Updated Flora & Fauna Assessment

for the
proposed subdivision
at
Lot 101 & 103 DP 1170190
Ironbark Road
MUSWELLBROOK
NSW

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Job No: 12832

February 2024

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Project Name	Updated Flora & Fauna Assessment for the proposed subdivision at Lot 101 & 103 DP 1170190 Ironbark Road, Muswellbrook NSW.	
Project Number	12832	
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Date	22 February 2024	
Version Number	**Version 1**	

Disclaimer

This report has been prepared in accordance with the proposal provided by the Client and outlined within this report. All findings, conclusions or recommendations contained within this report are based upon the data and results collected under the times and conditions specified in the report and are only applicable for the proposal considered within this report. This report has been prepared for use exclusively by the Client. No responsibility for its use by any other party is accepted by WILDTHING Environmental Consultants.

Summary

Updated Flora, fauna and habitat studies have been undertaken for the proposed subdivision at Lots 101 & 103 DP1170190 Ironbark Road, Muswellbrook NSW. Previous ecological studies have been undertaken for the rezoning of the subject site (Wildthing Environmental Consultants, 2012, 2015 & 2017.

The 81.23ha subject site had an irregular shape and was situated on undulating terrain on the south-east edge of Muswellbrook. The entire subject site had been subject to historic native vegetation clearance and ongoing cattle grazing. Cattle were still present during recent fieldwork.

The proposed subdivision will result in the formation of 513 lots. These lots will be composed of 329 General Residential and 127 Duplex lots within areas zoned R1 – General Residential and 57 lots zoned R5 Large Lot Residential under the Muswellbrook LEP. A total of 11.96ha of offset land is zoned C3 – Environment Management. These areas have been established over areas of better-quality vegetation and habitat.

Despite the disturbance areas of remnant native trees and associated regrowth were present over parts of the subject site. Larger areas consisted of derived native grassland with isolated remnant trees. This area of derived grassland was present in a number of condition states from good to poor. All native vegetation within the subject site with the exception of a small amount of aquatic vegetation around the constructed dams was found to be most consistent with that of one Plant Community Type (PCT) 3431 - Central Hunter Ironbark Grassy Woodland. *Eucalyptus crebra* (Narrow-leaved Ironbark) was the most common canopy species. *Eucalyptus moluccana* (Grey Box) was present to a lesser extent and was more commonly recorded in the far south-east.

PCT 3431 Central Hunter Ironbark Grassy Woodland 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. Significant areas of better-quality Central Hunter Grey Box – Ironbark Woodland are incorporated in to the areas zoned C3 – Environment Management under the Muswellbrook LEP. Given the retention of areas of better-quality Central Hunter Grey Box – Ironbark Woodland and taking into consideration the mitigation measures such as a vegetation management plan to protect and enhance areas zoned C3 – Environment Management it is unlikely that the proposal will have a significant impact on the extent or substantially and adversely modify the composition of this EEC such that its local occurrence is likely to be placed at risk of extinction.

An individual specimen of the threatened *Diuris tricolor* (Pine Donkey Orchid) listed as vulnerable under the NSW BC Act 2016 was recorded within the far west of the subject land as a result of a targeted search conducted in 2015 (Wildthing Environmental Consultants, 2015). The Pine Donkey Orchid is also listed as an Endangered Populations within the Muswellbrook LGA. Woodland and better-quality areas of derived native grassland within the subject site contain suitable habitat for the Pine Donkey Orchid. Under the rezoning the specimen of Pine Donkey Orchid has been given protection by its positioning within an area zoned C3 – Environment Management. Taking into consideration the recommendations for long-term management of the C3 – Environment zones it is considered unlikely that the proposal would significantly affect the life cycle of *D. tricolor* or place any viable local populations of at risk of extinction.

Of the remaining 15 addressed threatened flora species assessed, the subject site was found to contain suitable habitat for 5 of the addressed species. The proposal may result in an incremental loss of habitat for these threatened flora species; however, it is considered not likely that the proposal would significantly affect the life cycle of any of these threatened flora species or place any viable local populations of at risk of extinction.

No threatened fauna species were recorded in the study area during surveys. Of the 61 addressed threatened fauna species the subject site was considered to contain suitable habitat of varying quality for 41 species. Of these threatened fauna species those most likely to utilise the site would include a number of the woodland birds, Grey-headed Flying-Fox and microchiropteran bats. The proposal will result in an incremental reduction habitat for the above species in the local area. Given areas of better-

quality vegetation and habitat will be retained within areas zoned C3 – Environment Management and taking into consideration the mitigation measures such as a vegetation management plan to protect and enhance areas zoned C3 – Environment Management it is unlikely that the proposal will have a significant impact on these threatened fauna species such that a local extinction would occur.

The proposal will result in the following direct and potential impacts/losses:

- Removal of up to 64.57ha of PCT 3431 - Central Hunter Ironbark Grassy Woodland, composed of 7.9ha of better-quality woodland and 56.67ha of derived grassland in varying condition states.
- Removal of up to 64.57ha of PCT 3431 – of the BC Act 2016 listed (EEC) Central Hunter Grey Box – Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions, composed of 7.9ha of better-quality woodland and 56.67ha of derived grassland in varying condition states.
- Removal of up to 78 hollow-bearing trees, potential removal of up to 18 hollow-bearing trees (those located within close proximity to proposed lot boundaries and within larger residential lots). A total of 83 hollow-bearing trees will be retained within the C3 – Environment Management zones.
- Removal of potential habitat for a number of the addressed threatened flora and fauna species;
- Injury/Mortality to native fauna during felling of trees.

Consideration under SEPP (Biodiversity Conservation) 2021 - Chapter 4 Koala Habitat Protection. No koalas were identified within the subject site during recent or past surveys. Most trees within the mapped native vegetation are considered koala use trees species under Schedule 1 of SEPP (Biodiversity Conservation) 2021. Considering the presence of Koalas records in the last 18 years within 2.5km (under an accuracy of ≤1000m) on the NSW BioNet Atlas (DPE, 2024a) habitat on the subject site could be considered to be Core Koala Habitat. Based on this information, a Koala Assessment Report (KAR) may be required to be undertaken.

Considerations have been made to the Commonwealth Environment Protection and Biodiversity Conservation (EPBC) Act (1999). Areas of better quality PCT 3431 Central Hunter Ironbark Grassy Woodland within the subject site were also likely to be consistent with the Nationally Listed EPBC Act 1999 Critically Endangered Community (CEEC) Central Hunter Valley Eucalypt Forest and Woodland. Under the National Legislation (EPBC Act 1999), Approved Conservation Advice for Critically Endangered Community (CEEC) Central Hunter Valley Eucalypt Forest and Woodland (DoEE 2016), derived native grassland and shrublands are not included in the Critically Endangered Community Central Hunter Valley Eucalypt Forest and Woodland CEEC. The exceptions are where there is a gap, in or at the edge of a patch; or connecting two patches across a short distance (i.e., 30 metres). The majority of PCT 3431 within impacted areas consisted largely of derived grassland. Given the retention of areas of better-quality areas of Central Hunter Grey Box – Ironbark Woodland and taking into consideration the mitigation measures such as a vegetation management plan to protect and enhance areas zoned C3 – Environment Management it is unlikely that the proposal will have a significant impact on this CEEC, therefore a referral is unlikely to be required.

In conclusion, the proposal will result in a small incremental reduction of PCT 3431 Central Hunter Ironbark Grassy Woodland Given the mitigation measures the proposal is unlikely to disrupt the life cycle of any addressed threatened species, endangered population or endangered ecological community such that local extinction would occur.

CONTENTS

Acronyms and Abbreviations used in this report

Acronym/Abreviation	Phrase
AOBV	Area of outstanding Biodiversity Value
BAAS	Biodiversity Assessors Accreditation System
BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Calculator
BAR	Biodiversity Assessment Report
BESS	Battery Energy Storage System
BC Act	Biodiversity Conservation Act 2016
BDAR	Biodiversity Development Assessment Report
BOAMS	Biodiversity Offsets and Agreement Management System
BOS	Biodiversity Offset Scheme
BOSET	Biodiversity Offsets Scheme Entry Tool
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DPE	Department of Planning and Environment (NSW)
EEC	Endangered Ecological Community
EPBC Act	Environmental Protection & Biodiversity Conservation Act 1999
EP&A Act	Environmental Planning & Assessment Act 1979
IBRA	Interim Biogeographic Regionalisation for Australia
LGA	Local Government Area
LLS Act	Local Land Services Act 2013
MSC	Muswellbrook Shire Council
NES	Matters of National Significance under the EPBC Act
NPW Act	National Parks & Wildlife Act 1974
OEH	Office of Environment & Heritage (now DPE)
PCT	Plant Community Type
PMST	Protected Matters Search Tool
SAII	Serious and Irreversible Impacts
SEPP	State Environmental Planning Policy
TEC	Threatened Ecological Community

1.0 INTRODUCTION

Updated flora, fauna and habitat studies have been undertaken for a proposed subdivision of Lots 101 & 103 DP1170190 Ironbark Road, Muswellbrook NSW. The investigations were in accordance with the requirements of the *Environmental Planning and Assessment Amendment Act 2017* (EP&A Act 2017), the *Biodiversity Conservation Act 2016* (BC Act 2016) and the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999). The results are presented here in the form of a Flora and Fauna Assessment.

1.1 GENERAL DESCRIPTION OF THE SITE

The 81.23ha subject site (Lots 101 & 103 DP 1170190) had an irregular shape and was located on the south-east edge of Muswellbrook (Figure 1.1). Lot 101 formed the majority of the site with Lot 103 occurring as a narrow north-south orientated band in the middle. The site was situated on undulating terrain with higher ground present to the north and east. The entire subject site had been subject to historic native vegetation clearance and ongoing cattle grazing. Cattle were still present during recent fieldwork. Despite the disturbance areas of clumped and isolated remnant native trees and more recent tree regrowth were present over parts of the subject site. The most common canopy species was *Eucalyptus crebra* (Narrow-leaved Ironbark) with *Eucalyptus moluccana* (Grey Box) present to a lesser extent. The vegetative groundcover was largely composed of derived native grassland. Areas of derived native grassland varied in condition from a high composition of native species to areas containing a higher proportion of introduced species.

An aerial photo of the subject site is shown in Figure 1.2.

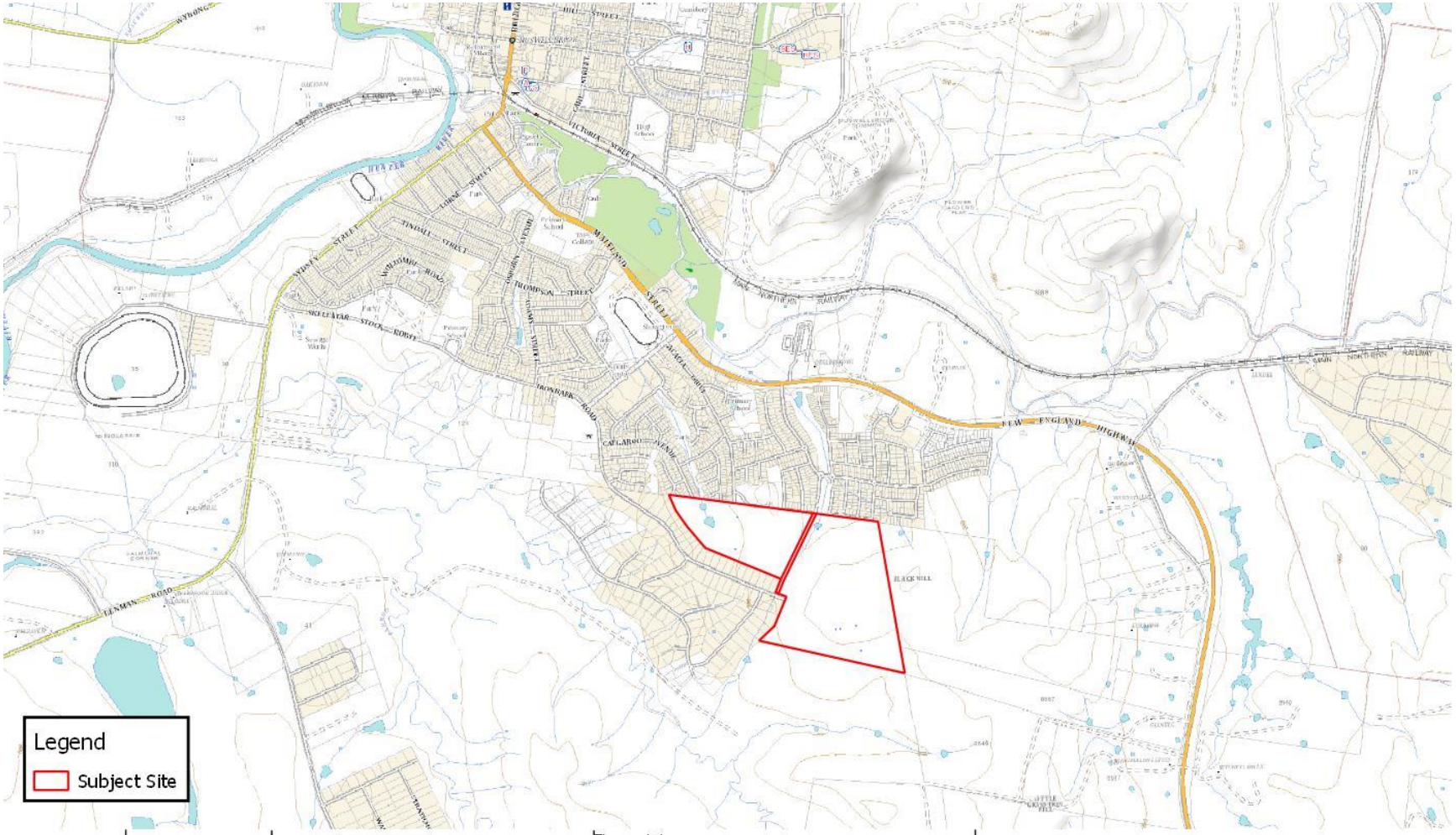
1.2 THE PROPOSAL

It is proposed that Lots 101 & 103 DP1170190 Ironbark Road, Muswellbrook be subdivided. The subdivision will result in the formation of 513 lots. These lots will be composed of 329 General Residential and 127 Duplex lots within areas zoned R1 – General Residential and 57 lots zoned R5 Large Lot Residential under the Muswellbrook LEP. A total of 11.96ha of offset land is zoned C3 – Environment Management. These areas have been established over areas of better-quality vegetation and habitat within the subject site.

Plans of the proposal are shown in Figures 1.3 & 1.4.

1.3 PREVIOUS ECOLOGICAL STUDIES

Past ecological studies have been undertaken for the rezoning within the subject site. These studies included a Seven Part Test on Threatened Flora & Fauna (Wildthing Environmental Consultants, 2012), Targeted Orchid and Habitat Tree Surveys (Wildthing Environmental Consultant, 2015) and an Offset Report (Wildthing Environmental Consultants, 2017).


Legend
Subject Site
Job Ref
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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.
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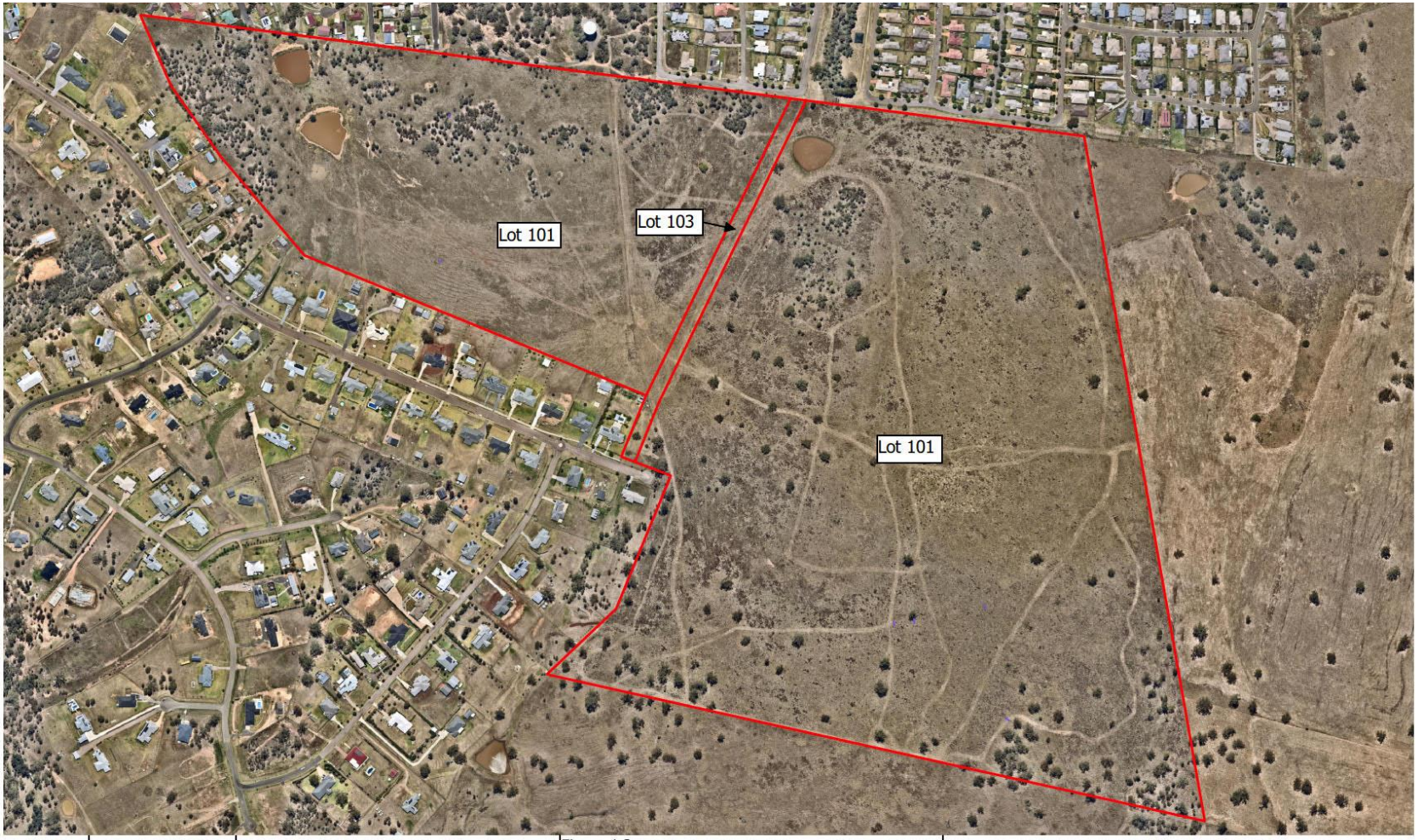
750
1500 m
Map Projection GDA2020 MGA Zone 56
Data Sources: Nearmap (2023),
Location of the Subject Site
Lots 101 & 103 DP 1170190, Ironbark Road
MUSWELLBROOK, NSW
19 February 2024
WILDTHING Environmental Consultants
(a Division of Tattersall Lander Pty Ltd)
ABN 41 003 509 215

Figure 1.1.



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0 100 200 300 m

Map Projection GDA2020 MGA Zone 56

Data Sources: Nearmap (2023),

Figure 1.2

Aerial Photo of Subject Site

Lots 101 & 103 DP1170190 Ironbark Road
MUSWELLBROOK, NSW

19 February 2024

WILDTHING Environmental Consultants
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LAND BUDGET

	Site Area	81.23		
		Area (ha)	%Site	% NDA
	Non Developable			
	Open Space			
	Offset Areas	11.96	14.72%	17.26%
	Subtotal	11.96	14.72%	17.26%
	Total	11.96	14.72%	17.26%
	NDA	69.27	85.28%	100.00%

	Land Use			
	General Residential	29.46	36.26%	42.52%
	Large Residential	23.23	28.60%	33.54%
	Roads	15.80	19.45%	22.80%
	Café	0.09	0.12%	0.14%
	Childcare	0.23	0.28%	0.33%
	Non Credited Open Space	0.47	0.57%	0.67%
	Total	69.27	85.28%	100.00%

Note: Numbers are rounded to two decimal places

Number Lots	513
Lots/NDHa	7.41
Average Lot Size	1,027m²
Potential Duplex Yield	254
Total Yield	640

	Lot Type	Lots	Yield	Avg. Lot Size	% Lot Breakdown
	General Residential	329	329	729m²	64%
	Large Lots	57	57	4,076m²	11%
	Duplex lots	127	254	431m²	25%
	TOTAL	513	640		100%

LIMITATION OF PLAN

- This plan is an illustrative drawing of plan 205116_layout_Rezoning lots sewer_v5.dwg

LEGEND

1. Retained Vegetation/Revegetation
2. Market Garden
3. Childcare
4. Cafe
5. Cluster scale microgrid
6. Potential Affordable Housing
7. Biodiversity Zones
8. Dog Park
9. Waking Trail
10. Bike Trail
11. Retained water bodies
12. BBQ Areas
13. Toilet Blocks
14. Play Equipment
15. Children Bike Track
16. Fitness Station
17. C3 (Enviromental Management Zone)

- Site boundary
- Staging boundary
- Strata titles
- //// C3 within private lot

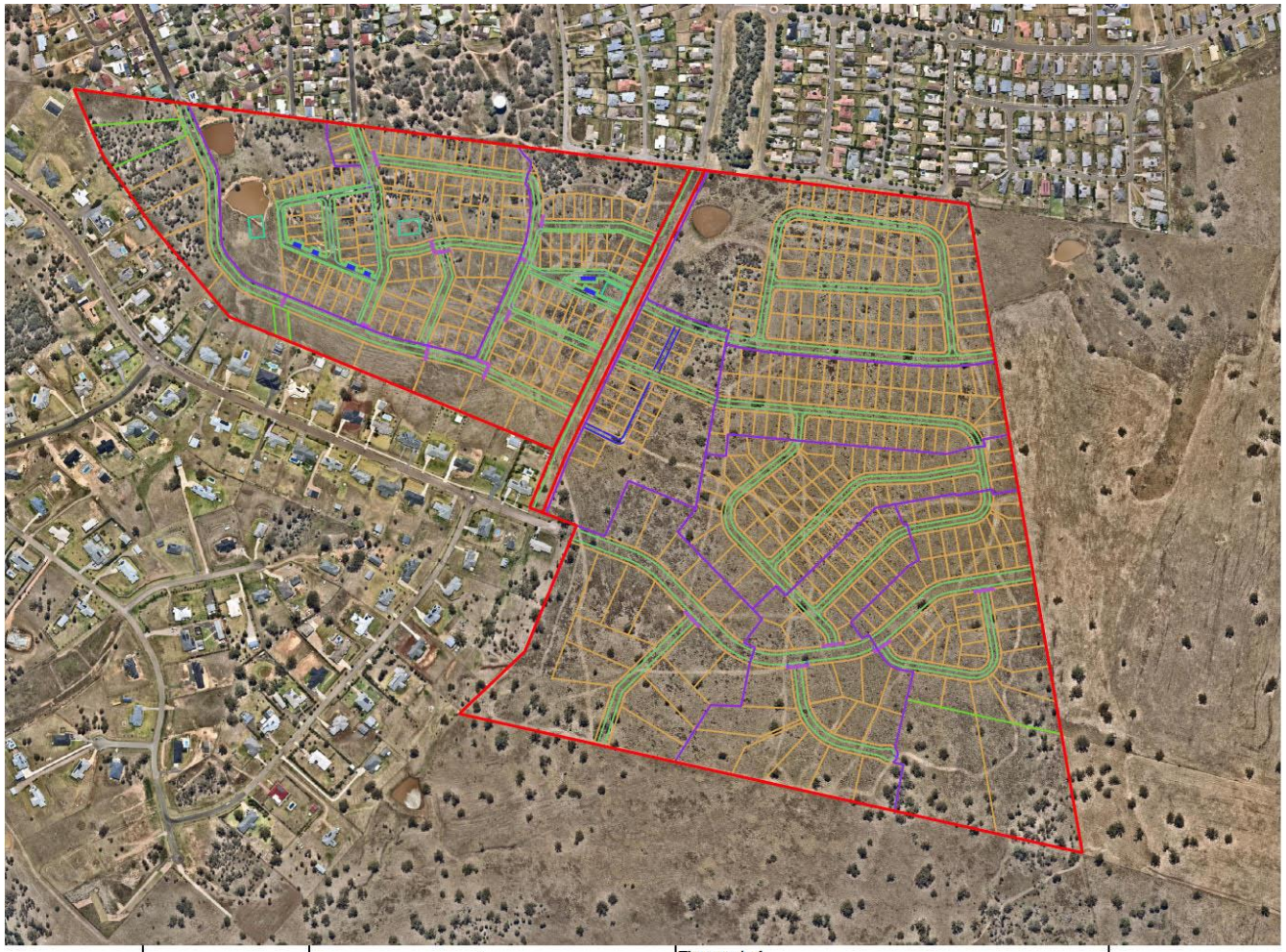
SUBDIVISION PLAN
IRONBARK RD MUSWELLBROOK

DRG NO. 321570 UD ID 01 CAD REV. 7 | REV 7 | DATE 14/02/2024 | DES/DOC LT/AC | AUTH ER

Figure 1.3: Subdivision Plan

spiire | 0 25 50 75 100 125m | SCALE 1:5000@A3

G:\32\321570\000\Urban Design\Plans & Drawings\InDesign\UD ID 01 Concept Plan\UD ID 01 Concept Plan_rev 7.indd



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0 100 200 300 400 m

Map Projection GDA2020 MGA Zone 56

Data Sources: Nearmap (2023),

Figure 1.4

Aerial Photo of Subject Site showing Proposed Subdivision

Lots 101 & 103 DP1170190 Ironbark Road
MUSWELLBROOK, NSW

19 February 2024

WILDTHING Environmental Consultants
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2.0 SUBJECT LAND CONTEXT

The subject land is located within the Sydney Basin Bioregion and Hunter Sub-bioregion (regions gazetted by the Minister, or an Interim Biogeographical Regionalisation of Australia (IBRA Bioregion). The subject land is located within the Muswellbrook Shire Local Government Area (LGA).

2.1 HYDROGEOGRAPHY

The subject land, occurs within the Greater Hunter River Catchment, with the Hunter River flowing through the settlement of Muswellbrook. Two first order streams associated with the three constructed dams were present in the north of the subject site. These streams drained into the Muscle Creek sub catchment. An additional first order stream just entered the southern part of the subject site. This stream is associated with the Ramrod Creek Sub catchment.

3.0 LEGISLATIVE CONTEXT

The following sections detail the legislative frameworks relevant to this report.

3.1 NSW ENVIRONMENTAL PLANNING AND ASSESSMENT AMENDMENT ACT 2017

The assessment of development applications in NSW is regulated under Part 4 or Part 5 of the EP&A Act. Part 1 Section 1.7 of the EP&A Act links proponents to Part 7 of the BC Act for the operation of the EP&A Act in connection with potential impacts to the terrestrial environment. The EP&A Act is also supported by other statutory environmental planning instruments, including State Environmental Planning Policies (SEPPs).

3.2 NSW BIODIVERSITY CONSERVATION ACT 2016

The purpose of the BC Act is "to establish a pathway to avoid, minimise and offset the impacts of proposed development and land use change on biodiversity and to establish a scientific method for assessing the likely impacts on biodiversity values of proposed development and land use change, for calculating measures to offset those impacts and for assessing improvements in biodiversity values".

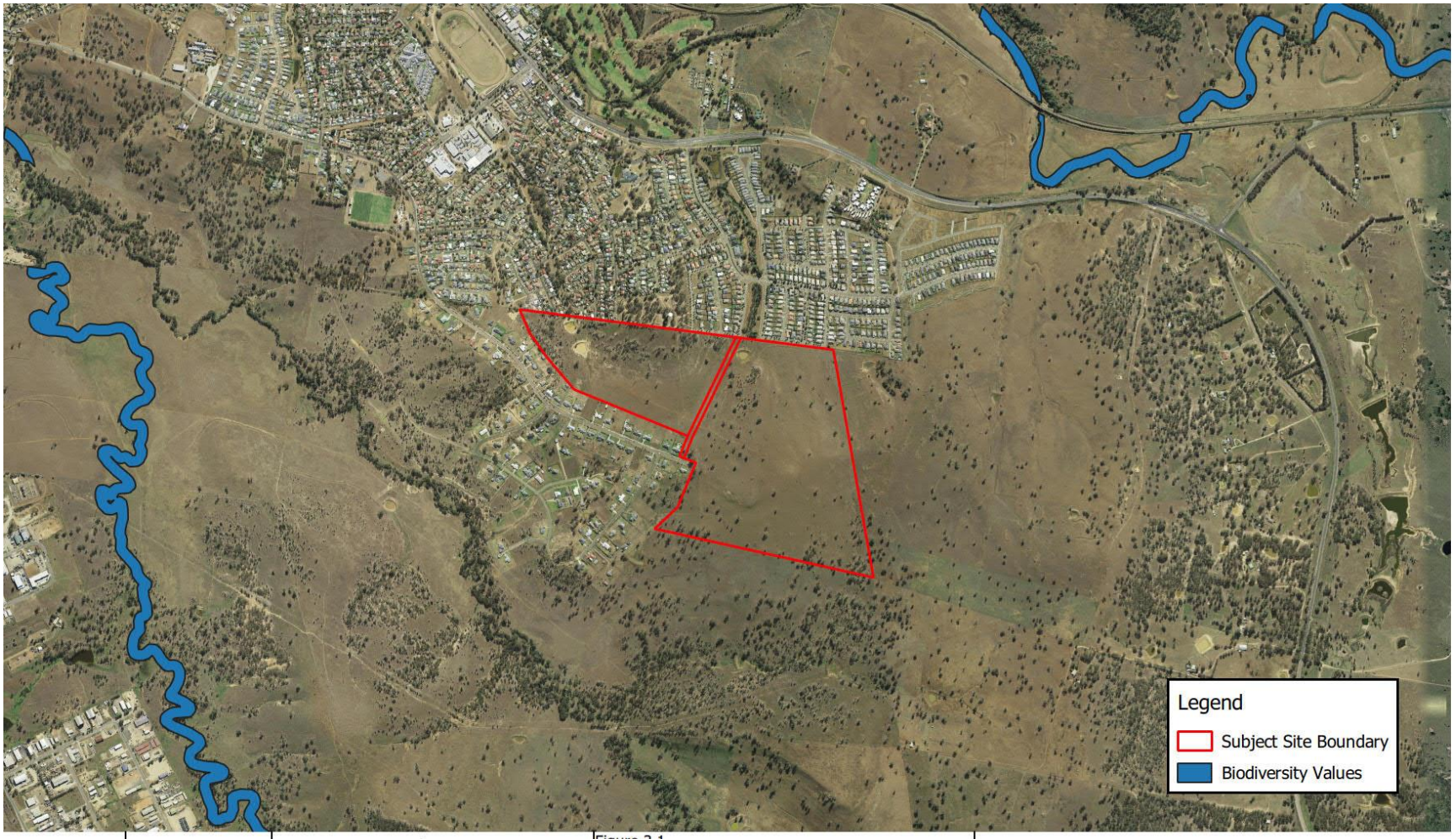
In accordance with the BC Act, the Biodiversity Assessment Method (BAM) and entry into the Biodiversity Offsets Scheme (BOS) is applicable to certain development activities based on specific Preparation of a Biodiversity Development Assessment Report (BDAR) is required for a development application that meets any of the following criteria detailed in Table 3.1.

As the proposed development was not found to comply within any of the criteria it was determined that a BDAR and entry into the BOS threshold would not be applicable for this development. Thus, the survey methodology detailed in the following sections have been undertaken in accordance with the requirements for a standard Assessment of Significance.

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. No candidate SAII entities were found to be present within the subject land thus no obligation for development refusal would be applicable to this proposed development from relevant regulatory bodies.

Table 3.1: Criteria for entry into the Biodiversity Offsets Scheme in relation to the proposed development.

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.	Section 7.0	No declared areas of outstanding biodiversity value were located within or in proximity to the site.
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;	Section 7.0	The five-part test found no significant impact on threatened species, populations or ecological communities listed under Schedules 1 and 2 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);	Section 3.0 Figure 3.1.	The NSW Biodiversity Values Map was consulted on the 20 February 2024. As of this date it was determined that there were no areas of mapped 'Biodiversity Values' near the subject site. An extract of the Biodiversity Values Map has been provided in Figure 3.1.
Development activities that involve clearing of native vegetation that exceeds the Biodiversity Offset Scheme thresholds (BOS thresholds) as determined by the NSW BC regulation.	Section 6.0	The clearing threshold for the subject land is 0.25ha. The impact to native vegetation will exceed 0.25ha.



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0 500 1000 m

Map Projection GDA2020 MGA Zone 56

Data Sources: Nearmap (2024),

Figure 3.1

Biodiversity Values Map

Lots 101 & 103 DP1170190 Ironbark Road
MUSWELLBROOK, NSW

20 February 2024

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

3.3 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.

3.3.1 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.

Within Muswellbrook Shire Council SEPP 2021 applies to land that is not zoned RU1, RU2 or RU3. The subject site is zoned as R1, R5 and C3 therefore it falls under Chapter 4, and has been addressed in Section 8.0 of this report.

3.4 BIOSECURITY ACT 2015

The NSW Biosecurity Act 2015 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).

3.5 COMMONWEALTH ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

The purpose of the 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.

3.6 LICENSING

Fieldwork undertaken by Wildthing Environmental Consultants was carried out under NPWS Scientific Investigation Licence SL100345 and under Animal Care and Ethics Approval: Animal Research Authority Issue by the Department of Primary Industries (Trim File No. 13/251) for Fauna Survey for Biodiversity and Impact Assessment.

4.0 METHODOLOGY

4.1 DESKTOP ASSESSMENT

A site-specific literature and database review was undertaken prior to conducting the field survey and the preparation of this report. A list of the resources reviewed, the date they were accessed and the spatial extent of the search conducted, where relevant, is provided in Table 4.1.

Table 4.1: Desktop Resources

RESOURCE	LAST ACCESS DATE	SPATIAL EXTENT
Biodiversity Values and Landscape Maps		
BioNet Atlas of NSW Wildlife (BioNet) (DPE 2024a)	15 January 2024	10x10km radius of subject land
Commonwealth Protected Matters Search Tool (PMST) (DCCEEW 2024a)	15 January 2024	10x10km radius of subject land
NSW Biodiversity Values Map (DPE 2022b)	20 February 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)	20 February 2024	Entire subject land
NSW Government SEED Mapping (NSW Government 2024)	20 February 2024	Entire subject land
BioNet NSW (Mitchell) Landscapes – Version 3.1 (OEH 2016a)	20 February 2024	Entire subject land
NSW Interim Biogeographic Regions of Australia (IBRA region and sub-regions) – Version 7 (DAWE 2016).	20 February 2024	Entire subject land
Threatened Species and Vegetation Databases		
Commonwealth species profiles and threats database (SPRAT) (DCCEEW 2022a)	February 2024	-
DPE Profiles of threatened species, population, and ecological communities (DPIE 2022d)	February 2024	-
DPE BioNet vegetation classification database (DPIE 2022c)	February 2024	-
Reports		
Seven Part Test on Threatened Flora & Fauna for a proposed Rezoning at Lots 101 & 103 DP 1170190 Ironbark Road, Muswellbrook NSW. (Wildthing Environmental Consultants, 2012).		
Wildthing Environmental Consultants (2015). Targeted threatened orchid searches - Lots 101 & 103 DP 1170190 Ironbark Road, Muswellbrook NSW. (Wildthing Environmental Consultants, 2015a).		
Addendum Letter – Seven Part Test on the presence of *Diuris tricolor* (Pine Donkey Orchid). Letter Report, 22 December 2015. (Wildthing Environmental Consultants, 2015b).		
Plans		
Subdivision Plan. Ironbark Road Muswellbrook (Spiire, 2024)	November 2023	Study area

4.2 FIELD ASSESSMENT

Fieldwork was undertaken in November 2023. A summary of the time spent on site during fieldwork and the prevailing weather conditions at the time is contained in Table 4.2.

Table 4.2: Survey Dates, Times and Weather Conditions

DATE	TIME	SURVEY EFFORT (PERSON HOURS)	ACTIVITY	WEATHER
Monday 29/01/2024	0830 - 1230	4h (1 person)	General site inspection Vegetation survey Diurnal fauna survey Updated Tree survey Incidental observations	2/8 Cloud, 22.8°C, 76% relative humidity, Wind Calm.

A detailed methodology for the surveys listed within Table 4.2 above have been described in the following Sections 4.2.1 – 4.2.5:

4.2.1 VEGETATION ASSESSMENT

Previous ecological studies within the subject site were referred to for the vegetation assessment (Wildthing Environmental Consultants, 2012, 2015 & 2017. The initial determination of the basic vegetation community boundaries was undertaken through the review of a recent aerial photo (Nearmap, 2023) covering the subject site. Following this, a ground inspection was conducted to ascertain if there were any changes to the vegetation.

4.2.2 DIURNAL FAUNA SURVEY

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

- dedicated searches for avifauna;
- dedicated searches for herpetofauna;
- checks for obvious nests of raptors;
- checking trees (particularly smooth-barked species) for scratches consistent with arboreal mammals.

4.2.3 GENERAL HABITAT FOR NATIVE SPECIES

From the vegetation appraisal, diurnal fauna survey and a general inspection of the site and surrounding areas, a subjective assessment of the general habitat value of this site was made. Considered in this assessment were:

- occurrence of that habitat type in the general vicinity;
- degree of disturbance and degradation;
- area occupied by that habitat on site;

- continuity with similar habitat adjacent to the site, or connection with similar habitat off site by way of corridors; and
- structural and floral diversity.

4.2.4 TREE SURVEY

A hollow-bearing Tree survey was conducted within the subject site in September 2025 (Wildthing Environmental Consultants, 2015a). Hollow-bearing trees are a habitat resource utilised by a variety of native avifaunal and mammalian species. This resource is usually a limiting factor in the occurrence of hollow-dependent species on a site, due to the time taken for hollows to form in trees. The status of these tree species was checked during fieldwork completed on 29 January 2024 and comparison with recent aerial photography (Nearmap, 2023).

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.

4.2.5 HABITAT FOR SIGNIFICANT SPECIES

The subject areas were evaluated as potential habitat for each of the threatened species reported on the BioNet (DPE, 2024a) and PMST (DCCEEW, 2024) databases from within 10km of the site. This evaluation was based on home range, feeding, roosting, breeding, movement patterns and corridor requirements for fauna and hydrology, soil types, aspect and structural formation for flora species. The list of threatened species recorded within these databases is provided within Table 4.3 and an assessment of the likelihood of occurrence of these threatened species within the subject land is provided in Table 5.3.

4.3 SIGNIFICANT SPECIES

The following threatened species listed in Table 4.3 have been recorded on the BioNet (DPE, 2024a) and PMST (DCCEEW, 2024a) Databases as occurring within 10km of the subject land. Species marked with an asterisk (*) are listed on the DCCEEW Database as having habitat likely to occur within 10km of the subject land.

Table 4.3: Threatened species, endangered populations and ecological communities considered.

Scientific Name	Common Name	BC Act 2016	EPBC Act 1999
Flora Species			
Diuris tricolor	Pine Donkey Orchid	V	
Prasophyllum petilum	Tarengo Leek Orchid	E1	E
**Euphrasia arguta*			CE
**Pterostylis gibbosa*	Illawarra Greenhood	E1	E
**Dichanthium setosum*	Bluegrass	V	V
**Cynanchum elegans*	White-flowered Wax Plant	E1	E
Vincetoxicum forsteri (*Tylophora linearis*)		V	E
**Eucalyptus glaucina*	Slaty Red Gum	V	V
**Rhodamnia rubescens*	Scrub Turpentine	E4A	CE
**Picris evae*	Hawkweed	V	V
**Ozothamnus tesselatus*		V	V
**Pomaderris brunnea*	Brown Pomaderris	E1	V
**Swainsona murrayana*	Slender Darling-pea	V	V
**Lepidium aschersonii*	Spiny Peppercress	V	V
**Androcalva procumbens (Commersonia procumbens)*		V	V
**Thesium australe*	Austral Toadflax	V	V
Amphibians			
**Litoria aurea*	Green & Golden Bell Frog	E1	V
Litoria booroolongensis	Booroolong frog	E1	E
Reptiles			
**Aprasia parapulchella*	Pink-tailed Worm-lizard	V	V
**Delma impar*	Striped Legless Lizard	E	E
Birds			
**Calidris ferruginea*	Curlew Sandpiper	E1	CE & M
Gallinago hardwickii	Latham's Snipe		V & M
Tringa nebularia	Common Greenshank		E
**Rostratula australis*	Australian Painted Snipe	E1	E
Anseranas semipalmata	Magpie Goose	V	
Stictonetta naevosa	Freckled Duck	V	
Ephippiorhynchus asiaticus	Black-necked		
**Melanodryas cucullata cucullata*	Hooded Robin (south-eastern)	E	E
**Calyptorhynchus lathami lathami*	South-eastern Glossy Black-Cockatoo	V	
**Callocephalon fimbriatum*	Gang Gang Cockatoo	V	E
**Lathamus discolor*	Swift Parrot	E1	CE
**Neophema chrysostoma*	Blue-winged Parrot	V	V
Neophema pulchella	Turquoise Parrot	V	
**Polytelis swainsonii*	Superb Parrot	V	V
Glossopsitta pusilla	Little Lorikeet	V	
**Aphelocephala leucopsis*	Southern Whiteface	V	V
**Hirundapus caudacutus*	White-throated Needletail		V & M
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	
Petroica boodang	Scarlet Robin	V	
Petroica phoenicea	Flame Robin	V	
**Climacteris picumnus victoriae*	Brown Treecreeper	V	
**Stagonopleura guttata*	Diamond Firetail	V	
Pomatostomus temporalis subsp. *temporalis*	Grey-crowned Babbler	V	
Chthonicola sagittata	Speckled Warbler	V	
**Anthochaera phrygia*	Regent Honeyeater	E4A	CE
**Grantiella picta*	Painted Honeyeater	V	V

Scientific Name	Common Name	BC Act 2016	EPBC Act 1999
Daphoenositta chrysoptera	Varied Sittella	V	
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	V	
Circus assimilis	Spotted Harrier	V	
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	M
Hieraaetus morphnoides	Little Eagle	V	
Lophoictinia isura	Square-tailed Kite	V	
**Falco hypoleucos*	Grey Falcon	E1	V
Falco subniger	Black Falcon	V	
Ninox strenua	Powerful Owl	V	
Tyto novaehollandiae	Masked Owl	V	
Tyto tenebricosa	Sooty Owl	V	
Mammals			
**Dasyurus maculatus*	Spotted-tailed Quoll	V	E
Phascogale tapoatafa	Brush-tailed Phascogale	V	
**Phascolarctos cinereus*	Koala	E1	E
**Petrogale penicillata*	Brush-tailed Rock-wallaby	E	V
**Notamacropus parma*	Parma Wallaby	V	
**Petaurus australis*	Yellow-bellied Glider	V	
Petaurus norfolcensis	Squirrel Glider	V	
**Petauroides volans*	Greater Glider	E	E
Pteropus poliocephalus	Grey-headed Flying-fox	V	V
**Pseudomys novaehollandiae*	New Holland Mouse		V
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V	
Micronomus norfolkensis	Eastern Freetail-bat	V	
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V	
Miniopterus australis	Little Bentwing-bat	V	
Miniopterus orianae oceanensis	Large Bentwing-bat	V	
Myotis macropus	Southern Myotis	V	
**Nyctophilus corbeni*	Corben's Long-eared Bat	V	V
Scoteanax rueppellii	Greater Broad-nosed Bat	V	
**Chalinolobus dwyeri*	Large-eared Pied Bat	V	V
Vespadelus troughtoni	Eastern Cave Bat	V	
Endangered Populations			
Acacia pendula (Weeping Myall) – population in the Hunter Catchment		E2	
Cymbidium canaliculatum population in the Hunter Catchment		E2	
Eucalyptus camaldulensis (River Red Gum) – population in the Hunter Catchment		E2	
Diuris tricolor (Pine Donkey Orchid) - population in the Muswellbrook local government area			
Endangered Ecological Communities			
Central Hunter Grey Box - Ironbark Woodland in the NSW North Coast and Sydney Basin Bioregions		E3	CE
Central Hunter Ironbark-Spotted Gum-Grey Box Forest in the New South Wales North Coast and Sydney Basin Bioregions		E3	CE
*Central Hunter Valley eucalypt forest and woodland			E3
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and Southeast Corner Bioregions		E3	E
Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		E3	
*Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions			E
Hunter Floodplain Red Gum Woodland in the NSW North Coast and Sydney Basin Bioregions		E3	
Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions		E3	
Hunter Valley Footslopes Slaty Gum Woodland in the Sydney Basin Bioregion		V2	CE

Scientific Name	Common Name	BC Act 2016	EPBC Act 1999
Hunter Valley Vine Thicket in the NSW North Coast and Sydney Basin Bioregions		E3	
Hunter Valley Weeping Myall Woodland in the Sydney Basin Bioregion		E4B	CE
*Hunter Valley Weeping Myall (Acacia pendula) Woodland			CE
*Weeping Myall Woodlands			E
Kurri Sand Swamp Woodland in the Sydney Basin Bioregion		E3	
Lowland Rainforest in the NSW North Coast and Sydney Basin Bioregions		E3	
*Lowland Rainforest of Subtropical Australia			CE
Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions		E3	
Lower Hunter Valley Dry Rainforest in the Sydney Basin and NSW North Coast Bioregions		V2	
*Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland			CE
*River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria			CE
River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions		E3	
Sydney Freshwater Wetlands in the Sydney Basin Bioregion		E3	
Warkworth Sands Woodland in the Sydney Basin Bioregion		E3	CE
*Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions			E
*White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland			CE

E1/E=Endangered Species E2=Endangered Population E3=Endangered Ecological Community
V=Vulnerable Species V2= Vulnerable Ecological Community E4A/E4B/CE=Critically Endangered
M=Migratory Species

5.0 RESULTS

5.1 FLORA ASSEMBLAGES

The entire subject site had been subject to historic native vegetation clearance and ongoing cattle grazing. Cattle were still present within the subject site during recent fieldwork. Despite the disturbance areas of remnant native trees and associated regrowth were present over parts of the subject site. The larger remaining area consisted of derived native grassland with isolated remnant trees. This area of derived grassland was present in a number of condition states from good to poor.

Vegetation within the subject land has been assessed as aligning with the NSW BioNet Vegetation Classification Plant Community Types (PCTs). One PCT; PCT 3431 - Central Hunter Ironbark Grassy Woodland was identified as occurring within the subject site. Additionally, areas of aquatic vegetation were present around the three constructed dams.

Details of the vegetation assemblages within the subject site shown below in Tables 5.1 & 5.2. A vegetation map of the subject site is shown in Figure 5.1. A list of flora species recorded within the subject site is contained in Appendix A.

Table 5.1: 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
Equivalent Old PCT ID & Name	PCT 1691 - Narrow-leaved Ironbark - Grey Box grassy woodland of the central and upper Hunter
Equivalent Old Biometric Name	HU905 Narrow-leaved Ironbark – Grey Box grassy woodland of the Central and Upper Hunter
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 site (ha)	PCT 3431 Central Hunter Ironbark Grassy Woodland – (17.34ha) PCT 3431 Central Hunter Ironbark Grassy Woodland (Derived Grassland)– (63.11)
Description of PCT 3442 within the subject land	PCT 3431 - Central Hunter Ironbark Grassy Woodland was present within the subject site in either a woodland structure or derived grassland. *Eucalyptus crebra* (Narrow-leaved Ironbark) was the most common canopy species in the west and northern parts of the subject land. *Eucalyptus moluccana* (Grey Box) was present to a lesser extent and was more commonly recorded in the far south-east. Another canopy species observed was *Eucalyptus blakelyi* (Blakely's Red Gum) which was observed in the south. *Brachychiton populneus* (Kurrajong) was a mid-storey species which was noted over the entire subject land. 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).

PCT 3431 - Central Hunter Ironbark Grassy Woodland	
	Native grasses were common groundcovers within both woodland and derived grassland areas. Common native grasses were *Aristida ramosa* (Three-awn Grass), *Bothriochloa decipiens* var. *decipiens* (Red Leg Grass), *Cymbopogon refractus* (Barbed Wire Grass), *Chloris ventricosa* (Tall Windmill Grass), *Austrostipa verticillata* (Slender Bamboo Grass), *Sporobolus creber* (Rats Tail Grass), *Rytidosperma fulvum* (Wallaby Grass), *Cynodon dactylon* (Couch), *Eragrostis leptostachya* (Paddock Lovegrass) and *Microlaena stipoides* (Weeping Meadow Grass). Other common native ground covers tended to be more associated with remnant areas of woodland and included *Chrysocephalum apiculatum* (Common Everlasting), *Sida corrugata* (Corrugated Sida), *Glycine tabacina*, *Dichondra repens* (Kidneyweed), *Einadia hastata* (Berry Saltbush), *Eremophila debilis* (Amulla), *Vittadinia cuneata* (Fuzzweed), *Commelina cyanea* (Scurvy Weed), *Mentha satureioides* (Native Mint), *Rumex brownii* (Slender Dock), *Dianella revoluta* (Blueberry Lily), *Erodium crinitum* (Blue Storksbill) and *Cheilanthes sieberi* subsp. *sieberi* (Mulga Fern). Common introduced species were grasses such as *Paspalum dilatatum* (Paspalum), and *Lolium perenne* (Perennial Ryegrass). Other common introduced species included *Senecio madagascariensis* (Fireweed), *Sida rhombifolia* (Paddy's Lucerne), *Plantago lanceolata* (Plantago), *Gomphocarpus fruticosus* (Narrow-leaved Cottonbush), *Galenia pubescens* (Galenia), *Verbena bonariensis* (Purple-top Verbena) and *Lycium ferocissimum* (African Boxthorn).
Condition States	Present as woodland containing remnant and regrowth trees and derived grassland with varying condition states from high weed proportion to native species dominant.
BC Act Status	Consistent with the Endangered Ecological Community - Central Hunter Grey Box-Ironbark Woodland in the New South Wales North Coast and Sydney Basin Bioregions
EPBC Act Status	Better quality areas are likely to be consistent with the Critically Endangered Ecological Community - Central Hunter Valley eucalypt forest and woodland

A Photo examples of PCT 3431 within the subject land is shown in Plates 5.1 to 5.9.

PCT 3431 - Central Hunter Ironbark Grassy Woodland

Plate 5.1 PCT 3431 - Central Hunter Ironbark Grassy Woodland (far east of site) (29/01/2024).

Plate 5.2 PCT 3431 - Central Hunter Ironbark Grassy Woodland (far south-west) (29/01/2024).

PCT 3431 - Central Hunter Ironbark Grassy Woodland

Plate 5.3 PCT 3431 - Central Hunter Ironbark Grassy Woodland (far south-east) (29/01/2024).

Plate 5.4 PCT 3431 - Central Hunter Ironbark Grassy Woodland (regrowth trees) (north-east) (29/01/2024).

PCT 3431 - Central Hunter Ironbark Grassy Woodland

Plate 5.5 PCT 3431 - Central Hunter Ironbark Grassy Woodland (younger regrowth trees and remnant trees) (central area of subject land) (29/01/2024).

Plate 5.6 PCT 3431 - Central Hunter Ironbark Grassy Woodland (derived grassland) (far east) (29/01/2024).

PCT 3431 - Central Hunter Ironbark Grassy Woodland

Plate 5.7 PCT 3431 - Central Hunter Ironbark Grassy Woodland (derived grassland) (central-east) (29/01/2024).

PCT 3431 - Central Hunter Ironbark Grassy Woodland

Plate 5.8 PCT 3431 - Central Hunter Ironbark Grassy Woodland (derived grassland) (centre east) (29/01/2024).

Plate 5.9 PCT 3431 - Central Hunter Ironbark Grassy Woodland (derived grassland) (centre east) (29/01/2024).

Table 5.2: Aquatic Vegetation – Constructed Dams

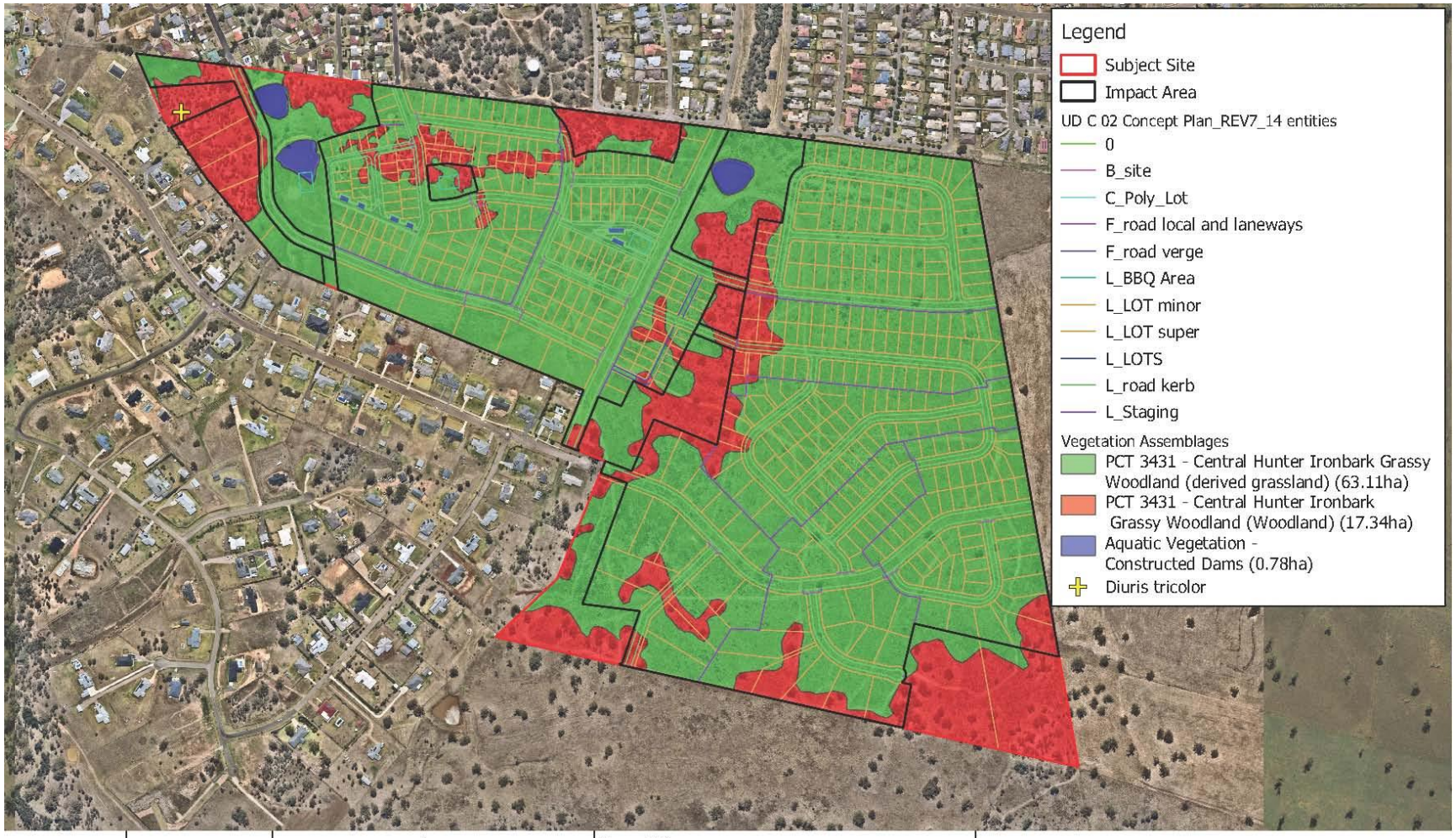
Aquatic Vegetation – Constructed Dams	
PCT ID	NA
PCT name	NA
Equivalent Old PCT ID & Name	NA
Equivalent Old Biometric Name	NA
Vegetation Formation	NA
Vegetation Class	NA
Per cent cleared value (%)	NA
Extent within subject land (ha)	
Description of PCT 3442 within the subject land	Aquatic vegetation associated with the constructed dams was *Juncus usitatus* (Common Reed).
Condition States	
BC Act Status	Not listed
EPBC Act Status	Not listed
A Photo examples of Aquatic Vegetation within the subject land is shown in Plates 5.10 & 5.11.	

Aquatic Vegetation – Constructed Dams

Plate 5.10 – Constructed Dam in far west of the subject site (29/01/2024).

Aquatic Vegetation – Constructed Dams

Plate 5.11 – Constructed Dam in far north-west of the subject site (29/01/2024).



Job Ref	12832
A4 Scale	1:7,500

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarentee 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.

0 100 200 300 m

Map Projection GDA2020 MGA Zone 56

Data Sources: Nearmap (2023),

Figure 5.1

Vegetation within Subject Site

Lots 101 & 103 DP1170190 Ironbark Road
MUSWELLBROOK, NSW

22 February 2024

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

5.1.1 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, results of the database search conducted for TECs are shown within Table 4.3.

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 in varying condition states. Smaller areas were composed of more concentrated remnant trees and regrowth and had a woodland structure. Areas of better-quality Central Hunter Grey Box – Ironbark Woodland have been incorporated in to the areas zoned C3 – Environment Management under the Muswellbrook LEP and will be protected.

Areas of better quality PCT 3431 Central Hunter Ironbark Grassy Woodland within the subject site were also likely to be consistent with the Nationally Listed EPBC Act 1999 Critically Endangered Community (CEEC) Central Hunter Valley Eucalypt Forest and Woodland. Under the National Legislation (EPBC Act 1999), Approved Conservation Advice for Critically Endangered Community (CEEC) Central Hunter Valley Eucalypt Forest and Woodland (DoEE 2016), derived native grassland and shrublands are not included in the Critically Endangered Community Central Hunter Valley Eucalypt Forest and Woodland CEEC. The exceptions are where there is a gap, in or at the edge of a patch; or connecting two patches across a short distance (i.e., 30 metres). The majority of PCT 3431 within impacted areas consisted largely of derived grassland.

Impacts to the Nationally listed TEC have been addressed within Section 6.0 and 10.0 of this report.

5.1.2 ENDANGERED POPULATIONS

Four Endangered Populations are listed in the local area:

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

One specimen of *Diuris tricolor* (Pine Donkey Orchid) was recorded within the far north-west of the subject land as a result of targeted orchid surveys conducted in September 2015 (Wildthing Environmental Consultants, 2015a) (Figure 5.1) (Plate 5.12) . The location of this individual threatened orchid and surrounding native vegetation has been protected by incorporating the area Zoned C3 – Environment Management under the Muswellbrook LEP and will be protected.

No other Endangered Populations were recorded within the subject site. *Cymbidium canaliculatum* has been previously recorded within a tree 80m to the south of the subject land nearby in 2011 (Wildthing Environmental Consultants, 2011).

Plate 12: Specimen of *Diuris tricolor* (Pine Donkey Orchid) recorded in far west of subject site (29/09/2015).

5.1.3 THREATENED AND RARE FLORA SPECIES

Sixteen threatened plant species have been recorded within 10km of the subject land according to the BioNet database (DPE, 2024) or are considered to have suitable habitat on the PMST database. The results of the database search conducted for threatened flora species is shown within Table 4.3.

One threatened flora species, *Diuris tricolor* (Pine Donkey Orchid) was recorded within the far north-west of the subject land as a result of targeted orchid surveys conducted in September 2015 (Wildthing Environmental Consultants, 2015a) (Figure 5.1) (Plate 5.12). As this species is also listed as an Endangered Population the findings of this species have been addressed in Section 5.1.2. An assessment of this species under the BC Act 2016 has been undertaken in Section 7.0.

No additional threatened flora species were recorded within the subject site. The impact of the proposal on threatened flora species has been addressed in Section 7.0 of this report.

5.1.4 PRIORITY WEEDS AND WEEDS OF STATE AND NATIONAL SIGNIFICANCE

Three priority weed species listed under the Biosecurity Act 2015 were identified on site and are listed below in Table 5.3. The site lies within the Hunter Regional Weed Committee (HRWC).

Table 5.3: Priority Weed species found within the subject land.

WEED SPECIES	LEGAL REQUIREMENTS	ADDITIONAL SIGNIFICANCE
Carthamus lanatus Saffron Thistle	General Biosecurity Duty	
Senecio madagascariensis Fireweed	General Biosecurity Duty Regional Recommended Measure	N
Lycium ferocissimum African Boxthorn	General Biosecurity Duty Regional Recommended Measure	N
Opuntia stricta Prickly Pear	General Biosecurity Duty Prohibition on dealings Regional Recommended Measure	
Heliotropium amplexicaule Blue Heliotrope	General Biosecurity Duty Regional Recommended Measure (Hunter)	
Cinnamomum camphora Camphor Laurel	General Biosecurity Duty Regional Recommended Measure	
Olea europaea subsp. cuspidata African Olive	General Biosecurity Duty Regional Recommended Measure	T
Galenia pubescens Galenia	General Biosecurity Duty Regional Recommended Measure (Hunter)	

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.

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.

Biosecurity Zone - Within the Biosecurity Zone this weed must be eradicated where practicable, or as much of the weed destroyed as practicable, and any remaining weed suppressed. The local control authority must be notified of any new infestations of this weed within the Biosecurity Zone

Control Order - owners and occupiers must notify the local control authority for the area if the weed is part of a new infestation on the land, destroy all specimens are destroyed; and keep the land free of this weed.

It is recommended that priority and other invasive weeds are controlled as part of routine asset maintenance.

5.2 HABITAT APPRASIAL

5.2.1 HABITAT DESCRIPTION AND DISTRIBUTION IN THE VICINITY

The vegetation and landforms present within the subject land offer potential habitat for a number of native fauna species. The broad habitat types within the subject land consisted of Open Woodland, derived grassland and Aquatic – Constructed Dam.

Open Woodland

Open Woodland would provide suitable habitat opportunities for a variety of species. Frugivorous, nectivorous, granivorous and insectivorous birds and microchiropteran bat species would all find potential foraging resources within this complex. Hollow-bearing trees would provide nesting and roosting sites for a variety of avifauna and other hollow dependant species such as arboreal mammals and tree-roosting bats. The presence of flowering myrtaceous species would offer potential seasonal foraging habitat for Flying Foxes. Hunting opportunities exist for birds of prey. Such habitat is suitable for terrestrial species including small and medium sized mammals, macropods and reptiles.

Derived Grassland

Derived Grassland provides habitat for a number of avifauna species, including predominantly terrestrial species preferring open spaces, seed eating birds and several birds of prey, which may hunt over this area in search of potential prey species. Macropods may also frequent such areas whilst grazing. Some species of bats would also forage over this cleared area for insects. The scarcity of trees and shrubs along with the close proximity of a road often limits the value of such areas for many species, particularly some reptiles, small mammals and birds which are vulnerable to predation in open spaces.

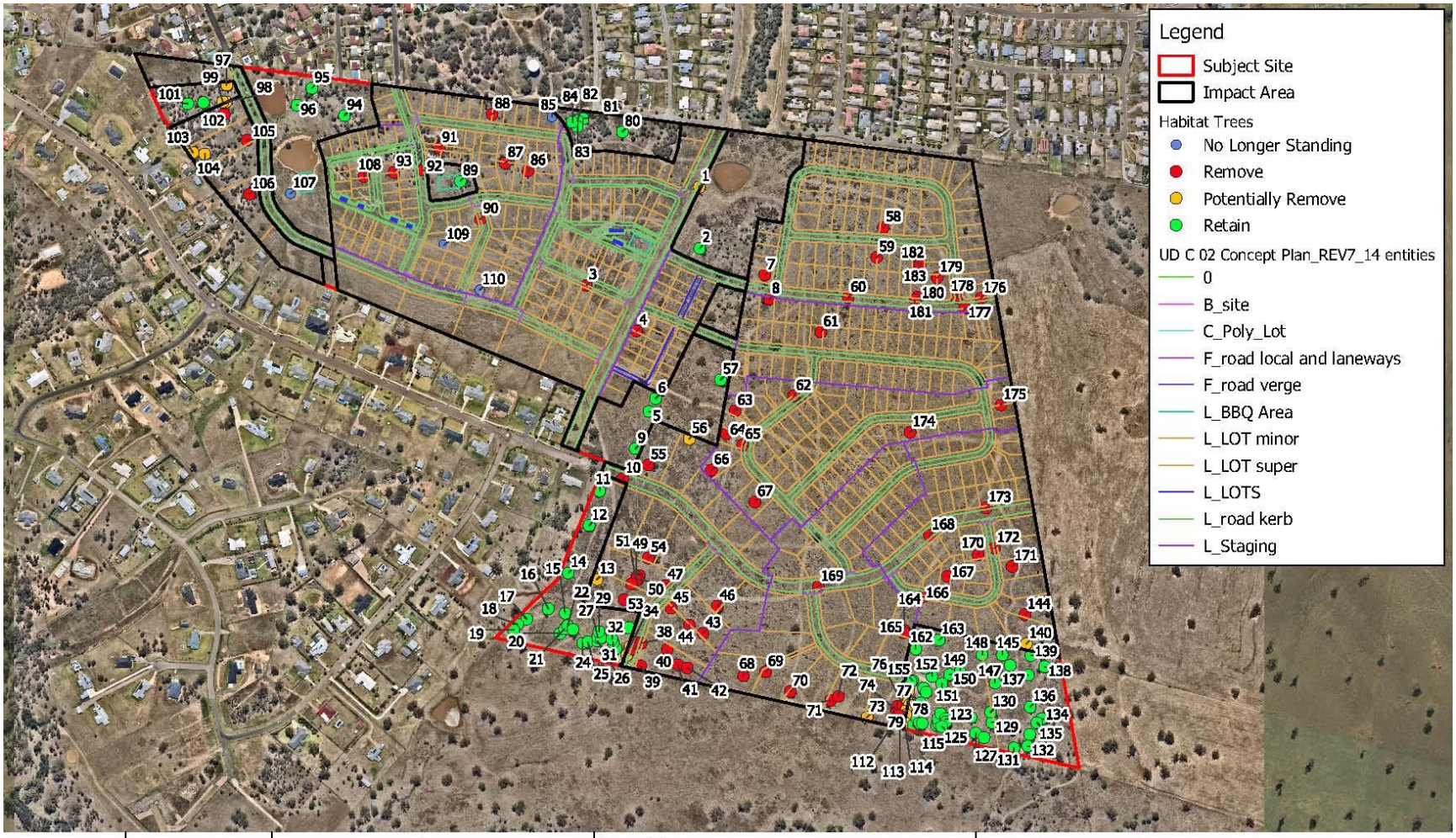
Aquatic Habitat Dam

The three constructed dams and associated ephemeral drainage lines would provide some suitable habitat for a range of frog, reptile, mammal and some waterbird species. This area would also act as a water source for other native animals such as macropods and offer preferred hunting habitat for microchiropteran bats such as *Myotis macropus* (Southern Myotis) that prefer to hunt above or around water bodies.

5.2.2 TREE SURVEY

A total of 183 hollow-bearing trees were recorded within the subject land during targeted surveys in 2015 (Wildthing Environmental Consultants, 2015). Through comparing recent aerial photos (Nearmap, 2023) in together with fieldwork undertaken in January 2024 it was found that four (4) of these trees were no longer present (Numbers 84, 107, 109 & 110). The current number of hollow-bearing trees now stands at 179.

It is recommended that trees particularly hollow-bearing trees be retained within the subject site wherever possible. Details of each of the original 183 hollow-bearing tree including height, diameter at breast height (DBH), coordinates, fauna habitat attributes (hollows) and the future status (with remain in-situ or be removed) is shown in Appendix B. The location of the hollow-bearing trees within the subject site is shown in Figure 5.2.



Job Ref	12832
A4 Scale	1:7,500

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarentee is given that the information pretrayed 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.

0 100 200 300 m

Map Projection GDA2020 MGA Zone 56

Data Sources: Nearmap (2023),

Figure 5.2

Surveyed Habitat Trees

Lots 101 & 103 DP1170190 Ironbark Road
MUSWELLBROOK, NSW

22 February 2024

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

5.3 HABITAT FOR SIGNIFICANT SPECIES

An assessment of habitat attributes on site has been undertaken for the significant species listed in Table 4.3. The results of the assessment using definitions shown in Table 5.4 are displayed in Table 5.5. Threatened species identified in this assessment as having potential habitat available on site have been considered further in Section 7.0 of this report.

Table 5.4: Definitions of likelihood of occurrence criteria.

Likelihood of Occurrence	Threatened Fauna	Threatened Flora
Unlikely	Suitable habitat is absent from the study area and/or the study area is outside of the species known distribution	
Low	• The species has not been recorded in the locality (10km) within the last five years; and/or • Although suitable habitat is present in the study area the suitable habitat is in a highly modified, limited or degraded state; and/or • This species may be an occasional visitor, but habitat similar or of higher quality is widely distributed in the local area.	• The species has not been recorded in the locality (10km) within the last five years, and/or • Although suitable habitat is present in the study area the suitable habitat is in a highly modified or degraded state
Moderate	• The species has been recorded in the locality (10km) within the last five years; and/or • It is unlikely to be dependent on habitat within the study area (i.e., for breeding or important life cycle periods) or to maintain a permanent resident population. However, the species may seasonally, opportunistically or occasionally use resources within the study area; and/or • Although suitable habitat is present in the study area the suitable habitat is in a moderately modified, limited or degraded state This category includes fauna species that were targeted by seasonal surveys and were not recorded, wide ranging species which may fly-over' the site, regardless of the habitat types present and generalist species with non-specific habitat requirements	• The species has been recorded in the locality (10km) within the last five years; and/or. • Although potential habitat is present in the study area the suitable habitat is in a moderately modified or degraded state. This category includes flora species that were targeted by seasonal surveys and were not recorded.
High	• The species has been recorded in the locality (10km) within the last five years; and/or • It is highly likely that the species inhabits the study area and is dependent on identified suitable habitat (i.e., for breeding or important life cycle periods) and is likely to maintain a resident population. This includes species that are known to visit the study area during regular seasonal movements or migration.	• The species has been recorded in the locality (10km) within the last five years; and/or • It is highly likely to inhabit the study area and is dependent on identified suitable habitat.
Known	The species was observed in the study area during the current survey and/or was recorded during a survey conducted on the site during the last 5 years.	

Table 5.5: Habitat Assessment for Significant Species (Oceanic fauna have been removed from assessment).

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SUBJECT SITE
	BC Act 2016	EPBC Act 1999	SAII		
FLORA					
Diuris tricolor Pine Donkey Orchid	V		No	Sporadically distributed on the western slopes of NSW, extending from south of Narrandera all the way to the north of NSW. Localities in the south include several sites west of Wagga Wagga, Dubbo in the Central West and Pilliga National in the north. The population in the Muswellbrook LGA is at the eastern limit of the geographic range of the species. Grows in sclerophyll forest among grass with native Cypress Pine (*Callitris* spp.). It is found in sandy soils, either on flats or small rises. Flowers from September to November.	**Recorded within the far east of the subject site.** Habitat for this orchid species occurs within better quality areas of native ground cover.
Prasophyllum petilum	E1	E	Yes	Found in grasslands and grassy woodlands. It has been recorded at Hall, Boorowa, Ilford, Delegate, near Queanbeyan and Muswellbrook.	**Low** Habitat for this orchid species was considered to occur within better quality areas of native ground cover.
Euphrasia arguta		CE	Yes	Historic records note habitats in the open forest country around Bathurst in sub humid places, on the grassy country near Bathurst, and in meadows near rivers.	**Unlikely** Suitable habitat was absent. No local records.
Pterostylis gibbosa Illawarra Greenhood	E1	E	No	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.	**Low** Marginal habitat was present. No nearby records.
**Dichanthium setosum* Blue Grass	V	V	No	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.	**Low** Marginal habitat was present. No nearby records.
Cynanchum elegans White-flowered Wax Plant	E1	E	No	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** No suitable habitat was present.
Vincetoxicum forsteri (Tylophora linearis)	V	E	No	Occurs from southern Queensland into central NSW, as far south near Temora with the majority of records occurring in the central western region. Grows in dry scrub and open forest.	**Low** Marginal habitat was present.
**Eucalyptus glaucina* Slaty Red Gum	V	V	No	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** Suitable habitat was present.
Rhodamnia rubescens Scrub Turpentine	E4A		Yes	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Found in littoral,	**Unlikely** No suitable habitat was present.

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SUBJECT SITE
	BC Act 2016	EPBC Act 1999	SAII		
				warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils.	
Picris evae Hawkweed	V	V	No	Known in NSW north from the Inverell area, in the north-western slopes and plains regions. All recent collections appear to come from modified habitats such as weedy roadside vegetation and paddocks.	**Low** Marginal habitat was present. No nearby records.
Ozothamnus tesselatus	V	V	No	Restricted to a few locations in an east-west zone south of Bunnan and between west Bylong and east Ravensworth. Grows in eucalypt woodland.	**Low** Marginal habitat was present. No nearby records.
Pomaderris brunnea Brown Pomaderris	E1	V	No	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** No suitable habitat was present. No nearby records.
Swainsona murrayana Slender Darling-pea	V	V	No	Found throughout NSW, it has been recorded in the Jerilderie and Deniliquin areas of the southern riverine plain, the Hay plain as far north as Willandra National Park, near Broken Hill and in various localities between Dubbo and Moree.	**Unlikely** No suitable habitat was present. No nearby records.
Lepidium aschersonii Spiny Peppercress	V	V	No	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** No suitable habitat was present. No nearby records.
**Androcalva procumbens*	V	V	No	In sandy sites mainly confined to the Dubbo; -Mendooran; -and Gilgandra region, also in Pilliga and Nymagee areas.	**Unlikely** No suitable habitat was present.
**Thesium australe* Austral Toadflax	V	V	No	Grows in grassland or woodland, often in damp sites.	**Low** Marginal habitat was present. No nearby records.
FAUNA - AMPHIBIANS					
Litoria aurea Green and Golden Bell Frog	E1	V	No	Inhabits swamps, lagoons, streams and ponds as well as dams, drains and storm water basins.	**Low** Marginal habitat was present within the vicinity of the constructed dams. No nearby records.
**Litoria booroolongensis* Booroolong Frog	E1	E	No	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, sedges, or grasses. Adults occur on or near cobble banks and other rock structures within stream margins.	**Unlikely** No suitable habitat was present. No nearby records.

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SUBJECT SITE
	BC Act 2016	EPBC Act 1999	SAII		
FAUNA - REPTILES					
**Aprasia parapulchella* Pink-tailed Worm-lizard	V	V	No	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** Marginal habitat was present. Sites lacked rocky ground. No nearby records.
**Delma impar* Striped Legless Lizard	E	E	No	Occurs in the Southern Tablelands, the Southwest Slopes, the Upper Hunter and possibly on the Riverina. Populations are known in the Goulburn, Yass, Queanbeyan, Cooma, Muswellbrook and Tumut areas. Found mainly in Natural Temperate Grassland but has also been captured in grasslands that have a high exotic component. Also found in secondary grassland near Natural Temperate Grassland and occasionally in open Box-Gum Woodland.	**Moderate** Suitable habitat was present. No known nearby records.
FAUNA - BIRDS					
**Calidris ferruginea* Curlew Sandpiper	E1	CE & M	Yes	Tidal mudflats; saltmarsh; fresh, brackish or saline wetlands; sewage ponds.	**Unlikely** No suitable habitat was present.
Gallinago hardwickii Latham's Snipe		V & M	No	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.	**Low-Moderate** Habitat was present within the vicinity of the constructed dams.
Tringa nebularia Common Greenshank		E & M	No	Inhabits a wide variety of inland permanent and temporary wetlands and sheltered coastal habitats of varying salinity.	**Low** Habitat was present within the vicinity of the constructed dams.
**Rostratula australis* Australian Painted Snipe	E1	E	No	Margins of swamps and streams, chiefly those covered with low and stunted vegetation.	**Low** Marginal habitat was present within the vicinity of the constructed dams.
Anseranas semipalmata Magpie Goose	V		No	Relatively common in the Australian northern tropics. Records in central and northern NSW. Vagrants can follow food sources to south-eastern NSW. Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges.	**Unlikely** No suitable habitat was present.
Stictonetta naevosa *Freckled Duck*	V		No	Prefer permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds. Is found primarily in south-eastern and south-western Australia, occurring as a vagrant elsewhere. The species may also occur as far as coastal NSW and Victoria during extensive droughts.	**Low** Marginal habitat was present within the vicinity of the constructed dams.

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SUBJECT SITE
	BC Act 2016	EPBC Act 1999	SAII		
Ephippiorhynchus asiaticus Black-necked Stork	E1		No	Widespread in coastal and subcoastal northern and eastern Australia, as far south as central NSW. Breeding has been recorded as far south as Tomago NSW.	**Unlikely** No suitable habitat was present.
**Melanodryas cucullata cucullata* South eastern Hooded Robin	E	E	No	Widespread, found across Australia, except for the driest deserts and the wetter coastal areas - northern and eastern coastal Queensland and Tasmania. Prefers lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas.	**Moderate** Suitable habitat was present.
Calyptorhynchus lathami lathami South eastern Glossy Black-Cockatoo	V	V	No	Lowland coastal forests, dense mountain forests, semi-arid woodland and trees bordering watercourses, with (Allo)Casuarina trees for foraging.	**Low** Marginal habitat was present. Limited specimens of Bulloak a potential feed tree species was present.
Callocephalon fimbriatum Gang Gang Cockatoo	V	E	No	Tall montane forests and woodlands in mature wet sclerophyll forests. Requires hollows in which to breed between October and January.	**Low** Suitable habitat was present.
Lathamus discolor Swift Parrot	E1	CE	Yes	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 - Medium Seasonal foraging habitat was present.**
Neophema chrysostoma Blue-winged Parrot	V	V	No	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.	**Low** Suitable habitat was present. No nearby records.
Neophema pulchella Turquoise Parrot	V		No	Lives on the edges of Eucalypt woodland adjoining clearings and on timbered ridges and creeks in farmland. It has also been recorded utilising roadside verges and orchards. Nests in small hollow branches of Eucalypts.	**Low-Moderate** Suitable habitat was present.
**Polytelis swainsonii* Superb Parrot	V	V	No	Found throughout eastern inland NSW. On the South-western Slopes their core breeding area is roughly bounded by Cowra and Yass in the east, and Grenfell, Cootamundra and Coolac in the west. Inhabit Box-Gum, Box-Cypress-pine and Boree woodlands and River Red Gum Forest.	**Low** Suitable habitat was present. No nearby records.
Glossopsitta pusilla Little Lorikeet	V		No	Tall Open Forests, woodlands, orchards, parks and street trees.	**Moderate-High** Suitable foraging and nesting habitat were present.
**Aphelocephala leucopsis* Southern Whiteface	V	V	No	Found in dry. sparse open forest/woodland and inland scrubs.	**Low** Suitable habitat was present. No nearby records
**Hirundapus caudacutus*		V & M	No	Inhabits the airspace above forests, woodlands, farmlands, plains, lakes, coasts and towns.	**Moderate**

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SUBJECT SITE
	BC Act 2016	EPBC Act 1999	SAII		
White-throated Needletail					Due to the non-specific habitat requirements of this species habitat was considered to be present.
Artamus cyanopterus cyanopterus Dusky Woodswallow	V		No	The Dusky Woodswallow is found in open forests and woodlands and may be seen along roadsides and on golf courses.	**Moderate-High** Foraging and roosting habitat was present.
Petroica boodang Scarlet Robin	V		No	Primarily a resident in forests and woodlands, but some adults and young birds disperse to more open habitats after breeding. This species lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs. Habitat usually contains abundant logs and fallen timber and these are important components of its habitat.	**Low** Suitable habitat was present.
Petroica phoenicea Flame Robin	V		No	Breeds in upland tall moist eucalypt forests and woodlands, often on ridges and slopes. Endemic to south-eastern Australia, and ranges from near the Queensland border to southeast South Australia and also in Tasmania.	**Low** Suitable habitat was present.
Climacteris picumnus victoriae Brown Treecreeper	V		No	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.
Stagonopleura guttata *Diamond Firetail*	V		No	Inhabits areas with a grassy, shrubby understorey including Eucalypt woodlands, forests, Acacia scrubs and mallee.	**Moderate-High** Suitable habitat was present.
Pomatostomus temporalis subsp. *temporalis* Grey-crowned Babbler	V		No	Open forest, woodland, scrubland, farmland and outer suburbs. Prefers woodlands with regenerating trees, tall shrubs, and an intact ground cover of grass and forbs.	**Moderate-High** Suitable habitat was present.
Chthonicola sagittata Speckled Warbler	V		No	Speckled Warblers live in a wide range of eucalypt-dominated vegetation that has a grassy understorey, often on rocky ridges or in gullies. It builds a domed nest of grass, bark shreds and moss, lined with fur on the ground.	**Moderate-High** Suitable habitat was present.
Anthochaera phrygia Regent Honeyeater	E4A	CE	Yes	Temperate woodlands and open forest, including forest edges, preferring to forage on large-flowered Eucalypts.	**Low** Seasonal foraging habitat was present.
Grantiella picta Painted Honeyeater	V	V	No	Nomadic, within a range of generally drier forested areas with mistletoes.	**Low** Suitable habitat was present.
Daphoenositta chrysoptera Varied Sittella	V		No	Open eucalypt woodland/forest, mallee, inland acacia, coastal tea-tree scrubs, golf courses, orchards and parks.	**Moderate-High** Suitable habitat was present.
Melithreptus gularis gularis Black-chinned Honeyeater (eastern subspecies)	V		No	Usually found on the western side of the Great Dividing Range in dry sclerophyll forests and woodlands containing box-ironbark associations and River Red Gum. In the Hunter Valley this species is known to utilise drier coastal woodlands. Usually found in open woodlands.	**Moderate** Suitable habitat was present.

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SUBJECT SITE
	BC Act 2016	EPBC Act 1999	SAII		
Circus assimilis Spotted Harrier	V		No	Occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment and ranges, and rarely in Tasmania. Occurs in grassy open woodland including Acacia and mallee remnants, inland riparian woodland, grassland and shrub steppe.	**Low - Moderate** Suitable habitat was present.
Haliaeetus leucogaster White-bellied Sea-Eagle	V	M	No	Occupies habitat characterised by the presence of large areas of open water and feeds opportunistically on a variety of fish, birds, reptiles, mammals and crustaceans. The nests are built in a variety of sites including tall trees, bushes, mangroves, cliffs, rocky outcrops, caves, crevices, on the ground or even in artificial structures.	**Unlikely** This species is unlikely to utilise the site due to a lack of nearby suitable hunting habitat.
Hieraaetus morphnoides Little Eagle	V		No	Is found throughout the Australian mainland excepting the most densely forested parts of the Dividing Range escarpment. It occurs as a single population throughout NSW. Occupies open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used.	**Moderate** Suitable habitat was present.
Lophoictinia isura Square-tailed Kite	V		No	Inhabits open forests and woodlands, particularly those on fertile soils with abundant passerines.	**Low-Moderate** Suitable habitat was present.
Falco hypoleucos Grey Falcon	E1	V	No	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** Suitable habitat was present.
Falco subniger Black Falcon	V		No	Widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions.	**Moderate** Suitable habitat was present.
Ninox strenua Powerful Owl	V		No	Inhabits a wide range of vegetation types from wet Eucalypt forests with a Rainforest understorey to Dry Open Forests and Woodlands. The species has been recorded utilising disturbed habitats such as exotic pine plantations and large trees in parks and gardens. Powerful Owls nest in a slight depression in the wood-mould on the base of a cavity in a large old tree, sometimes in excess of 25 metres above the ground.	**Low - Moderate** Hunting and potential nesting habitat was present.
Tyto novaehollandiae Masked Owl	V		No	A range of wooded habitats that contain mature trees with large hollows for roosting and nesting, and more open areas for hunting.	**Low** Hunting and potential nesting habitat was present.
Tyto tenebricosa Sooty Owl	V		Yes	Prefers dense dimly lit forests, inhabiting pockets of rainforest and wet sclerophyll forest mainly in mountainous areas, often in south-east facing gullies.	**Unlikely** No suitable habitat was present.
FAUNA – MAMMALS					
**Dasyurus maculatus* ssp. *maculatus* Spotted-tailed Quoll	V	E	No	Inhabits sclerophyll forests, rainforests and coastal woodlands. Nests are made in rock caves and hollow logs or trees, and basking sites are usually found nearby.	**Moderate** Suitable habitat was present. A BioNet Atlas record was present just outside the SE

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SUBJECT SITE
	BC Act 2016	EPBC Act 1999	SAII		
					Boundary in 2021 (DPE, 2024a).
Phascogale tapoatafa Brush-tailed Phascogale	V		No	Prefer dry sclerophyll open forest with sparse groundcover of herbs, grasses, shrubs or leaf litter.	**Low-Moderate** Suitable habitat was present
**Phascolarctos cinereus* Koala	E1	E	No	Coastal woodland and open forest containing suitable food trees.	**Low** Suitable habitat was present.
**Petrogale penicillata* Brush-tailed Rock-wallaby	E	V	Yes	Found in steep rocky sites in sclerophyll forests with a grassy understorey.	**Unlikely** No suitable habitat was present.
**Notamacropus parma* Parma Wallaby	V		No	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.
**Petaurus australis* Yellow-bellied Glider	V		No	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.
Petaurus norfolcensis Squirrel Glider	V		No	Dry sclerophyll forests and woodlands with exudates for foraging and hollows for nesting.	**Low-Moderate** Suitable habitat was present.
**Petauroides volans* Greater Glider	E	E	No	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 preferred habitat was present.
Pteropus poliocephalus Grey-headed Flying-Fox	V	V	No	Wet and Dry Sclerophyll Forests, Rainforest, Mangroves and Paperbark swamps and Banksia Woodlands.	**High** Seasonal foraging habitat was available in the form of flowering myrtaceous canopy species.
**Pseudomys novaehollandiae* New Holland Mouse		V	No	Known to inhabit open heathlands, open woodlands with a heathland understorey and vegetated sand dunes.	**Unlikely** No suitable habitat was present for this species.
Saccolaimus flaviventris Yellow-bellied Sheathtail-bat	V		No	Has been reported from a wide variety of habitats. Roosts in tree hollows, animal burrows, dry clay cracks, under rock slabs and in abandoned Sugar Glider nests.	**Low-Moderate** Suitable hunting and roosting habitat were present.

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SUBJECT SITE
	BC Act 2016	EPBC Act 1999	SAII		
Micronomus norfolkensis Eastern Freetail-bat	V		No	Appears to live in sclerophyll forests and woodland. Roosts in tree hollows or under loose bark.	**High** Suitable hunting and roosting habitat were available. Has been previously recorded nearby in 2011 (Wildthing Environmental Consultants, 2011).
Falsistrellus tasmaniensis Eastern False Pipistrelle	V		No	Inhabits sclerophyll forests and has been observed roosting in holes and hollow trunks of Eucalypts.	**Moderate** Suitable hunting and roosting habitat were available.
Miniopterus australis Little Bentwing-bat	V		Yes	Tropical rainforest to warm-temperate wet and dry sclerophyll forest; caves or similar structures for roosting.	**Moderate** Suitable hunting habitat was present. Preferred roosting habitat was absent.
Miniopterus orianae oceanensis Large Bentwing-bat	V		No	Wet and dry tall open forest, rainforest, monsoon forest, open woodland, paperbark forests and open grasslands, caves or similar structures for roosting. It occasionally uses tree hollows.	**Moderate** Suitable foraging habitat was present. Preferred roosting habitat in the form of caves was absent.
Myotis macropus Southern Myotis	V		No	Various habitats of the coast and adjacent ranges with suitable waterbodies for hunting; caves or similar structures for roosting. It occasionally uses tree hollows.	**Moderate** Suitable hunting habitat was present around the constructed dams. Preferred roosting habitat in the form of caves was absent.
**Nyctophilus corbeni* Corben's Long-eared Bat	V	V	No	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** Suitable hunting and roosting habitat were available.
Scoteanax rueppellii Greater Broad-nosed Bat	V		No	Tree-lined creeks, woodland/clearing ecotones and rainforest creeks, roosting mainly in tree hollows.	**Moderate** Suitable foraging and roosting habitat were present.

SPECIES	STATUS			HABITAT DESCRIPTION AND LOCALLY KNOWN POPULATIONS	LIKELIHOOD OF OCCURRENCE WITHIN THE SUBJECT SITE
	BC Act 2016	EPBC Act 1999	SAII		
**Chalinolobus dwyeri* Large-eared Pied Bat	V	V	Yes	Occupies dry sclerophyll forest and woodland. Roosts in caves, abandoned mud-nests of Fairy Martins and mine tunnels.	**Low** Suitable foraging habitat was present. Preferred roosting habitat was absent.
Vespadelus troughtoni Eastern Cave Bat	V		Yes	The Eastern Cave Bat is found in a broad band on both sides of the Great Dividing Range from Cape York to Kempsey, with records from the New England Tablelands and the upper north coast of NSW. The western limit appears to be the Warrumbungle Range, and there is a single record from southern NSW, east of the ACT. A cave-roosting species that is usually found in dry open forest and woodland, near cliffs or rocky overhangs; has been recorded roosting in disused mine workings, occasionally in colonies of up to 500 individuals.	**Moderate** Suitable foraging habitat was present. Preferred roosting habitat was absent.

5.4 FAUNA APPRASIAL RESULTS

5.4.1 DIURNAL SURVEYS

Amphibians

No amphibian species were recorded within the subject land during fieldwork in January 2024. A previous survey within the subject land recorded *Crinia signifera* (Common Eastern Froglet) calling from the vicinity of the dams.

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

Reptile Survey

One reptile species *Pogona barbata* (Eastern Bearded Dragon) was recorded within the subject site during previous surveys (Wildthing Environmental Consultants, 2015). Other reptile species such as *Nebulifera robusta* (Robust Velvet Gecko) and *Egernia striolata* (Tree Skink) were commonly recorded during past tree clearance supervision the immediate south-west and would occur on the subject site.

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

Avifauna

Species observed within the subject site included *Grallina cyanoleuca* (Magpie-lark), *Rhipidura leucophrys* (Willie Wagtail), *Platycercus eximius* (Eastern Rosella), *Falco cenchroides* (Australian Kestrel), *Eolophus roseicapilla* (Galah), *Cacatua galerita* (Sulphur-crested Cockatoo), *Psephotus haematonotus* (Red-rumped Parrot), *Cisticola exilis* (Golden-headed Cisticola), *Acanthiza chrysorrhoa* (Yellow-rumped Thornbill), *Corvus coronoides* (Australian Raven), *Manorina melanocephala* (Noisy Miner), *Gymnorhina tibicen* (Magpie) and *Malurus cyaneus* (Superb Fairywren). *Acridotheres tristis* (Indian Myna) was a common introduced species.

Species recorded around the three constructed dams were *Phalacrocorax carbo* (Great Cormorant) and Anas superciliosa (Pacific Black Duck).

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

Mammals

A number of specimens of *Macropus giganteus* (Eastern Grey Kangaroo) were encountered within the subject site during fieldwork. Scats consistent with this macropod species were also observed.

The introduced *Oryctolagus cuniculus* (European Rabbit) and associated diggings and scats were commonly encountered. A number of *Bos taurus* (Cattle) were also present within the subject site

during recent and previous surveys. The European Rabbit is listed as Key Threatening Processes under the BC Act 2016 and have been addressed in Section 7 of this report.

No mammal species listed as threatened under the BC Act 2016 or EPBC Act 1999 were recorded on site.

Both mammal species observed within the subject land are listed as Key Threatening Processes under the BC Act 2016 and have been addressed in Section 7 of this report.

5.5 SURVEY LIMITATIONS

As with all reports of this type the main survey limitation is considered to be the short period of time in which the fieldwork was carried out. Limitations to the likelihood of detecting certain subject species were also encountered during this survey. Such limitations were generally related to the seasonal occurrence of species, be it as a result of known flowering periods for flora or migratory movements by fauna.

These 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 site 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.

6.0 IMPACT ASSESSMENT

6.1 AVOIDANCE AND MINIMISATION OF IMPACTS

Impact on vegetation has been minimised by positioning areas of better quality the BESS and associated APZ and access road within an area of the subject land that contained disturbance from historic vegetation removal and current livestock grazing. A large portion of the access road is a pre-existing access road that will require widening.

6.2 DIRECT IMPACT

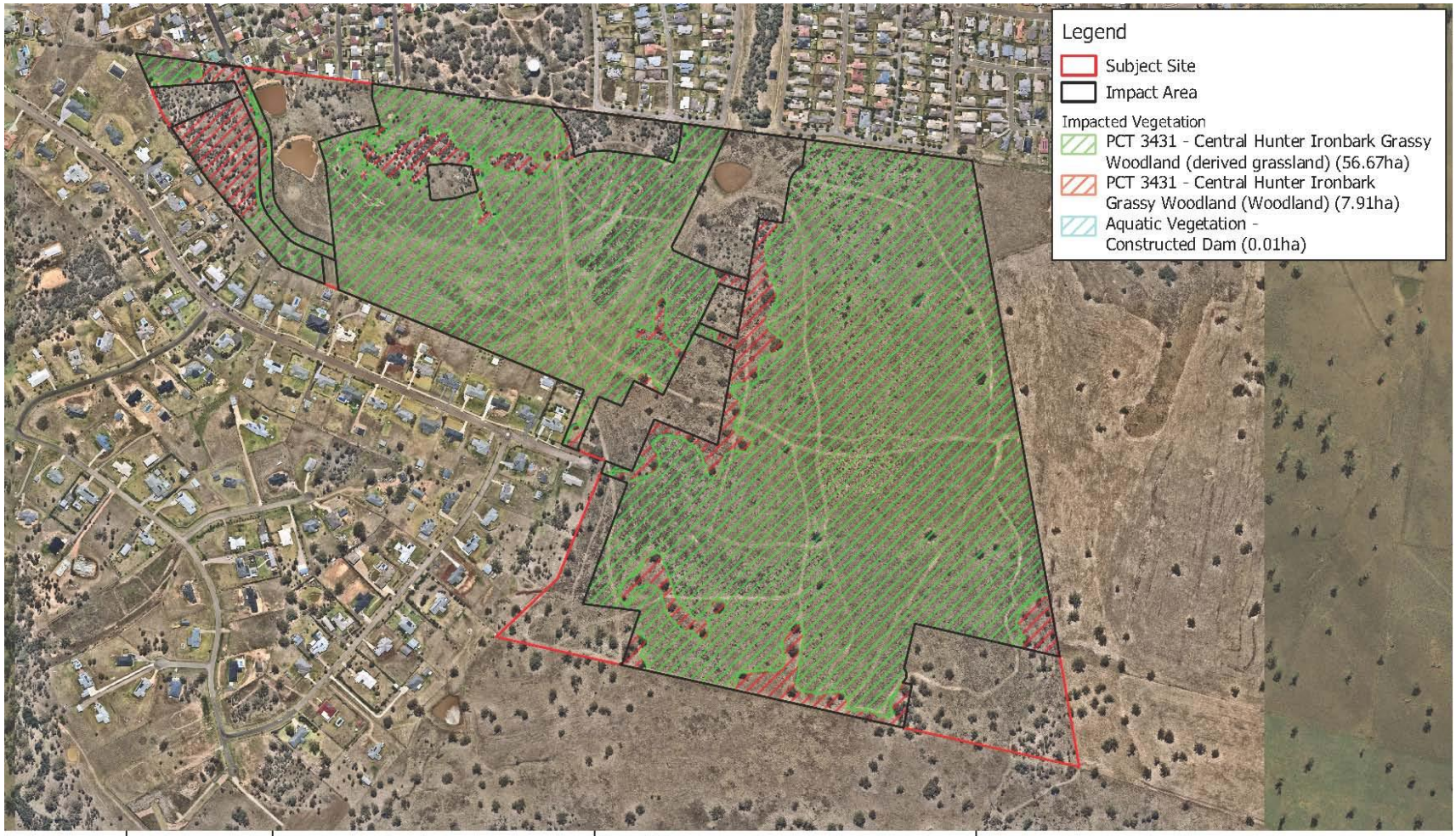
The proposal will result in the following direct and potential impacts/losses:

- Removal of up to 64.57ha of PCT 3431 - Central Hunter Ironbark Grassy Woodland, composed of 7.9ha of better-quality woodland and 56.67ha of derived grassland in varying condition states. Impacted areas are shown in Figure 6.1.
- Removal of up to 78 hollow-bearing trees, potential removal of up to 18 hollow-bearing trees (those located within close proximity to proposed lot boundaries and within larger residential lots). A total of 83 hollow-bearing trees will be retained within the C3 – Environment Management zones.
- Removal of potential habitat for a number of the addressed threatened flora and fauna species;
- Injury/Mortality to native fauna during felling of trees.

6.3 INDIRECT IMPACTS

The proposal may result in the following indirect and potential impacts:

- Erosion and sedimentation;
- Increased spread of priority and other weed species;
- Loss in connectivity for some fauna species;
- Edge effects;
- Increased light spill;
- Increase noise;
- Increase in vehicle native fauna strikes;
- Impact of domestic pets on native fauna;
- Increase in rubbish:
- Other impacts on biodiversity values.



Job Ref	12832
A4 Scale	1:7,500

Disclaimer: While all reasonable care has been taken to ensure the information contained on this map is up to date and accurate, no guarentee 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.

0 100 200 300 m

Map Projection GDA2020 MGA Zone 56

Data Sources: Nearmap (2023),

Figure 6.1

Impact to Vegetation

Lots 101 & 103 DP1170190 Ironbark Road
MUSWELLBROOK, NSW

22 February 2024

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

6.4 MITIGATION MEASURES

Mitigation measures have been specified to minimise the impact of the proposal on biodiversity values. Priority will be given during vegetation clearing to avoid any inadvertent impacts to biodiversity values occurring adjacent to the impact area. Mitigation measures should include the following:

Protection of native vegetation

- The C3 – Environment Management zones are to be clearly defined on the ground to avoid any unintended impact on these areas;
- Clearance of native vegetation within any of the residential lots should be minimised as far as is practicable. Any area of native vegetation which is proposed to be retained is to be clearly defined on the ground to avoid any unintended impact on these areas;
- all workers are to be informed of the sensitive nature of the C3 – Environment Management zones, and other retained areas of native vegetation and importance that no disturbance occur within these areas;
- all material stockpiles, vehicle parking and machinery storage will be located within outside areas zoned C3 – Environment Management;
- It is recommended that a vegetation management plan be completed to ensure native vegetation occurring within C3 – Environment Management zones are adequately protected and enhanced. The management plant would contain fencing, weed control practices and likely native plantings in some areas.
- A potential long-term plan of formalised Landcare/Bushcare group to help maintain C3 – Environment Management zones.

Protection of native fauna

- A preclearance habitat survey is to be conducted by a qualified, licenced and experienced fauna ecologist prior to vegetation removal. All habitat (hollow-bearing) trees or those which contain habitat in the form of termite or bird nests which require removal are to be clearly marked with a large Fluro “H” prior to removal;
- Immediately prior to removal the fauna ecologist is to inspect all areas to be cleared for fauna species;
- A qualified, licenced and experienced fauna ecologist is to be present during vegetation clearance operations;
- It is recommended that a number of compensatory nest boxes be installed within C3 – Environment Management zones to help offset the removal of hollow-bearing trees.
- Roads within the development are to be limited to low speeds and erect signage to minimise the chance of vehicle collision with fauna species such as Macropods.
- It is recommended that domestic cats be controlled and confined to properties to reduce the threat of predation on local fauna.

- Street and other lighting should be directed away from areas of retained native vegetation to reduce the impact on nocturnal fauna species.

Erosion and sedimentation;

- Where required, erosion and sediment controls (e.g., silt fences, sediment traps) are to be installed prior to construction to avoid disturbance and degradation of soils and nearby features (e.g., water ways, adjacent habitat and vegetation). These should conform to the specifications in Soils and Construction 'Blue Book' (Landcom, 2004) and should be left *in-situ* if required.

Increased spread of priority and other weed species

- It is recommended that all weeds within the subject site be managed and maintained as part of routine management through the implementation of the associated VMP. Particular attention should be given to the weeds listed in Table 5.3 of this report.
- vehicles and machinery to be clean of soils, vegetation and seeds that have been brushed off or washed down prior to entering/leaving the site area;
- All weed material removed from the subject site will need to be disposed of appropriately;
- Addressing the issue of weeds and formulating a long-term Vegetation Management Plan.

7.0 CONSIDERATIONS UNDER SECTION 7.3 OF THE BC ACT 2016

Considerations of the effects of the vegetation removal undertaken for the proposed development under *Section 7.3* of the BC Act (2016) for the concerned threatened species is given below. The species dealt with are those identified during the fieldwork and those identified as having potential habitat available on site in Table 4.3.

A detailed assessment for each BC Act 2016 listed threatened species located within the study area is undertaken in Appendix C.

For the purposes of the Section 7.3 of the BC Act (2016), the following factors have been taken into account in deciding whether there is likely to be a significant effect on this threatened species, populations or ecological communities, or their habitats:

a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction.

Threatened Flora

Diuris tricolor (Pine Donkey Orchid)

An individual specimen of *Diuris tricolor* (Pine Donkey Orchid) was recorded within the far west of the subject land as a result of a targeted search conducted in 2015 (Wildthing Environmental Consultants, 2015). Despite the survey occurring in this species' peak flowering period and during favourable weather conditions no other specimens were found within the subject site during the survey. Woodland and better-quality areas of derived native grassland within the subject site contain suitable habitat for the *D. tricolor*. The rezoning of the subject site, positioned an area zoned C3 – Environment Management over the location of the specimen of *D. tricolor* aiding in its long-term protection. Taking into consideration the recommendations for long-term management of the C3 – Environment zones it is considered unlikely that the proposal would significantly affect the life cycle of *D. tricolor* or place any viable local populations of at risk of extinction.

Of the remaining 15 addressed threatened flora species assessed, the subject site was found to contain suitable habitat for 5 of the addressed species:

- *Prasophyllum petilum*
- *Pterostylis gibbosa* (Illawarra Greenhood);
- *Vincetoxicum forsteri (Tylophora linearis);*
- *Eucalyptus glaucina* (Slaty Red Gum)*;*
- *Thesium australe* (Austral Toadflax)

Of these addressed threatened flora species the most likely to occur within the subject land area would include *Eucalyptus glaucina* (Slaty Red Gum). The proposal may result in an incremental loss of habitat for these threatened flora species; however, it is considered not likely that the proposal would

significantly affect the life cycle of any of these threatened flora species or place any viable local populations of at risk of extinction.

Threatened Fauna

No threatened fauna species were recorded in the study area during surveys. Of the 61 addressed threatened fauna species the subject site was considered to contain suitable habitat of varying quality for 41 species:

- *Litoria aurea* (Green and Golden Bell Frog);
- *Aprasia parapulchella* Pink-tailed Worm-lizard
- *Delma impar* Striped Legless Lizard
- *Tringa nebularia* Common Greenshank
- *Rostratula australis* Australian Painted Snipe
- *Stictonetta naevosa* Freckled Duck
- *Melanodryas cucullata cucullata* Hooded Robin (south-eastern form)
- *Calyptorhynchus lathami* Glossy Black-Cockatoo
- *Callocephalon fimbriatum* Gang Gang Cockatoo
- *Lathamus discolor* Swift Parrot
- *Neophema chrysostoma* Blue-winged Parrot
- *Neophema pulchella* Turquoise Parrot
- *Polytelis swainsonii* Superb Parrot
- *Glossopsitta pusilla* Little Lorikeet
- *Aphelocephala leucopsis* Southern Whiteface
- *Artamus cyanopterus cyanopterus* Dusky Woodswallow
- *Petroica boodang* Scarlet Robin
- *Petroica phoenicea* Flame Robin
- *Climacteris picumnus victoriae* Brown Treecreeper
- *Stagonopleura guttata* Diamond Firetail
- *Pomatostomus temporalis subsp. temporalis* Grey-crowned Babbler
- *Chthonicola sagittata* Speckled Warbler
- *Anthochaera phrygia* Regent Honeyeater
- *Grantiella picta* Painted Honeyeater
- *Daphoenositta chrysoptera* Varied Sittella
- *Melithreptus gularis gularis* Black-chinned Honeyeater
- *Circus assimilis* Spotted Harrier
- *Hieraaetus morphnoides* Little Eagle
- *Lophoictinia isura* Square-tailed Kite
- Falco hypoleucos Grey Falcon
- *Falco subniger* Black Falcon
- *Ninox strenua* Powerful Owl
- *Tyto novaehollandiae* Masked Owl
- *Dasyurus maculatus ssp. maculatus* Spotted-tailed Quoll
- *Phascogale tapoatafa* Brush-tailed Phascogale
- *Phascolarctos cinereus* Koala
- *Petaurus norfolcensis* Squirrel Glider
- *Pteropus poliocephalus* Grey-headed Flying-Fox
- *Saccolaimus flaviventris* Yellow-bellied Sheathtail-bat
- *Micronomus norfolkensis* Eastern Coastal Free-tailed Bat
- *Falsistrellus tasmaniensis* Eastern False Pipistrelle
- *Miniopterus australis* Little Bentwing-bat
- *Miniopterus orianae oceanensis* Large Bentwing-bat
- *Myotis macropus* Southern Myotis

- *Nyctophilus corbeni* Corben's Long-eared Bat
- *Scoteanax rueppellii* Greater Broad-nosed Bat
- *Chalinolobus dwyeri* Large Pied Bat
- *Vespadelus troughtoni* Eastern Cave Bat

Of these threatened fauna species those most likely to utilise the site would include a number of the woodland birds, Squirrel Glider, Grey-headed Flying-Fox and microchiropteran bats. The proposal will result in an incremental reduction habitat for the above species in the local area. Given areas of better-quality vegetation and habitat will be retained within areas zoned C3 – Environment Management and taking into consideration the mitigation measures such as a vegetation management plan to protect and enhance areas zoned C3 – Environment Management it is unlikely that the proposal will have a significant impact on these threatened fauna species such that a local extinction would occur.

b) In the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction.

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 in varying condition states. Smaller areas were composed of more concentrated remnant trees and regrowth and had a woodland structure. Significant areas of better-quality Central Hunter Grey Box – Ironbark Woodland have been incorporated in to the areas zoned C3 – Environment Management under the Muswellbrook LEP and will be protected and enhanced. Given the retention of areas of better-quality areas of Central Hunter Grey Box – Ironbark Woodland and taking into consideration the mitigation measures such as a vegetation management plan to protect and enhance areas zoned C3 – Environment Management it is unlikely that the proposal will have a significant impact on the extent or substantially and adversely modify the composition of this EEC such that its local occurrence is likely to be placed at risk of extinction.

c) *In relation to the habitat of a threatened species or ecological community:*

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

The proposal will result in the following direct and potential impacts/losses:

- Removal of up to 64.57ha of PCT 3431 - Central Hunter Ironbark Grassy Woodland, composed of 7.9ha of better-quality woodland and 56.67ha of derived grassland in varying condition states. Impacted areas are shown in Figure 6.1.
- Removal of up to 78 hollow-bearing trees, potential removal of up to 18 hollow-bearing trees (those located within close proximity to proposed lot boundaries and within larger residential lots). A total of 83 hollow-bearing trees will be retained within the C3 – Environment Management zones.
- Removal of potential habitat for a number of the addressed threatened flora and fauna species;
- Injury/Mortality to native fauna during felling of trees.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

The proposal will result in some fragmentation and isolation of areas of habitat within the subject site for several fauna species. A number of areas zoned C3 – Environment Management have been positioned to allow movement of fauna species through the subject site. The C3 – Environment Management zones within the centre of the subject site allow for movement of fauna in a north-south direction. A number of these areas also link up with areas of habitat outside the subject site. Taking this into consideration, no areas of habitat are likely to become significantly fragmented or isolated from others areas of habitat as a result of the proposal.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality.

Significant areas of better-quality Central Hunter Grey Box – Ironbark Woodland have been incorporated in to the areas zoned C3 – Environment Management under the Muswellbrook LEP and will be protected and enhanced including the area where the threatened *Diuris tricolor* specimen was recorded. Taking this into consideration the linkages within and outside the subject site for a number of these C3 areas no important areas of habitat are likely to become significantly fragmented or isolated from others areas of habitat as a result of the proposal.

d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly).

No areas of outstanding biodiversity value are within the subject site or within close proximity.

e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The 'Key Threatening Processes' currently listed under Schedule 4 of the BC Act 2016 that are relevant to the study area have been listed in Table 7.1.

Table 7.1: Key Threatening Processes.

Key Threatening Process	Applicability in regards to the subject land
Clearing of Native Vegetation.	The proposal will result in the removal of native vegetation and may be viewed as being part of this Key Threatening Process. However, the action is unlikely to be responsible for the significant loss of any TEC, endangered population or threatened species provided that recommendations for impact minimisation as listed within Section 6.4 are undertaken.
Loss of Hollow-bearing Trees	UP to four hollow-bearing trees could potentially require removal as a result of the proposed development. Nest boxes are to be installed into retained trees at a ratio of two nest boxes per hollow-bearing tree. The nest boxes are to be installed prior to tree clearance within retained trees. The artificial nest boxes should be installed onto a tree in the nearest adjacent area of similar habitat by a suitably qualified ecologist. This mitigation measure will ensure that no net loss of hollows will result from the proposed development.
Removal of dead wood and dead trees	A number dead trees and wood were present within the subject site. Any dead wood or dead trees requiring removal for the proposal is to be moved into retained vegetation outside of the impact area to provide ground habitat.
Invasion of native plant communities by exotic perennial grasses.	Exotic grasses such as *Paspalum dilatatum* (Paspalum) were present within the subject site. The proposal has the potential to result in an increase in invasion by exotic perennial grasses.
Reduced viability of adjacent habitat due to edge effects	The proposal has the potential to create edge effects on retained native vegetation within and bordering the subject site. A Vegetation Management Plan should address these issues.
Predation by the *Felis catus* (Feral Cat)	The Feral Cat was not recorded on site at the time of the survey however this species would be considered to have an impact on native fauna in the local area. The proposal is not likely to result in an increase in feral numbers of this introduced species.
Predation by the *Vulpes vulpes* (Red Fox)	Evidence of the Red Fox was recorded during surveys within the subject site and this species would be considered to have an impact on native fauna in the local area. The proposal is not likely to result in an increase in numbers of this introduced species.
Aggressive exclusion of birds by noisy miners (*Manorina melanocephala*)	Noisy miners were not recorded within the subject site; however, the proposal is unlikely to increase the impacts associated with this species.
High frequency fire resulting in the disruption of life cycle processes in plants and animals and loss of vegetation structure and composition	It is unknown what impact fire has had within the subject site.
Invasion, establishment and spread of Lantana (*Lantana camara*)	Lantana was not recorded within the subject land. If this species is located within subject land, it is recommended that this weed be controlled as part of routine property maintenance.
Competition and grazing by the feral European rabbit	The European Rabbit was present within the subject site. The proposal is not likely to result in an increase in feral numbers of this introduced species.

Key Threatening Process	Applicability in regards to the subject land
Infection by *Psittacine circoviral* (beak and feather) disease affecting endangered psittacine species	No evidence of the disease was observed on psittacine species.
Infection of frogs by amphibian chytrid causing the disease chytridiomycosis.	No evidence of chytrid was observed during site visits.
Introduction and establishment of Exotic Rust Fungi of the order Pucciniales pathogenic on plants of the family Myrtaceae.	No evidence of the fungi was observed during site visits.
Invasion of native plant communities by African Olive *Olea europaea* subsp. *cuspidata*	African Olive was observed within the subject land, occurrences should be removed from the subject site.

8.0 CONSIDERATIONS UNDER STATE ENVIRONMENTAL PLANNING POLICY (BIODIVERSITY AND CONSERVATION) 2021

8.1 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 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, R5 & C3 and encompasses an area larger than 1ha therefore Chapter 4 is addressed further below. The Muswellbrook Shire is in the Central Coast Koala Management Area (KMA)

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 1 of SEPP (Biodiversity Conservation) 2021. This includes *Eucalyptus crebra* (Narrow-leaved Ironbark), Eucalyptus moluccana (Grey Box) and Eucalyptus blakelyi (Blakely's Red Gum). A number of the trees are 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 within the subject site during recent or past surveys. According to the BioNet Atlas database search (DPE, 2024a), there has been a total of 23 koala sightings recorded with a 10km radius of the subject site however only 17 of these are from within the past 18 years. The closest koala recorded was approximately 1.6km to the north-west of the site from 2004. While this record is within 2.5km of the site, the accuracy of this record is 10,000m. This accuracy is greater than 1,000m therefore it is not considered under this SEPP as outlined in the Koala SEPP 2021 Factsheet (DPIE 2021). The next closest records are 1.7km away from the Muswellbrook Golf Course to the NW in 2029 and directly south in 2016. The subject site has a connection of native vegetation to Koala records to the south. The record at the Muswellbrook Golf Course is isolated from the subject site by the New England Highway and residential development within Muswellbrook.

> *(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*

A large number of the trees within the subject site had a dbh above 10cm.

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

No horticultural or agricultural plantations were present on site.

The definition of Core Koala Habitat under the SEPP 2021 is highly suitable habitat where 15% or greater of the total number of trees within any Plant Community Type (PCT) are the relevant species of those listed in Schedule of the SEPP. Considering the presence of Koalas records in the last 18 years within 2.5km (under an accuracy of ≤1000m) habitat on the subject site could be considered to be Core Koala Habitat. Based on this information, a Koala Assessment Report (KAR) may be required to be undertaken.

9.0 ASSESSMENT OF SERIOUS AND IRREVERSIBLE IMPACTS

Under the BC Act 2016, a determination of whether an impact is serious and irreversible (SAII) must be made in accordance with the principles prescribed in section 6.7 of the BC Regulation.

The "*Guidance to assist a decision maker to determine a serious and irreversible impact*, 2017, sets out those potential SAII species and ecological communities (known as "potential SAII entities").

The principles for determining serious and irreversible impacts in the Biodiversity Conservation Regulation, 2017 are:

- *will cause a further decline of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline, or*
- *will further reduce the population of a species or ecological community that is currently observed, estimated, inferred, or reasonably suspected to have a very small population size, or*
- *are impacts on the habitat of a species or area of ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution, or*
- *are impacts on a species or ecological community is unlikely to respond to measures to improve habitat and vegetation integrity and is therefore irreplaceable.*

9.1 POTENTIAL SAII ENTITIES

In this case all potential SAII entities are derived from Appendix 2 of the Guide, and are within the BioNet search area (DPE, 2023). The approval authority must take those impacts into consideration and determine whether there are any additional and appropriate measures that will minimise those impacts if approval is to be granted. An Impact evaluation is shown in Table 9.1. Entities include:

- *Prasophyllum* sp. Wybong (A Leek Orchid);
- *Euphrasia arguta* (Eyebright)
- *Calidris ferruginea* (Curlew Sandpiper)
- *Lathamus discolor* (Swift Parrot);
- *Anthochaera phrygia* (Regent Honeyeater);
- *Tyto tenebricosa* (Sooty Owl);
- *Petrogale penicillata* (Brush-tailed Rock-wallaby)
- *Miniopterus australis* (Little Bentwing-bat);
- *Chalinolobus dwyeri* (Large Pied Bat);
- *Vespadelus troughtoni* (Eastern Cave Bat).

Table 9.1: SAII impact evaluation

Potential SAII Entities	Impact Evaluation	Impact Thresholds	Serious and Irreversible Impact?
Prasophyllum sp. Wybong A Leek Orchid	Marginal habitat was present. No nearby records.		No
Euphrasia arguta Eyebright	No habitat was considered present		No
Calidris ferruginea Curlew Sandpiper	No habitat was considered present		No
Lathamus discolor Swift Parrot	Seasonal foraging habitat was present.	Not within a mapped BAM Important Area (DPE, 2023	No
Anthochaera phrygia Regent Honeyeater	Seasonal foraging habitat was present.	Not within a mapped BAM Important Area (DPE, 2023)	No
Erythrotriorchis radiatus Red Goshawk	No habitat was considered present		No
Tyto tenebricosa Sooty Owl	No habitat was considered present		
Petrogale penicillata Brush-tailed Rock-wallaby	No habitat was considered present		No
Miniopterus australis Little Bentwing-bat	Species recorded within the study area. Suitable habitat was present. Preferred roosting habitat was absent.		No
Chalinolobus dwyeri Large Pied Bat	Suitable hunting habitat was present. Preferred roosting habitat was absent.		No
Vespadelus troughtoni Eastern Cave Bat	No preferred roosting habitat was available within the site.		No

9.2 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.

10.0CONSIDERATIONS UNDER THE COMMONWEALTH ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

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 site is not likely to have a significant impact to any World Heritage Properties.

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

The subject site is 50 - 100km upstream of the Hunter Estuary Ramsar Wetland. The proposed works is not likely to have a significant impact to any Ramsar Wetlands.

- *listed threatened species and communities;*

Threatened Communities

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

- Subtropical eucalypt floodplain forest and woodland of the New South Wales North Coast and South East Queensland bioregions
- 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
- Weeping Myall Woodlands
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland
- Hunter Valley Weeping Myall (Acacia pendula) Woodland
- River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria
- Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions

Taking into consideration the diagnostic characters listed below better-quality areas of PCT 3431 Central Hunter Ironbark Grassy Woodland would likely fit the criteria of the nationally Critically Endangered Ecological Community (CEEC); Central Hunter Valley eucalypt forest and woodland. The key diagnostic characteristics of this ecological community are:

- It is limited to the Sydney Basin (SYB) and the NSW North Coast (NNC) IBRA7 bioregions in New South Wales.
- It is limited to the Hunter River catchment (typically called the Hunter Valley region).
- It mostly occurs within the Hunter Valley IBRA subregion (SYB02) of the Sydney Basin Bioregion.
- It typically occurs on lower hillslopes and low ridges or valley floors in undulating country, mostly on Permian sedimentary soils.
- It is woodland or forest, with projected cover of canopy trees of 10% or more.
- The canopy of the ecological community is dominated by one or more of the following four eucalypt species: *Eucalyptus crebra* (Narrow-leaved Ironbark), *Corymbia maculata* (Spotted Gum), *E. dawsonii* (Slaty Gum) and *E. moluccana* (Grey Box).
- Under certain circumstances a fifth species, *Allocasuarina luehmannii* (Bulloak), may dominate (or be part of the mix of dominants above) in sites previously dominated by one or more of the above four eucalypt species;
- A number of other tree species may be sub-dominant (or locally dominant within a patch). These include *Angophora floribunda* (Rough Barked apple), *Eucalyptus blakelyi* (Blakely's Red Gum), *E. glaucina* (slaty red gum) and *E. tereticornis* (Forest Red Gum)
- Hybrids of these eucalypt species may be present (and contribute to levels of dominance) and are included in this definition of the ecological community.
- A ground layer is present (although it may vary in development and composition), as a sparse to thick layer of native grasses, other herbs and/or low shrubs;
- • Three tree species: forest oak (*Allocasuarina torulosa*)—also known as forest sheoak, rose oak or rose she-oak; white mahogany (*Eucalyptus acmenoides*); and red ironbark (*Eucalyptus fibrosa*)—also referred to as broad-leaved ironbark, are all largely absent from the canopy of a patch (i.e., no more than two trees per hectare, on average across a patch—of each of the three species).

This CEEC was subject to disturbances, particularly past vegetation removal and livestock grazing Under the National Legislation (EPBC Act 1999), Approved Conservation Advice for Critically Endangered Community (CEEC) Central Hunter Valley Eucalypt Forest and Woodland (DoEE 2016), derived native grassland and shrublands are not included in the Critically Endangered Community Central Hunter Valley Eucalypt Forest and Woodland CEEC. The exceptions are where there is a gap, in or at the edge of a patch; or connecting two patches across a short distance (i.e., 30 metres).

A large portion of this EEC consisted of derived grassland in varying condition states. Smaller areas were composed of more concentrated remnant trees and regrowth and had a woodland structure. Many of the more significant areas of better-quality Central Hunter Grey Box – Ironbark Woodland have been incorporated in to the areas zoned C3 – Environment Management under the Muswellbrook LEP and

will be protected and enhanced. Given the retention of areas of better-quality areas of Central Hunter Grey Box – Ironbark Woodland and taking into consideration the mitigation measures such as a vegetation management plan to protect and enhance areas zoned C3 – Environment Management it is unlikely that the proposal will have a significant impact on this CEEC, therefore a referral is unlikely to be required.

Forty-five nationally threatened species were recorded on the DCCEEW 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:

Anthochaera phrygia	Regent Honeyeater
Aphelocephala leucopsis	Southern Whiteface
Calidris ferruginea	Curlew Sandpiper
Callocephalon fimbriatum	Gang-gang Cockatoo
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo
Climacteris picumnus victoriae	Brown Treecreeper (south-eastern)
Erythrotriorchis radiatus	Red Goshawk
Falco hypoleucos	Grey Falcon
Grantiella picta	Painted Honeyeater
Hirundapus caudacutus	White-throated Needletail
Lathamus discolor	Swift Parrot
Melanodryas cucullata cucullata	Hooded Robin (south-eastern)
Neophema chrysostoma	Blue-winged Parrot
Polytelis swainsonii	Superb Parrot
Rostratula australis	Australian Painted Snipe
Stagonopleura guttata	Diamond Firetail
Litoria booroolongensis	Booroolong Frog
Aprasia parapulchella	Pink-tailed Worm-lizard
Delma impar	Striped Legless Lizard
Chalinolobus dwyeri	Large-eared Pied Bat
Dasyurus maculatus maculatus	Spot-tailed Quoll
Notamacropus parma	Parma Wallaby
Nyctophilus corbeni	Corben's Long-eared Bat
Petauroides volans	Greater Glider (southern and central)
Petaurus australis australis	Yellow-bellied Glider (south-eastern)
Petrogale penicillata	Brush-tailed Rock-wallaby
Phascolarctos cinereus	Koala
Pseudomys novaehollandiae	New Holland Mouse
Pteropus poliocephalus	Grey-headed Flying-fox
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
Ozothamnus tesselatus	
Dichanthium setosum	bluegrass
Swainsona murrayana	Slender Darling-pea
Lepidium aschersonii	Spiny Peppercress
Pomaderris brunnea	Rufous Pomaderris
Androcalva procumbens	
Thesium australe	Austral Toadflax

No nationally threatened species were recorded on site during surveys. Marginal habitat was considered to be present for threatened flora species such as *Eucalyptus glaucina* (Slaty Red Gum). Habitat of varying quality was considered to be available for those mobile threatened species such as woodland birds, megachiropteran bats and microchiropteran bats. The action will result in an incremental loss/modification of habitat within the locality for these species. The removal of trees as a result of the proposal will also result in an incremental reduction of seasonal foraging habitat for the majority of birds listed above, as well as the Grey-headed Flying Fox. The proposal will result in an incremental loss of foraging and roosting/nesting habitat for these species in the local area, however it is not likely to have a significant impact on any of these species.

- *migratory species protected under international agreements;*

Twelve nationally listed migratory species were recorded on the DCCEEW 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)
- *Monarcha melanopsis* (Black-faced Monarch)
- *Motacilla flava* (Yellow Wagtail)
- *Myiagra cyanoleuca* (Satin Flycatcher)
- *Rhipidura rufifrons* (Rufous Fantail)

Migratory Wetland Species:

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

Migratory Marine Birds

- *Apus pacificus* (Fork-tailed Swift)

Considering the impacts on habitat in the locality it is unlikely that these species or any of the listed migratory species would be significantly affected by the proposal.

- *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.

11.0CONCLUSION

In conclusion, the proposed subdivision of the 81.23ha subject site (Lots 101 & 103 DP 1170190) will result in an incremental reduction of habitat within the local area. However, given the retention of a number of areas of better-quality habitat within zoned C3 – Environment Management and taking the mitigation measures into consideration, is unlikely to have a significant impact on any addressed threatened species, endangered populations or threatened ecological communities considered within this report.

12.0BIBLIOGRAPHY

Bell SAJ, Rockley C, Llewellyn A. (2019). Flora of the Hunter Region, Endemic Trees and Larger Shrubs. March 2019. CSIRO Publishing.

Churchill, S. (2008). Australian Bats (2nd edn). Allen & Unwin Australia.

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

Cropper, S. (1993). *Management of Endangered Plants.* CSIRO Publications, East Melbourne.

DCCEEW (Department of Climate Change, Energy, the Environment and Water) (2024a). EPBC Act Protected Matters Report for a 10 Kilometre radius search from the centre of the subject land. Department of the Environment, Commonwealth of Australia. Accessed via, https://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl >.

DCCEEW (Department of Climate Change, Energy, the Environment and Water) (2022b). *Commonwealth species profiles and threats database (SPRAT*). Department of the Environment, Commonwealth of Australia.

DAWE (Department of Agriculture, Water and the Environment) (2016). Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Regions). Accessed via <https://datasets.seed.nsw.gov.au/dataset/interim-biogeographic-regionalisation-for-australia-ibra-version-7-regions />

DoE (Department of the Environment) (2013). *Matters of National Significance. Significant Impact Guidelines 1.1* Environment Protection and Biodiversity Conservation Act 1999.

DPE (Department of Planning and Environment), (2024a). BioNet Atlas NSW Wildlife Database selected area. (Data extracted 2 November 2023).

DPE (Department of Planning and Environment), (2024b). NSW Biodiversity Values Map_v16.2 accessed via <https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BVMap>.

DPE (Department of Planning and Environment), (2024c) BioNet vegetation classification database. Accessed via < http://www.environment.nsw.gov.au/research/Visclassification.htm>

DPE (Department of Planning and Environment), (2024d). Profiles of threatened species, population, and ecological communities. Accessed via <http://www.environment.nsw.gov.au/threatenedspeciesapp/>

DPIE (Department of Planning, Industry and Environment), (2011). *Soil and Land Resources of the Hunter Region, version 1.5, NSW Department of Planning, Industry and Environment, Parramatta.*

DPIE (Department of Planning, Industry and Environment) (2017) BioNet NSW (Mitchell) Landscapes – Version 3.1 accessed via < https://datasets.seed.nsw.gov.au/dataset/nsw-mitchell-landscapes-version-3-1>.

DPIE (2023). Department of Planning, Industry and Environment, 2020, Soil and Land Resources of the Hunter Region, version 1.5, NSW Department of Planning, Industry and Environment, Parramatta.

Harden, G (1991-2000). *Flora of New South Wales*. Vols 1-4. NSW University Press.

Kovac, M. and Lawrie, J.W. (1991). Soil Landscapes of the Singleton 1:250 000 Sheet. Soil Conservation. Service of NSW, Sydney.

Landcom (2004). *Managing Urban Stormwater: Soils and Construction.* National Library of Australia, Canberra, Australia

Leonard, G. (2007). *Eucalypts: A Bushwalker's Guide. Second Edition* New South Wales University Press, Sydney.
LPI (Land and Property Information NSW), (2023). NSW Imagery Web Services.

Nearmap (2023) Aerial image of the subject land.

NSW Government (2018) *Australia's IBRA Bioregions and sub-bioregions*. Accessed via <https://www.seed.nsw.gov.au/> (Data extracted 2 November 2023).

NSW Government (2023). NSW SEED Mapping. Accessed via <https://www.seed.nsw.gov.au/>

OEH (Office of Environment and Heritage) (2018). *Threatened Species Test of Significance Guidelines.* State of New South Wales and Office of Environment and Heritage 2019.

Pizzey, G. & Knight, F. (2012). The field guide to the birds of Australia. (9th edn). HarperCollins Publishers, Australia.

PlantNET (The NSW Plant Information Network System) (2023) *Royal Botanic Gardens and Domain Trust, Sydney.* http://plantnet.rbgsyd.nsw.gov.au.

Robinson, L. (2003). *Field Guide to the Native Plants of Sydney*. 3rd edn. Kangaroo Press Pty. Ltd., New South Wales.

Triggs, B. (1996). *Mammal Tracks and Signs-A Field Guide for South-eastern Australia.* Oxford University Press, Melbourne.

Van Dyck, S. & Strahan, R. (Ed) (2008). *The Mammals of Australia*. 3rd edn. New Holland Publishers, Australia.

Wildthing Environmental Consultants (2011). Tree Clearance Supervision – Stage 6 – Ironbark Ridge Estate, Muswellbrook NSW. McCloy Group. 15 April 2011.

Wildthing Environmental Consultants (2011). Tree Clearance Supervision – Stage 2A – Ironbark Ridge Estate, Muswellbrook NSW. McCloy Group. 9 December 2011.

Wildthing Environmental Consultants (2012). Seven Part Test on Threatened Flora & Fauna for a proposed Rezoning at Lots 101 & 103 DP 1170190 Ironbark Road, Muswellbrook NSW. Ian & Faye Webber.

Wildthing Environmental Consultants (2015a). Targeted threatened orchid searches - Lots 101 & 103 DP 1170190 Ironbark Road, Muswellbrook NSW. Letter Report, 6 October 2015. MM Hyndes Bailey & Co.

Wildthing Environmental Consultants (2015b). Addendum Letter – Seven Part Test on the presence of *Diuris tricolor* (Pine Donkey Orchid). Letter Report, 22 December 2015. MM Hyndes Bailey & Co.

Wildthing Environmental Consultants (2017). Addendum Report for a proposed rezoning at Lots 101 & 103 DP 1170190 Ironbark Road, Muswellbrook NSW. December 2017. MM Hyndes Bailey & Co.

APPENDIX A

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.

National

N Weed of National Significance (WoNS)

Table A1: Flora species recorded within the study area

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	WEEDS	FLOWERING PERIOD
CLASS FILICOPSIDA (Ferns)							
Pteridaceae							
Cheilanthes distans	Bristly Cloak Fern						
Cheilanthes sieberi ssp. *sieberi*	Mulga Fern						
MAGNOLIOPSIDA: Magnoliidae							
LILOPSIDA: (Monocotyledons)							
Asparagaceae							
Arthropodium strictum syn. *Dichopogon strictus*	Chocolate Lily						
Lomandra filiformis	Wattle Mat-rush						
Lomandra glauca	Pale Mat-rush						
Lomandra multiflora subsp. *multiflora*	Many-flowered Mat-rush						Sept
Asphodelaceae							
Caesia parviflora	Pale Grass-lily						
Dianella caerulea var. caerulea	Blue Flax-lily						
Dianella revoluta	Blue Flax-lily						
Tricoryne elatior	Yellow Rush-lily						
Commelinaceae							
Commelina cyanea	Scurvy Weed						
Cyperaceae							
**Cyperus eragrostis*	Umbrella Sedge						
Fimbristylis dichotoma	Common Fringe Sedge						
Hypoxidaceae							
Hypoxis hygrometrica	Golden Weather-grass						
Iridaceae							
**Romulea rosea* var. *australis*	Onion Grass						
Juncaceae							
**Juncus cognatus*							
Juncus usitatus	Common Rush						

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	WEEDS	FLOWERING PERIOD
Orchidaceae							
Diuris tricolor	Pine Donkey Orchid	V	V		E U R*		Sept. Oct, Nov
Microtis parviflora	Slender Onion Orchid						Sept, Oct
Poaceae							
Aristida ramosa var. *ramosa*	Three-awn Speargrass				W?		
Aristida vagans	Three-awn Speargrass						
Austrostipa scabra	Speargrass						
Austrostipa verticillata	Slender Bamboo Grass						
**Avena fatua*	Wild Oats						
**Axonopus fissifolius*	Narrow-leaved Carpet Grass						
Bothriochloa decipens	Red grass						
**Bromus catharticus*	Prairie Grass						
**Cenchrus clandestinus syn Pennisetum clandestinum*	Kikuyu						
Chloris ventricosa	Tall Windmill Grass						
Cynodon dactylon	Common Couch						
Cymbopogon refractus	Barbed Wire Grass						
Digitaria divaricatissima	Umbrella Grass						
Digitaria parviflora	Smallflower Fingergrass						
Enteropogon acicularis							
Eragrostis brownii	Browns Love Grass						
Eragrostis leptostachya	Paddock Lovegrass						
**Lolium perenne*	Perennial Ryegrass						
**Melinis repens*	Red Natal Grass						
Microlaena stipoides var. *stipoides*	Weeping Meadow Grass						
Panicum effusum	Hairy Panic						
**Paspalum dilatatum*	Paspalum						
Paspalum distichum	Water Couch						
Rytidosperma fulvum	Wallaby Grass						
**Setaria parviflora* syn. *Setaria gracillis*	Slender Pigeon Grass						
Sporobolus creber	Slender Rats Tail						
Themeda triandra syn. *Themeda australis*	Kangaroo Grass						Oct, Nov
MAGNOLIIDAE (Dicotyledons)							
Aizoaceae							
**Galenia pubescens*	Galenia						

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	WEEDS	FLOWERING PERIOD
Amaranthaceae							
**Gomphrena celosioides*	Gomphrena Weed						
Nyssanthes diffusa	Barbwire Weed						
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						
**Cirsium vulgare*	Spear Thistle						Sept
**Conyza bonariensis*	Flax-leaved Fleabane						
**Facelis retusa*	Facelis						
Glossocardia bidens syn. *Glossogyne tannensis*	Cobbler's Tack						
**Hypochaeris radicata*	Catsear, Flatweed						
**Lactuca serriola*	Prickly Lettuce						
**Senecio madagascariensis*	Fireweed						Sept, Oct
Sigesbeckia orientalis	Indian-Weed						
**Sonchus oleraceus*	Common Sow Thistle						
**Taraxacum officinale*	Dandelion						
Vittadinia cuneata var. *cuneata*	Fuzzweed						Sept, Oct
Boraginaceae							
**Echium plantagineum*	Paterson's Curse						

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	WEEDS	FLOWERING PERIOD
**Heliotropium amplexicaule*	Blue Heliotrope						
Brassicaceae							
**Lepidium africanum*	Peppercress						
Cactaceae							
**Opuntia stricta*	Prickly Pear						
Campanulaceae							
Lobelia purpurascens	White Root						
Wahlenbergia communis	Native Bluebell, Tufted Bluebell						
Wahlenbergia gracillis	Sprawling Bluebell						
Caryophyllaceae							
**Cerastium glomeratum*	Mouse Ear Chickweed						
**Petrorhagia nanteuilii*	Proliferous Pink						Sept, Oct
**Silene gallica* var. *gallica*	French Catchfly						Sept, Oct
**Stellaria media*	Common Chickweed						Aug, Sept
Casuarinaceae							
Allocasuarina luehmannii	Bulloak						
Chenopodiaceae							
Einadia hastata	Berry Saltbush						
Einadia nutans	Nodding Saltbush						
Enchylaena tomentosa	Ruby Saltbush						
Maireana microphylla	Small-leaf Bluebush				E?		
Convolvulaceae							
Dichondra repens	Kidney Weed						
Euphorbiaceae							
**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						

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	WEEDS	FLOWERING PERIOD
**Medicargo polymorpha*	Burr Medic						
**Trifolium arvense*	Haresfoot Clover						
**Trifolium campestre*	Hop Clover						Sept, Oct
**Trifolium repens*	White Clover						Sept, Oct
Fabaceae (Subfamily Mimosoideae)							
Acacia decora	Western Silver Wattle				U*		
Acacia paradoxa	Kangaroo Wattle						Sept, Oct
Gentianaceae							
**Cenaurium erythraea*	Common Centaury						
Geraniaceae							
Erodium crinitum	Blue Heronsbill						Sept, Oct
Geranium solanderi	Native Geranium						
Hypericaceae							
Hypericum gramineum	Native St Johns Wort						
Lamiaceae							
Mentha satureioides	Native Pennyroyal						
**Stachys arvensis*	Stagger Weed						
Lauraceae							
**Cinnamomum camphora*	Camphor Laurel						
Loranthaceae							
Amyema miquelii	Box Mistletoe						
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						

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	WEEDS	FLOWERING PERIOD
Meliaceae							
Melia azedarach var. *australasica*	White Cedar						
Myrtaceae							
Eucalyptus albens x Eucalyptus moluccana?							
Eucalyptus blakelyi	Blakely's Red Gum						
Eucalyptus crebra	Narrow-leaved Ironbark						Sept, Oct
Eucalyptus moluccana	Grey Box						Mar
Oleaceae							
Notelaea microcarpa	Native Olive						
**Olea europaea* subsp. *cuspidata*	African Olive						
Oxalidaceae							
Oxalis perennans	-						
Phyllanthaceae							
Phyllanthus virgatus	Spurge						
Plantaginaceae							
Plantago debilis							
**Plantago lanceolata*	Plantain						
Polygonaceae							
Persicaria decipens	Slender Knotweed						
Rumex brownii	Swamp Dock						
**Rumex crispus*	Curled Dock						
Portulacaceae							
Portulaca oleracea	Purslane, Pigweed						
Primulaceae							
**Lysimachia arvensis* syn. *Anagallis arvensis*	Scarlet Pimpernel						
Ranunculaceae							
Ranunculus lappaceus	Common Buttercup						

SCIENTIFIC NAME	COMMON NAME	BC ACT	EPBC ACT	SAII	REGIONALLY SIGNIFICANT	WEEDS	FLOWERING PERIOD
Rubiaceae							
Asperula conferta	Common Woodruff						
**Richardia humistrata*							
Scrophulariaceae							
Eremophila debilis	Amulla						
Myoporum montanum	Western Boobialla						
**Verbascum virgatum*	Twiggy Mullein						
Solanaceae							
Solanum cinereum	Narrawa Burr						
**Solanum nigrum*	Blackberry Nightshade						
Stackhousiaceae							
Stackhousia viminea	Slender Stackhousia						
Verbenaceae							
**Verbena bonariensis*	Purple Top						
**Verbena rigida* var. *rigida*	Veined Verbena						
Zygophyllaceae							
Tribulus sp.	Caltrop						

APPENDIX B

HABITAT TREE DATA

Significant Tree Data Key for Table B1.

- ***DBH** – Diameter at Breast Height. Tree trunk diameter measured at breast height (1.4 metres above ground level).
- ***Tree Height** –(m)
- **Coordinates** - **GDA – 2020, MGA 56**
- **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 Owls and 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

Arboreal Termite Nest – provides potential nesting opportunities for hollow-dependent birds, such as kingfishers and kookaburras

Table B1: Details of habitat trees within the subject land.

Tree No.	Species	Easting GDA2020	Northing GDA2020	DBH (m)	Height (m)	Habitat				Comments	Removal Required?
						Class 1	Class 2	Class 3	Class 4		
1	*Eucalyptus moluccana* Grey Box	302968	6425417	0.75	28			2	3		Potentially Remove
2	*Eucalyptus crebra* Narrow-leaved Ironbark	302969	6425323	0.7	25			2	3		Retain
3	Dead Tree	302795	6425266	0.6	15		1	6	10		Remove
4	Dead Tree	302872	6425196	0.8	14	3	1	6	6		Remove
5	*Eucalyptus moluccana* Grey Box	302891	6425072	0.6	14	2	2	5	2		Retain
6	*E. moluccana*	302901	6425092	0.6	14	3	2	7			Retain
7	*E. crebra*	303069	6425282	0.4	20				1		Remove
8	*E. crebra*	303076	6425245	0.4 + 0.4	20			1 spout			Remove
9	*E. crebra*	302870	6425015	0.9	16	3			2		Retain
10	*E. crebra*	302851	6424969	0.5	25	1					Remove
11	*E. crebra*	302815	6424950	0.6	23			1	2		Retain
12	*E. crebra*	302799	6424897	0.5	18			5			Retain
13	Dead Tree	302811	6424814	0.6	16	2	3	2			Potentially Remove
14	*E. moluccana*	302767	6424824	0.55	12		1	6	1		Retain
15	Dead Tree	302762	6424762	0.8	14	3	2	2			Retain
16	*E. moluccana*	302736	6424769	0.7	15	1 scar base	2	2			Retain
17	*E. moluccana*	302703	6424753	0.85	16	1	2		1		Retain
18	Dead Tree	302689	6424745	0.75	17	2	3	2	2		Retain
19	*E. moluccana*	302683	6424736	0.7	16	2	3	3	2		Retain
20	*E. moluccana*	302754	6424731	0.7	16	1	2				Retain
21	*E. moluccana*	302761	6424738	0.65	16		1				Retain
22	*E. moluccana*	302766	6424743	0.5	12		3	2	1		Retain
23	*E. moluccana*	302774	6424737	0.8	16		3	2	2		Retain
24	Dead Tree	302789	6424716	0.55	8	4	1	1		Hollow throughout	Retain
25	*Eucalyptus blakelyi* Blakely's Red Gum	302797	6424718	0.7	18			2			Retain
26	*E. blakelyi*	302812	6424719	0.4	18			1			Retain
27	*E. blakelyi*	302812	6424725	0.6	16				1		Retain
28	*E. blakelyi*	302817	6424724	0.35	17		2	4	1		Retain

Tree No.	Species	Easting GDA2020	Northing GDA2020	DBH (m)	Height (m)	Habitat				Comments	Removal Required?
						Class 1	Class 2	Class 3	Class 4		
29	*E. moluccana*	302814	6424734	0.7	17		1	1			Retain
30	Dead Tree	302840	6424708	0.75	7	1 spout	1 at base				Retain
31	*E. blakelyi*	302836	6424717	0.55	17		1		2		Retain
32	*E. moluccana*	302834	6424722	0.45	16		1 spout	2			Retain
33	*E. moluccana*	302860	6424740	1.0	15	3	3	2			Retain
34	*E. moluccana*	302862	6424711	0.8	14	1	4	4	2		Potentially Remove
35	*E. blakelyi*	302857	6424698	0.75	17		1	5	2		Potentially Remove
36	*E. moluccana*	302865	6424707	0.6	16	1 spout		2			Remove
37	Dead Tree	302870	6424717	0.5	6	2 (1 spout)	2	1			Remove
38	*E. moluccana*	302879	6424716	0.75	18	1	2	2			Remove
39	*E. moluccana*	302878	6424681	0.45	13	2 (1 spout)	2	2			Remove
40	Dead Tree	302919	6424706	0.5	12		3	7	3		Remove
41	Dead Tree	302935	6424683	1.0	12	4	7	5	8		Remove
42	Dead Tree	302950	6424678	0.55	10	2	5	2	1		Remove
43	*E. moluccana*	302974	6424731	0.6	14		5	4	3		Remove
44	*E. moluccana*	302953	6424744	0.5	14	1	2	1			Remove
45	*E. moluccana*	302925	6424770	0.7	18	1	3	5	4		Remove
46	*E. moluccana*	302996	6424773	0.85	16	5 (2 spouts)	4	2			Remove
47	*E. moluccana*	302916	6424805	1.1	16	2 spouts	1	1			Remove
48	Dead Tree	302876	6424820	0.6	10	2	3	4	3		Remove
49	Dead Tree	302872	6424818	0.45	13		1	1	4		Remove
50	*E. moluccana*	302874	6424814	0.45	10	1					Remove
51	Dead Tree	302871	6424813	0.3	10		1	1			Remove
52	Dead Tree	302864	6424807	0.7	10	1	2	3	2		Remove
53	*E. moluccana*	302853	6424783	0.5	12	1 spout					Remove
54	*E. moluccana*	302890	6424847	1.0	14	2	1	2	1		Remove
55	*E. crebra*	302890	6424990	0.55	19			1	1		Remove
56	*E. crebra*	302953	6425030	0.8	16			3			Potentially Remove
57	*E. crebra*	303001	6425121	0.8	20		1				Retain

Tree No.	Species	Easting GDA2020	Northing GDA2020	DBH (m)	Height (m)	Habitat				Comments	Removal Required?
						Class 1	Class 2	Class 3	Class 4		
58	*E. crebra*	303251	6425355	0.7	20		2 spouts	3			Remove
59	*E. crebra*	303241	6425309	0.85	20		1				Remove
60	*E. crebra*	303197	6425247	0.8	19	1	2				Remove
61	*E. crebra*	303155	6425194	0.45	16		1				Remove
62	Dead Tree	303113	6425096	0.5	12		7	6	5		Remove
63	*E. moluccana*	303023	6425073	0.8	16	1 spout		3			Remove
64	*E. crebra*	303010	6425038	0.5	18			1			Remove
65	*E. crebra*	303035	6425021	0.6	18			1			Remove
66	*E. crebra*	302987	6424982	0.5	18			4 (1 at base)			Remove
67	Dead Tree	303054	6424933	0.65	10	5		5	10		Remove
68	*E. moluccana*	303036	6424666	0.85	11	3 (2 spouts)	5	4	2		Remove
69	Dead Tree	303070	6424672	0.9	14	3	3	8	6		Remove
70	*E. moluccana*	303108	6424642	0.85	16		2	4	3		Remove
71	*E. moluccana*	303170	6424628	0.5	17			3			Remove
72	*E. moluccana*	303182	6424634	0.55	16		2	5	4		Remove
73	*E. moluccana*	303226	6424602	0.5	14		2	2	1		Potentially Remove
74	*E. moluccana*	303271	6424614	0.5	16		1 spout				Remove
75	*E. moluccana*	303273	6424619	0.3	6		1 spout				Remove
76	*E. moluccana*	303281	6424621	0.4	14	1 spout					Remove
77	*E. moluccana*	303289	6424625	0.3	6		1 spout				Potentially Remove
78	*E. moluccana*	303291	6424621	0.4	16			2			Potentially Remove
79	*E. moluccana*	303286	6424612	0.5	17		1 spout				Potentially Remove
80	Dead Tree	302850	6425502	1.0	20	5	5	5			Retain
81	*E. crebra*	302790	6425522	0.5	16				2		Retain
82	*E. crebra*	302781	6425519	0.7	18				1		Retain
83	*E. crebra*	302781	6425510	1.1	25	1 beehive			3		Retain
84	*E. crebra*	302773	6425517	0.9	22		1		1		Retain

Tree No.	Species	Easting GDA2020	Northing GDA2020	DBH (m)	Height (m)	Habitat				Comments	Removal Required?
						Class 1	Class 2	Class 3	Class 4		
85	*E. crebra*	302742	6425525	0.9	25		3		5	Tree no longer present	No Longer Standing
86	*E. crebra*	302705	6425442	1.0	20	1	1		2		Remove
87	*E. crebra*	302670	6425454	1.0	25		1	1	2		Remove
88	*E. crebra*	302650	6425529	0.9	20		1	3	2		Remove
89	*E. crebra*	302601	6425426	1.0	25				1		Retain
90	*E. crebra*	302632	6425368	1.0	22		2	2	2		Remove
91	*E. crebra*	302569	6425477	1.0	20		4	4	5		Remove
92	*E. crebra*	302544	6425443	0.7	22		2		2		Remove
93	*E. crebra*	302499	6425440	1.2	25	1	2				Remove
94	*E. crebra*	302423	6425527	1.0	25			1 beehive	7		Retain
95	*E. crebra*	302373	6425569	0.85	17		1		2		Retain
96	*E. crebra*	302350	6425543	0.65	20	2			2		Retain
97	*E. crebra*	302242	6425574	1.2	25				1		Potentially Remove
98	*E. crebra*	302241	6425548	0.8	18	1	2	4	3		Potentially Remove
99	*E. crebra*	302236	6425548	0.8	22	1 spout					Potentially Remove
100	*E. crebra*	302206	6425547	1.0	25	1		1	1		Retain
101	*E. crebra*	302182	6425545	0.9	18	3	4	3	3		Retain
102	*E. crebra*	302238	6425529	0.75	25			1	2		Remove
103	*E. crebra*	302190	6425470	1.1	25	1 spout					Potentially Remove
104	*E. crebra*	302208	6425468	0.8	20	1	2	2			Potentially Remove
105	*E. crebra*	302273	6425489	0.8	20	3			2		Remove
106	*E. crebra*	302277	6425406	0.9	25			2	2		Remove
107	*E. crebra*	302340	6425407	1.1	30		1	2		Tree no longer present	No Longer Standing
108	*E. moluccana*	302453	6425433	1.0	22		2		2		Remove
109	*E. moluccana*	302576	6425328	0.7	18	1 spout				Tree no longer present Hollow throughout	No Longer Standing
110	*E. crebra*	302631	6425259	0.6	18			1	2	Tree no longer present	No Longer Standing
111	*E. moluccana*	303286	6424606	0.5	18		1 spout	4			Potentially Remove

Tree No.	Species	Easting GDA2020	Northing GDA2020	DBH (m)	Height (m)	Habitat				Comments	Removal Required?
						Class 1	Class 2	Class 3	Class 4		
112	*E. moluccana*	303275	6424605	0.5	16			2			Remove
113	*E. moluccana*	303276	6424597	0.4	9	1 low spout		1			Remove
114	*E. moluccana*	303284	6424594	0.4	14		1	3	1		Potentially Remove
115	*E. moluccana*	303297	6424590	0.55	15		1	2			Retain
116	*E. moluccana*	303303	6424600	0.45 + 0.45	16	2 spouts	2				Retain
117	*E. moluccana*	303306	6424593	0.3	14			1			Retain
118	Dead Tree	303311	6424593	0.3	5	2		1			Retain
119	Dead Tree	303333	6424590	0.3	11			2	3		Retain
120	Dead Tree	303336	6424592	0.3	10			5	4		Retain
121	*E. moluccana*	303335	6424600	0.4	14			2			Retain
122	*E. moluccana*	303339	6424608	0.3 + 0.3	15			2			Retain
123	Dead Tree	303347	6424600	0.45	10		2	4	2		Retain
124	*E. moluccana*	303347	6424595	0.65	14			2	3		Retain
125	Dead Tree	303341	6424588	0.45	15		1	5	6		Retain
126	*E. moluccana*	303386	6424602	0.5	13	1 spout		2			Retain
127	*E. moluccana*	303393	6424578	0.7	14	2 spouts					Retain
128	*E. moluccana*	303406	6424571	0.4	12		1	3			Retain
129	*E. moluccana*	303418	6424594	0.6	12	2 spouts	2	1			Retain
130	*E. moluccana*	303416	6424610	0.8	15	1	2	7	1		Retain
131	*E. moluccana*	303452	6424555	0.75	13	2 spouts	2	7	2		Retain
132	*E. moluccana*	303473	6424558	0.8	16		1	7	4		Retain
133	*E. moluccana*	303476	6424576	0.8	18			4			Retain
134	*E. moluccana*	303495	6424600	0.9	18	1		4			Retain
135	*E. moluccana*	303487	6424594	0.85	18	1 spout	2	4			Retain
136	*E. moluccana*	303477	6424618	0.9	20	3 (1 spout)	2	7	3		Retain
137	*E. moluccana*	303474	6424667	0.8	18		2	8	4		Retain
138	*E. moluccana*	303499	6424680	0.5	17		3				Retain
139	*E. moluccana*	303478	6424697	0.6	17	2 spouts		3		Hollow throughout	Retain

Tree No.	Species	Easting GDA2020	Northing GDA2020	DBH (m)	Height (m)	Habitat				Comments	Removal Required?
						Class 1	Class 2	Class 3	Class 4		
140	*E. moluccana*	303471	6424715	0.8	13	1 spout	1	6			Potentially Remove
141	Dead Tree	303506	3424743	0.7	10	2	4	5		Hollow throughout	Retain
142	Dead Tree	303500	3424758	0.6	17	1	4	8			Retain
143	*E. moluccana*	303490	3424782	0.75	14	1 spout				Open scar	Retain
144	*E. moluccana*	303469	6424760	0.65	18	2	3	7	1		Remove
145	Dead Tree	303434	6424698	0.7	16	1 scar, 1 spout	1	5			Retain
146	Dead Tree	303446	6424682	0.8	14	3 (1 spout)	4	4	3		Retain
147	*E. moluccana*	303423	6424655	1.1	14	2 spouts	4	5	2		Retain
148	*E. moluccana*	303403	6424698	0.65	14		3	4	2		Retain
149	Dead Tree	303369	6424672	0.65	13	1 spout	3	5	1		Retain
150	*E. moluccana*	303353	6424668	0.7	15	1 spout		2			Retain
151	Dead Tree	303341	6424654	0.3	7		4 (1 spout)	3	1		Retain
152	*E. moluccana*	303326	6424665	0.4	5	1 spout					Retain
153	*E. moluccana*	303318	6424678	0.45	12			1			Retain
154	*E. moluccana*	303315	6424678	0.4	12		2 spouts				Retain
155	*E. moluccana*	303296	6424659	0.4	13		1 spout	1			Retain
156	*E. moluccana*	303294	6424657	0.4	13		1	4			Retain
157	*E. moluccana*	303313	6424647	0.55	16			5			Retain
158	*E. moluccana*	303317	6424641	0.6	15		2	1	1		Retain
159	Dead Tree	303308	6424624	0.45	15	1 spout	2	2	1		Retain
160	*E. moluccana*	303283	6424643	0.6	17		1	3			Remove
161	Dead Tree	303290	6424643	0.4	10	1			2		Potentially Remove
162	*E. moluccana*	303301	6424707	0.85	14	1		5			Retain
163	Dead Tree	303337	6424721	0.8	17	2 spouts	3	5	4		Retain
164	Dead Tree	303283	6424736	0.75	14	4	6	3	3		Remove
165	Dead Tree	303283	6424732	0.75	14	4 (1 spout)	1	3	1		Remove
166	*E. moluccana*	303311	6424787	0.8	16	3	5	2	1		Remove
167	Dead Tree	303350	6424819	0.9	12	2	2		1		Remove

Tree No.	Species	Easting GDA2020	Northing GDA2020	DBH (m)	Height (m)	Habitat				Comments	Removal Required?
						Class 1	Class 2	Class 3	Class 4		
168	*E. moluccana*	303322	6424882	0.75	18	1 scar	1	1			Remove
169	*E. crebra*	303151	6424803	0.7	20			2	1		Remove
170	*E. moluccana*	303397	6424852	0.75	18	2 spouts	1	2			Remove
171	Dead Tree	303449	6424834	0.55	15	2 spouts	3	3			Remove
172	*E. moluccana*	303422	6424862	0.5	14	2 spouts	1				Remove
173	Dead Tree	303409	6424924	0.65	16	2	2	3	1		Remove
174	*E. crebra*	303292	6425040	0.50	18			2	2		Remove
175	*E. crebra*	303432	6425082	1.0	20		1	2	2		Remove
176	*E. crebra*	303401	6425246	0.5	16				1		Remove
177	*E. crebra*	303376	6425231	0.45	15				1		Remove
178	*E. crebra*	303364	6425247	0.4	16				2		Remove
179	Dead Tree	303334	6425278	0.55	10		3	4	5		Remove
180	*E. crebra*	303304	6425248	0.5	11		1	1			Remove
181	*E. crebra*	303300	6425244	0.7	17				1		Remove
182	*E. moluccana*	303305	6425298	0.7	12		1				Remove
183	*E. moluccana*	303308	6425299	0.8	8	1 at base					Remove