are defined as dead woody material with a diameter greater than 10cm. Where logs extend outside the plot only the length within the plot is recorded.
   - Percentage cover of leave litter, bare ground, cryptograms and bare rock in each 1 x 1m plot. Litter is taken as plant material detached from a plant including leaves, seeds, twigs, branchlets and branches with diameter of <10cm.

4. Other Attributes

- Number of stems with hollows is counted in the plot (50 x 20m). A tree is considered to contain a hollow if:
- the entrance can be seen.
- the entrance width is at least 5 centimetres.
- the hollow appears to have depth (i.e., solid wood cannot be seen beyond the entrance); and
- the hollow is at least 1 metre above the ground.

2.3 Threatened flora survey methods

2.3.1 Review of existing information

Habitat constraints for threatened species are identified in the BAM-CC and the Threatened Species Biodiversity Data Collection.

2.3.2 Habitat constraints assessment

Habitat constraints associated with threatened species were assessed for the subject land during field assessments.

2.3.3 Field surveys

2.3.3.1 Targeted Flora Surveys

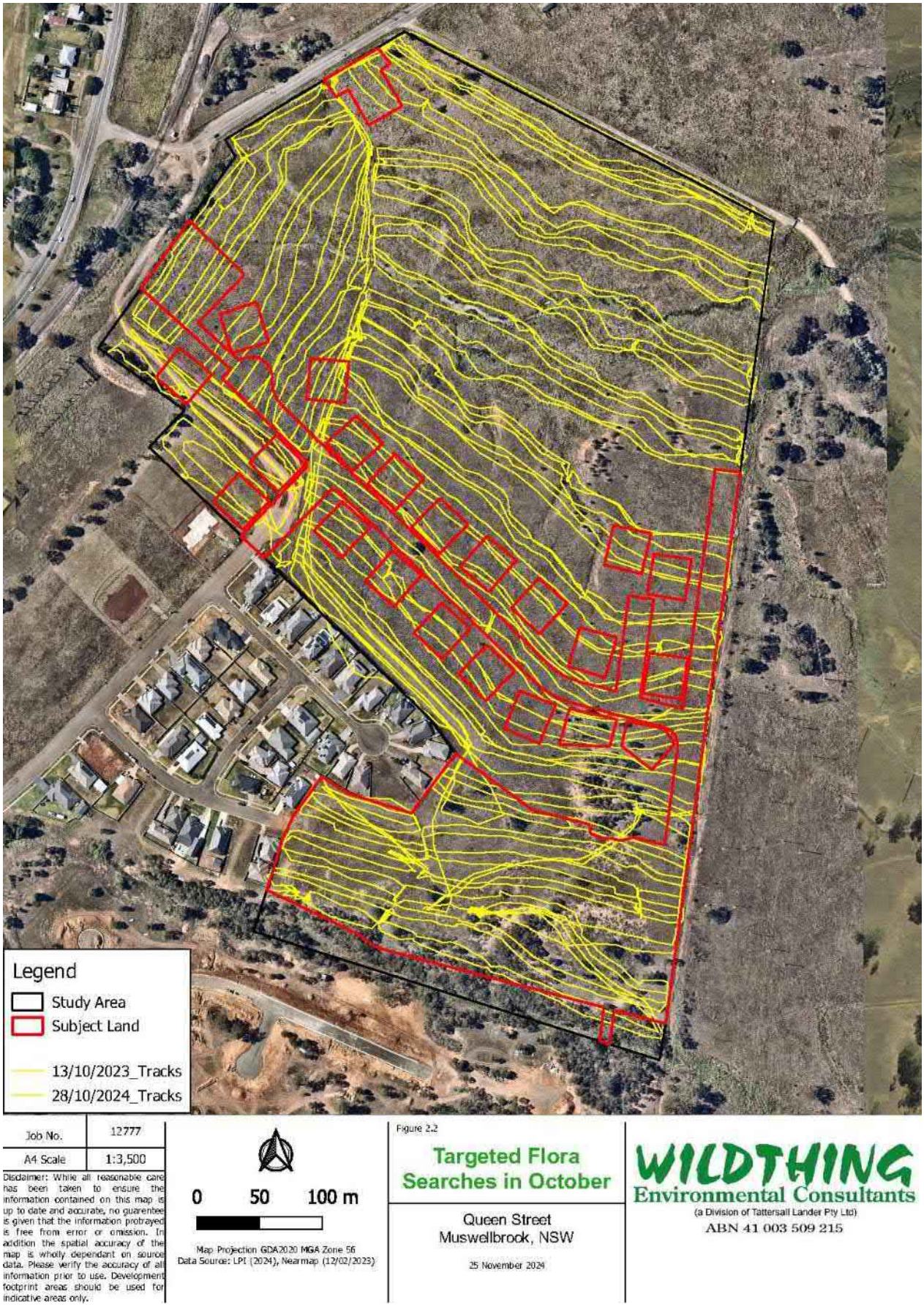
Targeted flora surveys were used in accordance with the NSW Guide to Surveying threatened plants and their habitats (DPIE 2020e), Draft survey guidelines for Australia's threatened orchids (DoE, 2013a). Each target threatened flora species was allocated areas of potential habitat. All vegetation communities considered to be habitat for the target species were searched. A parallel field traverse (i.e., parallel transects) were undertaken within the subject land. Surveys were conducted along parallel line transects approximately 5-10 metres apart for orchids, herbs and forbs, and 10 -20m for shrubs and trees. Transects were conducted along a straight path using the tracks on a GPS to guide the surveyors. Required survey times were stated in the BAM Candidate species report. Targeted surveys were undertaken for each flora species credit species within the required survey period identified in the BAM-CC.

The location of the targeted flora tracks is shown in Figure 2.2.

2.3.3.2 Significant Tree Survey

The significant tree survey involved a survey for hollow-bearing trees and trees containing large stick nests within and within close proximity to the impact area. The ground-based survey recorded the details of each significant tree including height, diameter at breast height (dbh), hand held GPS coordinates and fauna habitat attributes such as hollows. The presence of activity in the form of scratches, scats on the trunks of trees and scats around the base were also noted. It must be noted that observations made from ground level may fail to record a small number of hollows that are obscured. Some entrances may also not lead to a cavity. The internal dimensions of the hollows are also impossible in many cases to determine from the ground.

Figure 2.2 Targeted Flora Survey Tracks (October 2023 and October 2024)



2.4 Threatened fauna survey methods

2.4.1 Review of existing information

Habitat constraints for threatened fauna species are identified in the BAM-C and the Threatened Species Biodiversity Data Collection.

2.4.2 Habitat constraints assessment

Habitat constraints associated with threatened species were assessed for the subject land during field assessments. The habitat constraints included the absence of hollow-bearing trees and other attributes such as a lack of caves and other man-made structures.

2.4.3 Field surveys

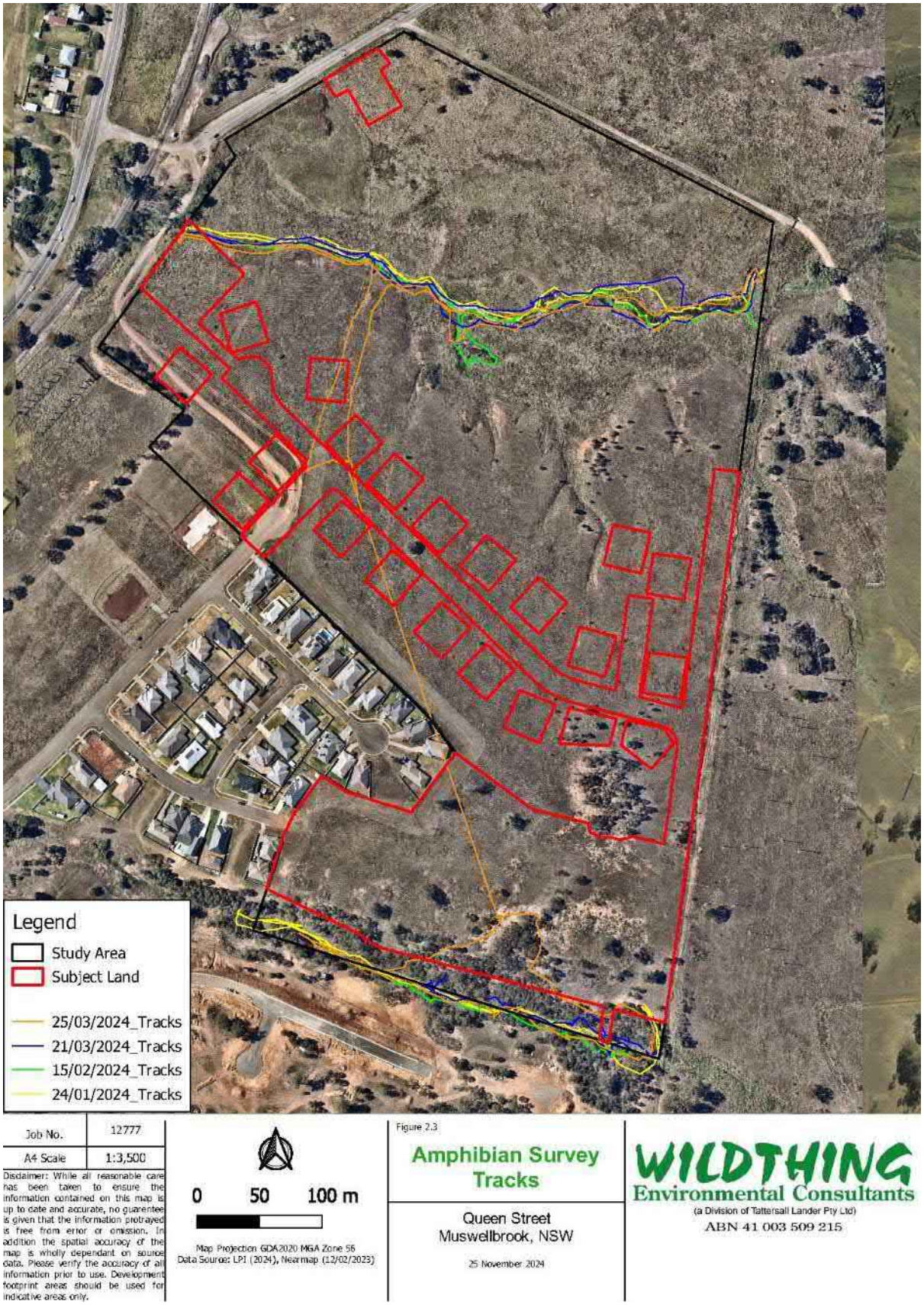
The fauna survey was initiated with an assessment of the potential use of the subject land by any species credit species. Subsequently, the confirmation of the fauna species list, by way of on-site observation and recording, was carried out as described below. The survey was carried out using the Department of Environment and Conservation's (NSW) Threatened Biodiversity Survey and Assessment Guidelines – Working Draft (DEC, 2004). Survey details including dates, timing and weather conditions are displayed in Table 2.1.

2.4.3.1 Targeted Amphibian Surveys

Amphibian surveys were conducted for the candidate species *Litoria aurea* (Green & Golden Bell Frog) under the NSW Survey Guide for Threatened Frogs. A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment (DPIE, 2020d). Methods included Nocturnal Aural-visual surveys, which were a combination of listening for the calls of frogs and searching for individuals along a 500m transect within suitable habitat. An aural-visual survey commenced with an aural survey where the surveyor/s listened for calls (in silence and darkness), for a minimum of five minutes. The aural survey process is repeated every 50 metres of the transect (i.e.,11 points on a full 500 metre transect or six points where only 250 metres of habitat is available). The visual survey detects frogs via 'eyeshine'. Suitable habitat is scanned along the transect, around and between aural survey points, using a headlamp with a minimum of 200 lumens brightness. Walking slowly undertaking the visual search assisted in noticing moving frogs. A call-playback component used a loudspeaker to broadcast the advertisement calls of target threatened frogs to elicit either an advertisement or territorial response call. Call playbacks were undertaken after the aural survey aural-visual survey for each point.

Amphibian surveys were conducted after periods of high rainfall, a small number of diurnal surveys were also undertaken after rainfall within the subject land to conduct an aural-visual survey during periods of high frog activity. The locations of the Amphibian surveys are shown in Figure 2.3.

Figure 2.3 Amphibian Survey Tracks



2.4.3.2 Diurnal Avifauna Survey

The diurnal avifauna survey involved point assessments for 30 minutes. Surveys were conducted at peak activity periods (i.e., dawn and dusk). Searches were also conducted within the subject land and in close proximity for large stick nests which may indicate breeding by the candidate species. Incidental observations of avifauna were also made during other surveys. Observations were also made of secondary indications (i.e., distinctive feathers and nests) of avifauna were also recorded. The locations of the diurnal avifauna surveys are shown in Figure 2.4.

2.4.3.3 Reptile Survey

Reptile surveys involved habitat surveys, spotlighting and use of artificial covers. Habitat surveys involved visual searches while walking throughout the subject land and checking under potential shelter sites (i.e., leaf litter, dead logs and long grass) during the morning and afternoon survey period.

Spotlighting surveys were conducted using high powered spotlights and head torches to search for nocturnal reptiles. Searches targeted both terrestrial and arboreal habitats.

Artificial cover boards (roof tiles) were installed 5m apart from each other in grids of 10 by 5 tiles. They were place in vegetated areas 3 months prior to the first survey. 2 grids of 50 tiles each were installed for a total of 100 tiles. During the survey period tiles were checked once per week, when ambient temperature is ≤28°C. Outside the survey period tiles were occasionally checked. Tiles or other potential shelter sites were never checked more than once a week.

The location of artificial cover grids is shown in Figure 2.5.

2.4.3.4 Stagwatching Survey

The stag watching survey involved watching hollow-bearing trees within the study area, 20 minutes prior to sunset and continuing until 20 minutes after sunset. The person was in a position to allow a good view of the tree to be obtained, preferably with the tree silhouetted against the sky. The required listening period and stag watching were undertaken concurrently. Hollow trees targeted were those suitable for *Petaurus norfolcensis* (Squirrel Glider) and owl species such as *Tyto novaehollandiae* (Masked Owl) and *Ninox strenua* (Powerful Owl). The location of the watched stag trees is shown in Figure 2.4.

Figure 2.4 Avifauna Survey Tracks

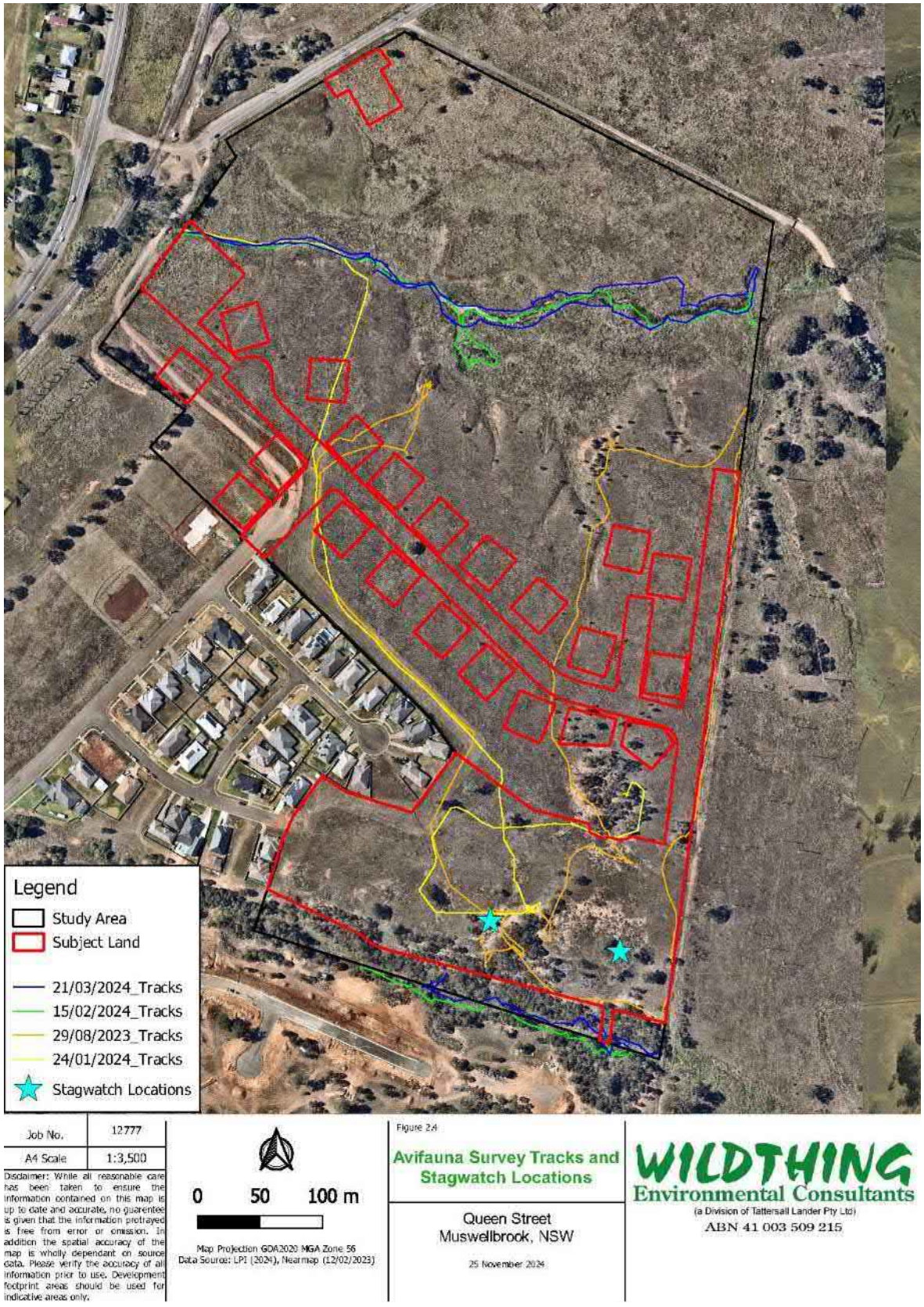
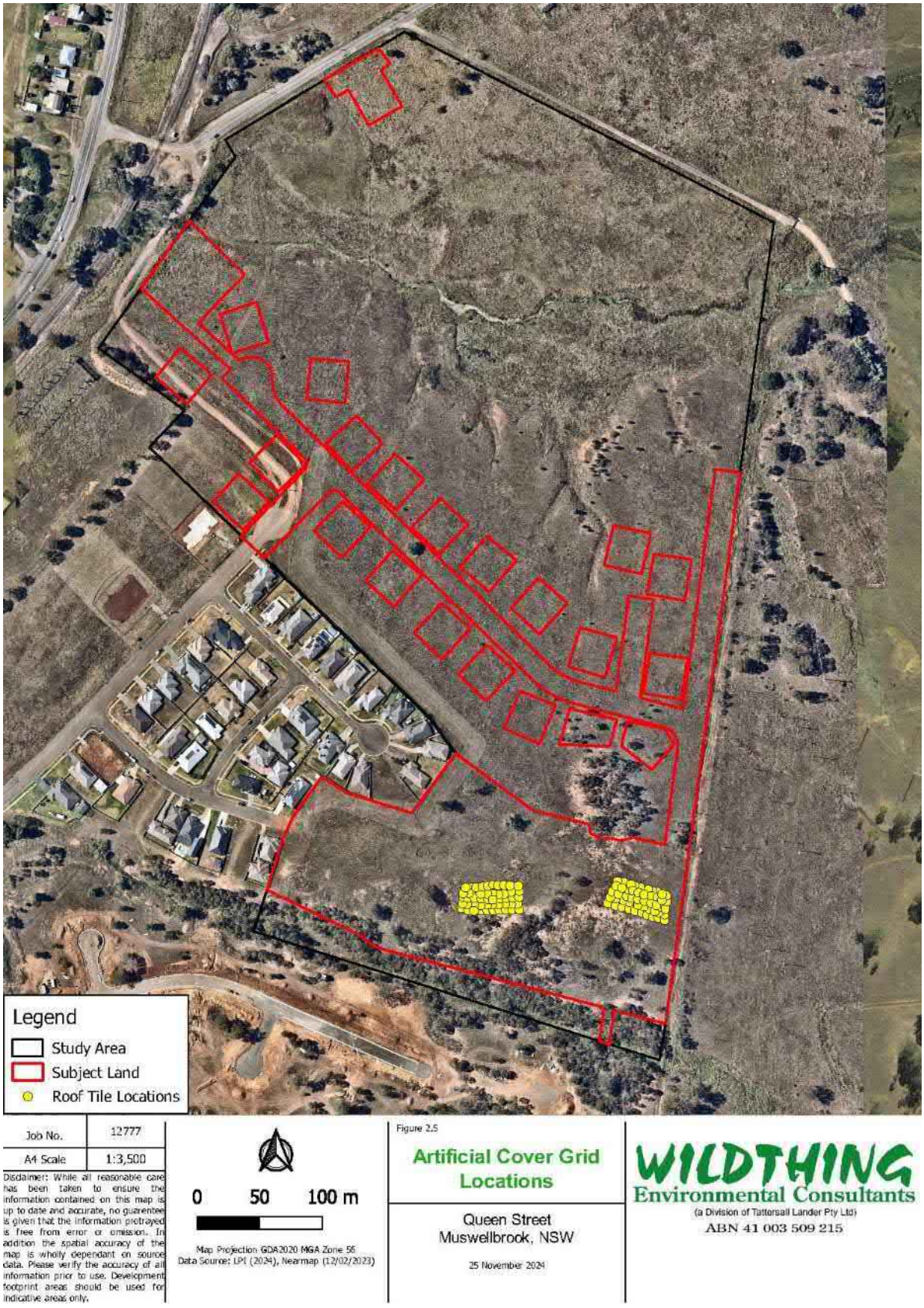


Figure 2.5 Artificial Cover Grid Locations



2.4.3.5 Arboreal Mammals

Arboreal mammal surveys targeted the candidate species credit species and *Cercartetus nanus* (Eastern Pygmy Possum), *Petaurus norfolcensis* (Squirrel Glider), *Phascogale tapoatafa* (Brush-tailed Phascogale) and *Phascolarctos cinereus* (Koala). Surveys included spotlighting and camera trapping.

Four camera traps (Swift Enduro & Reconyx Hyperfire cameras) were set up within the subject land between 17 May and 22 June 2023. Arboreal cameras were installed at least 4m up in trees to target arboreal species, particularly *Petaurus norfolcensis* (Squirrel Glider) and *Phascogale tapoatafa* (Brush-tailed Phascogale). Each of the cameras were aimed at a bait station containing a mixture of oats, peanut butter, honey and a truffle oil mixture. A mixture of honey and water was also sprayed on the trunk of the tree. After 2 weeks the bait stations and trees were re-sprayed with the honey-water mixture. The location of the camera traps within the subject land is shown in Figure 2.6.

Spotlighting was undertaken on foot using 100watt hand-held spotlights and high-powered head torches. The spotlighting involved walking at a slow pace along tracks and trails within the subject land area and stopping every 2 minutes, allowing the observer to hear movements of animals. Targeted candidate species targeted included *Petaurus norfolcensis* (Squirrel Glider), *Petauroides volans* (Greater Glider) and *Phascolarctos cinereus* (Koala). The location of the spotlighting routes within the subject land is shown in Figure 2.6.

2.4.3.6 Terrestrial Mammals

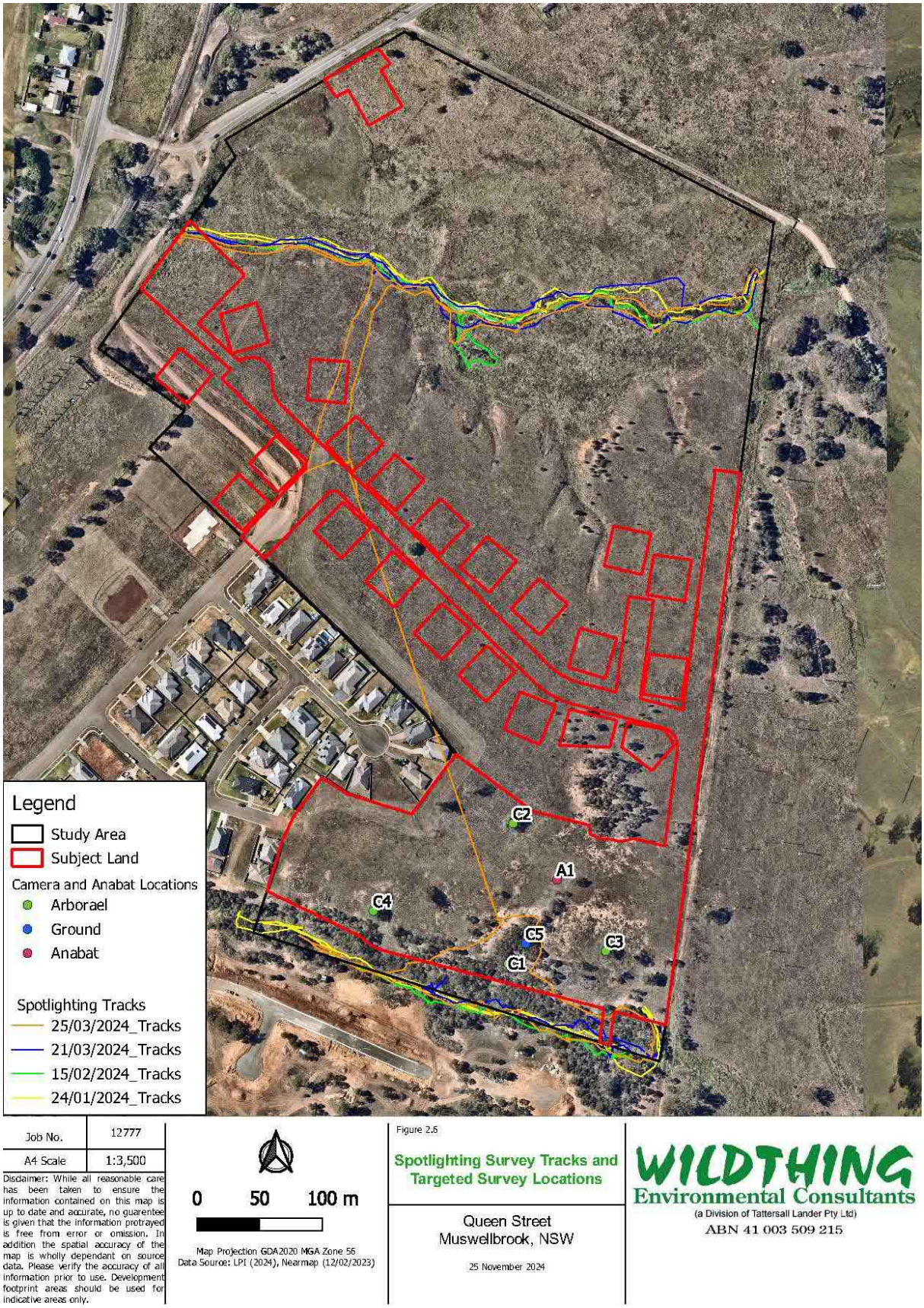
Terrestrial mammal surveys targeted the candidate species credit species *Planigale maculata* (Common Planigale). Surveys involved camera trapping and spotlighting.

One camera trap (Swift Endruo) was set at a height below 1m, targeting terrestrial mammal species within the subject land at various times between 25 January – 29 January 2024. The camera was aimed down a gully and possible track used by fauna. The location of the camera traps within the subject land is shown in Figure 2.6.

2.4.3.7 Microchiropteran Bat Survey

The microchiropteran bat surveys involving bat call detection involved recording Bat echo-location calls using a Anabat Swift detector. The stationary detector was positioned to sample potential hunting sites for bats, including flyways, clearings and ecotones. A total of 16 nights of recording was undertaken. The bat calls recorded by Wildthing Environmental Consultants were analysed in-house by Mungo Worth. The location of the microchiropteran bat call surveys is shown in Figure 2.6.

Figure 2.6 Spotlighting Survey Tracks and Targeted Survey Locations



2.4.3.8 Koala Spot Assessment Technique

The Spot Assessment Technique (SAT): a tool for determining localised levels of habitat use by Koalas was used to obtain additional information on Koala activity within the study area. The SAT involved a radial assessment of "Koala activity" within the immediate area surrounding a tree of any species that is known to have been utilised by the species, or otherwise considered to be of some importance for Koala conservation and/or management purposes. Three assessments were undertaken within random sites of the subject land.

In the field the technique was applied as follows:

1. Locate and uniquely mark with flagging tape a tree (the centre tree) that meets one or more of the following selection criteria:
    a. a tree of any species beneath which one or more Koala faecal pellets have been observed and/or
    b. a tree in which a Koala has been observed and/or
    c. any other tree known or considered to be potentially important for the Koala, or of interest for other assessment purposes.
2. Identify and uniquely mark the 29 nearest trees to the centre tree,
3. Undertake a search for the Koala faecal pellets beneath each of the 30 marked trees based on a cursory inspection of the undisturbed ground surface within a distance of 200 centimetres around the base of each tree, followed (if no faecal pellets are initially detected) by a more thorough inspection involving disturbance of the leaf litter and ground cover within the prescribed search area.

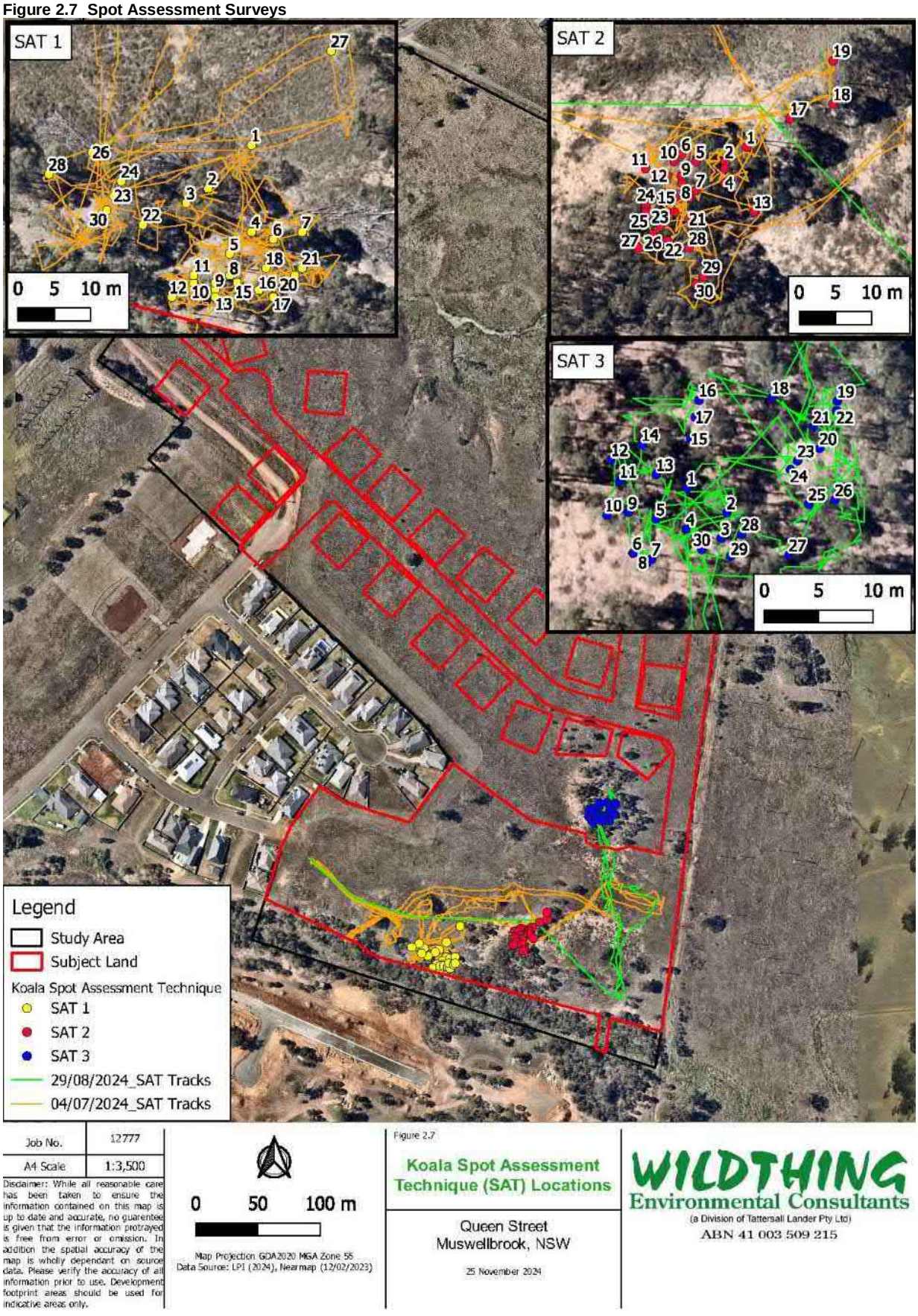
Five-person minutes per tree was dedicated to the faecal pellet search. The search of an individual tree was concluded once a single faecal pellet has been detected or when the maximum search time has expired, whichever happens first. This process was repeated until each of the 30 trees in the site had been assessed.

The location of the SAT surveys is shown in Figure 2.7.

2.4.3.9 Incidental Observations and Secondary Indications

All incidental observations and secondary indications such as the presence of scats were recorded.

Figure 2.7 Spot Assessment Surveys



2.5 Weather conditions

Survey effort, dates and timing and conditions are presented in Table 2.1. It should be noted that NSW has experience a high amount of rainfall in the month leading up to surveys undertaken within the subject land. The ground was noted to be wet underfoot, with visible pooling of water in low-lying depressions.

Table 2.1 Environmental conditions during threatened species surveys

Survey undertaken (e.g. method / targeted species)	Date	Time	Survey Effort (Person Hours)	Temperature (min. & max.)	Wind (light, mod…)	Rainfall (mm) at weather station	Other conditions relevant to the species
Initial site visit	27/04/2023	1230-1400	7.0hrs (2 persons)				
Set Camera Traps	17/05/2023	1200-1445	2.75hrs (1 person)	14.5°C	15km/hr ESE		7/8 Cloud, 71% Relative humidity
Check and rebait camera traps	6/06/2023	1130-1300	1.5hrs (1 person)	17.7°C	9km/hr S		2/8 Cloud, 59% Relative humidity
Retrieve cameras	22/06/2023	1230-1330	1.0hrs (1 person)	13°C	2km/hr SE		7/8 Cloud, 56% Relative humidity
Avifauna Survey	29/08/2023	1600-1745	1.75hrs (1 person)	24°C	8km/hr NW		1/8 Cloud, 28% Relative humidity
Stagwatching Spotlighting Mobile Bat Call Detection Owl Call Playback	29/08/2023	1745-2000	2.15hrs (1 person)	21°C	6km/hr NW		8/8 Cloud, 37% Relative humidity
Stagwatching Spotlighting	31/08/2023	1715-1915	2.0hrs (1 person)	19.3°C	9km/hr WNW		3/8 Cloud, 52% Relative humidity
Lay Tiles Targeted Flora Searches	13/10/2023	845-1430	18.75hrs (3 persons)	14.4°C	9km/hr NNW		0/8 Cloud, 52% Relative humidity
BAM Plot	13/11/2023	1345-1515	1.5hrs (1 person)	28°C	16km/hr SSW		1/8 Cloud, 41% Relative humidity
Set Anabat	9/01/2024	945-1015	0.5hrs (1 person)				Cloud, % Relative humidity
Check Anabat and move location Amphibian Survey Spotlight BAM Plots	24/01/2024	1430-2145	15.0hrs (2 persons)	36.3°C	2km.hr W		0/8 Cloud, 27% Relative humidity

Survey undertaken (e.g. method / targeted species)	Date	Time	Survey Effort (Person Hours)	Temperature (min. & max.)	Wind (light, mod…)	Rainfall (mm) at weather station	Other conditions relevant to the species
Avifauna Survey							
Retrieve Anabat Set Ground Camera	25/01/2024	1030-1130	1.0hrs (1 person)	31°C	8km/hr NW		2/8 Cloud, 46% Relative humidity
Retrieve Ground Camera	29/01/2024	1415-1430	0.5hrs (1 person)	36.9°C	7km/hr NNE		1/8 Cloud, 33% Relative humidity
BAM Plots Avifauna Survey Amphibian Survey	15/02/2024	1600-2045	4.75hrs (1 person)	26°C	33km/hr S		6/8 Cloud, 68% Relative humidity
Avifauna Survey Amphibian Survey	21/03/2024	1830-	(1 person)	19°C	14km/hr S		1/8 Cloud, 57% Relative humidity
Amphibian Survey	25/03/2024	1900-2100	2.0hrs (1 person)	24°C	2km/hr NW		0/8 Cloud, 44% Relative humidity
Habitat Tree Survey BAM Plot	3/04/2024	1230-1445	2.25hrs (1 person)	22°C	2km/hr NE		0/8 Cloud, 22% Relative humidity
Habitat Tree Survey Koala Spot assessments	4/07/2024	1200-1300	6.0hrs (2 persons)	14°C	22km/hr SSE		6/8 Cloud, 76% Relative humidity
Habitat Tree Survey	11/0712024	1400-1500	1.0hrs (1 person)	17°C	10km/hr SE		7/8 Cloud, 57% Relative humidity
Koala Spot assessment	29/08/2024	-	(2 persons)	18°C	15km/hr W		0/8 Cloud, 42% Relative humidity
Retrieve roof tiles	4/09/2024	730-900	3.0hrs (2 persons)	4°C	calm		1/8 Cloud, 100% Relative humidity
Vegetation survey	Monday 28/10/2024	1315 – 1415	1.0hrs (1 person)	30°C	13km/hr W		3/8 Cloud, 19% Relative H

2.6 Limitations

Limiting factors included the detection of species with large home ranges such as *Dasyurus maculatus* (Tiger Quoll) and Large Forest Owls. Climate variability may also affect the occurrence of some species such as *Lathamus discolor* (Swift Parrot) and *Anthochaera phrygia* (Regent Honeyeater).

Limitations have been overcome by applying the precautionary principle in all cases where the survey methodology may have given a false negative result. This precautionary principle was achieved by recognising that most threatened species are rare and therefore unlikely to be encountered during a survey even if they may utilise the study area at other times. These species have been assessed on the basis of the presence of their habitat and the likely significance of that habitat to a viable local population.

2.7 Licences

Fieldwork undertaken by Wildthing Environmental Consultants was carried out under the NPWS Scientific Investigation Licence SL 100345 and under Animal Care and Ethics Approval: Animal Research Authority Issue by the Director General of NSW Agriculture (File No. TRIM 13/251) for the Fauna Survey for Biodiversity and Impact Assessment.

3.0 Site context

3.1 Assessment area

The assessment area included the subject land and all land within a 1500m buffer around the boundary of the subject land for a total area of 1,043.35ha. The assessment area has been presented in Figure 3.1.

3.2 Landscape features

3.2.1 IBRA bioregions and IBRA subregions

Interim Biogeographic Regionalisation for Australia (IBRA) Bioregions are large, geographically distinct areas of land with common characteristics such as geology, landform patterns, climate, ecological features, and flora and fauna communities. The subject land is located within the Sydney Basin (SYB) IBRA Bioregion and the Hunter IBRA Subregion (DAWE 2016). Both IBRA and IBRA Subregional Boundaries do not occur near the subject land and hence are not shown within any Figures.

3.2.2 Rivers, streams, estuaries and wetlands

The subject land occurs within the greater Hunter River Catchment. A first order prescribed stream runs along the southern boundary of the subject land. A third order prescribed stream runs east to west in the north of the subject land with two first order streams that feed into it. The third order prescribed stream is located in a defined channel however no surface water was seen in the majority of the channel during any field work. Surface water was only ever observed within the study area in the far west of the third order stream in the north of the study area.

No wetlands were located within the 1500m assessment area or within close proximity. Prescribed streams within the Assessment Area are shown in Figure 3.1.

3.2.3 Habitat connectivity

According to the Fauna Key Habitats and Corridors for North East NSW (DPIE 2011) the subject land and assessment area do not contain any mapped corridors or habitat. Vegetation in the south of the subject land had loose connections to patches of habitat in the east. A weak connection runs along the west of a subdivision south of the subject land that connects the habitat within the subject land to a patch of good quality habitat in the south.

Both Key Fauna Habitat and Fauna Corridors of NE NSW do not occur within the assessment area and hence are not shown within any Figures.

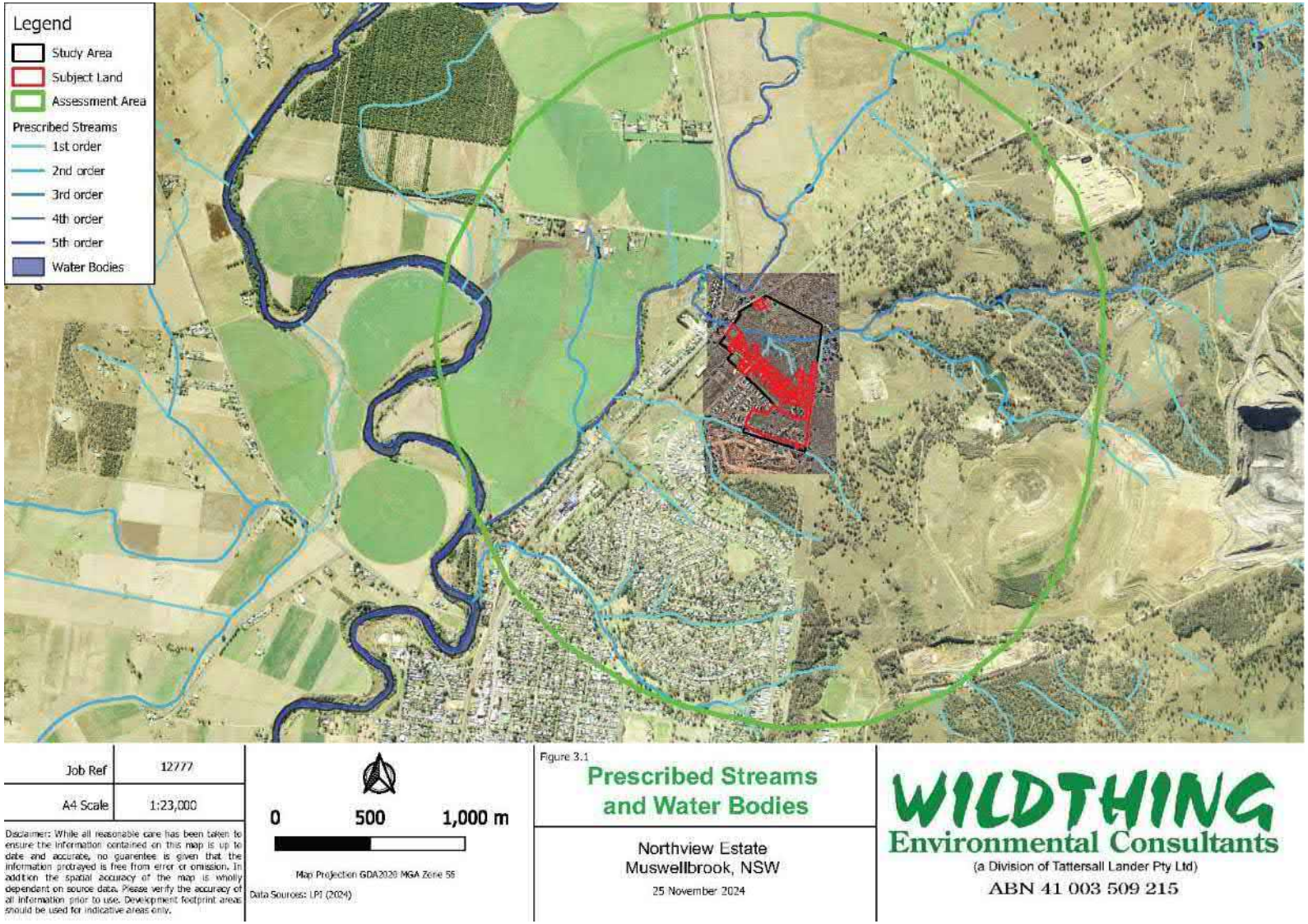
3.2.4 Karst, caves, crevices, cliffs, rocks or other geological features of significance

No significant geological features were present within the subject land.

3.2.5 Areas of outstanding biodiversity value

No areas of outstanding biodiversity value were identified within the subject land or assessment area.

Figure 3.1 Assessment area showing Prescribed Streams and Water Bodies



3.2.6 BioNet Landscapes NSW

The subject land fell within the BioNet Landscapes (formerly Mitchell Landscapes) (DPIE 2017) Central Hunter Foothills and Upper Hunter Channels and Floodplain. The majority of the subject land fell within the Central Hunter Foothills therefore this landscape was used as the primary landscape for the assessment. BioNet Landscapes occurs within subject land and assessment area are shown in Figure 3.2.

3.2.7 Geology and Soils

The subject land occurred on Roxburgh (rx) and Hunter (hu) Soil Landscapes. Roxburgh Soil Landscape occurred within the southern and eastern portions of the subject land and consisted of undulating hills with yellow podzolic soils on upper to midslopes and Red Solodic Soils on more rounded hills. Lithosols occurred on crests. Hunter Soil Landscape occurred within the western portion of the subject land an included soils formed in alluvium. Soils included Brown Clays and Black Earths on prior stream channels and on tributary flats, Alluvial Soils on levees and flats adjacent to the present river channel. Red Podzolic Soils and Lateritic Podzolic Soils are located on old terraces, with Non-calcic Brown Soils and Yellow Solodic Soils in some drainage lines. Figure 3.2 shows the occurrence of Soil Landscapes within and in proximity to the subject land.

3.2.8 Important Areas Map

The Important Areas Map was consulted and no important habitat mapping occurs within or in close proximity to the subject land.

3.3 Native vegetation cover

Approximately 424.17ha of native vegetation was mapped within the 1043.35ha assessment area (subject land and within a 1500m buffer and surrounding the outer edge surrounding the boundary of the subject land). Native vegetation cover within the assessment area is approximately 40.65 (41%) and falls within the >30-70% class according to the BAM (2020c). Table 3.1 summarises the extent of native vegetation cover within the assessment area. Figure 3.3 shows native vegetation cover within the assessment area.

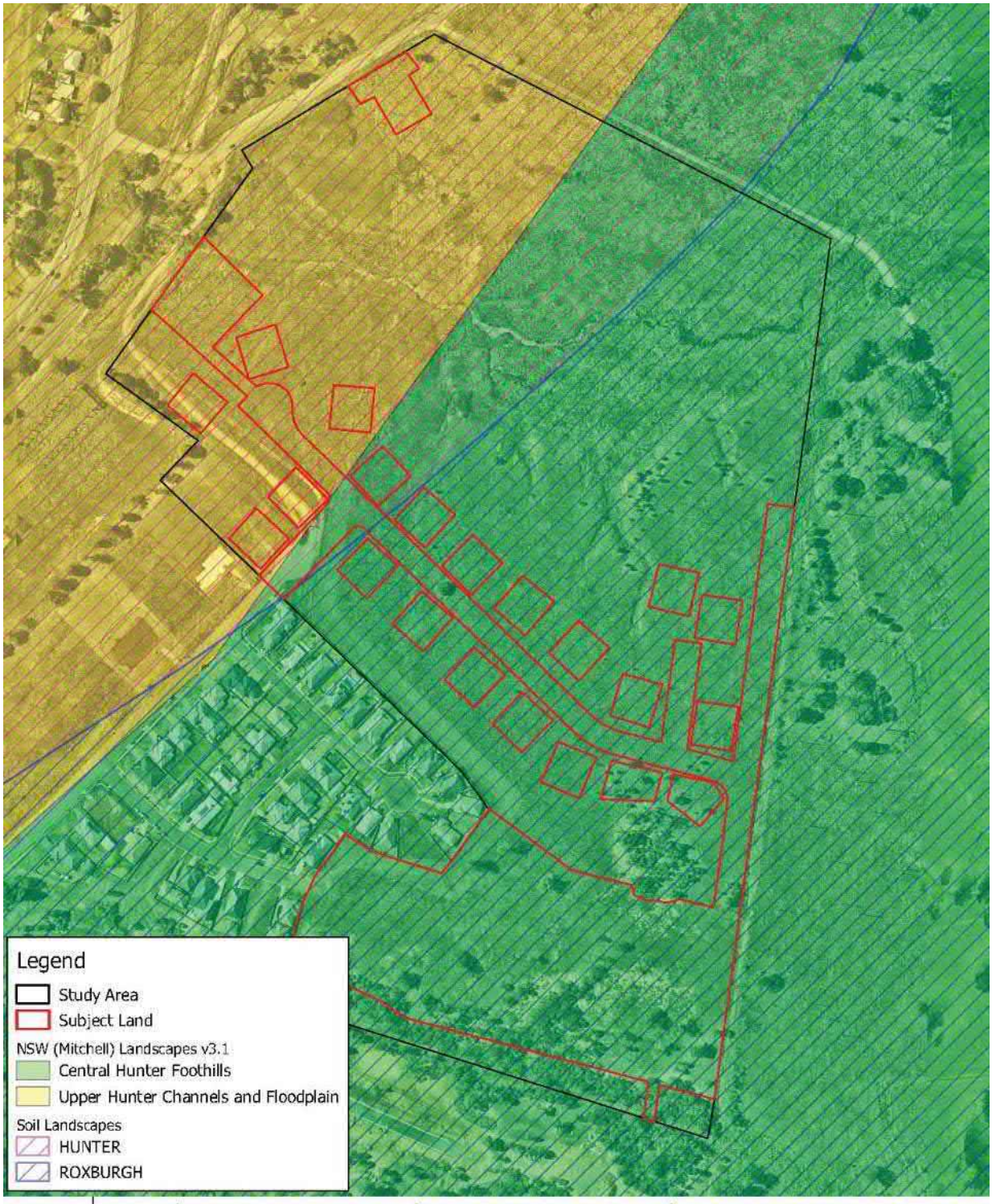
Table 3.1 Native vegetation cover in the assessment area

Assessment area (ha)	1043.35
Total area of native vegetation cover (ha)	424.17
Percentage of native vegetation cover (%)	40.65%
Class (0-10, >10-30, >30-70 or >70%)	>30-70 %

3.4 Past and current disturbance to native vegetation

The vegetation within the site had been subject to disturbances from past vegetation removal as a result of past agricultural practices particularly cattle grazing as well as ongoing slashing of ground vegetation around existing residential lots along the west side of the subject land. Native vegetation was present in the form of derived grassland throughout the majority of the subject land with remnant scattered trees and clustered trees in the south.

Figure 3.2 Occurrence of Soil Landscapes and BioNet (Mitchell) Landscapes within and in proximity to the subject land



Job No.	12777
A4 Scale	1:3,500

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarantee is given that the information protrayed is free from error or omission. In addition the spatial accuracy of the map is wholly dependant on source data. Please verify the accuracy of all information prior to use. Development footprint areas should be used for indicative areas only.

0 50 100 m

Map Projection GDA2020 MGA Zone 56
Data Source: LPI (2024), Nearmap (12/02/2023), NSW DCCEEW (2024 and 2016)

Figure 3.2

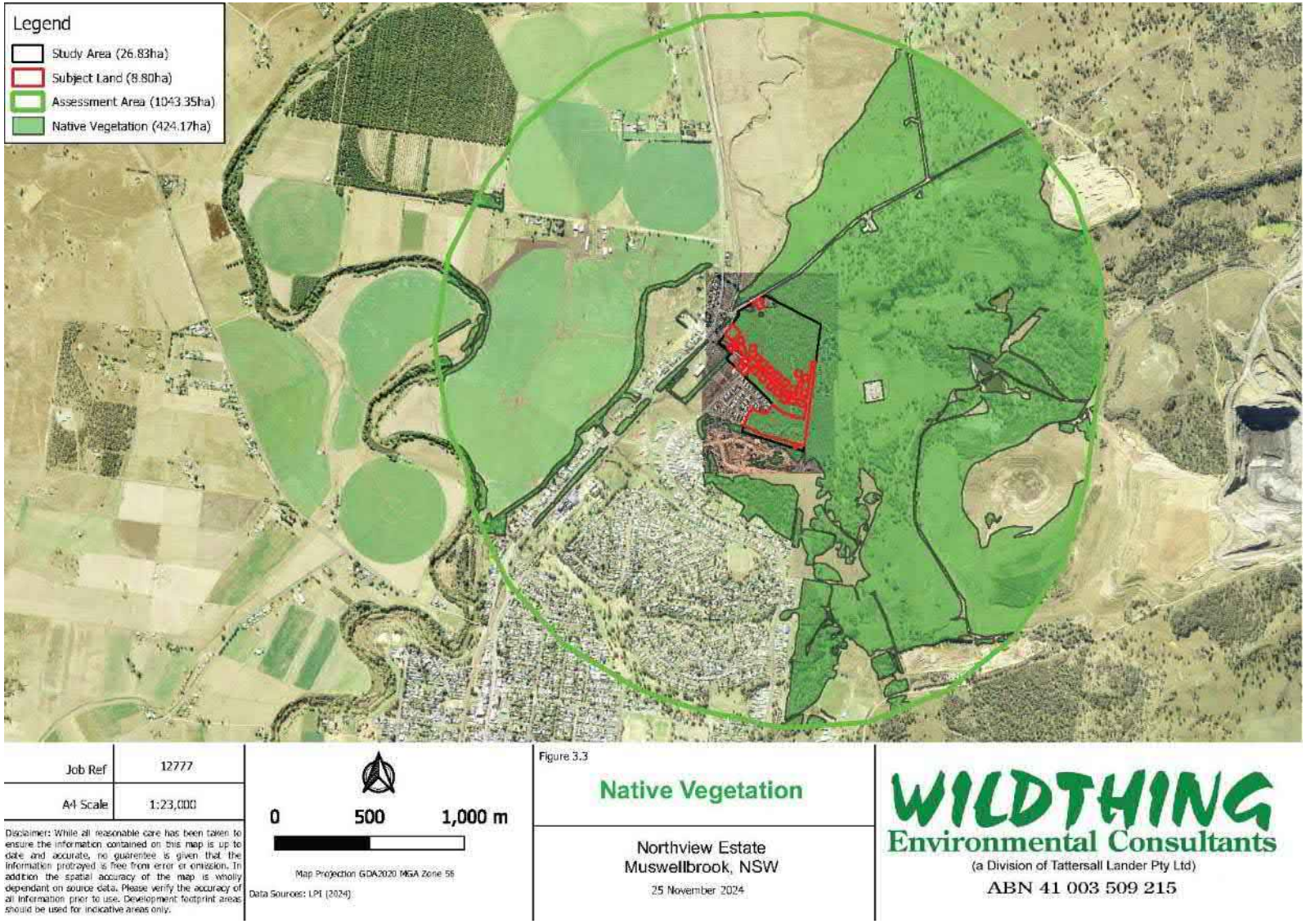
Bionet Landscapes and Soil Landscapes

Queen Street
Muswellbrook, NSW

25 November 2024

WILDTHING Environmental Consultants
(a Division of Tattersall Lander Pty Ltd)
ABN 41 003 509 215

Figure 3.3 Native Vegetation within the Assessment Area.



4.0 Native vegetation, threatened ecological communities and vegetation integrity

4.1 Native vegetation extent

Approximately 424.17ha of native vegetation was mapped within the 1,043.35ha assessment area (Native vegetation cover within the assessment area is approximately 41% and falls within Class b. >30-70% according to the BAM (2020c). Figure 3.3 shows the native vegetation extant within the assessment area.

4.1.1 Changes to the mapped native vegetation extent

Native vegetation within the subject land was found to reflect the review of aerial mapping interpretation and did not appear to be recently altered, with the exception of general property maintenance.

4.1.2 Areas that are not native vegetation

The majority of the subject land including the study area was mostly covered in derived native grassland with smaller areas of native trees. Areas of non-native vegetation were present in the far north-west of the subject land where a residence was once located. Non-native vegetation was also located in the north-west around the cattle yards and areas containing piles of dumped soil. These areas were largely dominated by introduced grasses, *Cenchrus clandestinus* (Kikuyu), *Chloris gayana* (Rhodes Grass) and other introduced ground covers particularly *Galenia pubescens* (Galenia).

Non-native vegetation was also located either side of the unsealed road off Queen Street including the area of land north-east of the existing residence. Common introduced ground covers here were *Cenchrus clandestinus* (Kikuyu), *Chloris gayana* (Rhodes Grass), *Bromus catharticus* (Prairie Grass), *Plantago lanceolata* (Plantain) and *Avena barbata* (Wild Oats).

In total 0.35ha of non-native vegetation was mapped within the subject land. Examples of non-native vegetation within the subject land are presented in Plates 4.1 – 4.8.

Plate 4.1: Non-native vegetation in the far northwest of the subject land (facing east)

Plate 4.2: Non-native vegetation in the far north-west of the subject land (facing north)

Plate 4.3: Non-native vegetation in the north of the subject land (facing south)

Plate 4.4: Non-native vegetation in the north-west of the subject land (facing west)

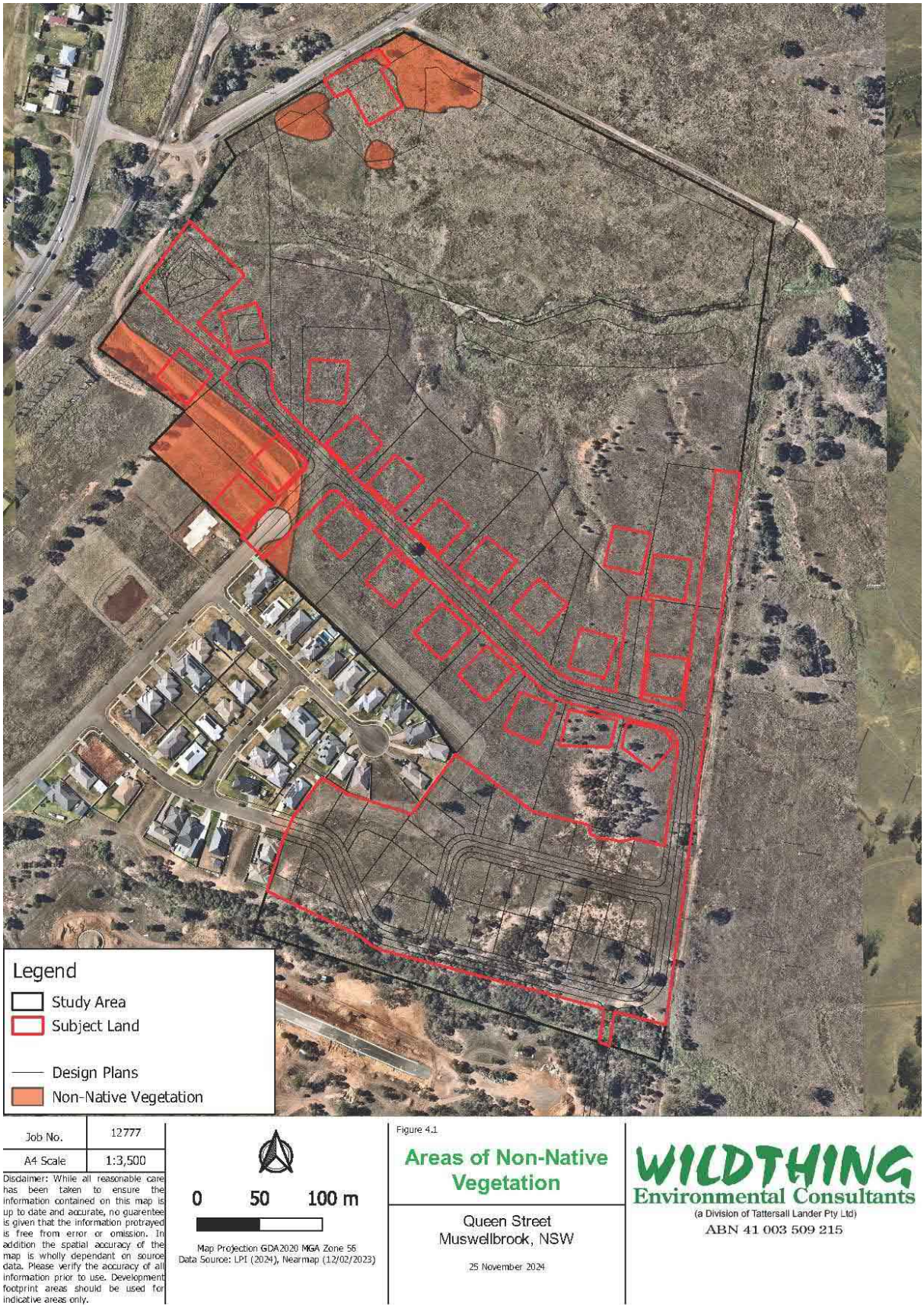
Plate 4.5: Non-native vegetation in the west of the subject land (facing north-west)

Plate 4.6: Non-native vegetation in the west of the subject land at the end of Queen Street (facing west)

Plate 4.7: Non-native vegetation along unsealed road in the west of the subject land (facing east)

Plate 4.8: Non-native vegetation along unsealed road in the west of the subject land (facing west)

Figure 4.1 Areas of non-native vegetation within subject land



4.2 Plant Community Types

4.2.1 Overview

Vegetation within the subject land has been assessed as aligning with the BioNet Vegetation Classification Plant Community Types (PCTs) identified within Table 4.1 and their extent is shown in Figure 4.2. BioNet Vegetation Classification bulk export data of all PCT's was downloaded and filtered. Filters (search terms) were applied to determine the most consistent PCT. Flora species within each stratum within the vegetation assemblage. Detailed descriptions of each PCT are provided in the following subsections.

Table 4.1 PCTs identified within the subject land

PCT ID	PCT name	Subject land area (ha)
3431	Central Hunter Ironbark Grassy Woodland	8.37
Total area		8.37

4.2.1.1 PCT 3431 - Central Hunter Ironbark Grassy Woodland

Table 4.2 PCT 3431 - Central Hunter Ironbark Grassy Woodland

PCT 3431 - Central Hunter Ironbark Grassy Woodland		
PCT ID	PCT 3431	
PCT name	Central Hunter Ironbark Grassy Woodland	
Vegetation Formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)	
Vegetation Class	Hunter-Macleay Dry Sclerophyll Forests	
Per cent cleared value (%)	86.47	
Extent within subject land (ha)	8.37ha	
Justification of PCT selection	Potential PCTs were identified by filtering through the BioNet Vegetation Classification Bulk Export Data of all PCTs (NSW DCCEEW 2024c). The following filters were applied:	
	Filter	**Selection**
	IBRA Region	Sydney Basin
	IBRA Subregion	Hunter
	Tree Growth Form Group Species	*Eucalyptus crebra*
	Native vegetation within the study area included a canopy almost exclusively made up of *Eucalyptus crebra*. Therefore, of the remaining PCTs, only those that contained *E. crebra* as the dominant canopy species were considered further. These PCTs were: 3431, 3438, 3757, 3759 and 3768. Upon review of the PCT descriptions, PCT 3757, 3759 and 3768 we not considered further as they area described as occurring on Narrabeen sandstone and steep, exposed locations which was not present in the study area.	

PCT 3431 - Central Hunter Ironbark Grassy Woodland	
	Of the remaining two PCTs (3431 and 3438), they are described as being different in their shrub layer composition. PCT 3431 is described as having sparse cover while PCT 3438 is described as having a mid-dense mid-canopy layer consisting of Acacias. Native vegetation within the study area almost entirely lacked a mid-canopy layer. Therefore PCT 3431 was found to best fit the vegetation on site. PCT 3431 is also mapped as occurring within the study area on the NSW State Vegetation Type Map (NSW DCCEEW 2022).
Description of PCT 3431 within the subject land	The entire subject site had been subject to historic native vegetation clearance and past agricultural practices particularly cattle grazing. The majority of the subject land and study area contained native vegetation most consistent with PCT 3431 - Central Hunter Ironbark Grassy Woodland. A large portion of PCT 3431 consisted of derived grassland. Smaller areas were composed of more concentrated remnant trees and regrowth were present in the south of the subject land. *Eucalyptus crebra* (Narrow-leaved Ironbark) was the dominant canopy species. A small number of specimens of *Eucalyptus moluccana* (Grey Box) were noted in the far south-east. Mid-storey species were largely absent. A small number of specimens of *Allocasuarina luehmannii* (Bulloak) were present. Native shrub species were uncommon within the subject site. Species recorded were *Notelaea microcarpa* var. *microcarpa* (Native Olive), *Acacia paradoxa* (Kangaroo Wattle), *Acacia decora* (Western Silver Wattle), *Solanum cinereum* (Narrawa Burr) and *Maireana microphylla* (Eastern Cottonbush). Native grasses were common groundcovers over the subject land within derived and treed areas. Common native grasses were *Aristida ramosa* (Three-awn Grass), *Sporobolus creber* (Rats Tail Grass), *Bothriochloa decipiens* var. *decipiens* (Red Leg Grass), *Cymbopogon refractus* (Barbed Wire Grass), *Chloris ventricosa* (Tall Windmill Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Digitaria divaricatissima* (Umbrella Grass), *Eriochloa pseudoacrotricha* (Early Spring Grass), *Rytidosperma fulvum* (Wallaby Grass), *Cynodon dactylon* (Couch), *Eragrostis leptostachya* (Paddock Lovegrass) and *Microlaena stipoides* (Weeping Meadow Grass). Other common native ground included *Chrysocephalum apiculatum* (Common Everlasting), *Sida corrugata* (Corrugated Sida), *Sida hackettiana* (Golden Rod), *Glycine tabacina*, *Dichondra repens* (Kidneyweed), *Einadia hastata* (Berry Saltbush), *Eremophila debilis* (Amulla), *Vittadinia cuneata* (Fuzzweed), *Commelina cyanea* (Scurvy Weed), *Mentha satureioides* (Native Mint), *Stackhousia viminea* (Slender Stackhousia), *Rumex brownii* (Slender Dock), *Dianella revoluta* (Blueberry Lily), *Erodium crinitum* (Blue Storksbill) and *Cheilanthes sieberi* subsp. *sieberi* (Mulga Fern).

PCT 3431 - Central Hunter Ironbark Grassy Woodland	
	Common introduced species included *Paspalum dilatatum* (Paspalum), *Lolium perenne* (Perennial Ryegrass), *Senecio madagascariensis* (Fireweed), *Sida rhombifolia* (Paddy's Lucerne), *Plantago lanceolata* (Plantago), *Gomphocarpus fruticosus* (Narrow-leaved Cottonbush), *Galenia pubescens* (Galenia), *Bidens pilosa* (Cobblers Pegs), *Verbena bonariensis* (Purple-top Verbena) and *Lycium ferocissimum* (African Boxthorn).
Condition States	PCT 3431 has been split into 4 vegetation zones based on different condition states that were present. Vegetation Zones are described in Section 4.4.
BC Act Status	Consistent with Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions
EPBC Act Status	Smaller areas in far south were consistent with the Critically Endangered Ecological Community Central Hunter Valley eucalypt forest and woodland. Areas of native derived grassland were excluded from this CEEC.

Examples of PCT 3431 within the study area (Plates 4.9 – 4.11).

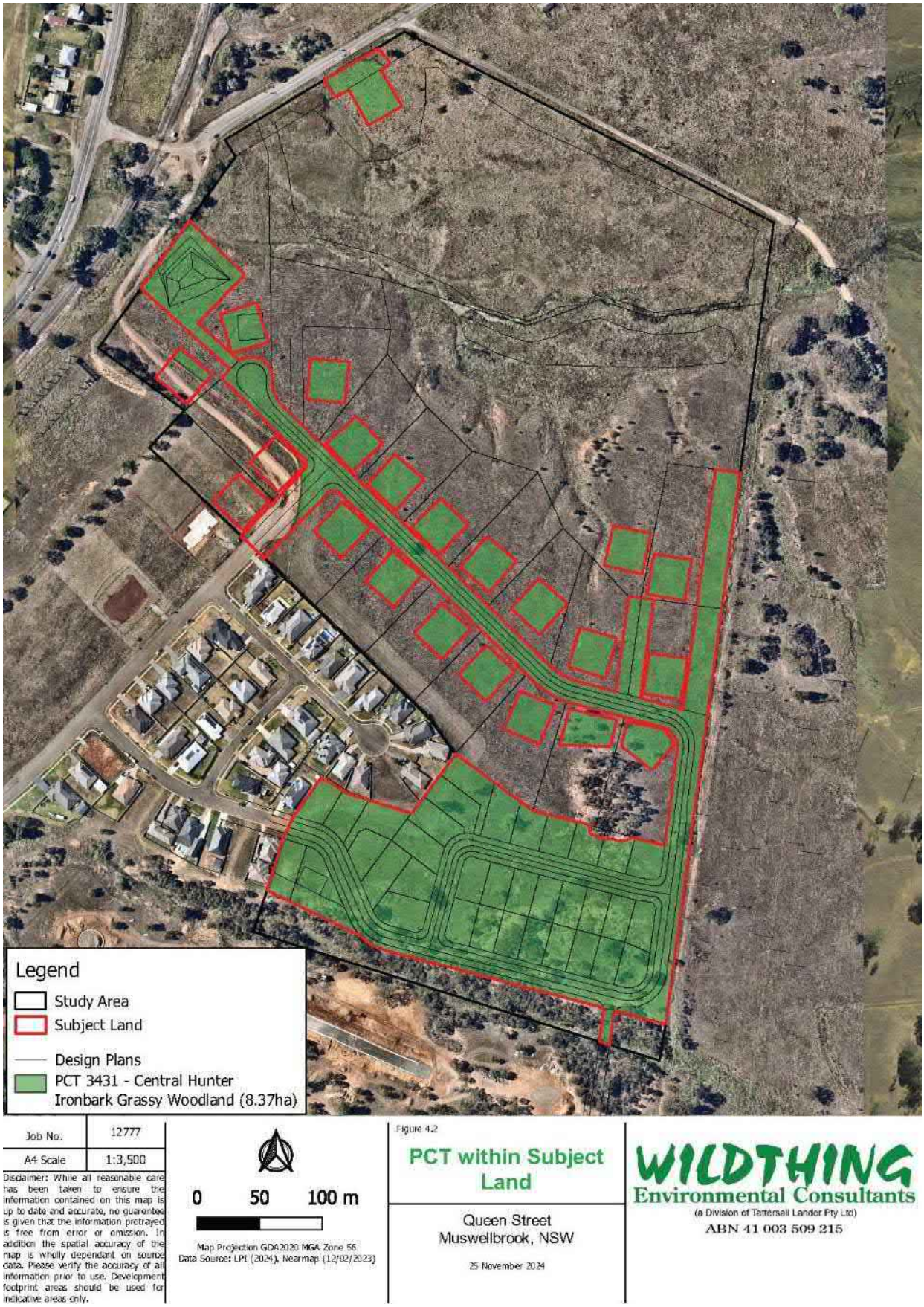
Plate 4.9 PCT 3431 within the south of subject land (facing south)

PCT 3431 - Central Hunter Ironbark Grassy Woodland

Plate 4.10 PCT 3431 within the centre of the study area (facing north-west)

Plate 4.11 PCT 3431 within the north of the study area (facing south)

Figure 4.2 PCT's within the subject land



4.3 Threatened ecological communities

Twenty-six threatened ecological communities (TECs) have been recorded within the region according to both the BioNet (DPE, 2024) and PMST databases.

PCT 3431 Central Hunter Ironbark Grassy Woodland within the subject site was found to be consistent with the listed NSW BC Act 2016 Endangered Ecological Community (EEC) Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions. A large portion of this EEC consisted of derived grassland. Smaller areas were composed of more concentrated remnant trees and regrowth.

4.4 Vegetation zones

Designation of vegetation zones was undertaken accordance with the methodology for vegetation integrity assessment outlined within Section 4.3 of the BAM (DPIE, 2020a). As described above one PCT was identified within the subject land:

- PCT 3431 - Central Hunter Ironbark Grassy Woodland

This PCT was assessed to determine if each PCT could be further stratified into separate vegetation zones based on current condition state or other environmental variables. The random meander, overview inspection and detailed floristic plot data have been used to inform the stratification of this PCT into vegetation zones. It was determined that the condition of each PCT found to occur within the subject land equated to one vegetation zone and could not be further stratified based on condition or environmental variables.

PCT 3431 was stratified on the basis of the broad presence/absence of key strata over the subject land. This stratification resulted in three vegetation zones. It is however proposed that credit offsetting for this development occur over stages. While three vegetation zones were found to occur within the subject land, they have been further split into additional vegetation zones based on which stage of the impact area they occur in to allow for the staged credit offsetting. Each vegetation zone of the same condition uses the same vegetation integrity score data since the vegetation quality/condition is the same for them and the only feature defining their boundaries is the impact area of the proposed stages. With this further stratification four vegetation zones were attributed with a vegetation zone ID:

- Zone 1: PCT 3431_Moderate_Stage 6 (0.54ha)
- Zone 2: PCT 3431_Remnant Trees_Stage 6 (1.49ha)
- Zone 3: PCT 3431_Derived Grassland_Stage 6 (2.19ha)
- Zone 4: PCT 3431_Derived Grassland_Stage 7 (4.15ha)

Descriptions of each vegetation zone are as follows:

Zone 1: PCT 3431 Moderate_Stage 6

Vegetation within this zone consisted of native canopy, groundcover and a few native mid-canopy species. Canopy was dominated by relatively small *Eucalyptus crebra* (Narrow-leaved Ironbark) with some larger remnant trees. A few individuals of *Myoporum montanum* (Water Bush) were present and common native groundcover included *Aristida ramosa* (Purple Wiregrass), *Cymbopogon refractus* (Barbes Wire Grass), *Chrysocephalum apiculatum* (Yellow Buttons) and *Lomandra multiflora* (Many-flowered Mat-rush).

Introduced species such as *Galenia pubescens* (Galenia) and *Lycium ferocissimum* (African Boxthorn) were common in areas.

This entire zone occurs within Stage 6.

Plate 4.12: Vegetation Zone 1 PCT 3431_Moderate within subject land

Plate 4.13: Vegetation Zone 1 PCT 3431_Moderate within subject land

Plate 4.14: Vegetation Zone 1 PCT 3431_Moderate within subject land

Zone 2: PCT 3431 Remnant Trees_Stage 6

This vegetation zone primarily contained canopy species in the form of large, remnant trees. Most remnant trees were *Eucalyptus crebra* (Narrow-leaved Ironbark) with the occasional *Eucalyptus moluccana* (Grey Box). Mid-canopy and shrub layer species were largely absent. Common ground cover species included *Fimbristylis dichotoma* (Common Fringe-sedge), *Sporobolus creber (*Slender Rat's Tail Grass) and *Chrysocephalum apiculatum* (Yellow Buttons).

Introduced species included *Sida rhombifolia* (Paddy's Lucerne) and *Galenia pubescens* (Galenia).

This entire zone occurs within Stage 6.

Plate 4.15: Vegetation Zone 2 PCT 3431_Remnant Trees

Plate 4.16: Vegetation Zone 2 PCT 3431_Remnant Trees

Zone 3: PCT 3431 Derived Grassland_Stage 6

The canopy, mid-story most shrub layer was almost entirely absent within this zone. Native groundcover included *Fimbristylis dichotoma* (Common Fringe-sedge), *Chrysocephalum apiculatum* (Yellow Buttons), *Digitaria divaricatissima* (Umbrella Grass), *Bothriochloa decipiens* (Redleg Grass) and *Cynodon dactylon* (Couch).

Introduced species included *Sida rhombifolia* (Paddy's Lucerne), *Setaria parviflora* and *Plantago lanceolate* (Plantain).

The southern portion of this vegetation condition occurs within Stage 6.

Zone 4: PCT 3431 Derived Grassland_Stage 7

Vegetation in this zone was in the same condition as that in Zone 3 and contained the same composition of species. The northern portion of vegetation in this condition occurs within Stage 7.

Examples of Zones 3 and 4 area shown in Plates 4.17 and 4.18.

Vegetation Zones within the subject land are identified within Table 4.3 and their extent is shown in Figure 4.3.

Plate 4.17: Vegetation Zone 3 and 4 PCT 3431_Derived Grassland

Plate 4.18: Vegetation Zone 3 and 4 PCT 3431_Derived Grassland

Figure 4.3 Vegetation Zones within the subject land

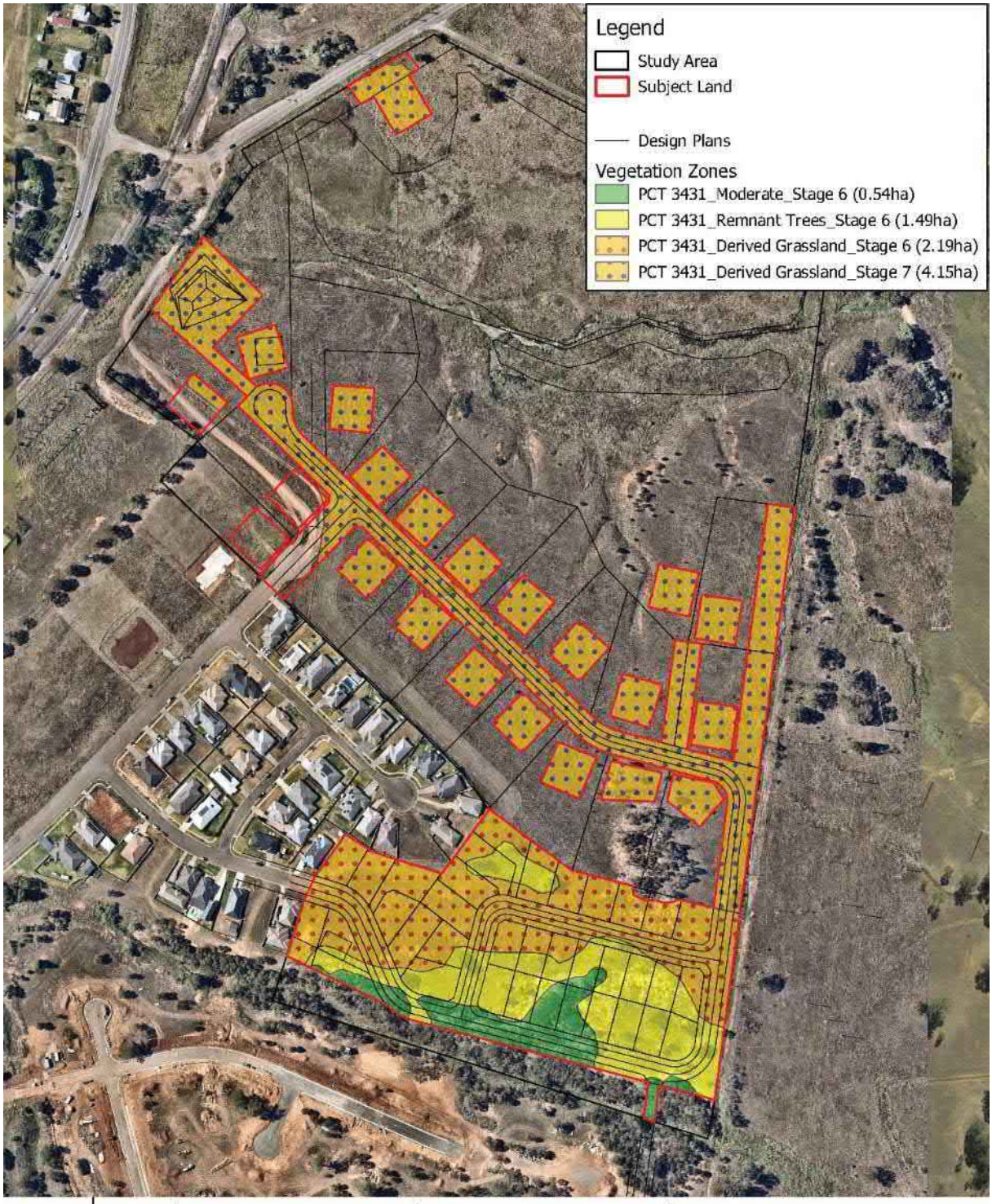


Table 4.3 Vegetation zones and patch sizes

Vegetation zone ID	PCT ID number and name	Condition/ other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	No. vegetation integrity plots used in assessment	Plot IDs of vegetation integrity plots used in assessment
1	PCT 3431 - Central Hunter Ironbark Grassy Woodland	Moderate_Stage 6	0.54	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	1A 1B
2	PCT 3431 - Central Hunter Ironbark Grassy Woodland	Remnant Trees_Stage 6	1.49	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	1	1	1	2A
3	PCT 3431 - Central Hunter Ironbark Grassy Woodland	Derived Grassland_Stage 7	2.19	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	3	3	4A 4B 4C
3	PCT 3431 - Central Hunter Ironbark Grassy Woodland	Derived Grassland_Stage 7	4.15	☐ <5 ha ☐ 5–24 ha ☐ 25–100 ha ☒ >100 ha	3	3	3	4A 4B 4C

4.5 Vegetation integrity (vegetation condition)

4.5.1 Vegetation integrity survey plots

The number of vegetation integrity plots sampled for each vegetation zone was determined by comparing the area of each vegetation zone with Table 3 of the BAM (DPIE 2020a). In all cases at least the minimum number of plots was sampled.

4.5.2 Scores

Table 4.8 Vegetation integrity scores

Vegetation zone ID	Composition condition score	Structure condition score	Function condition score (where relevant)	Vegetation integrity score	Hollow bearing trees present?
PCT 3431_Moderate_Stage 6	45.6	23.6	40	35.1	No
PCT 3431_Remnant Trees_Stage 6	52.4	20.1	31.1	32	Yes
PCT 3431_Derived Grassland_Stage 6	34.4	15.5	11.5	18.3	No
PCT 3431_Derived Grassland_Stage 7	34.4	15.5	11.5	18.3	No

4.5.3 Management Zones

All vegetation zones were each split into two management zones based on different impacts that will occur within the subject land. Areas that will require complete removal of all vegetation for the proposed lots in Stage 6, building envelopes in Stage 7, roads and basin were assigned Management Zone 1 (Removal). Areas outside of Management Zone 1 fell within the APZ and were assigned Management Zone 2 (APZ). Future Vegetation Integrity (VI) scored for the management zones were calculated as follows:

Management Zone 1 (Removal)

Future condition and VI scores for this zone were set at 0.

Management Zone 2 (APZ)

Planning for Bush Fire Protection (2019) outlines that Inner Protection Areas should establish and maintain the following criteria:

- *tree canopy cover should be less than 15% at maturity;*
- *tree canopies should be separated by 2 to 5m;*
- *shrubs should not be located under trees;*
- *shrubs should not form more than 10% ground cover*
- *grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and*
- *leaves and vegetation debris should be removed.*

Based on these recommendations, the following values were chosen for calculating future scores

Item	Value Entered	Justification
Future Composition Data		
Tree	1 (vegetation zone 1 & 2) 0 (vegetation Zone 3 & 4)	Some trees will require removal to reduce canopy cover to 15%. Many vegetation zones only contained one canopy species and within zones that contained more, only specimens of *E. crebra* fall within the APZ and can be retained. No trees were in the APZ management zone of vegetation zone 3 & 4.
Shrub	0	Most shrubs occur under trees or tree canopy therefore requiring removal to meet APZ requirements
Grass and Grass Like	Same as surveyed	No change. Removal not required for APZ
Forb	Same as surveyed	No change. Removal not required for APZ
Fern	Same as surveyed	No change. Removal not required for APZ
Other	Same as surveyed	No change. Removal not required for APZ
Future Structure Data		
Tree	15 (vegetation zone 1 & 2) 0 (vegetation Zone 3 & 4)	Some trees will require removal to reduce canopy cover to 15%. No trees were in the APZ management zone of vegetation zone 3 & 4.
Shrub	0	Most shrubs occur under trees or tree canopy therefore requiring removal to meet APZ requirements
Grass and Grass Like	Same as surveyed	No change. Removal not required for APZ
Forb	Same as surveyed	No change. Removal not required for APZ
Fern	Same as surveyed	No change. Removal not required for APZ
Other	Same as surveyed	No change. Removal not required for APZ
Future Function Data		
Number of Large Trees	0	No large trees are present in this management zone
Litter Cover	0	Not allowed within APZ
Length of Fallen Logs	0	Not allowed within APZ
Stem Size Class	2 (vegetation zone 1) 0 (vegetation Zone 2 - 4)	The two largest stem sizes were assumed to be retained for vegetation zone 1. No stem sizes were present for the other vegetation zones.
Regeneration	Absent	Ongoing required mowing will prevent regeneration
High Threat Weed Cover	Same as surveyed	No change. Removal not required for APZ

The management zones across the vegetation zones are shown in Figure 4.5.

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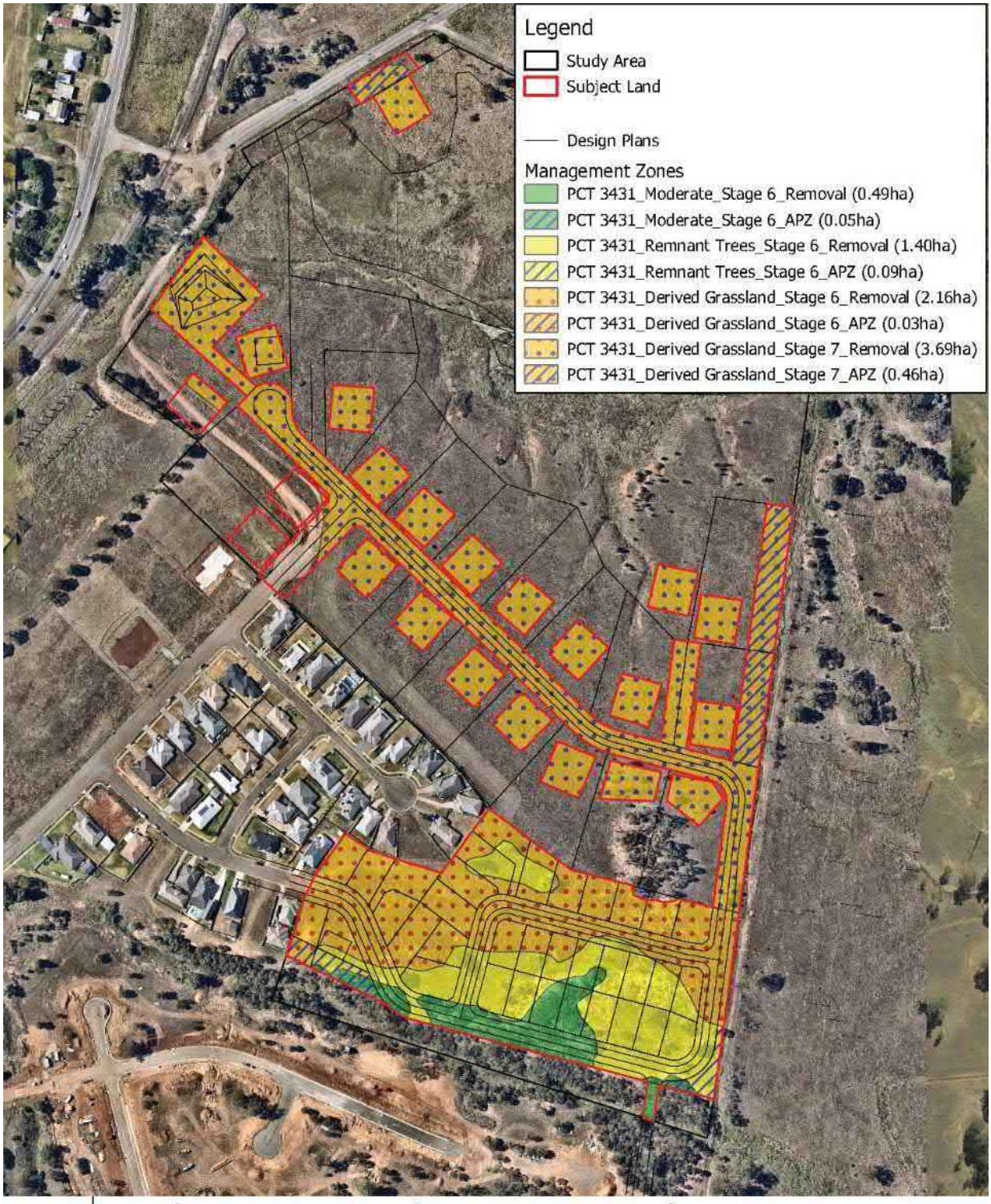
Figure 4.5 Management Zones



4.6 Threatened Flora Populations

Four Endangered Populations are listed in the local area:

- *Acacia pendula* (Weeping Myall) – population in the Hunter Catchment
- *Diuris tricolor*, the Pine Donkey Orchid population in the Muswellbrook local government area
- *Cymbidium canaliculatum* population in the Hunter Catchment
- *Eucalyptus camaldulensis* (River Red Gum) – population in the Hunter Catchment

No endangered populations or were recorded within the subject land or or study area despite targeted searches. A small number of specimens of *Acacia pendula* (Weeping Myall) were observed a short distance to the north over Sandy Creek Road. A photo of Weeping Myall north of the study area is shown below in Plate 4.19.

Plate 4.19 *Acacia pendula* (Weeping Myall) north of study area over Sandy Creek Road.

4.7 Tree Survey

Fourteen hollow-bearing trees were found within the study area during the significant tree survey. Eleven of these hollow-bearing trees are located within the subject land and one is located within earlier stages of the development. No large stick nests were found in trees within the subject land or in close proximity. The location of significant trees within the subject land and within close proximity are shown in are shown in Figure 4.5.

4.8 Movement Corridors

Forested vegetation in the south and south-east of the subject land acts as a corridor running east-west along the south of the subject land. This habitat is loosely connected to habitat in the east. This corridor connects to habitat south of the subject land via scattered trees in earlier stages of the Northview Estate. The proposal will result in a narrowing of this corridor. An aerial photo showing existing movement corridors is shown in Figure 4.6.

Figure 4.5 Significant Tree Survey Map

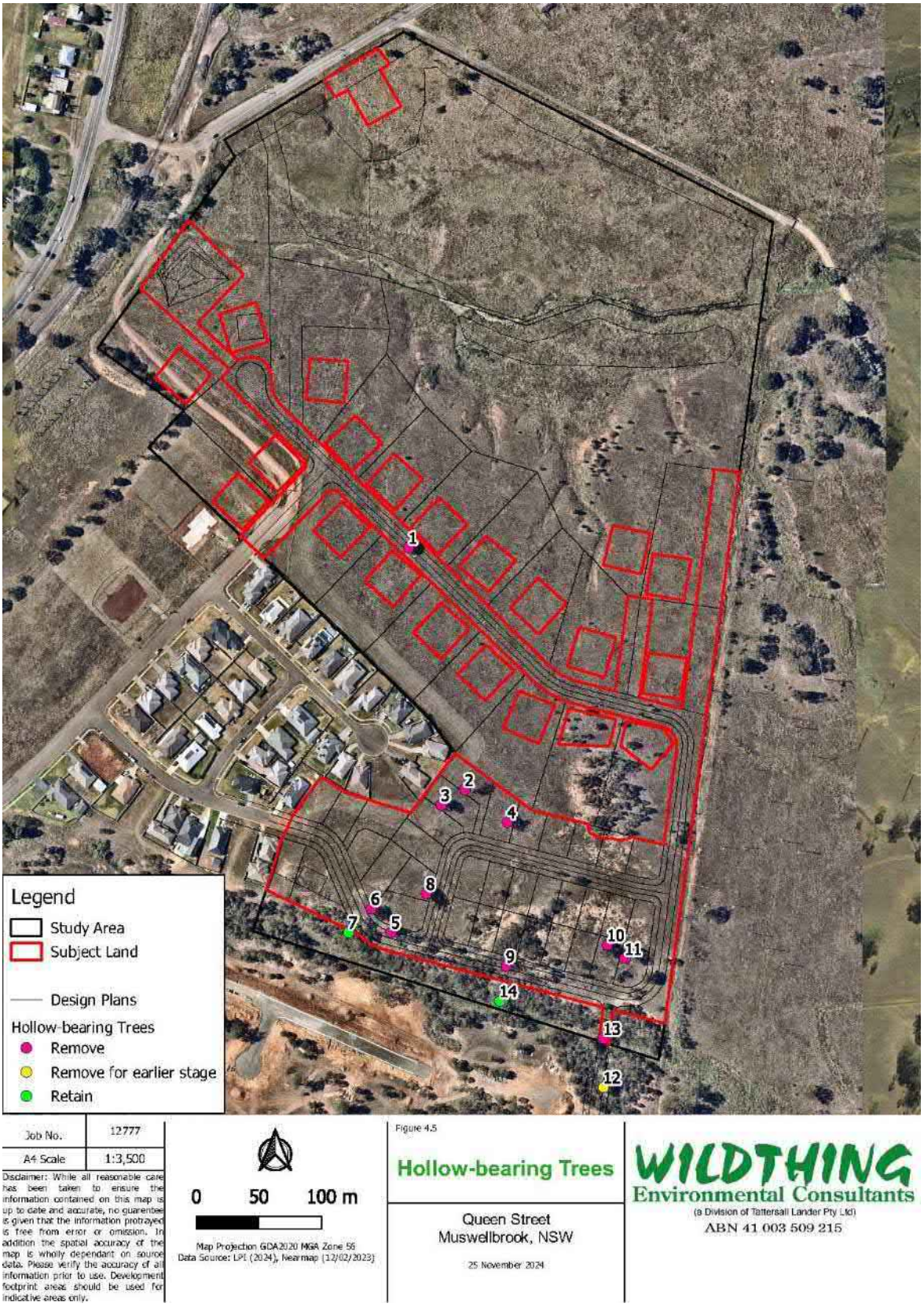
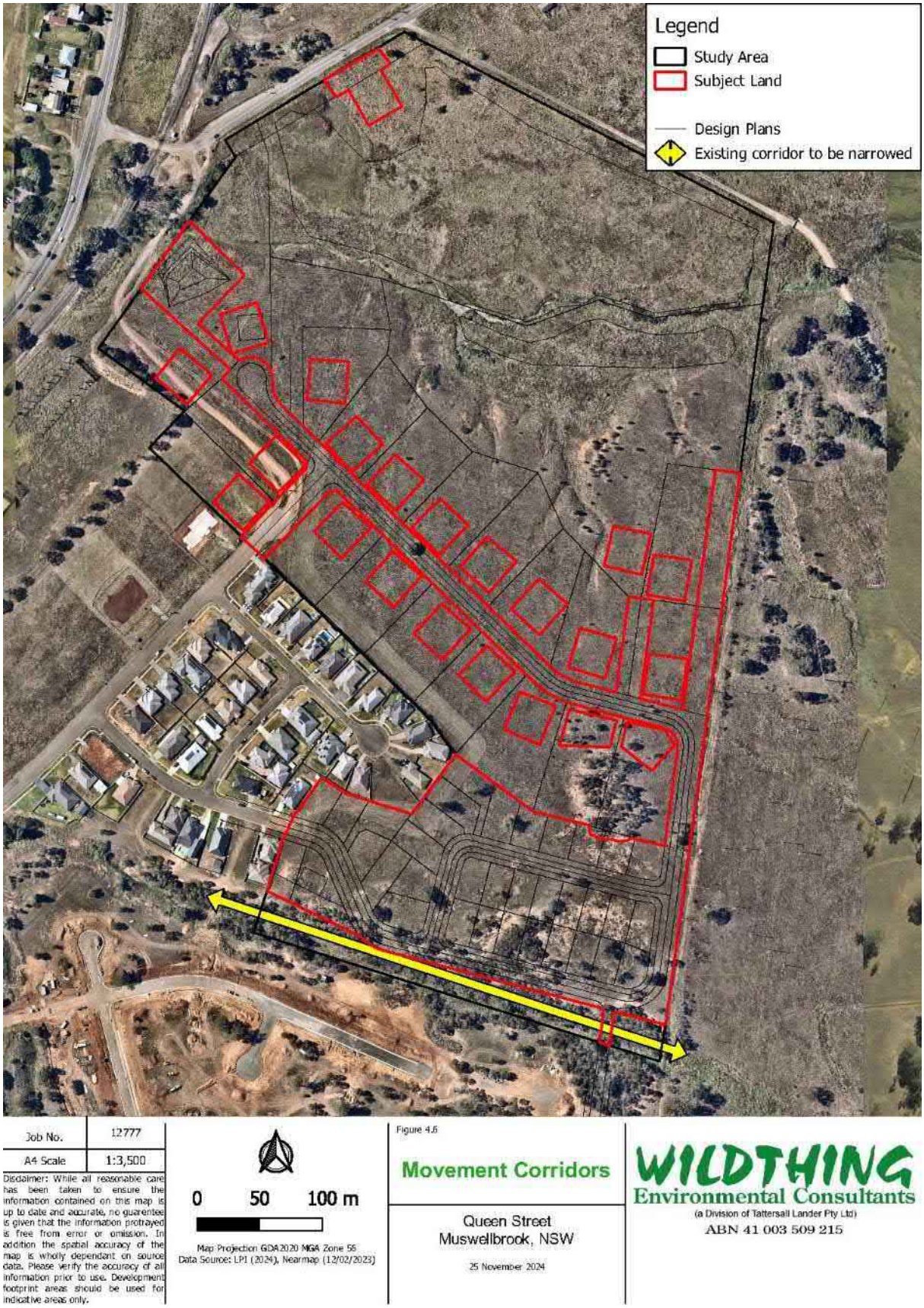


Figure 4.6 Existing and future movement corridors



5.0 Habitat suitability for threatened species

5.1 Identification of threatened species for assessment

5.1.1 Ecosystem credit species

Table 5.1 Predicted ecosystem credit species

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	High
Dusky Woodswallow	*Artamus cyanopterus cyanopterus*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	Moderate
Gang-gang Cockatoo (Foraging)	*Callocephalon fimbriatum*	V		Yes	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	Moderate

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Glossy Black-Cockatoo	*Calyptorhynchus lathami*	V		Yes	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	High
Speckled Warbler	*Chthonicola sagittata*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	High
Spotted Harrier	*Circus assimilis*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	Moderate
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	High

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Varied Sittella	*Daphoenositta chrysoptera*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	Moderate
Spotted-tailed Quoll	*Dasyurus maculatus*	V	E	No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	High
Black-necked Stork	*Ephippiorhynchus asiaticus*	E		No	BAM-C	No	None of the following habitat constraints were within the subject land: • Swamps • Shallow, open freshwater or saline wetlands or shallow edges of deeper wetlands within 300m of these waterbodies • Shallow lakes, lake margins and estuaries within 300m of these waterbodies	N/A	Moderate
Black Falcon	*Falco subniger*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6	Moderate

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
								PCT 3431_Derived Grassland_Stage 7	
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*	V		Yes	BAM-C	Yes – Recorded on site	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	High
Little Lorikeet	*Glossopsitta pusilla*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	High
White-bellied Sea-Eagle (foraging)	*Haliaeetus leucogaster*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	High
Little Eagle (Foraging)	*Hieraaetus morphnoides*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived	Moderate

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
								Grassland_Stage 7	
White-throated Needletail	*Hirundapus caudacutus*		V	No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	High
Black Bittern	*Ixobrychus flavicollis*	V		No	BAM-C	No	None of the following habitat constraints were within the subject land: • Waterbodies • Land within 40 m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation	N/A	Moderate
Swift Parrot (Foraging)	*Lathamus discolor*	E	CE	Yes	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	Moderate

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Broad-billed Sandpiper (Foraging)	*Limosa falcinellus*		V	No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	High
Square-tailed Kite (Foraging)	*Lophoictinia isura*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	Moderate
Black-chinned Honeyeater (eastern subspecies)	*Melithreptus gularis gularis*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	Moderate
Eastern Coastal Free-tailed Bat	*Micronomus norfolkensis*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	High

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Little Bent-winged-bat (Foraging)	*Miniopterus australis*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	High
Large Bent-winged-bat (Foraging)	*Miniopterus orianae oceanensis*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	High
Turquoise Parrot	*Neophema pulchella*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	High
Eastern Osprey (Foraging)	*Pandion cristatus*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	Moderate

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Scarlet Robin	*Petroica boodang*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	Moderate
Flame Robin	*Petroica phoenicea*			No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	Moderate
Grey-crowned Babbler (eastern subspecies)	*Pomatostomus temporalis temporalis*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	Moderate
Grey-headed Flying-fox (foraging)	*Pteropus poliocephalus*	V	V	Yes	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	High

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	High
Greater Broad-nosed Bat	*Scoteanax rueppellii*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	High
Diamond Firetail	*Stagonopleura guttata*	V	V	No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7	Moderate

5.1.3 Species credit species

Table 5.2 Predicted flora species credit species

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Acacia pendula population in the Hunter catchment	*Acacia pendula* - endangered population	E3		BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
Cymbidium canaliculatum population in the Hunter Catchment	*Cymbidium canaliculatum* - endangered population	E3		BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
Pine Donkey Orchid	*Diuris tricolor*	V		BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
Pine Donkey Orchid population in the Muswellbrook local government area	*Diuris tricolor - endangered population*	E3		BAM-C	No	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
Slaty Red Gum	*Eucalyptus glaucina*	V	V	TBDC	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Ozothamnus tesselatus	*Ozothamnus tesselatus*	V		BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
North Rothbury Persoonia	*Persoonia pauciflora*	CE	CE	BAM-C	No	Outside 10km of North Rothbury	N/A
Scant Pomaderris	*Pomaderris queenslandica*	E		BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
Tarengo Leek Orchid	*Prasophyllum petilum*	E	E	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
Prasophyllum sp. Wybong	*Prasophyllum sp. Wybong*		CE	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Pterostylis chaetophora	*Pterostylis chaetophora*	V		BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7

Table 5.3 Predicted fauna species credit species

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act					
Regent Honeyeater	*Anthochaera phrygia*	CE	CE	Yes	BAM-C	No	This species was excluded as a SCS as the subject land was not within the Important Areas Map for this species.	N/A
Bush Stone-curlew	*Burhinus grallarius*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
Gang-gang Cockatoo (Breeding)	*Callocephalon fimbriatum*	V	E	Yes	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
Glossy Black-Cockatoo (breeding)	*Calyptorhynchus lathami*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
Eastern Pygmy-possum	*Cercartetus nanus*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act					
Large-eared Pied Bat	*Chalinolobus dwyeri*	V	V	Yes	BAM-C	No	None of the following habitat constraints were within the subject land: • Cliffs • Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels	N/A
Striped Legless Lizard	*Delma impar*	V	V	No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
Emu population in the New South Wales North Coast Bioregion and Port Stephens local government area	*Dromaius novaehollandiae - endangered population*	E2		No	BAM-C	No	Outside of Port Stephens LGA	N/A
White-bellied Sea-Eagle (breeding)	*Haliaeetus leucogaster*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act					
Little Eagle	*Hieraaetus morphnoides*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
Swift Parrot (Breeding)	*Lathamus discolor*	E	CE	Yes	BAM-C	No	This species was excluded as a SCS as the subject land was not within the Important Areas Map for this species.	N/A
Broad-billed Sandpiper (Breeding)	*Limosa falcinellus*		V	No	BAM-C	No	This species was excluded as a SCS as the subject land was not within the Important Areas Map for this species.	N/A
Green & Golden Bell Frog	*Litoria aurea*	E	V	Yes	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
Square-tailed Kite (Breeding)	*Lophoictinia isura*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
Little Bent-winged Bat (breeding)	*Miniopterus australis*	V		No	BAM-C	No	None of the following habitat constraints were within the subject land: • Caves	N/A

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act					
							• Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' • observation type code 'E nest-roost' • with numbers of individuals >500 • or from the scientific literature	
Large Bent-winged Bat (breeding)	*Miniopterus orianae oceanensis*	V		No	BAM-C	No	None of the following habitat constraints were within the subject land: • Caves • Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' • observation type code 'E nest-roost' • with numbers of individuals >500 • or from the scientific literature	N/A

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act					
Southern Myotis	*Myotis macropus*	V		No	BAM-C	No	None of the following habitat constraints were within the subject land: • Waterbodies • Waterbodies with permanent pools/stretches 3m or wider, including rivers, large creeks, billabongs, lagoons, estuaries, dams and other waterbodies, on or within 200m of the site	N/A
Barking Owl (Breeding)	*Ninox connivens*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
Powerful Owl (Breeding)	*Ninox strenua*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
Eastern Osprey (breeding)	*Pandion cristatus*	V		No	BAM-C	No	None of the following habitat constraints were within the subject land: • Presence of stick-nests in living and dead trees (>15m) or artificial structures within 100m of a floodplain for nesting)	N/A

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act					
Southern Greater Glider	*Petauroides volans*	E	E	No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
Squirrel Glider	*Petaurus norfolcensis*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
Brush-tailed Rock-wallaby	*Petrogale penicillata*	E	V	Yes	BAM-C	No	None of the following habitat constraints were within the subject land: • Land not within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or cliftlines	N/A
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
Koala	*Phascolarctos cinereus*	E	E	Yes	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act					
								Grassland_Stage 7
Common Planigale	*Planigale maculata*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
Grey-headed Flying-fox	*Pteropus poliocephalus*	V	V	Yes	BAM-C	No	None of the following habitat constraints were within the subject land: • Breeding Camps	N/A
Masked Owl (breeding)	*Tyto novaehollandiae*	V		No	BAM-C	Yes	N/A	PCT 3431_Moderate_Stage 6 PCT 3431_Remnant Trees_Stage 6 PCT 3431_Derived Grassland_Stage 6 PCT 3431_Derived Grassland_Stage 7
Eastern Cave Bat	*Vespadelus troughtoni*	V		No	BAM-C	No	None of the following habitat constraints were within the subject land: • Caves present • Rocky areas within two kilometres containing caves, overhangs, escarpments, outcrops, crevices or boulder piles, or within two kilometres of old	N/A

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act					
							mines, tunnels, old buildings or sheds."	

5.2 Presence of candidate species credit species

From the remaining lists shown in Table 5.4 (Flora) and Table 5.5 (Fauna) candidate species credit species can be determined in accordance with BAM Subsection 5.2.4 to be present or absent within the subject land based on:

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

The presence or absence of all candidate species credit species was determined by targeted threatened species surveys. No important habitat mapping for any candidate species was present within the subject land.

Table 5.4 Determining the presence of candidate flora species credit species on the subject land

Common name	Scientific name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Acacia pendula population in the Hunter catchment	*Acacia pendula* - endangered population	E3		Targeted threatened species survey	No	No
Cymbidium canaliculatum population in the Hunter Catchment	*Cymbidium canaliculatum* - endangered population	E3		Targeted threatened species survey	No	No
Pine Donkey Orchid	*Diuris tricolor*	V		Targeted threatened species survey	No	No
Pine Donkey Orchid population in the Muswellbrook local government area	*Diuris tricolor - endangered population*	E3		Targeted threatened species survey	No	No
Slaty Red Gum	*Eucalyptus glaucina*	V	V	Targeted threatened species survey	No	No
Ozothamnus tesselatus	*Ozothamnus tesselatus*	V		Targeted threatened species survey	No	No
Scant Pomaderris	*Pomaderris queenslandica*	E		Targeted threatened species survey	No	No

Common name	Scientific name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Tarengo Leek Orchid	*Prasophyllum petilum*	E	E	Targeted threatened species survey	No	No
Prasophyllum sp. Wybong	*Prasophyllum sp. Wybong*		CE	Targeted threatened species survey	No	No
Pterostylis chaetophora	*Pterostylis chaetophora*	V		Targeted threatened species survey	No	No

Table 5.5 Determining the presence of candidate fauna species credit species on the subject land

Common name	Scientific name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Bush Stone-curlew	*Burhinus grallarius*	V		Targeted threatened species survey	No	No
Gang-gang Cockatoo (Breeding)	*Callocephalon fimbriatum*	V	E	Targeted threatened species survey	No	No
Glossy Black-Cockatoo (breeding)	*Calyptorhynchus lathami*	V		Targeted threatened species survey	No	No
Eastern Pygmy-possum	*Cercartetus nanus*	V		Targeted threatened species survey	No	No
Striped Legless Lizard	*Delma impar*	V	V	Targeted threatened species survey	Yes	Yes
White-bellied Sea-Eagle (breeding)	*Haliaeetus leucogaster*	V		Targeted threatened species survey	No	No
Little Eagle	*Hieraaetus morphnoides*	V		Targeted threatened species	No	No

Common name	Scientific name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
				survey		
Green & Golden Bell Frog	*Litoria aurea*	E	V	Targeted threatened species survey	No	No
Square-tailed Kite (Breeding)	*Lophoictinia isura*	V		Targeted threatened species survey	No	No
Barking Owl (Breeding)	*Ninox connivens*	V		Targeted threatened species survey	No	No
Powerful Owl (Breeding)	*Ninox strenua*	V		Targeted threatened species survey	No	No
Southern Greater Glider	*Petauroides volans*	E	E	Targeted threatened species survey	No	No
Squirrel Glider	*Petaurus norfolcensis*	V		Targeted threatened species survey	Yes	Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	V		Targeted threatened species survey	No	No
Koala	*Phascolarctos cinereus*	E	E	Targeted threatened species survey	No	No
Common Planigale	*Planigale maculata*	V		Targeted threatened species survey	No	No
Masked Owl (breeding)	*Tyto novaehollandiae*	V		Targeted threatened species survey	No	No

5.3 Threatened species surveys

All candidate flora species were surveyed in accordance with the Surveying threatened plants and their habitats – NSW survey guide for the Biodiversity Assessment Method (DPIE, 2020d). All surveys were conducted using systematic parallel transects within suitable habitat. Parallel field traverses were separated by 5-10m for orchids, herbs and forbs, 10-15m for sub-shrubs and 10-20m for tree and shrubs.

Table 5.6 Threatened species surveys for candidate flora species credit species on the subject land

Common name	Scientific name	Threatened flora species surveys				Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Acacia pendula population in the Hunter catchment	*Acacia pendula* - endangered population	Systematic parallel transects Methods described in NSW survey guide for the Biodiversity Assessment Method (DPIE 2020e)	☒ Yes 03/04/2024 4/07/2024 11/07/2024	☐ No	2 hours (1 person) 2.0 hours (2 persons)	No	No
Cymbidium canaliculatum population in the Hunter Catchment	*Cymbidium canaliculatum* - endangered population	Systematic parallel transects Methods described in NSW survey guide for the Biodiversity Assessment Method (DPIE 2020e)	☒ Yes 03/04/2024 4/07/2024 11/07/2024	☐ No	2 hours (1 person) 2.0 hours (2 persons)	No	No
Pine Donkey Orchid	*Diuris tricolor*	Systematic parallel transects Methods described in NSW survey guide for the Biodiversity Assessment Method (DPIE 2020e)	☒ Yes 13/10/2023 28/10/2024	☐ No	1.0 hours (1 person) 18.75 hours (3 persons)	No	No
Pine Donkey Orchid population in the Muswellbrook local government area	*Diuris tricolor - endangered population*	Systematic parallel transects Methods described in NSW survey guide for the Biodiversity Assessment Method (DPIE 2020e)	☒ Yes 13/10/2023 28/10/2024	☐ No	1.0 hours (1 person) 18.75 hours (3 persons)	No	No
Slaty Red Gum	*Eucalyptus glaucina*	Systematic parallel transects Methods described in NSW survey guide for the Biodiversity Assessment Method (DPIE 2020e)	☒ Yes 03/04/2024 4/07/2024 11/07/2024	☐ No	2 hours (1 person) 2.0 hours (2 persons)	No	No

Common name	Scientific name	Threatened flora species surveys				Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Ozothamnus tesselatus	*Ozothamnus tesselatus*	Systematic parallel transects Methods described in NSW survey guide for the Biodiversity Assessment Method (DPIE 2020e)	☒ Yes 13/10/2023 28/10/2024	☐ No	1.0 hours (1 person) 18.75 hours (3 persons)	No	No
Scant Pomaderris	*Pomaderris queenslandica*	Systematic parallel transects Methods described in NSW survey guide for the Biodiversity Assessment Method (DPIE 2020e)	☒ Yes 13/10/2023 28/10/2024	☐ No	1.0 hours (1 person) 18.75 hours (3 persons)	No	No
Tarengo Leek Orchid	*Prasophyllum petilum*	Systematic parallel transects Methods described in NSW survey guide for the Biodiversity Assessment Method (DPIE 2020e)	☒ Yes 13/10/2023 28/10/2024	☐ No	1.0 hours (1 person) 18.75 hours (3 persons)	No	No
Prasophyllum sp. Wybong	*Prasophyllum sp. Wybong*	Systematic parallel transects Methods described in NSW survey guide for the Biodiversity Assessment Method (DPIE 2020e)	☒ Yes 13/10/2023 28/10/2024	☐ No	1.0 hours (1 person) 18.75 hours (3 persons)	No	No
Pterostylis chaetophora	*Pterostylis chaetophora*	Systematic parallel transects Methods described in NSW survey guide for the Biodiversity Assessment Method (DPIE 2020e)	☒ Yes 13/10/2023 28/10/2024	☐ No	1.0 hours (1 person) 18.75 hours (3 persons)	No	No

Table 5.7 Threatened species surveys for candidate fauna species credit species on the subject land

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Bush Stone-curlew	*Burhinus grallarius*	Spotlighting Camera Trapping As described in Threatened biodiversity survey and assessment Guidelines for developments and activities (2004 working draft) (DEC 2004)	☒ Yes Spotlighting 29/08/2023 31/08/2023 24/01/2024 Ground Camera Trapping 25/01/2024 – 29/01/2024	☐ No	Spotlighting 4.25 hours (1 Person) 2.0 hours (2 People) Camera Trapping 4 days	No	No
Gang-gang Cockatoo (Breeding)	*Callocephalon fimbriatum*	Avifauna Survey for signs of breeding Significant Tree Survey for habitat trees Methods described in TBDC (DPE 2023b)	☒ Yes Avifauna Survey 24/01/2024 Tree Survey 4/07/2024 11/07/2024	☐ No	Avifauna Survey 1.75 hours (1 Person) Tree Survey 1 hour (1 person) 2.0 hours (2 persons)	No	No
Glossy Black-Cockatoo (breeding)	*Calyptorhynchus lathami*	Avifauna Survey for signs of breeding Significant Tree Survey for habitat trees Methods described in TBDC (DPE 2023b)	☒ Yes Avifauna Survey 29/08/2023 24/01/2024 15/02/2024	☐ No	Avifauna Survey 6.5 hours (1 Person) 1.0 (2 Persons)	No	No

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
			21/03/2024 Tree Survey 4/07/2024 11/07/2024		Tree Survey 1 hour (1 person) 2.0 hours (2 persons)		
Eastern Pygmy-possum	*Cercartetus nanus*	Spotlighting Arboreal Camera Trapping Methods as outlined in Survey guidelines for Australia's threatened mammals (DSEWPaC 2011)	☒ Yes Spotlighting 24/01/2024	☒ No Arboreal Camera Trapping 17/05/2023 – 22/06/2024 (4 cameras)	Spotlighting 2.0 hours (2 People) Camera Trapping 36 days outside survey period x 4 cameras = 144days outside survey period	No	No
Striped Legless Lizard	*Delma impar*	Habitat Surveys Artificial cover Methods as outlined in Threatened reptiles Biodiversity Assessment Method survey guide (DPE 2022)	☒ Yes Artificial Cover checks 13/11/2023 29/08/2024 4/09/2024	☒ No 21/03/2024 (lizard detected on this date)	Artificial Cover 100 tiles (2 grids of 50 tiles)	Yes	Yes
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	Avifauna Survey Significant Tree Survey for large stick nests Methods described in TBDC (2023b)	☒ Yes Avifauna Survey 29/08/2023	☐ No	Avifauna Survey 2.25 hours (1 Person)	No	No

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
			Tree Survey 4/07/2024 11/07/2024		Tree Survey 1 hour (1 person) 2.0 hours (2 persons)		
Little Eagle	*Hieraaetus morphnoides*	Avifauna Survey Significant Tree Survey for large stick nests Methods described in TBDC (2023b)	☒ Yes Tree Survey 4/07/2024 11/07/2024	☒ No Avifauna Survey 29/08/2023 24/01/2024 15/02/2024 21/03/2024	Avifauna Survey 6.5 hours (1 Person) 1.0 (2 Persons) Tree Survey 1 hour (1 person) 2.0 hours (2 persons)	No	No
Green and Golden Bell Frog	*Litoria aurea*	Nocturnal/Diurnal Aural-visual surveys with Call Playback Methods described in NSW Survey Guide for Threatened Frogs (DPIE 2020d)	☒ Yes Amphibian Surveys 24/01/2024 15/02/2024 21/03/2024 25/03/2024	☐ No	6.0 hours (1 person) 2.0 hours (2 persons)	No	No
Square-tailed Kite	*Lophoictinia isura*	Avifauna Survey Significant Tree Survey for large stick nests Methods described in TBDC (2023b)	☒ Yes Avifauna Survey 24/01/2024 Tree Survey	☐ No	Avifauna Survey 1.75 hours (1 Person) Tree Survey	No	Yes

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
			4/07/2024 11/07/2024		1 hour (1 person) 2.0 hours (2 persons)		
Barking Owl	*Ninox connivens*	Stagwatching Owl Call Playback Significant Tree Survey for large hollows Methods described in TBDC at time of survey (2023b)	☒ Yes Stagwatch Surveys 29/08/2023 31/08/2023 Owl Call Playback 29/08/2023	☐ No	2.5 hours (1 Person)	No	No
Powerful Owl	*Ninox strenua*	Stagwatching Significant Tree Survey for large hollows Methods described in TBDC at time of survey (2023b)	☒ Yes Stagwatch Surveys 29/08/2023 31/08/2023 Owl Call Playback 29/08/2023	☐ No	2.5 hours (1 Person)	No	No
Southern Greater Glider	*Petauroides volans*	Spotlighting Camera Trapping Methods as outlined in Survey guidelines for Australia's threatened mammals (DSEWPaC 2011)	☒ Yes Spotlighting 29/08/2023 31/08/2023 24/01/2024 Arboreal Camera Trapping	☐ No	Spotlighting 4.25 hours (1 Person) 2.0 hours (2 People) Camera Trapping 36 days x 4	No	No

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
			17/05/2023 – 22/06/2024 (4 cameras)		cameras = 144 days within survey period		
Squirrel Glider	*Petaurus norfolcensis*	Spotlighting Camera Trapping Methods as outlined in Survey guidelines for Australia's threatened mammals (DSEWPaC 2011)	☒ Yes Spotlighting 29/08/2023 31/08/2023 24/01/2024 Arboreal Camera Trapping 17/05/2023 – 22/06/2024 (4 cameras)	☐ No	Spotlighting 4.25 hours (1 Person) 2.0 hours (2 People) Camera Trapping 36 days x 4 cameras = 144 days within survey period	Yes	Yes
Brush-tailed Phascogale	*Phascogale tapoatafa*	Spotlighting Camera Trapping Methods outlined in TBDC (2023b) and Survey guidelines for Australia's threatened mammals (DSEWPaC 2011)	☒ Yes Spotlighting 29/08/2023 31/08/2023 24/01/2024 Arboreal Camera Trapping 17/05/2023 – 22/06/2024 (4 cameras)	☐ No	Spotlighting 4.25 hours (1 Person) 2.0 hours (2 People) Camera Trapping 36 days x 4 cameras = 144 days within survey period	No	No
Koala	*Phascolarctos cinereus*	Spotlighting	☒ Yes Spotlighting	☐ No	Spotlighting 4.25 hours	No	No

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	**Timing of survey – within recommended period? (BAM-C / TBDC)**		**Effort (hours & no. people)**		
		Camera Trapping Spot Assessment Technique Methods outlined in Koala (Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide (DPE 2022)	29/08/2023 31/08/2023 24/01/2024 <u>Arboreal Camera Trapping</u> 17/05/2023 – 22/06/2024 (4 cameras) <u>Spot Assessments</u> 4/07/2024 29/08/2024		(1 Person) 2.0 hours (2 People) <u>Camera Trapping</u> 36 days outside survey period x 4 cameras = 144 days within survey period 3 x Spot Assessments		
Common Planigale	*Planigale maculata*	Spotlighting Camera Trapping Methods described in TBDC (2022b) and Survey guidelines for Australia's threatened mammals (DSEWPaC 2011)	☒ Yes <u>Spotlighting</u> 29/08/2023 31/08/2023 24/01/2024 <u>Arboreal Camera Trapping</u> 17/05/2023 – 22/06/2024 (4 cameras)	☐ No	<u>Spotlighting</u> 4.25 hours (1 Person) 2.0 hours (2 People) <u>Camera Trapping</u> 36 days x 4 cameras = 144 days within survey period	No	No
Masked Owl (breeding)	*Tyto novaehollandiae*	Stagwatching Significant Tree Survey for large hollows	☒ Yes <u>Stagwatch Surveys</u> 29/08/2023	☐ No	2.5 hours (1 Person)	No	No

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
		Methods described in TBDC at time of survey (2023b)	31/08/2023 Owl Call Playback 29/08/2023				

5.4 Expert reports

- No expert reports were required.

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

Miniopterus orianae oceanensis (Large Bent-winged Bat) was recorded during bat call surveys. This species is being offset as ecosystem credit species but not as an ecosystem credit species because no breeding habitat or signs of a breeding were present on site or within 2km.

Delma vescolineata (Hunter Valley Delma) was recorded in the subject land. This species has recently been described and identified as a separate species from the species credit species *Delma impar* (Striped Legless Lizard). This species has also recently been listed as Endangered under the BC Act and EPBC Act. General notes for *Delma* impar within the TBDC says "While the Hunter populations of *Delma impar* have recently been described as *Delma vescolineata* in a peer reviewed study, this is not yet recognised under NSW legislation. As *Delma vescolineata* is not legally recognised, all occurrences within the *Delma impar* species complex are to be identified and assessed as *Delma impar* for NSW planning matters until a formal assessment of *D. vescolineata* has been completed by the NSW Threatened Species Scientific Committee." This species will therefore require offsetting under the species credit species *Delma impar* (Striped Legless Lizard). Species Polygon will include all areas of mapped PCT 3431 (8.37ha). Species polygon for *Delma impar* (Striped Legless Lizard) is shown in 5.1.

Petaurus norfolcensis (Squirrel Glider) was found to occur on site and will require offsetting. Species Polygon includes all vegetation zones containing suitable canopy species (PCT 3431_Moderate_Stage 6 and PCT 3431_Remnant Trees_Stage 6). The area of the species polygon for Squirrel Glider is 2.03ha. Species polygon for Squirrel Glider is shown in 5.2.

Figure 5.1 ***Delma vescolineata*** **(Hunter Valley Delma) Species Polygon**

Figure 5.2 *Petaurus norfolcensis* (Squirrel Glider) Species Polygon

6.0 Identifying prescribed impacts

The subdivision area contains the following prescribed impacts outlined in Table 6.1.

Table 6.1 Prescribed impacts identified

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature. Where relevant, threatened species or fauna that are part of a TEC or EC, that are at risk of vehicle strike
Karst, caves, crevices, cliffs, rocks or other geological features of significance	☐Yes / ☒No	N/A	N/A
Human-made structures	☐Yes / ☒No	N/A	N/A
Non-native vegetation	☒Yes / ☐No	The subject land contained 0.35ha of non-native vegetation (Figure 4.1) mostly comprised of pasture grasses and weeds. (Plates 4.1 – 4.8.).	Hunting avifauna species such as *Lophoictinia isura* (Square-tailed Kite) (Foraging) and *Hieraaetus morphnoides* (Little Eagle) (foraging
Habitat connectivity	☒Yes / ☐No	Habitat in the south and south-east of the subject land acts as a corridor with loose connections to habitat in the east. This corridor connects to habitat south of the subject land via scattered trees in earlier stages of the Northview Estate.	Highly mobile threatened species such as woodland birds (e.g. *Glossopsitta pusilla* (Little Lorikeet), *Lathamus discolor* (Swift Parrot) and arboreal mammals like *Petaurus norfolcensis* (Squirrel Glider).
Waterbodies, water quality and hydrological processes	☒Yes / ☐No	Three 1st order prescribed streams and one 3rd order prescribed stream were present within the subject land. Surface water was only ever seen in the west corner of the third order stream in the north of the study area. No Groundwater Dependent Ecosystems (GDE's) were located within and surrounding the subject land.	Amphibians, aquatic avifauna and hunting avifauna as well as microchiropteran bats (foraging).
Wind turbine strikes (wind farm development only)	☐Yes / ☒No	N/A	N/A
Vehicle strikes	☒Yes / ☐No	The subdivision area will allow for the inclusion of additional roadways to facilitate access for future residential development.	Mobile threatened species such as avifauna, microchiropteran bats, arboreal mammals like *Petaurus norfolcensis* (Squirrel Glider).

Stage 2: Impact assessment (biodiversity values and prescribed impacts)

7.0 Avoid and minimise impacts

7.1 Avoid and minimise direct and indirect impacts

7.1.1 Project location

The proposal has been positioned within a location that has been previously subject to agricultural disturbances and cattle grazing. The proposed location of the subdivision allows for the retention of some of the better quality native vegetation in the south of the study area.

7.1.2 Project design

The proposal avoids impacting 4.55ha of native vegetation in the form of derived grassland where the two PAD areas have been identified. No impact is planned to occur in these areas. The proposal also avoids impacting two hollow-bearing trees (No. 7 and 14) within the riparian corridor in the south of the study area. The proposal design has undergone revision to include designated building envelopes within Stage 7 lots. This has reduced the impact area from 21.27ha down to 8.80ha. Large areas of derived grassland favoured by the *Delma vescolineata* (Hunter Valley Delma) have been avoided by this design revision. The development area has been designed such that some internal roads run along the boundary of the subject land and overlap with the required APZ. This avoids impacting additional vegetation solely for the APZ. Changes to design plan that have reduced the impact area are shown in Figure 7.1.

7.2 Avoid and minimise prescribed impacts

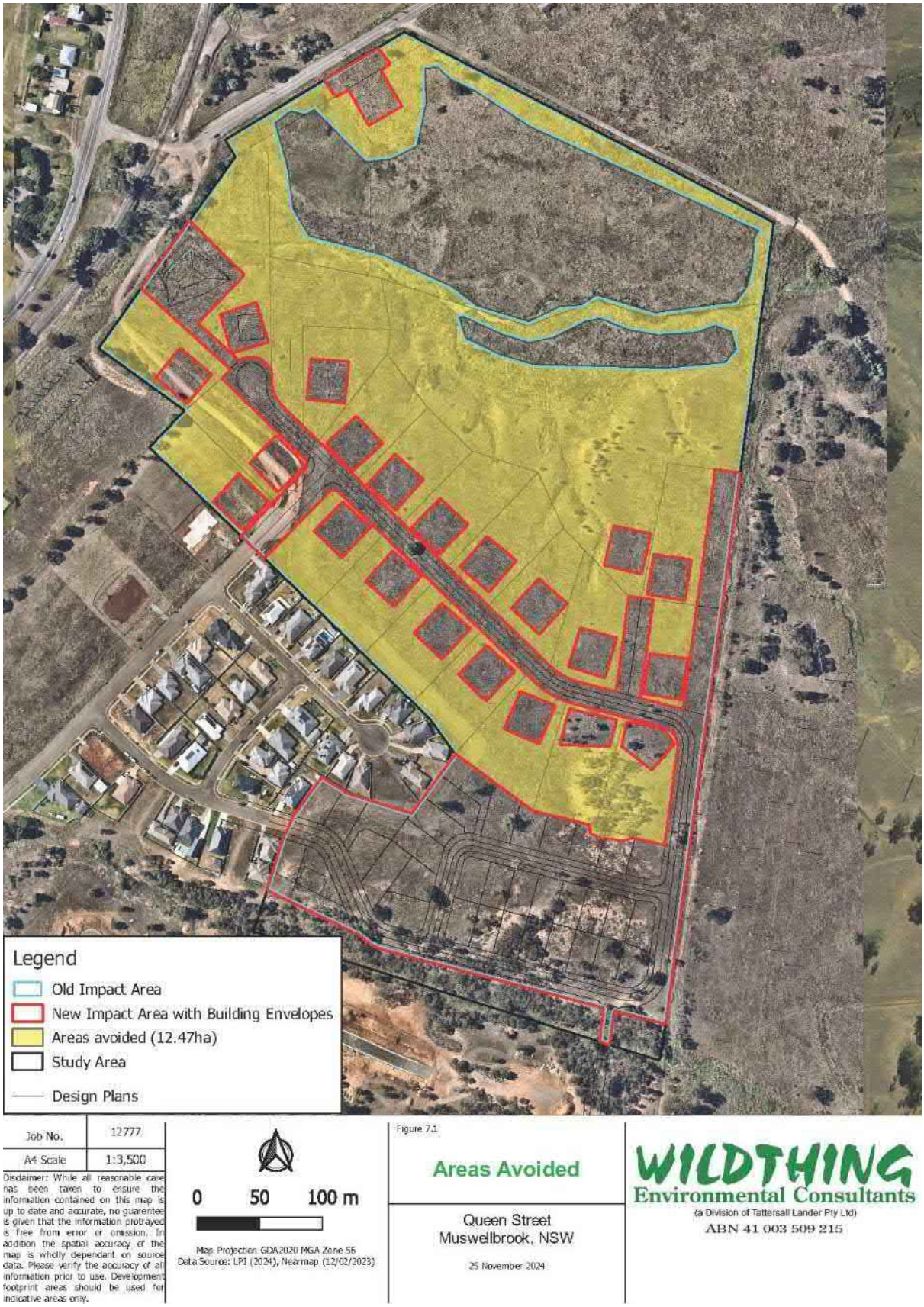
7.2.1 Project location

The development site has been positioned within a location that has been previously subject to disturbances such as likely past agricultural practices. Parts of the proposed development footprint is currently subject to regular slashing. The proposed location of the subdivision allows for the retention of some native vegetation in the south of the study area. This minimises impact to the vegetation corridor running east/west along the creekline in the south of the site.

7.2.2 Project design

The project design had undergone revisions to include designated building envelopes within Stage 7 lots. This has reduced the impact area from 21.27ha down to 8.80ha. The revised design impacts less areas of prescribed streams and associated vegetated riparian corridors. It also avoids impacting some areas of non-native vegetation within the study area.

Figure 7.1 Areas avoided by proposal revision



7.3 Other measures considered

A Vegetation Management Plan (VMP) has recommended for the proposal. The objectives of the VMP include:

- To ensure the ongoing ecological viability of the retained areas of vegetation by protecting the ecological biodiversity and habitat values of the land;
- To provide compensatory vegetation planting to retain and improve the quality of the vegetation corridor in the south of the study area.
- To provide compensatory habitat with the installation of nest boxes.

7.4 Summary of measures to avoid and minimise impacts

Table 7.1 documents the measures to avoid and minimise direct, indirect and prescribed impacts associated with the development proposal.

Table 7.1 Avoidance and minimisation measures for direct, indirect and prescribed impacts

Impact	Avoidance and Minimisation Action	Outcome	Timing	Responsibility
Removal of 8.80ha of native vegetation	Locating the development area within a location that has been previously subject to disturbances such as past native vegetation removal agriculture practices and cattle grazing. Required weed management under a recommended VMP in the retained vegetation.	The development area has been located to minimise impacts to higher quality native vegetation and threatened species habitat. Weed management will increase the quality of retained native vegetation.	During the Design phase	Project designer
Connectivity (habitat fragmentation) (Design phase)	Project has been designed so that some vegetation in the corridor along the south of the subject land is retained. Locating the project such that connectivity enabling movement of species and genetic material between areas of adjacent or nearby habitat is maintained. Trees in the south-west of the subject site that fall within the APZ should be retained wherever possible. Required weed management under a recommended VMP in the retained vegetation.	The removal of vegetation for the proposal will create a narrowing of the east-west corridor, it will not fragment connection to retained vegetation. Management under the VMP will increase the quality of the retained corridor	During the Design and construction phase	Project designer Project manager
Loss of Squirrel Glider habitat	A total of 2.03ha of Squirrel Glider habitat will be removed as a result of the development. Tree limbs containing natural hollows should be relocated and restored for use by fauna in the nearest adjacent area of similar habitat by a suitably qualified ecologist. Where natural hollows cannot be relocated, an artificial nest box should be installed onto a tree in the nearest adjacent area of similar habitat by a suitably qualified ecologist at a ratio of 2:1. Nest boxes should be installed prior to removal of vegetation. Trees in the south-west of the subject site that fall	A net positive increase of squirrel glider nesting habitat within the locality, a retention of key connections.	During the Construction phase	Project manager

Impact	Avoidance and Minimisation Action	Outcome	Timing	Responsibility
	within the APZ should be retained wherever possible.			
Loss of Hunter Valley Delma habitat	A total of 8.37ha of Hunter Valley Delma habitat will be removed as a result of the development. Non-hollow containing sections of trees requiring removal should be relocated within retained areas of habitat in the centre and north of the study area under supervision of a suitably qualified ecologist. Required weed management under a recommended VMP in the retained vegetation to control invasive weeds and introduced clumping grasses. No grazing is to occur within the retained vegetation including the grassland in the north and centre of the study area.	An increase in quality of Hunter Valley Delma habitat within the locality.	During the Construction phase	Project manager
Impact on breeding populations	Timing of vegetation clearance should also occur outside of the bird nesting season (late August - December)	Timing works to avoid critical life cycle events such as breeding for avifauna species.	During construction phase	Project manager
Reduced viability of adjacent habitat due to artificial light spill	Directing artificial lighting such as security lighting, street lighting, etc. away from adjacent habitat and angled downwards to avoid excessive light pollution affecting adjacent habitat.	Avoid excessive light pollution affecting adjacent habitat.	During the construction and operational phases	Project designer, construction site manager and project manager
Reduced viability of adjacent habitat due to noise, dust, light spill, edge effects and weed incursion	Locating roads along the boundary buts additional space between dwellings and the retained vegetation.	Creation of buffer space between dwellings and retained vegetation for reduce edge effects, weed incursion, light spill.	During the design phase	Project designer
Impact on waterbodies, water quality and hydrological processes	Silt fencing and controls on sediment and runoff must be implemented prior to any construction within the subject land particularly around prescribed streams within and in proximity to the subject land.	Minimise impacts on surface water quality and quantity.	During the Design phase and construction phase	Project designer and construction site manager

Impact	Avoidance and Minimisation Action	Outcome	Timing	Responsibility
	The proposal includes a stormwater basin to minimise impacts on surface water quality and quantity.			
Increased risk of starvation, exposure and loss of shade or shelter	Where possible, construction works should avoid any impact to mature trees and hollow-bearing trees.	The retention of mature trees, hollow-bearing trees will provide food and shelter resources within the immediate locality.	During the Design phase and construction phase	Project designer
Clearing of native vegetation	Where possible, construction works should avoid any impact to mature trees and hollow-bearing trees, especially within the APZ. Where unavoidable, works should minimise impacts to mature trees as follows: • clearing limits will be clearly marked to prevent unnecessary clearing beyond the extent of the development footprint. Tree clearing and disturbance will be limited to the development site; • where a tree must be disturbed the priority should be given to pruning rather than clearing; and • the clearing of any trees should be undertaken in a manner that avoids damaging adjacent vegetation i.e., all trees should be felled into disturbed areas when feasible; • Individual trees that are to be retained are to be protected during construction by temporary fence around the dripline.	Retention of mature trees and hollow-bearing trees within the retained native vegetation in the south of the study area will facilitate the movement of mobile threatened species and provide foraging, nesting and shelter/shade resources.	Prior to and during vegetation clearing in the construction phase	Construction site manager
Inadvertent impact to biodiversity values	Priority will be given during construction to avoid any inadvertent impact to significant biodiversity values within the subject land. Avoidance measures should include the following: • all material stockpiles, vehicle parking and machinery storage will be located within open	Avoid inadvertent impact to biodiversity values	Prior to and during vegetation clearing	Construction site manager

Impact	Avoidance and Minimisation Action	Outcome	Timing	Responsibility
	areas proposed for clearing, and not in areas of native vegetation that are to be retained; and • implementation of temporary stormwater controls during construction and to ensure that discharges outside the development footprint are consistent with existing conditions.			
Clearing of fauna habitat, resulting in arboreal fauna injury and/or mortality	Trees within the subject land are to undergo a preclearance survey (thorough inspection of the canopy) every morning prior to tree clearance operations by a suitably qualified ecologist, particularly for arboreal species just prior to removal/trimming. If a Koala is found clearing activities are to cease until the animal has left on its own accord. Searches are also to be undertaken for bird nests that are currently being utilised for breeding. Any animals injured during construction should be taken immediately to a Vet for treatment. Any animals suspected to require rehabilitation would be delivered post-veterinary care to an appropriate animal rehabilitator.	Clearing of fauna habitat, resulting in fauna injury and/or mortality	During vegetation clearing	Construction site manager
Clearing of fauna habitat, resulting in ground dwelling fauna injury and/or mortality, including *Delma vescolineata* (Hunter Valley Delma)	Prior to the removal of vegetation from the subject land barrier fencing is to be installed along the retained vegetation to prevent ground dwelling species entering the development area. Vegetation within the subject land is to undergo pre-clearance searches for ground dwelling species, notably *Delma vescolineata* (Hunter Valley Delma) to	Clearing of fauna habitat, resulting in fauna injury and/or mortality	During vegetation clearing	Construction site manager

Impact	Avoidance and Minimisation Action	Outcome	Timing	Responsibility
	relocate captured specimens into the retained vegetation on the other side of the barrier fencing.			
Clearing of fauna habitat and displacement of resident fauna	A suitably qualified and experienced ecologist should be engaged to supervise removal of all significant habitat features, including hollow-bearing trees and maintain a vegetation clearance register which should include the location, type, size of felled habitat trees and any contact with resident fauna. The supervising ecologist will work co-operatively with the plant operator to develop an adaptive clearance methodology that should minimise impacts to potential resident fauna whilst being conducted according to safe work methods. The adaptive clearance methodology should include the following key aspects: • seeking consultation with a suitably qualified ecologist to determine the best time to schedule clearance works to avoid nesting and breeding times for resident fauna; • preclearance surveys completed on the morning of any clearance works to determine if any nesting birds or canopy dwelling mammals are within the clearance footprint; • clearing utilising a 'soft felling' technique in which trees are 'nudged' by machinery and fauna given time to leave (overnight), before slowly felling the tree the following day; • if fauna are identified within the proposed clearing area prior to clearing, or after 'nudging' the tree, operations will cease until	Avoid fauna injury and/or mortality during clearing of vegetation.	During vegetation clearing	Construction site manager

Impact	Avoidance and Minimisation Action	Outcome	Timing	Responsibility
	the fauna has moved to a safe location or has been relocated. If fauna flee into a habitat tree demarcated for removal this tree should be left to fell until the following day; • any captured displaced fauna relocated to the nearest area of appropriate habitat. If arboreal, the fauna to be placed inside an artificial nest box and relocated. If the displaced fauna is nocturnal relocation to occur during dusk; and • all hollow logs and felled trees would be inspected by the ecologist before relocation into areas of similar adjacent habitat All habitat tree felling activities and results to be summarised in a tree clearance report by the supervising ecologist, including fauna injuries. Any animals injured during construction should be taken immediately to the nearest Veterinary Hospital for treatment. Any animals suspected to require rehabilitation would be delivered post-veterinary care to an appropriate animal rehabilitator associated with Hunter Wildlife (NATF Inc) Rescue phone no. 0418 628 483. All fauna sightings/captures are to be recorded and uploaded to the NSW BioNet Atlas.			
Loss of significant habitat features	Habitat salvage within the development footprint should be undertaken prior to and during clearance activities, with the salvage methodology including the following key aspect:	Salvage of significant habitat features to create habitat within adjoining vegetation	Prior to and during vegetation clearing	Construction site manager and suitably trained fauna handler

Impact	Avoidance and Minimisation Action	Outcome	Timing	Responsibility
	• Tree limbs containing natural hollows deadwood should be relocated and restored for use by fauna in the nearest adjacent area of similar habitat by a suitably qualified ecologist. Where natural hollows cannot be relocated, an artificial nest box should be installed onto a tree in the nearest adjacent area of similar habitat by a suitably qualified ecologist at a ratio of 2:1. Where removal of woody debris is required: • dead trees and woody debris that are removed (diameter >10 cm) are to be placed in the nearest adjacent area of similar habitat under supervision of a suitably qualified ecologist.			
Movement barrier for mobile ground dwelling species via fencing (Operational phase)	Larger residential lots, particularly in stage 7 should use fauna friendly fencing that allows kangaroos and wallabies to safely travel through the land. Fauna friendly fencing includes elements such as: • having the top wire and the next one down far enough apart and kept taut so that they cannot come together to capture a foot/leg of a Kangaroo (known as a hangup); • there is a gap of at least 30cm between the ground and the first strand of fence so wildlife can go UNDER the fence rather than having to go OVER the fence; • Use of plain wire (not barbs) to help prevent the chances of entanglement of Gliders and Flying-Foxes. If not all strands then at least the top two.	Avoid cutting off connectivity for mobile ground dwelling species	Construction and operational phase	Construction site manager and Project manager

Impact	Avoidance and Minimisation Action	Outcome	Timing	Responsibility
Transport of weeds and pathogens from the site to adjacent vegetation	The following measures are to be implemented to prevent exotic plant material from entering/exiting the subject land: • no imported/exported material to be permitted unless it has been inspected and confirmed to be free of dirt and mud which may contain weed seeds and vegetative material such as bulbs, root fragment, tubers or rhizomes; and • vehicles and machinery to be clean of soils, vegetation and seeds that have been brushed off or washed down prior to entering the study area A clean down register to be maintained at the entry of the study area	Minimise weed infestations within adjoining vegetation	Prior to and during vegetation clearing	Construction Site Manager
Impact to adjoining native vegetation	Erection of a fauna friendly fencing along the southern boundary of the development area. Erection of signage discouraging dumping and human activity in the retained vegetation.	Prevent degradation of retained vegetation by dumping and other human activities.	Construction and operational phase	Construction site manager and Project manager
Vehicle strike	Implementation of a low-speed limit within the development area.	Reduce the likelihood and occurrence of vehicle strikes with fauna within the locality	Construction and operational phase	Construction site manager and Project manager

8.0 Impact assessment

8.1 Direct impacts

8.1.1 Residual direct impacts

Table 8.1 documents impact likely to occur on the subject land associated with the proposed development area after steps taken to avoid and minimise impacts.

Table 8.1 Summary of residual direct impacts

Direct impact	BC Act status	EPBC Act status	SAII entity	Project phase/timing of impact (e.g. construction, operation, rehabilitation)	Extent (ha, number of individuals)
Removal of PCT 3431 - Central Hunter Ironbark Grassy Woodland	-	-	No	Construction and operation	8.37ha
Removal of TEC Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	E		No	Construction and operation	8.37ha
Removal of TEC Central Hunter Valley eucalypt forest and woodland		CE	No	Construction and operation	1.91ha
Removal of *Petaurus norfolcensis* (Squirrel Glider) habitat	V	-	No	Construction and operation	2.03ha
Removal of *Delma vescolineata* (Hunter Valley Delma) habitat	E	E	No	Construction and operation	8.37ha
Modification of hunting habitat for *Miniopterus orianae oceanensis* (Large Bentwing Bat).	V		No	Construction and operation	8.37ha

8.1.2 Change in vegetation integrity score

Table 8.2 documents change in vegetation integrity score on the subject land associated with the proposed development area.

Table 8.2 Impacts to vegetation integrity

Vegetation zone	PCT ID	Management zone	Area (ha)	Before development				After development				Change	
				Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	Change in VI score	Total Change
1 PCT 3431 _Moderate _Stage 6	3431	Removal	0.49	45.6	23.6	40	35.1	0	0	0	0	-35.1	-33.9
1 PCT 343 _Moderate _Stage 6	3431	APZ	0.05	45.6	23.6	40	35.1	42.7	5.9	8.9	13.1	-22	
2 PCT 3431 _Remnant Trees _Stage 6	3431	Removal	1.40	52.4	20.1	31.1	32	0	0	0	0	-32	-31.4
2 PCT3431 _Remnant Trees _Stage 6	3431	APZ	0.09	52.4	20.1	31.1	32	48.7	15	0	9	-23	
3 PCT 3431 _Derived Grassland _Stage 6	3431	Removal	2.16	34.4	15.5	11.5	18.3	0	0	0	0	-18.3	-18.2
3 PCT 3431 _Derived Grassland _Stage 6	3431	APZ	0.03	34.4	15.5	11.5	18.3	34.2	15.5	0	8.1	-10.2	

Vegetation zone	PCT ID	Management zone	Area (ha)	Before development				After development				Change	
				Composition	Structure	Function	VI score	Composition	Structure	Function	VI score	Change in VI score	Total Change
3 PCT 3431 _Derived Grassland _Stage 7	3431	Removal	3.69	34.4	15.5	11.5	18.3	0	0	0	0	-18.3	-17.4
3 PCT 3431 _Derived Grassland _Stage 7	3431	APZ	0.46	34.4	15.5	11.5	18.3	34.2	15.5	0	8.1	-10.2	

8.2 Residual Indirect impacts

Table 8.3 documents residual indirect impacts of the proposal (likely to occur on native vegetation, threatened entities and their habitat beyond the development footprint) as a result of any future planning proposal associated with the subdivision area.

Table 8.3 Summary of residual indirect impacts

Indirect impact	Impacted entities	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation, rehabilitation)	Likelihood and consequences
Sedimentation and contaminated and/or nutrient rich run-off	Adjacent vegetation, including 1st order prescribed stream and retained areas (PADs)	Surrounding vegetation outside the subject land boundary	During heavy rainfall or storm events	Long-term	Construction and operation phase	During the construction and operation phase, potential sediment and contaminated runoff into adjacent and retained vegetation is likely to occur during high rainfall events.

Indirect impact	Impacted entities	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation, rehabilitation)	Likelihood and consequences
Transport of weeds and pathogens from the subject land to adjacent vegetation	Adjacent vegetation and retained vegetation with the PADs	Surrounding vegetation outside the subject land boundary	Daily during the construction phase and ongoing during the operation phase	Long-term	Construction and operation phase	During the construction phase the risk of the spread of weeds with the establishment of non-native grassed areas within the subject land and potential of exotic plant and lawn clipping dumping within adjacent vegetation increases.
Inadvertent impacts on adjacent habitat or vegetation	Adjacent vegetation and retained vegetation with the PADs	Surrounding vegetation outside the subject land boundary	Daily during the construction phase and ongoing during the operation phase	Long-term	Construction and operation phase	Any future planning proposal increases the risk of inadvertent impacts on adjacent habitat and vegetation.
Reduced viability of adjacent habitat due to edge effects	Adjacent vegetation and retained vegetation with the PADs	Surrounding vegetation outside the subject land boundary	During the life of the proposal	Long-term	Construction and operation phase	The subject land borders a vegetation corridor running along the creekline in the south and large areas of vegetation will be retained in the north of the subject land (PADs). Removal of vegetation from the subject land increases the risk of edge effects occurring within the corridor and PAD.
Fertiliser and herbicide drift	Adjacent vegetation and retained vegetation with the PADs	Surrounding vegetation outside the subject land boundary	During the life of the proposal.	Long-term	Construction and operation phase	Any future landscaping within the development footprint may increase fertiliser and herbicide drift into adjacent and retained vegetation.
Rubbish dumping	Adjacent vegetation and retained	Surrounding vegetation outside the	During the life of the proposal	Long-term	Construction and operation phase	Any future development may increase the occurrence of rubbish dumping within adjoining vegetation and within the PADs.

Indirect impact	Impacted entities	Extent (ha or zone reference)	Frequency	Duration (long-term/ short-term/ medium-term)	Project phase/ timing of impact (e.g. construction, operation, rehabilitation)	Likelihood and consequences
	vegetation with the PADs	subject land boundary				
Fragmentation of movement corridor	Mammals and reptiles	Surrounding vegetation outside the subject land boundary	During the life of the proposal	Long-term	Construction and operation phase	The development will reduce the east-west corridor along the creekline in the south.

8.3 Prescribed impacts

All prescribed impacts identified in Section 6.0 assessed as occurring within the subdivision area as a result of the proposal have been addressed below. Mitigation measures for prescribed impacts are detailed within Table 8.6.

8.3.1 Non-native vegetation

8.3.1.1 Nature

1. Likely removal of non-native habitat.

8.3.1.2 Extent

Removal of 0.35ha of non-native vegetation in the form of introduced grasses in the north of the subject land.

8.3.1.3 Duration

The construction and operational phase.

8.3.1.4 Consequences

Reduction in grazing habitat for macropod species. Reduction in hunting habitat for highly mobile avifauna species that hunts in open areas, namely raptors and microchiropteran bats.

8.3.1.5 Residual prescribed impact

The removal of 0.35ha of non-native vegetation is unlikely to have a significant impact on these species due to the presence of open non-native grassed areas to the north, east and west of the subject land. Therefore, there is no residual prescribed impact.

8.3.2 Habitat connectivity

8.3.2.1 Nature

Narrowing of habitat corridor.

8.3.2.2 Extent

Narrowing of east-west corridor running along creek line in south of study area.

8.3.2.3 Duration

The construction and operational phase.

8.3.2.4 Consequences

The east-west habitat corridor will be reduced and an 8m wide road will cross the remaining corridor, which will likely restrict movement of mobile mammal species, notably *Petaurus norfolcensis* (Squirrel Glider).

8.3.2.5 Residual prescribed impact

Minimisation and mitigation measures have been detailed within Table 7.1 which prioritizes the retention of trees in the south of the subject land APZ and installation of harvested hollows and nest boxes for a net positive increase of squirrel glider nesting habitat. Part of the proposal includes the construction of an 8m wide road that connects Stages 6 and 7 to earlier stages in the south. This connecting road will cross the 1st order stream and riparian habitat corridor south of the subject land. It will create an 8m gap maximum between the trees. Gaps of more than 35m wide have been considered a potential barrier to crossing (LMCC 2015) for Squirrel Gliders. The distance between retained trees on either side of the crossing will be shorter than 35m and will still be a viable connection for the species. Therefore, the corridor will not be severed to the point that it will have significant impact on the species using it and there is no residual prescribed impact.

8.3.3 Waterbodies, water quality and hydrological processes

8.3.3.1 Nature

Groundwater Dependent Ecosystems (GDE's) are ecosystems that are fully or partially dependent on groundwater to maintain ecosystem function. These ecosystems occur across both surface and subsurface landscapes and are highly variable. No GDE's were found to be present within the subject land.

A 1st order prescribed stream runs along the southern boundary of the subject land. A 3rd order prescribed stream runs east to west in the north of the subject land with two 1st order streams that feed into it. The 3rd order prescribed stream and its tributaries are in a defined channel however as a result of their ephemeral nature no surface water was seen in any streams during most field work. Surface water was only ever seen in the west corner of the third order stream in the north of the study area.

8.3.3.2 Extent

No GDE's were found to be present within the subject land.

Vegetated Riparian Zones (VRZ) of the 1st order prescribed streams will be 10m and 30m around the 3rd order prescribed stream according to the Controlled activities – Guidelines for riparian corridors on waterfront land (DPE 2022). VRZ of each stream have been mapped from the highest bank for each stream in accordance with the guidelines. Highest banks for the third order stream were determined using aerial imagery where the top bank of the channel and changes in vegetation were visible. VRZs of the tributary first order streams were determined from review of aerial imagery where the path of the stream was visible as the mapped stream lines did not align with what was on the

ground. The VRZ of the first order stream in the south of the study area was mapped from the highest bank which was determined from aerial imagery where changes in vegetation could be seen.

A road is planned to cross the 1st order stream in the south of the subject land. Proposed APZ in the south-east of the subject land will overlap with the VRZ of the prescribed stream in the south. Proposed residential lots and internal roads overlap the remaining prescribed streams and their VRZ in the subject land. The location of prescribed streams and their respective VRZ are shown in Figure 8.1.

8.3.3.3 Duration

Construction and operational phase of the subsequent subdivision

8.3.3.4 Consequences

Potential long-term impacts to riparian corridors and streams within and around the study area.

8.3.3.5 Maximum predicted offset liability

N/A as minimisation and mitigation measures have been detailed within Table 7.1 and Table 8.6 including temporary stormwater controls and installing silt fencing and controls on sediment and runoff.

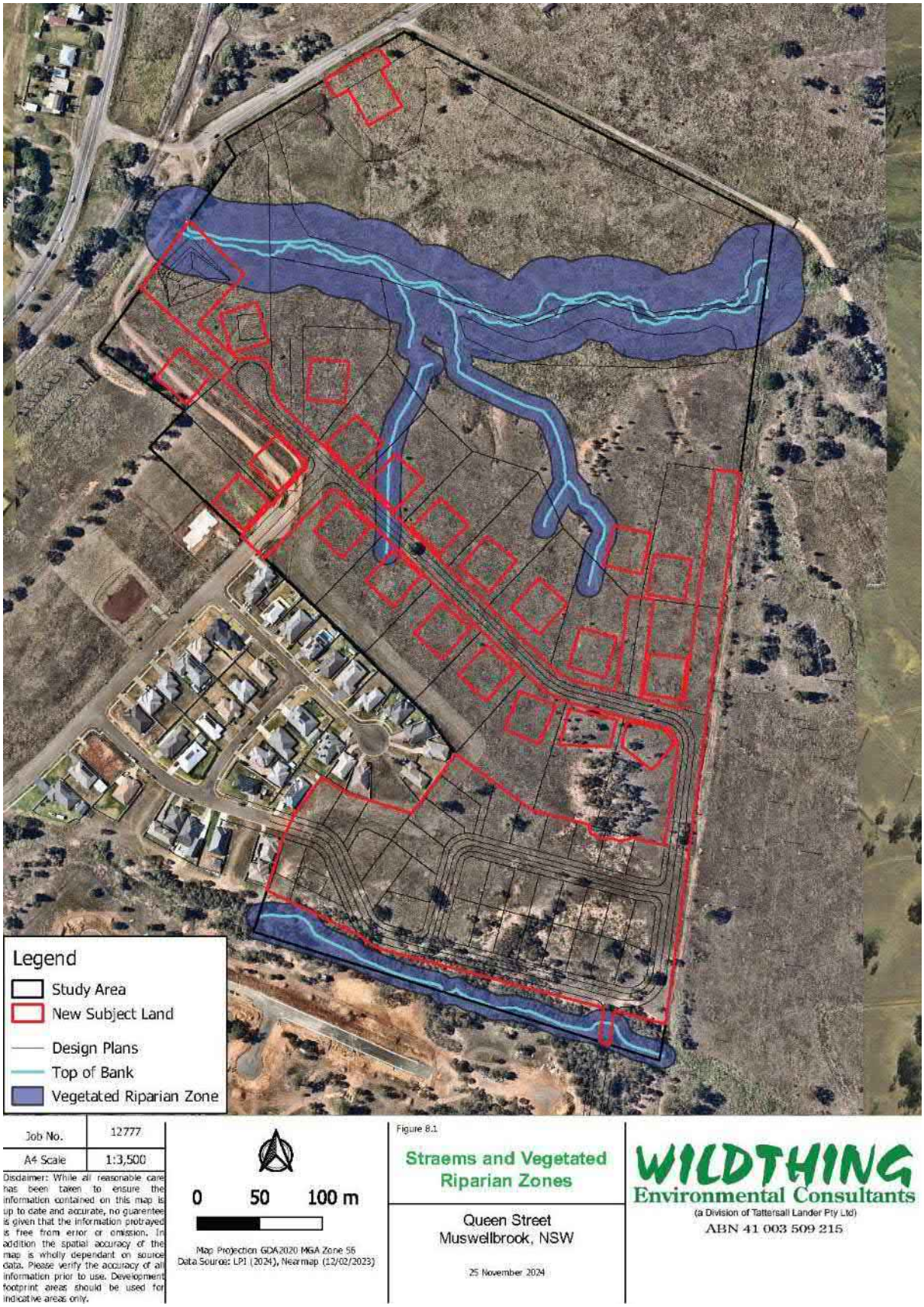
8.3.4 Vehicle strikes

Residual predicted impacts of vehicle strike on threatened fauna recorded within the subject land are documented within Table 8.5.

Table 8.4 Prescribed impacts – vehicle strikes

Threatened fauna recorded within the subject land that are that are at risk of vehicle strike	SAII entity	Likelihood	Estimated vehicle strike rates	Consequences
Petaurus norfolcensis (Squirrel Glider)	No	Low	Unknown	Injury, mortality, reduction in local population
Pteropus poliocephalus (Grey-headed Flying-Fox)	No	Unlikely	Unknown	Injury, mortality, reduction in local population
Falsistrellus tasmaniensis (Eastern False Pipistrelle)	Yes	Unlikely	Unknown	Injury, mortality, reduction in local population
Miniopterus orianae oceanensis (Large Bent-winged Bat)	Yes	Unlikely	Unknown	Injury, mortality, reduction in local population

Figure 8.1 Mapped top of banks and vegetated riparian corridors



8.4 Mitigating residual impacts – management measures and implementation

Table 8.5 Summary of proposed mitigation and management measures for residual impacts (direct, indirect and prescribed)

Residual Impact	Mitigation measure	Method/technique	Timing	Frequency	Responsibility	Likely efficacy	MNES (when relevant)
Sedimentation and contaminated and/or nutrient rich run-off	Sediment barriers and silt fencing to prevent sediment runoff into retained and adjacent vegetation	Install sediment barriers and erosion control during construction to prevent runoff into retained and adjacent vegetation	Prior to the removal of vegetation	Duration of construction phase	Construction site manager	High. Low risk of failure when installed correctly	No
Changing surface water characteristics	The proposal includes a stormwater basin to minimise impacts on surface water quality and quantity.	Inclusion of biofilters, catch-drains and mounds as measures to minimise impacts on surface water quality and quantity.	Design during the planning phase and construction during the construction phase	Design and Construction phase	Project designer and construction site supervisor	High. Low risk of failure when installed correctly	No
Transport of weeds and pathogens from the site to retained and adjacent vegetation	Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	Vehicles should be washed down before entering and exiting the site to prevent the spread of weeds and pathogens to or from the development site and adjacent vegetation. Any weed outbreaks should be controlled during the project.	During the removal of vegetation from the subject land	Construction phase	Construction site manager	High. Low risk of failure when installed correctly	No
Inadvertent impacts on retained and adjacent habitat or vegetation	Staff training and site briefing to communicate environmental features to be protected and	All staff working on the development will undertake an environmental induction as part of their site familiarisation. Site briefings should be updated based on phase of the work. This	Prior to the commencement and the duration of the construction phase for all	Construction phase	Project manager	High efficacy with a low risk of failure.	No

Residual Impact	Mitigation measure	Method/technique	Timing	Frequency	Responsibility	Likely efficacy	MNES (when relevant)
	measures to be implemented	induction will include items such as: - Site environmental procedures (vegetation management, sediment and erosion control, exclusion fencing and weeds of national significance (WoNS) and priority weeds)	new contractors				
Reduced viability of adjacent and retained habitat due to edge effects	Minimise clearance along the southern boundary with remnant vegetation to minimise edge effects, weed incursion, light spill and filter noise.	Appropriate situating and management of associated future development APZs with retaining vegetation along the boundary between the development area and retained vegetation in the east.	The duration of the project	Design, construction and operation phase	Project manager	Moderate efficacy with a low risk of failure if management actions are undertaken	No
Fertiliser and herbicide drift, and rubbish dumping.	Restrict access and strict no-go areas within adjoining vegetation and retained vegetation within the subject site	Erection of fencing along the boundary connected vegetation in the south.	Installed during the construction phase and for perpetuity of the operational phase	Construction and operational phase	Project manager	Moderate efficacy with a moderate risk of failure.	No
Fragmentation of movement corridor	Plantings and street trees are to be implemented in future planning proposal design. Required weed management under a recommended VMP in the retained	Plantings and street trees. Weed management within retained corridor under VMP.	Installed during the construction phase and maintained in the operational phase	Construction and operational phase	Construction site manager and Project manager	Moderate efficacy with a moderate risk of failure.	No

Residual Impact	Mitigation measure	Method/technique	Timing	Frequency	Responsibility	Likely efficacy	MNES (when relevant)
	vegetation.						
Vehicle strike	Low speed limits	Erection of low-speed limit within the development area.	Installed during the construction phase and maintained in the operational phase	Construction and operational phase	Construction site manager and Project manager	Moderate efficacy with a moderate risk of failure.	No

9.0 Serious and irreversible impacts

9.1 Assessment for serious and irreversible impacts on biodiversity values

Candidate species for a Serious and Irreversible Impact (SAII) are listed in Table 9.1. The candidate species list has been derived from threatened species predicted to have the potential to occur based on the BAM Calculator and state and national database searches. No candidate SAII ecological communities are present within the development area. Table 9.1 also contains analysis of whether impacts on candidate species are serious and irreversible.

Table 9.1 Entities at risk of an SAII

Common name	Scientific name	Further SAII assessment required?	Reason for exclusion from further assessment if no further SAII assessment is required
Regent Honeyeater	*Anthochaera phrygia*	No	The development area was not within the Important Areas Map for this species.
Large-eared Pied Bat	*Chalinolobus dwyeri*	No	This species was not recorded on site and no breeding habitat for this species was located within the development area, including: • No Cliffs within the subject land; and • Not within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.
Swift Parrot	*Lathamus discolor*	No	The development area was not within the Important Areas Map for this species.
Little Bent-winged-bat	*Miniopterus australis*	No	This species was not recorded on site and no breeding habitat for this species was located within the development area, including: • Caves; • Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave'; • observation type code 'E nest-roost' with numbers of individuals >500 or from the scientific literature
Large Bent-winged-bat	*Miniopterus orianae oceanensis*	No	Although this species was recorded within the subject land, no breeding habitat for this species was located within the development area, including: • Caves; • Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in

Common name	Scientific name	Further SAII assessment required?	Reason for exclusion from further assessment if no further SAII assessment is required
			cave'; • observation type code 'E nest-roost' with numbers of individuals >500 or from the scientific literature
Brush-tailed Rock-wallaby	*Petrogale penicillata*	No	The development area was not within 1 km of rocky escarpments, gorges, steep slopes, boulder piles, rock outcrops or clifflines.
Eastern Cave Bat	*Vespadelus troughtoni*	No	This species was not recorded on site and no breeding habitat for this species was located within the development area, including: • Caves; and • Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, crevices or boulder piles, or within two kilometres of old mines, tunnels, old buildings or sheds

9.1.1 Additional impact assessment provisions for threatened species at risk of an SAII

No threatened matter consistent with a SAII candidate species identified as likely to occur or to contain significant habitat within the study area is likely to be significantly impacted by the proposed development. Although *Miniopterus orianae oceanensis* (Large Bent-winged Bat) was positively identified within the study area during the microchiropteran bat call survey, which is an SAII species, the subject land was only considered to contain hunting habitat and roosting habitat in the form of tree hollows. Preferred roosting habitat in the form of caves was absent within the site. The proposal will require the removal of up to 11 hollow-bearing trees.

9.1.2 *MINIOPTERUS ORIANAE OCEANENSIS* (LARGE BENT-WINGED BAT)

Miniopterus orianae oceanensis (Large Bent-winged Bat) was positively identified within the study area during the microchiropteran bat call survey.

Assessment under Biodiversity Conservation Regulation 2017 6.7(2):

(1) An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community becoming extinct because:

a It will cause a further decline of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline, or

The proposal requires the removal of 8.37ha of PCT 3431 Central Hunter Ironbark Grassy Woodland, which would provide hunting habitat for *M. orianae oceanensis*. The proposal will also require the removal of 11 hollow-bearing trees. The entire site is likely to contain suitable hunting habitat for this microchiropteran bat species. Preferred roosting habitat in the form of caves was absent within the site. Nest boxes are recommended to be installed at a ratio of 2:1 per hollow-bearing tree. The

removal of vegetation from this site may result in an incremental loss of hunting habitat in the local area. Taking into consideration the relatively large amount of suitable hunting habitat in the local area, the recommendation for the installation of nest boxes, and the absence of preferred roosting habitat within the site the proposal is unlikely to disrupt the life cycle of *M. orianae oceanensis* such that local extinction would occur.

b It will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size, or

The proposal to remove of 8.37ha of PCT 3431 Central Hunter Ironbark Grassy Woodland is unlikely to result in the reduction of population size of Large Bentwing Bat. This vegetation only provided suitable hunting habitat for this highly mobile species and an incremental number of hollow-bearing trees. There is suitable hunting habitat and hollow-bearing trees within close proximity to the proposed impact area. Taking into consideration the suitable hunting habitat in the local area, the recommendation for compensatory nest boxes and the absence of preferred roosting habitat within the site the proposal is unlikely to reduce the population size of this species.

c It is an impact on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographical distribution, or

The Large Bentwing Bat is a highly mobile species and does not have a very limited geographical distribution. The proposal will only require the removal of 8.37ha of PCT 3431 Central Hunter Ironbark Grassy Woodland.

d The impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity and therefore its members are not replaceable.

Under the Saving Our Species Strategy the key threats to the viability of landscape-managed species are loss, fragmentation and degradation of habitat, and widespread pervasive factors such as impacts of climate change and disease. Recommendations within this report for the installation of nest boxes would ensure that no roosting habitat for this species is lost as a result of the proposal.

e Actions to avoid and minimise direct and indirect impacts

Recommendations within this report for the installation of nest boxes would ensure that no roosting habitat for this species is lost as a result of the proposal. The proposal has been designed to retain trees, including two hollow-bearing trees within the scope of the proposal and the retention of 11.41ha of PCT 3431 Central Hunter Ironbark Grassy Woodland, which provides hunting habitat for this species .

10.0 Impact summary

10.1 Determine an offset requirement for impacts

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

Table 10.1 identifies impacts that require an offset (as per BAM Subsection 9.2.1(1.)). An offset is not required for impacts where the vegetation integrity score is below those as per BAM Subsection 9.2.1(3.) for impacts on native vegetation. This is not applicable to the Proposal.

Table 10.1 Impacts that require an offset – ecosystem credits

Vegetation zone	PCT name	TEC	Impact area (ha)	Current VI score	Future VI score	Change in VI score	Biodiversity risk weighting	Number of ecosystem credits required
PCT 3431_Moderate_Stage 6	Central Hunter Ironbark Grassy Woodland	Yes	0.54	35.1	0	-33.9	2	9
					13.1			
PCT 3431_Remnant Trees_Stage 6	Central Hunter Ironbark Grassy Woodland	Yes	1.49	32	0	-31.4	2	23
					9			
PCT 3431_Derived Grassland_Stage 6	Central Hunter Ironbark Grassy Woodland	Yes	2.19	18.3	0	-18.2	2	20
					8.1			
PCT 3431_Derived Grassland_Stage 7	Central Hunter Ironbark Grassy Woodland	Yes	4.15	18.3	0	-17.4	2	36
					8.1			
Total								88

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

Table 10.2 identifies impacts on threatened species (species credits) that require an offset (as per BAM Subsection 9.2.2(2.)).

Table 10.2 Impacts that require an offset – species credits

Vegetation Zone	Common name	Scientific name	BC Act status	EPBC Act status	Loss of habitat (ha) or individuals	Biodiversity risk weighting	Number of species credits required
PCT 3431_Moderate_Stage 6	Striped Legless Lizard	*Delma impar*	V	V	0.54ha	1.5	7
PCT 3431_Remnant Trees_Stage 6	Striped Legless Lizard	*Delma impar*	V	V	1.49ha	1.5	18
PCT 3431_Derived Grassland_Stage 6	Striped Legless Lizard	*Delma impar*	V	V	2.19ha	1.5	15
PCT 3431_Derived Grassland_Stage 7	Striped Legless Lizard	*Delma impar*	V	V	4.15ha	1.5	27
						Subtotal	**67**
PCT 3431_Moderate_Stage 6	Squirrel Glider	*Petaurus norfolcensis*	V	Not listed	0.54ha	2	9
PCT 3431_Remnant Trees_Stage 6	Squirrel Glider	*Petaurus norfolcensis*	V	Not listed	0.1.49ha	2	23
						Subtotal	**32**

10.1.3 Indirect and prescribed impacts

No indirect and prescribed impacts remain after measures to avoid, minimise and mitigate have been applied.

10.1.4 Serious and Irreversible Impacts (SAII)

No threatened matter consistent with a SAII candidate species identified as likely to occur or to contain significant habitat within the study area is likely to be impacted by the proposal.

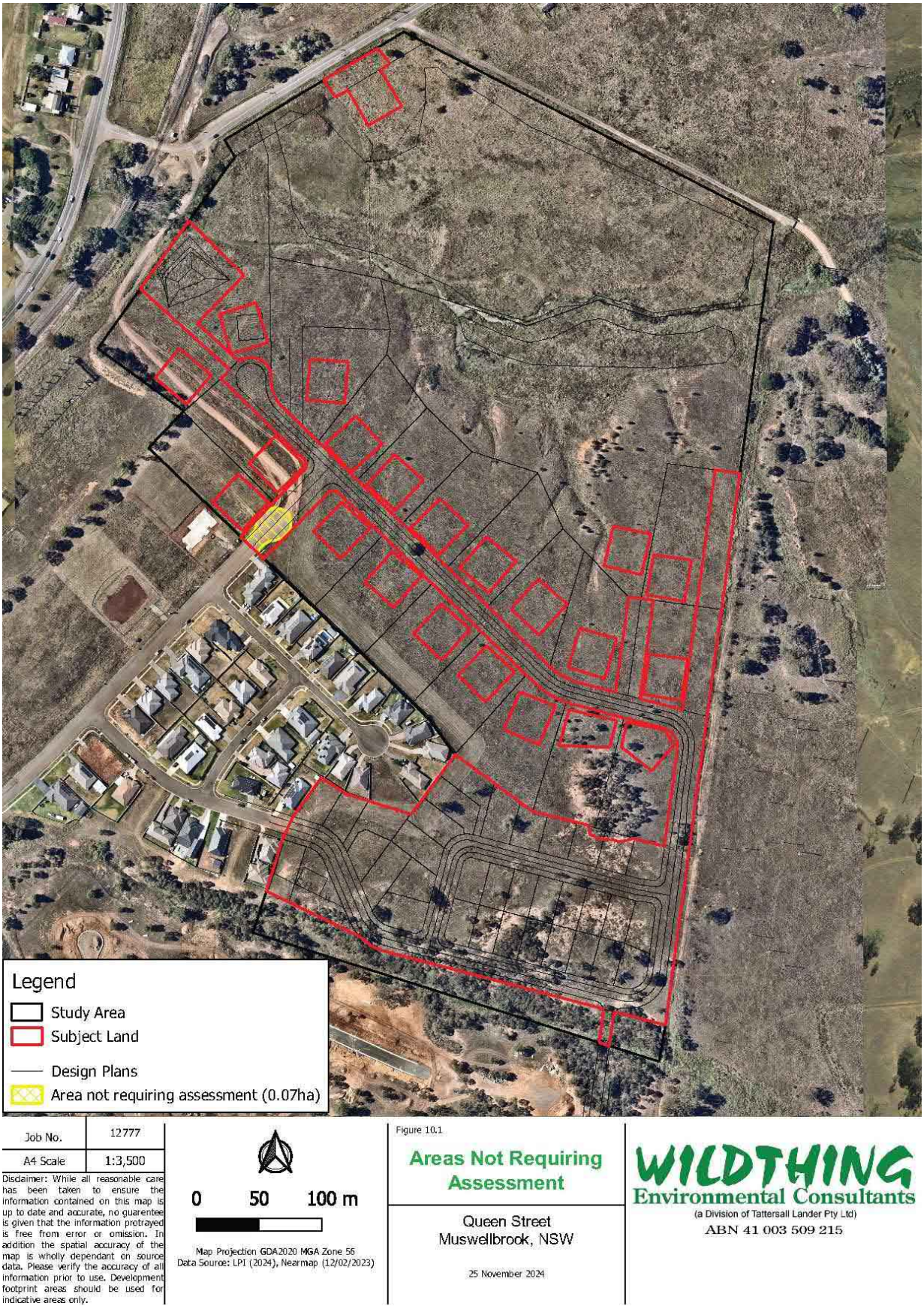
10.1.5 Areas not requiring assessment

Areas not requiring assessment are shown in Figure 10.1. These areas consist of an existing paved road.

10.1.6 Impact on biodiversity values

No biodiversity values will be impacted by this proposal.

Figure 10.1 Areas not requiring assessment.



11.0 Biodiversity credit report

Table 11.1 contains offset ecosystem credit details and Table 11.2 contains offset species credit details. Also see Appendix H Credit reports.

11.1 Ecosystem credits

Table 11.1 Ecosystem credit class and matching credit profile

Ecosystem credit	Attributes shared with matching credits						
	PCT name	PCT vegetation class	PCT vegetation formation	Associated TEC or EC	Offset trading group (BAM Section 10.2, Tables 4 & 5)	Hollow bearing trees present?	IBRA subregion (in which proposal is located)
65	3431-Central Hunter Ironbark Grassy Woodland	Hunter Macleay Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub/grass-formation)	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	No	Hunter
23	3431-Central Hunter Ironbark Grassy Woodland	Hunter Macleay Dry Sclerophyll Forests	Dry Sclerophyll Forests (Shrubby sub/grass-formation)	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	Yes	Hunter

11.2 Species credits

Table 11.2 Species credit class and matching credit profile

Common name	Scientific name	BC Act status	EPBC Act status	Loss of habitat (ha) or individuals	Biodiversity risk weighting	Number of species credits required
Striped Legless Lizard	*Delma impar*	V	V	8.37	1.5	**67**
Squirrel Glider	*Petaurus norfolcensis*	V	Not listed	2.03	2	**32**

12.0 Considerations Under State Environmental Planning Policy (Biodiversity and Conservation) 2021

12.1 Chapter 4 Koala Habitat Protection 2021

This Chapter aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline.

Within the Muswellbrook Shire Council LGA Chapter 4 applies to land that is not zoned RU1, RU2 or RU3 and has an area of more than one hectare or an area which has together with any adjoining land in the same ownership an area of more than one hectare, whether or not the development application applies to the whole, or only part of the land. The site is zoned R1 and R5 and encompasses an area larger than 1ha therefore Chapter 4 is addressed further below.

With no approved Koala Plan of Management for this LGA, Chapter 4 is addressed by considering Part *4.9 Development assessment process — no approved koala plan of management for land.*

For the purposes of Part 4.9 of the SEPP (Biodiversity Conservation) 2021, the following factors have been taken into account in deciding whether there is likely to be a significant impact on koalas or koala habitat:

4.9.5 … the council may grant development consent if the applicant provides to the council—

(a) information, prepared by a suitably qualified and experienced person, the council is satisfied demonstrates that the land subject of the development application-

(i) does not include any trees belonging to the koala use tree species listed in Schedule 3 for the relevant koala management area, or

Most trees within the mapped native vegetation are considered koala use trees species in the Central Coast Koala Management Area under Schedule 3 of SEPP (Biodiversity Conservation) 2021. This includes *Eucalyptus crebra* (Narrow-leaved Ironbark). Most of the trees proposed to be removed as part of the subdivision are koala use trees.

(ii) is not core koala habitat, or

Core Koala Habitat is defined in Chapter 4 as

" (a) an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas are recorded as being present at the time of assessment of the land as highly suitable koala habitat, or

(b) an area of land which has been assessed by a suitably qualified and experienced person as being highly suitable koala habitat and where koalas have been recorded as being present in the previous 18 years."

No koalas were identified during site surveys. No evidence of koalas was found during Spot Assessment Technique surveys. According to the BioNet Atlas database search (NSW DCCEEW, 2024a), there has been a total of 25 koala sightings recorded with a 10km radius of the subject land. One of these records is within 2.5km of the site, occurred within the past 18 years and has an accuracy of 1000m or less as outlined in the Koala SEPP 2021 Factsheet (DPIE 2021). This record is 1.8km south of the subject land from 2019. A second record was 2.51km east of the subject land from 2018 within the Muswellbrook Coal Company open cut mine.

The Koala SEPP 2021 Factsheet (DPIE 2021) outlines highly suitable habitat to be where 15% or greater of the total number of trees within any Plant Community Type (PCT) are the regionally relevant species of those listed in Schedule 2 of the SEPP. The majority of the canopy species within the subject land were *Eucalyptus crebra* (Narrow-leaved Ironbark) which is considered a koala use trees species in the Central Coast Koala Management Area under Schedule 3 of SEPP (Biodiversity Conservation) 2021. Therefore the treed areas of the subject land meet the criteria for highly suitable habitat.

Given that there is suitable koala habitat and a valid koala record within 2.5km of the subject land the site is considered to constitute Core Koala Habitat. Based on this information, a Koala Assessment Report is likely required.

> *(b) information the council is satisfied demonstrates that the land subject of the development application-*
> *(i) does not include any trees with a diameter at breast height over bark of more than 10 centimetres, or*

Many trees surveyed within the site had a BDH above 10cm.

> *(ii) includes only horticultural or agricultural plantations.*

No horticultural or agricultural plantations were present on site.

Given that there is suitable koala habitat and a valid koala record within 2.5km of the subject land the site is considered to constitute Core Koala Habitat. Based on this information, a Koala Assessment Report is likely required.

13.0 NSW Biosecurity Act 2015

Five priority weed species listed under the Biosecurity Act 2015 were identified on site and are listed below in Table 14.1. The site lies within the Hunter Local Land Services Region.

Table 13.1 Priority Weed species found within the subject land.

WEED Species	Legal Requirements	ADDITIONAL SIGNIFICANCE
Senecio madagascariensis Fireweed	General Biosecurity Duty Prohibition on dealings	N
Galenia pubescens Galenia	General Biosecurity Duty Regional Recommended Measure (Hunter)	
Opuntia aurantiaca Tiger pear	General Biosecurity Duty Prohibition on dealings Regional Recommended Measure	N
Opuntia stricta Prickly Pear	General Biosecurity Duty Prohibition on dealings Regional Recommended Measure	
Lycium ferocissimum African Boxthorn	General Biosecurity Duty Regional Recommended Measure	N

T – Listed as a Threatening Process under the NSW BC Act 2016.

N –Weed of National Significance.

*Priorities under the Biosecurity Act 2015

General Biosecurity Duty - any person dealing with plant matter must take measures to prevent, minimise or eliminate the biosecurity risk (as far as is reasonably practicable).

Prohibition on dealings - Must not be imported into the State or sold

It is recommended that weed control be implemented as part of the proposal and recommended VMP. It is also recommended that the spread of weeds be minimised through recommended mitigation measures during the construction phase.

14.0 Commonwealth Environment Protection and Biodiversity Conservation Act 1999 & Matters of National Environmental Significance

The EPBC Act establishes a process for assessing the environmental impact of activities and developments where "Matters of National Environmental Significance" (MNES) may be affected. Under the Act, any action which "has, will have, or is likely to have a significant impact on a matter of MNES" is defined as a "controlled action", and requires approval from the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW), which is responsible for administering the EPBC Act. The process includes conducting a Significant Impact Criteria assessment for listed threatened species and ecological communities that represent a matter of MNES that will be impacted as a result of the proposed action. Guidelines that outline of the significant impact criteria have been developed by the Commonwealth and help decide whether or not a referral to the Minister is required. The likelihood of occurrence for EPBC listed threatened species is shown in Appendix C.

The assessment in Appendix C has been undertaken in accordance with significant impact guidelines 1.1 under the EPBC Act (DoEE, 2013) to address the significant impact criteria for following EPBC listed threatened species;

- *Delma vescolineata* (Hunter Valley Delma) – Endangered
- Central Hunter Valley eucalypt forest and woodland (Critically Endangered)

The significant impact criteria found that there will not likely to be a significant impact for Hunter valley Delma or Central Hunter Valley eucalypt forest and woodland.

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Appendix A: BDAR requirements compliance

Table A 1 Assessment of compliance with BDAR minimum information requirements

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
Introduction	Chapters 2 and 3	**Information**	
		Introduction to the biodiversity assessment including:	–
		☒ brief description of the proposal	1.1.1
		☒ identification of subject land boundary, including: ☒ operational footprint ☒ construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure	1.1.3
		☒ general description of the subject land	
		☒ sources of information used in the assessment, including reports and spatial data	Table 1.2
		☒ identification and justification for entering the BOS	1.2.2
		Maps and tables	
		☒ 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	Figure 1.3
Landscape	Sections 3.1 and 3.2, Appendix E	Information	
		Identification of site context components and landscape features, including:	–
		☒ general description of subject land topographic and hydrological setting, geology and soils	3.2.7
		☒ per cent native vegetation cover in the assessment area (as described in BAM Section 3.2)	3.3
		☒ IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))	3.2.1

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☒ rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3(3.) and Appendix E)	
		☒ wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3(3.))	
		☒ connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6.))	3.2.3
		☒ karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(12.))	3.2.4
		☒ areas of outstanding biodiversity value occurring on the subject land and assessment area (as described in BAM Subsection 3.1.3(8–9.))	3.2.5
		☒ NSW (Mitchell) landscape on which the subject land occurs	3.2.6
		☒ details of field reconnaissance undertaken to confirm the extent and condition of landscape features and native vegetation cover (as described in Operational Manual Stage 1 Section 2.4)	2.1
		Maps and tables	
		☒ Site Map ☒ Property boundary ☒ Boundary of subject land ☒ Cadastre of subject land (including labelling of Lot and DP or section plan if relevant) ☐ Landscape features identified in BAM Subsection 3.1.3	Figure 1.2
		☒ 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	
		Landscape features identified in BAM Subsection 3.1.3 and to be shown on the Site Map and/or Location	–

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		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 3.1 Figure 3.2
		Data	
		☐ 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	–
Native vegetation	Chapter 4, Appendix A and Appendix H	Information	
		☒ Identify native vegetation extent within the subject land, including cleared areas and evidence to support differences between mapped vegetation extent and aerial imagery (as described in BAM Section 4.1(1–3.) and Subsection 4.1.1)	4.1 **Error! Reference**

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
			source not found.
		☒ Provide justification for all parts of the subject land that do not contain native vegetation (as described in BAM Subsection 4.1.2)	4.1
		☒ 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)	Figure
		☒ Describe the systematic field-based floristic vegetation survey undertaken in accordance with BAM Section 4.2	2.3.2
		☐ 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)	
		For each PCT within the subject land, describe:	–
		☒ PCT name and ID	4.2.1
		☒ vegetation class	4.2.1.1
		☒ extent (ha) within subject land	4.2.1.1
		☒ 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 per cent cleared value of PCT (BAM Subsection 4.2.1(5.))	4.2.1.1
		Describe the vegetation integrity assessment of the subject land, including:	–
		☒ identification and mapping of vegetation zones (as described in BAM Subsection 4.3.1)	

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☒ description of vegetation zones within the subject land (as described in Operational Manual Stage 1 Table 2 and Subsection 3.3.2)	Table 4.
		☒ area (ha) of each vegetation zone	Table 4.
		☒ assessment of patch size (as described in BAM Subsection 4.3.2)	Table 4.
		☒ survey effort (i.e., number of vegetation integrity survey plots) as described in BAM Subsection 4.3.4(1–2.)	Table 4.
		☐ use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsection 4.3.3(5.))	
		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	
		Maps and tables	
		☒ Map of native vegetation extent within the subject land at scale not greater than 1:10,000 including identification of all areas of native vegetation including areas that are ground cover only, cleared areas (as described in BAM Section 4.1(1–3.)) and all parts of the subject land that do not contain native vegetation (BAM Subsection 4.1.2)	**Error! Reference source not found.**
		☒ Map of PCTs within the subject land (as described in BAM Section 4.2(1.))	Figure 4.
		☒ Map of vegetation zones within the subject land (as described in BAM Subsection 4.3.1)	
		☒ Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCT boundaries	Figure D 1

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☒ Map of TEC distribution on the subject land and table of TEC listing, status and area (ha)	**Error! Reference source not found.** **Error! Reference source not found.**
		☒ Map of patch size locations for each native vegetation zone and table of patch size areas (as described in BAM Subsection 4.3.2)	
		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 4.
		Data	
		☐ All report maps as separate jpeg files	–
		☐ Plot field data (MS Excel format)	
		☐ Plot field datasheets	Appendix D
		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	–
Threatened species	Chapter 5	Information	

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		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.))	Table 5.1
		☒ 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)	Table 5.1
		☒ justification for addition of any ecosystem credit species to the list	Table 5.1
		Identify species credit species likely to occur on the subject land, including:	–
		☒ list of species credit species derived from the BAM-C (as described in BAM Subsection 5.1.1)	Table 5.2 Table 5.3
		☒ 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)	Table 5.2 Table 5.3
		☒ 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)	Table 5.2 Table 5.3
		☒ justification for addition of any species credit species to the list	Table 5.2 Table 5.3
		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.))	Table 5.4 Table 5.5

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☒ species for which targeted surveys are to be completed to determine species presence (BAM Subsection 5.2.4(2.b.)) ☒ species for which an expert report is to be used to determine species presence (BAM Subsection 5.2.4(2.c.))	
		Present the outcomes of species credit species assessments from:	–
		☒ threatened species survey (as described in BAM Section 5.2.4)	Table 5.6 Table 5.7
		☐ expert reports (if relevant) including justification for presence of the species and information used to make this determination (as described in BAM Subsection 5.2.4, Section 5.3, Box 3)	
		Where survey has been undertaken include detailed information on:	–
		☒ survey method and effort (as described in BAM Section 5.3)	Table 5.6 Table 5.7
		☒ 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	2.3.3.1 2.4.3
		☒ 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	Table 5.6 Table 5.7
		☐ survey personnel and relevant experience	Declarations
		☐ describe any limitations to surveys and how these were addressed/overcome	
		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	
		Where use of local data is proposed (BAM Subsection 1.4.2):	–

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☐ 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	
		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)	Figure 5.1 Figure 5.2
		☐ 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)	Table 10.2

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		Maps and tables	
		☒ Table showing ecosystem credit species in accordance with BAM Subsection 5.1.1, and identifying:	Table 5.1
		☒ the ecosystem credit species removed from the list	Table 5.1
		☒ the sensitivity to gain class of each species	Table 5.1
		☒ Table detailing species credit species in accordance with BAM Section 5.2 and identifying:	Table 5.2 Table 5.3 Table 5.6 Table 5.7
		☒ the species credit species removed from the list of species because the species is considered vagrant, out of geographic range or the habitat or microhabitat features are not present	Table 5.2 Table 5.3
		☒ the candidate species credit species not recorded on the subject land as determined by targeted survey, expert report or important habitat map	Table 5.6 Table 5.7
		☐ 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 5.6 Table 5.7
		☐ Map indicating the GPS coordinates of all individuals of each species recorded within the subject land and the species polygon for each species (as described in BAM Subsection 5.2.5)	Figure 5.1 Figure 5.2
		Data	
		☐ Digital shape files of suitable habitat identified for survey for each candidate species credit species	–
		☐ Survey locations including GPS coordinates of any plots, transects, grids	

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☐ Digital shape files of each species polygon including GPS coordinates of located individuals	–
		☐ Species polygon map in jpeg format	–
		☐ Expert reports and any supporting data used to support conclusions of the expert report	
		☐ Field datasheets detailing survey information including prevailing conditions, date, time, equipment used, etc.	
Prescribed impacts	Chapter 6	Information	
		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) ☒ waterbodies or any hydrological processes that sustain threatened entities (as described in BAM Subsection 6.1.4)	Table 6.1
		☒ where the proposed development may result in vehicle strike on threatened fauna or on animals that are part of a threatened ecological community (as described in BAM Subsection 6.1.6)	Table 6.1
		☒ Identify a list of threatened entities that may be dependent upon or may use habitat features associated with any of the prescribed impacts	Table 6.1
		☒ 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)	Table 6.1
		Maps and tables	
		☐ Map showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, human-made structures, etc.)	
		☐ Map showing location of potential vehicle strike locations	

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		Data	
		☐ Digital shape files of prescribed impact feature locations	–
		☐ Prescribed impact features map in jpeg format	–
Avoid and minimise impacts	Chapter 7	Information	
		Demonstration of efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the proposal location in accordance with Chapter 7, including an analysis of alternative:	–
		☒ modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology	Figure 7.1 Table 7.1
		☒ routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route	Figure 7.1 Table 7.1
		☒ alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location	7.1.1 7.2.1
		☒ alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site	7.1.2 7.2.2
		☒ Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Sections 7.1 and 7.2)	Figure 7.1 Table 7.1
		☒ Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal (as described in BAM Subsection 7.2.1(3.))	Figure 7.1 Table 7.1
		☐ Detail measures or options considered but not implemented because they are not feasible and/or	

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		practical (e.g., due to site constraints)	
		Maps and tables	
		☒ Table of measures to be implemented to avoid and minimise the impacts of the proposal, including action, outcome, timing and responsibility	Figure 7.1 Table 7.1
		☒ Map of alternative footprints considered to avoid or minimise impacts on biodiversity values; and of the final proposal footprint, including construction and operation	
		☐ Maps demonstrating indirect impact zones where applicable	
		Data	
		Digital shape files of:	–
		☐ alternative and final proposal footprint	–
		☐ direct and indirect impact zones	–
		☐ Maps in jpeg format	–
Assessment of impacts	Chapter 8, Sections 8.1 and 8.2	Information	
		☒ Determine the impacts on native vegetation and threatened species habitat, including a description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Section 8.1)	Table 8.1 Table 8.2
		Assessment of indirect impacts on vegetation and threatened species and their habitat including (as described in BAM Section 8.2):	–
		☒ description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal	Table 8.3
		☒ documenting the consequences to vegetation and threatened species and their habitat including evidence-based justifications	Table 8.1 Table 8.2

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☒ reporting any limitations or assumptions, etc. made during the assessment	Table 8.3
		☒ identification of the threatened entities and their habitat likely to be affected	Table 8.1 Table 8.2
		Assessment of prescribed biodiversity impacts (as described in BAM Section 8.3) including:	–
		assessment of the nature, extent frequency, duration and timing of impacts on the habitat of threatened species or ecological communities associated with:	–
		☐ karst, caves, crevices, cliffs, rocks and other features of geological significance	
		☐ human-made structures	
		☒ non-native vegetation	8.3.1
		☒ connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	Table 8.3
		☐ movement of threatened species that maintains their life cycle	
		☒ water quality, waterbodies and hydrological processes that sustain threatened species and threatened ecological communities	8.3.3
		☒ assessment of the impacts of vehicle strikes on threatened species of animals or on animals that are part of a TEC	8.3.4
		☒ evaluate the consequences of prescribed impacts	Table 8.3
		☐ describe impacts that are uncertain	
		☐ document limitations to data, assumptions and predictions	
		Maps and tables	
		☐ Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts	Table 8.2
		Data	
		N/A	–

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
Mitigation and management of impacts	Chapter 8, Sections 8.4 and 8.5	Information	
		Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM Sections 8.4 and 8.5 including:	–
		☒ techniques, timing, frequency and responsibility ☐ identify measures for which there is risk of failure ☒ evaluate the risk and consequence of any residual impacts	Table 8.3 Table 8.5
		☐ document any adaptive management strategy proposed	
		Identification of measures for mitigating impacts related to:	–
		☒ displacement of resident fauna (as described in BAM Subsection 8.4.1(2.)) ☒ indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1(3.)) ☒ mitigating prescribed biodiversity impacts (as described in BAM Subsection 8.4.2)	Table 8.5
		☐ Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (BAM Section 8.5)	
		Maps and tables	
		☒ Table of measures to be implemented before, during and after construction to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility	Table 8.5
		Data	
		N/A	–
Impact summary	Chapter 9	Information	
		Identification and assessment of impacts on TECs and threatened species that are at risk of a serious and irreversible impacts (SAII, in accordance with BAM Section 9.1) including:	–

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☒ addressing all criteria in Subsection 9.1.1 for each TEC listed as at risk of an SAII present on the subject land	
		☐ for each TEC, report the extent of the TEC in NSW	
		☐ addressing all criteria in Subsection 9.1.2 for each threatened species at risk of an SAII present on the subject land	
		☐ for each threatened species, report the population size in NSW	
		☒ documenting assumptions made and/or limitations to information ☒ documenting all sources of data, information, references used or consulted ☐ clearly justifying why any criteria could not be addressed	
		☒ Identification of impacts requiring offset in accordance with BAM Section 9.2	
		☒ Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1(3.)	
		☒ Identification of areas not requiring assessment in accordance with BAM Section 9.3	
		Maps and tables	
		☐ Map showing the extent of TECs at risk of an SAII within the subject land	
		☐ Map showing location of threatened species at risk of an SAII within the subject land	
		Map showing location of:	–
		☐ impacts requiring offset	
		☐ impacts not requiring offset	
		☐ areas not requiring assessment	
		Data	
		Digital shape files of:	–
		☐ extent of TECs at risk of an SAII within the subject land	–
		☐ location of threatened species at risk of an SAII within the subject land	–

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☐ boundary of impacts requiring offset	–
		☐ boundary of impacts not requiring offset	–
		☐ boundary of areas not requiring assessment	–
		☐ Maps in jpeg format	–
Impact summary	Chapter 10	Information	
		Ecosystem credits and species credits that measure the impact of the development on biodiversity values, including:	–
		☒ future vegetation integrity score for each vegetation zone within the subject land (Equation 25 and Equation 26 in BAM Appendix H) ☒ change in vegetation integrity score (BAM Subsection 8.1.1) ☒ number of required ecosystem credits for the direct impacts of the proposal on each vegetation zone within the subject land (BAM Subsection 10.1.2)	Table 10.1
		☒ biodiversity risk weighting for each	Table 10.1 Table 10.2
		☒ number of required species credits for each candidate threatened species that is directly impacted on by the proposal (BAM Subsection 10.1.3)	Table 10.2
		Maps and tables	
		☒ Table of PCTs requiring offset and the number of ecosystem credits required	Table 10.1
		☒ Table of threatened species requiring offset and the number of species credits required	Table 10.2
		Data	
		☐ Submitted proposal in the BAM Calculator	–
Biodiversity credit report	Chapter 10	Information	
		☒ Description of credit classes for ecosystem credits and species credits at the development or clearing	Table 11.1

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		site or land to be biodiversity certified (BAM Section 10.2)	Table 11.2
		☐ BAM credit report in pdf format	<Appendix E>
		Maps and tables	
		☒ Table of credit class and matching credit profile	Table 11.1 Table 11.2
		Data	
		☐ BAM credit report in pdf format	<Appendix E>

Appendix B: Biodiversity Values Map and Threshold tool report

NSW GOVERNMENT Department of Planning and Environment

Biodiversity Values Map and Threshold Report

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

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

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

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

Biodiversity Values Map and Threshold Report		
Date of Report Generation		16/10/2024 8:35 AM
1. Biodiversity Values (BV) Map - Results Summary (Biodiversity Conservation Regulation Section 7.3)		
1.1	**Does the development Footprint intersect with BV mapping?**	no
1.2	**Was ALL BV Mapping within the development footprinted added in the last 90 days?** (dark purple mapping only, no light purple mapping present)	no
1.3	**Date of expiry of dark purple 90 day mapping**	N/A
1.4	**Is the Biodiversity Values Map threshold exceeded?**	no
2. Area Clearing Threshold - Results Summary (Biodiversity Conservation Regulation Section 7.2)		
2.1	**Size of the development or clearing footprint**	52,328.5 sqm
2.2	**Native Vegetation Area Clearing Estimate (NVACE)** (within development/clearing footprint)	52,328.5 sqm
2.3	**Method for determining Minimum Lot Size**	LEP
2.4	**Minimum Lot Size** (10,000sqm = 1ha)	600 sqm
2.5	**Area Clearing Threshold** (10,000sqm = 1ha)	2,500 sqm
2.6	**Does the estimate exceed the Area Clearing Threshold?** (NVACE results are an estimate and can be reviewed using the Guidance)	yes
REPORT RESULT: Is the Biodiversity Offset Scheme (BOS) Threshold exceeded for the proposed development footprint area? (Your local council will determine if a BDAR is required)		**yes**

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Department of Planning and Environment

What do I do with this report?

- If the result above indicates the BOS Threshold has been exceeded, your local council **may require** a Biodiversity Development Assessment Report with your development application. Seek further advice from Council. An accredited assessor can apply the Biodiversity Assessment Method and prepare a BDAR for you. For a list of accredited assessors go to: https://customer.lmbc.nsw.gov.au/assessment/AccreditedAssessor.

- If the result above indicates the BOS Threshold has not been exceeded, you may not require a Biodiversity Development Assessment Report. This BMAT report can be provided to Council to support your development application. Council can advise how the area clearing threshold results should be considered. Council will review these results and make a determination if a BDAR is required. Council may ask you to review the area clearing threshold results. You may also be required to assess whether the development is "likely to significantly affect threatened species" as determined under the test in Section 7.3 of the *Biodiversity Conservation Act 2016*.

- If a BDAR is not required by Council, you may still require a permit to clear vegetation from your local council.

- If **all** Biodiversity Values mapping within your development footprint was less than 90 days old, i.e. areas are displayed as dark purple on the BV map, a BDAR may not be required if your Development Application is submitted within that 90 day period. Any BV mapping less than 90 days old on this report will expire on the date provided in Line item 1.3 above.

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

Review Options:

- If you believe the Biodiversity Values mapping is incorrect please refer to our BV Map Review webpage for further information.

- If you or Council disagree with the area clearing threshold estimate results from the NVACE in Line Item 2.6 above (i.e. area of Native Vegetation within the Development footprint proposed to be cleared), review the results using the Guide for reviewing area clearing threshold results from the BMAT Tool.

Acknowledgement

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

Signature: _____ Date: _____

(Typing your name in the signature field will be considered as your signature for the purposes of this form)

16/10/2024 08:35 AM

Department of Planning and Environment

Biodiversity Values Map and Threshold Tool

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

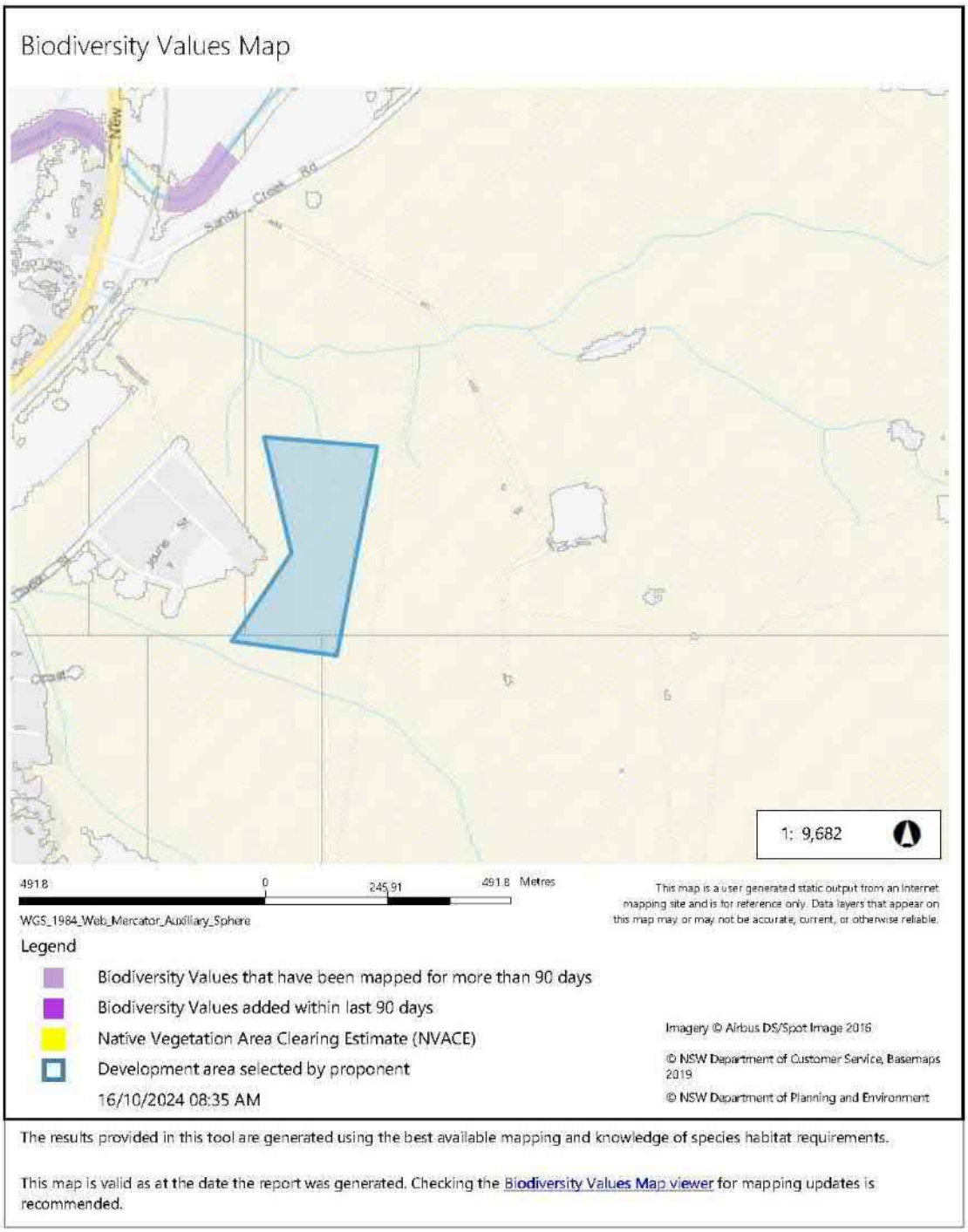
The BV map forms part of the Biodiversity Offsets Scheme threshold, which is one of the factors for determining whether the Scheme applies to a clearing or development proposal. You have used the Threshold Tool in the map viewer to generate this BV Threshold Report for your nominated area. This report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

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

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

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

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



The results provided in this tool are generated using the best available mapping and knowledge of species habitat requirements.

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

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Appendix C: Commonwealth Environment Protection and Biodiversity Conservation Act 1999 & Matters of National Environmental Significance

Considerations have been made to the Commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act 1999. Assessments have been made to determine whether or not the proposal or activity has, will have, or is likely to have a significant impact on a matter of National Environmental Significance. The matters of National Environmental Significance and the appropriate responses are listed below:

- World Heritage properties;

The proposed development does not affect any World Heritage properties.

- wetlands recognised under the Ramsar convention as having international significance;

The subject land is located 50-100km upstream from the Hunter Estuary. The proposal is unlikely to have any impact on this Ramsar site.

- listed threatened species and communities;

Threatened Communities

Seven nationally threatened ecological communities were recorded on the DCCEEW database as having potential to occur within 10km of the site, these being:

- Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland
- Lowland Rainforest of Subtropical Australia
- Central Hunter Valley eucalypt forest and woodland
- Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland
- 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
- Hunter Valley Weeping Myall (Acacia pendula) Woodland

Taking into consideration the 'Approved Conservation Advice (including listing advice) for the Central Hunter Valley eucalypt forest and woodland ecological community' (DotE 2015), vegetation zones 1 and 2 of Plant Community Type (PCT) 3431 - Central Hunter Ironbark Grassy Woodland within the subject land are considered to align with TEC Central Hunter Valley eucalypt forest and woodland ecological community (see Table C1). A test of significance for the TEC was conducted and found that the proposal is unlikely to significantly impact the community consideration the retention of areas of Central Hunter Valley eucalypt forest and woodland in the south of the study area, mitigation measures to protect the retained vegetation from edge effect and recommended rehabilitation of vegetation under a VMP.

Table C 1 Assessment of EPBC Act Central Hunter Valley eucalypt forest and woodland Key diagnostic characteristics against Plant Community Type (PCT) 3431 - Central Hunter Ironbark Grassy Woodland

Key diagnostic characteristics as described in in Section 1.5.1 of DotE 2015	Vegetation Zone 1 – 0.54ha PCT 3431_Moderate	Vegetation Zone 2 – 1.49ha PCT 3431_Remnant Trees	Vegetation Zone 3 & 4 – 6.34ha PCT 3431_Derived Grassland
It occurs in the Hunter River catchment (typically called the Hunter Valley region)	Yes	Yes	Yes
It typically occurs on lower hillslopes and low ridges, or valley floors in undulating country; on soils derived from Permian sedimentary rocks	Yes	Yes	Yes
It does not occur on alluvial flats, river terraces, aeolian sands, Triassic sediments, or escarpments	Yes	Yes	Yes
The canopy of the ecological community is dominated by one or more of the following four eucalypt species: *Eucalyptus crebra* (narrow-leaved ironbark), *Corymbia aculata* (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	Dominated by *Eucalyptus crebra* (Narrow-leaved Ironbark). Some specimens of *Eucalyptus moluccana* (Grey Box)	Dominated by *Eucalyptus crebra* (Narrow-leaved Ironbark). Some specimens of *Eucalyptus moluccana* (Grey Box)	Generally, no canopy present
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	Yes	Yes
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	Yes	Yes	Yes
Does this PCT/condition zone meet the EPBC Act listing criterion	**Yes**	**Yes**	**No**

Minimum Condition Thresholds

Minimum condition thresholds for species composition and patch sizes (DotE 2015).

(1) Is the patch at least 0.5 ha in size? -

Areas of vegetation zones 1 and 2 (PCT 3431_Moderate_Stage 6 and PCT 3431_remnant trees_Stage 6) in the south of the subject land along the creekline constituted a patch larger than 0.5ha. The canopy of patches of vegetation zones 1 and 2 to the north was located more than 30m from another patch and covered an area below 0.5ha. These areas therefore do not meet the minimum condition threshold for the patch size. Figure C1 shows patches that meet these conditions and those that do not.

↓

(2) Is at least 50% of the perennial understorey vegetative cover of the patch (due to) native plants?

This is true for areas within vegetation zones PCT 3431_Moderate_Stage 6 and PCT 3431_remnant trees_Stage 6 that also meet the patch size threshold.

↓

(3) Are there at least 12 native understorey species in the whole patch?

This is true areas within vegetation zones PCT 3431_Moderate_Stage 6 and PCT 3431_remnant trees_Stage 6 that also meet the patch size threshold.

↓

Southern parts of vegetation zones PCT 3431_Moderate_Stage 6 and PCT 3431_remnant trees_Stage 6 mapped in Figure C1 meet the minimum condition thresholds for species composition and patch size and are considered part of the protected nationally listed ecological community. A test of significance for this TEC has been conducted below.

Figure C1 Patches of TEC Central Hunter Valley eucalypt forest and woodland within the subject land.

Significant Impact Criteria EPBC Act - Central Hunter Valley eucalypt forest and woodland

An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:

a. *Reduce the extent of an ecological community*

The project will result in the removal or modification of 1.91ha of vegetation identified as TEC Central Hunter Valley eucalypt forest and woodland. Areas of this TEC occur within retained vegetation south of the subject land and in neighboring land to the east. Due to the disturbed nature and small proportion of TEC to be impacted within the locality, it is considered unlikely that the proposed action would have an adverse effect on the extent of the TEC or significantly modify the composition of the TEC such that its local occurrence is likely to be placed at risk of extinction.

b. *fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines*

The proposal will not result in the construction of any transmission lines. The proposal will include internal roads within the subdivision however the removal of this TEC within the proposal will not fragment the occurrences of the community within the subject land or proximity. The proposal is unlikely to impede any genetic transfer between retained patches.

c. *Adversely affect habitat critical to the survival of an ecological community*

The project will adversely affect 1.91ha of habitat considered to be critical to the survival of the community, however it is unlikely to result in any substantial change to the community locally such that its local occurrence is likely to be placed at risk of extinction.

d. *Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns*

Considering mitigation measures including temporary stormwater controls, installing silt fencing and controls on sediment and runoff the proposal is unlikely to affect any abiotic processes necessary for the community's survival.

e. *Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting*

The project will remove or modify 1.94ha of the critically endangered community. Mitigation measures to reduce edge effects include fencing off retained vegetation and posted signage discouraging human activities and dumping within the retained vegetation. Considering the mitigation measures it is unlikely the proposal will result in any substantial change to the community species composition locally.

f. Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:

– assisting invasive species, that are harmful to the listed ecological community, to become established, or

– causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or

Mitigation measures to reduce edge effects include fencing off retained vegetation and posted signage discouraging human activities and dumping within the retained vegetation. Weed management within retained vegetation has been recommended under a VMP. This will reduce the risk of spread or establishment of invasive weeds. Considering these measures the project will unlikely assist the establishment of any invasive species or cause any increased mobilisation of fertilisers which would kill or inhibit the growth of species in the ecological Community.

g. Interfere with the recovery of an ecological community.

Mitigation measures to reduce edge effects include fencing off retained vegetation and posted signage discouraging human activities and dumping within the retained vegetation. A VMP has been recommended that will prioritize the ongoing ecological viability of the retained areas of vegetation by protecting the ecological biodiversity and habitat values through weed management. Considering these measures the proposal is not likely to interfere with any current recovery programs.

Taking into consideration the retention of areas of Central Hunter Valley eucalypt forest and woodland in the south of the study area, mitigation measures to protect the retained vegetation from edge effect and recommended rehabilitation of vegetation under a VMP, the removal of 1.91ha of TEC for the proposal is unlikely to significantly impact areas identified as Central Hunter Valley eucalypt forest and woodland.

Threatened Species

Forty-eight nationally threatened species were recorded on the DAWE database as occurring or having potential habitat available within 10km of the site (note all pelagic species and ocean-going birds which do not complete part of their life cycles on mainland NSW were excluded from the search), these being:

Lathamus discolor	Swift Parrot
Anthochaera phrygia	Regent Honeyeater
Calidris ferruginea	Curlew Sandpiper
Rostratula australis	Australian Painted Snipe
Melanodryas cucullata cucullata	South-eastern Hooded Robin
Callocephalon fimbriatum	Gang-gang Cockatoo
Tringa nebularia	Common Greenshank
Botaurus poiciloptilus	Australasian Bittern
Erythrotriorchis radiatus	Red Goshawk

Stagonopleura guttata	Diamond Firetail
Climacteris picumnus victoriae	Brown Treecreeper (south-eastern)
Polytelis swainsonii	Superb Parrot
Aphelocephala leucopsis	Southern Whiteface
Calidris acuminata	Sharp-tailed Sandpiper
Hirundapus caudacutus	White-throated Needletail
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo
Gallinago hardwickii	Latham's Snipe
Neophema chrysostoma	Blue-winged Parrot
Falco hypoleucos	Grey Falcon
Grantiella picta	Painted Honeyeater
Galaxias sp. nov. 'Hunter'	Hunter Galaxias
Litoria booroolongensis	Booroolong Frog
Chalinolobus dwyeri	Large-eared Pied Bat
Dasyurus maculatus maculatus	Spot-tailed Quoll
Petauroides volans	Greater Glider (southern and central)
Phascolarctos cinereus	Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory)
Notamacropus parma	Parma Wallaby
Petrogale penicillata	Brush-tailed Rock-wallaby
Pseudomys novaehollandiae	New Holland Mouse
Petaurus australis australis	Yellow-bellied Glider (south-eastern)
Pteropus poliocephalus	Grey-headed Flying-fox
Nyctophilus corbeni	Corben's Long-eared Bat
Prasophyllum sp. Wybong (C.Phelps ORG 5269)	a leek-orchid
Euphrasia arguta	
Cynanchum elegans	White-flowered Wax Plant
Pterostylis gibbosa	Illawarra Greenhood
Vincetoxicum forsteri	
Eucalyptus glaucina	Slaty Red Gum
Picris evae	Hawkweed
Dichanthium setosum	bluegrass
Ozothamnus tesselatus	
Swainsona murrayana	Slender Darling-pea
Lepidium aschersonii	Spiny Peppercress
Pomaderris brunnea	Rufous Pomaderris
Androcalva procumbens	
Thesium australe	Austral Toadflax
Delma vescolineata	Hunter Valley Delma
Aprasia parapulchella	Pink-tailed Worm-lizard

An assessment of likelihood of occurrence for the above species was conducted and is described below.

Likelihood of occurrence for EPBC Act listed species

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database search (Table C2). Species listed only under the BC Act were assessed as part of determining credit species included in the BAMC.

This assessment was based on database or other records, presence or absence of suitable habitat, features of the proposal site, results of the site inspection and professional judgement. Some Migratory or Marine species identified from the Commonwealth database search have been excluded from the assessment, due to lack of habitat. The terms for likelihood of occurrence are defined below:

- "known" - the species was or has been observed on the subject land;
- "likely" - a medium to high probability that a species uses the subject land;
- "potential" - suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur
- "unlikely" - a very low to low probability that a species uses the subject land;
- "no" = habitat within the subject land and in the vicinity is unsuitable for the species.

Delma vescolineata (Hunter Valley Delma) was observed during artificial cover surveys. A test of significance was conducted for Hunter Valley Delma and found that the proposal will require the removal of 8.37ha of native vegetation used by *Delma vescolineata* (Hunter Valley Delma). The removal of 8.37ha of native vegetation whilst resulting in an incremental decline in known habitat is not likely to have a significant impact on the Hunter Valley Delma given that the proposal will retain 11.40ha of habitat and the presence of large areas of similar habitat to the east and north of the study area.

No other threatened species were recorded within the subject area during fieldwork. Of the remaining species, the site would likely provide foraging trees for woodland bird species and Grey-headed flying fox. Given the recommendations in Section 7.0, 8.0 and 9.0 of this report the proposal would not likely result in the modification or loss of any suitable habitat that would significantly affect the life cycle of woodland birds or any of the remaining fauna species or place any viable local populations of these species at risk of extinction.

Table C2 Assessment of likelihood of occurrence of threatened species recorded on the DAWE database

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required?
Prasophyllum sp. Wybong	A Leek Orchid	CE	Leek orchids are generally found in shrubby and grassy habitats in dry to wet soil (Jones 2006). Known to occur in open eucalypt woodland and grassland.	Low	Marginal habitat was present. No nearby species records. Presence of species was not identified during surveys.	No
Pterostylis gibbosa	Illawarra Greenhood	E	All known sub-populations occur in open forest and woodland on flat or gently sloping land with poorly drained soils. Within the Hunter Valley this orchid species is confined to the Milbrodale area.	Unlikely	Outside known area of occurrence. No suitable habitat was present. Presence of species was not identified during surveys.	No
Dichanthium setosum	Blue Grass	V	Occurs on the New England Tablelands, Northwest Slopes and Plains and the Central Western Slopes of NSW, extending to northern Queensland. Associated with heavy basaltic black soils and red-brown loams with clay subsoil.	Unlikely	Outside known area of occurrence. No suitable habitat was present. Presence of species was not identified during surveys.	No
Androcalva procumbens		V	Occurs in sandy sites mainly confined to the Dubbo;-Mendooran;-and Gilgandra region, also in Pilliga and Nymagee areas.	Unlikely	Outside known area of occurrence. No suitable habitat was present. Presence of species was not identified during surveys.	No
Cynanchum elegans	White-flowered Wax Plant	E	This species occurs in scattered coastal localities from the QLD-NSW border south to Wollongong. Found in dry, littoral or subtropical rainforest, and occasionally in scrub and woodland from sea level to about 600m ASL.	Unlikely	Outside known area of occurrence. No suitable habitat was present. Presence of species was not identified during surveys.	No
Eucalyptus glaucina	Slaty Red Gum	V	Grows in grassy woodland and dry eucalypt forest, usually on deep, moderately fertile and well-watered soils. This species has only been recorded on the north coast of NSW and in small populations from Taree to Broke and west of Maitland.	Low	Marginal habitat was present. Species has been recorded within 1.5km of the subject land. Presence of species was not identified during surveys.	No
Euphrasia arguta	Eyebright	CE	Found within the Nundle area reported from eucalypt forest with a mixed grass and shrub understorey; here, plants were most dense in an open disturbed area and along the roadside, indicating the species had regenerated following disturbance.	Unlikely	Outside known area of occurrence. Marginal habitat was present. No nearby records. Presence of species was not identified during surveys.	No
Ozothamnus tesselatus		V	Grows in eucalypt woodland in the area north of Rylstone.	Low	No nearby records. Presence of species was not identified during surveys.	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required?
Swainsona murrayana	Slender Darling-pea	V	Often grows with Maireana species on heavy soils, especially in depressions; west from Warialda district.	Unlikely	Outside known area of occurrence. No suitable habitat was present. No nearby records. Presence of species was not identified during surveys.	No
Lepidium aschersonii	Spiny Peppercress	V	Occurs in the marginal central-western slopes and north-western plains regions of NSW (and potentially the south western plains). Found on ridges of gilgai clays dominated by Brigalow (*Acacia harpophylla*), Belah (*Casuarina cristata*), Buloke (*Allocasuarina luehmanii*) and Grey Box (*Eucalyptus microcarpa*)	Unlikely	Outside known area of occurrence. No suitable habitat was present. Presence of species was not identified during surveys.	No
Pomaderris brunnea	Brown Pomaderris	V	Found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. It also occurs near Walcha on the New England tablelands and in far eastern Gippsland in Victoria. Grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines.	Unlikely	Outside known area of occurrence. No suitable habitat was present. Presence of species was not identified during surveys.	No
Picris evae	Hawkweed	V	Grows in black soils, north from the Inverell area.	Unlikely	Outside known area of occurrence. No suitable habitat was present. Presence of species was not identified during surveys.	No
Thesium australe	Austral Toadflax	V	Grows in grassland or woodland, often in damp sites.	Low	Marginal habitat was present. No nearby records. Presence of species was not identified during surveys.	No
Vincetoxicum forsteri (listed as *Tylophora linearis*)		E	Grows in dry scrubland that may have a eucalypt, Callitris glaucophylla and/or Allocasuarina luehmannii overtopping the scrub, in the Barraba, Mendooran, Temora and West Wyalong districts.	Unlikely	Outside known area of occurrence. No suitable habitat was present. Presence of species was not identified during surveys.	No
Galaxias sp. nov. 'Hunter'	Hunter Galaxias	CE	Is known from seven highly isolated and fragmented sites between 300–650 m above sea level (ASL) in the north-east corner of the Hunter River catchment.	Unlikely	No suitable habitat was present. No nearby records. Presence of species was not identified during surveys.	No
Litoria booroolongensis	Booroolong Frog	E	Restricted to NSW and north-eastern Victoria, predominantly along the western-flowing streams of the Great Dividing Range. Lives along permanent streams with some fringing vegetation cover such as ferns,	Unlikely	No suitable habitat was present. No nearby records. Presence of species was not identified during surveys.	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required?
			sedges, or grasses. Adults occur on or near cobble banks and other rock structures within stream margins.			
Aprasia parapulchella	Pink-tailed Worm-lizard	V	Is distributed along the western foothills of the Great Dividing Range between Bendigo in Victoria and Gunnedah in northern New South Wales. Generally, occupies sites with a grassy ground layer particularly those dominated by Kangaroo Grass with little or no leaf litter, and relatively low tree and shrub cover. Sites are typically well-drained, with rocky outcrops or scattered, partially buried rocks.	Low	Outside known distribution. Suitable habitat was present. No nearby records. Presence of species was not identified during surveys.	No
Delma vescolineata	Hunter Valley Delma	E	Is known almost entirely from a 25 km wide corridor in the Hunter Valley NSW, between Maitland and Muswellbrook. Occurs in secondary native grassland remaining after the removal or dieback of previous woody canopy vegetation (Benson 1996) in association with sparse boxgum or ironbark woodland	**Known**	Species recorded onsite during surveys.	**Yes**
Calidris acuminata	Sharp-tailed Sandpiper	V & M	Widespread in both inland and coastal locations and in both freshwater and saline habitats.	Unlikely	No suitable habitat present in the form of freshwater habitat with surface water or wetlands. Presence of species was not identified during surveys.	No
Calidris ferruginea	Curlew Sandpiper	CE	Tidal mudflats; saltmarsh; fresh, brackish or saline wetlands; sewage ponds.	Unlikely	No suitable habitat present in the form of freshwater habitat with surface water or wetlands. Presence of species was not identified during surveys.	No
Tringa nebularia	Common Greenshank	E & M	Inhabits a wide variety of inland permanent and temporary wetlands and sheltered coastal habitats of varying salinity.	Unlikely	No suitable habitat present in the form of freshwater habitat with surface water or wetlands. Presence of species was not identified during surveys.	No
Gallinago hardwickii	Latham's Snipe	M	Utilises a variety of habitat, such as soft wet ground or shallow water with tussock and other green and dead vegetation, and scrub or open wetland from sea-level to alpine bogs.	Unlikely	No suitable habitat present in the form of freshwater habitat with surface water or wetlands. Presence of species was not identified during surveys.	No
Rostratula australis	Australian Painted snipe	E	Margins of swamps and streams, chiefly those covered with low and stunted vegetation.	Unlikely	No suitable habitat present in the form of freshwater habitat with surface water or wetlands. Presence of species was not	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required?
					identified during surveys.	
Botaurus poiciloptilus	Australasian Bittern	E	The Australasian Bittern lives alone or in loose groups and favours permanent fresh waters dominated by sedges, rushes, reeds or cutting grasses (eg. Phragmites, Scirpus, Eleocharis, Juncus, Typha, Baumea and Gahnia) and feeds on insects, small fish, eels, frogs and other aquatic life, sometimes in rice fields.	Unlikely	No suitable habitat present in the form of freshwater habitat with surface water or wetlands. Presence of species was not identified during surveys.	No
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	Lowland coastal forests, dense mountain forests, semi-arid woodland and trees bordering watercourses, with (Allo)Casuarina trees for foraging.	Moderate	Foraging habitat was present in the form of Allocasuarina species. Presence of species was not identified during surveys.	No
Callocephalon fimbriatum	Gang Gang Cockatoo	E	Tall montane forests and woodlands in mature wet sclerophyll forests. Requires hollows in which to breed between October and January.	Low	Marginal transitory habitat present. No nearby records. Presence of species was not identified during surveys.	No
Lathamus discolor	Swift Parrot	CE M	Open Forest to Woodland, also street trees and in parks and gardens, winter flowering eucalypts for feeding. This species nests in Tasmania during the summer months.	Low - Moderate	Foraging habitat was present in the form of flowering myrtaceous trees. Presence of species was not identified during surveys. No important habitat mapping nearby.	No
Neophema chrysostoma	Blue-winged Parrot	V	Found in western NSW. They favour grasslands and grassy woodlands. They are often found near wetlands both near the coast and in semi-arid zones. Blue-winged Parrots can also be seen in altered environments such as airfields, golf-courses and paddocks.	Moderate	Suitable habitat was present. Presence of species was not identified during surveys.	No
Polytelis swainsonii	Superb Parrot	V	Found in NSW and northern Victoria, where it occurs on the inland slopes of the Great Divide and on adjacent plains, especially along the major river-systems	Low	Marginal habitat was present. Presence of species was not identified during surveys.	No
Aphelocephala leucopsis	Southern Whiteface	V	Prefers dry open forests and woodland and inland scrubs of mallee, mulga and saltbush with fallen timber or dead trees and stumps.	Unlikely	No suitable habitat was present. Presence of species was not identified during surveys.	No
Hirundapus caudacutus	White-throated Needletail	V & M	Inhabits the airspace above forests, woodlands, farmlands, plains, lakes, coasts and towns.	Moderate	Suitable habitat was present. Presence of species was not identified during surveys.	No
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	E	Eucalypt woodlands, Acacia scrublands, Banksia dominated coastal scrubs and open forests.	Low	Suitable habitat was present. No nearby records. Presence of species was not identified during surveys.	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required?
Climacteris picumnus victoriae	Brown Treecreeper	V	This species is a medium sized insectivorous bird that occupies Eucalypt woodlands, particularly open woodlands lacking a dense understorey, River Red Gums on watercourses and around lakeshores. It is sedentary and nests in tree hollows within permanent territories.	Moderate – High	Suitable habitat was present. Several species records nearby. Presence of species was not identified during surveys.	No
Stagonopleura guttata	Diamond Firetail	V	Inhabits areas with a grassy, shrubby understorey including Eucalypt woodlands, forests, Acacia scrubs and mallee.	Moderate – High	Suitable habitat was present. Several species records nearby. Presence of species was not identified during surveys.	No
Anthochaera phrygia	Regent Honeyeater	CE M	Temperate woodlands and open forest, including forest edges, preferring to forage on large-flowered Eucalypts.	Low	Foraging habitat was present in the form of flowering Eucalypt trees. No nearby records. No important habitat mapping present nearby. Presence of species was not identified during surveys.	No
Grantiella picta	Painted Honeyeater	V	Nomadic, within a range of generally drier forested areas with mistletoes.	Low - Moderate	Foraging habitat was present in the form of flowering Eucalypt trees. No nearby records. Presence of species was not identified during surveys.	No
Erythrotriorchis radiatus	Red Goshawk	E	The species is very rare in NSW, extending south to about 30°S, with most records north of this, in the Clarence River Catchment, and a few around the lower Richmond and Tweed Rivers. Formerly, it was at least occasionally reported as far south as Port Stephens. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and riparian Eucalyptus forest of coastal rivers.	Unlikely	No suitable habitat was present. No nearby records. Presence of species was not identified during surveys.	No
Falco hypoleucos	Grey Falcon		Sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Generally restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast.	Low	Marginal habitat was present. No nearby records. Presence of species was not identified during surveys.	No
Dasyurus maculatus ssp. maculatus	Spotted-tailed Quoll	V	Inhabits sclerophyll forests, rainforests and coastal woodlands. Nests are made in rock caves and hollow logs or trees, and basking sites are usually found	Moderate – High	Suitable habitat was present. Several records nearby. Presence of species was not	No

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required?
			nearby.		identified during surveys.	
Phascolarctos cinereus	Koala	V	Coastal woodland and open forest containing suitable food trees.	Moderate	Suitable habitat was present in the form of koala feed trees. Several records nearby. Presence of species was not identified during surveys.	No
Petrogale penicillata	Brush-tailed Rock-wallaby	V	Found in steep rocky sites in sclerophyll forests with a grassy understorey.	Unlikely	No suitable habitat was present. No nearby records. Presence of species was not identified during surveys.	No
Notamacropus parma	Parma Wallaby		Range is now confined to the coast and ranges of central and northern NSW from the Gosford district to south of the Bruxner Highway between Tenterfield and Casino. Preferred habitat is moist eucalypt forest with thick, shrubby understorey, often with nearby grassy areas, rainforest margins and occasionally drier eucalypt forest.	Unlikely	No suitable habitat was present. No nearby records. Presence of species was not identified during surveys.	No
Petaurus australis	Yellow-bellied Glider		Occurs in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Is found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria.	Unlikely	No suitable habitat was present. No nearby records. Presence of species was not identified during surveys.	No
Petauroides volans	Greater Glider	V	Eucalypt-dominated low open forests on the coast to tall forests in the ranges and low woodland west of Great Dividing Range. Not found within rainforests.	Unlikely	No suitable habitat was present. No nearby records. Presence of species was not identified during surveys.	No
Pseudomys novaehollandiae	New Holland Mouse	V	Known to inhabit open heathlands, open woodlands with a heathland understorey and vegetated sand dunes.	Unlikely	No suitable habitat was present. No nearby records. Presence of species was not identified during surveys.	No
Pteropus poliocephalus	Grey-headed Flying-Fox	V	Wet and Dry Sclerophyll Forests, Rainforest, Mangroves and Paperbark swamps and Banksia Woodlands.	High	Suitable foraging habitat was present in the form of flowering myrtaceous trees. Several nearby records. Presence of species was not identified during surveys.	Yes

Scientific Name	Common Name	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence	Justification	Impact Assessment Required?
Nyctophilus corbeni	Corben's Long-eared Bat	V	Inhabits a variety of vegetation types, including mallee, bull oak Allocasuarina leuhmanni and box eucalypt dominated communities, but it is distinctly more common in box/ironbark/cypress-pine vegetation that occurs in a north-south belt along the western slopes and plains of NSW and southern Queensland. Roosts in tree hollows, crevices, and under loose bark.	Moderate - High	Suitable foraging and roosting habitat was present. Some nearby records. Presence of species was not identified during surveys.	No
Chalinolobus dwyeri	Large Pied Bat	V	Occupies dry sclerophyll forest and woodland. Roosts in caves, abandoned mud-nests of Fairy Martins and mine tunnels.	Moderate - High	Suitable foraging habitat was present. Roosting habitat was not present. Several nearby records. Presence of species was not identified during surveys.	No

EPBC Assessment of Significance Under the EPBC Act Policy Statement 1.1 – Significant Impact Guidelines for Vulnerable species present within the subject land.

***Delma vescolineata* (Hunter Valley Delma)**

a. lead to a long-term decrease in the size of a population

One individual Hunter Valley Delma was recorded under roof tiles during artificial cover surveys. This species is known to occur almost entirely from a 25 km wide corridor in the Hunter Valley NSW, between Maitland and Muswellbrook (Mahony et al. 2022). A further specimen has been identified from just north of Parraweena on the Liverpool plains, approximately 80 km north-west of Muswellbrook. It is possible that the Hunter Valley Delma is more widespread in this region (DCCEEW 2024d). It has previously been recorded 3km east of the subject land (Ecological Australia 2023). *Delma impar* (Striped Legless Lizard) has been recorded 750m south-east of the subject land prior to the description *Delma vescolineata* (Hunter Valley Delma) as a separate species occurring within the Hunter Valley (WSP 2021). There is no evidence of the Hunter Valley Delma co-occurring with the striped legless lizard (Mahony et al. 2022) therefore these individuals were likely *D. vescolineata*.

Suitable habitat was present in the form of PCT 3431 Central Hunter Ironbark Grassy Woodland in different conditions throughout the study area. The largest vegetation zone (PCT 3431_Derived Grassland) was considered to contain the most suitable habitat for Hunter Valley Delma as it had higher grass cover and ground habitat. The proposal will result in the removal of up to 8.37ha of habitat of varying quality resulting in an incremental reduction of habitat within the local area. The development footprint has been largely reduced through avoidance and minimisation measures and resulted in the retention of 11.40ha of habitat within the study area. The majority of this retained vegetation is the better quality habitat (derived grassland). Given the proximity of large areas of similar habitat outside the study area and the retention of 11.40ha of habitat within the study area, the proposal is unlikely to lead to a long-term decrease in the size of population of this species.

b. reduce the area of occupancy of the species

The proposal will result in a reduction of up to 8.37ha of habitat for the Hunter Valley Delma. Mitigation measures have recommended to avoid inadvertent impacts and minimise indirect impacts to retained vegetation outside the subject land. These measures include clearly demarcating boundary clearing limits, temporary stormwater controls and installing silt fencing and controls on sediment and runoff. Considering these measures, the large amount of similar habitat within proximity to the study area and the retention of 11.40ha of habitat within the study area, the proposal is unlikely to significantly reduce the extent of the occupancy of the population.

c. fragment an existing population into two or more populations

Considering mitigation measures to use fauna friendly fencing that will allow the Hunter Valley Delma to move through the retained vegetation within Stage 7, the proposal will not isolate areas of habitat such that the population fragments.

d. adversely affect habitat critical to the survival of a species

Habitat critical to the survival of the Hunter Valley delma is not well understood, but likely includes the secondary native grassland of the Hunter Valley between Maitland and Muswellbrook where the species is known to occur…The Hunter Valley delma relies on a diverse grass ground cover layer, as this habitat provides the species with refuge from predators, and habitat for foraging and breeding.

- DCCEEW (2024d)

The proposal will result in the removal of up to 8.37ha of habitat. 6.34ha of this is derived grassland that would be considered critical habitat under the above definition. 11.07ha of derived grassland also considered critical habitat will be retained within the study area and large areas of similar habitat are present outside the study area. Mitigation measures will be implemented to minimise impacts to retained vegetation and allow fauna movement through the space. These measures include clearly demarcating boundary clearing limits, temporary stormwater controls, installing silt fencing and controls on sediment and runoff and fauna friendly fencing that will allow the Hunter Valley Delma to move through the retained vegetation within Stage 7. Considering the retention of critical habitat within the study area, the large areas of habitat in proximity to the subject land and mitigation measures, the proposal is unlikely to adversely affect habitat critical to the survival of a species.

e. disrupt the breeding cycle of a population

Only one individual was captured during targeted surveys. Reproductive ecology of this species is unknown however it is thought to be similar to that of the closely related *Delma impar* (Striped Legless Lizard) (DCCEEW 2024d). The proposal will result in the removal of up to 8.37ha of habitat. 6.34ha of this is derived grassland that would be considered critical habitat which provides habitat for breeding. 11.07ha of derived grassland also considered critical habitat will be retained within the study area and large areas of similar habitat are present outside the study area. Mitigation measures will be implemented to minimise impacts to retained vegetation and allow fauna movement through the space. Considering the retention of critical habitat within the study area, the large areas of habitat in proximity to the subject land and mitigation measures, the proposal is unlikely to disrupt the breeding cycle of the local population.

f. modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline

The proposal will result in the removal of up to 8.37ha of habitat. 11.40ha of habitat will be retained within the study area and large areas of similar habitat are present outside the study area. Mitigation measures will be implemented to minimise impacts to retained vegetation and allow fauna movement

through the space. Considering these measures, the large amount of similar habitat within proximity to the study area and the retention of 11.40ha of habitat within the study area, no significant areas are to be modified, destroyed, removed, isolated or decreased to the extent that the species is likely to decline.

g. result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat

The proposal is unlikely to result in the establishment of invasive species that is harmful to this species.

h. introduce disease that may cause the species to decline, or

The proposal is unlikely to result in the introduction of a disease that may cause the species to decline.

i. interfere with the recovery of the species.

Considering the above factors, the proposal is unlikely to interfere with the recovery of the Hunter Valley Delma.

Conclusion

Considering the above factors, the proposal is unlikely to have a significant impact on the Hunter Valley Delma and therefore referral would not be required.

- migratory species protected under international agreements;

Ten nationally listed migratory species were recorded on the DoEE on-line database as occurring or having potential habitat available within 10km of the subject land, these being:

Migratory Terrestrial Species:

- *Hirundapus caudacutus* (White-throated Needletail)
- *Motacilla flava* (Yellow Wagtail)

Migratory Wetland Species:

- *Tringa nebularia* (Common Greenshank)
- *Actitis hypoleucos* (Common Sandpiper)
- *Pandion haliaetus* (Osprey)
- *Calidris acuminata* (Sharp-tailed Sandpiper)
- *Gallinago hardwickii* (Latham's Snipe)
- *Calidris ferruginea* (Curlew Sandpiper)
- *Calidris melanotos* (Pectoral Sandpiper)

Migratory Marine Birds

- *Apus pacificus* (Fork-tailed Swift)

Under the EPBC Act Policy Statement 1.1 – Significant Impact Guidelines (Department of the Environment, Water, Heritage and the Arts, 2009) an action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species.
- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or
- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

No threatened migratory species were recorded within the site. Potential habitat was considered present for a few of the listed migratory species. The proposal is unlikely to have a significant impact on any of these species.

- nuclear activities;

The proposal does not involve any type of nuclear activity.

- the Commonwealth marine environment;

The proposal does not involve the modification of the Commonwealth marine environment.

Australian Government
Department of Climate Change, Energy, the Environment and Water

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 16-Oct-2024

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	7
Listed Threatened Species:	48
Listed Migratory Species:	10

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	11
Commonwealth Heritage Places:	1
Listed Marine Species:	21
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	None
Regional Forest Agreements:	1
Nationally Important Wetlands:	None
EPBC Act Referrals:	24
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	1
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands)		[Resource Information]
Ramsar Site Name	Proximity	Buffer Status
Hunter estuary wetlands	50 - 100km upstream from Ramsar site	In feature area

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Central Hunter Valley eucalypt forest and woodland	Critically Endangered	Community likely to occur within area	In feature area
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland	Endangered	Community may occur within area	In buffer area only
Hunter Valley Weeping Myall (Acacia pendula) Woodland	Critically Endangered	Community may occur within area	In feature area
Lowland Rainforest of Subtropical Australia	Critically Endangered	Community likely to occur within area	In buffer area only
Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland	Critically Endangered	Community may occur within area	In buffer area only
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	Critically Endangered	Community may occur within area	In feature area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour likely to occur within area	In feature area
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat known to occur within area	In feature area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Callocephalon fimbriatum Gang-gang Cockatoo [768]	Endangered	Species or species habitat may occur within area	In buffer area only
Calyptorhynchus lathami lathami South-eastern Glossy Black-Cockatoo [67036]	Vulnerable	Species or species habitat known to occur within area	In feature area
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat known to occur within area	In feature area
Erythrotriorchis radiatus Red Goshawk [942]	Endangered	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Melanodryas cucullata cucullata South-eastern Hooded Robin, Hooded Robin (south-eastern) [67093]	Endangered	Species or species habitat known to occur within area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area	In feature area
Polytelis swainsonii Superb Parrot [738]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Stagonopleura guttata Diamond Firetail [59398]	Vulnerable	Species or species habitat known to occur within area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat may occur within area	In buffer area only
FISH			
Galaxias sp. nov. 'Hunter' Hunter Galaxias, Hunter Upland Galaxias [90728]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
FROG			
Litoria booroolongensis Booroolong Frog [1844]	Endangered	Species or species habitat may occur within area	In feature area
MAMMAL			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Chalinolobus dwyeri			
Large-eared Pied Bat, Large Pied Bat [183]	Endangered	Species or species habitat known to occur within area	In feature area
Dasyurus maculatus maculatus (SE mainland population)			
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area	In feature area
Notamacropus parma			
Parma Wallaby [89289]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Nyctophilus corbeni			
Corben's Long-eared Bat, South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Petauroides volans			
Greater Glider (southern and central) [254]	Endangered	Species or species habitat may occur within area	In buffer area only
Petaurus australis australis			
Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Petrogale penicillata			
Brush-tailed Rock-wallaby [225]	Vulnerable	Species or species habitat may occur within area	In feature area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)			
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat known to occur within area	In feature area
Pseudomys novaehollandiae			
New Holland Mouse, Pookila [96]	Vulnerable	Species or species habitat may occur within area	In feature area
Pteropus poliocephalus			
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area	In feature area
PLANT			
Androcalva procumbens			
[87153]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Cynanchum elegans White-flowered Wax Plant [12533]	Endangered	Species or species habitat may occur within area	In feature area
Dichanthium setosum bluegrass [14159]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Eucalyptus glaucina Slaty Red Gum [5670]	Vulnerable	Species or species habitat known to occur within area	In feature area
Euphrasia arguta [4325]	Critically Endangered	Species or species habitat may occur within area	In feature area
Lepidium aschersonii Spiny Peppercress [10976]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Ozothamnus tesselatus [56203]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Picris evae Hawkweed [10839]	Vulnerable	Species or species habitat may occur within area	In feature area
Pomaderris brunnea Rufous Pomaderris, Brown Pomaderris [16845]	Vulnerable	Species or species habitat may occur within area	In feature area
Prasophyllum sp. Wybong (C.Phelps ORG 5269) a leek-orchid [81964]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Pterostylis gibbosa Illawarra Greenhood, Rufa Greenhood, Pouched Greenhood [4562]	Endangered	Species or species habitat may occur within area	In buffer area only
Swainsona murrayana Slender Darling-pea, Slender Swainson, Murray Swainson-pea [6765]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Thesium australe			
Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat known to occur within area	In feature area
Vincetoxicum forsteri listed as Tylophora linearis			
[92384]	Endangered	Species or species habitat may occur within area	In buffer area only
REPTILE			
Aprasia parapulchella			
Pink-tailed Worm-lizard, Pink-tailed Legless Lizard [1665]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Delma vescolineata			
Hunter Valley Delma [92599]	Endangered	Species or species habitat known to occur within area	In feature area

Listed Migratory Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Hirundapus caudacutus			
White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Motacilla flava			
Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Gallinago hardwickii			
Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Pandion haliaetus			
Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
Tringa nebularia			
Common Greenshank, Greenshank [832]	Endangered	Species or species habitat may occur within area	In buffer area only

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Commonwealth Bank of Australia		
Commonwealth Land - Commonwealth Bank of Australia [12536]	NSW	In buffer area only
Commonwealth Trading Bank of Australia		
Commonwealth Land - Commonwealth Trading Bank of Australia [12530]	NSW	In feature area
Commonwealth Land - Commonwealth Trading Bank of Australia [12533]	NSW	In buffer area only
Communications, Information Technology and the Arts - Australian Postal Corporation		
Commonwealth Land - Australian Postal Commission [12532]	NSW	In buffer area only
Communications, Information Technology and the Arts - Telstra Corporation Limited		
Commonwealth Land - Australian Telecommunications Commission [12537]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [12531]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [12535]	NSW	In buffer area only
Commonwealth Land - Australian Telecommunications Commission [12534]	NSW	In buffer area only
Defence		

Commonwealth Land Name	State	Buffer Status
Defence - MUSWELLBROOK GRES DEPOT [11194]	NSW	In buffer area only
Defence - Defence Housing Authority		
Commonwealth Land - Defence Housing Authority [15955]	NSW	In buffer area only
Unknown		
Commonwealth Land - [14106]	NSW	In buffer area only

Commonwealth Heritage Places [Resource Information]

Name	State	Status	Buffer Status
Historic			
Muswellbrook Post Office	NSW	Listed place	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Chalcites osculans as Chrysococcyx osculans			
Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area	In feature area
Gallinago hardwickii			
Latham's Snipe, Japanese Snipe [863]	Vulnerable	Species or species habitat likely to occur within area overfly marine area	In feature area
Haliaeetus leucogaster			
White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area	In feature area
Hirundapus caudacutus			
White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Lathamus discolor			
Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area overfly marine area	In feature area
Merops ornatus			
Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Monarcha melanopsis			
Black-faced Monarch [609]		Species or species habitat likely to occur within area overfly marine area	In feature area
Motacilla flava			
Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Myiagra cyanoleuca			
Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat may occur within area overfly marine area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area	In buffer area only
Pterodroma cervicalis White-necked Petrel [59642]		Species or species habitat may occur within area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area overfly marine area	In feature area
Rostratula australis as Rostratula benghalensis (sensu lato) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area overfly marine area	In feature area
Tringa nebularia Common Greenshank, Greenshank [832]	Endangered	Species or species habitat may occur within area overfly marine area	In buffer area only

Extra Information

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included. Please see the associated resource information for specific caveats and use limitations associated with RFA boundary information.

RFA Name	State	Buffer Status
North East NSW RFA	New South Wales	In feature area

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Liddell Future Land Use and Enabling Works Project	2022/09330		Assessment	In buffer area only
Mara Team Testing Release 37 - Allira	2024/09835		Assessment	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Maxwell Coal Mine, Hunter Valley, NSW	2018/8287		Post-Approval	In buffer area only
Mount Pleasant Optimisation Project	2020/8735		Post-Approval	In buffer area only
Muswellbrook Solar Farm	2022/09303		Assessment	In buffer area only
Controlled action				
Continuation of Bengalla Mine	2012/6378	Controlled Action	Post-Approval	In buffer area only
Mount Pleasant Project	2011/5795	Controlled Action	Post-Approval	In buffer area only
Mt Arthur Coal Extension Project Hunter Valley NSW	2011/5866	Controlled Action	Post-Approval	In buffer area only
Mt Arthur Coal open cut mine modification, Muswellbrook, NSW	2014/7377	Controlled Action	Post-Approval	In buffer area only
Queensland Hunter Gas Pipeline, approximately 825 km in length	2008/4483	Controlled Action	Completed	In buffer area only
Thomas Mitchell Drive Upgrade, Muswellbrook, NSW	2012/6533	Controlled Action	Completed	In buffer area only
Not controlled action				
clearing of GWB Woodland for residential development	2004/1771	Not Controlled Action	Completed	In feature area
Construction of a new power line	2011/5930	Not Controlled Action	Completed	In feature area
Dartbrook Mine Bord and Pillar Mining, Hunter Valley, NSW	2018/8295	Not Controlled Action	Completed	In buffer area only
Extension of operations to existing Muswellbrook No 1 Open Cut mine	2002/614	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
Industrial Subdivision, Thomas Mitchell Drive	2006/3097	Not Controlled Action	Completed	In buffer area only
Ironbark Ridge Rural Residential Development	2009/5116	Not Controlled Action	Completed	In buffer area only
Kyoto Alternative Energy Farm	2008/3979	Not Controlled Action	Completed	In feature area
Queensland Hunter Gas Pipeline, approximately 833 km in length	2008/4620	Not Controlled Action	Completed	In buffer area only

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Not controlled action (particular manner)				
Aerial baiting for wild dog control	2006/2713	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
N40-Ulan line underbridge replacement, Muswellbrook, NSW	2019/8507	Not Controlled Action (Particular Manner)	Post-Approval	In buffer area only
Referral decision				
Clearing for development of rural subdivision	2009/4931	Referral Decision	Completed	In buffer area only
Mount Pleasant Project	2010/5529	Referral Decision	Completed	In buffer area only

Bioregional Assessments			[Resource Information]
SubRegion	BioRegion	Website	Buffer Status
Hunter	Northern Sydney Basin	BA website	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999 early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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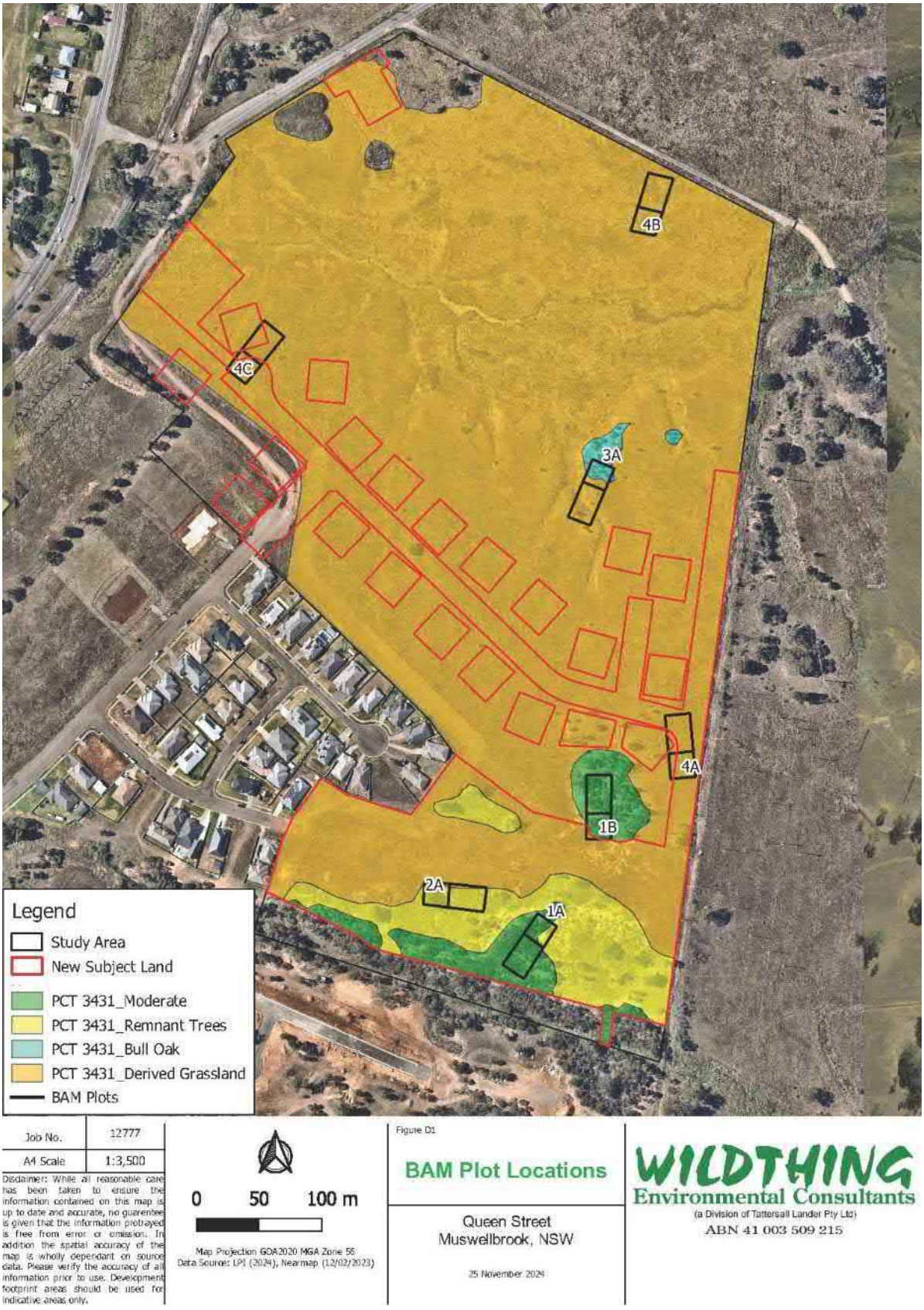
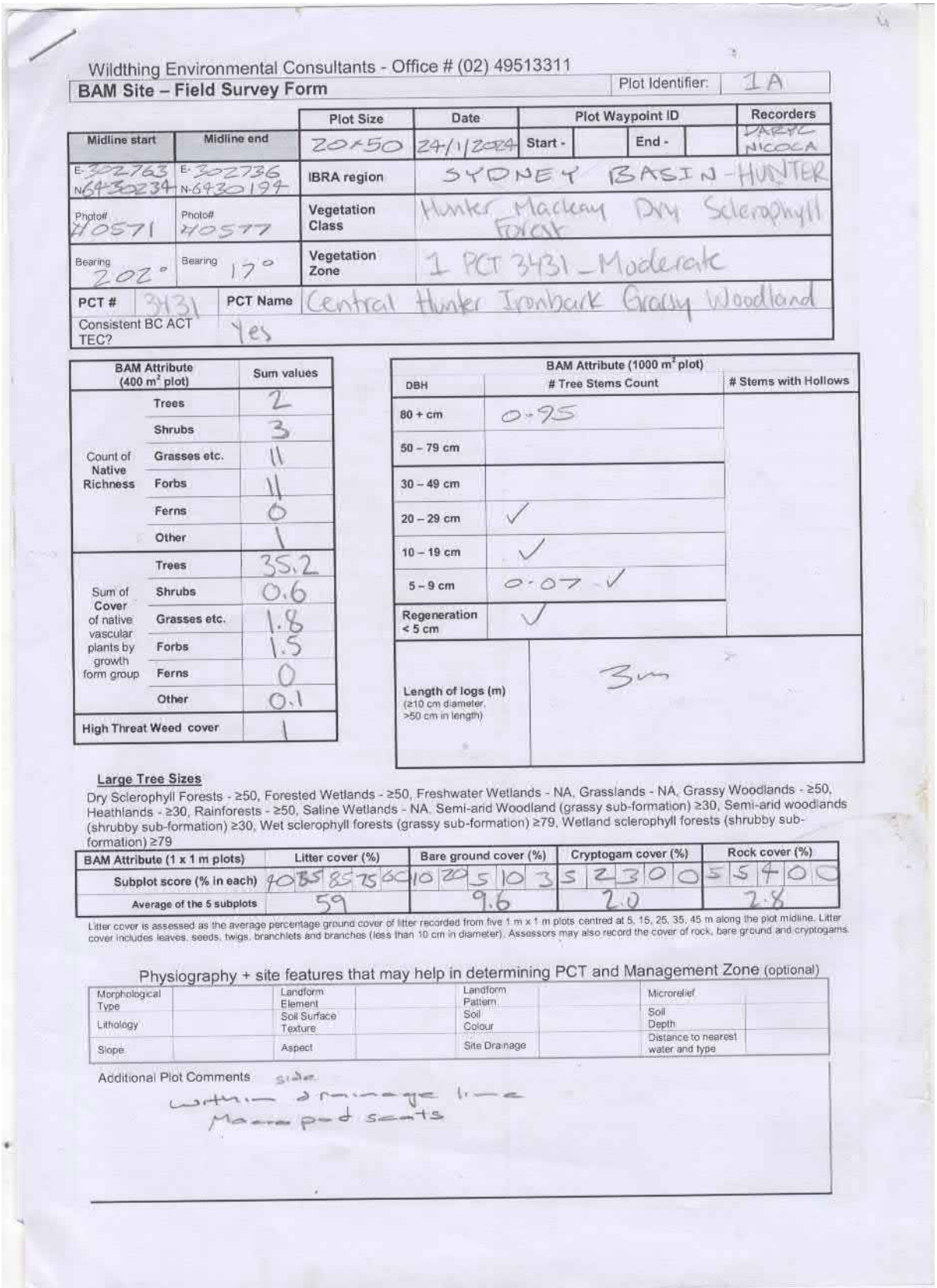
Appendix D: Vegetation survey data

Table D1 Vegetation BAM Plot survey data and locations

plot	pct	area	patchsize	condition class	zone	easting	northing	bearing	compTree	compShrub	compGrass	compForbs	compFerns	compOther	strucTree	strucShrub	strucGrass	strucForbs	strucFerns	strucOther	funLargeTrees	funHollowtrees	funLitterCover	funLenFallenLogs	funTreeStem5to9	funTreeStem10to19	funTreeStem20to29	funTreeStem30to49	funTreeStem50to79	funTreeRegen	funHighThreatExotic	Plot-based vegetation survey?	Vegetation integrity survey?
1A	3431	0.88	101	Moderate	56	302763	6430234	202	2	3	11	11	0	1	35.2	0.6	1.8	1.5	0.0	0.1	1	0	59.0	3.0	1	1	1	0	0	1	1	☒ Yes ☐ No	☒ Yes ☐ No
1B	3431	0.88	101	Moderate	56	302805	6430301	339	1	1	6	3	0	0	28.0	0.1	0.8	0.3	0.0	0.0	0	0	17.8	0.0	1	1	0	0	0	1	1.4	☒ Yes ☐ No	☒ Yes ☐ No
2A	3431	1.49	101	Remnant_Trees	56	302666	6430255	89	2	1	13	9	0	1	20.1	0.1	19.6	2.0	0.0	0.2	1	1	26.8	2.0	0	0	0	0	1	1	1.7	☒ Yes ☐ No	☒ Yes ☐ No
4A	3431	17.3	101	Derived_Grassland	56	302871	6430349	347	0	0	11	5	0	2	0.0	0.0	26.4	4.5	0.0	0.3	0	0	24.0	0.0	0	0	0	0	0	0	0.4	☒ Yes ☐ No	☒ Yes ☐ No
4B	3431	17.3	101	Derived_Grassland	56	302513	6430667	19	0	1	12	6	1	1	0.0	0.2	20.4	0.8	0.1	0.1	0	0	41.0	0.0	0	0	0	0	0	0	5.3	☒ Yes ☐ No	☒ Yes ☐ No
4C	3431	17.3	101	Derived_Grassland	56	302840	6430782	359	0	0	12	2	0	0	0.0	0.0	28.7	2.2	0.0	0.0	0	0	53.0	0.0	0	0	0	0	0	0	3.8	☒ Yes ☐ No	☒ Yes ☐ No

Figure D 1 Location: Vegetation BAM Plot locations.





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BAM Site – Field Survey Form — Plot Identifier: 1A

Midline start	Midline end	Plot Size	Date	Plot Waypoint ID	Recorders
E 302763 N 6430234	E 302736 N 6430194	20×50	24/1/2024	Start - End -	DARYL NICOLA
Photo# 40571	Photo# 40577	IBRA region	SYDNEY BASIN - HUNTER		
Bearing 202°	Bearing 17°	Vegetation Class	Hunter Mackeay Dry Sclerophyll Forest		
		Vegetation Zone	1 PCT 3431 _ Moderate		
PCT # 3431	PCT Name	Central Hunter Ironbark Grassy Woodland			
Consistent BC ACT TEC?	Yes				

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	2
	Shrubs	3
	Grasses etc.	11
	Forbs	11
	Ferns	0
	Other	1
Sum of Cover of native vascular plants by growth form group	Trees	35.2
	Shrubs	0.6
	Grasses etc.	1.8
	Forbs	1.5
	Ferns	0
	Other	0.1
High Threat Weed cover		1

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	0.95	
50 – 79 cm		
30 – 49 cm		
20 – 29 cm	✓	
10 – 19 cm	✓	
5 – 9 cm	0.07 ✓	
Regeneration < 5 cm	✓	
Length of logs (m) (≥10 cm diameter, >50 cm in length)	3m	

Large Tree Sizes

Dry Sclerophyll Forests - ≥50, Forested Wetlands - ≥50, Freshwater Wetlands - NA, Grasslands - NA, Grassy Woodlands - ≥50, Heathlands - ≥30, Rainforests - ≥50, Saline Wetlands - NA, Semi-arid Woodland (grassy sub-formation) ≥30, Semi-arid woodlands (shrubby sub-formation) ≥30, Wet sclerophyll forests (grassy sub-formation) ≥79, Wetland sclerophyll forests (shrubby sub-formation) ≥79

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	90 85 85 75 60	10 20 5 10 3	5 2 3 0 0	5 5 4 0 0
Average of the 5 subplots	59	9.6	2.0	2.8

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Additional Plot Comments: side within drainage line Macro pad scats

Wildthing Environmental Consultants - Office # (02) 49513311

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 24/1/2024		1A	DARYL, NICOLA

GF		Species	Cover	Abund	voucher
TG	1	Eucalyptus crebra	3.5	74	
TG	2	Allocasuarina leuhmin	0.2	1	
GG	3	Cymbopogon refractus	0.3	40	
FG	4	Chrysocephalum apiculata	0.3	40	
GG	5	Lomandra multiflora	0.2	45	
FG	6	Enadia nutans	0.2	15	
SG	7	Eremophila debilis	0.2	12	
HTW	8	Galenia pubescens	0.6	32	
FG	9	Stackhousia viminea	0.1	6	
GG	10	Frimbrystylis dicotoma	0.1	40	
GG	11	Digitaria divaricatissima	0.1	6	
FG	12	Pentalaca oleracea	0.1	1	
FG	13	Rylanthus virgatus	0.1	10	
HTW	14	Opuntia stricta	0.2	7	
GG	15	Eriochloa pseudoacrotricha	0.1	10	
GG	16	Rytidosperma fulvum	0.1	10	
GG	17	Sporobolus creber	0.2	10	
FG	18	Callotis lappacea	0.2	12	
FG	19	Wahlenbergia communis	0.1	10	
GG	20	Aristida racemosa	0.4	50	
HTW	21	Opuntia aurantiaca	0.1	2	
SG	22	Enchylaena tomentosa	0.2	20	
OG	23	Glycine tabacina	0.1	20	
GG	24	Enteropogen acicularis	0.1	10	
HTW	25	Senecio madagascariensis	0.1	5	
GG	26	Panicum effusum	0.1	5	
SG	27	Myoporum montanum	0.2	1	
GG	28	Bothriochloa decipens	0.1	5	
FG	29	Glossocardia bidens	0.1	3	
FG	30	Calotis cuneifolia	0.1	10	
FG	31	Sida corrugata	0.1	2	
FG	32	Sida hackettiana	0.1	1	
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Wildthing Environmental Consultants - Office # (02) 49513311

BAM Site – Field Survey Form | Plot Identifier: 1B

Midline start	Midline end	Plot Size	Date	Plot Waypoint ID	Recorders
E- 302805 N- 6432021	E- 302805 N- 6433349	20 x 50	13/11/2023	Start - End -	Daryl
Photo# 7156	Photo# 7158	IBRA region	SYDNEY BASIN - HUNTER		
Bearing 339	Bearing 179	Vegetation Class	Hunter Macleay Dry Sclerophyll Forest		
		Vegetation Zone	1 PCT 3431 _Moderate		
PCT # 3431	PCT Name	Central Hunter Ironbark Grassy Woodland			
Consistent BC ACT TEC?	Yes				

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	1
	Shrubs	1
	Grasses etc.	6
	Forbs	3
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	28
	Shrubs	0.1
	Grasses etc.	6.8
	Forbs	0.3
	Ferns	0
	Other	0
High Threat Weed cover		1.4

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	Ø	Ø
50 – 79 cm	Ø	
30 – 49 cm	Ø	
20 – 29 cm	Ø	
10 – 19 cm	✓	
5 – 9 cm	✓	
Regeneration < 5 cm	✓	
Length of logs (m) (≥10 cm diameter, >50 cm in length)	Ø	

Large Tree Sizes

Dry Sclerophyll Forests - ≥50, Forested Wetlands - ≥50, Freshwater Wetlands - NA, Grasslands - NA, Grassy Woodlands - ≥50, Heathlands - ≥30, Rainforests - ≥50, Saline Wetlands - NA, Semi-arid Woodland (grassy sub-formation) ≥30, Semi-arid woodlands (shrubby sub-formation) ≥30, Wet sclerophyll forests (grassy sub-formation) ≥79, Wetland sclerophyll forests (shrubby sub-formation) ≥79

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	35 10 18 7 19	15 80 50 85 80	Ø Ø Ø Ø Ø	Ø Ø 5 5 6
Average of the 5 subplots	17.8	62.0	Ø	3.2

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope		Aspect		Site Drainage		Distance to nearest water and type	

Additional Plot Comments

Wildthing Environmental Consultants - Office # (02) 49513311

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 13/11/2023		1B	DARYL

GF		Species	Cover	Abund	voucher
HTW	1	Lycium ferocissimum	0.1	2	
TG	2	Eucalyptus crebra	28	46	
FG	3	Einadia nutans	0.1	20	
SG	4	Enchylaena tomentosa	0.1	5	
GG	5	Aristida ramosa	0.2	15	
E	6	Leptochloa africanum	0.2	20	
FG	7	Solanum prinophyllum	0.1	3	
HTW	8	Opuntia aurantiaca	0.1	3	
GG	9	Cymbopogon refractus	0.1	15	
GG	10	Enteropogon acicularis	0.2	30	
HTW	11	Galenia pubescens	1	35	
GG	12	Lomandra multiflora	0.1	7	
GG	13	Sporobolus creber	0.1	10	
FG	14	Calotis lappulacea	0.1	5	
HTW	15	Senecio madagascariensis	0.1	2	
GG	16	Eragrostis leptostachya	0.1	10	
HTW	17	Opuntia stricta	0.1	5	
E	18	Sida rhombifolia	0.1	17	
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Wildthing Environmental Consultants - Office # (02) 49513311

BAM Site – Field Survey Form | Plot Identifier: 2A

Midline start	Midline end	Plot Size	Date	Plot Waypoint ID	Recorders
E- 302666 N- 6430255	E- 302724 N- 6430252	20x50	24/01/24	Start - End -	DAREC NICOLA
Photo# #0546	Photo# #0547	IBRA region	SYDNEY BASIN - Hunter		
Bearing 89°	Bearing 265°	Vegetation Class	Hunter Macleay Dry Sclerophyll Forest		
		Vegetation Zone	2 PCT 3431_Remnant Trees		
PCT # 3431	PCT Name	Central Hunter Ironbark Grassy Woodland			
Consistent BC ACT TEC?	Yes				

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	2
	Shrubs	1
	Grasses etc.	13
	Forbs	9
	Ferns	0
	Other	1
Sum of Cover of native vascular plants by growth form group	Trees	20.1
	Shrubs	0.1
	Grasses etc.	19.6
	Forbs	2
	Ferns	0
	Other	0.2
High Threat Weed cover		1.7

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	0	1
50 – 79 cm	0.79	
30 – 49 cm	0	
20 – 29 cm	0	
10 – 19 cm	0	
5 – 9 cm	0	
Regeneration < 5 cm	✓	
Length of logs (m) (≥10 cm diameter, >50 cm in length)	2	

Large Tree Sizes

Dry Sclerophyll Forests - ≥50, Forested Wetlands - ≥50, Freshwater Wetlands - NA, Grasslands - NA, Grassy Woodlands - ≥50, Heathlands - ≥30, Rainforests - ≥50, Saline Wetlands - NA, Semi-arid Woodland (grassy sub-formation) ≥30, Semi-arid woodlands (shrubby sub-formation) ≥30, Wet sclerophyll forests (grassy sub-formation) ≥79, Wetland sclerophyll forests (shrubby sub-formation) ≥79

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	74 10 15 30 15	0 40 20 5 10	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	26.8	15.0	0	0

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope	10°	Aspect	Southerly	Site Drainage		Distance to nearest water and type	

Additional Plot Comments: Macropod scats

Wildthing Environmental Consultants - Office # (02) 49513311

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 24/01/2024		2A	DARYL, NICOLA

GF		Species	Cover	Abund	voucher
TG	1	Eucalyptus crebra	20	16	
HTW	2	Lycium ferosissima	0.2	2	
E	3	Sida rhombifolia	3	150	
GG	4	Cymbopogon refractus	1	50	
FG	5	Wahlenbergia communis	0.1	10	
GG	6	Digitaria divaricatissima	0.2	20	
FG	7	Chrysocephalum apiculatus	1	100	
HTW	8	Senecio madagascariensis	0.2	20	
OG	9	Glycine tabacina	0.2	50	
GG	10	Fimbristylis dichotoma	2	1000	
GG	11	Sporobolus creber	1.5	1000	
HTW	12	Galenia pubescens	1	20	
GG	13	Chloris ventricosa	0.2	30	
GG	14	Eragrostis leptostachya	0.3	100	
GG	15	Lomandra multiflora	0.1	10	
E	16	Verbena bonariensis	0.1	10	
GG	17	Aristida racemosa	0.2	40	
E	18	Hypochaeris radicata	0.1	5	
SG	19	Eremophila debilis	0.1	12	
FG	20	Commelina cyanea	0.3	20	
HTW	21	Opuntia stricta	0.1	1	
GG	22	Cyperus gracilis	0.1	20	
E	23	Setaria gracilis	0.2	20	
FG	24	Calotis lappulacea	0.1	5	
E	25	Lysimachia arvensis	0.1	5	
E	26	Gamphocarpus fruticosus	0.1	1	
FG	27	Phyllanthus virgatus	0.1	5	
GG	28	Juncus subsecundus	0.2	20	
TG	29	Allocasuarina luehmannii	0.1	1	
HTW	30	Opuntia aurantiaca	0.1	2	
E	31	Conyza bonariensis	0.1	5	
HTW	32	Bidens subalternans	0.1	25	
FG	33	Goodenia heteromera	0.1	2	
E	34	Cirsium vulgare	0.1	1	
GG	35	Bothriochloa decipiens	0.1	10	
FG	36	Sida corrugata	0.1	2	
GG	37	Stipa pubescens	0.1	3	
FG	38	Enadia nutans	0.1	5	
GG	39	Rytidosperma fulvum	0.1	10	
FG	40	Stackhousia viminea	0.1	20	
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3A

Wildthing Environmental Consultants - Office # (02) 49513311

BAM Site – Field Survey Form | Plot Identifier: 4A

Midline start	Midline end	Plot Size	Date	Plot Waypoint ID	Recorders
E 302871 N 6430349	E 302868 N 6430397	20×50	24/1/2024	Start - End -	DARYL NICOLA
Photo# 0585	Photo# 0587	IBRA region	SYDNEY BASIN - Hunter		
Bearing 347°	Bearing 166°	Vegetation Class	Hunter Macleay Dry Sclerophyll Forest		
		Vegetation Zone	4 PCT 3431 _ Derived Grassland		
PCT # 3431	PCT Name	Central Hunter Ironbark Grassy Woodland			
Consistent BC ACT TEC?	Yes				

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	11
	Forbs	5
	Ferns	0
	Other	2
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	26.4
	Forbs	4.5
	Ferns	0
	Other	0.3
High Threat Weed cover		0.4

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	Ø	0
50 – 79 cm	Ø	
30 – 49 cm	Ø	
20 – 29 cm	Ø	
10 – 19 cm	Ø	
5 – 9 cm	Ø	
Regeneration < 5 cm	Ø	
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0	

Large Tree Sizes

Dry Sclerophyll Forests - ≥50, Forested Wetlands - ≥50, Freshwater Wetlands - NA, Grasslands - NA, Grassy Woodlands - ≥50, Heathlands - ≥30, Rainforests - ≥50, Saline Wetlands - NA, Semi-arid Woodland (grassy sub-formation) ≥30, Semi-arid woodlands (shrubby sub-formation) ≥30, Wet sclerophyll forests (grassy sub-formation) ≥79, Wetland sclerophyll forests (shrubby sub-formation) ≥79

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	40 25 30 10 15	1 3 0 0 0	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	24.0	0.8	0	0

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope	8°	Aspect	Northerly	Site Drainage		Distance to nearest water and type	

Additional Plot Comments

Macropod scats
Rabbit scats

Wildthing Environmental Consultants - Office # (02) 49513311

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 24/1/2024		3A	DARYL, NICOLA

GF	Species	Cover	Abund	voucher
GG	1 Sporobolus creber	10	1000	
FG	2 Sida hackettiana	2	40	
E	3 Sida rhombifolia	0.1	100	
GG	4 Cymbopogon refractus	2 3	45	
E	5 Plantago lanceolata	0.2	50	
OG	6 Glycine tabacina	0.2	100	
GG	7 Fimbristylis dichotoma	1 2	1000	
FG	8 Chrysocephalum apiculata	2	800	
HTW	9 Galenia pubescens	0.2	18	
GG	10 Paspalidium distans	0.2	100	
E	11 Richardia stellaroides	0.1	5	
GG	12 Aristida ramosa	0.2	50	
FG	13 Phyllanthus virgatus	0.3	100	
HTW	14 Senecio madagascariensis	0.1	20	
GG	15 Eragrostis leptostachya	0.3	100	
GG	16 Bothriochloa decipens	3	500	
E	17 Verbena bonariensis	0.1	5	
FG	18 Geranium solanderi	0.1	5	
GG	19 Bothriochloa ingens	0.3	40	
OG	20 Glycine clandestina	0.1	5	
GG	21 Enteropogon acicularis	0.3	20	
E	22 Glossocardia bidens	0.1	5	
FG	23 Stackhousia viminea	0.1	20	
E	24 Calotis lappulacea	0.1	6	
GG	25 Digitaria divaricatissima	7	1000	
E	26 Lysimachia arvensis	0.1	1	
HTW	27 Opuntia stricta	0.1	1	
E	28 Hypochaeris radicata	0.1	5	
GG	29 Panicum effusum	0.1	10	
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Wildthing Environmental Consultants - Office # (02) 49513311

BAM Site – Field Survey Form | Plot Identifier: 4B

Midline start	Midline end	Plot Size	Date	Plot Waypoint ID	Recorders
E-302513 N-6430667	E-302551 N-6430712	20×50	15/2/2024	Start - End -	DARYL
Photo# #2197	Photo# #2201	IBRA region	SYDNEY BASIN - Hunter		
Bearing 19°	Bearing 211°	Vegetation Class	Hunter Macleay Dry Sclerophyll Forest		
		Vegetation Zone	4 PCT 3431 - Derived Grassland		
PCT # 3431	PCT Name	Central Hunter Ironbark Grassy Woodland			
Consistent BC ACT TEC?	Yes				

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	1
	Grasses etc.	12
	Forbs	6
	Ferns	1
	Other	1
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0.2
	Grasses etc.	20.4
	Forbs	0.8
	Ferns	0.1
	Other	0.1
High Threat Weed cover		5.3

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	Ø	
50 – 79 cm	Ø	
30 – 49 cm	Ø	0
20 – 29 cm	Ø	
10 – 19 cm	Ø	
5 – 9 cm	Ø	
Regeneration < 5 cm	Ø	
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0	

Large Tree Sizes

Dry Sclerophyll Forests - ≥50, Forested Wetlands - ≥50, Freshwater Wetlands - NA, Grasslands - NA, Grassy Woodlands - ≥50, Heathlands - ≥30, Rainforests - ≥50, Saline Wetlands - NA, Semi-arid Woodland (grassy sub-formation) ≥30, Semi-arid woodlands (shrubby sub-formation) ≥30, Wet sclerophyll forests (grassy sub-formation) ≥79, Wetland sclerophyll forests (shrubby sub-formation) ≥79

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	40 35 95 70 95	5 2 0 0 0	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	41.0	1.4	Ø	Ø

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern		Microrelief	
Lithology		Soil Surface Texture		Soil Colour		Soil Depth	
Slope	4°	Aspect	NW	Site Drainage		Distance to nearest water and type	

Additional Plot Comments

Some Macropod scats in plot

Wildthing Environmental Consultants - Office # (02) 49513311

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 15/2/2024		4B	DARYL

GF		Species	Cover	Abund	voucher
GG	1	Cymbopogon refractus	4	50	
HTW	2	Paspalum dilatatum	4	50	
GG	3	Digitaria divaricatissima	10	300	
GG	4	Fimbristylis dichotoma	0.4	500	
E	5	Sida rhombifolia	0.4	100	
GG	6	Sporobolus creber	0.7	200	
GG	7	Panicum effusum	0.7	200	
HTW	8	Galenia pubescens	1	20	
EG	9	Chelanthes sieberi	0.1	10	
FG	10	Wahlenbergia	0.1	20	
E	11	Setaria parviflora	0.4	100	
E	12	Gomphocarpus fruticosa	0.2	10	
FG	13	Sida hackettiana	0.2	12	
E	14	Verbena bonariensis	0.3	10	
GG	15	Aristida ramosa	0.5	50	
E	16	Plantago lanceolata	0.5	200	
HTW	17	Bidens subalternans	0.3	50	
FG	18	Oxalis perennans	0.1	5	
GG	19	Bothriochla decipens	3	200	
E	20	Circium vulgare	0.1	2	
FG	21	Chrysocephalum apiculatum	0.2	9	
GG	22	Eragrotis leptostachya	0.2	20	
GG	23	Rhytidosperma fulvum	0.2	20	
SG	24	Eremaphila debilis	0.2	10	
FG	25	Phylanthus vigatus	0.1	20	
E	26	Lepidium africanum	0.1	8	
FG	27	Commelina cyanea	0.1	2	
GG	28	Cyperus gracilis	0.1	10	
E	29	Sonchus oleraceus	0.1	17	
GG	30	Microlaena stipoides	0.3	50	
GG	31	Eriochloa pseudoacrotricha	0.3	50	
OG	32	Glycine tabacina	0.1	5	
E	33	Avena barbata	0.1	2	
E	34	Conyza bonariensis	0.1	1	
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Wildthing Environmental Consultants - Office # (02) 49513311

BAM Site – Field Survey Form | Plot Identifier: 4C

Midline start	Midline end	Plot Size	Date	Plot Waypoint ID	Recorders
E 302940 N 6430782	E 302855 N 6430830	20x50	15/2/2024	Start - End -	DARYL
Photo# #2235	Photo# #2237	IBRA region	SYDNEY BASIN - Hunter		
Bearing 359°	Bearing 179°	Vegetation Class	Hunter Macleay Dry Sclerophyll Forest		
		Vegetation Zone	4 PCT 3431 - Derived Grassland		
PCT # 3431	PCT Name	Central Hunter Ironbark Grassy Woodland			
Consistent BC ACT TEC?	Yes				

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	0
	Shrubs	0
	Grasses etc.	12
	Forbs	2
	Ferns	0
	Other	0
Sum of Cover of native vascular plants by growth form group	Trees	0
	Shrubs	0
	Grasses etc.	28.7
	Forbs	2.2
	Ferns	0
	Other	0
High Threat Weed cover		3.8

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	Ø	0
50 – 79 cm	Ø	
30 – 49 cm	Ø	
20 – 29 cm	Ø	
10 – 19 cm	Ø	
5 – 9 cm	Ø	
Regeneration < 5 cm	Ø	
Length of logs (m) (≥10 cm diameter, >50 cm in length)	0	

Large Tree Sizes

Dry Sclerophyll Forests - ≥50, Forested Wetlands - ≥50, Freshwater Wetlands - NA, Grasslands - NA, Grassy Woodlands - ≥50, Heathlands - ≥30, Rainforests - ≥50, Saline Wetlands - NA, Semi-arid Woodland (grassy sub-formation) ≥30, Semi-arid woodlands (shrubby sub-formation) ≥30, Wet sclerophyll forests (grassy sub-formation) ≥79, Wetland sclerophyll forests (shrubby sub-formation) ≥79

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	60 55 60 40 50	0 0 0 5 0	0 0 0 0 0	0 0 0 0 0
Average of the 5 subplots	53.0	1.0	Ø	Ø

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

Physiography + site features that may help in determining PCT and Management Zone (optional)

Morphological Type		Landform Element		Landform Pattern	Microrelief
Lithology		Soil Surface Texture		Soil Colour	Soil Depth
Slope	Level	Aspect		Site Drainage	Distance to nearest water and type

Additional Plot Comments

North-east of site, near boundary

Wildthing Environmental Consultants - Office # (02) 49513311

400 m² plot: Sheet _ of _

Date	Survey Name	Plot Identifier	Recorders
15/2/2024		4C	DARYL

GF		Species	Cover	Abund	voucher
GG	1	Sporobolus creber	5	200	
GG	2	Austrostipa verticillata	1	40	
GG	3	Aristida racemosa	7	1000	
GG	4	Cynodon dactylon	10	2000	
E	5	Sida rhombifolia	1	200	
E	6	Cirsium vulgare	0.5	2	
FG	7	Commelina cyanea	2	50	
HW	8	Galenia pubescens	3	30	
E	9	Setaria parviflora	2	100	
GG	10	Cyperus gracilis	0.4	60	
GG	11	Fimbristylis dichotoma	0.2	200	
E	12	Verbena bonariensis	0.2	10	
GG	13	Eragrostis leptostachya	2	200	
GG	14	Digitaria divaricatissima	1	60	
E	15	Conyza bonariensis	0.1	2	
FG	16	Sida hackettiana	0.2	5	
E	17	Solanum nigrum	0.2	6	
GG	18	Cymbonotus refractus	0.2	3	
E	19	Bidens subalternans	0.2	20	
GG	20	Digitaria brownii	1	200	
HW	21	Paspalum dilatatum	0.3	15	
GG	22	Panicum effusum	0.4	50	
GG	23	Microlaena stipoides	0.5	200	
HW	24	Carthamus lanatus	0.3	15	
	25				
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	44				

Plate D1: Plot 1A-PCT 3328_Disturbed Front Peg.

Plate D2: Plot 1A-PCT 3328_Disturbed Back Peg.

Plate **D1: Plot 1B-PCT 3328_Disturbed Front Peg.**

Plate D2: Plot 1B-PCT 3328_Disturbed Back Peg.

Plate D3: Plot 2A-PCT 3442_Disturbed Front Peg.

Plate D4: Plot 2A-PCT 3442_Disturbed Back Peg.

Plate D1: Plot 4A-PCT 3328_Disturbed Front Peg.

Plate D2: Plot 4A-PCT 3328_Disturbed Back Peg.

Plate D1: Plot 4B-PCT 3328_Disturbed Front Peg.

Plate D2: Plot 4B-PCT 3328_Disturbed Back Peg.

Plate D1: Plot 4C-PCT 3328_Disturbed Front Peg.

Plate D2: Plot 4C-PCT 3328_Disturbed Back Peg.

Appendix E: Credit reports

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BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00042906/BAAS23007/23/00042907	Northview Estate_Muswellbrook	28/10/2024
Assessor Name	Report Created	BAM Data version *
Nicola Mohr	26/11/2024	Current classification (live - default) (80)
Assessor Number	BAM Case Status	Date Finalised
BAAS23007	Finalised	26/11/2024
Assessment Revision	BOS entry trigger	Assessment Type
3	BOS Threshold: Area clearing threshold	Part 4 Developments (General)

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

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

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

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BAM Credit Summary Report

Central Hunter Ironbark Grassy Woodland											
1	3431_Moderate_Stage6	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	35.1	33.9	0.54	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		9
2	3431_Remnant_Trees_Stage6	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	32	31.4	1.5	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		23
3	3431_Drvd_Grassland_Stg6	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	18.3	18.2	2.2	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		20

Assessment Id
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Proposal Name
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BAM Credit Summary Report

4	3431_Drvd_Grassland_Stg7	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	18.3	17.4	4.2	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00	36
										Subtotal	**88**
										Total	**88**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Delma impar / Striped Legless Lizard (Fauna)									
3431_Moderate_Stage6	33.9	33.9	0.54	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Vulnerable	Vulnerable	False	7
3431_Remnant_Trees_Stage6	31.4	31.4	1.5	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Vulnerable	Vulnerable	False	18

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BAM Credit Summary Report

3431_Drvd_Grassland_Stg6	18.2	18.2	2.2	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Vulnerable	Vulnerable	False	15
3431_Drvd_Grassland_Stg7	17.4	17.4	4.2	Biodiversity Conservation Act listing status	Effectiveness of management in controlling threats	Vulnerable	Vulnerable	False	27
								Subtotal	**67**
Petaurus norfolcensis / Squirrel Glider (Fauna)									
3431_Moderate_Stage6	33.9	33.9	0.54	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	9
3431_Remnant_Trees_Stage6	31.4	31.4	1.5	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	23
								Subtotal	**32**

Assessment Id
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Proposal Name
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BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id 00042906/BAAS23007/23/00042907	Proposal Name Northview Estate_Muswellbrook	BAM data last updated * 28/10/2024
Assessor Name Nicola Mohr	Assessor Number BAAS23007	BAM Data version * Current classification (live - default) (80)
Proponent Names	Report Created 26/11/2024	BAM Case Status Finalised
Assessment Revision 3	BOS entry trigger BOS Threshold: Area clearing threshold	Assessment Type Part 4 Developments (General)
Date Finalised 26/11/2024	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	

Potential Serious and Irreversible Impacts

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

Additional Information for Approval

BAM Biodiversity Credit Report (Like for like)

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
3431-Central Hunter Ironbark Grassy Woodland	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	8.4	23	65	88

3431-Central Hunter Ironbark Grassy Woodland	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region

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BAM Biodiversity Credit Report (Like for like)

Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions This includes PCT's: 1603, 1605, 1691, 1692, 3314, 3431, 3485	-	3431_Moderate_Stage6	No	9	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.
Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions This includes PCT's: 1603, 1605, 1691, 1692, 3314, 3431, 3485	-	3431_Remnant_Trees_Stage6	Yes	23	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.
Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions This includes PCT's: 1603, 1605, 1691, 1692, 3314, 3431, 3485	-	3431_Drvd_Grassland_Stg6	No	20	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.

BAM Biodiversity Credit Report (Like for like)

	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions This includes PCT's: 1603, 1605, 1691, 1692, 3314, 3431, 3485	-	3431_Drvd_Grassland_Stg7	No	36	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Delma impar / Striped Legless Lizard	**3431_Moderate_Stage6, 3431_Remnant_Trees_Stage6, 3431_Drvd_Grassland_Stg6, 3431_Drvd_Grassland_Stg7**	8.4	67.00
Petaurus norfolcensis / Squirrel Glider	**3431_Moderate_Stage6, 3431_Remnant_Trees_Stage6**	2.0	32.00

Credit Retirement Options

Like-for-like credit retirement options

	Spp	IBRA subregion
Delma impar / Striped Legless Lizard		

BAM Biodiversity Credit Report (Like for like)

	Delma impar / Striped Legless Lizard	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
00042906/BAAS23007/23/00042907

Proposal Name
Northview Estate_Muswellbrook

BAM data last updated *
28/10/2024

Assessor Name
Nicola Mohr

Assessor Number
BAAS23007

BAM Data version *
Current classification (live - default) (80)

Proponent Name(s)

Report Created
26/11/2024

BAM Case Status
Finalised

Assessment Revision
3

BOS entry trigger
BOS Threshold: Area clearing threshold

Assessment Type
Part 4 Developments (General)

Date Finalised
26/11/2024

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

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

Additional Information for Approval

PCT Outside Ibra Added

None added

BAM Biodiversity Credit Report (Variations)

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
3431-Central Hunter Ironbark Grassy Woodland	Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions	8.4	23	65	88.00

3431-Central Hunter Ironbark Grassy Woodland

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions This includes PCT's: 1603, 1605, 1691, 1692, 3314, 3431, 3485	-	3431_Moderate_Stage6	No	9	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.

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BAM Biodiversity Credit Report (Variations)

Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions This includes PCT's: 1603, 1605, 1691, 1692, 3314, 3431, 3485	-	3431_Remnant_Trees_Stage6	Yes	23	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.
Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions This includes PCT's: 1603, 1605, 1691, 1692, 3314, 3431, 3485	-	3431_Drvd_Grassland_Stg6	No	20	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.
Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions This includes PCT's: 1603, 1605, 1691, 1692, 3314, 3431, 3485	-	3431_Drvd_Grassland_Stg7	No	36	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

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BAM Biodiversity Credit Report (Variations)

	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	3431_Moderate_Stage6	No	9	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	3431_Remnant_Trees_Stage6	Yes (including artificial)	23	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	3431_Drvd_Grassland_Stg6	No	20	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	3431_Drvd_Grassland_Stg7	No	36	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
Delma impar / Striped Legless Lizard	**3431_Moderate_Stage6, 3431_Remnant_Trees_Stage6, 3431_Drvd_Grassland_Stg6, 3431_Drvd_Grassland_Stg7**	8.4	67.00
Petaurus norfolcensis / Squirrel Glider	**3431_Moderate_Stage6, 3431_Remnant_Trees_Stage6**	2.0	32.00

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BAM Biodiversity Credit Report (Variations)

Credit Retirement Options — **Like-for-like options**

Delma impar/ Striped Legless Lizard	Spp		IBRA region
	Delma impar/Striped Legless Lizard		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

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Proposal Name: Northview Estate_Muswellbrook
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BAM Biodiversity Credit Report (Variations)

	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 F: Total Flora List

Introduced species are indicated by an asterisk ("*").

The following standard abbreviations are used to indicate subspecific taxa:

subsp. subspecies
var.- variety
× - hybrid between the two indicated species

Threatened Species - NSW Biodiversity Conservation Act 2016 (BC Act)

V Vulnerable
E1 Endangered
E2 Endangered Population
E4A Critically Endangered Population

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

V Vulnerable
E Endangered
CE Critically Endangered

Serious and Irreversible Impact SAII

Regional Significance (Hunter Rare Plants Database – Version 1 2003)

L endemic to Hunter Region
DA disjunct in the Hunter Region, rare or localized (aggregated)
DB disjunct in the Hunter Region, widespread and uncommon (broad)
R rare but extends beyond the Hunter Region
U everywhere uncommon
N at northern distributional limit in the Hunter
E at eastern distributional limit in the Hunter
S at southern distributional limited in the Hunter
W at western distributional limited in the Hunter
T may be threatened in the Hunter Region
S Probably secure in the Hunter Region

Weeds

Priorities under the Biosecurity Act 2015

G General Biosecurity Duty - any person dealing with plant matter must take measures to prevent, minimise or eliminate the biosecurity risk (as far as is reasonably practicable).
P Prohibition on dealings - Must not be imported into the State or sold.
R Regional Recommended Measure - Land managers mitigate the risk of the plant being introduced to their land. Land managers reduce impacts from the plant on priority assets. Land managers prevent spread from their land where feasible. The plant or parts of the plant are not traded, carried, grown or released into the environment.

NSW BC Act 2016

T Listed as a Threatening Process under the NSW BC Act 2016.

N Weed of National Significance (WoNS)

Table F1 Total Flora List

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	BIOSECURITY ACT 2015	FLOWERING PERIOD
CLASS FILICOPSIDA (Ferns)							
Pteridaceae							
Cheilanthes distans	Bristly Cloak Fern						
Cheilanthes sieberi ssp. *sieberi*	Mulga Fern						
MAGNOLIOPSIDA: Magnoliidae							
LILOPSIDA: (Monocotyledons)							
Amaryllidaceae							
**Nothoscordum gracile*	Onion Weed						
Asparagaceae							
Arthropodium fimbriatum syn. *Dichopogon fimbriatus*	Nodding Chocolate Lily						
Arthropodium strictum syn. *Dichopogon strictus*	Chocolate Lily						
Laxmannia gracilis	Slender Wire Lily						
Lomandra confertifolia							
Lomandra filiformis							
Lomandra longifolia	Spiny Mat Rush						Aug, Sept
Lomandra multiflora subsp. *multiflora*	Many-flowered Mat-rush						Sept
**Yucca aloifolia*	Dagger Plant						
Asphodelaceae							
Dianella caerulea var. caerulea	Blue Flax-lily						
Dianella revoluta	Blue Flax-lily						
Tricoryne elatior	Yellow Rush-lily						
Colchicaceae syn Uvulariaceae							
Wurmbea dioica	Early Nancy						
Commelinaceae							
Commelina cyanea	Scurvy Weed						
Cyperaceae							

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	BIOSECURITY ACT 2015	FLOWERING PERIOD
Carex appressa	Saw Sedge						
**Cyperus brevifolius*	Mullumbimby Couch						
**Cyperus eragrostis*	Umbrella Sedge						
Cyperus gracilis	Slender Flat-sedge						
Cyperus polystachyos	Bunchy Sedge						
Gahnia aspera	Rough Saw Sedge						
Iridaceae							
**Romulea rosea* var. *australis*	Onion Grass						
Juncaceae							
**Juncus acutus*	Spiny Rush						
**Juncus cognatus*							
Juncus subsecundus	Finger Rush						
Juncus usitatus	Common Rush						
Poaceae							
Anisopogon avenaceus	Oat Speargrass						
Aristida ramosa var. *ramosa*	Three-awn Speargrass				W?		
Aristida vagans	Three-awn Speargrass						
Austrostipa ramosissima	Stout Bamboo Grass						
Austrostipa scabra	Speargrass						
Austrostipa verticillata	Slender Bamboo Grass						
**Avena fatua*	Wild Oats						
**Axonopus fissifolius*	Narrow-leaved Carpet Grass						
Bothriochloa decipens	Red grass						
Bothriochloa macra	Red Grass						
**Briza maxima*	Quaking Grass						
**Briza minor*	Shivery Grass						
**Bromus catharticus*	Prairie Grass						
**Cenchrus clandestinus syn Pennisetum clandestinum*	Kikuyu						
**Chloris gayana*	Rhodes Grass						
Chloris truncata	Windmill Grass						
Chloris ventricosa	Tall Windmill Grass						
Cynodon dactylon	Common Couch						
Dichelachne micrantha	Plume Grass						

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	BIOSECURITY ACT 2015	FLOWERING PERIOD
Digitaria divaricatissima	Umbrella Grass						
Digitaria parviflora	Smallflower Fingergrass						
**Ehrhartia erecta*	Panic Veldt Grass						
**Elusine indica*	Crowsfoot Grass						
Enteropogon acicularis							
Eragrostis brownii	Browns Love Grass						
**Eragrostis cilianensis*	Stinkgrass						
**Eragrostis curvula*	African Lovegrass						
Eragrostis leptostachya	Paddock Lovegrass						
Eriochloa pseudoacrotricha	Early Spring Grass						
**Hordeum leporinum*	Barley Grass						
**Hyparrhenia hirta*	Coolatai Grass						Sept
Imperata cylindrica var. *major*	Blady Grass						
**Lolium perenne*	Perennial Ryegrass						
**Megathyrsus maximus* syn. *Panicum maximum*	Guinea Grass						
**Melinis repens*	Red Natal Grass						
Microlaena stipoides var. *stipoides*	Weeping Meadow Grass						
Panicum effusum	Hairy Panic						
Panicum simile	Two Colour Panic						
Paspalidium distans	Spreading Panic Grass						
**Paspalum dilatatum*	Paspalum						
Paspalum distichum	Water Couch						
**Poa annua*	Winter Grass						Aug, Sept
Rytidosperma fulvum	Wallaby Grass						
**Setaria parviflora* syn. *Setaria gracillis*	Slender Pigeon Grass						
**Sorghum halepense*	Johnson Grass						
Sporobolus creber	Slender Rats Tail						
**Stenotaphrum secundatum*	Buffalo Grass						
Themeda triandra syn. *Themeda australis*	Kangaroo Grass						Oct, Nov
**Vulpia bromoides*	Fescue						
MAGNOLIIDAE (Dicotyledons)							
Aceraceae							
**Acer pseudoplatanus*	Sycamore Maple						

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	BIOSECURITY ACT 2015	FLOWERING PERIOD
Aizoaceae							
**Galenia pubescens*	Galenia						
Amaranthaceae							
Alternanthera denticulata	Lesser Joyweed						
**Gomphrena celosioides*	Gomphrena Weed						
Anacardiaceae							
**Schinus areira syn. Schinus molle*	Pepper Tree						
Apiaceae							
**Cyclospermum leptophyllum*	Slender Celery						
Daucus glochidiatus	Native Carrot						
**Foeniculum vulgare*	Fennel						
Apocynaceae							
**Gomphocarpus fruticosus*	Narrow-leaved Cottonbush						
Parsonsia straminea var. *straminea*	Common Silkpod				W?		
Asteraceae							
**Aectotheca calendula*	Cape Weed						
**Ambrosia artemisiifolia*	Annual Ragweed						Noxious Weed
** Aster subulatus* syn. *Aster squamatus*	Bushy Starwort						
**Bidens pilosa*	Cobblers Pegs						
**Bidens subalternans*	Greater Beggar's Ticks						
Calotis cuneifolia	Blue Burr-daisy						
Calotis lappulacea	Yellow Burr-daisy						Sept
**Carthamus lanatus*	Saffron Thistle						
Cassinia sifton syn Cassinia arcuata	Sifton Bush, Chinese Scrub						
Chrysocephalum apiculatum	Yellow Buttons						
Chrysocephalum semipapposum	Clustered Everlasting						
**Cirsium vulgare*	Spear Thistle						Sept
**Conyza bonariensis*	Flax-leaved Fleabane						
**Conyza parva*	Whorled Fleabane						
Cotula australis	Carrot Weed						
Cymbonotus lawsonianus	Bear’s Ear						
Euchiton involucratus syn. *Gnaphalium*	Cudweed						

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	BIOSECURITY ACT 2015	FLOWERING PERIOD
involucratum							
Euchiton sphaericus	Common Cudweed						
**Facelis retusa*	Facelis						
**Hypochaeris radicata*	Catsear, Flatweed						
**Lactuca serriola*	Prickly Lettuce						
Lagenophora stipitata (syn. Lagenifera stipitata)	Blue Bottle-daisy						
**Scorzonera laciniata*	Scorzonera						
**Senecio madagascariensis*	Fireweed						Sept, Oct
Senecio quadridentatus	Cotton Fireweed						
Sigesbeckia orientalis	Indian-Weed						
**Silybum marianum*	Variegated Thistle						
**Sonchus asper*	Prickly Sowthistle						
**Sonchus oleraceus*	Common Sow Thistle						
**Tagetes minuta*	Stinking Roger						
**Taraxacum officinale*	Dandelion						
Vittadinia cuneata var. *cuneata*	Fuzzweed						Sept, Oct
**Xanthium occidentale*	Noogoora Burr						
**Xanthium spinosum*	Bathurst Burr						
Boraginaceae							
**Echium plantagineum*	Paterson's Curse						
**Heliotropium amplexicaule*	Blue Heliotrope						
Brassicaceae							
**Capsella bursa-pastoris*	Shepherd's Purse						
**Lepidium africanum*	Peppercress						
**Rapistrum rugosum*	Turnip Weed, Giant Mustard						
Cactaceae							
**Opuntia aurantiaca*	Tiger Pear						
**Opuntia stricta*	Prickly Pear						
Campanulaceae							
Lobelia concolor	Poison Pratia						
Lobelia purpurascens	White Root						
Wahlenbergia communis	Native Bluebell						

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	BIOSECURITY ACT 2015	FLOWERING PERIOD
Wahlenbergia gracillis	Sprawling Bluebell						
Caryophyllaceae							
**Cerastium glomeratum*	Mouse Ear Chickweed						
**Paronychia brasiliana*	Brazilian Whitlow						
**Petrorhagia nanteuilii*	Proliferous Pink						Sept, Oct
**Polycarpon tetraphyllum*	Fourleaf Allseed						
**Silene gallica* var. *gallica*	French Catchfly						Sept, Oct
**Stellaria media*	Common Chickweed						Aug, Sept
Casuarinaceae							
Allocasuarina luehmannii	Bulloak						
Casuarina glauca	Swamp Oak						
Chenopodiaceae							
Einadia hastata	Berry Saltbush						
Einadia nutans	Nodding Saltbush						
Enchylaena tomentosa	Ruby Saltbush						
Maireana microphylla	Small-leaf Bluebush				E?		
Sclerolaena birchii	Galvanised Burr				E U		
Convolvulaceae							
Convolvulus erubescens	Australian Bindweed						
Dichondra repens	Kidney Weed						
Crassulaceae							
Crassula sieberana	Australian Stonecrop						
Euphorbiaceae							
Euphorbia drummondii	Caustic Weed						
**Euphorbia peplus*	Petty Spurge						
Fabaceae Subfamily (Faboideae)							
Chorizema parviflorum	Eastern Flame Pea						
Glycine clandestina subsp. complex	Love Creeper						Sept
Glycine tabacina sp. complex	Love Creeper						
Hardenbergia violacea	False Sarsaparilla						Aug, Sept

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	BIOSECURITY ACT 2015	FLOWERING PERIOD
Indigofera australis	Austral Indigo						July, Aug
**Medicargo polymorpha*	Burr Medic						
**Melilotus indicus*	Hexham Scent						
Pultenaea microphylla							
Templetonia stenophylla	Leafy Templetonia						Fruit Sept
**Trifolium arvense*	Haresfoot Clover						
**Trifolium campestre*	Hop Clover						Sept, Oct
**Trifolium repens*	White Clover						Sept, Oct
**Vicia sativa*	Common Vetch						
Zornia dyctiocarpa var. *dyctiocarpa*	Zornia						
Fabaceae (Subfamily Mimosoideae)							
Acacia decora	Western Silver Wattle				U*		
Acacia implexa	Hickory						
Acacia paradoxa	Kangaroo Wattle						Sept, Oct
Acacia salicina	Cooba				E		Mar,
Gentianaceae							
**Cenaurium erythraea*	Common Centaury						
Geraniaceae							
Erodium crinitum	Blue Heronsbill						Sept, Oct
Geranium homeanum	Cranesbill						
Geranium solanderi	Native Geranium						
Goodeniaceae							
Goodenia heterophylla	Varible-leaved Goodenia						
Hypericaceae							
Hypericum gramineum	Native St John's Wort						
Hypericum perforatum	St John's Wort						
Lamiaceae							
Mentha satureioides	Native Pennyroyal						
**Stachys arvensis*	Stagger Weed						
Linaceae							

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	BIOSECURITY ACT 2015	FLOWERING PERIOD
Linum marginale	Native Flax						Sept
**Linum trigynum*	French Flax						
Malvaceae							
Brachychiton populneus subsp. *populneus*	Kurrajong						
**Malva parviflora*	Small-flowered Mallow						
**Modiola carliniana*	Red-flowered Mallow						Sept
Sida corrugata	Corrugated Sida						
Sida hackettiana syn *Sida subspicata*	Golden Rod, Spiked Sida						
**Sida rhombifolia*	Paddys Lucerne						
Meliaceae							
Melia azedarach var. *australasica*	White Cedar						
Myrtaceae							
Angophora floribunda	Rough-barked Apple						Nov, Dec
Eucalyptus blakelyi	Blakely's Red Gum						
Eucalyptus crebra	Narrow-leaved Ironbark						Sept, Oct
Eucalyptus moluccana	Grey Box						Mar
Oleaceae							
**Ligustrum sinense*	Small-leaved Privet						Sept
Notelaea microcarpa	Native Olive						
**Olea europaea* subsp. *cuspidata*	African Olive						
Oxalidaceae							
Oxalis perennans	-						
Papaveraceae							
**Fumaria bastardii*	Bastard's Fumitory						
Phyllanthaceae							
Breynia oblongifolia	Coffee Bush						
Phyllanthus virgatus	Spurge						
Pittosporaceae							
Pittosporum undulatum	Sweet Pittosporum						Aug, Sept

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	BIOSECURITY ACT 2015	FLOWERING PERIOD
Plantaginaceae							
Plantago debilis							
**Plantago lanceolata*	Plantain						
Polygonaceae							
Persicaria decipens	Slender Knotweed						
**Polygonum aviculare*	Wireweed						
Rumex brownii	Swamp Dock						
**Rumex crispus*	Curled Dock						
Portulacaceae							
Portulaca oleracea	Purslane, Pigweed						
Primulaceae							
**Lysimachia arvensis* syn. *Anagallis arvensis*	Scarlet Pimpernel						
Proteaceae							
Grevillea robusta	Silky Oak						
Ranunculaceae							
Ranunculus inundatus	River Buttercup						
Ranunculus lappaceus	Common Buttercup						
Rubiaceae							
Asperula conferta	Common Woodruff						
**Galium aparine*	Clevers						
Opercularia diphylla	Stinkweed						
**Richardia humistrata*							
Rutaceae							
**Citrus × limon*	Lemon						
Geijera parviflora	Wilga						
Sapindaceae							
Dodonaea viscosa subsp. *cuneata*	Wedge-leaf Hop Bush						

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	BIOSECURITY ACT 2015	FLOWERING PERIOD
Scrophulariaceae							
Eremophila debilis	Amulla						
**Linaria pelisseriana*	Pelisser's Toadflax						
Myoporum montanum	Western Boobialla						
**Verbascum virgatum*	Twiggy Mullein						
Solanaceae							
**Cestrum parqui*	Green Cestrum						Sept, Oct
**Datura stramonium*	Common Thornapple						
**Lycium ferocissimum*	African Boxthorn						
Solanum cinereum	Narrawa Burr						
Solanum prinophyllum	Forest Nightshade						
Stackhousiaceae							
Stackhousia viminea	Slender Stackhousia						
Urticaceae							
**Urtica urens*	Small Nettle						
Verbenaceae							
**Verbena bonariensis*	Purple Top						
Verbena gaudichaudii							
**Verbena rigida* var. *rigida*	Veined Verbena						

Appendix G: Fauna Survey Results

Amphibian

Crinia signifera (Common Eastern Froglet) was heard calling on two occasions. Once during diurnal surveys and once during targeted amphibian surveys.

No species listed as threatened under the BC Act 2016 or EPBC Act 1999 were recorded within the subject land

Avifauna

No owls were heard calling or observed during stagwatch surveys. One deceased *Tyto alba* (Barn Owl) was observed during field surveys. Common bird species observed within the study area include *Platycercus eximius* (Eastern Rosella), *Dacelo novaeguineae* (Laughing Kookaburra), *Coracina novaehollandiae* (Black-faced Cuckoo-shrike), *Cracticus nigrogularis* (Pied Butcherbird), *Gymnorhina tibicen* (Australian Magpie) and *Corvus coronoides* (Australian Raven).

No avifauna species listed as threatened under the BC Act 2016 or EPBC Act 1999 were recorded within the subject land. Complete list of avifauna species detected on site have been presented in Table H1.

Reptiles

Five species were observed during field surveys. Several *Carlia tetradactyla* (Rainbow Skink) and *Ctenotus robustus* (Striped Skink) were observed during surveys using artificial cover (roof tiles). Multiple *Suta dwyeri* (Dwyer's Snake) were also recorded during artificial cover surveys. A juvenile *Tiliqua scincoides* (Eastern Blue-tongued Lizard) was observed and a deceased adult was also seen. One individual of BC Act and EPBC Act listed Vulnerable species *Delma vescolineata* (Hunter Valley Delma) was captured during artificial cover surveys and skins of the individual were collected. This newly described species was identified through morphological characteristics described in Mahony et al. (2022). The captured individual was light brown with a white underside. It had dark spots on scales bordering the mouth, behind the ear and sides toward the front of the body. In this individual, the third supralabial was below the eye which is typically seen in *D. vescolineata* (Mahony et al. 2022). This species has previously been captured and positively identified approximately 3km east of the study area (Ecological Australia 2023). *Delma impar* (Striped Legless Lizard) has been recorded 750m south-east of the subject land prior to the description *Delma vescolineata* (Hunter Valley Delma) as a separate species occurring within the Hunter Valley (WSP 2021). There is no evidence of the Hunter Valley delma co-occurring with the striped legless lizard (Mahony et al. 2022) therefore these individuals were likely *D. vescolineata*.

Photos of the captured individual are presented in Plates G1 and G2.

No other reptile species listed as threatened under the BC Act 2016 or EPBC Act 1999 were recorded within the subject land.

Plate G1 Captured *Delma vescolineata* (Hunter Valley Delma)

Plate G2 Close up of captured *Delma vescolineata* (Hunter Valley Delma)

Arboreal Mammals

Several *Trichosurus vulpecula* (Common Brushtail Possum) were observed in hollow bearing trees and on the ground during spotlight surveys and in all arboreal camera traps that were set. *Petaurus norfolcensis* (Squirrel Glider) was captured on three of the four arboreal camera trap set. Squirrel Glider is listed as Vulnerable under the BC Act. Complete results of camera trapping have been presented in Table G1. Photos of the *Petaurus norfolcensis* (Squirrel Glider) are shown in Plates G3 - G5.

No arboreal mammal species listed as threatened under the BC Act 2016 or EPBC Act 1999 were recorded within the subject land.

Terrestrial Mammals

A few specimens of *Sminthopsis murina* (Common Dunnart) were captured under roof tiles during artificial cover surveys. Several *Macropus giganteus* (Eastern Grey Kangaroo) were observed using and moving through the study area as well as on camera traps. One individual *Macropus rufogriseus* (Red-necked Wallaby) was observed during field surveys.

No terrestrial mammal species listed as threatened under the BC Act 2016 or EPBC Act 1999 were recorded within the subject land. Complete results of ground camera trapping have been presented in Table H1.

Table G1 Results of the Camera Trapping Surveys within the subject land.

Species	1 Swift Enduro Arboreal	2 Reconynx Arboreal	3 Swift Enduro Arboreal	4 Reconynx Arboreal	5 Swift Enduro Ground
Date Set/ Date Retrieved	**17/05/2023 – 22/06/2023**	**17/05/2023 – 22/06/2023**	**17/05/2023 – 22/06/2023**	**17/05/2023 – 22/06/2023**	**25/01/2024 – 29/01/2024**
Trapping days	**36**	**36**	**36**	**36**	**4**
Petaurus norfolcensis Squirrel Glider	**X**		**X**	**X**	
Trichosurus vulpecula Common Brushtail Possum	**X**	**X**		**X**	
Rattus rattus Black Rat		**X**			
Corvus coronoides Australian Raven	**X**				
Cracticus tibicen *Australian Magpie*	**X**				**X**
Eolophus roseicapilla Galah			**X**		
Trichoglossus moluccanus Rainbow Lorikeet			**X**		
Manorina melanocephala Noisy Miner				**X**	
Dacelo novaeguineae *Laughing Kookaburra*					**X**
Grallina cyanoleuca Magpie-lark					**X**
Macropus giganteus Eastern Grey Kangaroo	**X**	**X**		**X**	
Lepus capensis Hare					**X**

Plate G3 *Petaurus norfolcensis* (Squirrel Glider) observed on camera trap 1 (25/05/2023)

Plate G4 *Petaurus norfolcensis* (Squirrel Glider) observed on camera trap 3 (23/05/2023)

Plate G5 *Petaurus norfolcensis* (Squirrel Glider) observed on camera trap 4 (21/05/2023)

Plate G6 *Lepus capensis* (Hare) observed on camera trap 5 (24/01/2024)

Microchiropteran Bats

The following species were identified from Anabat recordings:

- *Austronomus australis* (White-striped free-tailed bat)
- *Chalinolobus gouldii* (Gould's wattled bat)
- *Chalinolobus morio* (Chocolate wattled bat)
- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle)
- *Miniopterus orianae oceanensis* (Large Bent-winged Bat)
- *Nyctophilus sp. (geoffroyii or gouldi)*
- *Ozimops ridei* (Ride's Free-Tailed Bat)
- *Vespadelus vulturnus (*Little Forest Bat*)*

Doubt exists over differentiation between calls within the genus Nyctophilus due to the similarity between species. Calls are most likely to come from *N. geoffroyi* or *N. gouldi*. Doubt exists over differentiation between *Scoteanax rueppellii* and *Falsistrellus tasmaniensis* calls due to the high number of fragmentary calls, the presence of doppler effects on frequency and social calls. Such calls in this analysis have been tentatively attributed to *F. tasmaniensis* due to factors such as the length of the pre-characteristic section of the call.

Falsistrellus tasmaniensis (Eastern False Pipistrelle) and *Miniopterus orianae oceanensis* (Large Bent-winged Bat)are listed as Vulnerable under the BC Act.

Koala Spot Assessment Technique

Survey results have been presented in Tables G3, G4 and G5. No Koala scats or evidence of koalas was observed. Results of the assessment are presented below:

Table G2. Categorisation of Koala activity into Low, Medium (normal) and High use categories based on use of mean activity level ± 99 per cent confidence intervals (nearest percentage equivalents) from each of the three area/population density categories.

Activity category	Low use	Medium (normal) use	High use
Area (density)			
East Coast (low)		≥ 3.33% but ≤ 12.59%	> 12.59%
East Coast (med – high)	< 22.52%	22.52% but ≤ 32.84%	> 32.84%
Western Plains (med – high)	< 35.84%	≥ 35.84% but ≤ 46.72%	> 46.72%

The activity level for a SAT site is simply expressed as the percentage equivalent of the proportion of surveyed trees within the site that had Koala faecal pellet recorded within the prescribed search area. Given a sample of 90 trees with no Koala scats present, the activity category would be 0. The categorisation of Koala activity is shown in Table G6. Considering that no Koala Pellets were recorded, Koala usage would be likely very low at the time of survey. This low activity may be associated with a low-density Koala population.

Table G3: Results of the Spot Assessment Technique (SAT) survey #1 (4/07/2024).

SAT Tree No	Easting	Northing	DBH	Tree species	Result
1	302685	6430222	0.16	*E. crebra*	Macropod scats
2	302679	6430216	0.28	*E. crebra*	Macropod scats
3	302676	6430214	0.16, 0.17	*E. crebra*	Rabbit and macropod scats
4	302685	6430210	0.26	*E. crebra*	Rabbit and macropod scats
5	302682	6430207	0.13, 0.15	*E. crebra*	Rabbit, macropod and brushtail possum scats
6	302688	6430209	0.28	*E. crebra*	Macropod scats
7	302692	6430210	0.18	*E. crebra*	European hare and macropod scats
8	302682	6430204	0.11	*E. crebra*	European hare and macropod scats
9	302680	6430202	0.21	*E. crebra*	Brushtail possum scats
10	302677	6430203	0.11	*E. crebra*	Brushtail possum and macropod scats
11	302677	6430204	0.2	*E. crebra*	Brushtail possum and macropod scats
12	302674	6430201	0.16	*E. crebra*	Brushtail possum and macropod scats
13	302680	6430201	0.16	*E. crebra*	European hare, brushtail possum and macropod scats
14	302680	6430203	0.18	*E. crebra*	European hare, brushtail possum and macropod scats
15	302683	6430203	0.13	*E. crebra*	European hare and macropod scats
16	302686	6430202	0.12	*E. crebra*	Macropod scats
17	302688	6430201	0.11	*E. crebra*	Brushtail possum and macropod scats
18	302687	6430205	0.13	*E. crebra*	Brushtail possum and macropod scats
19	302691	6430204	0.16	*E. crebra*	European hare, brushtail possum and macropod scats
20	302691	6430204	0.11	*E. crebra*	European hare and brushtail possum scats
21	302692	6430205	0.09, 0.12	*E. crebra*	Brushtail possum and macropod scats
22	302670	6430211	0.1	*E. crebra*	Macropod scats
23	302666	6430215	0.19, 0.20	*E. crebra*	Bird and brushtail possum scats
24	302667	6430217	0.18	*E. crebra*	Macropod scats
25	302663	6430221	0.25	*E. crebra*	Macropod scats
26	302663	6430221	0.28	*E. crebra*	Macropod scats
27	302696	6430235	0.20, 0.22	*E. crebra*	Eastern rosella feather
28	302657	6430218	0.15, 0.23	*E. crebra*	European hare and macropod scats
29	302665	6430213	0.14	*E. crebra*	Rabbit or echidna digging. Macropod scats
30	302665	6430213	0.15, 0.16	*E. crebra*	Bird and macropod scats.

Table G4: Results of the Spot Assessment Technique (SAT) survey #2 (4/07/2024).

SAT Tree No	Easting	Northing	DBH	Tree species	Result
1	302754	6430234	0.19, 0.20	*E. crebra*	Bird scats
2	302751	6430232	0.11	*E. crebra*	No evidence
3	302751	6430231	0.11	*E. crebra*	No evidence
4	302751	6430229	0.11, 0.17	*E. crebra*	No evidence
5	302747	6430232	0.21	*E. crebra*	Brushtail possum and macropod scats. Potential rodent or glider scats
6	302745	6430233	0.17	*E. crebra*	Brushtail possum scats
7	302747	6430228	0.18	*E. crebra*	Brushtail possum and macropod scats
8	302745	6430229		*E. crebra*	No evidence
9	302745	6430230		*E. crebra*	No evidence
10	302744	6430232	0.16	*E. crebra*	European hare, brushtail possum and macropod scats
11	302740	6430231	0.22	*E. crebra*	Brushtail possum scats and potential glider scats
12	302743	6430230	0.19	*E. crebra*	Brushtail possum scats
13	302755	6430225	0.24	*E. crebra*	Macropod scats
14	302746	6430227	0.2	*E. crebra*	Macropod scats
15	302744	6430227	0.16	*E. crebra*	Brushtail possum scats
16	302744	6430225	0.19	*E. crebra*	No evidence
17	302760	6430238	0.31	*E. crebra*	Rabbit and macropod scats
18	302766	6430240	0.24	*E. crebra*	Macropod scats
19	302766	6430246	0.29	*E. crebra*	Macropod scats
20	302746	6430224	0.1	*E. crebra*	Brushtail possum scats
21	302746	6430224	0.13	*E. crebra*	Rabbit and macropod scats
22	302743	6430221	0.13	*E. crebra*	European hare scats
23	302742	6430223	0.1	*E. crebra*	Brushtail possum scats
24	302740	6430226	0.11	*E. crebra*	European hare scats
25	302740	6430225	0.1	*E. crebra*	Macropod scats and potential glider scats
26	302741	6430222	0.15	*E. crebra*	No evidence
27	302739	6430220	0.1	*E. crebra*	Macropod scats and potential glider scats
28	302746	6430220	0.21	*E. crebra*	Brushtail possum scats
29	302748	6430216	0.21	*E. crebra*	Brushtail possum scats
30	302747	6430215	0.16	*E. crebra*	Brushtail possum scats and macropod jaw bone

Table G5: Results of the Spot Assessment Technique (SAT) survey #3 (29/08/2024).

SAT Tree No	Easting	Northing	DBH	Tree species	Result
1	302807	6430326	0.19	*E. crebra*	Rabbit, macropod and brushtail possum scats
2	302810.6	6430324	0.17	*E. crebra*	Rabbit, macropod and brushtail possum scats
3	302810.1	6430321	0.14	*E. crebra*	Rabbit and macropod scats
4	302806.9	6430322	0.15	*E. crebra*	Macropod scats
5	302804.1	6430323	0.19	*E. crebra*	Brushtail possum and macropod scats
6	302802	6430320	0.15	*E. crebra*	Macropod scats
7	302803.7	6430319	0.1	*E. crebra*	Macropod scats
8	302803.3	6430319	0.11	*E. crebra*	Macropod scats
9	302801.6	6430324	0.18	*E. crebra*	Brushtail possum scats
10	302799.6	6430323	0.13	*E. crebra*	Rabbit and macropod scats
11	302800.8	6430327	0.15	*E. crebra*	Macropod scats
12	302800	6430329	0.11	*E. crebra*	Rabbit and macropod scats
13	302804.2	6430327	0.16	*E. crebra*	Macropod scats
14	302802.8	6430330	0.14	*E. crebra*	Macropod scats
15	302807.3	6430331	0.14	*E. crebra*	Macropod scats
16	302808.1	6430334	0.17	*E. crebra*	Rodent and macropod scats
17	302807.7	6430333	0.15	*E. crebra*	Macropod scats
18	302814.8	6430334	0.18	*E. crebra*	Rodent and macropod scats
19	302820.8	6430334	0.17	*E. crebra*	Macropod scats
20	302819.2	6430330	0.11	*E. crebra*	Macropod scats
21	302818.6	6430332	0.17	*E. crebra*	Macropod scats
22	302820.7	6430333	0.18	*E. crebra*	Rabbit and macropod scats
23	302817.1	6430328	0.12	*E. crebra*	Rabbit and macropod scats
24	302816.5	6430328	0.13	*E. crebra*	Macropod scats
25	302818.2	6430325	0.16	*E. crebra*	Macropod scats
26	302820.6	6430325	0.12	*E. crebra*	Macropod scats
27	302816.4	6430320	0.19	*E. crebra*	Macropod scats
28	302812	6430322	0.16	*E. crebra*	Macropod scats
29	302811	6430320	0.13	*E. crebra*	Brushtail possum and macropod scats
30	302808.3	6430320	0.14	*E. crebra*	Rabbit and macropod scats

INCIDENTIAL OBSERVATIONS AND SECONDARY INDICATIONS

A number of incidental observations and secondary indications of fauna were observed during the survey and included:

- A large number of scats attributed to *Lepus capensis* (European Hare) and *Oryctolagus cuniculus* (European Rabbit) were commonly found throughout the study area. Specimens of Lepus capensis were observed within the subject land during site visits and the camera trapping survey;
- Scats and footprints consistent with that of a macropod were found to be common throughout the site. These scats and prints were most likely from *Macropus giganteus (*Eastern Grey Kangaroo) which was observed and recorded during the camera trapping survey;
- Diggins associated with *Tachyglossus aculeatus* (Echidna) were observed on a couple of occasions during field surveys.

Appendix H: Total Vertebrate Fauna List

Family sequencing and taxonomy follow for each fauna class:

Fish

Allen, G.R., Midgley, S.H. & Allen, M. (2002). *Field Guide to the Freshwater Fishes of Australia*. Western Australian Museum, Perth.

Herpetofauna

Cogger, H.G. (2014). *Reptiles and Amphibians of Australia* (7th edn.). CSIRO Publishing.

Birds

Pizzey and Knight (2012) (9th edn).

Mammals

Van Dyck, S. and Strahan, R. (Ed) (2008). The Mammals of Australia (3rd edn). New Holland Publishers, Australia – Churchill, S. (2008). *Australian Bats*. (2nd edn.). Allen & Unwin Australia.

(?) - Indicates a species identified without certainty or to a Genus level only.

* - Indicates an introduced species.

Threatened species addressed within this assessment appear in **bold** font.

Introduced species are indicated by an asterisk ("*").

The following standard abbreviations are used to indicate subspecific taxa:

subsp. -subspecies
var.- variety
× - hybrid between the two indicated species

Biodiversity Conservation Act 2016 (BC Act)

V Vulnerable
E1 Endangered
E2 Endangered Population
E4A Critically Endangered Population

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

V **Vulnerable**
E **Endangered**
CE **Critically Endangered Population**
M **Migratory**

Regionally Significant Fauna Species.

+ Region includes Gosford, Wyong, Cessnock, Maitland, Lake Macquarie, Newcastle and Port Stephens LGA's. Produced from Stage 1 of the LHCCREMS – Regional Biodiversity Conservation Strategy.

Observation Type

O - Observed (sighted)
W - Heard call
OW – Observed and heard call
X - In scat
P – Scat
T - Trapped or netted
H – Hair, feathers or skin
A - Stranded/Beached
G – Crushed cones
R – Road Kill
D – Dog Kill
Q – Camera
C – Cat Kill
V – Fox Kill
K – Dead
S – Shot
I – Fossil/subfossil
FB – Burrow
F – Tracks, scratching
Z – In raptor/owl Pellet
U – Ultrasonic recording
M - Miscellaneous
E – Nest/roost
B - Burnt
Y – Bones, teeth or shell
N – Not located
AR – Acoustic Recording

Table H1 Total Vertebrate Fauna List

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	REGIONALLY SIGNIFICANT	OBSERVATION TYPE
Phylum - Chordata					
Subphylum - Vertebrata					
Class Amphibia - Amphibians					
Order Salientia - Frogs					
Family Myobatrachidae - 'Southern Frogs'					
Crinia signifera	Common Eastern Froglet				
Class Reptilia - Reptiles					
Order Squamata – Lizards and Snakes					
Suborder Sauria - Lizards					
Family Pygopodidae – Legless Lizards					
Delma vescolineata	Hunter Valley Delma	V	V		
Family Scinidae - Skinks					
Carlia tetradactyla	Rainbow Skink			+	
Ctenotus robustus	Striped Skink				
Tiliqua scincoides	Eastern Blue-tongued Lizard				
Suborder Serpentes - Snakes					
Family Elapidae - Venomous Snakes					
Suta dwyeri	Dwyer's Snake				
Class Aves - Birds					
Family Anatidae - Ducks, Swans and Geese					
Chenonetta jubata	Australian Wood Duck				

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	REGIONALLY SIGNIFICANT	OBSERVATION TYPE
Family Columbidae - Pigeons, Doves					
Ocyphaps lophotes	Crested Pigeon				
Family Accipitridae - Osprey, Hawks, Eagles and Harriers					
Accipiter fasciatus	Brown Goshawk				
Family Falconidae - Falcons					
Falco cenchroides	Nankeen Kestrel				
Family Charadriidae Plover, Dotterels, Lapwings					
Vanellus miles	Masked Lapwing				
Family Cacatuidae - Cockatoos and Corellas					
Cacatua roseicapilla	Galah				
Cacatua sanguinea	Little Corella				
Calyptorhyncus funereus	Yellow-tailed Black-Cockatoo			+	
Family Psittacidae - Parrots, Rosellas and Lorikeets					
Alisterus scapularis	King Parrot				
Platycercus eximius	Eastern Rosella				
Family Cuculidae - Cuckoos					
Scythrops novaehollandiae	Channel-billed Cuckoo				
Family Tytonidae - Barn Owls					
Tyto alba	Barn Owl			+	

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	REGIONALLY SIGNIFICANT	OBSERVATION TYPE
Family Halcyonidae - Tree Kingfishers					
Dacelo novaeguineae	Laughing Kookaburra				
Family Coraciidae - Rollers 'Dollarbirds					
Eurystomus orientalis	Dollarbird				
Family Maluridae					
Malurus cyaneus	Superb Fairy-wren				
Family Pardalotidae - Pardalotes, Gerygones, Scrubwrens, Heathwrens and Thornbills					
Acanthiza apicalis	Inland Thornbill				
Acanthiza chrysorrhoa	Yellow-rumped Thornbill				
Acanthiza nana	Yellow Thornbill				
Acanthiza reguloides	Buff-rumped Thornbill				
Pardalotus punctatus	Spotted Pardalote				
Pardalotus striatus	Striated Pardalote				
Family Meliphagidae - Honeyeaters					
Anthrochaera carunculata	Red Wattlebird				
Manorina melanocephala	Noisy Miner				
Philemon corniculatus	Noisy Friarbird				
Family Petroicidae - Robins and Jacky Winter					
Microeca fascinans	Jacky Winter				
Family Pachycephalidae - Whistlers, Shrike-tit and Shrike-thrushes					
Pachycephala pectoralis	Golden Whistler				
Pachycephala rufiventris	Rufous Whistler				

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	REGIONALLY SIGNIFICANT	OBSERVATION TYPE
Family Monarchidae - Monarchs, Flycatchers and Magpie-Lark					
Grallina cyanoleuca	Magpie-lark				
Family Rhipiduridae - Fantails					
Rhipidura fuliginosa	Grey Fantail				
Rhipidura leucophrys	Willie Wagtail				
Family Campephagidae - Cuckoo-shrikes and Trillers					
Coracina novaehollandiae	Black-faced Cuckoo-shrike				
Family Hirundinidae - Swallows and Martins					
Cecropis nigricans	Tree Martin				
Hirundo neoxena	Welcome Swallow				
Family Artamidae - Wood-swallows, Butcherbirds, Magpie and Currawongs					
Cracticus nigrogularis	Pied Butcherbird				
Cracticus tibicen syn. *Gymnorhina tibicen*	Australian Magpie				
Strepera graculina	Pied Currawong				
Family Corvidae - Crows, Raven					
Corvus coronoides	Australian Raven				
Class Mammalia - Mammals					
Subclass Prototheria - Monotremes					

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	REGIONALLY SIGNIFICANT	OBSERVATION TYPE
Order Monotremata					
Family Tachyglossidae - Echidna					
Tachyglossus aculeatus	Echidna			+	
Subclass Marsupialia - Marsupials					
Order Dasyuromorphia – Carnivorus Marsupials					
Family Dasyuridae - Dasyurids					
Sminthopsis murina	Common Dunnart				
Order Diprotodontia					
Suborder Phalangerida					
Superfamily - Petauroidea					
Family Petauridae					
Petaurus norfolcensis	Squirrel Glider	V			
Superfamily - Phalangeroidea					
Family Phalangeridae - Brushtail Possums					
Trichosurus vulpecula	Common Brushtail Possum				
Superfamily - Macropodoidae					
Family Macropodidae - Kangaroos, Wallabies					
Macropus giganteus	Eastern Grey Kangaroo			+	
Macropus rufogriseus	Red-necked Wallaby			+	

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	REGIONALLY SIGNIFICANT	OBSERVATION TYPE
Subclass Eutheria - Eutherian Mammals					
Order Chiroptera					
Suborder Microchiroptera					
Family Molossidae - Freetail-bats					
Austronomus australis syn *Nyctinomus australis, Tadarida australis*	White-striped Freetail Bat				
Ozimops ridei syn. Mormopterus sp. 2					
Family Vespertilionidae - Plain-nosed Bats					
Chalinolobus gouldii	Gould's Wattled Bat				
Chalinolobus morio	Chocolate Wattled Bat				
Falsistrellus tasmaniensis	Eastern Falsistrelle	V			
Miniopterus schreibersii oceanensis	Large Bentwing-bat	V			
Nyctophilus sp.					
Vespadelus vulturnus	Little Forest Bat				
Order Rodentia					
Family Muridae - Rodents					
**Rattus rattus*	Black Rat			T	
Order Lagomorpha					
Family Leporidae					
**Lepus capensis*	European Hare				
**Oryctolagus cuniculus*	European Rabbit			O	

Appendix I Tree Survey Results

Tree Data Key for Table I1.

- **DBH** – Diameter at Breast Height. Tree trunk diameter measured at breast height (1.4 metres above ground level). Fabric diameter tape used which assumes a circular cross section.
- **Tree Height** – Estimated with the use of an inclinometer and rangefinder (metres).
- **Coordinates** - **GDA - 2020**
- **Habitat/Hollows** –

  Class 1 –very large sized hollow openings (i.e. >20cm) suitable for species such as Owls
  Class 2 – large sized hollow openings (i.e. 15-20cm) suitable for species such as Possums
  Class 3 –medium sized hollow-openings (i.e. 5-15cm) suitable for species such as Gliders and Possums
  Class 4 – small sized hollow openings (i.e. <5cm) suitable for species such as microchiropteran bats
  Spout: Hollow opening towards sky offering little protection from the weather.

Table I1: Details of significant trees within the subject land and within close proximity.

No.	Species of Tree	Easting	Northing	Height (m)	DBH (m)	Habitat Present				Comments	Removal Required?
						Class 1	Class 2	Class 3	Class 4		
1	*Eucalyptus crebra* Narrow-leaved Ironbark	302653	6430531	0.88	8	1 spout				Opening at base	**Yes**
2	*E. crebra*	302698	6430337	0.73	16			1	2	Scar high up in trunk	**Yes**
3	*E. crebra*	302679	6430325	0.7	15			1	1	Scar at base. Hollow in dead branch	**Yes**
4	*E. crebra*	302732	6430311	0.97			4		6		**Yes**
5	*E. crebra*	302639	6430223	0.82	17		1?	1	4	Loose bark and cracks	**Yes**
6	*E. crebra*	302623	6430242	1.02	16		1?	2	5		**Yes**
7	*E. crebra*	302605	6430223	0.83	17	2				One hollow in 3.5m up tree. Other hollow is long and narrow, higher up in tree	No
8	*E. crebra*	302667	6430254	0.8			1	1	3	Active European beehive in class 2 hollow	**Yes**
9	*E. crebra*	302731	6430196	0.91	17				3	Glider recorded in camera in this tree	**Yes**
10	*E. crebra*	302812	6430213	0.84	16				3	Glider recorded in camera in this tree	**Yes**
11	*Eucalyptus moluccana* Grey Box	302826	6430202	0.64	14		2	1	3		**Yes**
12	*E. crebra*	302809	6430099	0.87	17				2		Yes – for earlier stage
13	*E. moluccana*	302809	6430138	0.77				1	4		**Yes**
14	*E. crebra*	302726	6430168	0.9							No