



BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT (SMALL AREA)

FOR A
PROPOSED SUBDIVISION

AT
**512 RAYMOND TERRACE ROAD,
THORNTON NSW 2322**

Prepared by:

Firebird ecoSultants Pty Ltd

ABN – 16 105 985 993

PO Box 354
Newcastle NSW 2300

Mob: 0414 465 990

Ph: 02 4910 3939

Fax: 02 4929 2727

Email: sarah@firebirdeco.com.au



Site Details:	512 Raymond Terrace Road, Thornton NSW 2322 (Lot 191 DP 827070)				
Prepared by:	<p>Sarah Jones B.Env.Sc., G.DIP.DBPA (Design for Bushfire Prone Areas) BAAS18020 Accredited Assessor Firebird ecoSultants Pty Ltd ABN – 16 105 985 993</p> <p>PO Box 354, Newcastle NSW 2300</p> <p>M: 0414 465 990 Email: sarah@firebirdeco.com.au T: 02 4910 3939 Fax: 02 4929 2727</p>				
Prepared for:	Terry and Susan Bunt				
Reference No.	Thornton – Terry and Susan Bunt – January 2022				
Document Status & Date:	Version	Description	Date	Author(s)	Technical Reviewer
	1	Version 1	17/01/2022	Thomas Stephens	Sarah Jones
	2	Version 2	26/10/2022	Oliver Broun	Sarah Jones

Executive Summary

Introduction

Firebird ecoSultants Pty Ltd has been engaged by Terry and Susan Bunt to provide a Biodiversity Development Assessment Report (BDAR) for a proposed subdivision ('the proposal') at 512 Raymond Terrace Road, Thornton NSW 2322 (Lot 191 DP 827070) ('the site' or 'the subject site').

The proposal includes the development of a subdivision. The site is ~1.99 ha in size and is located in the northern periphery of the residential portion of Thornton. The site is zoned as R1 General Residential. The site contains an existing home dwelling and three sheds, driveway and remnant vegetation. No drainage canals occur on site. In accordance with the Strahler stream ordering system in Appendix 3 of the BAM, there are no streams located in or near the site. The site is surrounded by residential development lots. The site does not contain important mapped areas for threatened species or any mapped biodiversity values.

Landscape features

Details	Response
IBRA Region and Subregion	Dominant landscape forms have been used to divide Australia into bioregions. The site is within the Sydney Basin IBRA bioregion and the Hunter IBRA subregion. There are no other IBRA bioregions or subregions near the site. See previous Figure 1-1 for the locations of IBRA regions/subregions within 1.5 km of the site.
Mitchell Landscape	Mitchell Landscapes are used to describe areas in NSW in a broad sense and group together areas with relatively homogenous geomorphology, soils and broad vegetation types and are mapped at a scale of 1:250000. The subject site is within the Newcastle Coastal Ramp landscape. This landscape region has an estimated cleared fraction of 0.54. See previous Figure 1-1 for the locations of Mitchell Landscapes within 1.5 km of the site.
Percent Native Vegetation Cover	All areas of native vegetation cover, within the site and within a 1,500 m buffer area surrounding the site, have been mapped; see Figure 2-1. It is estimated, from this mapping, that the native vegetation cover would be 30%.
Wetlands, Streams, Rivers, and Estuaries	A first order stream which previously entered the north-eastern corner of the site, has since been removed by the residential development occurring around the site (Figure 1-1 for watercourses within 1.5 km of the site).
Connectivity Features	The site's native vegetation is one of several patches of remnant forest in the Thornton area. Thornton and the surrounding areas have been extensively cleared for residential development. The nearest relatively large area of intact bushland occurs ~150m to the west of the site.
Areas of Geological Significance and Soil Hazard Features	Karsts, caves, crevices and/or cliffs are not present within the 1,500m buffer. No soil hazards were identified on the site or within a 1,500 m buffer around the site.
Areas of Outstanding Biodiversity Value	Under the BC Act, the Minister for the Environment may declare Areas of Outstanding Biodiversity Value (AOBV). These are special areas that contain irreplaceable biodiversity values that are considered important to NSW,



	Australia or globally. No listed AOBV occur within the site or within a 1,500 m buffer around the site.
--	---

Assessment Method

As the area of the site is smaller than 40ha and the area of clearing is also less than 2ha, the streamlined assessment method – small area is applied to the development in accordance with Section 2.2 and Appendix C of the Biodiversity Assessment Method.

Patch Size

There is one patch of vegetation that is within 100m of the site’s native vegetation; however, this patch (including the site) are missing vegetation structural layers that are typical of the site’s PCTs, such as the upper and lower mid stratum. It has been determined that the patch size is 10 ha.

Plant Community Types

Attribute	Details
PCT 1600 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter	
Formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation Class	Hunter-Macleay Dry Sclerophyll Forests
TEC status	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregion
PCT Percent Cleared	71%
Justification for PCT Selection	Surveys undertaken by Firebird ecoSultants have confirmed the presence of several typical species associated with PCT 1600, including; <i>Corymbia maculata</i> (Spotted Gum), <i>Eucalyptus Fibrosa</i> (Red Ironbark), <i>Eucalyptus moluccana</i> (Grey Box) This PCT is also mapped as occurring within the area on the Greater Hunter Native Vegetation Mapping.
Impacted by the proposal?	Yes – Directly impacted by the proposal



Vegetation Integrity

PCT	Vegetation Zone (VZ)	Composition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score
PCT 1600 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter	VZ 1: Degraded	74.7	16.9	58.9	42

Habitat Assessment

The following describes the habitat attributes of the study area;

- No caves, tunnels, mines or culverts occur within the site;
- One hollow-bearing tree was identified within the site at the time of surveys

Avoidance of Impacts to the site's biodiversity values

PCT 1600 within the site is considered to be threatened. The proposal does not avoid impacts to this community; therefore, it is recommended that native species are used for landscaping within the development.

Direct Impacts

PCT	BC Act Name / Listing Status	EPBC Act Name / Listing Status	Vegetation Zone (VZ) Name	Direct Impact
PCT 1600 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter	Endangered Ecological Community	Not Listed	VZ1: Degraded	0.19ha



Abbreviations

Abbreviation	Meaning
AOBV	Areas of Outstanding Biodiversity Value
BAM	Biodiversity Assessment Methodology 2020
BC Act	<i>Biodiversity Conservation Act 2016</i>
BDAR	Biodiversity Development Assessment Report
DCP	Development Control Plan
DEC	Department of Environment and Conservation
DECC	Department of Environment and Climate Change
DECCW	Department of Environment, Climate Change and Water
DEE	Department of Environment and Energy
DoE	Department of Environment
EP&A Act	<i>Environmental Planning and Assessment Act 1979</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
Ha	Hectare
LEP	Local Environmental Plan
LGA	Local Government Area
MU	Map Unit
NPWS	NSW National Parks and Wildlife Service
OEH	Office of Environment and Heritage
PCT	Plant Community Type
PFC	Projected Foliage Cover
SAII	Serious and Irreversible Impacts
TBCD	Threatened Biodiversity Data Collection
TEC	Threatened Ecological Community



CONTENTS

1	INTRODUCTION	1
1.1	Description of the Proposal	1
1.2	General Site Description	1
1.3	The Study Area	1
1.4	Assessment Method	2
1.5	Information sources	2
	1.5.1 Database Searches	2
	1.5.2 Regional Vegetation Mapping	2
	1.5.3 Literature Review	3
2	STAGE 1 – BIODIVERSITY ASSESSMENT	7
2.1	Landscape features	7
2.2	Native vegetation	8
	2.2.1 Native Vegetation Cover Within the Site	8
	2.2.2 Patch Size	8
	2.2.3 Identifying Plant Community Types	11
	2.2.4 Vegetation Integrity Assessment	14
2.3	Threatened Species	16
	2.3.1 Identify Threatened Species for Assessment	17
	2.3.2 Ecosystem Credit Species	17
	2.3.3 Species Credit Species (Candidate Species)	21
	2.3.4 Habitat Assessment	24
2.4	Biodiversity Risk Weighting	25
3	IMPACT ASSESSMENT	26
3.1	Avoiding and Minimising Impacts	26
	3.1.1 Minimisation of Impacts	26
	3.1.2 Avoidance of Impacts	26
3.2	Assessment of Direct and Indirect Impacts	32
	3.2.1 Direct Impacts	32
	3.2.2 Indirect Impacts	34
	3.2.3 Potential Prescribed Biodiversity Impacts	38
3.3	Impact Summary	38
	3.3.1 Serious and Irreversible Impacts	38
	3.3.2 Impacts Which Require an Offset	38
	3.3.3 Impacts Not Requiring an Offset	38
	3.3.4 Identification of Areas Not Requiring Assessment	38
4	BIODIVERSITY CREDIT REPORT	39
5	BIBLIOGRAPHY	40
	APPENDIX A SITE PLANS	A-1
	APPENDIX B PLOT FLORISTIC SURVEY DATA	B-2
	APPENDIX C RECORDED SPECIES LIST	C-1
	APPENDIX D QUALIFICATIONS, LICENSING AND CERTIFICATION	D-2
	APPENDIX E BAM SUMMARY REPORTS	E-4
	APPENDIX F PHOTOS	F-5



TABLES

Table 2-1: Landscape Features	7
Table 2-2: Review of Existing Information on the Site's PCTs	11
Table 2-3: Plant Community Types within the site that are impacted by the proposal	12
Table 2-4: Vegetation Zones and Patch Size Classes	14
Table 2-5: Vegetation Integrity Scores	16
Table 2-6: Ecosystem Credit Species Predicted to occur within the Study Area	18
Table 2-7: Candidate Species Assessment	22
Table 3-1: Proposed Mitigation Measures	30
Table 3-2: Direct Impacts on Native Vegetation	32
Table 3-3: Change in Vegetation Integrity (VI) Scores	33
Table 3-4: Likelihood Criteria	34
Table 3-5: Consequence Criteria	35
Table 3-6: Risk Matrix	35
Table 3-7: Risk Assessment for all Identified Potential Indirect Impacts	36

FIGURES

Figure 1-1: Location Map	4
Figure 1-2: Site Map	5
Figure 1-3: Biodiversity Values Map	6
Figure 2-1: Native Vegetation Extent within a 1.5 km Radius of the Site	9
Figure 2-2: Native Vegetation Extent within the Site	10



I INTRODUCTION

Firebird ecoSultants Pty Ltd has been engaged by Terry and Susan Bunt to provide a Biodiversity Development Assessment Report (BDAR) for a proposed subdivision ('the proposal') at 512 Raymond Terrace Road, Thornton NSW 2322 (Lot 191 DP 827070) ('the site' or 'the subject site'). See Figure 1-1 for the Location Map and Figure 1-2 for the Site Map. This BDAR has been prepared to satisfy the requirements of the *Biodiversity Conservation Act 2016* (BC Act). This assessment has been undertaken in accordance with the Biodiversity Assessment Method 2020.

I.1 Description of the Proposal

The proposal is for the development of a subdivision at 512 Raymond Terrace Road, Thornton NSW 2322 (Lot 191 DP 827070) The proposed development footprint is indicated in Figure 1-2. It totals an area of 1.99 ha, resulting in the clearing of all vegetation within the site.

Refer to Appendix A for Site Plans.

I.2 General Site Description

The proposal includes the development of a subdivision. The site is ~1.99 ha in size and is located in the northern periphery of the residential portion of Thornton. The site is zoned as R1 General Residential. The site contains an existing home dwelling and three sheds, drive way, and remnant vegetation. No drainage canals occur on site. In accordance with the Strahler stream ordering system in Appendix 3 of the BAM, there are no streams within or near the site. The site is surrounded by residential lots. The site does not contain important mapped areas for threatened species or any mapped biodiversity values.

See Figure 1-1 for the site location.

I.3 The Study Area

The study area is the area of land within the site that has been assessed in this report, which is the area of vegetation within the site that is relevant to this BDAR i.e. the area of vegetation within or potentially impacted by the construction and operational footprint. Land within the site that is not considered to be impacted by the proposal (either directly or indirectly) is considered to be outside the study area. In this case however, the study area encompasses the entire site.



I.4 Assessment Method

As the area of the site is smaller than 40ha and the area of clearing is also less than 2ha, the streamlined assessment method – small area is applied to the development in accordance with Section 2.2 and Appendix C of the Biodiversity Assessment Method.

I.5 Information sources

I.5.1 Database Searches

The following database searches were undertaken, in order to compile a list of threatened flora and fauna species predicted to occur in the area:

- Review of threatened fauna and flora records within a 10 km radius of the site, contained in the OEH *Atlas of NSW Wildlife* (NSW BioNet).
- Review of the MNES records within a 10 km radius of the site, using the Commonwealth Department of Environment and Energy (DEE), EPBC Act Protected Matters Search Tool.

I.5.2 Regional Vegetation Mapping

Regional scale vegetation mapping, previously undertaken in the area, was reviewed. This included a review of *Greater Hunter Native Vegetation Mapping v4.0. VIS ID 3855*.



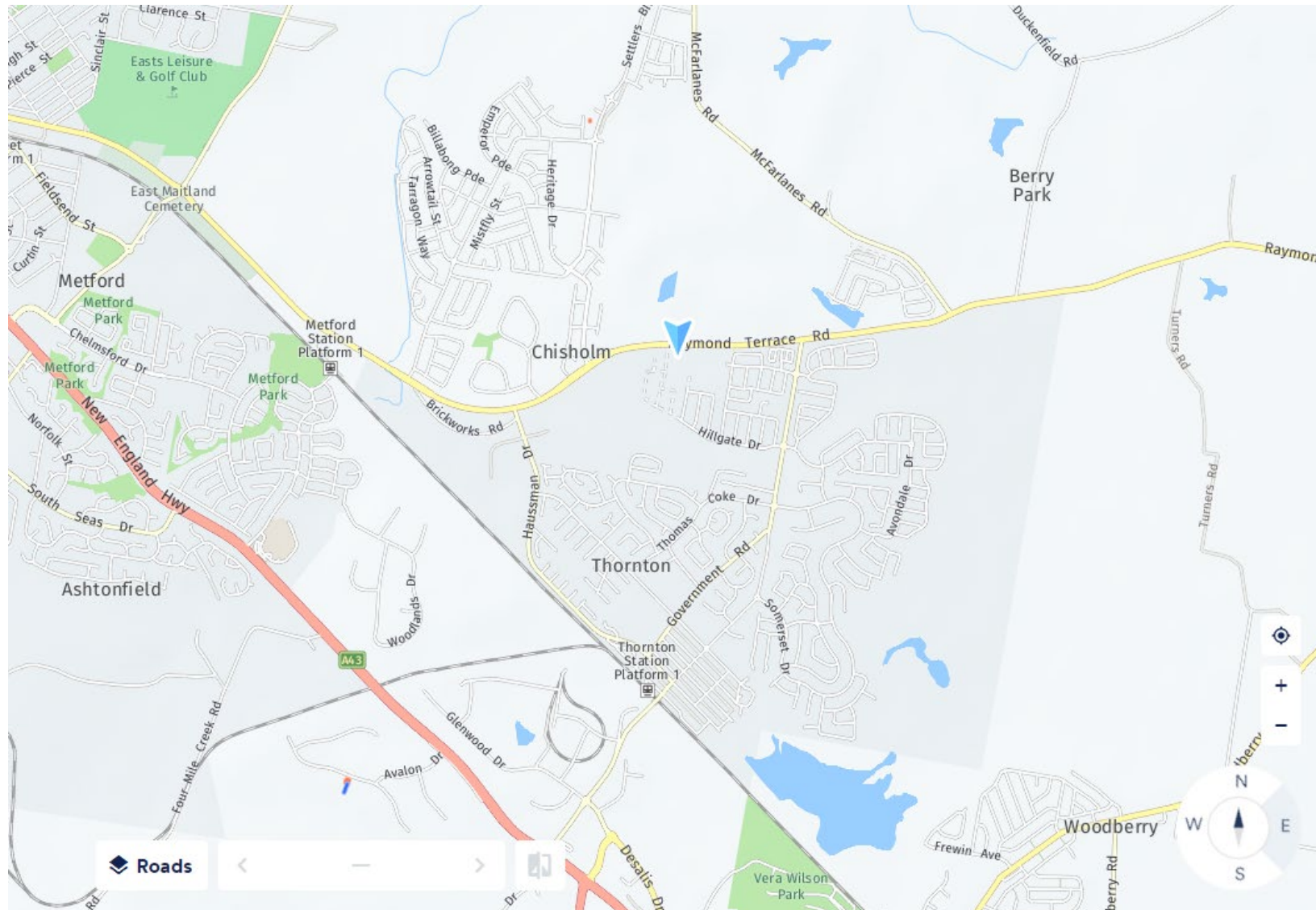
I.5.3 Literature Review

Information sources reviewed included, but were not limited to:

- Aerial Photograph Interpretation (API)
- Relevant guidelines, including:
 - OEH *Biodiversity Assessment Method*, 2020
 - *NSW Guide to Surveying Threatened Plants* (OEH, 2016)
 - *'Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method* (OEH, 2018)
 - *NSW Survey Guide for Threatened Frogs: A guide for the survey of frogs and their habitats for the Biodiversity Assessment Method* (DPI&E, 2020)
 - *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (Department of Environment and Conservation (DEC), 2004)
- Any environmental / ecological reports relevant to the site or area, including vegetation mapping.
- Online tools and resources, including:
 - BAM Calculator (OEH, 2020)
 - BioNet Vegetation Classification (OEH, 2020)
 - BioNet Threatened Biodiversity Data Collection (OEH, 2020)
 - Directory of Important Wetlands in Australia (Department of Environment and Energy (DEE), 2010)
 - NSW Scientific Committee Final Determinations (NSW Scientific Committee various dates)
 - Commonwealth Threatened Species Scientific Committee (TSSC) Final Determinations for threatened species (TSSC Various Dates)
 - OEH Threatened Species, Populations and Ecological Communities website
 - Commonwealth DEE Species, Profile and Threats Database
 - PlantNET NSW (Botanic Gardens Trust, 2018).



Figure 1-1: Location Map



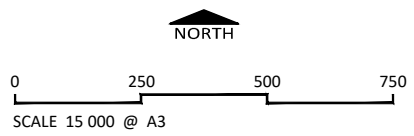
- Legend**
- Subject Site
 - 1.5km Buffer
 - Lower Hunter Channels and Floodplains
 - Newcastle Coastal Ramp
 - 1st Order Watercourse
 - 2nd Order Watercourse
 - - - 10m Riparian Buffer
 - - - 20m Riparian Buffer



Note:
 Boundaries are not survey accurate.
 Although all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

FIGURE 1-1: LOCALITY MAP

CLIENT Client
SITE DETAILS No.512 Raymond Terrace Road Thornton
DATE 4 December 2021

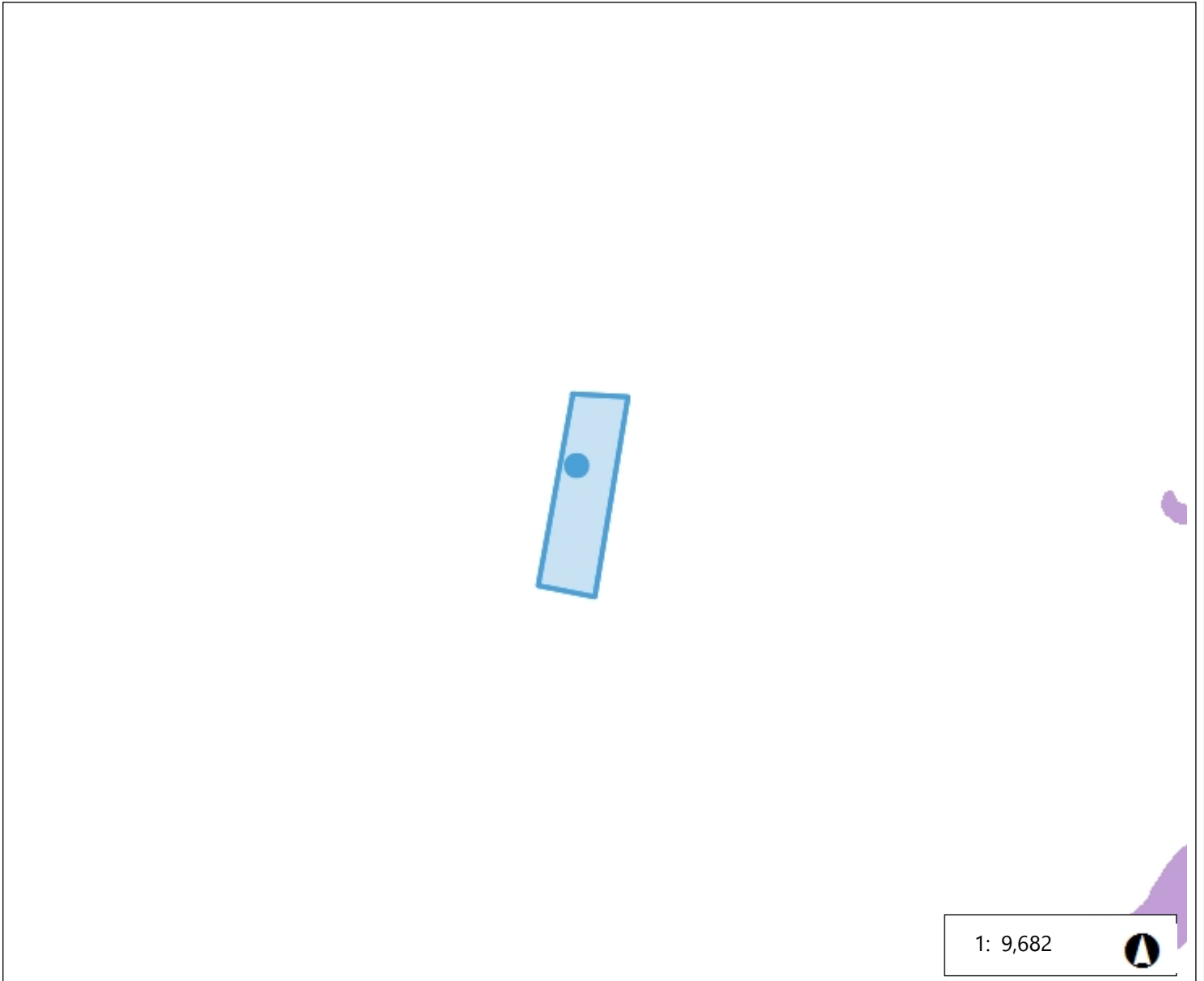


Firebird ecoSultants Pty Ltd
 ABN - 16 105 985 993
 Level 1, 146 Hunter Street, Newcastle NSW 2300
 P O Box 354 Newcastle NSW 2300



DISCLAIMER
 This document and the information shown shall remain the property of Firebird ecoSultants Pty Ltd. The document may only be used for the purpose for which it was supplied and in accordance with the terms of engagement for the commission. Unauthorised use of this document in any way is prohibited.

Biodiversity Offset Scheme (BOS) Entry Threshold Map





491.8 0 245.91 491.8 Metres
WGS_1984_Web_Mercator_Auxiliary_Sphere

This map is a user generated static output from an Internet mapping site and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Legend

-  Biodiversity Values that have been mapped for more than 90 days
-  Biodiversity Values added within last 90 days

Notes

© Office of Environment and Heritage |
NSW Environment & Heritage

2 STAGE I – BIODIVERSITY ASSESSMENT

2.1 Landscape features

This section details the landscape features occurring on the Subject Land or within the assessment area (i.e. a 1.5 km buffer) surrounding the Subject Land; see Table 2-1.

Table 2-1: Landscape Features

Details	Response
IBRA Region and Subregion	Dominant landscape forms have been used to divide Australia into bioregions. The site is within the Sydney Basin IBRA bioregion and the Hunter IBRA subregion. There are no other IBRA bioregions or subregions near the site. See previous Figure 1-1 for the locations of IBRA regions/subregions within 1.5 km of the site.
Mitchell Landscape	Mitchell Landscapes are used to describe areas in NSW in a broad sense and group together areas with relatively homogenous geomorphology, soils and broad vegetation types and are mapped at a scale of 1:250000. The subject site is within the Newcastle Coastal Ramp landscape. This landscape region has an estimated cleared fraction of 0.54. See previous Figure 1-1 for the locations of Mitchell Landscapes within 1.5 km of the site.
Percent Native Vegetation Cover	All areas of native vegetation cover, within the site and within a 1,500 m buffer area surrounding the site, have been mapped; see Figure 2-1. It is estimated, from this mapping, that the native vegetation cover would be 30%.
Wetlands, Rivers, Streams and Estuaries	A first order stream which previously entered the north-eastern corner of the site, has since been removed by the residential development occurring around the site (Figure 1-1 for watercourses within 1.5 km of the site).
Connectivity Features	The site's native vegetation is one of several patches of remnant forest in the Thornton area. Thornton and the surrounding areas have been extensively cleared for residential development. The nearest relatively large area of intact bushland occurs ~150m to the west of the site.
Areas of Geological Significance and Soil Hazard Features	Karsts, caves, crevices and/or cliffs are not present within the 1,500m buffer. No soil hazards were identified on the site or within a 1,500 m buffer around the site.
Areas of Outstanding Biodiversity Value	Under the BC Act, the Minister for the Environment may declare Areas of Outstanding Biodiversity Value (AOBV). These are special areas that contain irreplaceable biodiversity values that are considered important to NSW, Australia or globally. No listed AOBV occur within the site or within a 1,500 m buffer around the site.



2.2 Native vegetation

2.2.1 Native Vegetation Cover Within the Site

The site contains 0.19ha of native vegetation. The extent of native vegetation to be assessed in this BDAR (i.e. the area of native vegetation within or potentially impacted by the construction and operational footprint) is 0.19ha; see Figure 2-2 for the native vegetation extent within the site.

2.2.2 Patch Size

A patch is defined in the BAM as an area of intact native vegetation that occurs on the subject land. The patch may extend onto adjoining land beyond the footprint of the subject land, and for woody ecosystems, includes native vegetation separated by ≤ 100 metres from the next area of intact native vegetation. For non-woody vegetation, this gap is reduced to ≤ 30 metres. Intact vegetation must contain all structural layers (strata) characteristic of the PCT. Plot data should not be solely relied upon when determining whether vegetation is intact. If all structural growth form groups expected to exist within the community are present within the vegetation zone and/or adjoining off-site native vegetation, then the vegetation meets the definition of intact. For example, if all structural growth form groups except the shrub layer are present in the plots but species that belong to the shrub growth form group occur elsewhere within the vegetation zone, then the shrub growth form group is present, and the vegetation is intact.

The site's native vegetation is not connected to small areas of bushland, the patch size has been assessed as >5 ha.

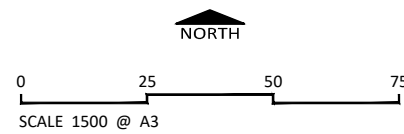
Legend
▭ Subject Site
● Native Vegetation



Note:
 Boundaries are not survey accurate.
 Although all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

FIGURE 2-2: NATIVE VEGETATION WITHIN THE SITE

CLIENT Client
SITE DETAILS No.512 Raymond Terrace Road Thornton
DATE 4 December 2021



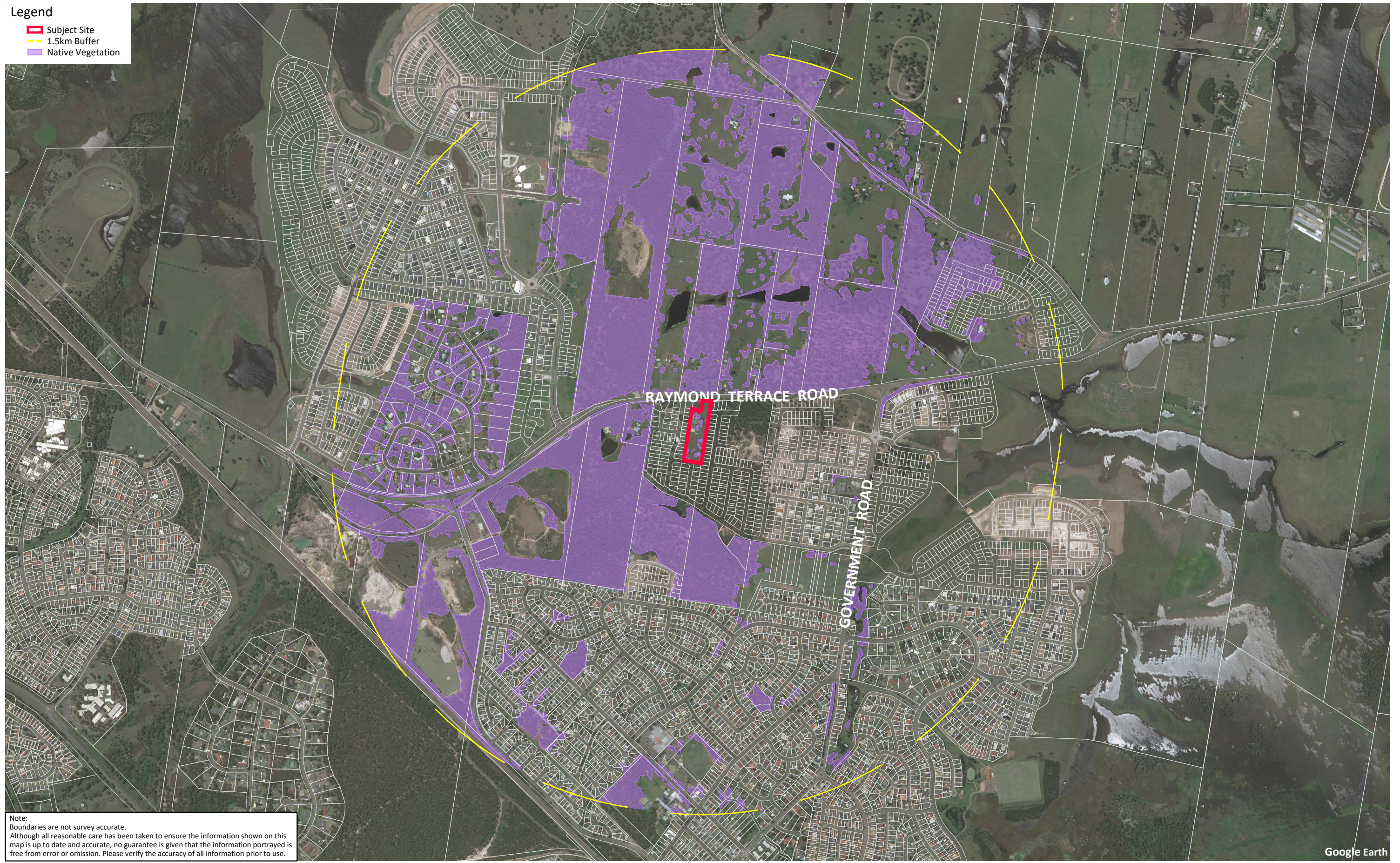
Firebird ecoSultants Pty Ltd
 ABN - 16 105 985 993
 Level 1, 146 Hunter Street, Newcastle NSW 2300
 P O Box 354 Newcastle NSW 2300



DISCLAIMER
 This document and the information shown shall remain the property of Firebird ecoSultants Pty Ltd. The document may only be used for the purpose for which it was supplied and in accordance with the terms of engagement for the commission. Unauthorised use of this document in any way is prohibited.

Legend

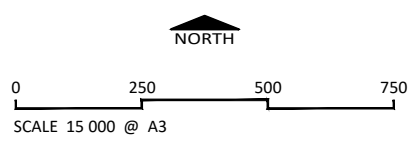
- ▭ Subject Site
- ▭ 1.5km Buffer
- ▭ Native Vegetation



Note:
 Boundaries are not survey accurate.
 Although all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

FIGURE 2 - 1: NATIVE VEGETATION EXTENT

CLIENT Client
 SITE DETAILS No.512 Raymond Terrace Road Thornton
 DATE 10 November 2022



Firebird ecoSultants Pty Ltd
 ABN - 16 105 985 993
 Level 1, 146 Hunter Street, Newcastle NSW 2300
 P O Box 354 Newcastle NSW 2300



DISCLAIMER
 This document and the information shown shall remain the property of Firebird ecoSultants Pty Ltd. The document may only be used for the purpose for which it was supplied and in accordance with the terms of engagement for the commission. Unauthorised use of this document in any way is prohibited.

2.2.3 Identifying Plant Community Types

Review of Existing Information

Table 2-3 details the review on existing information on the site’s PCTs/vegetation communities.

Table 2-2: Review of Existing Information on the Site’s PCTs

Vegetation Mapping Project	Response
Greater Hunter Native Vegetation Mapping	<p>One PCT has been mapped within the site:</p> <ul style="list-style-type: none"> PCT 1600 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter

2.2.3.1 Plot-based Floristic Surveys

Plot-based floristic vegetation surveys were undertaken within the study area in accordance with s.5.2.1.9 of the BAM, on the 28th October 2021. The 20 m x 20 m plots were sampled for the presence of flora species; see Figure 2-3 for the plot locations undertaken within the impacted PCTs (the study area) and see Appendix I for photos. The plots were carefully examined to identify all flora species present. This search continued until it was confident that all flora species within the plots were detected. Data collected for each species included:

- Stratum and layers in which each species occurs;
- Growth form for each species;
- Scientific and common name for each species;
- Percentage foliage cover (PFC) across the plot, of each species rooted in or overhanging the plot; and
- Abundance rating for each species.

Plant Community Type/s (PCTs) on the site were identified according to the NSW PCT classification described in the BioNet Vegetation Classification. One native PCT has been identified within the site; this PCT is described below. The distribution of the PCT in the development footprint is indicated in Figure 2-4. Plot data is provided in Appendix B. A full recorded species list is provided in Appendix C.

2.2.3.2 Plant Community Types

The PCT identified within the site was found to be consistent with the PCT mapped on the Greater Hunter Native Vegetation Mapping. The distribution of the site’s PCTs is indicated in Figure 2-4. See Appendix I for photos.

Table 2-3: Plant Community Types within the site that are impacted by the proposal

Attribute	Details
PCT 1600 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter	
Formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation Class	Hunter-Macleay Dry Sclerophyll Forests
TEC status	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregion
PCT Percent Cleared	71%
Justification for PCT Selection	Surveys undertaken by Firebird ecoSultants have confirmed the presence of several typical species associated with PCT 1600, including; <i>Corymbia maculata</i> (Spotted Gum), <i>Eucalyptus Fibrosa</i> (Red Ironbark), <i>Eucalyptus moluccana</i> (Grey Box) This PCT is also mapped as occurring within the area on the Greater Hunter Native Vegetation Mapping.
Impacted by the proposal?	Yes – Directly impacted by the proposal

Legend

- ▭ Subject Site
- PCT 1600

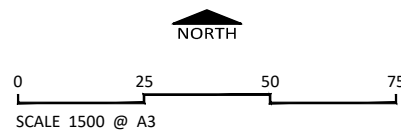


Note:
Boundaries are not survey accurate.
Although all reasonable care has been taken to ensure the information shown on this map is up to date and accurate, no guarantee is given that the information portrayed is free from error or omission. Please verify the accuracy of all information prior to use.

Google
Nearmap

FIGURE 2 - 3: PLANT COMMUNITY TYPES

CLIENT Client
SITE DETAILS No.512 Raymond Terrace Road Thornton
DATE 4 December 2021



Firebird ecoSultants Pty Ltd
ABN - 16 105 985 993
Level 1, 146 Hunter Street, Newcastle NSW 2300
P O Box 354 Newcastle NSW 2300



DISCLAIMER
This document and the information shown shall remain the property of Firebird ecoSultants Pty Ltd. The document may only be used for the purpose for which it was supplied and in accordance with the terms of engagement for the commission. Unauthorised use of this document in any way is prohibited.

2.2.4 Vegetation Integrity Assessment

Vegetation Zones

For the purposes of the BAM, a vegetation zone is an area of native vegetation on the site that is the same PCT and has a similar broad condition state. The site's impacted PCTs have been divided into several vegetation zones (as detailed in Table 2-4) (see Appendix I for photos). A patch size area has been assigned to each vegetation zone, as a class (as detailed in Table 2-4). See Appendix I for photos of each vegetation zone.

Table 2-4: Vegetation Zones and Patch Size Classes

PCT	Vegetation Zone (VZ) Name	Vegetation Description	Zone	Patch Size Class
PCT 1600 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter	VZ 1: Degraded	This vegetation zone occurs in a poor condition, with only a few large mature trees and no hollow bearing trees. The shrub layer is dominated by exotic flora cover in this vegetation zone.		<0.19 ha

Vegetation Integrity Scores

Each vegetation zone identified on the site has been surveyed to obtain a quantitative measure for each zone, of the composition, structure and function attributes listed in Table 3 of the BAM. These attributes are listed below:

- Growth form groups used to assess composition and structure:
 - Tree
 - Shrub
 - Grass and grass like
 - Forb
 - Fern
 - Other



- Attributes used to assess function:
 - Number of large trees
 - Tree regeneration
 - Tree stem size class
 - Total length of fallen logs
 - Litter cover
 - High threat exotic vegetation cover
 - Hollow-bearing trees

Plot-based surveys were conducted, in accordance with s.5.3.4 of the BAM, on 10th October 2021. Survey plots were established around a central 50 m transect and included:

- One 400 m² (20 m x 20 m) plot to assess the composition and structure attributes listed above.
- One 1000 m² (20 m x 50 m) plot to assess the function attributes: number of large trees, stem size class, tree regeneration and length of logs.
- Five 1 m² sub-plots to assess average litter cover (and other optional groundcover components).

See previous Figure 2-3 for plot locations. Plot data is provided in Appendix B. Table 2-5 details the vegetation integrity score.

Table 2-5: Vegetation Integrity Scores

PCT	Vegetation Zone (VZ)	Composition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score
PCT 1600 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter	VZ 1: Degraded	74.7	16.9	58.9	42

2.3 Threatened Species

The following has been undertaken in accordance with section 6 of the BAM.

Under the BAM, threatened species are separated into two classes, ‘ecosystem’ and ‘species’ credit species. Those threatened species where the likelihood of occurrence of a species or elements of the species’ habitat can be predicted by vegetation surrogates and landscape features, or for which a targeted survey has a low probability of detection, are identified as ‘ecosystem’ credit species. Targeted surveys are not required for ecosystem species and potential impacts to these species are assessed in conjunction with impacts to PCTs.

Threatened species where the likelihood of occurrence of a species or elements of suitable habitat for the species cannot be confidently predicted by vegetation surrogates and landscape features and can be reliably detected by survey are identified as ‘species’ credit species. A targeted survey or an expert report is required to confirm the presence or absence of these species on the subject land.

For some threatened species, they are identified as both ecosystem and species credit species, with different aspects of the habitat and life cycle representing different credit types. Commonly, threatened fauna species may have foraging habitat as an ecosystem credit, while their breeding habitat represents a species credit.

The following sections outline the process for determining the habitat suitability for threatened species within the subject lands, and the results of targeted surveys for candidate threatened species.



2.3.1 Identify Threatened Species for Assessment

Threatened species that require assessment are initially identified based upon the following criteria:

- the distribution of the species includes the IBRA subregion in which the subject land occurs
- the study area is within any geographic constraints of the distribution of the species within the IBRA subregion.
- the species is associated with any of the PCTs identified within the study area
- the native vegetation cover within an assessment area including a 1500m buffer around the study area is equal to or greater than the minimum required for the species.
- the patch size that each vegetation zone is part of is equal to or greater than the minimum required for that species.
- the species is identified as an ecosystem or species credit species in the Threatened Biodiversity Data Collection.

The process for identifying threatened species which meet the above criteria is completed through the BAM Calculator. The PCTs identified within the study area, patch sizes and native vegetation cover, as outlined in Section 3, were entered into the BAM Calculator and a preliminary list of threatened species were identified.

2.3.2 Ecosystem Credit Species

Ecosystem credit species are those where the likelihood of occurrence of the species or elements of the species' habitat, can be predicted by vegetation surrogates and landscape features, or for which targeted survey has a low probability of detection. The Threatened Biodiversity Data Collection (TBCD) has identified several ecosystem credit species as requiring assessment, for the proposal; these are listed in Table 2-6. Potential for these species to occur within the survey area was assessed, and any exclusions justified based on habitat constraints or the species potential to utilise vegetation zones



Table 2-6: Ecosystem Credit Species Predicted to occur within the Study Area

Ecosystem Credit Species	Habitat Constraints	Veg Zone - Confirmed Predicted Species	Exclusions	BC Act listing	EPBC Act listing
<i>Anthochaera Phrygia</i> Regent Honeyeater (Foraging)	-	PCT1600_Degraded = Yes	No – Habitat is substantially degraded such that the species is unlikely to occur	CE	CE
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo (Foraging)	-	PCT1600_Degraded = Yes	N/A	V	-
<i>Calyptorhynchus lathami</i> Glossy Black-Cockatoo (Foraging)	<ul style="list-style-type: none"> • Presence of Allocasuarina and casuarina species = no 	PCT1600_Degraded = No	No Allocasuarinas were located within the site.	V	-
<i>Chthonicola sagittate</i> Speckled Warbler	-	PCT1600_Degraded = Yes	No – Habitat is substantially degraded such that the species is unlikely to occur	V	-
<i>Climacteris picumnus victoriae</i> Brown Treecreeper (eastern subspecies)	-	PCT1600_Degraded = Yes	No – Habitat is substantially degraded such that the species is unlikely to occur	V	-
<i>Daphoenositta chrysoptera</i> Varied Sittella	-	PCT1600_Degraded = Yes	N/A	V	-
<i>Dasyurus maculatus</i> Spotted-tailed Quoll	-	PCT1600_Degraded = Yes	N/A	V	E
<i>Glossopsitta pusilla</i> Little Lorikeet	-	PCT1600_Degraded = Yes	No – Habitat is substantially degraded such that the species is unlikely to occur	V	-



<i>Grantiella picta</i> Painted Honeyeater	<ul style="list-style-type: none"> Mistletoes present at a density of greater than five mistletoes per hectare 	PCT1600_Degraded = No	No Mistletoes were located within the site.	V	V
<i>Haliaeetus leucogaster</i> White-bellied Sea Eagle (Foraging)	<ul style="list-style-type: none"> Within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines 	PCT1600_Degraded = No	The site is located at a distance >1km from the site.	V	-
<i>Hieraaetus morphnoides</i> Little Eagle (Foraging)	-	PCT1600_Degraded = Yes	N/A	V	-
<i>Hirundapus caudacutus</i> White-throated Needletail	-	PCT1600_Degraded = Yes	N/A	-	-
<i>Lathamus discolor</i> Swift Parrot (Foraging)	-	PCT1600_Degraded = Yes	N/A	E	CE
<i>Lophoictinia isura</i> Square-tailed Kite (Foraging)	-	PCT1600_Degraded = Yes	N/A	V	-
<i>Melanodryas cucullata cucullata</i> Hooded Robin (south-eastern form)	-	PCT1600_Degraded = Yes	N/A	V	-
<i>Micronomus norfolkensis</i> Eastern Coastal Free-tailed Bat	-	PCT1600_Degraded = Yes	N/A	V	-
<i>Miniopterus australis</i> Little Bentwing-bat (Foraging)	-	PCT1600_Degraded = Yes	N/A	V	-
<i>Miniopterus orianae oceanensis</i> Large Bentwing-bat (Foraging)	-	PCT1600_Degraded = Yes	N/A	V	-



<i>Neophema pulchella</i> Turquoise Parrot	-	PCT1600_Degraded = Yes	No – Habitat is substantially degraded such that the species is unlikely to occur	V	-
<i>Ninox connivens</i> Barking Owl (Foraging)	-	PCT1600_Degraded = Yes	N/A	V	-
<i>Ninox strenua</i> Powerful Owl (Foraging)	-	PCT1600_Degraded = Yes	No – Habitat is substantially degraded such that the species is unlikely to occur	V	-
<i>Petroica boodang</i> Scarlet Robin	-	PCT1600_Degraded = Yes	N/A	V	-
<i>Phascolarctos cinereus</i> Koala (Foraging)	-	PCT1600_Degraded = Yes	N/A	V	V
<i>Pomatostomus temporalis temporalis</i> Grey-crowned Babbler (eastern subspecies)	-	PCT1600_Degraded = Yes	N/A	V	-
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox (Foraging)	-	PCT1600_Degraded = Yes	No – Habitat is substantially degraded such that the species is unlikely to occur	V	V
<i>Saccolaimus flaviventris</i> Yellow-bellied Sheath-tail-bat	-	PCT1600_Degraded = Yes	N/A	V	-
<i>Stagonopleura guttata</i> Diamond Firetail	-	PCT1600_Degraded = Yes	N/A	V	-
<i>Tyto novaehollandiae</i> Masked Owl (Foraging)	-	PCT1600_Degraded = Yes	N/A	V	-



2.3.3 Species Credit Species (Candidate Species)

Additional threatened fauna species identified by the BAM calculator, which have the potential to utilise the study area as suitable habitat are identified in Table 2.7 below. For the streamlined assessment, targeted surveys for these species are not required.



Table 2-7: Candidate Species Assessment

Species Credit Species	Habitat Constraints / Geographic Limitations	Confirmed Candidate Species for Further Assessment	Justification of Habitat Constraints / Geographic Limitations
<i>Anthochaera phrygia</i> Regent Honeyeater (Breeding)	-	No	Habitat is substantially degraded such that the species is unlikely to occur and not recorded within the site
<i>Chalinolobus dwyeri</i> Large-eared Pied Bat	<ul style="list-style-type: none"> Cliffs Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels 	No	Habitat is substantially degraded such that the species is unlikely to occur
<i>Eucalyptus castrensis</i> Singleton Mallee	-	No	Habitat is substantially degraded such that the species is unlikely to occur and not recorded within the site
<i>Eucalyptus pumila</i> Pokolbin Mallee	-	No	Habitat is substantially degraded such that the species is unlikely to occur and not recorded within the site
<i>Lathamus discolor</i> Swift Parrot (Breeding)	<ul style="list-style-type: none"> As per mapped areas 	No	Habitat constraints not present: The study area is not within or near a mapped area of important habitat for this species.
<i>Miniopterus australis</i> Little Bent-winged Bat (Breeding)	<ul style="list-style-type: none"> Caves Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with 	No	Habitat constraints not present: The study area does not contain caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave'. No observation type code 'E nest-roost'.



	<p>microhabitat cose 'IC – in cave'</p> <ul style="list-style-type: none"> • Observation type code 'E nest-roost' • With numbers of individuals >500 • Or from the scientific literature 		
<p><i>Miniopterus orianae</i> Large Bent-winged Bat (Breeding)</p>	<ul style="list-style-type: none"> • Caves • Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code 'ICE – in cave' • Observation type code 'E nest-roost' • With numbers of individuals >500 	No	<p>Habitat constraints not present: The study area does not contain caves, tunnels, mines, culverts or other structures known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave'. No observation type code 'E nest-roost'.</p> <p>Refer to section 2.3.4 for the habitat assessment.</p>
<p><i>Persoonia pauciflora</i> North Rothbury Persoonia</p>	<ul style="list-style-type: none"> • Within 10km from North Rothbury 	No	Habitat is substantially degraded such that the species is unlikely to occur and not recorded within the site



2.3.4 Habitat Assessment

The following describes the habitat attributes of the study area;

- The site is largely infested with exotic weeds due to the surrounding land use.
- No Allocasuarinas or casuarinas, which are a food source for species such as *Calyptorhynchus lathami* (Glossy Black-Cockatoo), occur within the site – as such, the site provides limited habitat for these species.
- No caves, tunnels, mines or culverts occur within the site
- One hollow-bearing tree was identified within the site at the time of surveys

2.3.4.1 Koala Habitat Protection SEPP 2021

A development proposal must be assessed under the development assessment process under the SEPP in LGAs where no approved Koala Plan of Management is in place. This includes all land;

- a. with an area of at least 1 hectare, including adjoining land (meaning land the next cadastre over) within the same ownership, and
- b. that is within an LGA to which the SEPP applies.

A survey was completed for this species in October 2021, with no evidence found. A sighting of the species was found approximately 4.4 kilometres away from the site. The canopy cover cleared on site is <1ha. This concludes that the development will not impact this species.



2.4 Biodiversity Risk Weighting

For streamlined assessments, biodiversity risk weighting is only required for threatened species found within the site. No threatened species were identified during site visits and therefore no biodiversity risk weighting was needed



3 IMPACT ASSESSMENT

3.1 Avoiding and Minimising Impacts

The following sections 3.1.1 to 3.1.2 describe efforts undertaken to avoid and minimise impacts on biodiversity values in accordance with Chapter 7 of the BAM.

The applicant does not seek to avoid impacts to the PCT. It is acknowledged that:

- the site is zoned residential
- the site is located in an urbanised area.

The lot is approximately 1.99ha and the proposed development design requires utilisation of the entire lot. As such, there is insufficient area available to accommodate both the proposed development and avoid impacts to vegetation. Therefore, the following measures aimed at impact minimisation will be employed:

- the BOS will be utilised to offset development impacts
- the landscape design plan will utilise some species associated with the PCT or retain canopy trees within the site where possible. Post completion of works the native landscaping implemented will exceed current number of native trees found within site.

3.1.1 Minimisation of Impacts

Mitigation measures are proposed to minimise potential impacts to the site's biodiversity values; these are summarised in Table 3-1. These include measures to be implemented in the pre-construction, construction and post-construction phases. It is considered that these measures would serve to minimise any potential direct or indirect impacts.

3.1.2 Avoidance of Impacts

- Whilst avoiding all impacts on site cannot occur, due to the state of the site and how degraded the native vegetation is occurring on site the impacts will be minimal in nature.
- Loss of onsite native vegetation will be offset post construction as landscaping will implement the planting of Native species from PCT species to offset the impacted native vegetation, in doing so this will create long term native vegetation certainty within the proposed subdivision.
- Due to the ongoing surrounding developments and the fact that the site is so fragmented from nearby intact native vegetation the integrity of the site's

vegetation is already low, thus the removal of said vegetation will have little to no impact on the overall health of surrounding native vegetation.

Table 3-1 Avoid and Minimise Impacts

Locating a Project to Avoid and Minimise Impacts on Native Vegetation and Habitat in accordance with Section 7.1.1 of the BAM	
Requirements	Strategies undertaken
<p>Knowledge of biodiversity values should inform decisions about the location of the proposal. The initial assessment of biodiversity values from Stage 1 may be used to inform the early planning of the route or location of a proposal.</p>	<p>The proposed residential development occurs on land that is comprised of scattered native vegetation and surrounded by residential developments, and is not mapped on the biodiversity value map.</p>
<p>Selecting a final proposal location may be an iterative process. Decisions may need to be revisited after all field surveys have been complete</p>	<p>The proposed residential development occurs on land that is comprised of scattered native vegetation and surrounded by residential developments, and is not mapped on the biodiversity value map</p>
<p>Impacts from clearing native vegetation and threatened species habitat can be avoided or minimised by locating the proposal in areas: lacking biodiversity values</p> <p>where the native vegetation or threatened species, habitat is in the poorest condition (i.e., areas that have a low vegetation integrity score)</p> <p>that avoid habitat for species with a high biodiversity risk weighting or land mapped on the important habitat map, or native vegetation that is a TEC or a highly cleared PCT.</p> <p>outside of the buffer area around breeding habitat features such as nest trees or caves.</p>	<p>The Subject Site does not contain Biodiversity Value Mapped lands.</p> <p>The development has been located land that is comprised of highly fragmented native plants.</p> <p>No threatened species were identified within the proposed development footprint and the site has a low vegetation integrity score.</p> <p>The site is not habitat for species with a high biodiversity risk weighting or land mapped on the important habitat map, or native vegetation that is a TEC or a highly cleared PCT.</p> <p>The site does not contain any nest trees or caves.</p>
<p>When selecting a proposal's location, all of the following should be analysed. Justification for the decisions in determining the final location must be based on consideration of:</p> <p>a. alternative modes or technologies that would avoid or minimise impacts on biodiversity values</p> <p>b. alternative routes that would avoid or minimise impacts on biodiversity values</p>	<p>The has an existing dwelling 3 sheds and remnant vegetation</p>

<p>c. alternative locations that would avoid or minimise impacts on biodiversity values</p> <p>d. alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values.</p>	
<p>In the BDAR or BCAR, the assessor must document and justify any actions taken to avoid or minimise impacts through careful location of the proposal.</p>	<p>The proposal has been located in an area associated with past clearing and will remove remnant native vegetation, however proposed subdivision will offset clearing by planting of new native vegetation associated with PCT occurring on site.</p>
<p>Design the proposal to avoid or minimise direct and indirect impacts on native vegetation, threatened species, threatened ecological communities and their habitat</p>	
<p>The BDAR or BCAR must document and justify efforts to avoid or minimise impacts through design.</p> <p>Reducing the proposal’s clearing footprint by minimising the number and type of facilities</p> <p>Locating ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e., areas with the lowest vegetation integrity scores)</p> <p>Locating ancillary facilities in areas that avoid habitat for species and vegetation that has a high threat status (e.g., an endangered ecological community (EEC) or critically endangered ecological community (CEEC) or is an entity at risk of a serious and irreversible impact (SII)</p> <p>Actions and activities that provide for rehabilitation, ecological restoration and/or ongoing maintenance of retained areas of native vegetation, threatened species, threatened ecological communities and their habitat on the subject land</p>	<p>The proposed development is located in an area of cleared Land and remnant native vegetation</p> <p>There are no SII or CEEC present within the development</p>
<p>Design the proposal to avoid or minimise prescribed impacts</p>	

<p>Design measures that can avoid or minimise prescribed impacts include: a. engineering solutions, such as proven techniques to: i. minimise fracturing of bedrock underlying features of geological significance, or groundwater-dependent communities and their supporting aquifers ii. restore connectivity and movement corridors</p> <p>Design elements that minimise interactions with threatened entities, such as: i. designing turbines to dissuade perching and minimise the diameter of the rotor swept area ii. designing fencing to prevent animal entry to transport corridors iii. providing vegetated buffers rehabilitated with native species</p> <p>c. maintaining environmental processes that are critical to the formation and persistence of habitat features not associated with native vegetation</p> <p>d. maintaining hydrological processes that sustain threatened entities</p> <p>e. controlling the quality of water released from the site, to avoid or minimise downstream impacts on threatened entities.</p>	<p>Water Sensitive Urban Design (WSUD) will be implemented to ensure that water quality and runoff are appropriately similar to existing conditions within the Site and to minimise prescribed impacts on biodiversity values linked to hydrology and water quality.</p>
--	--



Table 3-1: Proposed Mitigation Measures

Action	Responsibility	Timing
Pre-construction Phase Measures		
Erosion and sediment control measures (e.g. silt fences, straw bales wrapped in geotextile etc) must be established before excavation or vegetation clearance begins and are to remain in place until all surfaces have been fully restored and stabilised.	Project manager.	Prior to commencement of any excavation or clearing works.
A pre-clearing survey will be conducted by a qualified ecologist	Project Ecologist	Prior to commencement of any excavation or clearing works.
Construction Phase Management Actions		
<p>During the clearing of native vegetation, and only if habitat trees occur within the development footprint, a suitably qualified and experienced ecologist must:</p> <ol style="list-style-type: none"> Ensure no vegetation clearing occurs outside of the approved clearing footprint. Ensure soft felling techniques are utilised for felling of any habitat/hollow-bearing trees. Supervise all habitat/hollow-bearing tree removal to capture and/or relocate any dispersed fauna. Transport any injured wildlife to appropriate veterinary care or transfer the animal to a local volunteer wildlife carer group. Provide post-clearing reporting back to Council should any threatened species be captured or encountered by clearing operations. 	Project ecologist	During clearing.
<p>Appropriate weed control measures must be implemented, including for instance:</p> <ul style="list-style-type: none"> All weeds removed from the site must be transported in a sealed container or bag and disposed at a waste management facility licenced to accept green waste. 	Project manager.	During excavation, clearing and construction works.



<ul style="list-style-type: none"> Vehicles, machinery and equipment must be free from weed material (including seeds) before entering the construction corridor. 		
Any spoil storage areas or stockpiles will have appropriate erosion control devices installed to control runoff and prevent sedimentation.	Project manager.	During excavation, clearing and construction works.
Materials, plant and equipment are not to be stored within the drip-lines of any retained trees at the site or near the site.	Project manager.	During excavation, clearing and construction works.
Topsoil is to be removed from newly cleared areas and then stockpiled for later use in the rehabilitation and/or landscaping works.	Project manager.	During excavation, clearing and construction works.
Cleared vegetation will be mulched and stockpiled for later use in any vegetation restoration/landscaping activities (provided that it doesn't contain weed material). Where possible, any felled trees may be cut into manageable sections and redistributed in the site.	Project manager.	During excavation, clearing and construction works.
Sediment and erosion control devices will be inspected regularly, maintained to ensure effectiveness over the entire duration of the project, and cleaned out before 30% capacity is reached.	Project manager.	During excavation, clearing and construction works.
Post-construction Phase Management Actions		
All temporary erosion and sediment control devices such as silt-stop fencing will be removed from the site at the completion of the works, but not until the site is fully revegetated/stabilised.	Project manager.	After construction, but not until the site is fully revegetated/stabilised.

3.2 Assessment of Direct and Indirect Impacts

The following sections 3.2.1 to 3.2.3 provide an assessment of direct and indirect impacts which were unable to be avoided at the development site in accordance with Section 8 of the BAM.

3.2.1 Direct Impacts

The following describes direct impacts on native vegetation, including impacts on TECs and threatened species through the removal of potential habitat. Direct impacts of the development are detailed in the following Tables 3-2 to 3-3.

Table 3-2: Direct Impacts on Native Vegetation

PCT	BC Act Name / Listing Status	EPBC Act Name / Listing Status	Vegetation Zone (VZ) Name	Direct Impact
PCT 1600 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter	Endangered Ecological Community	Not Listed	VZ1: Degraded	0.19ha

Table 3-3: Change in Vegetation Integrity (VI) Scores

PCT	Vegetation Zone (VZ)	Composition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score
PCT 1600 – Spotted Gum – Red Ironbark – Narrow-leaved Ironbark – Grey Box shrub-grass open forest of the lower Hunter	VZ 1: Degraded	0	0	0	0



3.2.2 Indirect Impacts

The indirect impacts of the development have been identified and are outlined in Table 3-7. A risk assessment has been undertaken for any residual impacts likely to remain after the mitigation measures have been applied. Likelihood criteria, consequence criteria and risk matrix are provided in Table 3-5, Table 3-6 and Table 3-7.

Table 3-4: Likelihood Criteria

Likelihood criteria	Description
Almost certain (Common)	Will occur, or is of a continuous nature, or the likelihood is unknown. There is likely to be an event at least once a year or greater (up to ten times per year). It often occurs in similar environments. The event is expected to occur in most circumstances.
Likely (Has occurred in recent history)	There is likely to be an event on average every one to five years. Likely to have been a similar incident occurring in similar environments. The event will probably occur in most circumstances.
Possible (Could happen, has occurred in the past, but not common)	The event could occur. There is likely to be an event on average every five to twenty years.
Unlikely (Not likely or uncommon)	The event could occur but is not expected. A rare occurrence (once per one hundred years).
Remote (Rare or practically impossible)	The event may occur only in exceptional circumstances. Very rare occurrence (once per one thousand years). Unlikely that it has occurred elsewhere; and, if it has occurred, it is regarded as unique.

Table 3-5: Consequence Criteria

Consequence category	Description
Critical (Severe, widespread long-term effect)	Destruction of sensitive environmental features. Severe impact on ecosystem. Impacts are irreversible and/or widespread. Regulatory and high-level government intervention/action. Community outrage expected. Prosecution likely.
Major (Wider spread, moderate to long term effect)	Long-term impact of regional significance on sensitive environmental features (e.g. wetlands). Likely to result in regulatory intervention/action. Environmental harm either temporary or permanent, requiring immediate attention. Community outrage possible. Prosecution possible.
Moderate (Localised, short-term to moderate effect)	Short term impact on sensitive environmental features. Triggers regulatory investigation. Significant changes that may be rehabilitated with difficulty. Repeated public concern.
Minor (Localised short-term effect)	Impact on fauna, flora and/or habitat but no negative effects on ecosystem. Easily rehabilitated. Requires immediate regulator notification.
Negligible (Minimal impact or no lasting effect)	Negligible impact on fauna/flora, habitat, aquatic ecosystem or water resources. Impacts are local, temporary and reversible. Incident reporting according to routine protocols.

Table 3-6: Risk Matrix

Consequence	Likelihood				
	Almost certain	Likely	Possible	Unlikely	Remote
Critical	Very High	Very High	High	High	Medium
Major	Very High	High	High	Medium	Medium
Moderate	High	Medium	Medium	Medium	Low
Minor	Medium	Medium	Low	Low	Very Low
Negligible	Medium	Low	Low	Very Low	Very Low



Table 3-7: Risk Assessment for all Identified Potential Indirect Impacts

Indirect Impact	Development Phase	Risk (pre-mitigation)	Risk (post-mitigation)	Nature	Extent	Frequency	Duration	Timing
Inadvertent impacts on adjacent habitat or vegetation	Construction and operation	Low	Low	Potential damage to adjacent habitat or vegetation	Adjacent vegetation	Daily, during construction	During construction	Potentially long-term impacts
Sedimentation and contaminated and/or nutrient rich run-off	Construction and operation	Low	Low	Potential runoff during construction works	Into downstream areas	During heavy rainfall or storm events	During rainfall events	Potentially long-term impacts
Noise, dust or light spill	Construction and operation	Low	Low	Noise and dust created from machinery during construction. No night works during construction. Minor noise and light during operation from residents	Adjacent vegetation	Daily during construction and sporadically during operation	Daily during construction and sporadically during operation	Short-term impacts during construction phase, long-term impacts during operation
Transport of weeds and pathogens from the site to adjacent vegetation	Construction and operation	Low	Low	Potential spread of weed and pathogens from incoming machinery and equipment, as well as from gardens established in new lots	Potential to spread into nearby habitat	During construction and operation	Ongoing for the life of the development	Potentially long-term impacts
Rubbish dumping	Construction and operation	Low	Low	Potential rubbish dumped by workers and/or residents	Potential for rubbish to spread into areas outside the development footprint	Anytime during construction and operation	Ongoing for the life of the development	Ongoing for the life of the development



Wood collection	Construction and operation	Low	Low	Potential removal of habitat by workers and/or residents	Potential habitat to be removed from areas outside the development footprint	Anytime during construction and operation	Ongoing for the life of the development	Ongoing for the life of the development
Bush rock removal and disturbance	Construction and operation	Low	Low	Potential removal of habitat by workers and/or residents	Potential habitat to be removed from areas outside the development footprint	Anytime during construction and operation	Ongoing for the life of the development	Ongoing for the life of the development
Vehicle strike	Construction and operation	Low	Very Low	Potential for native fauna to be struck by working machinery and moving vehicles	Within access roads and within development footprint	Daily, during construction and operational phases	Ongoing for the life of the development	Potential long-term impacts.
Increased risk of fire	Construction and operation	Low	Low	Potential for fire to spark during construction and operation from any machinery or electrical works	Adjacent vegetation	Anytime during construction and operation	Anytime during construction and operation	Anytime during construction and operation



3.2.3 Potential Prescribed Biodiversity Impacts

No prescribed biodiversity impacts are anticipated from the proposed development. The site does not contain any habitat features identified in s.8.2.1.2 of the BAM. The proposal would not severe or significantly interfere with a habitat corridor.

3.3 Impact Summary

3.3.1 Serious and Irreversible Impacts

The OEH (2017) *Guidance to Assist a Decision-maker to Determine a Serious and Irreversible Impact* lists the ecological communities and species that are 'potential serious and irreversible impact (SAII) entities'. There are no serious and irreversible impact (SAII) entities relevant to this assessment.

3.3.2 Impacts Which Require an Offset

Refer to Appendix E for BAM summary reports.

3.3.3 Impacts Not Requiring an Offset

N/A

3.3.4 Identification of Areas Not Requiring Assessment

N/A



4 BIODIVERSITY CREDIT REPORT

The Biodiversity Credit Report is provided in the following pages.



BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00035425/BAAS18020/22/00035426	512 Raymond Terrace Road	14/10/2022
Assessor Name	Assessor Number	BAM Data version *
Sarah Elizabeth Jones	BAAS18020	55
Proponent Names	Report Created	BAM Case Status
	06/12/2022	Finalised
Assessment Revision	Assessment Type	Date Finalised
1	Part 4 Developments (Small Area)	06/12/2022
BOS entry trigger	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.	
BOS Threshold: Area clearing threshold		

Potential Serious and Irreversible Impacts

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

Additional Information for Approval

Assessment Id	Proposal Name
00035425/BAAS18020/22/00035426	512 Raymond Terrace Road

BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT

No Changes

Predicted Threatened Species Not On Site

Name

Calyptorhynchus lathami / Glossy Black-Cockatoo

Grantiella picta / Painted Honeyeater

Anthochaera phrygia / Regent Honeyeater

Callocephalon fimbriatum / Gang-gang Cockatoo

Haliaeetus leucogaster / White-bellied Sea-Eagle

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	0.2	4	0	4

BAM Biodiversity Credit Report (Like for like)

1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions This includes PCT's: 1590, 1592, 1593, 1600, 1602	-	1600_Degraded	Yes	4	Hunter, Ellerston, Karuah Manning, Kerrabee, Liverpool Range, Peel, Tomalla, Upper Hunter, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options



BAM Biodiversity Credit Report (Like for like)

Assessment Id

00035425/BAAS18020/22/00035426

Proposal Name

512 Raymond Terrace Road

Page 4 of 4



5 BIBLIOGRAPHY

- Bladon, R.V., Dickman, C.R. and Hume, I.D. (2002). Effects of habitat fragmentation on the demography, movements and social organisation of the eastern pygmy-possum (*Cercartetus nanus*) in northern New South Wales. *Wildlife Research* 29(1) 105 – 116.
- Cropper, S. (1993). *Management of Endangered Plants*. CSIRO Publications, East Melbourne, Victoria.
- DEC (2004). *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities*. Working Draft November 2004.
- DEC (2006). *Recovery Plan for the Bush Stone-curlew *Burhinus grallarius**. Approved Recovery Plan, February 2006. Department of Environment and Conservation.
- DEE (2019). *Species Profile and Threats Database*. Accessed February 2021. <<http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>>
- Department of Environment and Climate Change (NSW) (2007). *Draft Management Plan for the Green and Golden Bell Frog Key Population in the Lower Hunter*. Department of Environment and Climate Change (NSW), Sydney.
- Francis, M.J., Spooner, P.G. and Matthews, A. (2015). The influence of urban encroachment on squirrel gliders (*Petaurus norfolcensis*): effects of road density, light and noise pollution. *Wildlife Research*, 42(4):324-333 (2015).
- Graham Pyke and Arthur White (1996) Habitat requirements for the Green and Golden Bell Frog *Litoria aurea* (Anura: Hylidae). *Australian Zoologist*: 1996, Vol. 30, No. 2, pp. 224-232.
- Harden, G. (ed) (2002). *Flora of New South Wales, Volume 2*. Revised edition. New South Wales University Press, NSW.
- Harden, G. (ed) (2000). *Flora of New South Wales, Volume 1*. Revised edition. New South Wales University Press, NSW.
- Harden, G. (ed) (1993). *Flora of New South Wales, Volume 4*. New South Wales University Press, NSW.
- Harden, G. (ed) (1992). *Flora of New South Wales, Volume 3*. New South Wales University Press, NSW.
- Meyer, E., Hero, J-M., Shoo, L. and Lewis, B. (2006). *National recovery plan for the wallum sedgefrog and other wallum-dependent frog species*. Report to Department of the Environment and Water Resources.



- Murray, M., Bell, S., Hoye, G. (2002). *Flora and Fauna Survey Guidelines: Lower Hunter Central Coast Region 2002*. Lower Hunter & Central Coast Regional Environmental Management Strategy, NSW.
- NSW Office of Water (2012). *Guidelines for Riparian Corridors on Waterfront Land*. July 2012.
- NSW Scientific Committee (2012) *Listing guidelines version 1.3, January 2012. Guidelines for interpreting listing criteria for species, populations and ecological communities under the NSW Threatened Species Conservation Act*.
- OEH (2016). *NSW Guide to Surveying Threatened Plants*, OEH, 2016.
- OEH (2017). *Biodiversity Assessment Method*, 2017 No 469.
- OEH (2017). *Guidance to Assist a Decision-maker to Determine a Serious and Irreversible Impact*.
- OEH (2019a) *Saving NSW Threatened Species*, accessed February 2021. <<http://www.environment.nsw.gov.au/threatenedspecies/>>.
- OEH (2019b) *Atlas of NSW Wildlife (BioNET)*, accessed February 2021. <<http://www.bionet.nsw.gov.au/>>.
- OEH (2019c) *Six Maps*, accessed February 2021. <http://maps.six.nsw.gov.au/apps/channels_3.5/?config=vegetation>.
- OEH (2019d). *'Species credit' threatened bats and their habitats: NSW survey guide for the Biodiversity Assessment Method*. 3 October 2018.
- Pepper, J.W. (1997). A Survey of the South Australian Glossy Black-cockatoo (*Calyptorhynchus lathami halmaturinus*) and its Habitat. *Wildlife Research* 24(2) 209 – 223.
- PSC (2014). *Technical Specifications Tree*. Version 1.0, May 2014.
- Robinson, L. (2003). *Field Guide to the Native Plants of Sydney*. 3rd ed. Kangaroo Press, Cammeray NSW.
- Rose, H. & Rose, C. (2012). *Grasses of Coastal NSW*. Department of Primary Industries, NSW.
- Richardson, F.J., Richardson, R.G. and Shepherd, R.C.H. (2016). *Weeds of the South-East: An Identification Guide for Australia*. 3rd Edition. R.G and F.J. Richardson, Meredith Vic.
- Scotts, D. (2003). *Key habitats and corridors for forest fauna: A landscape framework for conservation in north-east New South Wales*. NSW NPWS Occasional Paper 32, NSW National Parks and Wildlife Service, Sydney.
- Shelton, M.B., Phillips, S.S. and Goldingay, R.L. (2020). Habitat requirements of an



arboreal Australian snake (*Hoplocephalus bitorquatus*) are influenced by hollow abundance in living trees. *Forest Ecology and Management* Volume 455, 1 January 2020, 117675.

Sivertsen, D., Roff, A., Somerville, M., Thonell, J., and Denholm, B. (2011) *Hunter Native Vegetation Mapping. Geodatabase Guide (Version 4.0)*, Office of Environment and Heritage, Department of Premier and Cabinet, Sydney, Australia.

Smith, A.P. and Murray, M. (2003). Habitat requirements of the squirrel glider (*Petaurus norfolcensis*) and associated possums and gliders on the New South Wales central coast. *Wildlife Research* 30(3) 291 - 301

Triggs, B. (2004). *Tracks, Scats and Other Traces: a Field Guide to Australian Mammals*. Oxford University Press, Australia.

Tulloch, A.I. and Dickman, C.R. (2006). Floristic and structural components of habitat use by the eastern pygmy-possum (*Cercartetus nanus*) in burnt and unburnt habitats. *Wildlife Research* 33(8) 627-637.

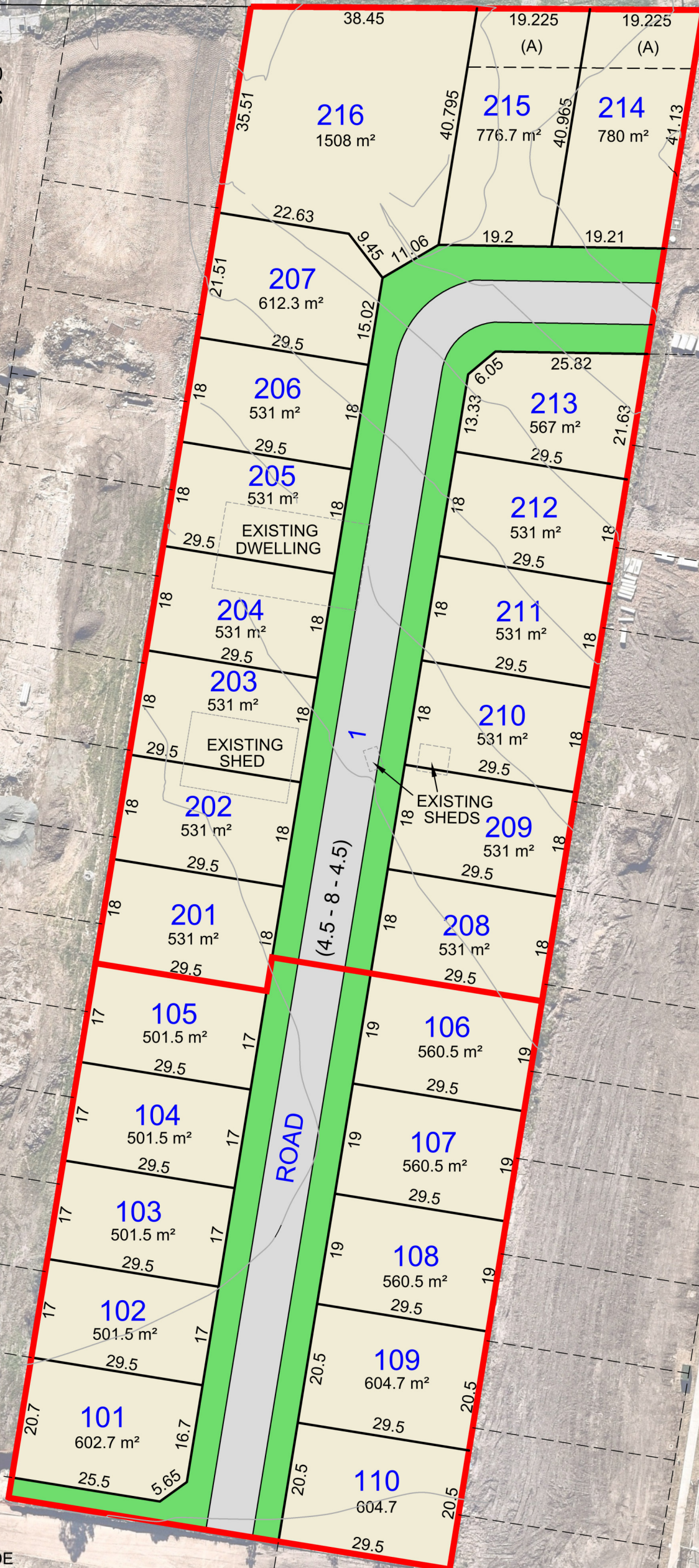
Van Dyck, S., Gynther, I. and Baker, A. (2013). *Field Companion to the Mammals of Australia*. New Holland Publishers, Sydney.

APPENDIX A SITE PLANS



RAYMOND TERRACE ROAD

STAGE 1 - LOTS 101 TO 110
STAGE 2 - LOTS 201 TO 216



(A) - POSITIVE COVENANT 10 WIDE

GENERAL RESTRICTIONS ON THE USE OF LAND EFFECTS
ALL LOTS ALL AREAS, DIMENSIONS & EASEMENTS ARE
SUBJECT TO FINAL SURVEY & APPROVALS

REV.	DATE	AMENDMENT(S)	SUR	DFT	CHK
A	05.10.21	ORIGINAL ISSUE	DL	JD	AL

DELFS LASCELLES
CONSULTING SURVEYORS

260 MAITLAND ROAD, T: (02) 4964 4886
MAYFIELD NSW 2304 E: admin@delacs.com.au
ABN: 28 164 260 100 delacs.com.au

CAD REF: 21664 - SALE

PROPOSED PLAN OF SUBDIVISION OF LOT 191 D.P.827070

SITE ADDRESS:
512 Raymond Terrace Road
RAYMOND TERRACE

CLIENT: TBC

POSITION DATUM: SSM XXXXX
ORIENTATION: MGA (GROUND)
EASTING: 362 527.102
NORTHING: 6 373 363.067
CLASS: LB ORDER: L2
HEIGHT DATUM: SSM XXXXX
CLASS: LB ORDER: L2
RL:123.456 (AHD) DATE: XX.XX.XX



SURVEYED	DRAFTED	CHECKED
	JD	AL

SCALE	PAGE SIZE	DATE
1:800	A3	05.10.21

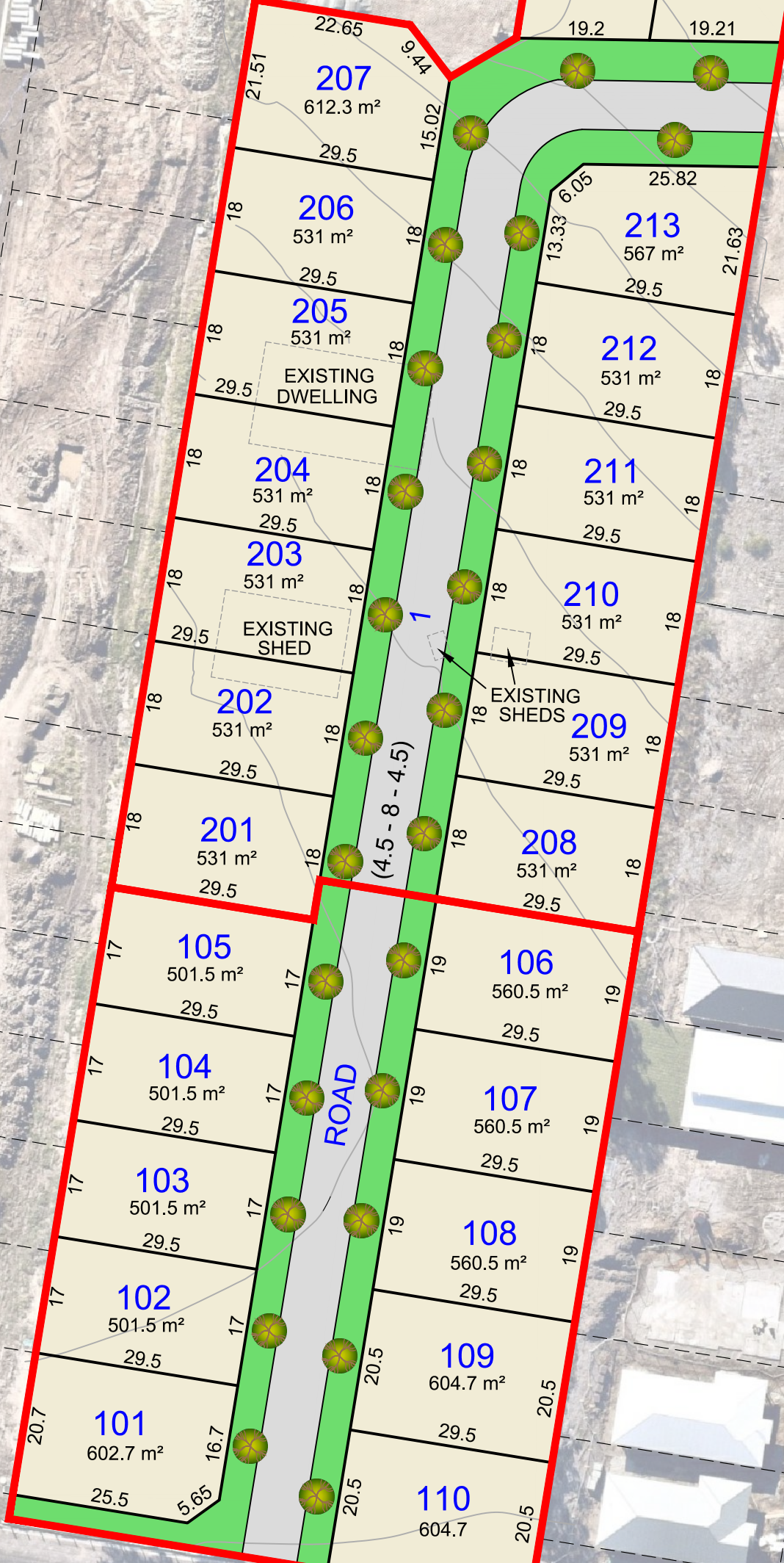
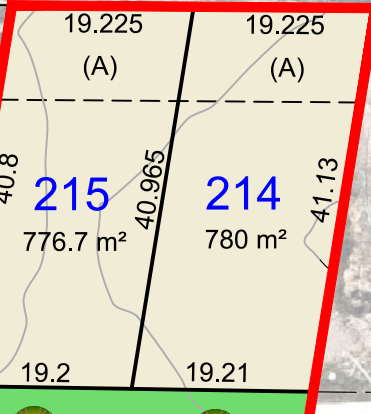
SHEET	REV.	PROJECT No.
1	A	21664



RAYMOND TERRACE ROAD

STAGE 1 - LOTS 101 TO 110
STAGE 2 - LOTS 201 TO 215

EXISTING
DETENTION
BASIN



(A) - POSITIVE COVENANT 10 WIDE

GENERAL RESTRICTIONS ON THE USE OF LAND EFFECTS
ALL LOTS ALL AREAS, DIMENSIONS & EASEMENTS ARE
SUBJECT TO FINAL SURVEY & APPROVALS

- TRISTANIOPSIS LAURINA

REV.	DATE	AMENDMENT(S)	SUR	DFT	CHK
A	05.10.21	ORIGINAL ISSUE	-	JD	AL
B	11.08.22	UPDATED INFORMATION	-	JD	AL
C	17.08.22	LANDSCAPE PLANS ADDED	-	JD	AL

DELFS LASCELLES
CONSULTING SURVEYORS

260 MAITLAND ROAD, MAYFIELD NSW 2304
ABN: 28 164 260 100

T: (02) 4964 4886
E: admin@delacs.com.au
delacs.com.au

CAD REF: 21664- SALE C

**PROPOSED PLAN OF
SUBDIVISION OF
LOT 101 DP 1279275
LANDSCAPE PLAN SHEET 2**

CLIENT: TBC

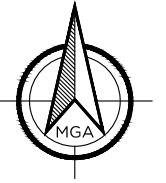
POSITION DATUM: N/A
ORIENTATION: MGA (GROUND)
EASTING: -
NORTHING: -
CLASS: -
HEIGHT DATUM: N/A
CLASS: -
RL: AHD

ORDER: -
DATE: -

SURVEYED	DRAFTED	CHECKED
-	JD	AL

SCALE	PAGE SIZE	DATE
1:800	A3	17.08.22

SHEET	REV.	PROJECT No.
2	C	21664



RAYMOND

TERRACE

ROAD

GROUND COVER PLANTING

BOTANICAL NAME	COMMON NAME
ACACIA FALCATA	FALCTE WATTLE
GOODENIA ROTUNDIFOLIA	STAR GOODENIA
JUNCUS CONTINUUS	SAND RUSH
CALLISTEMON CITRINUS	CRIMSON BOTTLEBRUSH
CALLISTEMON PALLIDUS	SILVER CLOUD
MELALEUCA QUINQUENERVIA	BROAD-LEAVED PAPERBARK
BURSARIA SPINOSA	NATIVE BLACKTHORN
THEMEDA AUSTRALIS	KANGAROO GRASS
HAKEA SERICEA	NEEDLEBUSH

ROAD WIDENING

LAPPED PINE PALING FENCE 1.8m HIGH TO MATCH EXISTING ON ADJOINING PROPERTY

GROUND COVER TO BE PLANTED BETWEEN FENCE & BOUNDARY AS PER SPECIES LISTED IN TABLE

POSITIVE COVENANT FOR LANDSCAPING

215

214

625 DP 1282012

624 DP 1282012

623 DP 1282012

- TRISTANIOPSIS LAURINA

AREA SUBJECT TO GROUND COVER PLANTING



100 DP 1279275
EXISTING DETENTION BASIN

REV.	DATE	AMENDMENT(S)	SUR	DFT	CHK
A	05.10.21	ORIGINAL ISSUE	-	JD	AL
B	11.08.22	UPDATED INFORMATION	-	JD	AL
C	17.08.22	LANDSCAPE PLANS ADDED	-	JD	AL

DELFS LASCELLES
CONSULTING SURVEYORS
260 MAITLAND ROAD, MAYFIELD NSW 2304
T: (02) 4964 4886
E: admin@delacs.com.au
delacs.com.au
ABN: 28 164 260 100

PROPOSED PLAN OF SUBDIVISION OF LOT 101 DP 1279275 LANDSCAPE PLAN SHEET 3

SITE ADDRESS:
512 RAYMOND TERRACE ROAD
RAYMOND TERRACE
CLIENT:
TBC

CAD REF: 21664- SALE C



POSITION DATUM: N/A
ORIENTATION: MGA (GROUND)
EASTING: -
NORTHING: -
CLASS: -
ORDER: -
HEIGHT DATUM: N/A
CLASS: -
ORDER: -
RL: AHD
DATE: -

SURVEYED	DRAFTED	CHECKED
-	JD	AL
SCALE	PAGE SIZE	DATE
1:400	A3	17.08.22
SHEET	REV.	PROJECT No.
3	C	21664

**APPENDIX B
DATA**

PLOT FLORISTIC SURVEY

ELOTONAL

PCT 1206 or equivalent

28/10/21

FIREBIRD - THORNTON - PLOT 1

	COVER	ABUND
Eucalyptus moluccana	10	1
Eucalyptus fibrosa	5	1
Corymbia maculata	5	1
Daviesia ulicifolia	0.2	15
Osothamnus diosmifolius	0.1	5
Flardenbergia violacea	0.2	10
Cheilanthes sieberi	0.1	30
Dionella revoluta	0.2	50
Pullenaea spirosa	0.1	5
Pullenaea retusa	0.1	1
Sporobolus creber	0.1	1
Eragrostis brownii	15 0.1	300
Arshida pa vagans	0.5	50
Microloena stipoides	1 1	150
Entolasia stricta	1 1	100
Dichelodre micrantha	2	200
Pterocarya australis	25 25	800
Panicum simile	26 26	400
Pratia purpurascens	0.1	20
Vernonia cinerea	0.1	30
Lomandra filiformis	10	800
Chrysoscephalum apiculatum	4	500
Goodenia rotundifolia	0.1	20
Glycine clandestina	0.1	25
Epulites australis	0.1	1
Juncus usitatus	0.1	5
Lomandra multiflora	0.1	8
Sida rhombifolia	0.5	400
Briza maxima	2	250
Hypochaeris radicata	0.1 1	20

	COVER	ABUND
<i>Acoelia parvipinnula</i>	0.1	2
<i>Glycine tobricina</i>	0.1	2
<i>Baccharis spinesca</i>	0.1	15
<i>Wahlenbergia</i> sp.	0.1	20
<i>Cynodon dactylon</i>	.4	200
<i>Laxmannia gracilis</i>	0.1	5
<i>Rytidosperma</i> sp.	0.1	2
<i>Brunoniella australis</i>	0.1	10
<i>Haloragis heterophylla</i>	0.1	50
<i>Echinopogon coespitosus</i>	0.1	10
<i>Brochyscome multifida</i>	0.1	3
<i>Poanthera microphylla</i>	0.1	10
<i>Poa sieberiana</i>	0.1	1

EXOTIC <i>Lolium corniculatum</i>	0.1	1
<i>Lolium</i> sp.	0.1	1
<i>Rondeletia rosea</i>	0.1	10
<i>Briza minor</i>	0.1	1
<i>Paspalum dilatum</i>	1	100
<i>Senecio madagascariensis</i>	0.2	20
<i>Plantago lanceolata</i>	1	250
<i>Cenchrus</i> sp.	0.1	10

50-79		
30-49		
20-29		
10-19		
5-9	0	
Tree regen	✓	good.

1 x hollows - see point

6m logs.

Plot 1 5m Photo.
80% litter
20% soil

Plot 2 10m
90% litter
10% soil

Plot 3 20m
90% litter
10% soil

Plot 4 30m
70% litter
30% soil

Plot 5 40m
85% litter
15% soil

APPENDIX C RECORDED SPECIES LIST

OR type/paste Scientific Name here									
Family	Scientific Name	Common Name	BC Act	EPBC	GrowthForm	N or E	HTE	Cover	Abundance
Myrtaceae	<i>Eucalyptus moluccana</i>	Grey Box	Not Listed	Not Listed	Tree (TG)	Alive in NSW, Native		10	1
Myrtaceae	<i>Eucalyptus fibrosa</i>	Red Ironbark	Not Listed	Not Listed	Tree (TG)	Alive in NSW, Native		6	1
Myrtaceae	<i>Corymbia maculata</i>	Spotted Gum	Not Listed	Not Listed	Tree (TG)	Alive in NSW, Native		5	1
Fabaceae (Faboide)	<i>Daviesia ulicifolia</i>	Gorse Bitter Pea	Not Listed	Not Listed	Shrub (SG)	Alive in NSW, Native		0.2	15
Asteraceae	<i>Ozothamnus diosmifolius</i>	White Dogwood	Not Listed	Not Listed	Shrub (SG)	Alive in NSW, Native		0.1	5
Fabaceae (Faboide)	<i>Hardenbergia violacea</i>	False Sarsaparilla	Not Listed	Not Listed	Other (OG)	Alive in NSW, Native		0.2	10
Pteridaceae	<i>Cheilanthes sieberi</i>	Rock Fern	Not Listed	Not Listed	Fern (EG)	Alive in NSW, Native		0.1	36
Phormiaceae	<i>Dianella revoluta</i>	Blueberry Lily	Not Listed	Not Listed	Forb (FG)	Alive in NSW, Native		0.2	50
Fabaceae (Faboide)	<i>Pultenaea spinosa</i>		Not Listed	Not Listed	Shrub (SG)	Alive in NSW, Native		0.1	5
Fabaceae (Faboide)	<i>Pultenaea retusa</i>		Not Listed	Not Listed	Shrub (SG)	Alive in NSW, Native		0.1	1
Poaceae	<i>Sporobolus creber</i>	Slender Rat's Tail Grass	Not Listed	Not Listed	Grass & grasslike (GG)	Alive in NSW, Native		0.1	1
Poaceae	<i>Eragrostis brownii</i>	Brown's Lovegrass	Not Listed	Not Listed	Grass & grasslike (GG)	Alive in NSW, Native		15	300
Poaceae	<i>Aristida vagans</i>	Threeawn Speargrass	Not Listed	Not Listed	Grass & grasslike (GG)	Alive in NSW, Native		0.5	50
Poaceae	<i>Microlaena stipoides</i>	Weeping Grass	Not Listed	Not Listed	Grass & grasslike (GG)	Alive in NSW, Native		21	150
Poaceae	<i>Entolasia stricta</i>	Wiry Panic	Not Listed	Not Listed	Grass & grasslike (GG)	Alive in NSW, Native		21	100
Poaceae	<i>Dichelachne micrantha</i>	Shorthair Plumegrass	Not Listed	Not Listed	Grass & grasslike (GG)	Alive in NSW, Native		2	200
Poaceae	<i>Themeda australis</i>	Kangaroo Grass	Not Listed	Not Listed	0	Alive in NSW, Native		25	600
Poaceae	<i>Panicum simile</i>	Two-colour Panic	Not Listed	Not Listed	Grass & grasslike (GG)	Alive in NSW, Native		26	400
Campanulaceae	<i>Pratia purpurascens</i>	Whiteroot	Not Listed	Not Listed	Forb (FG)	Alive in NSW, Native		0.1	20
Asteraceae	<i>Vernonia cinerea</i>		Not Listed	Not Listed	Forb (FG)	Alive in NSW, Native		0.1	30
Lomandraceae	<i>Lomandra filiformis</i>		Not Listed	Not Listed	0	Alive in NSW, Native		10	800
Asteraceae	<i>Chryscephalum apiculatum</i>	Common Everlasting	Not Listed	Not Listed	Forb (FG)	Alive in NSW, Native		4	500
Goodeniaceae	<i>Goodenia rostrivalvis</i>		Not Listed	Not Listed	Shrub (SG)	Alive in NSW, Native		0.1	20
Fabaceae (Faboide)	<i>Glycine clandestina</i>	Twining glycine	Not Listed	Not Listed	Other (OG)	Alive in NSW, Native		0.1	25
Asteraceae	<i>Epaltes australis</i>	Spreading Nut-heads	Not Listed	Not Listed	Forb (FG)	Alive in NSW, Native		0.1	1
Juncaceae	<i>Juncus usitatus</i>		Not Listed	Not Listed	Grass & grasslike (GG)	Alive in NSW, Native		0.1	5
Lomandraceae	<i>Lomandra multiflora</i>	Many-flowered Mat-rush	Not Listed	Not Listed	0	Alive in NSW, Native		0.1	8
Malvaceae	<i>Sida rhombifolia</i>	Paddy's Lucerne	Not Listed	Not Listed	0	Introduced		0.5	400
Poaceae	<i>Briza maxima</i>	Quaking Grass	Not Listed	Not Listed	0	Introduced		2	250
Asteraceae	<i>Hypochoeris radicata</i>	Catsear	Not Listed	Not Listed	0	Introduced		0.1	20
Fabaceae (Mimoso)	<i>Acacia parvipinnula</i>	Silver-stemmed Wattle	Not Listed	Not Listed	Shrub (SG)	Alive in NSW, Native		0.1	2
Fabaceae (Faboide)	<i>Glycine tabacina</i>	Variable Glycine	Not Listed	Not Listed	Other (OG)	Alive in NSW, Native		0.1	2
Pittosporaceae	<i>Bursaria spinosa</i>	Native Blackthorn	Not Listed	Not Listed	Shrub (SG)	Alive in NSW, Native		0.1	15
Campanulaceae	<i>Wahlenbergia sp. Mt Merino</i>		Not Listed	Not Listed	0	Alive in NSW, Native		0.1	20
Poaceae	<i>Cynodon dactylon</i>	Common Couch	Not Listed	Not Listed	Grass & grasslike (GG)	Alive in NSW, Native		4	200
Anthericaceae	<i>Laxmannia gracilis</i>	Slender Wire Lily	Not Listed	Not Listed	Forb (FG)	Alive in NSW, Native		0.1	5
Poaceae	<i>Rytidosperma spp.</i>		Not Listed	Not Listed	Grass & grasslike (GG)	Alive in NSW, Native		0.1	2
Goodeniaceae	<i>Brunonia australis</i>	Blue Pincushion	Not Listed	Not Listed	Forb (FG)	Alive in NSW, Native		0.1	10
Haloragaceae	<i>Haloragis heterophylla</i>	Variable Raspwort	Not Listed	Not Listed	Forb (FG)	Alive in NSW, Native		0.1	50
Poaceae	<i>Echinopogon caespitosus</i>	Bushy Hedgehog-grass	Not Listed	Not Listed	Grass & grasslike (GG)	Alive in NSW, Native		0.1	10
Asteraceae	<i>Brachyscome multifida</i>	Cut-leaved Daisy	Not Listed	Not Listed	Forb (FG)	Alive in NSW, Native		0.1	3
Phyllanthaceae	<i>Poranthera microphylla</i>	Small Poranthera	Not Listed	Not Listed	Forb (FG)	Alive in NSW, Native		0.1	10
Poaceae	<i>Poa sieberiana</i>	Snowgrass	Not Listed	Not Listed	Grass & grasslike (GG)	Alive in NSW, Native		0.1	1
Fabaceae (Faboide)	<i>Lotus corniculatus</i>	Birds-foot Trefoil	Not Listed	Not Listed	0	Introduced		0.1	1
Poaceae	<i>Lolium spp.</i>		Not Listed	Not Listed	0	Introduced		0.1	1
Iridaceae	<i>Romulea rosea</i>		Not Listed	Not Listed	0	Introduced		0.1	10
Poaceae	<i>Briza minor</i>	Shivery Grass	Not Listed	Not Listed	0	Introduced		0.1	1
Poaceae	<i>Paspalidium distans</i>		Not Listed	Not Listed	Grass & grasslike (GG)	Alive in NSW, Native		1	100
Asteraceae	<i>Senecio madagascariensis</i>	Fireweed	Not Listed	Not Listed	0	Introduced		0.2	20
Plantaginaceae	<i>Plantago lanceolata</i>	Lamb's Tongues	Not Listed	Not Listed	0	Introduced		0	250
Gentianaceae	<i>Centaurium spp.</i>		Not Listed	Not Listed	0	Introduced		0.1	10

APPENDIX D QUALIFICATIONS, LICENSING AND CERTIFICATION

Qualifications

Fieldwork for this project was undertaken by Sarah Jones. Report writing for this project was undertaken by Thomas Stephens with editing and review by Sarah Jones. Qualifications are provided in the table below.

Sarah Jones	<i>Ecologist / Bushfire Planning Consultant</i> B.Env.Sc., G.DIP.DBPA (Design for Bushfire Prone Areas) <i>BAAS 18020 Accredited Assessor, as required by the Biodiversity Conservation Regulation 2017 and accredited to apply the BAM</i> Member of the Ecological Consultants Association of NSW
Thomas Stephens	<i>Ecologist / Bushfire Planning Consultant</i> B.Env.Sc&Mgt.

Licensing

Research was conducted under the following licences:

- NSW National Parks and Wildlife Service Scientific Investigation Licence SL100533;
- Animal Research Authority (Trim File No: TRIM 11/5655) issued by NSW Department of Primary Industries; and
- Animal Care and Ethics Committee Certificate of Approval (Trim File No: TRIM 11/5655) issued by Department of Primary Industries.

Certification

As the project certifier, I, Sarah Jones make the following certification:

- This Biodiversity Development Assessment Report has been prepared in accordance with the Biodiversity Assessment Method established under the NSW Biodiversity Conservation Act 2016.
- The results presented in the report are, in the opinion of the principal author and certifier, a true and accurate account of the species recorded, or considered likely to occur within the site;
- Commonwealth, state and local government policies and guidelines formed the basis of project surveying methodology, or where the survey work has been

undertaken with specified departures from industry standard guidelines, details of which are discussed and justified in Section 2;

- All research workers have complied with relevant laws and codes relating to the conduct of flora and fauna research, including the *Animal Research Act 1995*, *National Parks and Wildlife Act 1974* and the *Australian Code of Practice for the Care and Use of Animals for Scientific Purposes*.

Signature of Certifier:



Sarah Jones

B.Env.Sc., G.DIP.DBPA (Design for Bushfire Prone Areas)

Ecologist / Bushfire Planner

BAAS 18020 Accredited Assessor

APPENDIX E BAM SUMMARY REPORTS

Proposal Details

Assessment Id 00035425/BAAS18020/22/00035426	Proposal Name 512 Raymond Terrace Road	BAM data last updated * 14/10/2022
Assessor Name Sarah Elizabeth Jones	Report Created 06/12/2022	BAM Data version * 55
Assessor Number BAAS18020	Assessment Type Part 4 Developments (Small Area)	BAM Case Status Finalised
Assessment Revision 1	Date Finalised 06/12/2022	BOS entry trigger BOS Threshold: Area clearing threshold

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

List of Species Requiring Survey

Name	Presence	Survey Months
------	----------	---------------

Threatened species Manually Added

None added

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Brush-tailed Rock-wallaby	<i>Petrogale penicillata</i>	Habitat constraints
Eastern Cave Bat	<i>Vespadelus troughtoni</i>	Habitat constraints
Large Bent-winged Bat	<i>Miniopterus orianae oceanensis</i>	Habitat constraints
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	Refer to BAR
Little Bent-winged Bat	<i>Miniopterus australis</i>	Habitat constraints
North Rothbury Persoonia	<i>Persoonia pauciflora</i>	Geographic limitations
Pokolbin Mallee	<i>Eucalyptus pumila</i>	Refer to BAR
Regent Honeyeater	<i>Anthochaera phrygia</i>	Refer to BAR



BAM Candidate Species Report

Singleton Mallee	Eucalyptus castrensis	Refer to BAR
Swift Parrot	Lathamus discolor	Refer to BAR

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00035425/BAAS18020/22/00035426	512 Raymond Terrace Road	14/10/2022
Assessor Name	Report Created	BAM Data version *
Sarah Elizabeth Jones	06/12/2022	55
Assessor Number	BAM Case Status	Date Finalised
BAAS18020	Finalised	06/12/2022
Assessment Revision	Assessment Type	BOS entry trigger
1	Part 4 Developments (Small Area)	BOS Threshold: Area clearing threshold

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

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

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

Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter												
1	1600_Degraded	Lower Hunter Spotted Gum Ironbark Forest in the Sydney Basin and NSW North Coast Bioregions	42	42.0	0.19	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		4
										Subtotal	4	
										Total	4	

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAI	Species credits
----------------------	--	-----------------------------	-----------------------------------	-------------------------------------	-------------------------------------	-----------------------	-------------------------	---------------	-----------------

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00035425/BAAS18020/22/00035426	512 Raymond Terrace Road	14/10/2022
Assessor Name	Report Created	BAM Data version *
Sarah Elizabeth Jones	06/12/2022	55
Assessor Number	Assessment Type	BAM Case Status
BAAS18020	Part 4 Developments (Small Area)	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
1	BOS Threshold: Area clearing threshold	06/12/2022

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

Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.

Common Name	Scientific Name	Vegetation Types(s)
Barking Owl	<i>Ninox connivens</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Black-chinned Honeyeater (eastern subspecies)	<i>Melithreptus gularis gularis</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Brown Treecreeper (eastern subspecies)	<i>Climacteris picumnus victoriae</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Diamond Firetail	<i>Stagonopleura guttata</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Eastern Coastal Free-tailed Bat	<i>Micronomus norfolkensis</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Grey-crowned Babbler (eastern subspecies)	<i>Pomatostomus temporalis temporalis</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Hooded Robin (south-eastern form)	<i>Melanodryas cucullata cucullata</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Large Bent-winged Bat	<i>Miniopterus orianae oceanensis</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter

BAM Predicted Species Report

Little Bent-winged Bat	<i>Miniopterus australis</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Little Eagle	<i>Hieraaetus morphnoides</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Little Lorikeet	<i>Glossopsitta pusilla</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Masked Owl	<i>Tyto novaehollandiae</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Powerful Owl	<i>Ninox strenua</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Scarlet Robin	<i>Petroica boodang</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Speckled Warbler	<i>Chthonicola sagittata</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Square-tailed Kite	<i>Lophoictinia isura</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Swift Parrot	<i>Lathamus discolor</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Turquoise Parrot	<i>Neophema pulchella</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Varied Sittella	<i>Daphoenositta chrysoptera</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
White-throated Needletail	<i>Hirundapus caudacutus</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Yellow-bellied Sheath-tail-bat	<i>Saccolaimus flaviventris</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter

Threatened species Manually Added

None added

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Common Name	Scientific Name	Plant Community Type(s)
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter

BAM Predicted Species Report

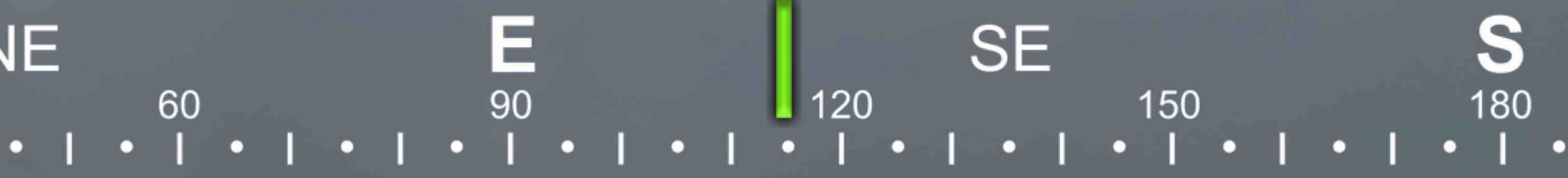
Painted Honeyeater	<i>Grantiella picta</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
Regent Honeyeater	<i>Anthochaera phrygia</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	1600-Spotted Gum - Red Ironbark - Narrow-leaved Ironbark - Grey Box shrub-grass open forest of the lower Hunter

Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

Common Name	Scientific Name	Justification in the BAM-C
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	Refer to BAR
Glossy Black-Cockatoo	<i>Calyptorhynchus lathami</i>	Habitat constraints
Painted Honeyeater	<i>Grantiella picta</i>	Habitat constraints
Regent Honeyeater	<i>Anthochaera phrygia</i>	Refer to BAR
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	Habitat constraints

APPENDIX F PHOTOS



☀ 115°SE (T) ● 32°45'49"S, 151°38'31"E ±22ft ▲ 81ft



18 Jan 2022, 14:53:36

SE S SW
120 150 180 210
☉ 163°S (T) ● 32°45'49"S, 151°38'31"E ±19ft ▲ 81ft



18 Jan 2022, 14:53:41

NW N NE
300 330 0 30
347°N (T) 32°45'58"S, 151°38'32"E ±85ft ▲ 98ft



18 Jan 2022, 15:00:30

W

270

NW

300

330

N

0

30

☉ 321°NW (T) ● 32°45'58"S, 151°38'32"E ±26ft ▲ 112ft



18 Jan 2022, 15:00:34



☀ 352°N (T) ● 32°45'58"S, 151°38'32"E ±22ft ▲ 113ft



18 Jan 2022, 15:01:22