



Department of Planning and Environment

Biodiversity Development Assessment Report

Proposed Residential Subdivision at HANLEYS CREEK ROAD (Lot 32 DP 1282790) Dungog, 2420

Prepared by Sarah Jones, BAAS18020



Revised Final Report – December 2024



Site Details:	Hanleys Creek Road, Dungog (Lot 32 DP 1282790)			
Prepared by:	<i>Sarah Jones B.Env.Sc., G.Dip.DBPA (Design in Bushfire Prone Areas)</i> <i>Firebird ecoSultants Pty Ltd</i> ABN – 16 105 985 993 PO Box 354, Newcastle NSW 2300 M: 0414 465 990 Email: sarah@firebirdeco.com.au T: 02 4910 3939 Fax: 02 4929 2727			
Reference No.	Dungog			
Document Status & Date:	Version	Description	Date	Author(s)
	1	Version 1	29/09/2022	Sarah Jones
	2	Version 2	10/02/2023	Sarah Jones
	3	Version 3	16/06/2023	Sarah Jones
	4	Version 4	09/01/2024	Sarah Jones
	5	Version 5	03/12/2024	Sarah Jones

Summary

Development Description

Firebird ecoSultants Pty Ltd has been engaged to provide a Biodiversity Development Assessment Report (BDAR) for a proposed residential subdivision ('the proposal') at Hanleys Creek Road, Dungog (Lot 32 DP 1282790) ('the site' or 'the subject site'). See Figure 1 for the Site Map and Figure 2 for the Site Location.

The proposal includes a 1 into 88 lot Torrens Title residential subdivision which makes up Stage 2 and 3 of the Hanley Creek Road rural lifestyle development. The subdivision will provide development space for the construction of 88 dwellings as well as associated infrastructure such as site access, services and asset protection zones (APZ).

The proposed lots range in size from 455 m² to 1428 m². Stages 2 and 3 of the Hanley Creek Road residential subdivision will be the final stages of the development and the subject of this application.

The site is located in a rural area south-west of Dungog and totals an area of ~238 ha. The site is zoned as RU1 Primary Production. The site is predominantly covered in exotic pasture grasses with scattered remnant native trees. A patch of regenerating forest occurs adjacent to the southern boundary of the site. Four (4) drainage canals occur from Cangon Creek, which pass through the north of the site. These canals drain through the site to toward the south. They are classed as 1st and 2nd order watercourses (in accordance with the Strahler stream ordering system in Appendix 3 of the BAM). The site is surrounded by similar rural land with large open areas of exotic pasture and patches of remnant forest. The site does not contain important mapped areas for threatened species or any mapped biodiversity values. Despite adequate surveying, no threatened species were located on the site.

The proposed operational footprint would include the same areas as the construction footprint indicated in Figure 4; that being the developed areas for the residential lots, site access and the APZs.

Field surveys performed in association of the BDAR delineated one Plant Community Types (PCT) within the subject site, being PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest. PCT 3446 is listed as a threatened ecological community (TEC), under the *Biodiversity Conservation Act 2016* (BC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Habitat Assessment

The following describes the habitat attributes of the study area;

- The study area provides open grassland habitat within the site's cleared exotic grassland area which may provide habitat for species adapted to open areas.
- PCT 3446 occurs in patches within the western, central and southern portions of the development. Building envelopes and associated Asset Protection Zones (APZs), have been located to avoid the majority of this PCT.
- No *Allocasuarinas* or *casuarinas* occur within the study area which are a food source for species such as *Calyptorhynchus lathamii* (Glossy Black-Cockatoo) – as such, the site only provides potential nesting habitat for this species in the form of tree hollows.

- The site contains numerous hollow-bearing trees with variable hollow sizes which would likely provide habitat for a wide range of species, including microbats, hollow-dependant arboreal mammals, woodland birds and in some cases owls; however, none occur within the impact area.
- The study area contains fallen logs, rocks and timber which may provide habitat for reptiles and small ground-foraging birds.
- No caves, tunnels, mines or culverts occur within the study area or the site.
- No stick nests occur within the study area or the site (at the time of surveys)
- No flying fox camps occur within or near the site.
- The subject site is not mapped as containing biodiversity values on the Biodiversity Values Map (refer to Appendix B).

Refer to Appendix A for Site Plans.

Measures to Avoid and Minimise

PCT 3446 is associated with the following BC Act and EPBC Act listed TECs:

- Hunter Lowland Redgum Forest in the Sydney Basin and NSW North Coast Bioregions – listed as endangered under the BC Act.
- Central Hunter Valley Eucalypt Forest and Woodland – listed as critically endangered under the EPBC Act.

The strategic positioning of the proposed development allows impacts to the TECs to be significantly avoided and minimised. The development has been located in the centre of the site, which is predominately covered by exotic pasture grasses and weeds. A total of 21 ha of land around the site's western boundaries will be retained within a conservation area (Lot 338; see Figure 7). The 6.5 ha of PCT within the conservation area is currently existing. The remaining land of this area will be allowed to naturally restore back to native vegetation (with the assistance of weed management). A proposed Vegetation Management Plan (VMP) will prescribe the management measures to protect and restore native vegetation in the conservation area.

Additionally, 14.7 ha of PCT 3446 is to be retained within the residential lots. This includes the majority of the site's central bushland area along a tributary of Cangon Creek. It is proposed that these areas of vegetation are protected in perpetuity by a s.88B covenant under the *Conveyancing Act 1919*. With these protective measure in place, the proposal will avoid severing or interfering with any corridors.

Table E1 details the areas of native vegetation that will be retained and protected and indicates that the development will have a significant net benefit in terms of native vegetation and threatened species habitat coverage across the Subject Site.

Table E1: Proposed Retention, Protection and Restoration of Native Vegetation

	Total Area of Native Vegetation Currently Existing	Total Area of Currently Existing Native Vegetation to be Protected and Retained *	Total Area of Additional Native Vegetation to be Restored in Currently Cleared Land	Total Area of Native Vegetation Post Development and Restoration Activities
Residential Lots	19.49 ha	14.7 ha	0 ha	14.7 ha
Conservation Area	6.5 ha	6.5 ha	14.5 ha	21 ha

* To be protected and retained either in the conservation area or in the residential lots by s.88B instruments under the *Conveyancing Act 1919*.

Several measures to minimise indirect impacts (such as changes in edge effects, noise, light pollution and dust from construction phase activities and post-development activities) are also proposed, as follows.

Proposed Mitigation Measures

Table E2 details the proposed mitigation measures designed to minimise and mitigate any residual and indirect impacts of the proposal.

Table E2: Proposed Mitigation Measures

Action	Responsibility	Timing
Pre-construction Phase Measures		
A VMP will be established, with the purpose of prescribing the vegetation management and restoration measures to be undertaken within the conservation area. This will include requirements to allow the natural restoration of the cleared areas in the conservation area back to native vegetation (with the assistance of weed management).	Project ecologist	Prior to the issuing of the construction certificate.
s.88B instruments will be established on title for the residential lots containing native vegetation to be retained.	Landowner	Prior to the issuing of the construction certificate.
The boundaries of the development footprint will be delineated in the field using bunting / flagging tape to ensure inadvertent clearing / disturbance of the adjacent vegetation does not occur.	Project manager.	Prior to commencement of any excavation or clearing works.
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> <ul style="list-style-type: none"> a) Ensure no vegetation clearing occurs outside of the approved clearing footprint. b) Ensure soft felling techniques are utilised for felling of any habitat/hollow-bearing trees. c) Supervise all habitat/hollow-bearing tree removal to capture and/or relocate any dispersed fauna. 	Project ecologist	During clearing.

<p>d) Transport any injured wildlife to appropriate veterinary care or transfer the animal to a local volunteer wildlife carer group.</p> <p>e) Provide post-clearing reporting back to Council should any threatened species be captured or encountered by clearing operations.</p>		
<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. • Vehicles, machinery and equipment must be free from weed material (including seeds) before entering the construction corridor. 	Project manager.	During excavation, clearing and construction works.
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.

The vegetation restoration and monitoring activities in the conservation area will commence as per the requirements in the VMP.

Project ecologist and bush regeneration contractor.

Ongoing for the life of the VMP.

Biodiversity Offsets Scheme (BOS) – Threshold Assessment

Based on the supplied plans provided by Perception Planning the development enters into the Biodiversity Offset Scheme due to:

- The proposed development will impact 4.7 ha which is greater than the area clearing threshold of the site, being 0.25 ha.

Threatened Species

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; and
- 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.

Direct Impacts

Table E3: Direct Impacts

PCT	BC Act Name / Listing Status	EPBC Act Name / Listing Status	Vegetation Zone (VZ) Name	Direct Impact
PCT 3446 Lower North Foothills Ironbark-Box- Gum Grassy Forest	Hunter Lowland Redgum Forest in the Sydney Basin and NSW North Coast Bioregions Endangered	Central Hunter Valley Eucalypt Forest and Woodland Critically endangered	VZ1: Regenerating – Stage 2	0.58 ha
PCT 3446 Lower North Foothills Ironbark-Box- Gum Grassy Forest	Hunter Lowland Redgum Forest in the Sydney Basin and NSW North Coast Bioregions Endangered	Central Hunter Valley Eucalypt Forest and Woodland Critically endangered	VZ1: Regenerating – Stage 3	5.26 ha

Biodiversity Offset Requirements

Table E4: Impacts that require an offset – ecosystem credits

<u>Vegetation zone</u>	<u>PCT</u>	<u>TEC</u>	<u>Impact area (ha)</u>	<u>Number of ecosystem credits required</u>
VZ1 – Stage 2	PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest	Hunter Lowland Redgum Forest in the Sydney Basin and NSW North Coast Bioregions (BC Act) Central Hunter Valley Eucalypt Forest and Woodland (EPBC Act)	0.58	19
VZ1 – Stage 3	PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest	Hunter Lowland Redgum Forest in the Sydney Basin and NSW North Coast Bioregions (BC Act) Central Hunter Valley Eucalypt Forest and Woodland (EPBC Act)	5.26	160

Table E4: Impacts that require an offset – species credits

Common name	Scientific name	Loss of habitat (ha) or individuals	Number of species credits required
N/A			

Contents

List of Tables	iv
List of figures	v
Shortened forms	vii
Declarations	vii
i. Certification under clause 6.15 <i>Biodiversity Conservation Act 2016</i>	viii
Authors and contributors	viii
Stage 1: Biodiversity assessment	1
1. Introduction	1
1.1 Proposed development	1
1.2 Biodiversity Offsets Scheme entry	2
1.3 Excluded impacts	2
1.4 Matters of national environmental significance	2
1.5 Information sources	2
2. Methods	3
2.1 Site context methods	3
2.2 Native vegetation, threatened ecological communities and vegetation integrity methods	3
2.3 Threatened flora survey methods	6
2.4 Threatened fauna survey methods	7
3. Site context	13
3.1 Assessment area	13
3.2 Landscape features	13
3.3 Native vegetation cover	14
4. Native vegetation threatened ecological communities and vegetation integrity	14
4.1 Native vegetation extent	14
4.2 Plant community types	14
4.4 Vegetation zones	18
4.5 Vegetation integrity (vegetation condition)	20
5. Habitat suitability for threatened species	22
5.1 Identification of threatened species for assessment	22
5.2 Presence of candidate species credit species	40
5.3 Threatened species surveys	45
5.4 Expert reports	50
5.5 More appropriate local data (where relevant)	51
5.6 Area or count, and location of suitable habitat for a species credit species (a species polygon)	51
6. Identifying prescribed impacts	52
7. STAGE 2 - IMPACT ASSESSMENT	52
7.1 Avoiding and Minimising Impacts	52

7.3 Assessment of Impacts	59
7.3.1 Minimisation of Impacts	59
7.4 Assessment of Direct and Indirect Impacts	63
Direct Impacts	63
Assessment of Direct Impacts	64
7.5 Indirect Impacts	64
Potential Prescribed Biodiversity Impacts	68
7.6 Impact Summary	68
Serious and Irreversible Impacts	68
Impacts Which Require an Offset	68
Impacts Not Requiring an Offset	68
Identification of Areas Not Requiring Assessment	68
8 Biodiversity Credit Report	68
9 References	70

Appendix A: Site plans

Appendix B: Biodiversity Values Map

Appendix C: BDAR requirements compliance table

Appendix D: Flora Plot Data

Appendix E: ANABAT Results

Appendix F: Camera Trap Results

Appendix G: Biodiversity Credit Reports

Appendix H: Recorded Species List

Appendix I: Koala Assessment Report

Appendix J: EPBC Impact Assessment

List of Tables

Table 1. Plant Community Types (PCTs) present on site	4
Table 2. Vegetation Zones and Patch size classes	5
Table 3. Vegetation Integrity Scores	6
Table 4. Environmental conditions during threatened species surveys	7
Table 5. Native vegetation cover in the assessment area	
Table 6. PCTs identified within the subject land	
Table 7. PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest	15
Table 8. Lower North Coastal Hills Red Gum Grassy Forest	14
Table 9. Threatened Ecological Communities (TECs), within the subject land	16
Table 10. Vegetation zones and patch sizes	19
Table 11. Vegetation integrity scores	20
Table 12. Benchmark Data for PCT 3446	21

Table 13. Predicted ecosystem credit species	21
Table 14 Predicted flora species credit species	33
Table 15 Predicted fauna species credit species	35
Table 16 Determining the presence of candidate flora species credit species on the subject land	41
Table 17 Determining the presence of candidate fauna species credit species on the subject land	43
Table 18 Threatened species surveys for candidate flora species credit species on the subject land	45
Table 19. Threatened species surveys for candidate fauna species credit species on the subject land	47
Table 20 Use of more appropriate local data for habitat suitability	51
Table 21. Results for present species (recorded within the subject land)	43
Table 22 Results for EPBC Act listed species present (recorded within the subject land)	51
Table 23 Prescribed impacts identified	52
Table 24. Avoidance and minimization measures	45
Table 25 Summary of residual direct impacts	
Table 26 Residual direct Impacts to vegetation integrity	
Table 27. Summary of residual indirect impacts	46
Table 28 Summary of proposed mitigation and management measures for residual impacts (direct, indirect and prescribed)	
Table 29. VMP implementation	
Table 30 Impacts that do not require offset – ecosystem credits	
Table 31 Impacts that require an offset – ecosystem credits	
Table 32 Ecosystem credit class and matching credit profile	
Table 33 Species credit class and matching credit profile	

List of figures

Figure 1	Site Map.....	90
Figure 2	Location Map	91
Figure 3	Development Layout	92
Figure 4	Biodiversity Values Map	93
Figure 5	BAM Plot Locations.....	94
Figure 6	Grassland Plots	95
Figure 6	Native Vegetation extent	96
Figure 8	Native Vegetation within the site.....	97
Figure 9	Plant community Types	98
Figure 10	Vegetation Zones.....	99
Figure 11	TECs Within Developmen Footprint.....	100
Figure 12	Asset Protection Zone.....	101
Figure 13	Camera trap Locations.....	102
Figure 14	Koala SAT Surveys.....	103
Figure 15	Flora Surveys.....	104
Figure 16	Location of Hollow-bearing Trees	105
Figure 17	Owl Call Playback.....	106
Figure 18	Anabat locations.....	107

Shortened forms

APZ	Asset protection zone
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BC Act	<i>Biodiversity Conservation Act 2016 (NSW)</i>
BC Regulation	Biodiversity Conservation Regulation 2017 (NSW)
BDAR	Biodiversity Development Assessment Report
BOAMS	Biodiversity Offsets and Agreement Management System
BOS	Biodiversity Offsets Scheme
CEEC	Critically endangered ecological community
DBH	Diameter at breast height over bark
EC	Ecological community listed under the EPBC Act
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999 (Cwlth)</i>
EP&A Act	<i>Environmental Planning and Assessment Act 1979 (NSW)</i>
EEC	Endangered ecological community
HTW	High threat weed
IBRA	Interim Biogeographic Regionalisation for Australia
LLS Act	<i>Local Land Services Act 2013 (NSW)</i>
MNES	Matters of national environmental significance
NPW Act	<i>National Parks and Wildlife Act 1974 (NSW)</i>
NSW	New South Wales
PCT	Plant community type
SAII	Serious and irreversible impact
SEARs	Secretary's Environmental Assessment Requirements
TBDC	Threatened Biodiversity Data Collection
TEC	Threatened ecological community
VEC	Vulnerable ecological community
Vegetation SEPP	<i>State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017 (NSW)</i>

Declarations

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

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



Signature:

Date: 03/12/2024

BAM Assessor Accreditation no: BAAS18020

This BDAR has been prepared to meet the requirements of BAM 2020. Appendix C provides an assessment of compliance with the minimum information requirements outlined in BAM Appendix 3.

ii. Details and experience of author/s and contributors

Authors and contributors


Name	BAM Assessor Accreditation no. (if relevant)	Position/Role	Tasks performed	Relevant qualifications
Sarah Jones	BAAS18020	Ecologist / Bushfire Planner	Field Work / Principal Author	B.Env.Sc., G.DIP.DBPA (Design for Bushfire Prone Areas)
Andrew Carty	BAAS19007	Ecologist/Botanist	Fieldwork	B.Envs.Sc. (Environmental Science)
Stephanie Sheehy	N/A	Ecologist/ Bushfire Planner	Author/Fieldwork	B.Envs.Sc. (Environmental Science)
Ollie Broun	N/A	Ecologist/ Bushfire Planner	Author/Fieldwork	B.Dev.Stud (Development Studies)
Kurtis Mumford	N/A	Ecologist/ Bushfire Planner	Fieldwork	B.Envs.Sc. (Environmental Science)
Theo Tasoulis	N/A	Ecologist/Botanist/Vertebrate Biologist	Targeted threatened fauna surveys/ Diurnal	BSc. (Hons), PhD

			bird surveys/ Report preparation	
Gage McNally	N/A	Graduate Ecologist/ Bushfire Planner	Fieldwork	B.Envs.Sc. (Environmental Science)
Sandeep Kaur Thind	N/A	Ecologist	Field work and Report writing	PhD (Environmental Science)
Courtney Kelly	N/A	Ecologist	Field work and Report writing	B.Envs.Sc. (Environmental Science and Management)
Fabian Dedal	N/A	Ecologist	Field work	B.Envs.Sc. (Environmental Science and Management)
Anneke Van Der Kellen	N/A	Ecologist	Field work	B.Envs.Sc. (Environmental Science and Management)

iii. Conflict of interest

I declare that I have considered the circumstances and there is no actual, perceived or potential conflict of interest.

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

Signature: 

Date: 03/12/2024

BAM Assessor Accreditation no: BAAS 18020

Stage 1: Biodiversity assessment

1. Introduction

Firebird ecoSultants Pty Ltd has been engaged to provide a Biodiversity Development Assessment Report (BDAR) for a proposed residential subdivision ('the proposal') at Hanley's Creek Road, Dungog (Lot 32 DP 1282790) ('the site' or 'the subject site'). See Figure 1 for Site Map and Figure 2 for the Site Location. 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.

1.1 Proposed development

1.1.1 Development overview

The proposal includes a Torrens title subdivision (1 lots into 88 residential lots) on Hanley Creek Road to provide development space for the construction of 88 dwellings as well as associated infrastructure such as site access, services and asset protection zones (APZ). The proposed lots ranging in size from 455 m² to 1428 m².

Stages 2 and 3 of the Hanley Creek Road residential subdivision will be the final stages of the development and the subject of this application.

The development footprint has largely been located in the centre of the site, which is predominately covered by exotic pasture grasses and weeds.

The proposed development footprint is indicated in Figure 3. It totals an area of 129.2 ha of land/vegetation (69.1 ha for Stage 2 and 60.1ha for stage 3) and encompasses the following areas:

- The designated area for residential lots, building envelopes and site access
- The proposed operational footprint would include the same areas as the construction footprint indicated in Figure 3; that being the developed areas for the residential lots and site access and the APZs.

Refer to Appendix A for Site Plans.

See Figure 2 for the Site Location.

1.1.2 Location

The site is located in a rural area 4 km south-west of Dungog and totals 238 ha with a proposed development area of ~129.2 ha. The site is zoned as RU1 Primary Production. The site is surrounded by similar rural land with large open areas of exotic pasture and patches of regenerating forest. The site does not contain important mapped areas for threatened species or any mapped biodiversity values.

Refer to Figure 1 Site Map and Figure 2 for Site Location.

1.1.3 Proposed development and the subject land

The proposal includes a Torrens title subdivision (1 lots into 88 residential lots) on Hanley Creek Road to provide development space for the construction of 88 dwellings as well as associated infrastructure

such as site access, services and asset protection zones (APZ). The proposed lots ranging in size from 455 m² to 1428 m².

Stages 2 and 3 of the Hanley Creek Road residential subdivision will be the final stage of the development.

The development footprint has largely been located in the centre of the site, which is predominately covered by exotic pasture grasses and weeds.

The proposed development footprint is indicated in Figure 3. It totals an area of 129.2 ha of land/vegetation and non-native vegetation and encompasses the following areas:

- The designated area for residential lots, building envelopes and site access.
- The proposed operational footprint would include the same areas as the construction footprint indicated in Figure 3; that being the developed areas for the residential lots and site access and the APZs.

The site is zoned as RU1 Primary Production. The site is predominantly covered in exotic pasture grasses with scattered remnant native trees. A patch of regenerating forest occurs adjacent to the southern boundary of the site

1.1.4 Other documentation

This report has been written in conjunction with the bushfire assessment report prepared by Firebird EcoSultants on the 18th December 2023. Refer to Appendix L.

1.2 Biodiversity Offsets Scheme entry

The development proposal will exceed the minimum clearing threshold for native vegetation from the site, which is 2,500m².

1.3 Excluded impacts

The proposed development will retain a designated conservation area along the western boundaries of proposed development within Lot 338. The area of the conservation area will be a total of 21 ha.

1.4 Matters of national environmental significance

No MNES records within a 10 km radius of the site were found. A review was conducted using the Commonwealth Department of Environment and Energy (DEE), EPBC Act Protected Matters Search Tool.

1.5 Information sources

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* (DPI&E, 2020)
 - '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)
- Environmental / planning reports relevant to the site / area, including: *Dungog LEP 2014*;
- *Dungog (DCP) 2021*;
- Online tools and resources, including:
 - BAM Calculator (OEH, 2023)
 - BioNet Vegetation Classification (OEH, 2023)
 - BioNet Threatened Biodiversity Data Collection (OEH, 2023)
 - 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).

2. **Methods**

2.1 **Site context methods**

2.1.1 **Landscape features**

Landscape features have been determined by Aerial Photograph Interpretation in conjunction with analysis of electronic contour maps with a contour interval of 2 m. Refer to Section 3.2.

2.1.2 **Native vegetation cover within the assessment area**

The native vegetation cover is calculated as a percentage cover on the site and the surrounding 1,500 m assessment area. Cover estimates are based on the cover of native woody and non-woody vegetation relative to the approximate benchmarks for the PCT, considering vegetation condition and extent.

2.2 **Native vegetation, threatened ecological communities and vegetation integrity methods**

2.2.1 **Existing information**

Several Plant Community Type/s (PCTs) have been mapped on the site by the NSW State Vegetation Type Map (SVTM). These include:

- PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest
- PCT 3433 Hunter Coast Foothills Spotted Gum-Ironbark Grassy Forest
- PCT 3091 Lower North Waterhousea-Water Gum Rainforest
- PCT 3089 Lower North Waterhousea Riparian Rainforest
- PCT 3244 Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest
- PCT 3074 Hunter Coast Lowland Grey Myrtle Wet Forest

- PCT 3100 Northern Hinterland Baloghia-Dendrocnide Subtropical Rainforest

were identified according to the NSW PCT classification described in the BioNet Vegetation Classification. One PCT has been mapped within the site.

Table 1 – Plant Community Types (PCT), present on the site.

Vegetation Mapping Project	Response
Greater Hunter Native Vegetation Mapping v4.0. VIS ID 3855	<p>One PCT has been mapped within the site:</p> <ul style="list-style-type: none"> • PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest

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.

Given there are multiple patches of native vegetation within 100 m of the site; combined they amount to a patch size of >100 ha.

2.2.3 Plot-based vegetation survey

Plot-based floristic vegetation surveys were undertaken within the study area in accordance with s.5.2.1.9 of the BAM, by two ecologists on 28th October 2021 and 11nd November 2021. The 20 m x 20 m plots were sampled for the presence of flora species; see Figure 5 for the plot locations undertaken within the impacted PCTs (the study area). 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 PCTs in the development footprint is indicated in Figure 7. Plot data is provided in Appendix D. A full recorded species list is provided in Appendix H.

2.2.4 Vegetation integrity survey

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 PCT has been divided into two vegetation zones (as detailed in Table 1). A patch size area has been assigned to each vegetation zone, as a class (as detailed in Table 1).

Table 1: Vegetation Zones and Patch Size Classes

PCT	Vegetation Zone (VZ) Name	Vegetation Zone Description	Patch Size Class
PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest	VZ 1: Regenerating – Stage 2	This vegetation zone occurs in a moderate condition, with an intact canopy stratum, numerous hollow-bearing trees and ground hollows, high density of native ground cover. This area also contains a moderate density of African Olive in the shrub layer and some exotic grasses and forbs in the ground layer.	≥100 ha
PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest	VZ1: Regenerating – Stage 3	This vegetation zone occurs in a moderate condition, with an intact canopy stratum, numerous hollow-bearing trees and ground hollows, high density of native ground cover. This area also contains a moderate density of African Olive in the shrub layer and some exotic grasses and forbs in the ground layer.	≥100 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, by two ecologists on 28th October 2021 and 11nd November 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 5 for plot locations. Plot data is provided in Appendix D. Table 2-5 details the vegetation integrity score.

Table 3: Vegetation Integrity Scores

PCT	Vegetation Zone (VZ)	Composition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score
PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest	VZ1: Regenerating – Stage 2	62.5	61.2	35.2	51.3
PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest	VZ1: Regenerating – Stage 3	64	71	49.5	60.8

See previous Figure 5 for plot locations. Table 7 details the vegetation integrity score.

2.3 Threatened flora survey methods

2.3.1 Review of existing information

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.

2.3.3 Field surveys

Refer to Figure 5 for Field survey locations

2.4 Threatened fauna survey methods

2.4.1 Review of existing information

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.

2.4.2 Habitat constraints assessment

Calculations made from BAM showed that the site was not mapped as an important habitat for both Regent Honeyeater *Anthochaera phrygia*, and Swift Parrot *Lathamus discolor*, so these species were not considered for inclusion in the targeted threatened species surveys. BAM calculations also showed that habitat constraints were not present for the following species; Glossy Black Cockatoo *Calyptorhynchus lathami*, White-bellied Sea Eagle *Haliaeetus leucogaster*, and Grey-headed Flying Fox *Pteropus poliocephalus*, so these species were not included in targeted threatened species surveys.

2.4.3 Field surveys

Targeted surveys have been undertaken for the candidate species in accordance with section 5.5 of the BAM. These searches consisted of targeted searches for Koalas, and Diurnal bird survey Gang Gang Cockatoos, and Nocturnal surveys for Barking Owls, and Powerful Owls, and scanning the sky for soaring Little Eagles, Square-tailed Kites. Spotlighting was conducted for Koalas, Barking Owls, Powerful Owls, Masked Owls, Squirrel Gliders, Brush-tailed Phascogales, and Green and Golden Bell Frogs. Additionally, Anabats were placed on site for microbat species, and camera traps for small arboreal mammals, and call playbacks and passively listening were used to survey for owls. Refer to Appendix E for ANABAT Results.

2.5 Weather conditions

Table 4 shows the weather conditions for each day during the survey effort. Rain and warm weather on the 14/03/23 were conducive for Green and Golden Bell Frog activity, so a search was conducted in the late afternoon and early evening of that day to target that species.

Table 4: Environmental conditions during threatened species surveys

Survey undertaken	Date	Time	Survey method	Temperature (min – max)	Wind (light – moderate)	Rainfall	Other conditions relevant to the species
<i>Callistemon linearifolius</i> Netted Bottle Brush	22/11/2022	9am - 5pm	Parallel field transverse method	13-23 °	Light to medium	0.0mm	N/A
	18/09/2024				Light to Medium	0.4mm	
	23/09/2024			8.6°		0.0mm	
	02/10/2024			9.8°			
<i>Callocephalon fimbriatum</i> Gang Gang Cockatoo	14/03/23	2:15PM to 7:30 PM	Diurnal bird surveys	18-26°	Light	24.0 mm	N/A
	15/03/23	2:55PM to 7:30PM		19-30°	Light	0.0mm	
	20/03/23	1:55PM to 7:30PM		19-26°C	Light	0.0mm	
	29/06/23	1:50 PM to 5:00 PM		11-16°C	Light to medium	6.0mm	
	02/10/2024	9:00PM – 5.00 PM		9.8°			
<i>Cercartetus nanus</i> Eastern Pygmy Possum	14/03/23	7:30PM to 9:00 PM	Spotlighting and camera and hair tube traps were left out for 4 weeks	18-26°	Light	24.0 mm	N/A
	15/03/23	7:30PM to 8:03PM		19-30°	Light	0.0mm	
	20/03/23	7:30PM to 8:05PM		19-26°	Light Light to medium	0.0mm	
	6/06/23	5:30 to 7:10 PM		11°C		0.0mm	
<i>Cynanchum elegans</i> White-flowered Wax Plant	30/05/23	9:00 AM – 5.00 PM	Parallel field transverse method		Light to Medium		N/A
	13/07/23						
	18/09/24						
	24/09/24						
	02/10/24			25.5°		0.0mm	

				9.8°		0.4mm	
<i>Eucalyptus glaucina</i> Slaty Red Gum	30/05/23	9:00 AM – 5.00 PM	Parallel field transverse method				N/A
	13/07/23						
	18/09/24						
	24/09/24			25.5°	Light to Medium	0.0mm	
	02/10/24			9.8°		0.4mm	
<i>Eucalyptus largeana</i> Craven Grey Box	30/05/23	9:00 AM – 5.00 PM	Parallel field transverse method				N/A
	13/07/23						
	18/09/24						
	24/09/24			25.5°	Light to Medium	0.0mm	
	02/10/24			9.8°		0.4mm	
<i>Grevillea parviflora</i> subsp. <i>Parviflora</i> Small-flower Grevillea	22/11/2022	9am - - 5pm	Parallel field transverse method	13-23 °		0.0mm	N/A
	04/07/2023					3.0 mm	
<i>Hieraaetus morphnoides</i> Little Eagle	14/03/23	2:15PM to 7:30 PM	Diurnal bird surveys	18-26°	Light	24.0mm	N/A
	15/03/23			19-30°	Light	0.0mm	
	20/03/23			19-26°	Light	0.0mm	
	29/06/23			11-16°C	Light to medium	0.0mm	
	18/09/24						
24/09/24							
<i>Lophoictinia isura</i> Square-tailed Kite	14/03/23	2:15PM to 7:30 PM	Diurnal bird surveys	18-26°	Light	24.0mm	N/A
	15/03/23			19-30°	Light	0.0mm	
	20/03/23			19-26°	Light	0.0mm	
	29/06/23			11-16°C	Light to medium	6.0mm	
	18/09/24						
24/09/24							

<i>Myotis Macropus</i> Southern Myotis	3 Anabats located on site for 6 nights 14/03/23 to 20/03/23	Night activated	Anabat recordings over 6 nights	18-26° 19-30° 20 -35° 22 -30° 20 - 28° 20 -31° 19-26°	Light Light Light Light Light Light	24.0mm 0.0mm 0.0mm 0.0mm 0.0mm 0.0mm	N/A
<i>Ninox connivens</i> Barking Owl	14/03/23 15/03/23 20/03/23 6/06/23 20/08/2024 29/08/2024	2:15PM to 9:00 PM 2:55PM to 8:03PM 1:55PM to 8:05PM 5:13PM to 6:43 PM 5:30PM to 7.30 PM 5:30PM to 7:30 PM	Diurnal bird surveys and nocturnal spotlighting / call playback	18-26° 19-30° 19-26° 14°-19° 11-16°C 7.1°	Light Light Light Light Light to medium	24.0mm 0.0mm 0.0mm 0.0mm 0.0mm 0.0mm	N/A
<i>Ninox strenua</i> Powerful Owl	14/03/23 15/03/23 20/03/23 6/06/23 20/08/2024 29/08/2024	2:15PM to 9:00 PM 2:55PM to 8:03PM 1:55PM to 8:05PM 5:13PM to 6:43 PM 5:30PM to 7.30 PM 5:30PM to 7:30 PM	Diurnal bird surveys and nocturnal spotlighting / call playback	18-26° 19-30° 19-26° 14°-19° 11-16°C 7.1°	Light Light Light Light Light to medium	24.0mm 0.0mm 0.0mm 0.0mm 0.0mm 0.0mm	N/A

<i>Petaurus norfolcensis</i> Squirrel Glider	14/03/23	7:30PM to 9:00 PM	Camera traps for 4 weeks	18-26°	Light	24.0mm	N/A
	15/03/23			19-30°	Light	0.0mm	
	20/03/23	7:30PM to 8:03PM	25/05/23 and 30/05/23 to 29/06/23	19-26°	Light	0.0mm	
	29/06/23	7:30PM to 8:05PM 5:30 to 7:10 PM		11°C	Light to medium	0.0mm 6.0mm	
<i>Phascogale tapoatafa</i> Brush-tailed Phascogale	14/03/23	7:30PM to 9:00 PM	Camera traps for 4 weeks	18-26°	Light	4.0mm	N/A
	15/03/23	7:30PM to 8:03PM	25/05/23 and 30/05/23 to 29/06/23	19-30°	Light	0.0mm	
	20/03/23	7:30PM to 8:05PM		19-26°	Light	0.0mm	
	29/06/23	5:30 to 7:10 PM		11°C	Light to medium	6.0mm	
<i>Phascolarctus cinereus</i> Koala	14/03/23	2:15PM to 9:00 PM	Diurnal searches and spotlighting	18-26°	Light	4.0mm	N/A
	15/03/23	2:55PM to 8:03PM		19-30°	Light	0.0mm	
	20/03/23	1:55PM to 8:05PM		19-26°	Light	0.0mm	
	29/06/23	1:50 PM to 7:10 PM		11-16°	Light to medium	0.0mm	
	29/08/24	2:00 PM to 5:00 PM			Light to medium	6.0mm 0.0mm	
	23/10/24	10.00 AM to 12:00 PM		10.5°		0.0mm	
<i>Pterostylis chaetophora</i> Pterostylis chaetophora	22/11/2022	9am - 5pm	Parallel field transverse method	13-23 °	Light to Medium	0.0mm	N/A
	18/09/2024					0.0mm	
	23/09/2024			8.6°		0.0mm	
	02/10/2024			9.8°		0.4mm	

<i>Rhodamnia rubescens</i> Scrub Turpentine	30/05/23	9:00 AM – 5.00 PM	Parallel field transverse method				N/A
	13/07/23						
	18/09/24						
	24/09/24			25.5°	Light to Medium	0.0mm	
	02/10/24			9.8°		0.4mm	
<i>Rutidosia heterogama</i> Heath Wrinklewort	22/11/2022	9am - 5pm	Parallel field transverse method	13-23 °	Light to Medium	0.0mm	N/A
	04/07/2023					3.0mm	
	18/09/2024					0.0mm	
	23/09/2024			8.6°			
	02/10/2024			9.8°		0.0mm	
<i>Tyto novaehollandiae</i> Masked Owl	14/03/23	7:30PM to 9:00 PM	Diurnal bird surveys and nocturnal spotlighting / call playback	18-26°	Light	4.0mm	N/A
	15/03/23	7:30PM to 8:03PM		19-30°	Light	0.0mm	
	20/03/23	7:30PM to 8:05PM		19-26°	Light	0.0mm 0.0mm	
	6/06/23	5:13PM to 6:43 PM		14°-19°	Light	0.0mm	
	20/08/2024	5:30PM to 7:30 PM		7.1°	Light to medium	0.0mm	
	29/08/2024	5:30PM to 7:30 PM				0.0mm	

2.6 Limitations

The following potential survey limitations (which are often inherent in ecological investigations) are considered and discussed:

Competency/experience of the team carrying out the survey – See qualifications in the certification section at the beginning of this report.

Survey timing – Factors such as seasonal variations, time of day and migratory movements would influence the fauna potentially present in the project area at any given time. Further, the flowering periods of some flora species may influence their detectability in the field. Targeted surveys for candidate species were undertaken during the required survey months specified in BioNet.

GPS inaccuracies – The hand-held GPS device used has a margin of error of a few metres depending on the weather.

Weather conditions – Weather conditions were generally favourable, i.e. minimal rain, not overcast, wind speed low.

3. Site context

3.1 Assessment area

The assessment area includes the site and any land within a 1,500 m buffer around the site. Landscape features and native vegetation cover within the assessment area is identified to establish the context of the site in relation to the surrounding area and identify the likely habitat suitability on the site for threatened entities. See Figure 2 Location Map, for the assessment area.

3.2 Landscape features

Landscape features identified within the site and assessment area are shown on Figure 1 Site Map and Figure 2 Location Map, respectively. A discussion of relevant landscape features is provided below.

3.2.1 IBRA bioregions and IBRA subregions

Dominant landscape forms have been used to divide Australia into bioregions. The site is within the NSW North Coast IBRA bioregion and the Upper Hunter IBRA subregion.

3.2.2 Rivers, streams, estuaries and wetlands

Four (4) drainage canals pass through the site (refer to Figure 2). These streams flow from the west, south-west, and south of the site and converge to the north-east of the site.

These streams are classed as a 1st, 2nd, and 3rd order watercourses (in accordance with the Strahler stream ordering system in Appendix 3 of the BAM). In the north-east of the site they converge into a 4th order stream, becoming Cangoon Creek drains into Williams River to the east, before eventually draining into the Hunter River.

3.2.3 Habitat connectivity

The site's native vegetation is one of many patches of regenerating forest in the Dungog area. Hanley's Creek and the surrounding areas have been extensively cleared for agricultural purposes. The nearest relatively large area of intact bushland occurs ~4.1 km to the west of the site.

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

No karst, caves, crevices or cliffs were located on the site or within a 1,500 m buffer around the site.

3.2.5 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.

3.2.6 NSW (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 Scone - Gloucester Foothills landscape. This landscape region has an estimated cleared fraction of 0.75. See previous Figure 2 for the locations of Mitchell Landscapes within 1.5 km of the site.

3.2.7 Additional landscape features identified in SEARs

N/A - The Proposal is not a State significant infrastructure (SSI) project.

3.2.8 Soil hazard features

No soil hazards were identified on the site or within a 1,500 m buffer around the site.

3.3 Native vegetation cover

The native vegetation cover is calculated as a percentage cover on the site and the surrounding 1,500 m assessment area. Cover estimates are based on the cover of native woody and non-woody vegetation relative to the approximate benchmarks for the PCT, considering vegetation condition and extent. The native vegetation cover within the assessment area is estimated at 30 % (see Figure 6). Note that the non-woody vegetation (i.e. derived grassland) within the assessment area was deemed to be non-native. This was determined through grassland plots within the site and a general drive by inspection of surrounding areas.

4 Native vegetation, threatened ecological communities and vegetation integrity

4.1 Native vegetation extent

The native vegetation extent within the assessment area is estimated at 30% (see Figure 6).

The site itself contains 49.1 ha of native vegetation. The extent of native vegetation relevant to this BDAR (i.e. the area of native vegetation within or potentially impacted by the construction and operational footprint) is 4.7 ha; see Figure 6 for the native vegetation extent within the site. The proposed conservation area contains 6.5 ha of PCT 3446. Additionally, another 14.7 ha of native vegetation will be retained within the development footprint.

4.1.1 Changes to the mapped native vegetation extent

There are no changes to the mapped native vegetation extent.

Refer to Figure 6 for native vegetation extent within the assessment area.

4.1.2 Areas that are not native vegetation

The proposed development footprint comprises 109.6 ha of non-native exotic grass species vegetation cover. Refer to the PCT map in Figure 7.

4.2 Plant community types

4.2.1 Overview

One PCT was identified and mapped in the site, being PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest; see Figure 7.

Detailed descriptions of each PCT are provided in the following subsections.

Table 7: PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest

PCT ID	PCT 3446
PCT name	Lower North Foothills Ironbark-Box-Gum Grassy Forest
Vegetation formation	Dry Sclerophyll Forests (Shrub/grass sub-formation)
Vegetation class	Hunter-Macleay Dry Sclerophyll Forests
Percent cleared value (%)	74.93%
TEC status	<p>Hunter Lowland Redgum Forest in the Sydney Basin and NSW North Coast Bioregions – listed as endangered under the BC Act.</p> <p>Central Hunter Valley Eucalypt Forest and Woodland – listed as critically endangered under the EPBC Act.</p>
Description	<p>Open forest / woodland, with a sparse or absent shrub layer and a grassy groundcover.</p> <p>Upper stratum – 15-20 m high with a PFC of 20-40%. Usually dominated by <i>Corymbia maculata</i>, ironbarks (<i>Eucalyptus crebra</i> and <i>E. paniculata</i>) and <i>E. moluccana</i>. but there are also patchy occurrences of <i>Eucalyptus tereticornis</i> and <i>E. canaliculata</i> and occasional <i>E. globoidea</i>.</p> <p>Mid stratum – 1-3 m high with a PFC of <1%. Dominated by Acacias (<i>A. falcata</i>, <i>A. implexa</i>, <i>A. ulicifolia</i>) and <i>Breynia oblongifolia</i>, with occasional <i>Goodenia ovata</i> and <i>Notelaea venosa</i>. <i>Lantana camara</i> also occurs in some areas.</p> <p>Ground stratum - <1 m high with a PFC of 50-90%. Dominated by a mix of native and exotic grasses, such as <i>Microlaena stipoides</i>, <i>Imperata cylindrica</i>, <i>Cymbopogon refractus</i>, <i>Oplismenus aemulus</i>, <i>Panicum decompositum</i>, <i>Eragrostis leptostachya</i>, <i>Aristida ramosa</i>, <i>Chloris ventricosa</i>, <i>Axonopus compressus</i>, <i>Cynodon dactylon</i>, <i>Digitaria didactyla</i>, <i>Sporobolus africanus</i>, <i>Chloris gayana</i> and <i>Paspalum dilatatum</i>. A mix of forbs also occur, such as <i>Pratia purpurascens</i>, <i>Geranium solanderi</i> and <i>Dichondra repens</i> as well as twiners such as <i>Geitonoplesium cymosum</i>,</p>

	<p><i>Desmodium gunnii</i>, <i>D. varians</i> and <i>Glycine</i> sp. Exotic weedy species are also present, such as <i>Cirsium vulgare</i>, <i>Senecio madagascariensis</i>, <i>Plantago lanceolata</i> and <i>Sida rhombifolia</i>.</p>
Conditions states / vegetation zones	<p>The community was found to occur in one condition state across the site, that being a disturbed open forest / woodland, with a sparse to absent shrub layer and grassy groundcover. There are numerous hollow-bearing trees and ground hollows and a moderate coverage of exotic weedy species. The community was split into two vegetation zones, to account for the planned staging of the project (stage 2 and stage 3).</p>
Justification for PCT selection	<p>The floristics, topography, soil characteristics and location of the vegetation community are consistent with it being in the Hunter-Macleay Dry Sclerophyll Forests vegetation class. PCT 3446 has been mapped on the site by the SVTM.</p> <p>The community contains a high number of diagnostic species for PCT 3446, including <i>Corymbia maculata</i>, <i>Eucalyptus tereticornis</i>, <i>E. moluccana</i>, <i>E. crebra</i>, <i>E. globoidea</i>, <i>E. canaliculata</i>, <i>Breynia oblongifolia</i>, <i>Acacia implexa</i>, <i>A. falcata</i> and <i>A. ulicifolia</i>.</p> <p>The following description in the PCT 3446 profile describes the community well: <i>The canopy very frequently includes Corymbia maculata, commonly with an ironbark (Eucalyptus crebra or Eucalyptus siderophloia), Eucalyptus tereticornis or Eucalyptus moluccana, which may be prominent in localised areas. The sparse mid-stratum commonly includes taller Acacia species, with Acacia falcata and Acacia implexa most frequently recorded.</i></p> <p>The following other PCTs were also considered and ruled out:</p> <p>PCT 3433 Hunter Coastal Foothills Spotted Gum-Ironbark Grassy Forest – this PCT is mapped on the site by the SVTM. It also contains <i>C. maculata</i> and ironbarks, however it also often contains mahoganies, which are absent on the site.</p> <p>PCT 3244 Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest – this PCT is mapped on the site by the SVTM. It contains <i>C. maculata</i>, mahoganies, ironbarks and grey gums. It was considered as a potential fit due to the <i>E. canaliculata</i> recorded on the site, however it is a wet sclerophyll PCT, which would not fit with the site's community.</p> <p>The PCTs identified in the previous revision of this BDAR (i.e., PCT 3444 and PCT 3445) have been ruled out as neither of them would occur in the area of the site.</p>

Photos 1-5: Eucalypt species on site indicative of PCTs present



Top Left. Forest Red Gum *Eucalyptus tereticornis*. This was a common eucalypt species in many areas on the site, indicative of PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest

Top Centre. Large-fruited Grey Gum *Eucalyptus canaliculata*.

Top Right. Grey Box *Eucalyptus moluccana*, commonly occurred within PCT 3446.

Bottom Left and Right. Spotted Gum *Corymbia maculata*, and Narrow-leaved Ironbark *Eucalyptus crebra*, are also representative of PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest.

4.2.3 Exotic grassland

4.2.4.1 Justification of PCT selection

This vegetation is dominated by the following; *Paspalum dilatatum* (Paspalum), *Sporobolus fertilis* (Giant Parramatta Grass), *Sporobolus africanus* (Parramatta Grass), *Axonopus compressus* (Broad-leaved Carpet Grass). See Appendix D for the grassland plot data, indicating that the site's derived grassland is exotic.

4.3 Threatened ecological communities

The TECs identified within the subject site are listed in Table 9. This TEC is associated with PCT 3446. The extent of this PCT can be seen in Figure 7.

Table 9: Threatened Ecological Communities TEC within the subject land

TEC name	Profile ID (from TBDC)	BC Act status	EPBC Act status	Associated vegetation zones within the subject land	Area within subject land (ha)
Central Hunter Valley Eucalypt Forest and Woodland	10416	Not listed	Critically Endangered Ecological Community	Stage 2 – 0.58 ha	Stage 2 – 0.58
Hunter Lowland Redgum Forest in the Sydney Basin and NSW North Coast Bioregions	20381	Endangered Ecological Community	Not listed	Stage 3 – 5.26 ha	Stage 3 – 5.26

4.4 Vegetation zones

Vegetation zones within PCT's were identified by using plot-based floristic vegetation surveys in accordance with s.5.2.1.9 of the BAM, by one ecologist on 28th October 2021 and 11th November 2021. The 20 m x 20 m plots were sampled for the presence of flora species; see Figure 5 for the plot locations undertaken within the impacted PCTs (the study area). 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.

The community was found to occur in one condition state across the site, that being a disturbed open forest / woodland, with a sparse to absent shrub layer and grassy groundcover. There are numerous hollow-bearing trees and ground hollows and a moderate coverage of exotic, weedy species. The community was split into two vegetation zones, to account for the planned staging of the project (stage 2 and stage 3).

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.

Given there are multiple patches of native vegetation within 100 m of the site; combined they amount to a patch size of >100ha.

Table 10: Vegetation zones and patch sizes

Vegetation zone ID	PCT ID number and name	Condition / other defining feature	Area (ha)	Patch size class (select multiple if areas of native vegetation are discontinuous)	No. vegetation integrity plots required	No. vegetation integrity plots completed	Plot IDs of vegetation integrity plots used in assessment
VZ 1 – Stage 2	PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest	Regenerating forest	0.58	<input type="checkbox"/> <5 ha <input type="checkbox"/> 5–24 ha <input type="checkbox"/> 25–100 ha <input checked="" type="checkbox"/> >100 ha	1	1	Plot 1
VZ 1 – Stage 3	PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest	Regenerating forest	5.26	<input type="checkbox"/> <5 ha <input type="checkbox"/> 5–24 ha <input type="checkbox"/> 25–100 ha <input checked="" type="checkbox"/> >100 ha	2	3	Plot 3, Plot 5, Plot 6

4.5 Vegetation integrity (vegetation condition)

4.5.1 Vegetation integrity survey plots

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

Plot-based surveys were conducted, in accordance with s.5.3.4 of the BAM, by two ecologists on 22nd November 2021.

Five, plots of 1000 m² (20 m x 50 m) were surveyed floristically to assess the following attributes: number of large trees, stem size class, tree regeneration and length of logs.

Also, five (5), 1 m² sub-plots to assess average litter cover (and other optional groundcover components).

4.5.2 Scores

Table 11. Vegetation integrity scores

Vegetation zone ID	Composition condition score	Structure condition score	Function condition score (where relevant)	Vegetation integrity score	Hollow bearing trees present ?
PCT 3446 Lower North Foothills Ironbark- Box-Gum Grassy Forest – Stage 2	62.5	61.2	35.2	51.3	Yes
PCT 3446 Lower North Foothills Ironbark- Box-Gum Grassy Forest – Stage 3	64	71	49.5	60.8	Yes

4.5.3 Use of benchmark data

The vegetation integrity benchmark data were taken from BAM for each PCT

Table 12. Benchmark Data for PCT 3446

PCT	Tree	Shrub	Grass and Grass like	Forb	Fern	Other
PCT3446	7	10	12	12	2	6

5. Habitat suitability for threatened species

5.1 Identification of threatened species for assessment

5.1.1 Ecosystem credit species

Table 13: Predicted ecosystem credit species

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Regent Honeyeater	<i>Anthochaera phrygia</i>	Critically Endangered	Critically Endangered	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	No	Not mapped as important habitat for this species on BAM	PCT 34476 – Stage 2 PCT 3446 – Stage 3	High
Dusky Woodswallow	<i>Artamus cyanopterus cyanopterus</i>	Vulnerable	Not listed	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	No	Was not listed as a candidate species on BAM	PCT 3446 – Stage 2 PCT 3446 – Stage 3	Moderate

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Gang Gang Cockatoo	<i>Callocephalum fimbriatum</i>	Vulnerable	Endangered	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	Moderate
Glossy Black Cockatoo	<i>Calyptorhynchus lathami</i>	Vulnerable	Vulnerable	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	No	There were no stands of Allocasuarinas or Casuarinas on the site	PCT 3446 – Stage 2 PCT 3446 – Stage 3	High
Speckled Warbler	<i>Chthonicola sagittata</i>	Vulnerable	Not listed	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	High

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Spotted Harrier	<i>Circus assimilis</i>	Vulnerable	Not listed	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	Moderate
Brown Treecreeper	<i>Climacteris picumnus victoriae</i>	Vulnerable	Not listed	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	High
Varied Sitella	<i>Daphoenositta chrysoptera</i>	Vulnerable	Not listed	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	High

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Spotted-tailed Quoll	<i>Dasyurus maculatus</i>	Vulnerable	Not listed	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	High
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	Endangered	Not listed	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	No	No swamps, open freshwater or saline wetlands, shallow lakes, estuaries within 300 metres of the site	PCT 3446 – Stage 2 PCT 3446 – Stage 3	Moderate
Little Lorikeet	<i>Glossopsitta pusilla</i>	Vulnerable	Not listed	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	High

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
White-bellied Sea Eagle	<i>Haliaeetus leucogaster</i>	Vulnerable	Not listed	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	No	The site is more than 1 km from a large water body	PCT 3446 – Stage 2 PCT 3446 – Stage 3	High
Little Eagle	<i>Hieraaetus morphnoides</i>	Vulnerable	Not listed	Yes	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	
White-throated Needletail	<i>Hirundapus caudacutus</i>	Not listed	Vulnerable	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	High

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
Black Bittern	<i>Ixobrychus flavicolis</i>	Vulnerable	Not listed	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	No	Land is not within 40 metres of freshwater and/or estuarine wetlands or areas of permanent water with dense vegetation	PCT 3446 – Stage 2 PCT 3446 – Stage 3	Moderate
Swift Parrot	<i>Lathamus discolor</i>	Endangered	Critically Endangered	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	No	Not mapped as important habitat for this species on BAM	PCT 3446 – Stage 2 PCT 3446 – Stage 3	Moderate
Square-tailed Kite	<i>Lophoictinia isura</i>	Vulnerable	Not listed	Yes	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	Moderate

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
					<input type="checkbox"/> Current survey				
Black-chinned Honeyeater (eastern subspecies)	<i>Melithreptus gularis gularis</i>	Vulnerable	Not listed	Yes	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	Moderate
Eastern Coastal Free-tailed Bat	<i>Micronomus norfolkensis</i>	Vulnerable	Not listed	Yes	<input type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	High
Little Bent-winged Bat	<i>Miniopterus australis</i>	Vulnerable	Not listed	Yes	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	High

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
					<input type="checkbox"/> Current survey				
Large bent-winged Bat	<i>Miniopterus orianae oceanensis</i>	Vulnerable	Not listed	Yes	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	High
Turquoise Parrot	<i>Neophema pulchella</i>	Vulnerable	Not listed	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	High
Scarlet Robin	<i>Petroica boodang</i>	Vulnerable	Not listed	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	Moderate

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
					<input type="checkbox"/> Current survey				
Flame Robin	<i>Petroica phoenicea</i>	Vulnerable	Not listed	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	Moderate
Grey-crowned Babbler	<i>Pomatostomus temporalis</i>	Vulnerable	Not listed	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	Moderate
New Holland Mouse	<i>Pseudomys novaehollandiae</i>	Not listed	Vulnerable		<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	High

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
					<input type="checkbox"/> Current survey				
Grey-headed Flying Fox	<i>Pteropus poliocephalus</i>	Vulnerable	Vulnerable	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	High
Yellow-bellied Sheath-tailed bat	<i>Saccolaimus fliviventris</i>	Vulnerable	Not listed	No	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	High
Diamond Firetail	<i>Stagonopleura guttata</i>	Vulnerable	Vulnerable	Yes	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey	Yes		PCT 3446 – Stage 2 PCT 3446 – Stage 3	Moderate

Common name	Scientific name	Listing status		Dual credit species	Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID	Sensitivity to gain class
		BC Act	EPBC Act						
					<input type="checkbox"/> Current survey				

5.2 Species credit species

Table 14: Predicted flora species credit species

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Red Helmet Orchid	<i>Corybas dowlingii</i>	E	-	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	No	Not present	
White-flowered Wax Plant	<i>Cynanchum elegans</i>	E	E	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes	Not present	
Slaty Red Gum	<i>Eucalyptus glaucina</i>	V	V	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes	Not present	
Craven Grey Box	<i>Eucalyptus largeana</i>	E	E	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes	Not present	

Small-flower Grevillea	<i>Grevillea parviflora</i> <i>subsp. parviflora</i>	V	V	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey	Yes	Not present	
<i>Pterostylis chaetophora</i>	<i>Pterostylis chaetophora</i>	V	-	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes	Not present	
Scrub Turpentine	<i>Rhodamnia rubescens</i>	CE	CE	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes	Not present	
Heath Wrinklewort	<i>Rutidosus heterogama</i>	V	V	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes	Not present	

Table 15: Predicted fauna species credit species

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Regent Honeyeater	<i>Anthochaera phrygia</i>	CE	CE	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC	No		

				<input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey			
Gang Gang Cockatoo	<i>Callocephalon fimbriatum</i>	V	E	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		
Glossy Black Cockatoo	<i>Calyptorhynchus lathami</i>	V	V	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	No	No stands of Allocasuarinas on site. No records of species on Bionet within a 10km radius	
Eastern Pygmy Possum	<i>Cercartetus nanus</i>	V	-	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	V	V	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	No		

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
White-bellied Sea Eagle	<i>Haliaeetus leucogaster</i>	V	-	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	No	No wet areas, swamps, or waterbodies within 1 km	
Little Eagle	<i>Hieraaetus morphnoides</i>	V	-	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		
Swift Parrot	<i>Lathamus discolor</i>	E	CE	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	No	Not mapped as important habitat for this species on BAM	
Square-tailed Kite	<i>Lophoictinia isura</i>	V	-	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Little Bent-winged Bat	<i>Miniopterus australis</i>	V	-	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	No		
Large Bent-winged Bat	<i>Miniopterus orianae oceanensis</i>	V	-	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	No		
Southern Myotis	<i>Myotis macropus</i>	V	-	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		
Barking owl	<i>Ninox connivens</i>	V	-	<input type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Powerful Owl	<i>Ninox strenua</i>	V	-	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		
Squirrel Glider	<i>Petaurus norfolcensis</i>	V	-	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		
Brush-tailed Phascogale	<i>Phascogale tapoatafa</i>	V	-	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		
Koala	<i>Phascolarctus cinereus</i>	E	E	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		

Common name	Scientific name	Listing status		Sources	Species retained for further assessment?	Reason for exclusion from further assessment	Vegetation zone ID species retained within, including PCT ID
		BC Act	EPBC Act				
Grey-headed Flying Fox	<i>Pteropus poliocephalus</i>	V	V	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	No	No breeding camps on site	
Masked Owl	<i>Tyto novaehollandiae</i>	V	-	<input checked="" type="checkbox"/> BAM-C <input type="checkbox"/> TBDC <input type="checkbox"/> Previous survey <input type="checkbox"/> Current survey	Yes		

5.2 Presence of candidate species credit species

From the remaining list of candidate species credit species, use 16 (flora) or 17 (fauna) to identify species determined to be present within the subject land based on:

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

Table 16: Determining the presence of candidate flora species credit species on the subject land

Common name	Scientific name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Red Helmet Orchid	<i>Corybas dowlingii</i>	E	-	Parallel field transverse method in accordance with NSW Guide to Surveying Threatened Plants (DPI&E, 2020)	No	No
White-flowered Wax Plant	<i>Cynanchum elegans</i>	E	E	Parallel field transverse method in accordance with NSW Guide to Surveying Threatened Plants (DPI&E, 2020)	No	No
Slaty Red Gum	<i>Eucalyptus glaucina</i>	V	V	Parallel field transverse method in accordance with NSW Guide to Surveying Threatened Plants (DPI&E, 2020)	No	No
Craven Grey Box	<i>Eucalyptus largeana</i>	E	E	Parallel field transverse method in accordance with NSW Guide to Surveying Threatened Plants (DPI&E, 2020)	No	No
Small-flower Grevillea	<i>Grevillea parviflora</i> subsp. <i>parviflora</i>	V	V	Parallel field transverse method in	No	No

Common name	Scientific name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
				accordance with NSW Guide to Surveying Threatened Plants (DPI&E, 2020)		
<i>Pterostylis chaetophora</i>	<i>Pterostylis chaetophora</i>	V	-	Parallel field transverse method in accordance with NSW Guide to Surveying Threatened Plants (DPI&E, 2020)	No	No
Scrub Turpentine	<i>Rhodamnia rubescens</i>	CE	CE	Parallel field transverse method in accordance with NSW Guide to Surveying Threatened Plants (DPI&E, 2020)	No	No
Heath Wrinklewort	<i>Rutidosus heterogama</i>	V	V	Parallel field transverse method in accordance with NSW Guide to Surveying Threatened Plants (DPI&E, 2020)	No	No

Table 17: Determining the presence of candidate fauna species credit species on the subject land

Common name	Scientific name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Gang Gang Cockatoo	<i>Callocephalon fimbriatum</i>	V	E	Diurnal Bird Surveys	No	No
Eastern Pygmy Possum	<i>Cercartetus nanus</i>	V	-	Spotlighting and camera traps	No	No
Large-eared Pied Bat	<i>Chalinolobus dwyeri</i>	V	V	Anabat	No	No
Little Eagle	<i>Hieraaetus morphnoides</i>	V	-	Diurnal bird survey, and assessment of habitat suitability and searching for nests	No	No
Square-tailed Kite	<i>Lophoictinia isura</i>	V	-	Diurnal bird survey, and assessment of habitat suitability and searches for nests	No	No
Little Bent-winged Bat	<i>Miniopterus australis</i>	V	-	Anabat	Yes	No (Habitat constraint)
Large Bent-winged Bat	<i>Miniopterus orianae oceanensis</i>	V	-	Anabat	No	No
Southern Myotis	<i>Myotis macropus</i>	V	-	Anabat	No	No
Barking Owl	<i>Ninox connivens</i>	V	-	Targeted threatened species survey inspecting potential hollow bearing trees for white wash / pellets,spotlighting and Call playbacks	No	No

Common name	Scientific name	Listing status		Method used to determine presence	Present?	Further assessment required? (BAM Subsections 5.2.5 and 5.2.6)
		BC Act	EPBC Act			
Powerful Owl	<i>Ninox strenua</i>	V	-	Inspecting potential hollow bearing trees for white wash / pellets and spotlighting call all playback	No	No
Squirrel Glider	<i>Petaurus norfolcensis</i>	V	-	Spotlighting/ camera and hair traps	No	No
Brush-tailed Phascogale	<i>Phascogale tapoatafa</i>	V	-	Spotlighting/ camera and hair traps	No	No
Koala	<i>Phascolarctus cinereus</i>	E	E	Targeted threatened species survey, diurnal searching and spotlighting	No	No
Masked Owl	<i>Tyto novaehollandiae</i>	V	-	Inspecting potential hollow bearing trees for white wash / pellets and spotlighting. Call playback	No	No

5.3 Threatened species surveys

Targeted threatened flora surveys were undertaken over several seasons, including in November 2021, May 2023, July 2023 and September 2024 (see Table 18). On all occasions, the parallel field traverse method was used. Figure 10 provides the available GPS tracking for each survey period, however, note that the GPS tracking is not available for November 2021 and is incomplete for the May 2023 and July 2023 periods (due to technical issues). The GPS tracking for September indicates that the entire proposed impact area was traversed at a minimum of 10 m wide transects.

Table 18: Threatened species surveys for candidate flora species credit species on the subject land

Common name	Scientific name	Threatened flora species surveys			Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)	
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)				
White-flowered Wax Plant	<i>Cynanchum elegans</i>	Parallel field transverse method	<input checked="" type="checkbox"/> Yes 30/05/23 13/07/23 18/09/24 24/09/24 02/10/24	<input type="checkbox"/> No	3 person, 45 hours	No	No
Slaty Red Gum	<i>Eucalyptus glaucina</i>	Parallel field transverse method	<input checked="" type="checkbox"/> Yes 30/05/23 13/07/23 18/09/24 24/09/24 02/10/24	<input type="checkbox"/> No	3 person, 45 hours	No	No
Craven Grey Box	<i>Eucalyptus largeana</i>	Parallel field transverse method	<input checked="" type="checkbox"/> Yes 22/11/21 30/5/23 13/7/23 Sept 2024	<input checked="" type="checkbox"/> Yes 22/11/21 30/5/23 13/7/23 Sept 2024	3 person, 45 hours	No	No

Common name	Scientific name	Threatened flora species surveys				Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (transects or grids)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Small-flower Grevillea	<i>Grevillea parviflora subsp. parviflora</i>	Parallel field transverse method	<input checked="" type="checkbox"/> Yes 22/11/21 30/5/23 13/7/23 Sept 2024	<input checked="" type="checkbox"/> Yes 22/11/21 30/5/23 13/7/23 Sept 2024	1 person, 8 hours (Nov 2021)	No	No
<i>Pterostylis chaetophora</i>	<i>Pterostylis chaetophora</i>	Parallel field transverse method	<input checked="" type="checkbox"/> Yes 22/11/21 30/5/23 13/7/23 Sept 2024	<input checked="" type="checkbox"/> Yes 22/11/21 30/5/23 13/7/23 Sept 2024	1 person, 8 hours (Nov 2021)	No	No
Scrub Turpentine	<i>Rhodamnia rubescens</i>	Parallel field transverse method	<input checked="" type="checkbox"/> Yes 30/05/23 13/07/23 18/09/24 24/09/24 02/10/24	<input type="checkbox"/> No	3 person, 45 hours	No	No
Heath Wrinklewort	<i>Rutidosia heterogama</i>	Parallel field transverse method	<input checked="" type="checkbox"/> Yes 30/5/23 13/7/23 Sept 2024	<input checked="" type="checkbox"/> Yes 30/5/23 13/7/23 Sept 2024	2 person, 8 hours (Nov 2021)	No	No

Table 19 summarises the targeted survey effort for candidate fauna species. These targeted surveys were undertaken in March 2023, June 2023 and September 2024 and included:

- Diurnal bird surveys, searching for nesting cockatoos, raptors and owls. During these surveys, the site was traversed to search for any nest trees and any hollow-bearing trees with evidence of use.
- Nocturnal spotlighting surveys, targeting eastern pygmy possum, squirrel glider, green and golden bell frog, nesting owls, brushtail phascogale and koala. During these surveys, the site was traversed at night and the canopy was continuously scanned using hand-held torches. Near aquatic habitat, frog calls were listened to, and green and golden frog calls were also broadcast.
- Nocturnal call playback for nesting owls was undertaken at several locations, involving the following methodology (in line with BioNet): A 10-minute listening and observation time prior to broadcasting was undertaken. Calls were then broadcast for no more than 15 seconds followed by at least 30 seconds of listening and watching time. The broadcasting and listening/watching process was repeated at each location for 15 minutes for each target owl. Following this, owls were searched for within a 1 ha area around the broadcast location.
- Bat call detection surveys for southern myotis, using Anabat detectors placed near aquatic habitat (see Figure 12 for map of the locations of Anabat detectors).
- Hair trap surveys were undertaken, targeting brush-tailed phascogale, eastern pygmy possum, squirrel glider and koala.
- Camera trapping surveys were undertaken, targeting brush-tailed phascogale, eastern pygmy possum, squirrel glider and koala. This involved the deployment of 14 camera traps for a period of 4 weeks, within either the impact area or just on the border of the impact area and the conservation area (see Figure 9). Baits included honeyed oat balls placed in bait canisters, and these were checked at the 2-week interval. Cameras were set in trees, at head height. It is noted that the BioNet requirements for brush-tailed phascogale surveys require a minimum of 4 cameras for the first ha and then 2 cameras for every ha after that. The impact area is 4.7 ha of native vegetation, which requires 11-12 cameras. Therefore, the 14 cameras deployed would meet the minimum survey requirements. Camera spacing was designed to reflect the areas of 'directly impacted vegetation' within the residential lots (i.e., the areas impacted by the building envelopes and APZs shown in Figure 8). It is considered that this combined with the hair trap and spotlighting survey effort would satisfy the survey requirements for the target arboreal mammals.
- Targeted surveys for koala were undertaken using the Spot Assessment Technique (SAT) (see Figure 10), in accordance with DPE (2022) *Koala (Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide*, as follows:
 - A central tree was located and marked. Moving outwards from the centre tree, 29 of the nearest trees (in suitable habitat) were identified.
 - A radial search for koala scats was undertaken beneath each of the 30 trees, within a prescribed search area extending 1 m from the base of each tree. Scat search effort was a minimum of two person-minutes for each tree.

A total of 3 SAT surveys were undertaken. Considering that the impact area is 4.7 ha, this would satisfy the minimum effort when dividing the approx. number of ha by 2.25 as stated in DPE (2022). SAT locations were also spaced out in accordance with the 150 m grid spacing requirement in DPE (2022).

Table 19: Threatened species surveys for candidate fauna species credit species on the subject land

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
Gang Gang Cockatoo	<i>Callocephalon fimbriatum</i>	Diurnal bird surveys	<input type="checkbox"/> Yes 14/03/23 15/03/23 20/03/23 Sept 2024	<input type="checkbox"/> Yes	1 person 15 hrs and 25 mins	No	No
Eastern Pygmy Possum	<i>Cercartetus nanus</i>	Spotlighting and camera traps	<input checked="" type="checkbox"/> Yes 14/03/23 15/03/23 20/03/23 6/06/23 Sept 2024	<input checked="" type="checkbox"/> Yes	1 person 3 hours and camera and hair tube traps were left out for 4 weeks	No	No
Little Eagle	<i>Hieraaetus morphnoides</i>	Diurnal bird surveys	<input type="checkbox"/> Yes 14/03/23 15/03/23 20/03/23 29/06/23 Sept 2024	<input type="checkbox"/> Yes	1 person 15 hrs and 25 mins	No	No
Green and Golden Bell Frog	<i>Litoria aurea</i>	Spotlighting and listening for calls	<input checked="" type="checkbox"/> Yes 14/03/23 15/03/23 20/03/23 Sept 2024	<input checked="" type="checkbox"/> Yes	1 person 3 hours	No	No
Square-tailed Kite	<i>Lophoictinia isura</i>	Diurnal bird surveys	<input type="checkbox"/> Yes 14/03/23 15/03/23 20/03/23 29/06/23 Sept 2024	<input type="checkbox"/> Yes	1 person 15 hrs and 25 mins	No	No
Southern Myotis	<i>Myotis macropus</i>	Anabat recordings	<input checked="" type="checkbox"/> Yes 14/03/23 to 24/03/23	<input checked="" type="checkbox"/> Yes	6 nights	Not recorded	No
Barking Owl	<i>Ninox connivens</i>	Diurnal bird surveys and spotlighting	<input checked="" type="checkbox"/> Yes 14/03/23 15/03/23	<input checked="" type="checkbox"/> Yes	1 person 15 hrs and 25 mins	No	No

Common name	Scientific name	Threatened fauna species surveys			Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)	
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)				Effort (hours & no. people)
		Nocturnal call playback	20/03/23 6/06/23 Sept 2024		1 person 15 hrs and 25 mins 1 person 15 hrs and 25 mins 1 person 1hr 30 min		
Powerful Owl	<i>Ninox strenua</i>	Diurnal bird surveys and spotlighting Nocturnal call playback	☑ Yes 14/03/23 15/03/23 20/03/23 6/06/23 Sept 2024	☑ Yes	1 person 15 hrs and 25 mins 1 person 15 hrs and 25 mins 1 person 15 hrs and 25 mins 1 person 1hr 30 min	No	No
Squirrel Glider	<i>Petaurus norfolcensis</i>	Spotlighting/ camera traps and hair traps	☑ Yes 14/03/23 15/03/23 20/03/23 6/06/23 Sept 2024	☑ Yes camera traps for 4 weeks 25/05/23 and 30/05/23 to 29/06/23	1 person 3 hours and camera and hair tube traps were left out for 4 weeks	No	No
Brush-tailed Phascogale	<i>Phascogale tapoatafa</i>	Spotlighting/ camera traps and hair traps	☑ Yes 14/03/23 15/03/23 20/03/23 29/06/23 Sept 2024	☑ Yes camera traps for 4 weeks 25/05/23 and 30/05/23 to	1 person 3 hours and camera and hair tube traps were left out for 4 weeks	No	No

Common name	Scientific name	Threatened fauna species surveys				Present	Further assessment required (BAM Subsections 5.2.5 and 5.2.6)
		Survey method (e.g. harp trap, Elliott trap, bioacoustics, etc.)	Timing of survey – within recommended period? (BAM-C / TBDC)		Effort (hours & no. people)		
				29/06/23			
Koala	<i>Phascolarctos cinereus</i>	Diurnal searches and spotlighting	<input checked="" type="checkbox"/> Yes 14/03/23 15/03/23 20/03/23 29/06/23 Sept 2024	<input checked="" type="checkbox"/> Yes	1 person 3 hours and camera and hair tube traps were left out for 4 weeks	No	No
Masked Owl	<i>Tyto novaehollandiae</i>	Diurnal bird surveys and spotlighting Nocturnal call playback	<input checked="" type="checkbox"/> Yes 14/03/23 15/03/23 20/03/23 6/06/23 Sept 2024	<input checked="" type="checkbox"/> Yes	1 person 15 hrs and 25 mins 1 person 15 hrs and 25 mins 1 person 15 hrs and 25 mins 1 person 1hr 30 min	No	No

Further Assessment of Candidate Species

One species detected within the Study Area are listed as vulnerable under the BC Act being the Little Bentwing-bat (*Miniopterus australis*). The Microchiropteran bat species were detected via AnaBat ultrasonic recorder and subsequent call analysis by Amy Rowles (refer to Anabat Results in Appendix E).

Little Bentwing-bat (*Miniopterus australis*) is a dual Species and Ecosystem Credit Species (species credit species for breeding habitat). The habitat constraint listed for Little Bentwing-bat (*Miniopterus australis*) species in the Threatened Biodiversity Data Collection (habitat constraint: cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding) is not present within the Study Area. As such, this species was determined as unlikely to occur within the Development Site (for breeding habitat) and was ruled out as a candidate species.

5.4 Expert reports

- N/A – No Expert Report is required

5.5 More appropriate local data (where relevant)

Table 20: Use of more appropriate local data for habitat suitability

Species	Amendments to species data	Local data source/s
N/A	N/A	N/A

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

The Little Bentwing-bat (*Miniopterus australis*) was the only threatened species recorded onsite (refer to Table 21 below). The habitat constraint listed for Little Bentwing-bat (*Miniopterus australis*) species in the Threatened Biodiversity Data Collection (habitat constraint: cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding) is not present within the Study Area. As such, this species was determined as unlikely to occur within the Development Site (for breeding habitat) and was ruled out as a candidate species.

Table 21: Results for present species (recorded within the subject land)

Common name	Scientific name	Biodiversity risk weighting (BAM-C & TBDC*)	SAIL entity** (BAM-C & TBDC)	Habitat constraints / microhabitats present on the subject land / vegetation zone	Abundance – No. individual plants present on subject land (flora with unit of measure of count)	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure of area)	TBDC species specific recommendations e.g. buffers, general comments (where relevant)	Habitat condition (vegetation integrity score for each vegetation zone in the polygon – area species only)
Little Bent-winged Bat	<i>Miniopterus australis</i>	N/A	N/A	Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding	N/A	N/A	N/A	N/A

Table 22: Results for EPBC Act listed species present (recorded within the subject land)

Common name	Scientific name	Abundance – No. individual plants present on subject land (flora with unit of measure as count)	Extent (ha) of suitable habitat present on site (flora or fauna with unit of measure as area)
N/A			

6. Identifying prescribed 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 severely or significantly interfere with a habitat corridor.

Table 23: Prescribed impacts identified

Feature	Present	Description of feature characteristics and location	Threatened entities that use, are likely to use, or are part of the habitat feature. Where relevant, threatened species or fauna that are part of a TEC or EC, that are at risk of vehicle strike
Karst, caves, crevices, cliffs, rocks or other geological features of significance	<input type="checkbox"/> Yes / <input checked="" type="checkbox"/> No		No Karst, caves, crevices, cliffs, rocks or other geological features of significance have been recorded on the site.
Human-made structures	<input type="checkbox"/> Yes / <input checked="" type="checkbox"/> No		No human-made structures are present on the site
Non-native vegetation	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No	Exotic grassland	Not relevant to any possible threatened species present
Habitat connectivity	<input checked="" type="checkbox"/> Yes / <input checked="" type="checkbox"/> No		
Waterbodies, water quality and hydrological processes	<input checked="" type="checkbox"/> Yes / <input type="checkbox"/> No		
Wind turbine strikes (wind farm development only)	<input type="checkbox"/> Yes / <input checked="" type="checkbox"/> No		
Vehicle strikes	<input type="checkbox"/> Yes / <input checked="" type="checkbox"/> No		

7. STAGE 2 - IMPACT ASSESSMENT

7.1 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.

7.1.1 Avoidance of impacts to the site's biodiversity values

The proposed development footprint totals 129.2 ha of land. 4.7 ha of native vegetation will be selectively cleared to facilitate the subject development. This vegetation clearing will take place in two stages, these being Stage 2 and 3. Hollow bearing trees are to be retained where possible. Where the avoidance of hollow bearing trees is not possible, they are to be replaced by nest boxes at a ratio of 1:1.

The strategic positioning of the proposed development allows impacts to local ecosystems within the site to be significantly minimised. The development has been located in the centre of the site, which is predominately covered by exotic pasture grasses and weeds. A total of 21 ha of land around the site's western boundaries will be retained within a conservation area (Lot 338; see Figure 7). The 6.5 ha of PCT within the conservation area is currently existing. The remaining land of this area will be allowed to naturally restore back to native vegetation (with the assistance of weed management). A proposed Vegetation Management Plan (VMP) will prescribe the management measures to protect and restore native vegetation in the conservation area.

Additionally, 14.7 ha of PCT 3446 is to be retained within the residential lots. This includes the majority of the site's central bushland area along a tributary of Cangon Creek. It is proposed that these areas of vegetation are protected in perpetuity by a s.88B covenant under the *Conveyancing Act 1919*. With these protective measure in place, the proposal will avoid severing or interfering with any corridors.

Table 3-1 details the areas of native vegetation that will be retained and protected and indicates that the development will have a significant net benefit in terms of native vegetation and threatened species habitat coverage across the Subject Site.

Table 7-1 Proposed Retention, Protection and Restoration of Native Vegetation

	Total Area of Native Vegetation Currently Existing	Total Area of Currently Existing Native Vegetation to be Protected and Retained *	Total Area of Additional Native Vegetation to be Restored in Currently Cleared Land	Total Area of Native Vegetation Post Development and Restoration Activities
Residential Lots	19.49 ha	14.7 ha	0 ha	14.7 ha
Conservation Area	6.5 ha	6.5 ha	14.5 ha	21 ha

* To be protected and retained either in the conservation area or in the residential lots by s.88B instruments under the *Conveyancing Act 1919*.

7.2 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.

Table 7-2 Avoid and Minimise Impacts on Biodiversity Values

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 development has been located in the centre of the site, which is predominately covered by exotic pasture grasses and weeds. The vegetation will be retained and protected in the conservation area, with a VMP proposed to guide the restoration of cleared areas in the conservation area. This is in addition the proposed retained of most of the native vegetation in the residential lots, which will be protected in perpetuity by a S.88B instrument under the <i>Conveyancing Act 1919</i>. See previous Table 3-1.</p> <p>The strategic positioning of the proposed development allows impacts to local ecosystems within the site to be significantly minimised. The vegetation within the conservation area is connected to large areas of bushland to the south-west. Further, the native vegetation to retained in the residential lots includes the majority of the sites central bushland area situated along a tributary of Cangon Creek.</p> <p>The proposal will therefore avoid severing or interfering with any corridors.</p> <p>Biodiversity Offsets have been quantified with an appropriate number of credits within the BAM-C to account for the proposed native vegetation to be removed.</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>As discussed above, the proposed development is located over the central area of the site, which is predominately covered by exotic pasture grasses and weeds retention. The majority of native vegetation will be retained and protected in perpetuity, within the proposed conservation area or (where it occurs within residential lots) by a s.88B covenant under the <i>Conveyancing Act 1919</i>.</p>
	<p>As discussed above, the proposed development has been located in the centre</p>

<p>Impacts from clearing native vegetation and threatened species habitat can be avoided or minimised by locating the proposal in areas:</p> <p>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>of the site, which is predominately covered by exotic pasture grasses and weeds and is comparatively lacking in biodiversity values.</p> <p>The subject site does not contain land mapped on the important habitat map. The majority of the site's TEC and threatened species habitat (including hollow-bearing trees) will be retained and protected in perpetuity, within the proposed conservation area or (where it occurs within residential lots) by a s.88B covenant under the <i>Conveyancing Act 1919</i>. There are also plans to restore cleared areas within the conservation area, and as previous Table 3-1 indicates, this will lead to a significant net benefit in terms of native vegetation coverage across the site.</p> <p>Hollow bearing trees are to be retained where possible. Where the avoidance of hollow bearing trees is not possible, they are to be replaced by nest boxes at a ratio of 1:1.</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>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>It is considered that the proposal's location has been designed to minimise removal of intact native vegetation, maintain habitat connectivity and in fact, significantly increase native vegetation and threatened species habitat in the Subject Site.</p> <p>The development area has been located mainly in cleared areas covered by exotic pasture grasses and weeds. The more intact areas of native vegetation, around the edges of the site (which are connected to large areas of bushland to south-west), are to be retained in the conservation area. Vegetation within the residential lots (along Cango Creek) is to be protected by s.88B instruments. There are also plans to restore cleared areas within the conservation area, and as previous Table 3-1 indicates, this will lead to a significant net benefit in terms of native vegetation / habitat coverage across the site.</p>
<p>The proposal may also list and map site constraints, such as:</p> <p>a. bushfire protection requirements, including clearing for asset protection zones</p> <p>b. flood planning levels</p> <p>c. servicing constraints.</p>	<p>The required asset protection zones (APZs) for all residential lots containing native vegetation have been established and mapped (see Figure 8). The building envelopes and APZs in these lots have been strategically placed to minimise the impacts to native vegetation.</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.	The proposed development has been designed to retain most of the native vegetation within the conservation area. Additionally, it is proposed that the areas of native vegetation that do occur within proposed residential lots will be protected in perpetuity by s.88B covenants under the <i>Conveyancing Act 1919</i> . There are also plans to restore cleared areas within the conservation area, and as previous Table 3-1 indicates, this will lead to a significant net benefit in terms of native vegetation / habitat coverage across the site.
Design the proposal to avoid or minimise direct and indirect impacts on native vegetation, threatened species, threatened ecological communities and their habitat	
<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 (SAII)</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>Efforts to avoid and minimise impacts through design are summarised as follows and discussed in previous sections.</p> <ul style="list-style-type: none"> - The proposed development has been located in the central area of the site to avoid vegetation around the edges of the site containing higher ecological values. - The proposed building envelopes and associated APZs have been positioned to avoid vegetation within the site where reasonably practicable (see Figure 8). S.88B instruments (under the <i>Conveyancing Act 1919</i>) are proposed to protect native vegetation within these lots in perpetuity. - A total of 6.5 ha of native vegetation around the sites western boundaries will be protected in perpetuity in the proposed conservation area and any cleared areas within the conservation area will be restored back to native vegetation under a VMP (resulting in an increase of 81.3 ha of native vegetation – see previous Table 3-1). - Where impacts can't be avoided within the Subject Site, the appointment of a Project Ecologist during vegetation clearing operations will ensure that harm to fauna will be reduced and dispersal of any species collected on site will be facilitated into remnant vegetation in the adjacent corridor.

	Ancillary facilities have been located in areas that avoid suitable 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 (SAIL).
--	--

Table 7-3 Avoiding and Minimising Prescribed Biodiversity Impacts during Project Planning

Avoiding and Minimising Prescribed Biodiversity Impacts during Project Planning	
Objectives/Requirements	Evidence of compliance
<i>The timing and extent of a prescribed impact on the habitat of threatened entities can be difficult to assess and adequately offset through the provision of biodiversity credits. Prescribed impacts may occur on habitat features that are not native vegetation, e.g., caves, rocky outcrops and flyways. Because these types of features cannot be readily replaced or offset, it is important that measures to avoid or minimise impacts are undertaken and are clearly documented in the BDAR or BCAR</i>	Multiple surveys undertaken within the site have not identified any habitat features which may be subject to prescribed impacts. The only habitat values identified on site consist of native vegetation.
Locating a Project to Avoid and Minimise Prescribed Biodiversity Impacts	
<p><i>To avoid or minimise prescribed biodiversity impacts, the proponent must consider how to:</i></p> <p><i>a) locate surface works to avoid direct impacts on the habitat features identified in Chapter 6</i></p> <p><i>b) locate subsurface works, in both the horizontal and vertical planes, to avoid and minimise operations beneath the habitat features identified in Chapter 6. For example, locating longwall panels away from geological their supporting aquifers</i></p> <p><i>c) locate the proposal to avoid severing or interfering with corridors connecting different areas of habitat and migratory flight paths, to important habitat or local movement pathways</i></p>	<p>The Subject Site:</p> <p>Does not contain karsts, caves, crevices, cliffs, rocks and other features of geological significance supporting threatened species and ecological communities;</p> <p>Does not contain rocks supporting habitat for threatened species and ecological communities;</p> <p>Does not contain human-made structures containing habitat for threatened species and ecological communities; and</p> <p>Does not contain non-native vegetation supporting threatened species and ecological communities.</p>

<p><i>d) optimise the proposal layout to minimise interactions with threatened entities; for example, design a wind farm that has:</i></p> <ul style="list-style-type: none"> - 100 m turbine-free buffers around features that attract and support aerial species, such as forest edges, riparian corridors, wetlands, ridgetops and gullies turbine-free corridors in zones of regular movement for species of concern, to avoid a barrier effect. <p><i>e) locate the proposal to avoid impacts on water bodies or hydrological processes</i></p>	<p>As such, no prescribed impacts are expected.</p>
<p>Avoiding and Minimising Prescribed Biodiversity Impacts during Project Planning</p>	
<p><i>When locating a proposal, the following need to be analysed and justification should be provided for each alternative selected: alternative modes or technologies that would avoid or minimise prescribed impacts alternative routes that would avoid or minimise prescribed impact's alternative locations that would avoid or minimise prescribed impacts alternative sites within a property on which the proposal is located that would avoid or minimise prescribed impacts.</i></p>	<p>The proposed design is the result of collaborative work between ecological consultants and the proponent to accommodate both ecological and practical placement of the residential subdivision.</p> <p>Alternative sites would result in greater impacts on native vegetation and with the amount of vegetation being retained and restored (see previous Table 3-1), it was considered that the proposed development footprint avoids and minimises the impacts of the development.</p>
<p>Designing a Project to Avoid and Minimise Prescribed Biodiversity Impacts</p>	
<p><i>Design measures that can avoid or minimise prescribed impacts include:</i></p> <ul style="list-style-type: none"> <i>a. engineering solutions, such as proven techniques to:</i> <ul style="list-style-type: none"> <i>i. minimise fracturing of bedrock underlying features of geological significance, or groundwater-dependent communities and their supporting aquifers</i> <i>ii. restore connectivity and movement corridors</i> <i>b. design elements that minimise interactions with threatened entities, such as:</i> <ul style="list-style-type: none"> <i>i. designing turbines to dissuade perching and minimise the diameter of the rotor swept area</i> <i>ii. designing fencing to prevent animal entry to transport corridors</i> 	<p>The site is constrained by bushfire requirements related to the construction of residential dwellings within the proposed subdivision. This has created APZs that must be complied with. The clearing for APZs would be required for any location within the property.</p> <p>The location of the dwelling allows for the use of the access into the site that is already present.</p> <p>Movement corridors and habitat connectivity will be maintained and in fact enhanced through the retention and restoration of native vegetation within the conservation area and the protection of native vegetation along Cangon Creek, within the residential lots (under s.88B instruments) – see previous Table 3-1.</p>

<p><i>iii. providing vegetated buffers rehabilitated with native species</i></p> <p><i>c. maintaining environmental processes that are critical to the formation and persistence of habitat features not associated with native vegetation</i></p> <p><i>d. maintaining hydrological processes that sustain threatened entities</i></p> <p><i>e. controlling the quality of water released from the site, to avoid or minimise downstream impacts on threatened entities.</i></p>	<p>Hydrological processes will be maintained within the site. Culverts will be installed to avoid any impacts of the proposed internal road the sites drainage channels. Erosion and sediment control measures will be implemented to avoid any impacts of construction works to aquatic habitat and threatened species.</p>
<p><i>The proposed measures must be evidence-based and directed towards the threatened entities identified in Chapter 6. The BDAR or BCAR must document the designs that are proposed to avoid or minimise prescribed impacts.</i></p>	<p>As discussed above, no prescribed impacts are expected to occur as a result of the proposed development. The only residual impact will be the removal of 4.7 ha of native vegetation and associated habitat. This will be split into two stages, with Stage 2 set to clear 0.58 ha of native vegetation and Stage 3 set to clear 5.26 ha of native vegetation. Previous Table 3-1 details the proposed native vegetation retention, protection and restoration plans.</p>

7.3 Assessment of Impacts

Section 8 of the BAM states that the BDAR “must assess the impacts of the project on native vegetation and habitat”. In addition to this, Sections 9.1.4 and 9.2 require that further assessment be produced for any impact, including biodiversity impacts, expected in land surrounding the Subject Site. Tables 2.3 to provide a summary of measures proposed to avoid and minimise direct, indirect and residual impacts on biodiversity.

7.3.1 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.

Table 7-4: Proposed Mitigation Measures

Action	Responsibility	Timing
Pre-construction Phase Measures		
A VMP will be established, with the purpose of prescribing the vegetation management and restoration measures to be undertaken within the conservation area. This will include requirements to allow the natural restoration of the cleared areas in the conservation area back to native vegetation (with the assistance of weed management).	Project ecologist	Prior to the issuing of the construction certificate.
s.88B instruments will be established on title for the residential lots containing native vegetation to be retained.	Landowner	Prior to the issuing of the construction certificate.
The boundaries of the development footprint will be delineated in the field using bunting / flagging tape to ensure inadvertent clearing / disturbance of the adjacent vegetation does not occur.	Project manager.	Prior to commencement of any excavation or clearing works.
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> <ul style="list-style-type: none"> a) Ensure no vegetation clearing occurs outside of the approved clearing footprint. b) Ensure soft felling techniques are utilised for felling of any habitat/hollow-bearing trees. c) Supervise all habitat/hollow-bearing tree removal to capture and/or relocate any dispersed fauna. 	Project ecologist	During clearing.

<p>d) Transport any injured wildlife to appropriate veterinary care or transfer the animal to a local volunteer wildlife carer group.</p> <p>e) Provide post-clearing reporting back to Council should any threatened species be captured or encountered by clearing operations.</p>		
<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. • Vehicles, machinery and equipment must be free from weed material (including seeds) before entering the construction corridor. 	Project manager.	During excavation, clearing and construction works.
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.
The vegetation restoration and monitoring activities in the conservation area will commence as per the requirements in the VMP.	Project ecologist and bush regeneration contractor.	Ongoing for the life of the VMP.

7.4 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.

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 7-5: Direct Impacts on Native Vegetation

PCT	Vegetation Zone (VZ)	Composition Score	Structure Condition Score	Function Condition Score	Vegetation Integrity Score
PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest	VZ1: Regenerating – Stage 2	62.5	61.2	35.2	51.3
PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest	VZ1: Regenerating – Stage 3	64	71	49.5	60.8

Table 7-6: Change in Vegetation Integrity (VI) Scores

PCT	Vegetation Zone (VZ)	Current Veg Integrity Score	Future Veg Integrity Score	Change in VI score	Total VIS loss
PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest	VZ1: Regenerating – Stage 2	51.3	0	-51.3	-51.3
PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest	VZ1: Regenerating – Stage 3	60.8	0	-60.8	-60.8

Assessment of Direct Impacts

The proposed development will have a direct impact by disturbing 4.7 ha of native vegetation. This clearing will take place in two stages with Stage 2 set to clear 0.58 ha of native vegetation and Stage 3 set to clear 5.26 ha of native vegetation at a later date.

No hollow-bearing trees are expected to be impacted by the proposed development. As such, the proposal has avoided impacts to nesting habitat for hollow-dependent threatened species.

Direct impacts will be avoided and minimised through the retention and restoration of native vegetation within the conservation area and the protection of native vegetation along Cango Creek, within the residential lots (under s.88B instruments).

7.5 Indirect Impacts

The indirect impacts of the development have been identified and are outlined in Table 3-8. 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 7-7: 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 7-8: 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 7-9: 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 7-10: 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	Medium	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	Medium	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	Medium	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	Medium	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	Anytime during construction and operation	Ongoing for the life of the development	Ongoing for the life of the development

					development footprint			
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	Medium	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

Potential Prescribed Biodiversity Impacts

No prescribed biodiversity impacts are anticipated from the proposed development as the subject site does not contain mapped biodiversity values. Any hollow bearing trees which cannot be avoided are to be replaced by nest boxes at a ratio of 1:1. The proposal would not sever or significantly interfere with a habitat corridor.

7.6 Impact Summary

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 (SAIL) entities'. There are no serious and irreversible impact (SAIL) entities relevant to this assessment.

Impacts Which Require an Offset

As per Section 10.3 of the BAM, the removal of native vegetation within the site will require offsetting to achieve the 'no net loss standard' detailed within Section 11 of the BAM. To calculate the required offsets in the form of ecosystem credits, the BAM Calculator has taken into consideration the impact area, the projected loss in vegetation integrity score and the biodiversity risk weighting of the PCT. Details of each along with the required credit outputs is provided in Table 2-10 and Table 2-11

Table 7-11 Ecosystem credit requirements

Veg Zone	Impact Area (ha)	Future VIS	VIS Loss	Biodiversity Risk Weighting	Credit Requirements
PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest – Stage 2	0.58	-51.3	-51.3	2.5	19
PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest – Stage 3	5.26	-60.8	-60.8	2	160

Impacts Not Requiring an Offset

N/A

Identification of Areas Not Requiring Assessment

N/A

8 Biodiversity Credit Report

The Biodiversity Credit Report is provided in the following pages.

9 References

- Botanical Gardens Trust 2023 -Plantnet- The Plant Information Network System of The Botanic Gardens Trust, Sydney, Australia (accessed January 2023).
- Department of the Environment and Energy (2023): Commonwealth Biodiversity: Species Profile and Department of Planning and the Environment (2022).
- Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide. Environment and Heritage Group, Department of Planning and Environment, Parramatta. Threats Database (SPRAT) - 4 (accessed January 2023)
- eBird (n.d.) Species maps database (amateur sightings uploaded to an interactive map). <https://ebird.org/map/>
- Harden, G.J. (Ed) (1992) Flora of New South Wales. Volume 3. Royal Botanical Gardens Sydney & New South Wales University Press, Sydney
- Harden, G.J. (Ed) (1993) Flora of New South Wales. Volume 4. Royal Botanical Gardens Sydney & New South Wales University Press, Sydney
- Harden, G.J. (Ed) (2000) Flora of New South Wales. Volume 1. Royal Botanical Gardens Sydney & New South Wales University Press, Sydney
- Harden, G.J. (Ed) (2002) Flora of New South Wales. Volume 2. Royal Botanical Gardens Sydney & New South Wales University Press, Sydney
- Kuginis L., Williams J.P., Byrne G., Serov P., June 2012, Risk assessment guidelines for groundwater dependent ecosystems, Volume 4 – The ecological value of groundwater sources on the coastal plains of NSW and the risk from groundwater extraction, NSW Department of Primary Industries, Office of Water, Sydney
- Mitchell, P.B. (2002). Descriptions for NSW (Mitchell) Landscapes Version 2. Prepare for the NSW National Parks and Wildlife Service, Hurstville.
- Naylor, SD, Chapman, GA, Atkinson, G, Murphy CL, Tulau MJ, Flewin TC, Milford HB, Morand DT, 1998, Guidelines for the Use of Acid Sulfate Soil Risk Maps, 2nd ed., Department of Land and Water Conservation, Sydney.
- NSW DPIE (2019) Biodiversity Assessment Method Operational Manual- Stage 2 Department of Planning, Industry and Environment for the NSW Government, Sydney, NSW.
- NSW DPIE (2020a) Biodiversity Assessment Methodology (BAM) Department of Planning, Industry and Environment for the NSW Government, Sydney, NSW.
- NSW DPIE (2020b) Biodiversity Assessment Method Operational Manual- Stage 1 State of NSW and Department of Planning, Industry and Environment, Parramatta NSW.
- NSW DPIE (2020c) Surveying threatened plants and their habitats; NSW survey guide for the Biodiversity Assessment Method State of NSW and Department of Planning, Industry and Environment, Parramatta NSW.
- NSW DPIE (2021) Biodiversity Conservation SEPP Biodiversity Conservation SEPP - (nsw.gov.au)
- NSW DPIE (2023a) BioNet Vegetation Information System: Classification Database. Accessed online at <http://www.environment.nsw.gov.au/research/Visclassification.ht> (accessed February 2023)
- NSW DPIE (2023b) NSW Bionet. Threatened Biodiversity Data Collection Accessed online – <http://www.bionet.nsw.gov.au/> (accessed January 2023)

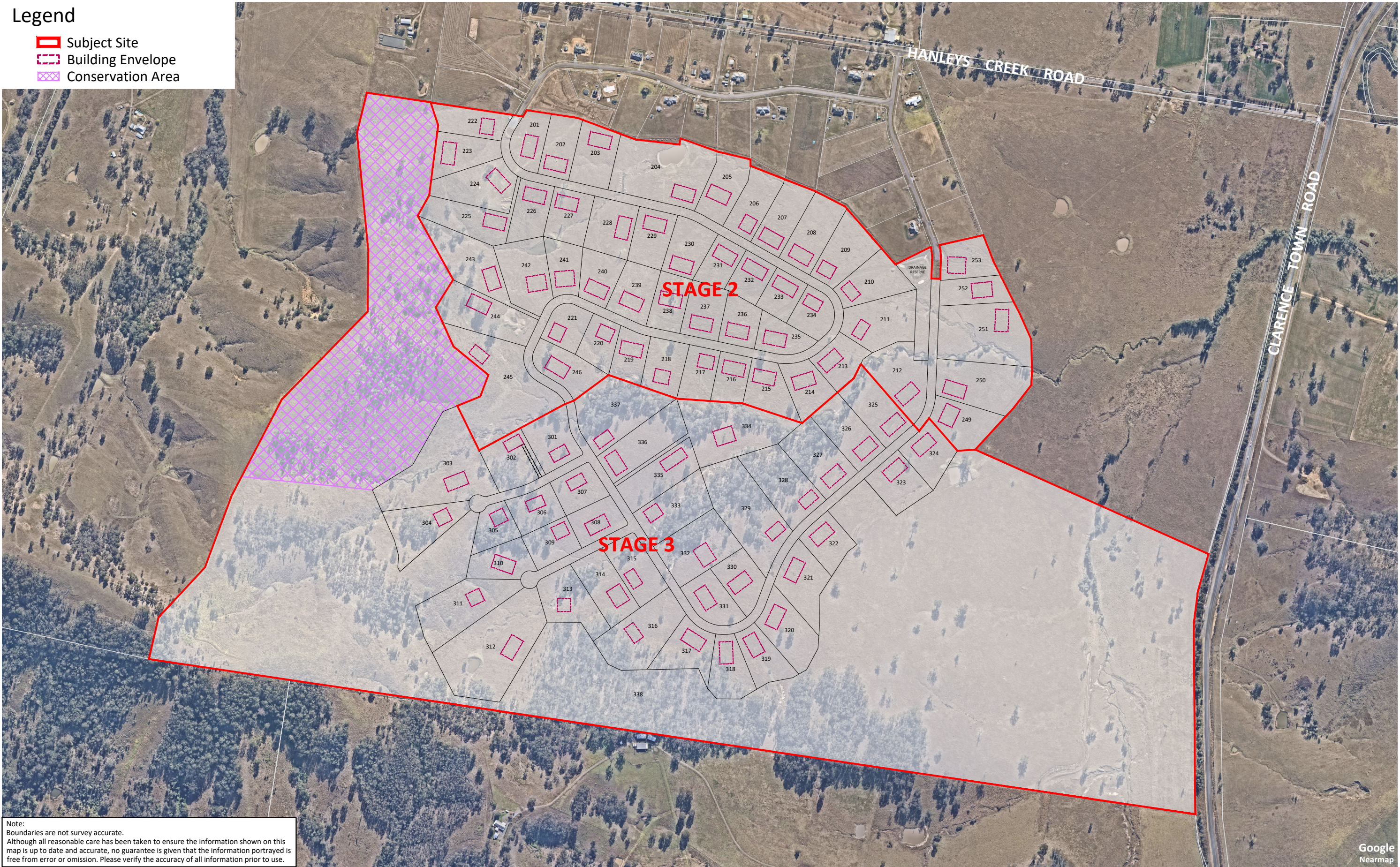
- NSW DPIE (2023c) Threatened Species Profile Search -
<http://www.environment.nsw.gov.au/threatenedSpeciesApp/> (accessed January 2023)
- NSW OEH (2017b) Guidance to assist a decision-maker to determine a serious and irreversible impact, NSW Government
- Thackway, R., Cresswell, I.D. (1995) An Interim Biogeographic Regionalisation for Australia. Reserve Systems Unit, Australian nature Conservation Agency
- Pizzey, G. and Knight, F. (2007) The Field Guide to the Birds of Australia. Harper Collins Publishers, Sydney.
- Robinson, M. (1998) A field Guide to Frogs of Australia. Reed New Holland, Sydney. Simpson, K, and Day, N. (2010) Field Guide to the Birds of Australia. Penguin Group, Australia.
- Strahan, R. (2004) The Mammals of Australia. New Holland Publishers, Australia. Tyler, M. J. And Knight, F. (2011) Field Guide to the Frogs of Australia. Revised Edition. CSIRO Publishing, Australia

Legend

Subject Site

Building Envelope

Conservation Area



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.

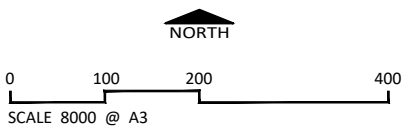
FIGURE 1: SITE MAP

SITE DETAILS

Stage 2 Hanleys Creek Road Dungog

DATE

13 November 2024







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



Ref No 2361 Stage 2 BDAR F

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
-  Newcastle Coastal Ramp
-  Scone - Gloucester Foothills

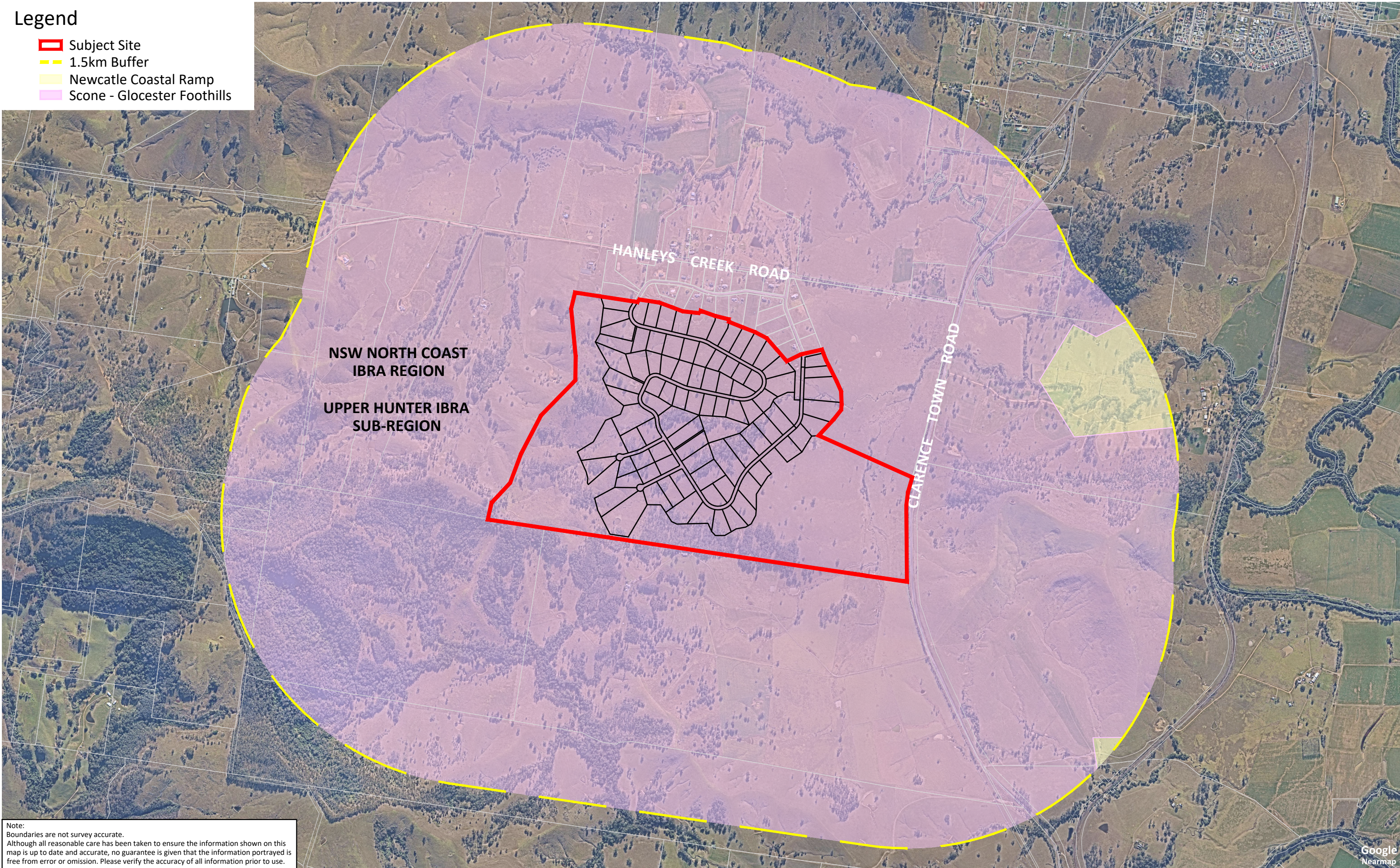
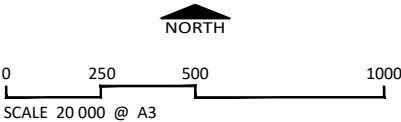


FIGURE 2: SITE LOCALITY MAP

SITE DETAILS
DATE Hanleys Creek Road Dungog
6 November 2024



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



Ref No 2361 Stage 2 BDAR E

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

Development Footprint

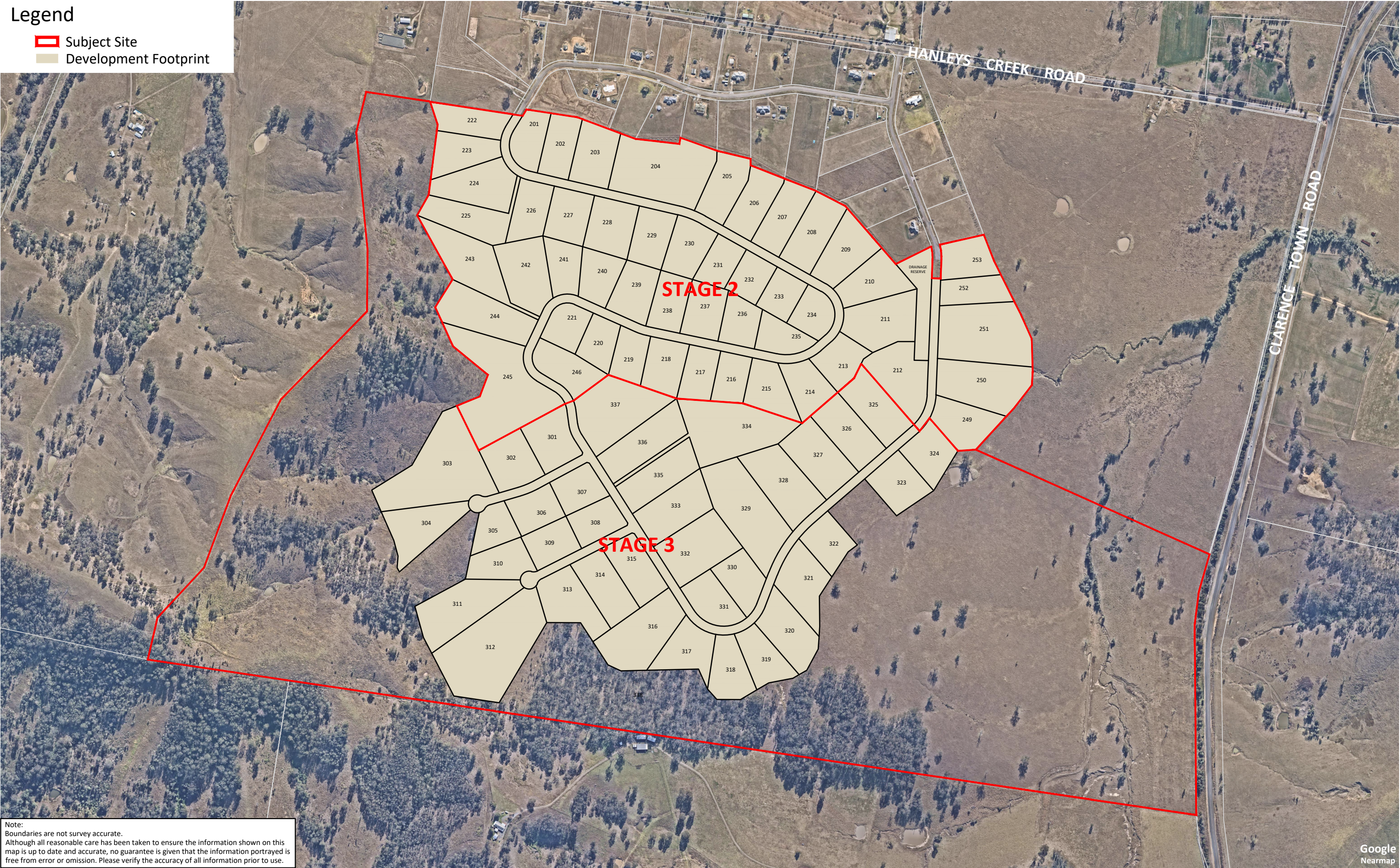


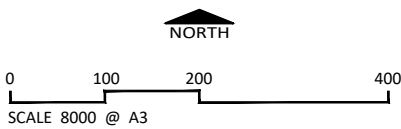
FIGURE 3:DEVELOPMENT LAYOUT

SITE DETAILS

Stage 2 Hanleys Creek Road Dungog

DATE

13 November 2024



Firebird ecoSultants Pty Ltd

ABN - 16 105 985 993

Level 1, 146 Hunter Street, Newcastle NSW 2300

P O Box 354 Newcastle NSW 2300



Ref No 2361 Stage 2 BDAR F

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
- Biodiversity Values

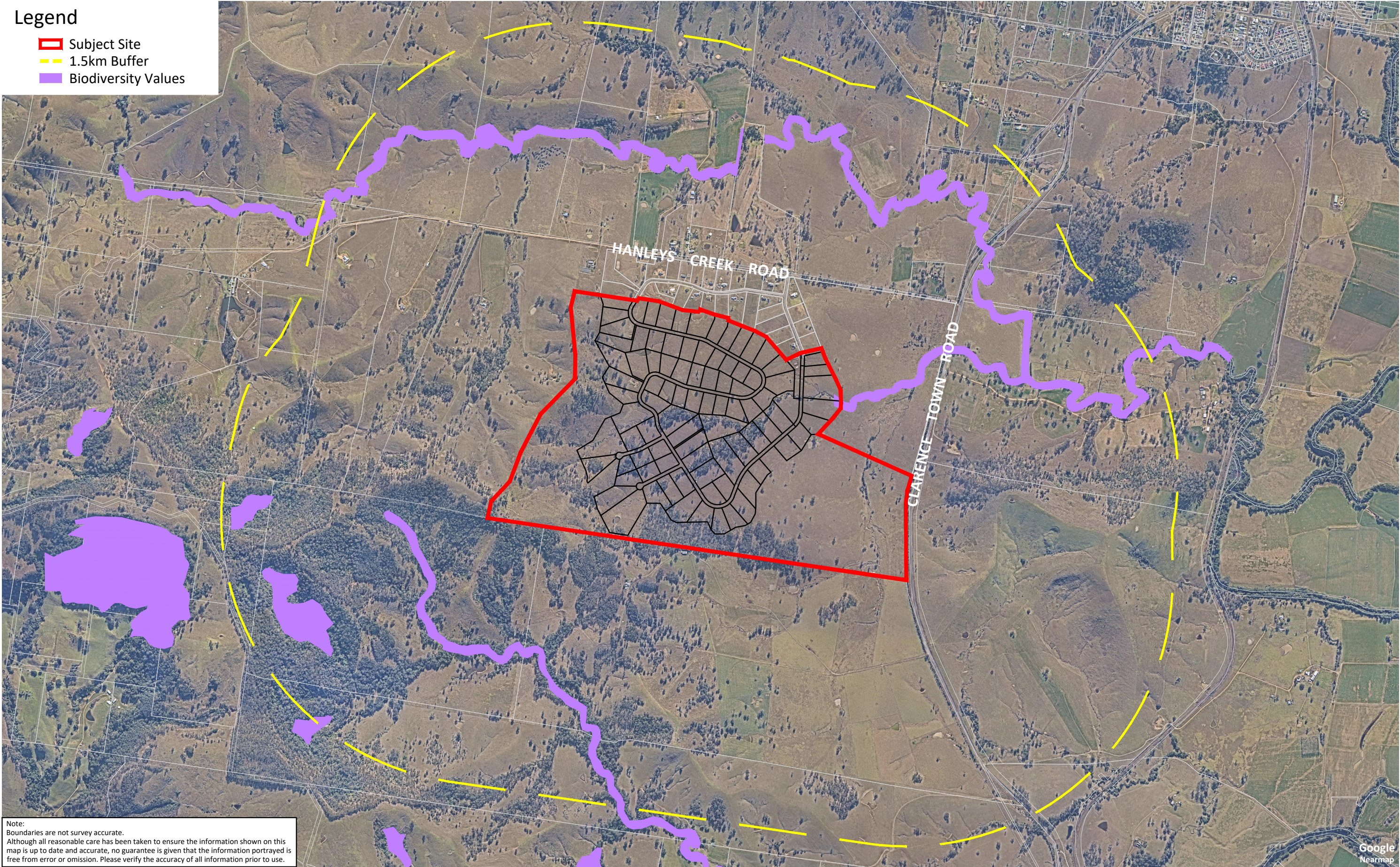
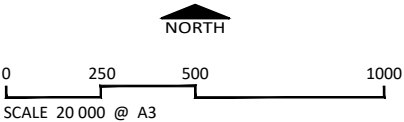


FIGURE 4:BIODIVERSITY VALUES

SITE DETAILS
DATE Hanleys Creek Road Dungog
6 November 2024



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

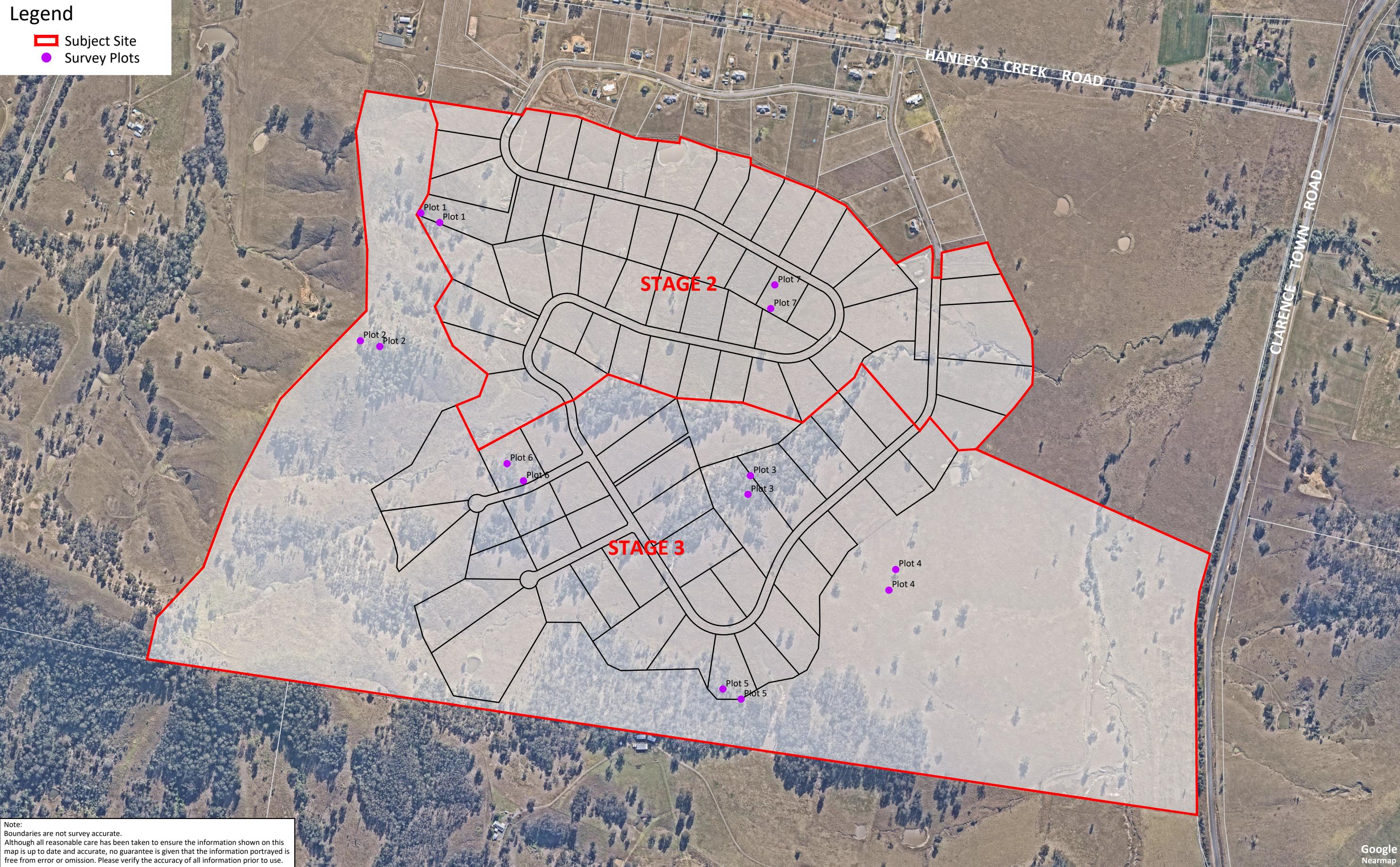


Ref No 2361 Stage 2 BDAR E

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

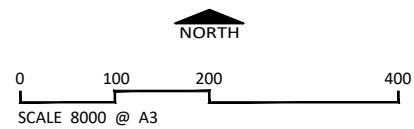
Legend

- ▬ Subject Site
- Survey Plots



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 5: FIELD SURVEY PLOTS



Legend

- ▬ Subject Site
- Grass Plot

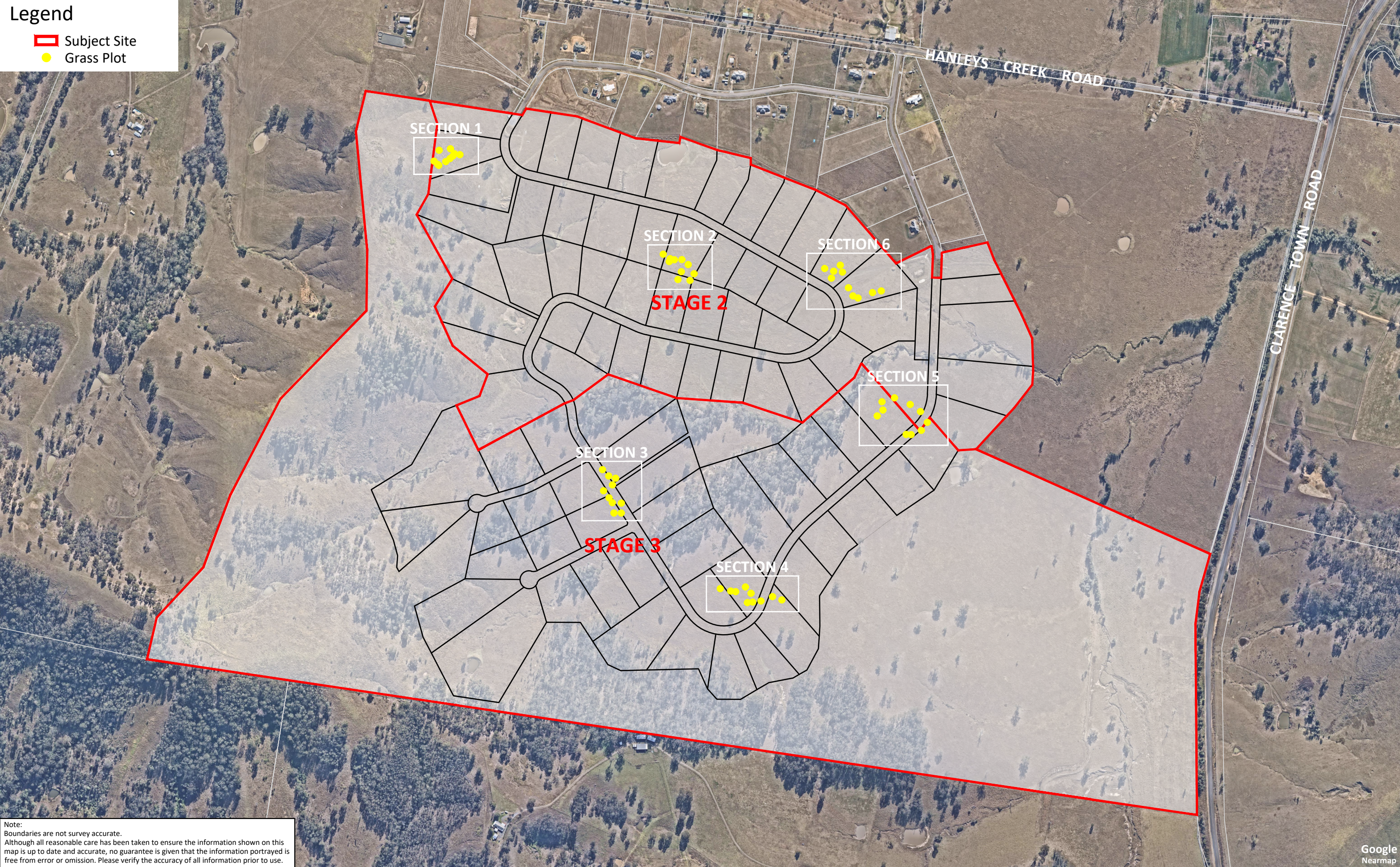
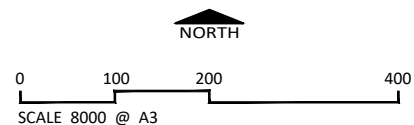


FIGURE 6: GRASS PLOT SURVEY

SITE DETAILS
DATE Stage 2 Hanleys Creek Road Dungog
4 October 2024



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



Ref No 2361 Stage 2 BDAR D

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

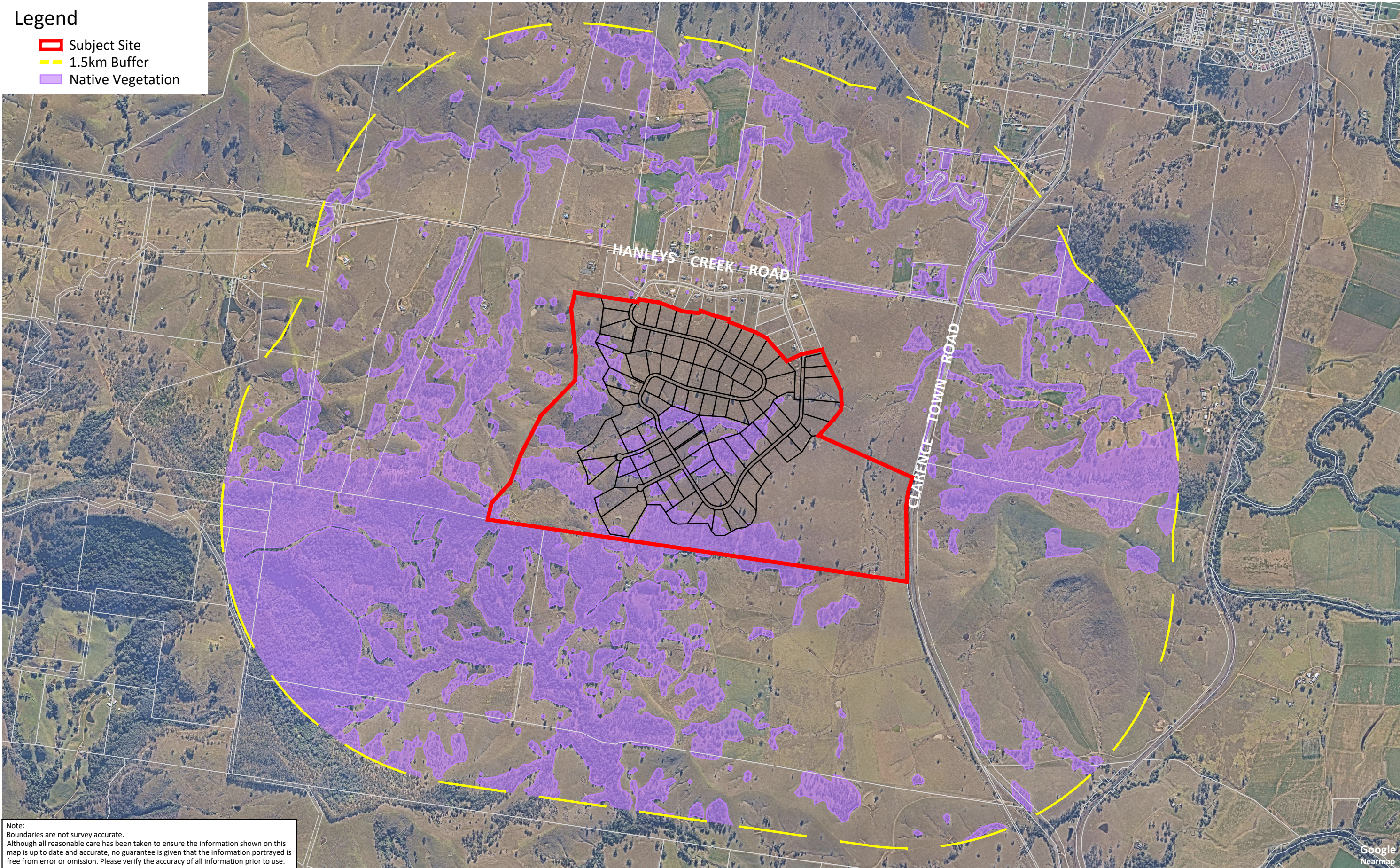


FIGURE 7:NATIVE VEGETATION EXTENT

Legend

- ▬ Subject Site
- Native Vegetation

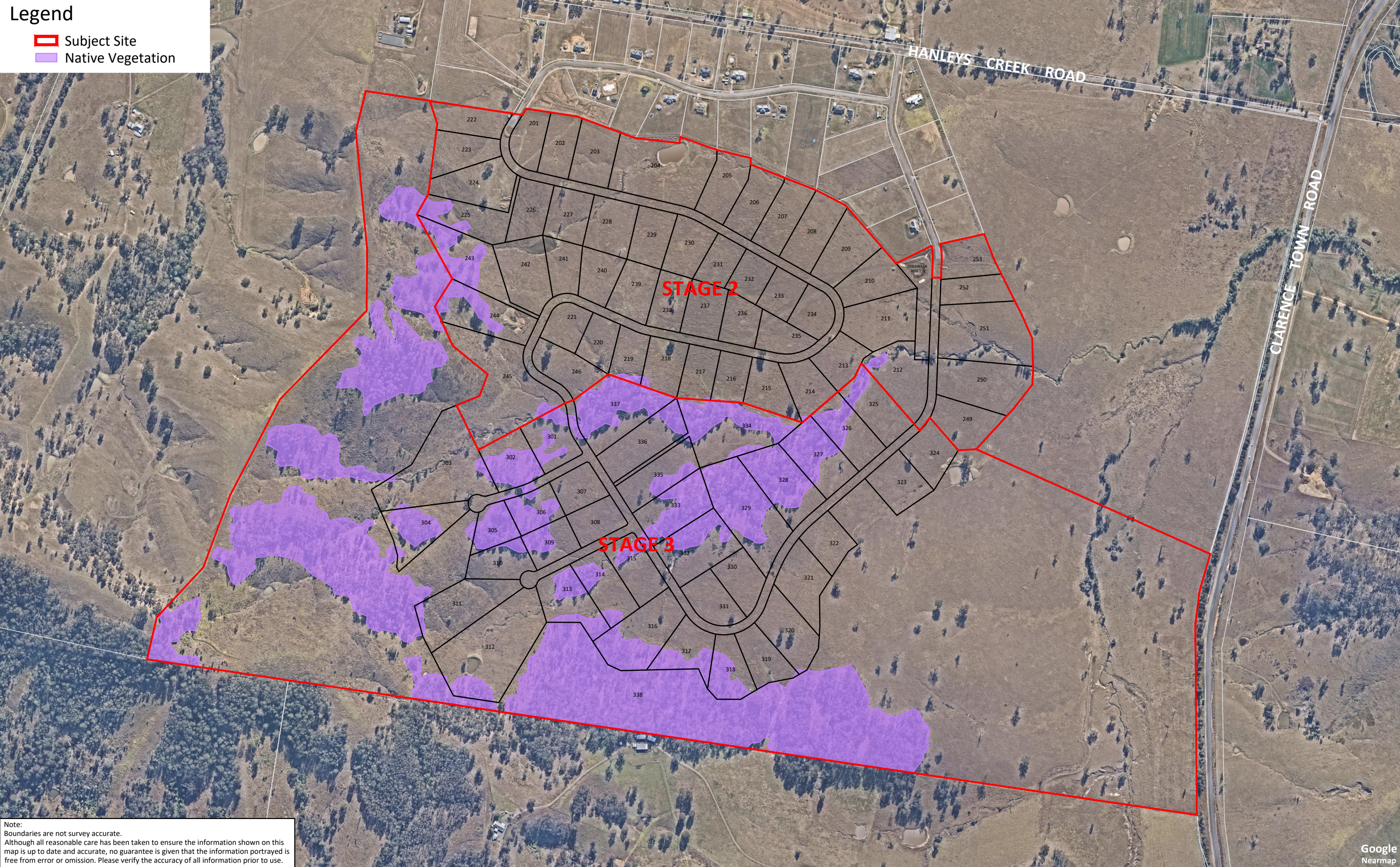
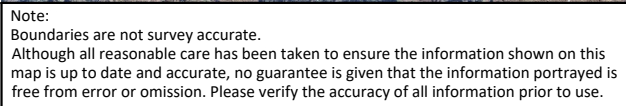


FIGURE 8:NATIVE VEGETATION WITHIN THE SITE

Subject Site
 PCT 3446 - 49.1ha
 Conservation Area - 21ha
 Directly Impacted Vegetation - 5.8ha
 Stage 2 PCT 3446 - 5776m²
 Stage 3 PCT 3446 - 5.26ha



SITE DETAILS	Stage 2 Hanleys Creek Road Dungog
DATE	13 November 2024





firebird

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
-  Vegetation Zone 1 - 49.1ha
- VZ1 within Development Footprint - 19.4ha

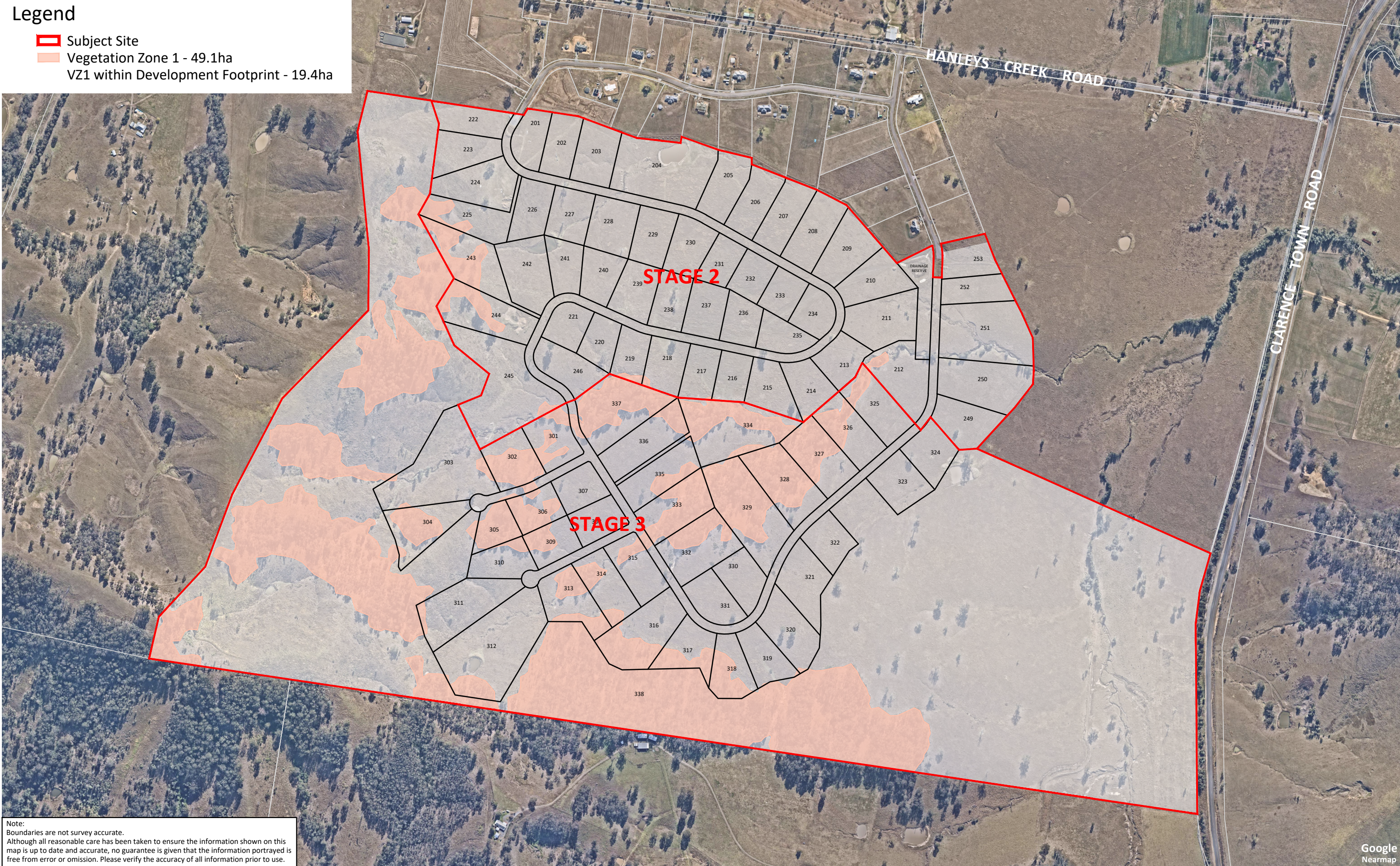
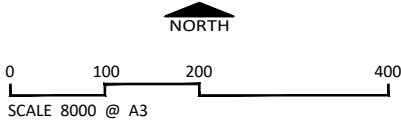
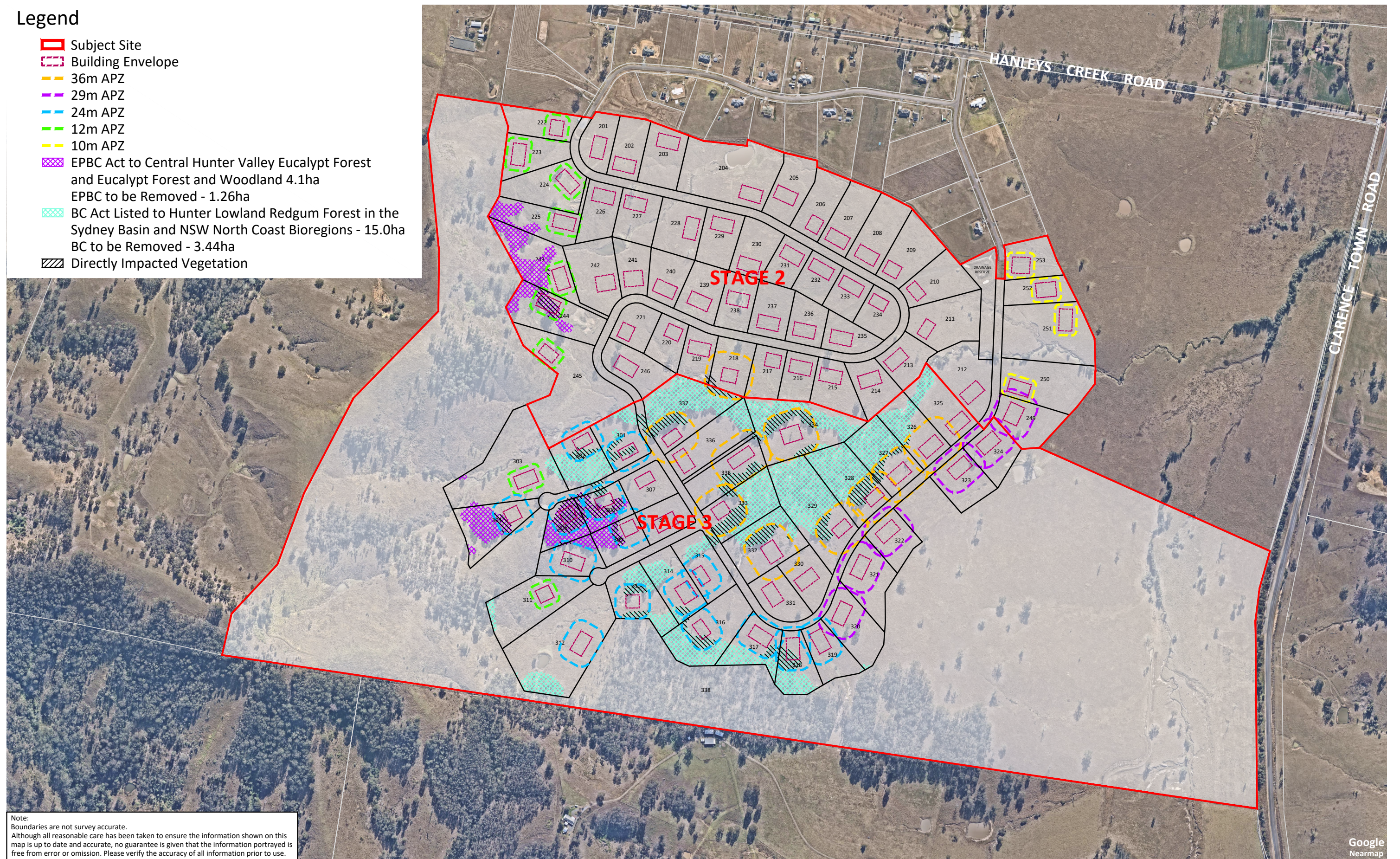


FIGURE 10: VEGETATION MANAGEMENT ZONES



Legend

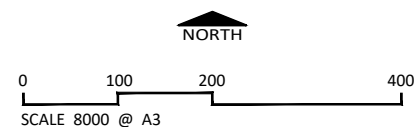
- Subject Site
- Building Envelope
- 36m APZ
- 29m APZ
- 24m APZ
- 12m APZ
- 10m APZ
- EPBC Act to Central Hunter Valley Eucalypt Forest and Eucalypt Forest and Woodland 4.1ha
EPBC to be Removed - 1.26ha
- BC Act Listed to Hunter Lowland Redgum Forest in the Sydney Basin and NSW North Coast Bioregions - 15.0ha
BC to be Removed - 3.44ha
- Directly Impacted 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 11: TEC WITHIN DEVELOPMENT FOOTPRINT

SITE DETAILS
DATE
Stage 2 Hanleys Creek Road Dungog
13 November 2024



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

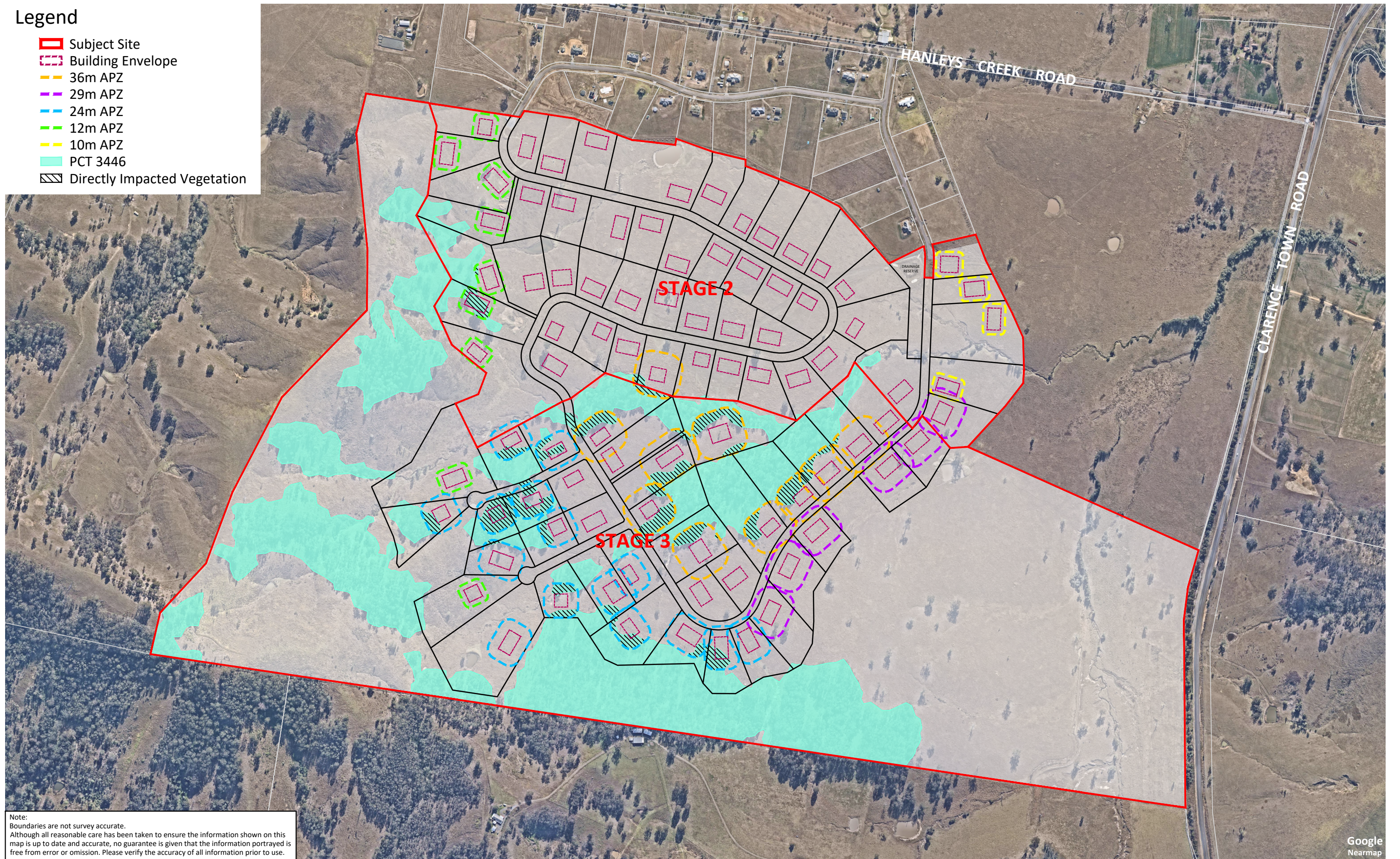


Ref No 2361 Stage 2 BDAR F

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

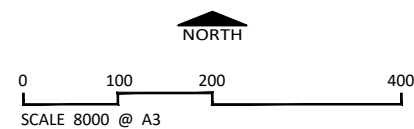
- Subject Site
- Building Envelope
- 36m APZ
- 29m APZ
- 24m APZ
- 12m APZ
- 10m APZ
- PCT 3446
- Directly Impacted Vegetation



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 12:ASSET PROTECTION ZONES

SITE DETAILS
DATE
Stage 2 Hanleys Creek Road Dungog
13 November 2024



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



Ref No 2361 Stage 2 BDAR F

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
- Camera Trap

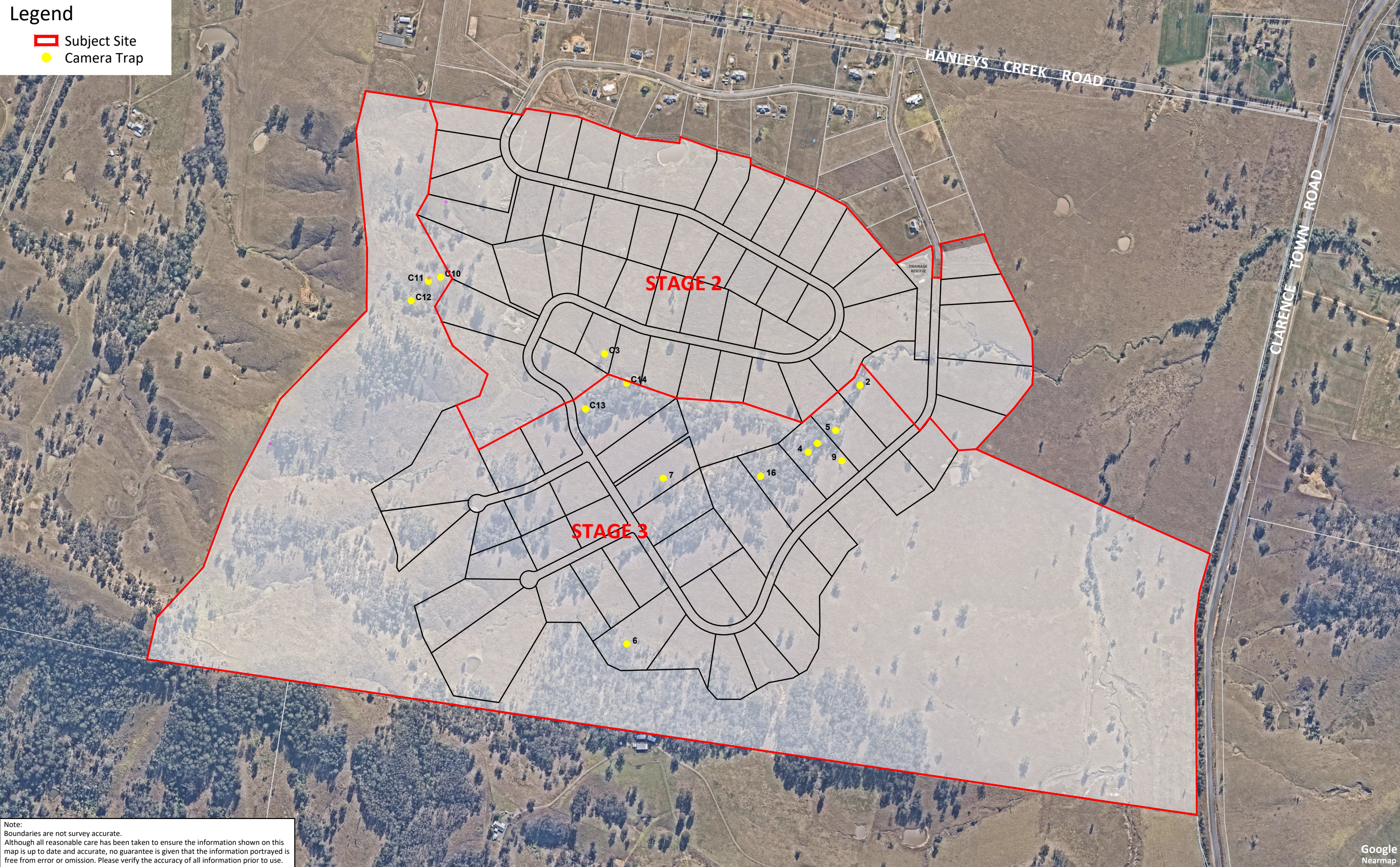
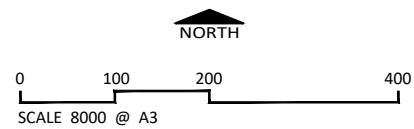


FIGURE 13: CAMERA TRAP LOCATIONS

SITE DETAILS
DATE Stage 2 Hanleys Creek Road Dungog
13 November 2024



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



Ref No 2361 Stage 2 BDAR F

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
- Koala SAT Survey 23.10.24
- Koala Scat Survey 23.10.24
- Koala SAT Survey
- Hollow-bearing Tree
- Stag

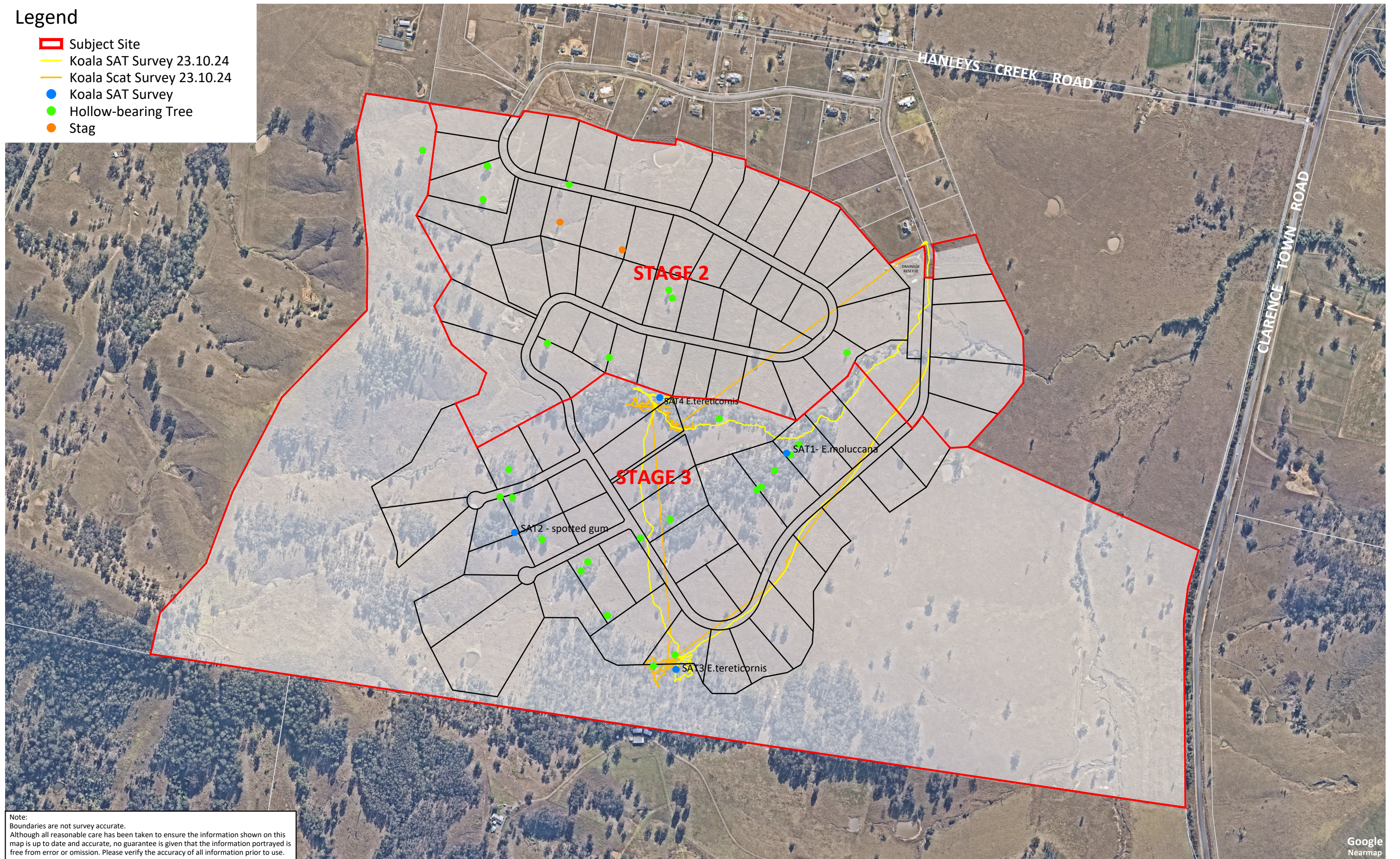
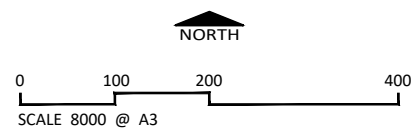


FIGURE 14:KOALA SAT SURVEY

SITE DETAILS Stage 2 Hanleys Creek Road Dungog
DATE 13 November 2024



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

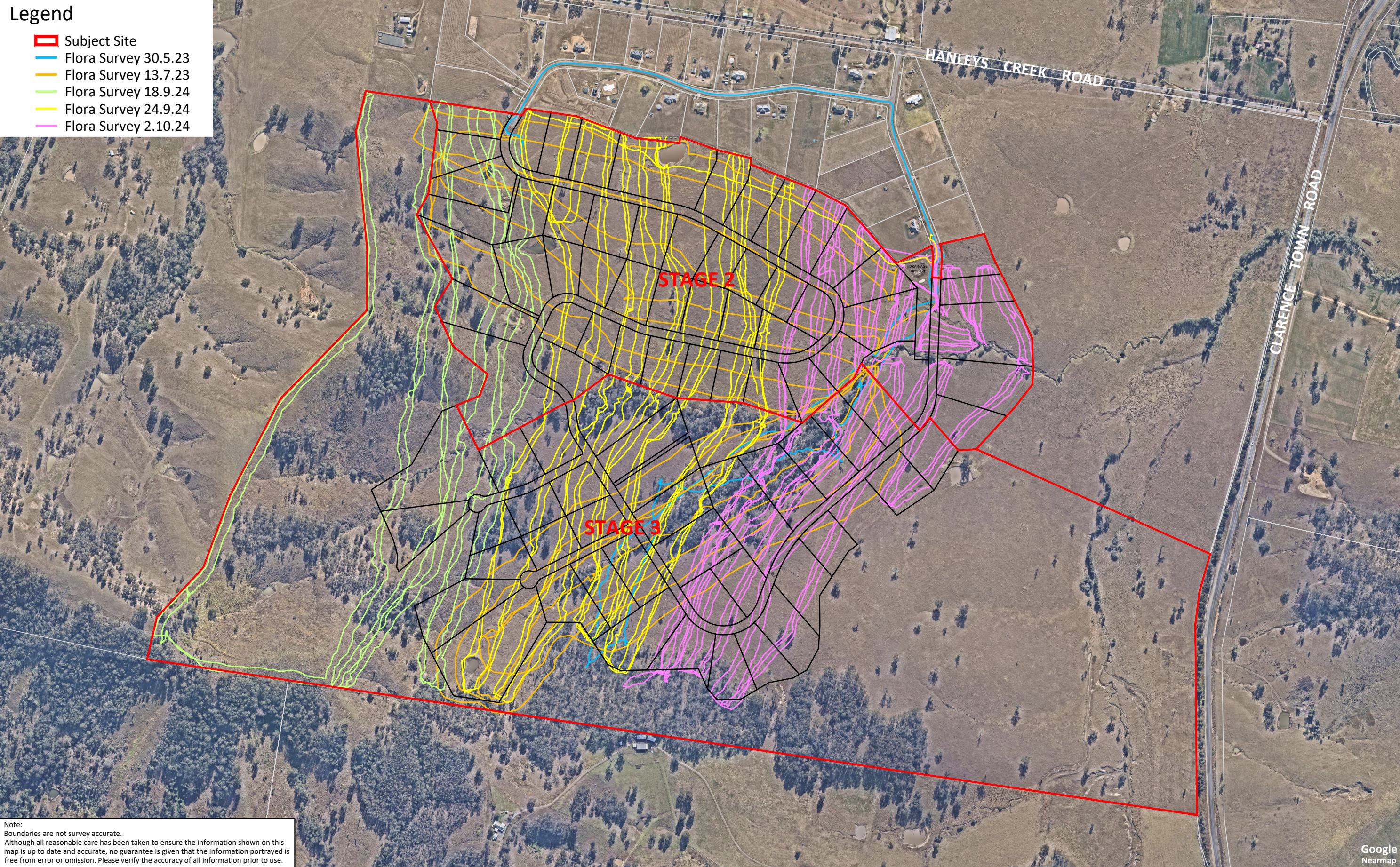


Ref No 2361 Stage 2 BDAR F

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

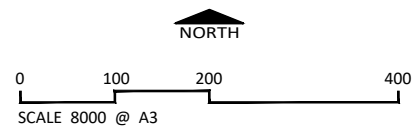
- Subject Site
- Flora Survey 30.5.23
- Flora Survey 13.7.23
- Flora Survey 18.9.24
- Flora Survey 24.9.24
- Flora Survey 2.10.24



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 15: FLORA SURVEY

SITE DETAILS
DATE
Stage 2 Hanleys Creek Road Dungog
4 October 2024



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



Ref No 2361 Stage 2 BDAR D

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

Hollow-bearing Tree

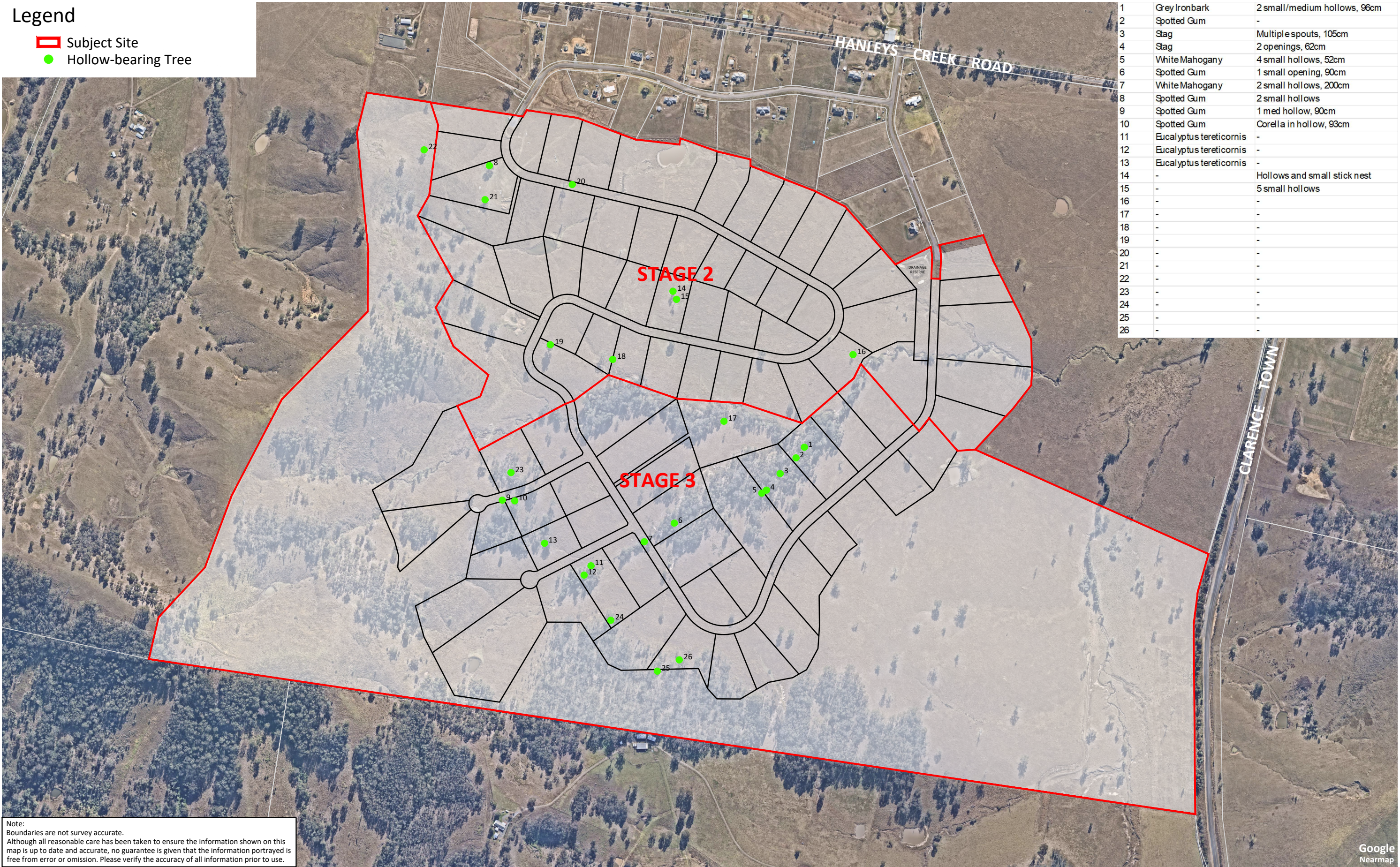
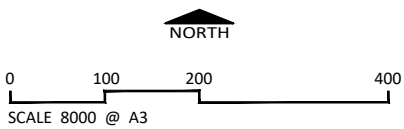
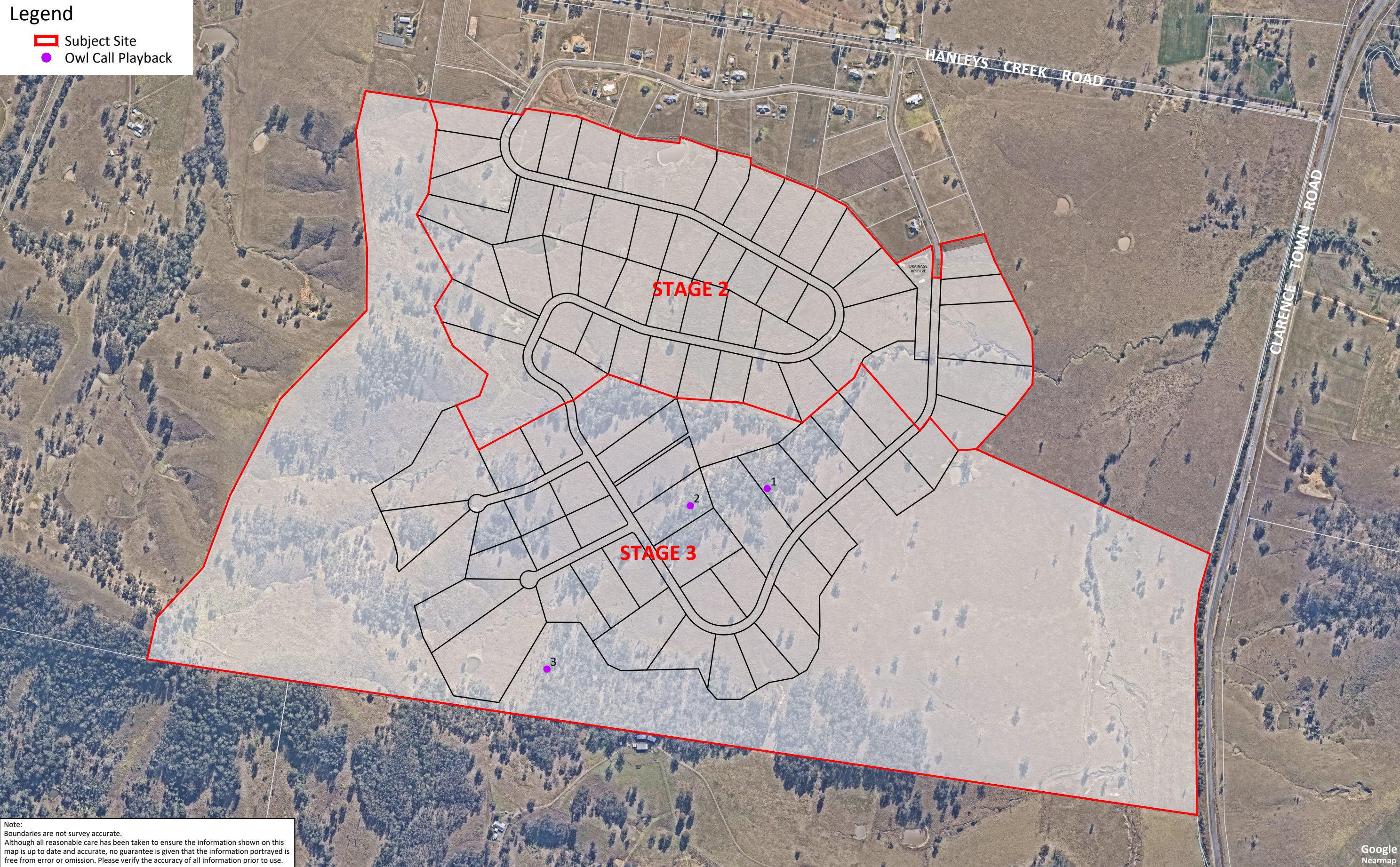


FIGURE 16: LOCATION OF HOLLOW-BEARING TREES



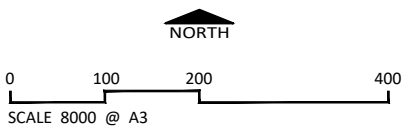
Legend

- ▬ Subject Site
- Owl Call Playback



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



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



Ref No 2361 Stage 2 BDAR F

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

● Anabat

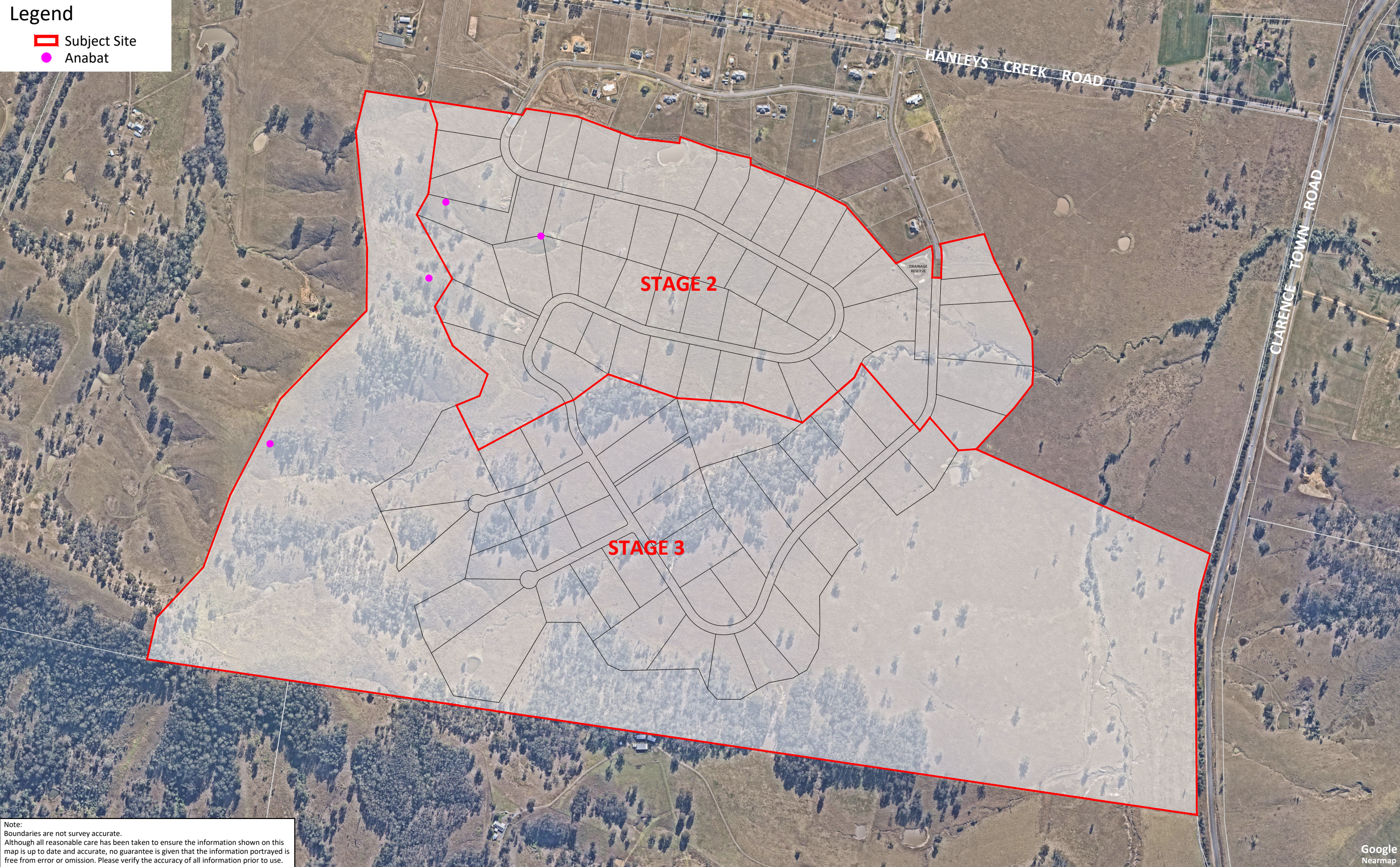
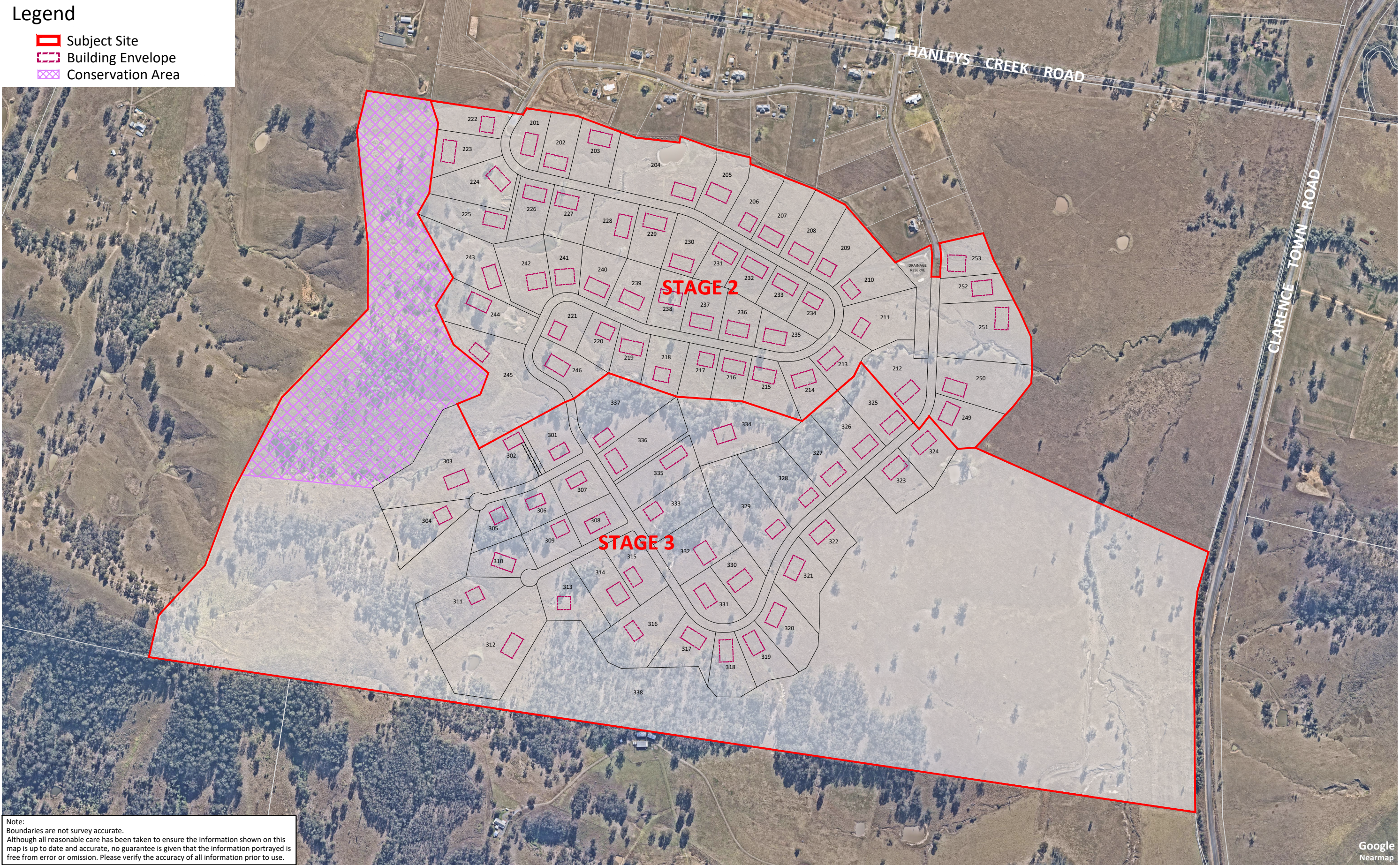


FIGURE 18: ANABAT LOCATIONS

Appendix A: Site Plans

Legend

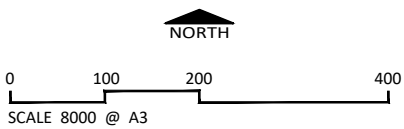
- Subject Site
- Building Envelope
- Conservation Area



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 1-2: SITE MAP

SITE DETAILS
DATE Stage 2 Hanleys Creek Road Dungog
 13 November 2024



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



Ref No 2361 Stage 2 BDAR F

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

Appendix B: Biodiversity Values Map and Threshold Report

Biodiversity Values Map and Threshold Report

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

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

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

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

Biodiversity Values Map and Threshold Report		
Date of Report Generation		21/11/2024 5:18 PM
1. Biodiversity Values (BV) Map - Results Summary (Biodiversity Conservation Regulation Section 7.3)		
1.1	Does the development Footprint intersect with BV mapping?	yes
1.2	Was <u>ALL</u> BV Mapping within the development footprint added in the last 90 days? (dark purple mapping only, no light purple mapping present)	no
1.3	Date of expiry of dark purple 90 day mapping	N/A
1.4	Is the Biodiversity Values Map threshold exceeded?	yes
2. Area Clearing Threshold - Results Summary (Biodiversity Conservation Regulation Section 7.2)		
2.1	Size of the development or clearing footprint	2,374,016.9 sqm
2.2	Native Vegetation Area Clearing Estimate (NVACE) (within development/clearing footprint)	2,068,577.8 sqm
2.3	Method for determining Minimum Lot Size	LEP
2.4	Minimum Lot Size (10,000sqm = 1ha)	8,000 sqm
2.5	Area Clearing Threshold (10,000sqm = 1ha)	2,500 sqm
2.6	Does the estimate exceed the Area Clearing Threshold? (NVACE results are an estimate and can be reviewed using the Guidance)	yes
REPORT RESULT: Is the Biodiversity Offset Scheme (BOS) Threshold exceeded for the proposed development footprint area?		yes
(Your local council will determine if a BDAR is required)		

What do I do with this report?

- If the result above indicates the BOS Threshold has been exceeded, your local council may require a Biodiversity Development Assessment Report with your development application. Seek further advice from Council. An accredited assessor can apply the Biodiversity Assessment Method and prepare a BDAR for you. For a list of accredited assessors go to: <https://customer.lmbc.nsw.gov.au/assessment/AccreditedAssessor>.
- If the result above indicates the BOS Threshold has not been exceeded, you may not require a Biodiversity Development Assessment Report. This BMAT report can be provided to Council to support your development application. Council can advise how the area clearing threshold results should be considered. Council will review these results and make a determination if a BDAR is required. Council may ask you to review the area clearing threshold results. You may also be required to assess whether the development is “likely to significantly affect threatened species” as determined under the test in Section 7.3 of the *Biodiversity Conservation Act 2016*.
- If a BDAR is not required by Council, you may still require a permit to clear vegetation from your local council.
- If all Biodiversity Values mapping within your development footprint was less than 90 days old, i.e. areas are displayed as dark purple on the BV map, a BDAR may not be required if your Development Application is submitted within that 90 day period. Any BV mapping less than 90 days old on this report will expire on the date provided in Line item 1.3 above.

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

Review Options:

- If you believe the Biodiversity Values mapping is incorrect please refer to our [BV Map Review webpage](#) for further information.
- If you or Council disagree with the area clearing threshold estimate results from the NVACE in Line Item 2.6 above (i.e. area of Native Vegetation within the Development footprint proposed to be cleared), review the results using the [Guide for reviewing area clearing threshold results from the BMAT Tool](#).

Acknowledgement

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

Signature: _____

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

Date: _____

21/11/2024 05:18 PM

Biodiversity Values Map and Threshold Tool

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

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

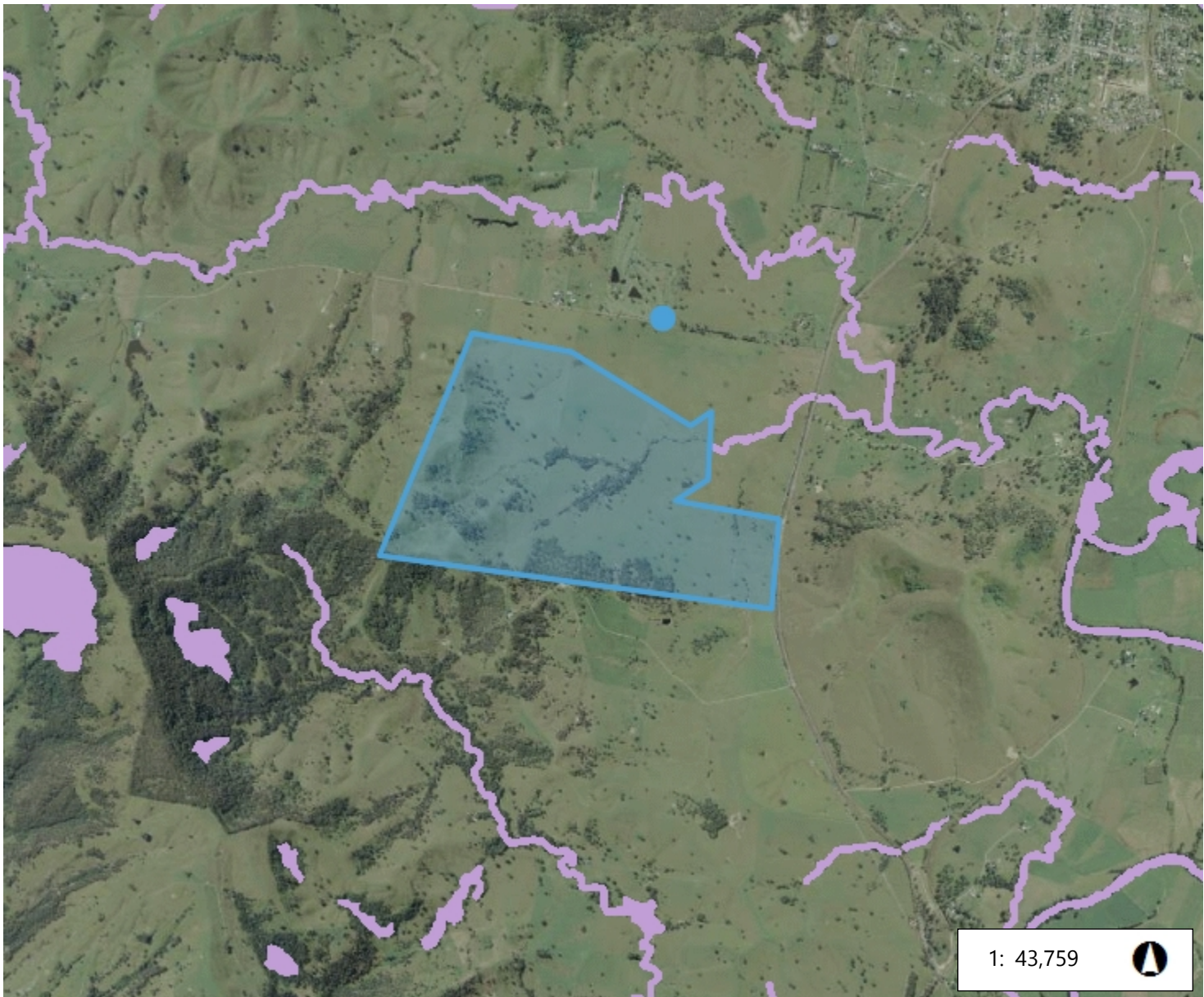
This report may be used as evidence for development applications submitted to councils. You may also use this report when considering native vegetation clearing under the State Environmental Planning Policy (Biodiversity and Conservation) 2021 - Chapter 2 vegetation in non-rural areas.

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

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

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

Biodiversity Values Map







1: 43,759

2,222.9 0 1,111.47 2,222.9 Metres

WGS_1984_Web_Mercator_Auxiliary_Sphere

Legend

-  Biodiversity Values that have been mapped for more than 90 days
-  Biodiversity Values added within last 90 days
-  Native Vegetation Area Clearing Estimate (NVACE)
-  Development area selected by proponent

21/11/2024 05:18 PM

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.

Imagery © Airbus DS/Spot Image 2016
© NSW Department of Customer Service, Basemaps 2019
© NSW Department of Planning and Environment

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

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

Appendix C: BDAR requirements compliance

Table 41: Assessment of compliance with BDAR minimum information requirements

BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
Introduction	Chapters 2 and 3	Information	
Section 1		Introduction to the biodiversity assessment including:	1
		<input checked="" type="checkbox"/> brief description of the proposal	1
		<input checked="" type="checkbox"/> identification of subject land boundary, including:	1
		<input checked="" type="checkbox"/> operational footprint	1
		<input checked="" type="checkbox"/> construction footprint indicating clearing associated with temporary/ancillary construction facilities and infrastructure	1
		<input checked="" type="checkbox"/> general description of the subject land	2
		<input checked="" type="checkbox"/> sources of information used in the assessment, including reports and spatial data	3
		<input checked="" type="checkbox"/> identification and justification for entering the BOS	2
		Maps and tables	
		<input checked="" type="checkbox"/> Map of the subject land boundary showing the final proposal footprint, including the construction footprint for any clearing associated with temporary/ancillary construction facilities and infrastructure	67, 71
Landscape	Section 3.1	Information	



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
	and 3.2, Appendix E		
		Identification of site context components and landscape features, including:	–
		<input checked="" type="checkbox"/> general description of subject land topographic and hydrological setting, geology and soils	11, 12
		<input checked="" type="checkbox"/> per cent native vegetation cover in the assessment area (as described in BAM Section 3.2)	11, 12
		<input checked="" type="checkbox"/> IBRA bioregions and subregions (as described in BAM Subsection 3.1.3(2.))	11, 12
		<input checked="" type="checkbox"/> rivers and streams classified according to stream order (as described in BAM Subsection 3.1.3(3.) and Appendix E)	11, 12
		<input checked="" type="checkbox"/> wetlands within, adjacent to and downstream of the site (as described in BAM Subsection 3.1.3(3.))	11, 12
		<input checked="" type="checkbox"/> connectivity of different areas of habitat (as described in BAM Subsection 3.1.3(5–6.))	11, 12
		<input checked="" type="checkbox"/> karst, caves, crevices, cliffs, rocks and other geological features of significance and for vegetation clearing proposals, soil hazard features (as described in BAM Subsections 3.1.3(7.) and 3.1.3(12.))	11, 12
		<input checked="" type="checkbox"/> areas of outstanding biodiversity value occurring on the subject land and assessment area (as described in BAM Subsection 3.1.3(8–9.))	11, 12
		<input checked="" type="checkbox"/> any additional landscape features identified in any SEARs for the proposal	11, 12
		<input checked="" type="checkbox"/> NSW (Mitchell) landscape on which the subject land occurs	11, 12
		<input checked="" type="checkbox"/> details of field reconnaissance undertaken to confirm the extent and condition of landscape features and native vegetation cover (as described in Operational Manual Stage 1 Section 2.4)	11, 12
		Maps and tables	



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		<input checked="" type="checkbox"/> Site Map	64, 65, 66
		<input checked="" type="checkbox"/> Property boundary	
		<input checked="" type="checkbox"/> Boundary of subject land	
		<input checked="" type="checkbox"/> Cadastre of subject land (including labelling of Lot and DP or section plan if relevant)	
		<input checked="" type="checkbox"/> Landscape features identified in BAM Subsection 3.1.3	
		<input checked="" type="checkbox"/> Location Map	64, 65, 66
		<input checked="" type="checkbox"/> Digital aerial photography at 1:1,000 scale or finer	
		<input checked="" type="checkbox"/> Boundary of subject land	
		<input checked="" type="checkbox"/> Assessment area (i.e. the subject land and either 1500 m buffer area or 500 m buffer for linear development)	
		<input checked="" type="checkbox"/> Landscape features identified in BAM Subsection 3.1.3	
		<input checked="" type="checkbox"/> Additional detail (e.g. local government area boundaries) relevant at this scale	
		Landscape features identified in BAM Subsection 3.1.3 and to be shown on the Site Map and/or Location Map include:	–
		<input checked="" type="checkbox"/> IBRA bioregions and subregions	11, 12, 64, 65, 66, 68
		<input checked="" type="checkbox"/> rivers, streams and estuaries	
		<input checked="" type="checkbox"/> wetlands and important wetlands	
		<input checked="" type="checkbox"/> connectivity of different areas of habitat	
		<input checked="" type="checkbox"/> karst, caves, crevices, cliffs, rocks and other geological features of significance and if required, soil hazard features	
		<input checked="" type="checkbox"/> areas of outstanding biodiversity value occurring on the subject land and assessment area	
		<input checked="" type="checkbox"/> any additional landscape features identified in any SEARs for the proposal	



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		<input checked="" type="checkbox"/> NSW (Mitchell) landscape on which the subject land occurs	
		Data	
		<input type="checkbox"/> All report maps as separate jpeg files	–
		Individual digital shape files of:	–
		<input type="checkbox"/> subject land boundary	
		<input type="checkbox"/> assessment area (i.e. subject land and 1500 m buffer area) boundary	
		<input type="checkbox"/> cadastral boundary of subject land	
		<input type="checkbox"/> areas of native vegetation cover	
		<input type="checkbox"/> landscape features	
Native vegetation	Chapter 4, Appendix A and Appendix H	Information	
		<input checked="" type="checkbox"/> Identify native vegetation extent within the subject land, including cleared areas and evidence to support differences between mapped vegetation extent and aerial imagery (as described in BAM Section 4.1(1–3.) and Subsection 4.1.1)	13
		<input checked="" type="checkbox"/> Provide justification for all parts of the subject land that do not contain native vegetation (as described in BAM Subsection 4.1.2)	14-17
		<input checked="" type="checkbox"/> Review of existing information on native vegetation including references to previous vegetation maps of the subject land and assessment area (described in BAM Section 4.1(3.) and Subsection 4.1.1)	13



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		<input checked="" type="checkbox"/> Describe the systematic field-based floristic vegetation survey undertaken in accordance with BAM Section 4.2	4, 5
		<input checked="" type="checkbox"/> Where relevant, describe the use of more appropriate local data, provide reasons that support the use of more appropriate local data and include the written confirmation from the decision-maker that they support the use of more appropriate local data (as described in BAM Subsection 1.4.2 and Appendix A)	4, 5
		For each PCT within the subject land, describe:	–
		<input checked="" type="checkbox"/> PCT 3444 Lower Hunter Spotted Gum-Ironbark Forest	13
		<input checked="" type="checkbox"/> vegetation class	13
		<input checked="" type="checkbox"/> extent (ha) within subject land	13
		<input checked="" type="checkbox"/> evidence used to identify a PCT including any analyses undertaken, references/sources, existing vegetation maps (BAM Section 4.2(1–3.))	13
		<input checked="" type="checkbox"/> plant species relied upon for identification of the PCT and relative abundance of each species	13
		<input checked="" type="checkbox"/> if relevant, TEC status including evidence used to determine vegetation is the TEC (BAM Subsection 4.2.2(1–2.))	13
		<input checked="" type="checkbox"/> estimate of per cent cleared value of PCT (BAM Subsection 4.2.1(5.))	13
		Describe the vegetation integrity assessment of the subject land, including:	–
		<input checked="" type="checkbox"/> identification and mapping of vegetation zones (as described in BAM Subsection 4.3.1)	16, 17, 18, 19
		<input checked="" type="checkbox"/> description of vegetation zones within the subject land (as described in Operational Manual Stage 1 Table 2 and Subsection 3.3.2)	16, 17
		<input checked="" type="checkbox"/> area (ha) of each vegetation zone	18



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		<input checked="" type="checkbox"/> assessment of patch size (as described in BAM Subsection 4.3.2)	17
		<input checked="" type="checkbox"/> survey effort (i.e. number of vegetation integrity survey plots) as described in BAM Subsection 4.3.4(1–2.)	19
		<input checked="" type="checkbox"/> use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsection 4.3.3(5.))	20
		Where use of more appropriate local benchmark data is proposed (as described in BAM Subsection 1.4.2, BAM Subsection 4.3.3(5.) and BAM Appendix A):	N/A
		<input checked="" type="checkbox"/> identify the PCT or vegetation class for which local benchmark data will be applied	N/A
		<input checked="" type="checkbox"/> identify published sources of local benchmark data (if benchmarks obtained from published sources)	
		<input checked="" type="checkbox"/> describe methods of local benchmark data collection (if reference plots used to determine local benchmark data)	
		<input checked="" type="checkbox"/> provide justification for use of local data rather than BioNet Vegetation Classification benchmark values	N/A
		<input checked="" type="checkbox"/> provide written confirmation from the decision-maker that they support the use of local benchmark data	N/A
		<input checked="" type="checkbox"/> PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest	14
		<input checked="" type="checkbox"/> vegetation class	14
		<input checked="" type="checkbox"/> extent (ha) within subject land	14
		<input checked="" type="checkbox"/> evidence used to identify a PCT including any analyses undertaken, references/sources, existing vegetation maps (BAM Section 4.2(1–3.))	15



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		<input checked="" type="checkbox"/> plant species relied upon for identification of the PCT and relative abundance of each species	15
		<input checked="" type="checkbox"/> if relevant, TEC status including evidence used to determine vegetation is the TEC (BAM Subsection 4.2.2(1–2.))	15
		<input checked="" type="checkbox"/> estimate of per cent cleared value of PCT (BAM Subsection 4.2.1(5.))	14
		Describe the vegetation integrity assessment of the subject land, including:	
		<input checked="" type="checkbox"/> identification and mapping of vegetation zones (as described in BAM Subsection 4.3.1)	16, 17, 18
		<input checked="" type="checkbox"/> description of vegetation zones within the subject land (as described in Operational Manual Stage 1 Table 2 and Subsection 3.3.2)	15, 16
		<input checked="" type="checkbox"/> area (ha) of each vegetation zone	18
		<input checked="" type="checkbox"/> assessment of patch size (as described in BAM Subsection 4.3.2)	17
		<input checked="" type="checkbox"/> survey effort (i.e. number of vegetation integrity survey plots) as described in BAM Subsection 4.3.4(1–2.)	19
		<input checked="" type="checkbox"/> use of relevant benchmark data from BioNet Vegetation Classification (as described in BAM Subsection 4.3.3(5.))	20
		Where use of more appropriate local benchmark data is proposed (as described in BAM Subsection 1.4.2, BAM Subsection 4.3.3(5.) and BAM Appendix A):	N/A
		<input checked="" type="checkbox"/> identify the PCT or vegetation class for which local benchmark data will be applied <input checked="" type="checkbox"/> identify published sources of local benchmark data (if benchmarks obtained from published sources) <input checked="" type="checkbox"/> describe methods of local benchmark data collection (if reference plots used to determine local benchmark data)	N/A
		<input checked="" type="checkbox"/> provide justification for use of local data rather than BioNet Vegetation Classification benchmark values	N/A



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		<input checked="" type="checkbox"/> provide written confirmation from the decision-maker that they support the use of local benchmark data	N/A
		Maps and tables	
		<input checked="" type="checkbox"/> Map of native vegetation extent within the subject land at scale not greater than 1:10,000 including identification of all areas of native vegetation including areas that are ground cover only, cleared areas (as described in BAM Section 4.1(1–3.)) and all parts of the subject land that do not contain native vegetation (BAM Subsection 4.1.2)	70
		<input checked="" type="checkbox"/> Map of PCTs within the subject land (as described in BAM Section 4.2(1.))	63
		<input type="checkbox"/> Map of vegetation zones within the subject land (as described in BAM Subsection 4.3.1)	N/A
		<input checked="" type="checkbox"/> Map the location of floristic vegetation survey plots and vegetation integrity survey plots relative to PCT boundaries	69
		<input type="checkbox"/> Map of TEC distribution on the subject land and table of TEC listing, status and area (ha)	N/A
		<input type="checkbox"/> Map of patch size locations for each native vegetation zone and table of patch size areas (as described in BAM Subsection 4.3.2)	N/A
		Table of current vegetation integrity scores for each vegetation zone within the site and including:	6, 19, 55
		<input checked="" type="checkbox"/> composition condition score	
		<input checked="" type="checkbox"/> structure condition score	
		<input checked="" type="checkbox"/> function condition score	
		<input checked="" type="checkbox"/> presence of hollow bearing trees	
		Data	
		<input type="checkbox"/> All report maps as separate jpeg files	–
		<input type="checkbox"/> Plot field data (MS Excel format)	



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		<input type="checkbox"/> Plot field datasheets	<Appendix D>
		Digital shape files of:	–
		<input type="checkbox"/> PCT boundaries within subject land	–
		<input type="checkbox"/> TEC boundaries within subject land	–
		<input type="checkbox"/> vegetation zone boundaries within subject land	–
		<input type="checkbox"/> floristic vegetation survey and vegetation integrity plot locations	–
Threatened species	Chapter 5	Information	
		Identify ecosystem credit species likely to occur on the subject land, including:	–
		<input checked="" type="checkbox"/> list of ecosystem credit species derived from the BAM-C (as described in BAM Subsection 5.1.1 and Section 5.2(1.))	21, 22, 23, 24, 25, 26, 27, 28, 29
		<input checked="" type="checkbox"/> justification and supporting evidence for exclusion of any ecosystem credit species based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2)	21, 22, 23, 24, 25, 26, 27, 28, 29
		<input checked="" type="checkbox"/> justification for addition of any ecosystem credit species to the list	21, 22, 23, 24, 25, 26, 27, 28, 29
		Identify species credit species likely to occur on the subject land, including:	–
		<input checked="" type="checkbox"/> list of species credit species derived from the BAM-C (as described in BAM Subsection 5.1.1)	30, 31, 32, 33, 34, 35
		<input checked="" type="checkbox"/> justification and supporting evidence for exclusions based on geographic limitations, habitat constraints or vagrancy (as described in BAM Subsections 5.2.1 and 5.2.2)	30, 31, 32, 33, 34, 35



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		<input checked="" type="checkbox"/> justification and supporting evidence for exclusions based on degraded habitat constraints and/or microhabitats on which the species depends (as described in BAM Subsection 5.2.2)	30, 31, 32, 33, 34, 35
		<input checked="" type="checkbox"/> justification for addition of any species credit species to the list	N/A
		From the list of candidate species credit species, identify:	–
		<input checked="" type="checkbox"/> species assumed present within the subject land (if relevant) (as described in BAM Subsection 5.2.4(2.a.))	46, 47
		<input checked="" type="checkbox"/> species present within the subject land on the basis of being identified on an important habitat map for a species (as described in BAM Subsection 5.2.4(2.d.))	
		<input checked="" type="checkbox"/> species for which targeted surveys are to be completed to determine species presence (BAM Subsection 5.2.4(2.b.))	
		<input checked="" type="checkbox"/> species for which an expert report is to be used to determine species presence (BAM Subsection 5.2.4(2.c.))	
		Present the outcomes of species credit species assessments from:	–
		<input checked="" type="checkbox"/> threatened species survey (as described in BAM Section 5.2.4)	48, 49, 50, 51
		<input checked="" type="checkbox"/> expert reports (if relevant) including justification for presence of the species and information used to make this determination (as described in BAM Subsection 5.2.4, Section 5.3, Box 3)	N/A
		Where survey has been undertaken include detailed information on:	–
		<input checked="" type="checkbox"/> survey method and effort (as described in BAM Section 5.3)	48, 49, 50, 51
		<input checked="" type="checkbox"/> justification of survey method and effort (e.g. citation of peer-reviewed literature) if approach differs from the department's taxa-specific survey guides or where no relevant guideline has been published	7



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		<input checked="" type="checkbox"/> timing of survey in relation to requirements in the TBDC or the department's taxa-specific survey guides. Where survey was undertaken outside these guides include justification for the timing of surveys	9, 10
		<input checked="" type="checkbox"/> survey personnel and relevant experience	XV
		<input checked="" type="checkbox"/> describe any limitations to surveys and how these were addressed/overcome	18
		Where an expert report has been used in place of survey (as described in BAM Section 5.3, Box 3), include:	–
		<input checked="" type="checkbox"/> justification of the use of an expert report	N/A
		<input checked="" type="checkbox"/> identify the expert, provide evidence of their expert credentials and departmental approval of expert status	
		<input checked="" type="checkbox"/> all requirements of Box 3 have been addressed in the expert report	
		Where use of local data is proposed (BAM Subsection 1.4.2):	–
		<input checked="" type="checkbox"/> identify relevant species	N/A
		<input checked="" type="checkbox"/> identify data to be amended	
		<input checked="" type="checkbox"/> identify source of information for local data, e.g. published literature, additional survey data, etc.	
		<input checked="" type="checkbox"/> justify use of local data in preference to VIS Classification or TBDC data	
		<input checked="" type="checkbox"/> provide written confirmation from the decision-maker that they support the use of local data	N/A
		Species polygon completed for species credit species present within the subject land (assumed present or determined on the basis of survey, expert report or important habitat map) ensuring that:	–
		<input checked="" type="checkbox"/> the unit of measure for each species is documented for species assessed by area:	N/A
		<input checked="" type="checkbox"/> the polygon includes the extent of suitable habitat for the target species within the subject land (as described in BAM Subsection 5.2.5)	N/A



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		☑ a description of, and evidence-based justification for, the habitat constraints, features or microhabitats used to map the species polygon including reference to information in the TBDC for that species and any buffers applied	N/A
		for species assessed by counts of individuals:	–
		☑ the number of individual plants present on the subject land (as described in BAM Subsection 5.2.5(3.))	N/A
		☑ the method used to derive this number (i.e. threatened species survey or expert report) and evidence-based justification for the approach taken	N/A
		☑ the polygon includes all individuals located on the subject land with a buffer of 30 m around the individuals or groups of individuals on the subject land	N/A
		☑ Identify the biodiversity risk weighting for each species credit species identified as present within the subject land (as described in BAM Section 5.4)	N/A
		Maps and tables	
		☑ Table showing ecosystem credit species in accordance with BAM Subsection 5.1.1, and identifying:	36-39
		☑ the ecosystem credit species removed from the list	43
		☑ the sensitivity to gain class of each species	21-29
		☑ Table detailing species credit species in accordance with BAM Section 5.2 and identifying:	36-39
		☑ the species credit species removed from the list of species because the species is considered vagrant, out of geographic range or the habitat or microhabitat features are not present	36-39
		☑ the candidate species credit species not recorded on the subject land as determined by targeted survey, expert report or important habitat map	40-43
		☑ Table detailing species credit species recorded or assumed as present within the subject land, habitat constraints or microhabitats associated with the species, counts of individuals	44-45



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		(flora)/extent of suitable habitat (flora and fauna) (as described in BAM Subsection 5.2.6) and biodiversity risk weighting (BAM Section 5.4)	
		<input checked="" type="checkbox"/> Map indicating the GPS coordinates of all individuals of each species recorded within the subject land and the species polygon for each species (as described in BAM Subsection 5.2.5)	N/A
		Data	
		<input type="checkbox"/> Digital shape files of suitable habitat identified for survey for each candidate species credit species	–
		<input type="checkbox"/> Survey locations including GPS coordinates of any plots, transects, grids	68
		<input checked="" type="checkbox"/> Digital shape files of each species polygon including GPS coordinates of located individuals	N/A
		<input checked="" type="checkbox"/> Species polygon map in jpeg format	N/A
		<input checked="" type="checkbox"/> Expert reports and any supporting data used to support conclusions of the expert report	N/A
		<input type="checkbox"/> Field datasheets detailing survey information including prevailing conditions, date, time, equipment used, etc.	
Prescribed impacts	Chapter 6	Information	
		Identify potential prescribed biodiversity impacts on threatened entities, including:	–
		<input checked="" type="checkbox"/> karst, caves, crevices, cliffs, rocks and other geological features of significance (as described in BAM Subsection 6.1.1)	49, 50
		<input checked="" type="checkbox"/> occurrences of human-made structures and non-native vegetation (as described in BAM Subsection 6.1.2)	
		<input checked="" type="checkbox"/> corridors or other areas of connectivity linking habitat for threatened entities (as described in BAM Subsection 6.1.3)	



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		<input checked="" type="checkbox"/> waterbodies or any hydrological processes that sustain threatened entities (as described in BAM Subsection 6.1.4)	
		<input checked="" type="checkbox"/> protected animals that may use the proposed wind farm development site as a flyway or migration route (as described in BAM Subsection 6.1.5)	N/A
		<input checked="" type="checkbox"/> where the proposed development may result in vehicle strike on threatened fauna or on animals that are part of a threatened ecological community (as described in BAM Subsection 6.1.6)	N/A
		<input checked="" type="checkbox"/> Identify a list of threatened entities that may be dependent upon or may use habitat features associated with any of the prescribed impacts	N/A
		<input checked="" type="checkbox"/> Describe the importance of habitat features to the species including, where relevant, impacts on life cycle or movement patterns (e.g. Subsection 6.1.3)	N/A
		Where the proposed development is for a wind farm:	–
		<input checked="" type="checkbox"/> identify a candidate list of protected animals that may use the development site as a flyway or migration route, including: resident threatened aerial species, resident raptor species and nomadic and migratory species that are likely to fly over the proposal area (as described in BAM Subsection 6.1.5)	N/A
		<input checked="" type="checkbox"/> provide details of targeted survey for candidate species of wind farm developments undertaken in accordance with BAM Subsection 6.1.5(2–3.)	N/A
		<input checked="" type="checkbox"/> predict the habitual flight paths for nomadic and migratory species likely to fly over the subject land and map the likely habitat for resident threatened aerial and raptor species (BAM Subsection 6.1.5(4.))	N/A
		Where the proposal may result in vehicle strike:	–
		<input checked="" type="checkbox"/> identify a list of threatened fauna or protected fauna species that are part of a TEC and at risk of vehicle strike due to the proposal	N/A
		Maps and tables	



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		<input type="checkbox"/> Map showing location of any prescribed impact features (i.e. karst, caves, crevices, cliffs, rocks, human-made structures, etc.)	N/A
		<input type="checkbox"/> Map showing location of potential vehicle strike locations	N/A
		<input type="checkbox"/> Maps of habitual flight paths for nomadic and migratory species likely to fly over the site and maps of likely habitat for threatened aerial species resident on the site (for wind farm developments only)	N/A
		Data	
		<input type="checkbox"/> Digital shape files of prescribed impact feature locations	–
		<input type="checkbox"/> Prescribed impact features map in jpeg format	–
Avoid and minimise impacts	Chapter 7	Information	
		Demonstration of efforts to avoid and minimise impacts on biodiversity values (including prescribed impacts) associated with the proposal location in accordance with Chapter 7, including an analysis of alternative:	46-51
		<input checked="" type="checkbox"/> modes or technologies that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed mode or technology	46-51
		<input checked="" type="checkbox"/> routes that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed route	46-51
		<input checked="" type="checkbox"/> alternative locations that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed location	46-51
		<input checked="" type="checkbox"/> alternative sites within a property on which the proposal is located that would avoid or minimise impacts on biodiversity values and justification for selecting the proposed site	46-51



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		<input checked="" type="checkbox"/> Describe efforts to avoid and minimise impacts (including prescribed impacts) to biodiversity values through proposal design (as described in BAM Sections 7.1 and 7.2)	46-51
		<input checked="" type="checkbox"/> Identification of any other site constraints that the proponent has considered in determining the location and design of the proposal (as described in BAM Subsection 7.2.1(3.))	46-51
		<input checked="" type="checkbox"/> Detail measures or options considered but not implemented because they are not feasible and/or practical (e.g. due to site constraints)	46-51
		Maps and tables	
		<input checked="" type="checkbox"/> Table of measures to be implemented to avoid and minimise the impacts of the proposal, including action, outcome, timing and responsibility	46-51
		<input checked="" type="checkbox"/> Map of alternative footprints considered to avoid or minimise impacts on biodiversity values; and of the final proposal footprint, including construction and operation	N/A
		<input checked="" type="checkbox"/> Maps demonstrating indirect impact zones where applicable	N/A
		Data	
		Digital shape files of:	–
		<input type="checkbox"/> alternative and final proposal footprint	–
		<input type="checkbox"/> direct and indirect impact zones	–
		<input type="checkbox"/> Maps in jpeg format	–
Assessment of impacts	Chapter 8, Sections 8.1 and 8.2	Information	



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		<input checked="" type="checkbox"/> Determine the impacts on native vegetation and threatened species habitat, including a description of direct impacts of clearing of native vegetation, threatened ecological communities and threatened species habitat (as described in BAM Section 8.1)	1, 2, 46
		Assessment of indirect impacts on vegetation and threatened species and their habitat including (as described in BAM Section 8.2):	57, 58
		<input checked="" type="checkbox"/> description of the nature, extent, frequency, duration and timing of indirect impacts of the proposal	57, 58
		<input checked="" type="checkbox"/> documenting the consequences to vegetation and threatened species and their habitat including evidence-based justifications	57, 58
		<input checked="" type="checkbox"/> reporting any limitations or assumptions, etc. made during the assessment	N/A
		<input checked="" type="checkbox"/> identification of the threatened entities and their habitat likely to be affected	N/A
		Assessment of prescribed biodiversity impacts (as described in BAM Section 8.3) including:	–
		assessment of the nature, extent frequency, duration and timing of impacts on the habitat of threatened species or ecological communities associated with:	45
		<input checked="" type="checkbox"/> karst, caves, crevices, cliffs, rocks and other features of geological significance	45
		<input checked="" type="checkbox"/> human-made structures	45
		<input checked="" type="checkbox"/> non-native vegetation	45
		<input checked="" type="checkbox"/> connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range	45
		<input checked="" type="checkbox"/> movement of threatened species that maintains their life cycle	45
		<input checked="" type="checkbox"/> water quality, waterbodies and hydrological processes that sustain threatened species and threatened ecological communities	45
		<input checked="" type="checkbox"/> assessment of the impacts of wind turbine strikes on protected animals	N/A



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		<input checked="" type="checkbox"/> assessment of the impacts of vehicle strikes on threatened species of animals or on animals that are part of a TEC	N/A
		<input checked="" type="checkbox"/> evaluate the consequences of prescribed impacts	59
		<input checked="" type="checkbox"/> describe impacts that are uncertain	59
		<input checked="" type="checkbox"/> document limitations to data, assumptions and predictions	59
		Maps and tables	
		<input checked="" type="checkbox"/> Table showing change in vegetation integrity score for each vegetation zone as a result of identified impacts	54
		Data	
		N/A	–
Mitigation and management of impacts	Chapter 8, Sections 8.4 and 8.5	Information	
		Identification of measures to mitigate or manage impacts in accordance with the recommendations in BAM Sections 8.4 and 8.5 including:	–
		<input checked="" type="checkbox"/> techniques, timing, frequency and responsibility	52, 53
		<input checked="" type="checkbox"/> identify measures for which there is risk of failure	
		<input checked="" type="checkbox"/> evaluate the risk and consequence of any residual impacts	
		<input checked="" type="checkbox"/> document any adaptive management strategy proposed	52, 53
		Identification of measures for mitigating impacts related to:	–



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		<input checked="" type="checkbox"/> displacement of resident fauna (as described in BAM Subsection 8.4.1(2.))	52, 53
		<input checked="" type="checkbox"/> indirect impacts on native vegetation and habitat (as described in BAM Subsection 8.4.1(3.))	
		<input checked="" type="checkbox"/> mitigating prescribed biodiversity impacts (as described in BAM Subsection 8.4.2)	
		<input checked="" type="checkbox"/> Details of the adaptive management strategy proposed to monitor and respond to impacts on biodiversity values that are uncertain (BAM Section 8.5)	
		Maps and tables	
		<input checked="" type="checkbox"/> Table of measures to be implemented before, during and after construction to mitigate and manage impacts of the proposal, including action, outcome, timing and responsibility	52, 53
		Data	
		N/A	–
Impact summary	Chapter 9	Information	
		Identification and assessment of impacts on TECs and threatened species that are at risk of a serious and irreversible impacts (SAIL, in accordance with BAM Section 9.1) including:	–
		<input checked="" type="checkbox"/> addressing all criteria in Subsection 9.1.1 for each TEC listed as at risk of an SAIL present on the subject land	N/A
		<input checked="" type="checkbox"/> for each TEC, report the extent of the TEC in NSW	
		<input checked="" type="checkbox"/> addressing all criteria in Subsection 9.1.2 for each threatened species at risk of an SAIL present on the subject land	
		<input checked="" type="checkbox"/> for each threatened species, report the population size in NSW	
		<input checked="" type="checkbox"/> documenting assumptions made and/or limitations to information	



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		<input checked="" type="checkbox"/> documenting all sources of data, information, references used or consulted	
		<input checked="" type="checkbox"/> clearly justifying why any criteria could not be addressed	
		<input checked="" type="checkbox"/> Identification of impacts requiring offset in accordance with BAM Section 9.2	
		<input checked="" type="checkbox"/> Identification of impacts not requiring offset in accordance with BAM Subsection 9.2.1(3.)	
		<input checked="" type="checkbox"/> Identification of areas not requiring assessment in accordance with BAM Section 9.3	
		Maps and tables	
		<input checked="" type="checkbox"/> Map showing the extent of TECs at risk of an SAI within the subject land	N/A
		<input checked="" type="checkbox"/> Map showing location of threatened species at risk of an SAI within the subject land	N/A
		Map showing location of:	–
		<input checked="" type="checkbox"/> impacts requiring offset	86
		<input checked="" type="checkbox"/> impacts not requiring offset	54
		<input checked="" type="checkbox"/> areas not requiring assessment	
		Data	
		Digital shape files of:	–
		<input type="checkbox"/> extent of TECs at risk of an SAI within the subject land	
		<input type="checkbox"/> location of threatened species at risk of an SAI within the subject land	
		<input type="checkbox"/> boundary of impacts requiring offset	
		<input type="checkbox"/> boundary of impacts not requiring offset	–
		<input type="checkbox"/> boundary of areas not requiring assessment	–
		<input type="checkbox"/> Maps in jpeg format	–



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
Impact summary	Chapter 10	Information	
		Ecosystem credits and species credits that measure the impact of the development on biodiversity values, including:	–
		<input checked="" type="checkbox"/> future vegetation integrity score for each vegetation zone within the subject land (Equation 25 and Equation 26 in BAM Appendix H)	54
		<input checked="" type="checkbox"/> change in vegetation integrity score (BAM Subsection 8.1.1)	
		<input checked="" type="checkbox"/> number of required ecosystem credits for the direct impacts of the proposal on each vegetation zone within the subject land (BAM Subsection 10.1.2)	
		<input type="checkbox"/> biodiversity risk weighting for each	59
		<input type="checkbox"/> number of required species credits for each candidate threatened species that is directly impacted on by the proposal (BAM Subsection 10.1.3)	N/A
		Maps and tables	
		<input type="checkbox"/> Table of PCTs requiring offset and the number of ecosystem credits required	59
		<input type="checkbox"/> Table of threatened species requiring offset and the number of species credits required	N/A
		Data	
		<input type="checkbox"/> Submitted proposal in the BAM Calculator	–
Biodiversity credit report	Chapter 10	Information	
		<input type="checkbox"/> Description of credit classes for ecosystem credits and species credits at the development or clearing site or land to be biodiversity certified (BAM Section 10.2)	60



BDAR section	BAM ref.	BAM requirement	Page reference(s) in the BDAR
		<input type="checkbox"/> BAM credit report in pdf format	<Appendix H>
		Maps and tables	
		<input type="checkbox"/> Table of credit class and matching credit profile	60
		Data	
		<input type="checkbox"/> BAM credit report in pdf format	<Appendix H>



Appendix D: Flora Plot Data

BAM PLOT DATA SHEET

28/10/2021

Copy these 2 rows
into BAM Calc

plot	pct	area
1.00	1561	

Species List

Enter first 4 letters of genus and first 4 letters of species here			
Abbreviation	Kingdom	Class	Family
euca cana	Plantae	Flora	Myrtaceae
euca molu	Plantae	Flora	Myrtaceae
cymb refr	Plantae	Flora	Poaceae
micr stip	Plantae	Flora	Poaceae
both macr	Plantae	Flora	Poaceae
opli aemu	Plantae	Flora	Poaceae
erag lept	Plantae	Flora	Poaceae
care long	Plantae	Flora	Cyperaceae
prat purp	Plantae	Flora	Campanulaceae
oxal exil	Plantae	Flora	Oxalidaceae
glyc micr	Plantae	Flora	Fabaceae (Faboideae)
chei sieb	Plantae	Flora	Pteridaceae
aspe conf	Plantae	Flora	Rubiaceae
desm gunn	Plantae	Flora	Fabaceae (Faboideae)
glyc latr	Plantae	Flora	Fabaceae (Faboideae)
cype grac	Plantae	Flora	Cyperaceae
digi dida	Plantae	Flora	Poaceae
gera home	Plantae	Flora	Geraniaceae
gera sola	Plantae	Flora	Geraniaceae
pani deco	Plantae	Flora	Poaceae
echi ovat	Plantae	Flora	Poaceae
axon comp	Plantae	Flora	Poaceae
pasp dila	Plantae	Flora	Poaceae
verb bona	Plantae	Flora	Verbenaceae
plan lanc	Plantae	Flora	Plantaginaceae
trif repe	Plantae	Flora	Fabaceae (Faboideae)
sene mada	Plantae	Flora	Asteraceae
spor afri	Plantae	Flora	Poaceae
cype brev	Plantae	Flora	Cyperaceae
cirs vulg	Plantae	Flora	Asteraceae
lant cama	Plantae	Flora	Verbenaceae
rume brow	Plantae	Flora	Polygonaceae
junc subg	Plantae	Flora	Juncaceae
geit cymo	Plantae	Flora	Luzuriagaceae
desm vari	Plantae	Flora	Fabaceae (Faboideae)
fimb dich	Plantae	Flora	Cyperaceae

MC and AC		
patchsize	conditionclass	zone
	forest	56
OR type/paste Scientific Name here		
Scientific Name	Common Name	BC Act
Eucalyptus canaliculata <--> punctata		Not Listed
Eucalyptus moluccana	Grey Box	Not Listed
Cymbopogon refractus	Barbed Wire Grass	Not Listed
Microlaena stipoides	Weeping Grass	Not Listed
Bothriochloa macra	Red Grass	Not Listed
Oplismenus aemulus		Not Listed
Eragrostis leptostachya	Paddock Lovegrass	Not Listed
Carex longibrachiata		Not Listed
Pratia purpurascens	Whiteroot	Not Listed
Oxalis exilis		Not Listed
Glycine microphylla	Small-leaf Glycine	Not Listed
Cheilanthes sieberi	Rock Fern	Not Listed
Asperula conferta	Common Woodruff	Not Listed
Desmodium gunnii	Slender Tick-trefoil	Not Listed
Glycine latrobeana	Clover Glycine	Critically Endan
Cyperus gracilis	Slender Flat-sedge	Not Listed
Digitaria didactyla	Queensland Blue Couch	Not Listed
Geranium homeanum		Not Listed
Geranium solanderi	Native Geranium	Not Listed
Panicum decompositum	Native Millet	Not Listed
Echinopogon ovatus	Forest Hedgehog Grass	Not Listed
Axonopus compressus	Broad-leaved Carpet Grass	Not Listed
Paspalum dilatatum	Paspalum	Not Listed
Verbena bonariensis	Purpletop	Not Listed
Plantago lanceolata	Lamb's Tongues	Not Listed
Trifolium repens	White Clover	Not Listed
Senecio madagascariensis	Fireweed	Not Listed
Sporobolus africanus	Parramatta Grass	Not Listed
Cyperus brevifolius		Not Listed
Cirsium vulgare	Spear Thistle	Not Listed
Lantana camara	Lantana	Not Listed
Rumex brownii	Swamp Dock	Not Listed
Juncus subglaucus	Rush	Not Listed
Geitonoplesium cymosum	Scrambling Lily	Not Listed
Desmodium varians	Slender Tick-trefoil	Not Listed
Fimbristylis dichotoma	Common Fringe-sedge	Not Listed

easting	northing	bearing

EPBC Act	GrowthForm	N or E
Not Listed	Tree (TG)	Alive in NSW, Native
Not Listed	Tree (TG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Other (OG)	Alive in NSW, Native
Not Listed	Fern (EG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Vulnerable	Other (OG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Other (OG)	Alive in NSW, Native
Not Listed	Other (OG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native

compTree	compShrub	compGrass	compForbs
	2	0	12
			9

HTE	Cover	Abundance
	25	3
	0.5	1
	6	200
	25	1000
	1	200
	1	200
	4	200
	0.5	20
	0.2	100
	0.1	1
	0.2	50
	0.1	2
	0.2	200
	0.1	10
	0.5	100
	0.1	10
	60	2000
	0.1	10
	0.2	50
	1	100
	0.5	50
	10	400
YES	0.5	100
	2	200
	0.5	100
	2	100
	0.1	5
	2	200
	0.1	20
	0.1	2
YES	0.2	2
	0.1	5
	0.2	10
	0.1	1
	0.1	1
	0.1	10

compFerns	compOther	strucTree	Shrub	
	1	4	25.5	0.0

Tree Count	Absent=0,Present =1
80cm +	
50-79 cm	4
30-49 cm	
20-29 cm	
10-19 cm	
5-9 cm	
<5 cm	

Logs	<sum of longs on ground >10cm
1	

Hollows	<Number of hollow bearing trees
2	

1 x 1 m Plots

5
15
25
35
45
5
15
25
35
45

5
15
25
35
45

5
15
25
35
45

strucGrass	strucForbs
99.4	1.2

Subplot	Average
Leaf Litter	
3	6.4
4	
7	
3	
15	
Bare Ground	
0	0.0
0	
0	
0	
0	

Cryptogram	
0	0.0
0	
0	
0	
0	

Rock Cover	
0	0.0
0	
0	
0	
0	

BAM PLOT DATA SHEET

11/11/2021

Copy these 2 rows
into BAM Calc

plot	pct	area
	3.00	

Species List

Enter first 4 letters of genus and first 4 letters of species here			
Abbreviation	Kingdom	Class	Family
euca glob	Plantae	Flora	Myrtaceae
cory macu	Plantae	Flora	Myrtaceae
euca pani	Plantae	Flora	Myrtaceae
loma long	Plantae	Flora	Lomandraceae
clem aris	Plantae	Flora	Ranunculaceae
dich repe	Plantae	Flora	Convolvulaceae
impe cyli	Plantae	Flora	Poaceae
micr stip	Plantae	Flora	Poaceae
echi ovat	Plantae	Flora	Poaceae
echi caes	Plantae	Flora	Poaceae
aris vaga	Plantae	Flora	Poaceae
cype laev	Plantae	Flora	Cyperaceae
desm gunn	Plantae	Flora	Fabaceae (Faboideae)
adia aeth	Plantae	Flora	Pteridaceae
gera sola	Plantae	Flora	Geraniaceae
glyc micr	Plantae	Flora	Fabaceae (Faboideae)
eust lati	Plantae	Flora	Luzuriagaceae
prat purp	Plantae	Flora	Campanulaceae
oxal exil	Plantae	Flora	Oxalidaceae
vero caly	Plantae	Flora	Plantaginaceae
digi dida	Plantae	Flora	Poaceae
loma fili	Plantae	Flora	Lomandraceae
arth mill	Plantae	Flora	Anthericaceae
bide pilo	Plantae	Flora	Asteraceae
plan lanc	Plantae	Flora	Plantaginaceae
sene mada	Plantae	Flora	Asteraceae
lant cama	Plantae	Flora	Verbenaceae
pasp dila	Plantae	Flora	Poaceae
gomp frut	Plantae	Flora	Apocynaceae
cirs vulg	Plantae	Flora	Asteraceae
acac impl	Plantae	Flora	Fabaceae (Mimosoideae)
pani simi	Plantae	Flora	Poaceae
dian tasm	Plantae	Flora	Phormiaceae
vern cine	Plantae	Flora	Asteraceae
aspe conf	Plantae	Flora	Rubiaceae
cent asia	Plantae	Flora	Apiaceae

acac falc	Plantae	Flora	Fabaceae (Mimosoideae)
chlo vent	Plantae	Flora	Poaceae
opli aemu	Plantae	Flora	Poaceae
desm vari	Plantae	Flora	Fabaceae (Faboideae)
chei sieb	Plantae	Flora	Pteridaceae
them aust	Plantae	Flora	Poaceae
acac ulic	Plantae	Flora	Fabaceae (Mimosoideae)
pani deco	Plantae	Flora	Poaceae
brey oblo	Plantae	Flora	Phyllanthaceae
hydr trip	Plantae	Flora	Apiaceae
care long	Plantae	Flora	Cyperaceae
good ovat	Plantae	Flora	Goodeniaceae
cymb refr	Plantae	Flora	Poaceae
ager aden	Plantae	Flora	Asteraceae
hypo radi	Plantae	Flora	Asteraceae
spor fert	Plantae	Flora	Poaceae
verb rigi	Plantae	Flora	Verbenaceae
sonc oler	Plantae	Flora	Asteraceae
axon comp	Plantae	Flora	Poaceae
sida rhom	Plantae	Flora	Malvaceae

Andrew and Logan		
patchsize	conditionclass	zone
	forest	56
OR type/paste Scientific Name here		
Scientific Name	Common Name	BC Act
Eucalyptus globulus		Not Listed
Corymbia maculata	Spotted Gum	Not Listed
Eucalyptus paniculata	Grey Ironbark	Not Listed
Lomandra longifolia 'Tanika'		Not Listed
Clematis aristata	Old Man's Beard	Not Listed
Dichondra repens	Kidney Weed	Not Listed
Imperata cylindrica	Blady Grass	Not Listed
Microlaena stipoides	Weeping Grass	Not Listed
Echinopogon ovatus	Forest Hedgehog Grass	Not Listed
Echinopogon caespitosus	Bushy Hedgehog-grass	Not Listed
Aristida vagans	Threeawn Speargrass	Not Listed
Cyperus laevigatus		Not Listed
Desmodium gunnii	Slender Tick-trefoil	Not Listed
Adiantum aethiopicum	Common Maidenhair	Not Listed
Geranium solanderi	Native Geranium	Not Listed
Glycine microphylla	Small-leaf Glycine	Not Listed
Eustrephus latifolius	Wombat Berry	Not Listed
Pratia purpurascens	Whiteroot	Not Listed
Oxalis exilis		Not Listed
Veronica calycina	Hairy Speedwell	Not Listed
Digitaria didactyla	Queensland Blue Couch	Not Listed
Lomandra filiformis		Not Listed
Arthropodium milleflorum	Pale Vanilla-lily	Not Listed
Bidens pilosa	Cobbler's Pegs	Not Listed
Plantago lanceolata	Lamb's Tongues	Not Listed
Senecio madagascariensis	Fireweed	Not Listed
Lantana camara	Lantana	Not Listed
Paspalum dilatatum	Paspalum	Not Listed
Gomphocarpus fruticosus	Narrow-leaved Cotton Bush	Not Listed
Cirsium vulgare	Spear Thistle	Not Listed
Acacia implexa	Hickory Wattle	Not Listed
Panicum simile	Two-colour Panic	Not Listed
Dianella tasmanica		Not Listed
Vernonia cinerea		Not Listed
Asperula conferta	Common Woodruff	Not Listed
Centella asiatica	Indian Pennywort	Not Listed

Acacia falcata		Not Listed
Chloris ventricosa	Tall Chloris	Not Listed
Oplismenus aemulus		Not Listed
Desmodium varians	Slender Tick-trefoil	Not Listed
Cheilanthes sieberi	Rock Fern	Not Listed
Themeda australis	Kangaroo Grass	Not Listed
Acacia ulicifolia	Prickly Moses	Not Listed
Panicum decompositum	Native Millet	Not Listed
Breynia oblongifolia	Coffee Bush	Not Listed
Hydrocotyle tripartita	Pennywort	Not Listed
Carex longebrachiata		Not Listed
Goodenia ovata	Hop Goodenia	Not Listed
Cymbopogon refractus	Barbed Wire Grass	Not Listed
Ageratina adenophora	Crofton Weed	Not Listed
Hypochoeris radicata	Catsear	Not Listed
Sporobolus fertilis	Giant Parramatta Grass	Not Listed
Verbena rigida	Veined Verbena	Not Listed
Sonchus oleraceus	Common Sowthistle	Not Listed
Axonopus compressus	Broad-leaved Carpet Grass	Not Listed
Sida rhombifolia	Paddy's Lucerne	Not Listed

easting	northing	bearing

EPBC Act	GrowthForm	N or E
Not Listed	Tree (TG)	Alive in NSW, Native
Not Listed	Tree (TG)	Alive in NSW, Native
Not Listed	Tree (TG)	Alive in NSW, Native
Not Listed		0 Alive in NSW, Native
Not Listed	Other (OG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Fern (EG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Other (OG)	Alive in NSW, Native
Not Listed	Other (OG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed		0 Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed	Shrub (SG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native

[illegible]

compTree	compShrub	compGrass	compForbs	
	3	5	13	13

HTE	Cover	Abundance
	4	1
	25	10
	6	2
	1	20
	2	100
	3	400
	40	1000
	25	800
	1	100
	1	100
	0.1	10
	0.1	10
	0.1	10
	0.5	50
	0.1	10
	0.5	500
	0.4	50
	0.2	100
	0.1	1
	0.2	20
	1	100
	0.1	10
	0.1	1
	0.5	20
	0.4	100
	0.5	50
YES	5	20
YES	0.5	20
	0.1	2
	0.2	10
	0.1	1
	0.1	10
	0.1	2
	0.1	50
	0.1	10
	0.2	50

YES

YES

0.1	1
0.5	20
5	200
0.1	1
0.1	10
0.5	20
0.3	1
10	200
0.1	1
0.1	20
2	20
0.3	1
0.3	20
0.1	1
0.1	10
1	20
0.1	1
0.1	1
0.2	10
0.1	10

compFerns	compOther	strucTree	Shrub	
	2	4	35.0	0.9

Tree Count	Absent=0,Present =1
80cm +	0
50-79 cm	1
30-49 cm	3
20-29 cm	8
10-19 cm	20
5-9 cm	6
<5 cm	2

Logs	<sum of longs on ground >10cm
6	

Hollows	<Number of hollow bearing trees
0	

1 x 1 m Plots

5
15
25
35
45
5
15
25
35
45

5
15
25
35
45

5
15
25
35
45

strucGrass	strucForbs
86.1	4.4

Subplot	Average
Leaf Litter	
5	43.6
3	
40	
85	
85	
Bare Ground	
0	2.0
0	
0	
5	
5	

Cryptogram	
0	0.0
0	
0	
0	
0	

Rock Cover	
0	0.2
0	
0	
1	
0	

BAM PLOT DATA SHEET

11/11/2021

Copy these 2 rows
into BAM Calc

plot	pct	area
5.00		

Species List

Enter first 4 letters of genus and first 4 letters of species here			
Abbreviation	Kingdom	Class	Family
Euca molu	Plantae	Flora	Myrtaceae
cory macu	Plantae	Flora	Myrtaceae
chlo vent	Plantae	Flora	Poaceae
opli aemu	Plantae	Flora	Poaceae
echi caes	Plantae	Flora	Poaceae
micr stip	Plantae	Flora	Poaceae
pani deco	Plantae	Flora	Poaceae
both macr	Plantae	Flora	Poaceae
cymb refr	Plantae	Flora	Poaceae
spor creb	Plantae	Flora	Poaceae
erag lept	Plantae	Flora	Poaceae
aspe conf	Plantae	Flora	Rubiaceae
arth mill	Plantae	Flora	Anthericaceae
glyc taba	Plantae	Flora	Fabaceae (Faboideae)
ment satu	Plantae	Flora	Lamiaceae
hypo hydr	Plantae	Flora	Hypoxidaceae
oxal exil	Plantae	Flora	Oxalidaceae
prat purp	Plantae	Flora	Campanulaceae
pand pand	Plantae	Flora	Bignoniaceae
cent asia	Plantae	Flora	Apiaceae
desm gunn	Plantae	Flora	Fabaceae (Faboideae)
halo hete	Plantae	Flora	Haloragaceae
digi dida	Plantae	Flora	Poaceae
glyc micr	Plantae	Flora	Fabaceae (Faboideae)
fimb dich	Plantae	Flora	Cyperaceae
cirs vulg	Plantae	Flora	Asteraceae
verb bona	Plantae	Flora	Verbenaceae
sene mada	Plantae	Flora	Asteraceae
verb rigi	Plantae	Flora	Verbenaceae
plan lanc	Plantae	Flora	Plantaginaceae
lant cama	Plantae	Flora	Verbenaceae
care long	Plantae	Flora	Cyperaceae
junc usit	Plantae	Flora	Juncaceae
vern cine	Plantae	Flora	Asteraceae
note veno	Plantae	Flora	Oleaceae
brun aust	Plantae	Flora	Acanthaceae

dich repe	Plantae	Flora	Convolvulaceae
aris ramo	Plantae	Flora	Poaceae
sige orie	Plantae	Flora	Asteraceae
poa labi	Plantae	Flora	Poaceae
gera sola	Plantae	Flora	Geraniaceae
spor afri	Plantae	Flora	Poaceae
spor fert	Plantae	Flora	Poaceae
gomp frut	Plantae	Flora	Apocynaceae
axon comp	Plantae	Flora	Poaceae

Andrew and Logan		
patchsize	conditionclass	zone
	forest	56
OR type/paste Scientific Name here		
Scientific Name	Common Name	BC Act
Eucalyptus moluccana	Grey Box	Not Listed
Corymbia maculata	Spotted Gum	Not Listed
Chloris ventricosa	Tall Chloris	Not Listed
Oplismenus aemulus		Not Listed
Echinopogon caespitosus	Bushy Hedgehog-grass	Not Listed
Microlaena stipoides	Weeping Grass	Not Listed
Panicum decompositum	Native Millet	Not Listed
Bothriochloa macra	Red Grass	Not Listed
Cymbopogon refractus	Barbed Wire Grass	Not Listed
Sporobolus creber	Slender Rat's Tail Grass	Not Listed
Eragrostis leptostachya	Paddock Lovegrass	Not Listed
Asperula conferta	Common Woodruff	Not Listed
Arthropodium milleflorum	Pale Vanilla-lily	Not Listed
Glycine tabacina complex		Not Listed
Mentha satuireioides	Native Pennyroyal	Not Listed
Hypoxis hygrometrica	Golden Weather-grass	Not Listed
Oxalis exilis		Not Listed
Pratia purpurascens	Whiteroot	Not Listed
Pandorea pandorana	Wonga Wonga Vine	Not Listed
Centella asiatica	Indian Pennywort	Not Listed
Desmodium gunnii	Slender Tick-trefoil	Not Listed
Haloragis heterophylla	Variable Raspwort	Not Listed
Digitaria didactyla	Queensland Blue Couch	Not Listed
Glycine microphylla	Small-leaf Glycine	Not Listed
Fimbristylis dichotoma	Common Fringe-sedge	Not Listed
Cirsium vulgare	Spear Thistle	Not Listed
Verbena bonariensis	Purpletop	Not Listed
Senecio madagascariensis	Fireweed	Not Listed
Verbena rigida	Veined Verbena	Not Listed
Plantago lanceolata	Lamb's Tongues	Not Listed
Lantana camara	Lantana	Not Listed
Carex longibrachiata		Not Listed
Juncus usitatus		Not Listed
Vernonia cinerea		Not Listed
Notelaea venosa	Veined Mock-olive	Not Listed
Brunoniella australis	Blue Trumpet	Not Listed

Dichondra repens	Kidney Weed	Not Listed
Aristida ramosa	Purple Wiregrass	Not Listed
Sigesbeckia orientalis		Not Listed
Poa labillardierei	Tussock grass	Not Listed
Geranium solanderi	Native Geranium	Not Listed
Sporobolus africanus	Parramatta Grass	Not Listed
Sporobolus fertilis	Giant Parramatta Grass	Not Listed
Gomphocarpus fruticosus	Narrow-leaved Cotton Bush	Not Listed
Axonopus compressus	Broad-leaved Carpet Grass	Not Listed

easting	northing	bearing

EPBC Act	GrowthForm	N or E
Not Listed	Tree (TG)	Alive in NSW, Native
Not Listed	Tree (TG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed		0 Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Other (OG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Other (OG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Shrub (SG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native

Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed		0 Alive in NSW, Native
Not Listed		0 Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced

compTree	compShrub	compGrass	compForbs
	2	1	14
			13

HTE	Cover	Abundance
	25	5
	15	35
	2	300
	35	1000
	0.5	100
	20	1000
	2	100
	0.1	10
	10	100
	5	200
	10	500
	0.1	50
	0.1	20
	0.1	50
	0.5	200
	0.1	1
	0.1	1
	0.5	200
	0.2	1
	0.2	50
	0.1	1
	0.1	10
	15	500
	0.1	10
	0.1	20
	0.1	2
	0.1	5
	0.1	10
	0.1	1
	4	1000
YES	0.3	1
	1	20
	0.1	1
	0.1	10
	0.2	1
	0.1	1

YES

0.2	100
0.1	10
0.1	1
0.5	10
0.1	10
1	100
6	200
0.1	1
0.2	20

compFerns	compOther	strucTree	Shrub	
	0	2	40.0	0.2

Tree Count	Absent=0,Present =1
80cm +	0
50-79 cm	3
30-49 cm	8
20-29 cm	5
10-19 cm	4
5-9 cm	4
<5 cm	0

Logs	<sum of longs on ground >10cm
20	

Hollows	<Number of hollow bearing trees
28	

1 x 1 m Plots

5
15
25
35
45
5
15
25
35
45

5
15
25
35
45

5
15
25
35
45

strucGrass	strucForbs
100.9	2.3

Subplot	Average
Leaf Litter	
3	19.8
65	
10	
10	
11	
Bare Ground	
0	0.0
0	
0	
0	
0	

Cryptogram	
0	0.0
0	
0	
0	
0	

Rock Cover	
0	0.0
0	
0	
0	
0	

BAM PLOT DATA SHEET

11/11/2021

Copy these 2 rows
into BAM Calc

plot	pct	area
6.00		

Species List

Enter first 4 letters of genus and first 4 letters of species here			
Abbreviation	Kingdom	Class	Family
acac impl	Plantae	Flora	Fabaceae (Mimosoideae)
cory macu	Plantae	Flora	Myrtaceae
micr stip	Plantae	Flora	Poaceae
chlo vent	Plantae	Flora	Poaceae
pasp dila	Plantae	Flora	Poaceae
aris ramo	Plantae	Flora	Poaceae
pani deco	Plantae	Flora	Poaceae
them tria	Plantae	Flora	Poaceae
cymb refr	Plantae	Flora	Poaceae
spor creb	Plantae	Flora	Poaceae
erag lept	Plantae	Flora	Poaceae
opli aemu	Plantae	Flora	Poaceae
chei sieb	Plantae	Flora	Pteridaceae
dich repe	Plantae	Flora	Convolvulaceae
prat purp	Plantae	Flora	Campanulaceae
vero caly	Plantae	Flora	Plantaginaceae
erag brow	Plantae	Flora	Poaceae
desm vari	Plantae	Flora	Fabaceae (Faboideae)
pani simi	Plantae	Flora	Poaceae
acac ulic	Plantae	Flora	Fabaceae (Mimosoideae)
digi dida	Plantae	Flora	Poaceae
axon comp	Plantae	Flora	Poaceae
cype brev	Plantae	Flora	Cyperaceae
sola maur	Plantae	Flora	Solanaceae
pasp dila	Plantae	Flora	Poaceae
gomp frut	Plantae	Flora	Apocynaceae
verb bona	Plantae	Flora	Verbenaceae
sida rhom	Plantae	Flora	Malvaceae
plan lanc	Plantae	Flora	Plantaginaceae
spor fert	Plantae	Flora	Poaceae
spor afri	Plantae	Flora	Poaceae
Lant cama	Plantae	Flora	Verbenaceae
chei dist	Plantae	Flora	Pteridaceae
oxal pere	Plantae	Flora	Oxalidaceae
pand pand	Plantae	Flora	Bignoniaceae
cype grac	Plantae	Flora	Cyperaceae

loma fili	Plantae	Flora	Lomandraceae
sola spp.	Plantae	Flora	Solanaceae
trif repe	Plantae	Flora	Fabaceae (Faboideae)
echi crus	Plantae	Flora	Poaceae
cenc clan	Plantae	Flora	Poaceae

Andrew and Logan		
patchsize	conditionclass	zone
	forest	56
OR type/paste Scientific Name here		
Scientific Name	Common Name	BC Act
Acacia implexa	Hickory Wattle	Not Listed
Corymbia maculata	Spotted Gum	Not Listed
Microlaena stipoides	Weeping Grass	Not Listed
Chloris ventricosa	Tall Chloris	Not Listed
Paspalum dilatatum	Paspalum	Not Listed
Aristida ramosa	Purple Wiregrass	Not Listed
Panicum decompositum	Native Millet	Not Listed
Themeda triandra		Not Listed
Cymbopogon refractus	Barbed Wire Grass	Not Listed
Sporobolus creber	Slender Rat's Tail Grass	Not Listed
Eragrostis leptostachya	Paddock Lovegrass	Not Listed
Oplismenus aemulus		Not Listed
Cheilanthes sieberi	Rock Fern	Not Listed
Dichondra repens	Kidney Weed	Not Listed
Pratia purpurascens	Whiteroot	Not Listed
Veronica calycina	Hairy Speedwell	Not Listed
Eragrostis brownii	Brown's Lovegrass	Not Listed
Desmodium varians	Slender Tick-trefoil	Not Listed
Panicum simile	Two-colour Panic	Not Listed
Acacia ulicifolia	Prickly Moses	Not Listed
Digitaria didactyla	Queensland Blue Couch	Not Listed
Axonopus compressus	Broad-leaved Carpet Grass	Not Listed
Cyperus brevifolius		Not Listed
Solanum mauritianum	Wild Tobacco Bush	Not Listed
Paspalum dilatatum	Paspalum	Not Listed
Gomphocarpus fruticosus	Narrow-leaved Cotton Bush	Not Listed
Verbena bonariensis	Purpletop	Not Listed
Sida rhombifolia	Paddy's Lucerne	Not Listed
Plantago lanceolata	Lamb's Tongues	Not Listed
Sporobolus fertilis	Giant Parramatta Grass	Not Listed
Sporobolus africanus	Parramatta Grass	Not Listed
Lantana camara	Lantana	Not Listed
Cheilanthes distans	Bristly Cloak Fern	Not Listed
Oxalis perennans		Not Listed
Pandorea pandorana	Wonga Wonga Vine	Not Listed
Cyperus gracilis	Slender Flat-sedge	Not Listed

Lomandra filiformis		Not Listed
Solanum spp.		Not Listed
Trifolium repens	White Clover	Not Listed
Echinochloa crusgalli	Barnyard Grass	Not Listed
Cenchrus clandestinus	Kikuyu Grass	Not Listed

easting	northing	bearing

EPBC Act	GrowthForm	N or E
Not Listed	Shrub (SG)	Alive in NSW, Native
Not Listed	Tree (TG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed		0 Introduced
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Fern (EG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Other (OG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed	Shrub (SG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed		0 Introduced
Not Listed	Fern (EG)	Alive in NSW, Native
Not Listed	Forb (FG)	Alive in NSW, Native
Not Listed	Other (OG)	Alive in NSW, Native
Not Listed	Grass & grasslike (GG)	Alive in NSW, Native

Not Listed		0	Alive in NSW, Native
Not Listed	Forb (FG)		Alive in NSW, Native
Not Listed		0	Introduced
Not Listed		0	Introduced
Not Listed		0	Introduced

compTree	compShrub	compGrass	compForbs
	1	2	13
			5

HTE	Cover	Abundance
YES	0.2	1
	30	20
	20	800
	26	500
	0.5	100
	26	500
	62	2200
	0.5	20
	2	50
	3	200
	2	100
	0.5	50
	0.1	20
	0.1	50
	0.2	100
	0.1	10
	0.2	50
	0.1	1
	0.1	1
	0.1	1
YES	25	800
	0.5	50
	0.1	1
	0.2	1
	2	100
YES	0.1	1
	0.3	20
	0.1	10
	0.1	50
	25	200
YES	5	100
	1	3
	0.1	20
	0.1	10
	0.1	2
	0.1	20

0.1	1
0.1	1
0.1	10
0.1	2
0.1	1

compFerns	compOther	strucTree	Shrub	
	2	2	30.0	0.3

Tree Count	Absent=0,Present =1
80cm +	1
50-79 cm	0
30-49 cm	6
20-29 cm	12
10-19 cm	12
5-9 cm	3
<5 cm	0

Logs	<sum of longs on ground >10cm
2	

Hollows	<Number of hollow bearing trees
5	

1 x 1 m Plots

5
15
25
35
45
5
15
25
35
45

5
15
25
35
45

5
15
25
35
45

strucGrass	strucForbs
167.4	0.6

Subplot	Average
Leaf Litter	
20	12.4
8	
11	
20	
3	
Bare Ground	
0	0.0
0	
0	
0	
0	

Cryptogram	
0	0.0
0	
0	
0	
0	

Rock Cover	
0	11.0
0	
0	
45	
10	

Grassland plots

Cover Type												
Section 1-	Column A % Overall Groundcover						Column B % Native Groundcover					
	Q1 100	Q2 100	Q3 100	Q4 100	Q5 100	Total	Q1 0	Q2 0.1	Q3 0	Q4 0	Q5 0	Total
	Q6 100	Q7 100	Q8 100	Q9 100	Q10 100	Average	Q6 0	Q7 0	Q8 0	Q9 0.9	Q10 0	Average

Section 2-	Column A % Overall Groundcover						Column B % Native Groundcover					
	Q1 100	Q2 100	Q3 100	Q4 100	Q5 100	Total	Q1 0	Q2 0	Q3 0	Q4 0	Q5 0	Total
	Q6 100	Q7 100	Q8 100	Q9 100	Q10 100	Average	Q6 0	Q7 0	Q8 0	Q9 0	Q10 100	Average

Section 3-	Column A % Overall Groundcover						Column B % Native Groundcover					
	Q1 100	Q2 100	Q3 100	Q4 100	Q5 100	Total	Q1 0	Q2 0	Q3 0	Q4 0	Q5 0	Total
	Q6 100	Q7 100	Q8 100	Q9 100	Q10 100	Average	Q6 0.1	Q7 0	Q8 0	Q9 0.1	Q10 0	Average

Section 4-	Column A % Overall Groundcover						Column B % Native Groundcover					
	Q1 100	Q2 95	Q3 100	Q4 100	Q5 100	Total	Q1 0	Q2 0	Q3 0.1	Q4 0	Q5 0	Total
	Q6 100	Q7 80	Q8 100	Q9 100	Q10 100	Average	Q6 0	Q7 0.1	Q8 0.5	Q9 0	Q10 0	Average

<u>Section 5</u>	<u>Column A</u> % Overall Groundcover						<u>Column B</u> % Native Groundcover					
	Q1 100	Q2 100	Q3 100	Q4 70	Q5 100	Total	Q1 0	Q2 0	Q3 0	Q4 0	Q5 0	Total
	Q6 95	Q7 100	Q8 100	Q9 100	Q10 100	Average	Q6 0	Q7 0	Q8 0	Q9 0	Q10 0	Average

Section 6-	Column A % Overall Groundcover						Column B % Native Groundcover					
	Q1 100	Q2 100	Q3 100	Q4 100	Q5 100	Total	Q1 0	Q2 0	Q3 0	Q4 0	Q5 0	Total
	Q6 100	Q7 100	Q8 100	Q9 100	Q10 100	Average	Q6 0	Q7 0	Q8 0	Q9 0	Q10 0	Average

Section 1

Plot 1:

- Plantago
- Blue couch
- White clover
- Fireweed
- Purple top
- Clustered clover
- Parramatta grass
- Scarlet pimpernel

Plot 2:

- Kikuyu
- White clover
- Blue couch
- Plantago
- Native geranium

Plot 3:

- Kikuyu
- Blue couch
- Plantago
- Parramatta grass
- White clover
- Fireweed
- Rats tail fescue

Plot 4:

- Parramatta
- Kikuyu
- Blue couch
- Scarlet pimpernel
- Purple top
- Hop clover

Plot 5:

- Briza minor
- Fireweed
- Parramatta grass
- Blue couch
- Kikuyu
- Scarlet pimpernel

Plot 6:

- Briza minor
- Juncus sp.

- Plantago
- Scarlet pimpernel
- Kikuyu
- Blue couch
- White clover

Plot 7:

- Purpletop
- Parramatta
- Plantago
- Kikuyu
- Blue couch
- White clover
- Briza minor
- Juncus sp.

Plot 8:

- Plantago
- Purple top
- Parramatta
- Blue couch
- Kikuyu
- Scarlet pimpernel
- Fireweed
- Briza minor

Plot 9:

- White clover
- Blue couch
- Parramatta grass
- Fireweed
- Purpletop
- Kikuyu
- Hop clover
- Native geranium

Plot 10:

- White clover
- Kikuyu
- Plantago
- Hop clover
- Thistle
- Purpletop

Section 2:

Plot 1:

- Fireweed
- White clover
- Kikuyu
- Blue couch
- Parramatta

Plot 2:

- Fireweed
- Parramatta
- Kikuyu
- Purpletop
- White clover

Plot 3:

- Paramatta
- Kikuyu
- Hop clover
- Fireweed
- Slender celery

Plot 4:

- Parramatta grass
- Scarlet pimpernel
- Plantago
- Fireweed
- Bluecouch
- Slender celery
- White clover

Plot 5:

- Slender celery
- Fireweed
- Blue couch
- Kikuyu
- Plantago
- Parramatta grass
- Scarlet pimpernel
- Hop clover

Plot 6:

- Scarlet pimpernel
- Fireweed
- Purpletop
- Kikuyu

- White clover
- Blue couch

Plot 7:

- Scotch thistle
- Paramatta grass
- Fireweed
- Slender celery
- Blue couch
- Kikuyu
- Scarlet pimpernel

Plot 8:

- Fireweed
- Parramatta grass
- Plantago
- White clover
- Kikuyu
- Blue couch
- Purpletop

Plot 9:

- Fireweed
- Paramatta
- Blue couch
- White clover
- Scarlet pimpernel
- Bindi

Plot 10:

- Fireweed
- White clover
- Dandelion
- Milk thistle
- Parramatta grass
- Blue couch
- Hop clover
- Purpletop

Section 3:

Plot 1:

- White clover
- Fireweed
- Plantago
- Parramatta grass
- Scarlet pimpernel
- Blue couch

Plot 2:

- Purpletop
- Scarlet pimpernel
- Blue couch
- White clover
- Plantago

Plot 3:

- Fireweed
- White clover
- Plantago
- Blue couch
- Scarlet pimpernel

Plot 4:

- White clover
- Plantago
- Rats tail grass
- Paramatta grass
- Scarlet pimpernel
- Kikuyu
- Onion grass

Plot 5:

- Briza minor
- Scarlet pimpernel



Appendix E: ANABAT Results

Photographs of ANABAT detectors in place on the site.



Appendix F: Camera trap results



Results from camera traps. Left. Brush-tail Possum, Centre top and bottom. Eastern Grey Kangaroos, and Right,



Appendix G: Biodiversity Credit Reports



BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00040132/BAAS18020/23/00040133	Hanleys Creek New PCT	28/10/2024
Assessor Name	Assessor Number	BAM Data version *
Sarah Elizabeth Jones	BAAS18020	Current classification (live - default) (80)
Proponent Names	Report Created	BAM Case Status
	03/12/2024	Finalised
Assessment Revision	BOS entry trigger	Assessment Type
5	BOS Threshold: Area clearing threshold	Part 4 Developments (General)
Date Finalised	* 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.	
03/12/2024		

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
00040132/BAAS18020/23/00040133	Hanleys Creek New PCT



BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT

No Changes

Predicted Threatened Species Not On Site

Name

No Changes

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest	Central Hunter Valley eucalypt forest and woodland	0.4	12	0	12
3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest	Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	4.3	130	0	130

3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region

BAM Biodiversity Credit Report (Like for like)

	Central Hunter Valley eucalypt forest and woodland This includes PCT's: 1176, 3314, 3315, 3431, 3438, 3446, 3485, 3490, 3497	-	3446_VZ1_Stag e2	Yes	12	Upper Hunter, Ellerston, Hunter, Karuah Manning, Mummel Escarpment and Tomalla. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions This includes PCT's: 1603, 1605, 1691, 1692, 3328, 3446, 3634	-	3446_VZ1_Stag e3	Yes	130	Upper Hunter, Ellerston, Hunter, Karuah Manning, Mummel Escarpment and Tomalla. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.



BAM Biodiversity Credit Report (Like for like)

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id

00040132/BAAS18020/23/00040133

Assessor Name

Sarah Elizabeth Jones

Proponent Name(s)

Assessment Revision

5

Date Finalised

03/12/2024

Proposal Name

Hanleys Creek New PCT

Assessor Number

BAAS18020

Report Created

03/12/2024

BOS entry trigger

BOS Threshold: Area clearing threshold

BAM data last updated *

28/10/2024

BAM Data version *

Current classification (live - default) (80)

BAM Case Status

Finalised

Assessment Type

Part 4 Developments (General)

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

Potential Serious and Irreversible Impacts

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

Additional Information for Approval

PCT Outside Ibra Added

None added

BAM Biodiversity Credit Report (Variations)

PCTs With Customized Benchmarks

PCT

No Changes

Predicted Threatened Species Not On Site

Name

No Changes

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

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest	Central Hunter Valley eucalypt forest and woodland	0.4	12	0	12.00
3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest	Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	4.3	130	0	130.00

3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Central Hunter Valley eucalypt forest and woodland This includes PCT's: 1176, 3314, 3315, 3431, 3438, 3446, 3485, 3490, 3497	-	3446_VZ1_Stage2	Yes	12	Upper Hunter, Ellerston, Hunter, Karuah Manning, Mummel Escarpment and Tomalla. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Variation options

Formation	Trading group	Zone	HBT	Credits	IBRA region
-----------	---------------	------	-----	---------	-------------

BAM Biodiversity Credit Report (Variations)

	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 2 or higher threat status	3446_VZ1_Stage2	Yes (including artificial)	12	IBRA Region: NSW North Coast, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest	Like-for-like credit retirement options					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions This includes PCT's: 1603, 1605, 1691, 1692, 3328, 3446, 3634	-	3446_VZ1_Stage3	Yes	130	Upper Hunter, Ellerston, Hunter, Karuah Manning, Mummel Escarpment and Tomalla. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Dry Sclerophyll Forests (Shrub/grass sub-formation)	Tier 3 or higher threat status	3446_VZ1_Stage3	Yes (including artificial)	130	IBRA Region: NSW North Coast, 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 options

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00040132/BAAS18020/23/00040133	Hanleys Creek New PCT	28/10/2024
Assessor Name	Report Created	BAM Data version *
Sarah Elizabeth Jones	03/12/2024	Current classification (live - default) (80)
Assessor Number	BAM Case Status	Date Finalised
BAAS18020	Finalised	03/12/2024
Assessment Revision	BOS entry trigger	Assessment Type
5	BOS Threshold: Area clearing threshold	Part 4 Developments (General)

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

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

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

BAM Credit Summary Report

Lower North Foothills Ironbark-Box-Gum Grassy Forest												
2	3446_VZ1_Stage3	Hunter Lowland Redgum Forest in the Sydney Basin and New South Wales North Coast Bioregions	60.8	60.8	5.3	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		160
											Subtotal	160
Lower North Foothills Ironbark-Box-Gum Grassy Forest												
1	3446_VZ1_Stage2	Central Hunter Valley eucalypt forest and woodland	51.3	51.3	0.58	Environment Protection and Conservation Act listing status	High Sensitivity to Gain	Not Listed	Critically Endangered	2.50		19
											Subtotal	19
											Total	179

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 SAIL	Species credits
----------------------	--	-----------------------------	-----------------------------------	-------------------------------------	-------------------------------------	-----------------------	-------------------------	----------------	-----------------

Appendix H: Recorded fauna species list

<i>Corvus coronoides</i>	Australian Raven
<i>Dacelo novaeguineae</i>	Kookaburra
<i>Gymnorhina tibicen</i>	Magpie
<i>Centropus phasianinus</i>	Pheasant Coucal
<i>Manorina melanocephala</i>	Noisy Miner
<i>Platycercus eximius</i>	Eastern Rosella
<i>Anthus novaeseelandiae</i>	Australian Pipit
<i>Falco berigora</i>	Brown Falcon
<i>Coturnix pectoralis</i>	Stubble Quail
<i>Tachybaptus ruficollis</i>	Little Grebe
<i>Poliocephalus poliocephalus</i>	Hoary-headed Grebe
<i>Egretta novaehollandiae</i>	White-faced Heron
<i>Chenonetta jubata</i>	Wood Duck
<i>Anas superciliosa</i>	Black Duck
<i>Megalurus gramineus</i>	Little Grassbird
<i>Vanellus miles</i>	Masked lapwing
<i>Carlia tetradactyla</i>	Southern Rainbow Skink
<i>Trichosurus vulpecula</i>	Brush-tailed Possum
<i>Macropus giganteus</i>	Eastern Grey Kangaroo
<i>Pseudechis porphyriacus</i>	Red-bellied black Snake
<i>Pseudonaja textilis</i>	Eastern Brown Snake

BAM Candidate Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00040132/BAAS18020/23/00040133	Hanleys Creek New PCT	28/10/2024
Assessor Name	Report Created	BAM Data version *
Sarah Elizabeth Jones	03/12/2024	Current classification (live - default) (80)
Assessor Number	Assessment Type	BAM Case Status
BAAS18020	Part 4 Developments (General)	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
5	BOS Threshold: Area clearing threshold	03/12/2024

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

List of Species Requiring Survey

Name	Presence	Survey Months
<i>Callocephalon fimbriatum</i> Gang-gang Cockatoo	No (surveyed) *Survey months are outside of the months specified in Bionet.	<div> <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr </div> <div> <input type="checkbox"/> May <input checked="" type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug </div> <div> <input type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec </div> <div> <input checked="" type="checkbox"/> Survey month outside the specified months? </div>
<i>Cercartetus nanus</i> Eastern Pygmy-possum	No (surveyed) *Survey months are outside of the months specified in Bionet.	<div> <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr </div> <div> <input type="checkbox"/> May <input checked="" type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug </div> <div> <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec </div> <div> <input checked="" type="checkbox"/> Survey month outside the specified months? </div>
<i>Cynanchum elegans</i> White-flowered Wax Plant	No (surveyed)	<div> <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr </div> <div> <input checked="" type="checkbox"/> May <input type="checkbox"/> Jun <input checked="" type="checkbox"/> Jul <input type="checkbox"/> Aug </div> <div> <input checked="" type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec </div> <div> <input type="checkbox"/> Survey month outside the specified months? </div>

BAM Candidate Species Report

<i>Eucalyptus glaucina</i> Slaty Red Gum	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input checked="" type="checkbox"/> May <input type="checkbox"/> Jun <input checked="" type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Eucalyptus largeana</i> Craven Grey Box	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input checked="" type="checkbox"/> May <input type="checkbox"/> Jun <input checked="" type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Grevillea parviflora subsp. parviflora</i> Small-flower Grevillea	No (surveyed) *Survey months are outside of the months specified in Bionet.	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input checked="" type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec <input checked="" type="checkbox"/> Survey month outside the specified months?
<i>Hieraaetus morphnoides</i> Little Eagle	No (surveyed) *Survey months are outside of the months specified in Bionet.	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input checked="" type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input checked="" type="checkbox"/> Survey month outside the specified months?
<i>Lophoictinia isura</i> Square-tailed Kite	No (surveyed) *Survey months are outside of the months specified in Bionet.	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input checked="" type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input checked="" type="checkbox"/> Survey month outside the specified months?
<i>Myotis macropus</i> Southern Myotis	No (surveyed) *Survey months are outside of the months specified in Bionet.	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input checked="" type="checkbox"/> Survey month outside the specified months?

BAM Candidate Species Report

<i>Ninox connivens</i> Barking Owl	No (surveyed) *Survey months are outside of the months specified in Bionet.	<div> <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr </div> <div> <input type="checkbox"/> May <input checked="" type="checkbox"/> Jun <input type="checkbox"/> Jul <input checked="" type="checkbox"/> Aug </div> <div> <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec </div> <div> <input checked="" type="checkbox"/> Survey month outside the specified months? </div>
<i>Ninox strenua</i> Powerful Owl	No (surveyed) *Survey months are outside of the months specified in Bionet.	<div> <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr </div> <div> <input type="checkbox"/> May <input checked="" type="checkbox"/> Jun <input type="checkbox"/> Jul <input checked="" type="checkbox"/> Aug </div> <div> <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec </div> <div> <input checked="" type="checkbox"/> Survey month outside the specified months? </div>
<i>Petaurus norfolcensis</i> Squirrel Glider	No (surveyed)	<div> <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr </div> <div> <input type="checkbox"/> May <input checked="" type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug </div> <div> <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec </div> <div> <input type="checkbox"/> Survey month outside the specified months? </div>
<i>Phascogale tapoatafa</i> Brush-tailed Phascogale	No (surveyed)	<div> <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr </div> <div> <input type="checkbox"/> May <input checked="" type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug </div> <div> <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec </div> <div> <input type="checkbox"/> Survey month outside the specified months? </div>
<i>Phascolarctos cinereus</i> Koala	No (surveyed)	<div> <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr </div> <div> <input type="checkbox"/> May <input checked="" type="checkbox"/> Jun <input type="checkbox"/> Jul <input checked="" type="checkbox"/> Aug </div> <div> <input type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec </div> <div> <input type="checkbox"/> Survey month outside the specified months? </div>
<i>Pterostylis chaetophora</i> Pterostylis chaetophora	No (surveyed)	<div> <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr </div> <div> <input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug </div> <div> <input checked="" type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec </div> <div> <input type="checkbox"/> Survey month outside the specified months? </div>

BAM Candidate Species Report

<i>Rhodamnia rubescens</i> Scrub Turpentine	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input checked="" type="checkbox"/> May <input type="checkbox"/> Jun <input checked="" type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Rutidosis heterogama</i> Heath Wrinklewort	No (surveyed)	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input type="checkbox"/> Jun <input checked="" type="checkbox"/> Jul <input type="checkbox"/> Aug <input checked="" type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec <input type="checkbox"/> Survey month outside the specified months?
<i>Tyto novaehollandiae</i> Masked Owl	No (surveyed) *Survey months are outside of the months specified in Bionet.	<input type="checkbox"/> Jan <input type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr <input type="checkbox"/> May <input checked="" type="checkbox"/> Jun <input type="checkbox"/> Jul <input checked="" type="checkbox"/> Aug <input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec <input checked="" type="checkbox"/> Survey month outside the specified months?

Threatened species Manually Added

Common Name	Scientific Name
White-flowered Wax Plant	Cynanchum elegans

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Grey-headed Flying-fox	Pteropus poliocephalus	Habitat constraints
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat constraints
Large-eared Pied Bat	Chalinolobus dwyeri	Habitat constraints
Little Bent-winged Bat	Miniopterus australis	Habitat constraints
Red Helmet Orchid	Corybas dowlingii	Refer to BAR
Regent Honeyeater	Anthochaera phrygia	Habitat constraints
South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	Refer to BAR
Swift Parrot	Lathamus discolor	Habitat constraints

White-bellied Sea-Eagle	Haliaeetus leucogaster	Habitat constraints
-------------------------	------------------------	---------------------

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00040132/BAAS18020/23/00040133	Hanleys Creek New PCT	28/10/2024
Assessor Name	Report Created	BAM Data version *
Sarah Elizabeth Jones	03/12/2024	Current classification (live - default) (80)
Assessor Number	Assessment Type	BAM Case Status
BAAS18020	Part 4 Developments (General)	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
5	BOS Threshold: Area clearing threshold	03/12/2024

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

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)
Black Bittern	<i>Ixobrychus flavicollis</i>	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Black-chinned Honeyeater (eastern subspecies)	<i>Melithreptus gularis gularis</i>	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Brown Treecreeper (eastern subspecies)	<i>Climacteris picumnus victoriae</i>	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Diamond Firetail	<i>Stagonopleura guttata</i>	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Dusky Woodswallow	<i>Artamus cyanopterus cyanopterus</i>	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Eastern Coastal Free-tailed Bat	<i>Micronomus norfolkensis</i>	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Flame Robin	<i>Petroica phoenicea</i>	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Gang-gang Cockatoo	<i>Callocephalon fimbriatum</i>	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest

BAM Predicted Species Report

Grey-crowned Babbler (eastern subspecies)	Pomatostomus temporalis temporalis	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Grey-headed Flying-fox	Pteropus poliocephalus	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Large Bent-winged Bat	Miniopterus orianae oceanensis	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Little Bent-winged Bat	Miniopterus australis	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Little Eagle	Hieraaetus morphnoides	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Little Lorikeet	Glossopsitta pusilla	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
New Holland Mouse	Pseudomys novaehollandiae	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Regent Honeyeater	Anthochaera phrygia	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Scarlet Robin	Petroica boodang	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Speckled Warbler	Chthonicola sagittata	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Spotted Harrier	Circus assimilis	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Spotted-tailed Quoll	Dasyurus maculatus	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Square-tailed Kite	Lophoictinia isura	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Swift Parrot	Lathamus discolor	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Turquoise Parrot	Neophema pulchella	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Varied Sittella	Daphoenositta chrysoptera	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
White-bellied Sea-Eagle	Haliaeetus leucogaster	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
White-throated Needletail	Hirundapus caudacutus	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest
Yellow-bellied Sheath-tail-bat	Saccolaimus flaviventris	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest

Threatened species Manually Added

None added



BAM Predicted Species Report

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
-------------	-----------------	----------------------------



BAM Vegetation Zones Report

Proposal Details

Assessment Id	Assessment name	BAM data last updated *
00040132/BAAS18020/23/00040133	Hanleys Creek New PCT	28/10/2024
Assessor Name	Report Created	BAM Data version *
Sarah Elizabeth Jones	03/12/2024	Current classification (live - default) (80)
Assessor Number	Assessment Type	BAM Case Status
BAAS18020	Part 4 Developments (General)	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
5	BOS Threshold: Area clearing threshold	03/12/2024

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

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	3446_VZ1_Stage2	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest	VZ1_Stage2	0.58	1	

BAM Vegetation Zones Report

2	3446_VZ1_Stage3	3446-Lower North Foothills Ironbark-Box-Gum Grassy Forest	VZ1_Stage3	5.26	3	
---	-----------------	---	------------	------	---	--



Appendix I: Koala Assessment Report

Appendix I: Koala Assessment Report



KOALA ASSESSMENT REPORT

FOR A
A PROPOSED RESIDENTIAL
SUBDIVISION
AT
HANLEYS CREEK ROAD,
DUNGOG 2420

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:	Hanleys Creek Road, Dungog (Lot 32 DP 1282790)
Prepared by:	<i>Sarah Jones B.Env.Sc., G.Dip.DBPA (Design in Bushfire Prone Areas) Firebird ecoSultants Pty Ltd</i> ABN – 16 105 985 993 PO Box 354, Newcastle NSW 2300 M: 0414 465 990 Email: sarah@firebirdeco.com.au T: 02 4910 3939 Fax: 02 4929 2727
Prepared for:	John Lidbury
Reference No.	Dungog – John Lidbury
Document Status & Date:	Version 1: 20/12/2023 – Sarah Jones Version 2: 21/11/2024 – Sarah Jones



CONTENTS

1	INTRODUCTION	4
1.1	Site Particulars	4
1.2	Description of the Proposal	7
1.3	How the SEPP applies to the Proposal	7
1.4	Aims of the SEPP	8
1.5	Planning Principles of the Koala Habitat Protection SEPP	9
2	KOALA HABITAT VALUES	10
2.1	Site Description and Development Footprint	10
2.1.1	Site Description	10
2.1.2	Development Footprint	10
2.1.3	Site Condition	11
2.2	Koala Habitat within the Site and Local Area	12
2.2.1	Koala Development Application Map & the SEPP	
2.2.2	Koala Habitat Suitability Model	13
2.2.3	Koala Tree Suitability Index	15
2.2.4	Koala Likelihood Map and Koala Likelihood Confidence Map	16
2.2.5	Native Vegetation of NSW	19
2.2.6	Areas of regional koala significance (ARKS)	21
2.2.7	Koala sightings recorded in NSW BioNet.	22
2.2.8	Corridors and Connectivity	26
2.3	Summary of Koala Habitat Values	28
2.4	Importance of the site area to a local Koala population	29
3	IMPACT AVOIDANCE	31
3.1	Site Selection	31
3.2	Avoid and Minimise Impacts on Koala Habitat	31
4	IMPACT ASSESSMENT	33
4.1	Direct Impacts	33
4.2	Indirect Impacts	33
4.3	Existing Impacts	33
4.4	Assessment of Impacts	34
5	MANAGEMENT MEASURES	35
5.1	Management Measures	35
5.2	Compensatory Measures	36
6	REFERENCES	37
APPENDIX A QUALIFICATIONS		A-1
APPENDIX B KOALA HABITAT PROTECTION GUIDELINE		B-1



FIGURES

Figure 1-1: Site Location	5
Figure 1-2: Development Footprint	5
Figure 2-1: Koala Habitat Suitability Model (KHSM) of NSW (DPIE 2019)	13
Figure 2-2: Koala Tree Index v1.0 of NSW (DPIE 2019)	15
Figure 2-3: Areas of regional koala significance near the site (SEED)	22



I INTRODUCTION

Firebird ecoSultants Pty Ltd has been engaged by John Lidbury to provide a Koala Assessment for a proposed residential subdivision ('the proposal') and associated infrastructure at Hanleys Creek Road, Dungog (Lot 32 DP 1282790), ('the site' or 'the subject site').

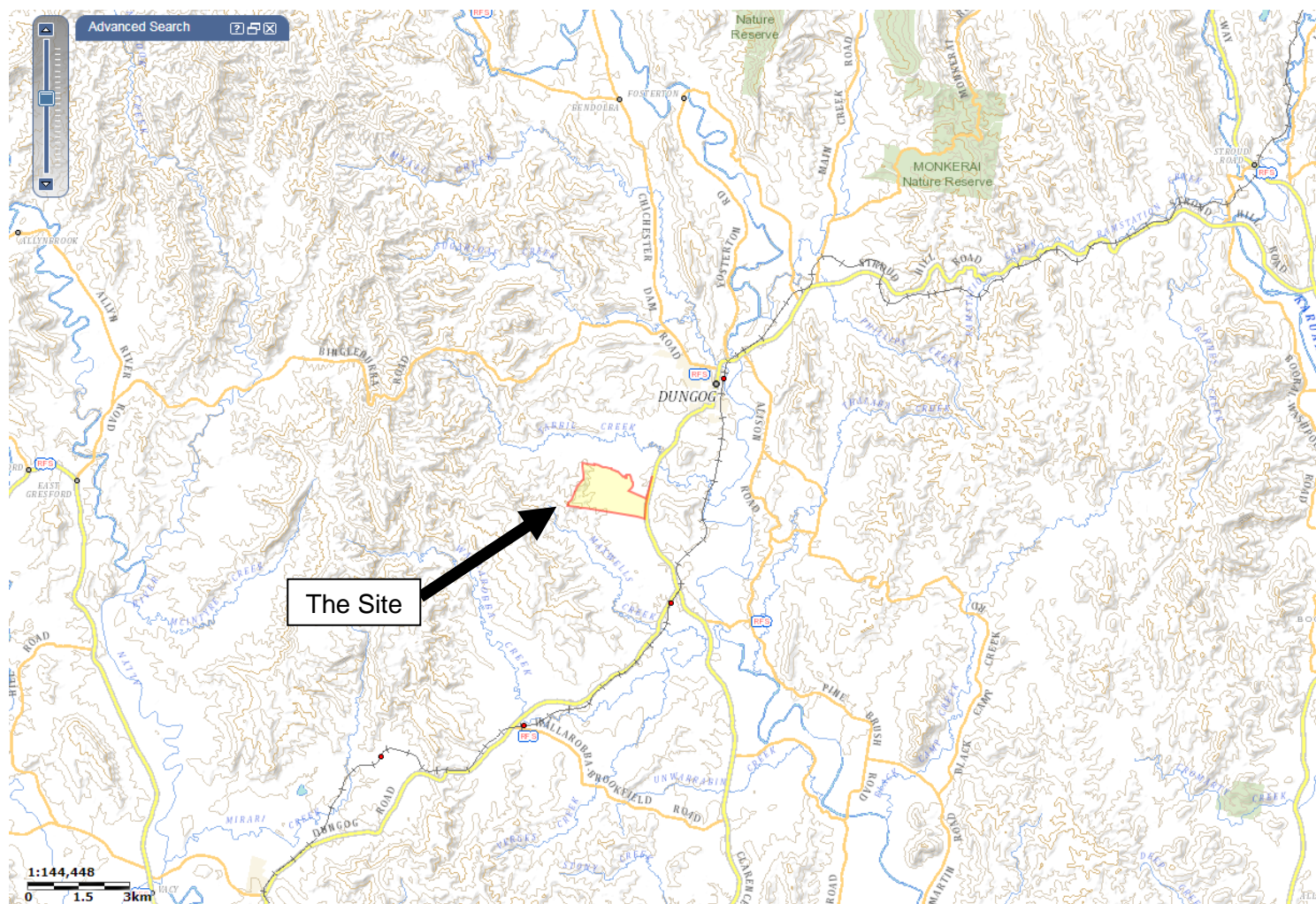
It was determined in the Koala assessment that the proposal must be assessed as a Tier 2 development application under the Chapter 4 - Koala Habitat Protection 2021 Assessment of State Environmental Planning Policy (Biodiversity Conservation) 2021 which requires a Koala Assessment Report. This Koala Assessment Report aims to address the criteria outlined in section 3.2 of the *Koala Habitat Protection Guideline* (DPIE March 2020).

I.1 Site Particulars

Locality:	Hanleys Creek Road, Dungog
LGA:	Cessnock
Lot / DP:	Lot 32 DP 1282790
IBRA Region	NSW North Coast
IBRA Subregion	Upper Hunter
Mitchell Landscape	Scone – Gloucester Foothills
Land size:	~238ha
Zoning:	RU1 – Primary Production
Current Land Use:	Existing dwelling and forest native vegetation

Refer to Figure 1-1 for the general location of the site and Figure 1-2 for the development footprint.

Figure 1-1: Site Location



Legend

Subject Site

Development Footprint

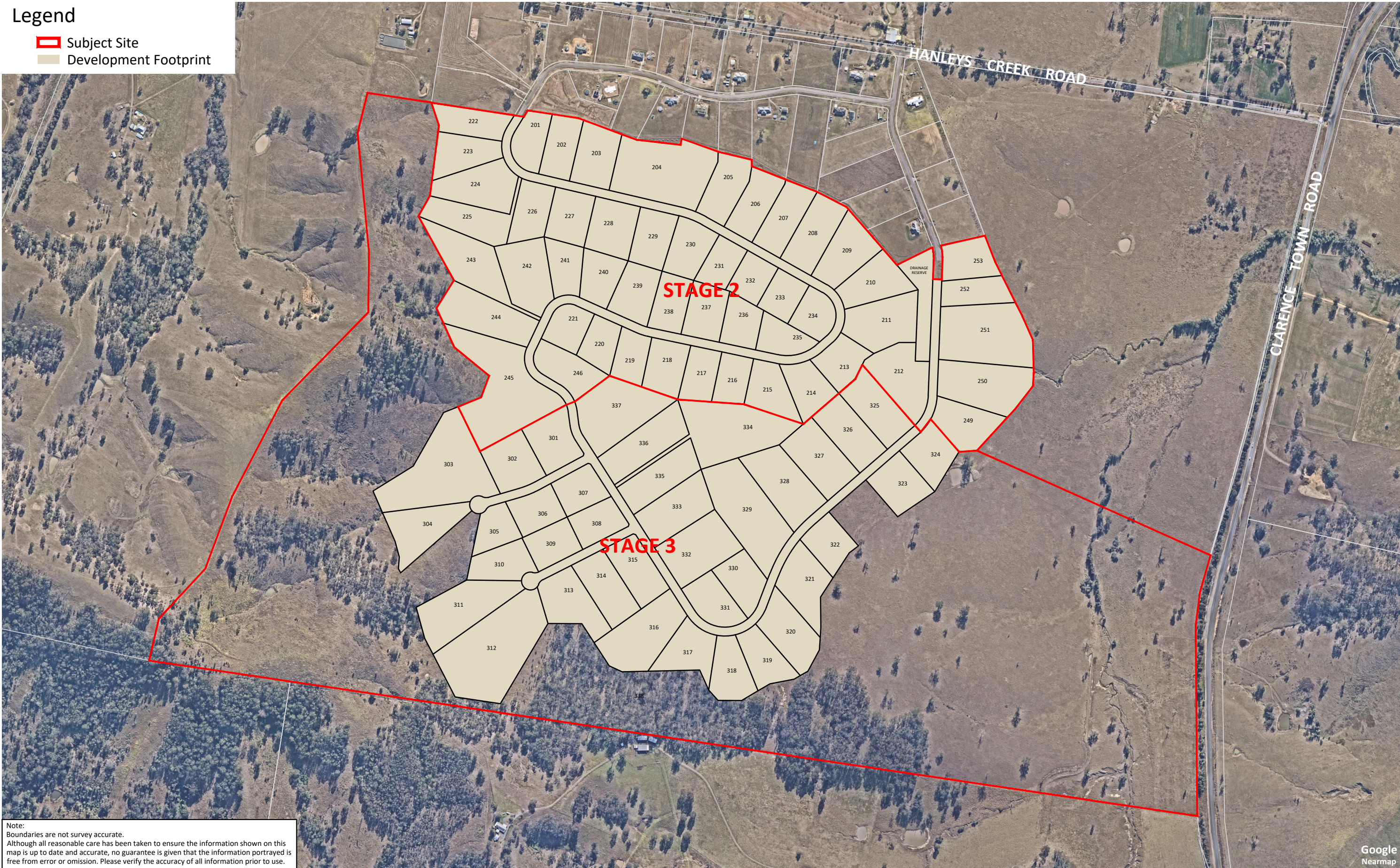
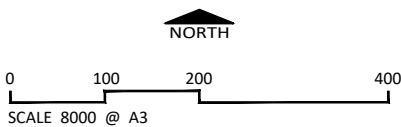


FIGURE 1-2:DEVELOPMENT LAYOUT



I.2 Description of the Proposal

The proposal includes a 1 into 88 lot Torrens Title residential subdivision which makes up Stage 2 and 3 of the Hanley Creek Road rural lifestyle development. The subdivision will provide development space for the construction of 88 dwellings as well as associated infrastructure such as site access, services and asset protection zones (APZ).

The proposed lots range in size from 455 m² to 1428 m². Stages 2 and 3 of the Hanley Creek Road residential subdivision will be the final stages of the development and the subject of this application (refer to Figure 1-2).

The site is located in a rural area south-west of Dungog and totals an area of ~238 ha. The site is zoned as RU1 Primary Production. The site is predominantly covered in exotic pasture grasses with scattered remnant native trees. A patch of regenerating forest occurs adjacent to the southern boundary of the site. Four (4) drainage canals occur from Cangoon Creek, which pass through the north of the site. These canals drain through the site to toward the south. They are classed as 1st and 2nd order watercourses (in accordance with the Strahler stream ordering system in Appendix 3 of the BAM). The site is surrounded by similar rural land with large open areas of exotic pasture and patches of remnant forest. The site does not contain important mapped areas for threatened species or any mapped biodiversity values. Despite adequate surveying, no threatened species were located on the site.

I.3 How the SEPP applies to the Proposal

The *Koala Habitat Protection SEPP 2020* applies to rural zoned land (RU1 Primary Production, RU2 Rural Landscape and RU3 Forestry) within 74 local government areas (LGAs) including the Dungog LGA which is within the Central Coast Management Area as defined in Schedule 1 of the SEPP.

The development control provisions of the SEPP apply to development applications relating to land within a council area;

- Where there is an approved Koala Plan of Management for the land
 - The development application must be consistent with the approved koala plan of management that applies to the land.
- Where there is no approved Koala Plan of Management for the land, if the land
 - Is identified on the Koala Development Application Map; and
 - Has an area of more than 1 hectare; or



- Has, together with any adjoining land in the same ownership, an area of more than 1 hectare, whether or not the development application applies to the whole, or only part, of the land.

The site is mapped on the Koala Development Application Map and is greater than 1 hectare in area, therefore further assessment under the SEPP is required.

The proposed development does not meet the criteria to be assessed under the Tier 1 process as outlined in section 3.1 of the *Koala Habitat Protection Guideline* (DPIE 2020). As such a Koala Assessment Report is required which aims to address the criteria of a Tier 2 development application against each of the seven planning principles as defined in section 3.2 of the *Koala Habitat Protection Guideline* (DPIE 2020). The Koala Assessment Report has been prepared by a suitably qualified and experienced person. Refer to Appendix A for qualifications.

I.4 Aims of the SEPP

The aim of the SEPP is to “... encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline” (DPIE 2020).

The aim of the policy will be achieved through this report by:

- Defining what constitutes core koala habitat.
- Outlining the circumstances where a consent authority must have regard to the matters set out in the guideline.
- Encouraging the development of Koala Plans of Management (KPoMs). These plans provide the best opportunity to deliver strategic conservation outcomes for koala populations in NSW. They play a critical role in helping to understand koala values at a landscape scale and avoiding the types of issues that can arise through site-based, incremental impacts, such as the loss of important habitat linkages, or intensifying land use within areas that are likely to lead to population decline.
- Requiring that a consent authority’s determination of a development application is consistent with a KPoM or Part 3 of this Guideline where there is no KPoM.

I.5 Planning Principles of the Koala Habitat Protection SEPP

The *Koala Habitat Protection Guideline* (DPIE 2020) outlines seven key planning principles which help to define the criteria and requirements of the report. The seven key planning principles are as follows;

1. Understand and identify koala habitat values including landscape connectivity (such as habitat extent and habitat linking areas).
2. Avoid inappropriate land uses or intensifying land uses in koala habitat areas through appropriate landscape planning and site selection.
3. Encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas.
4. Minimise potential impacts to koalas and their habitat through design that avoids fragmentation or direct loss of koala habitat, and maintains the function of the koala habitat.
5. Implement best practice measures to manage identified threats to koalas and their habitat (such as those listed in Part 3).
6. Use compensatory (i.e., offsetting) measures only where they can be shown to meet the aim of the SEPP.
7. Use adaptive management strategies to monitor, evaluate and deliver appropriate planning outcomes for koalas in their local setting.

2 KOALA HABITAT VALUES

Section 2 of this report aims to address criteria 1 and 2 of a Tier 2 development application as defined in section 3.2 of the Koala Habitat Protection Guideline. Refer to Appendix B for the Koala Habitat Protection Guideline.

2.1 Site Description and Development Footprint

2.1.1 Site Description

The site is located in a rural area 4km south-west of Dungog and totals 238 ha with a proposed development area of ~129.2 ha that includes both native trees and exotic grasslands. The site is zoned as RU1 Primary Production. The site is surrounded by similar rural land with large open areas of exotic pasture and patches of regenerating forest. The site does not contain important mapped areas for threatened species or any mapped biodiversity values. The site is zoned as RU1 Primary Production.

2.1.2 Development Footprint

The proposal includes a Torrens title subdivision (1 lots into 88 residential lots) on Hanley Creek Road to provide development space for the construction of 88 dwellings as well as associated infrastructure such as site access, services and asset protection zones (APZ). The proposed lots ranging in size from 455 m² to 1428 m². The proposed development footprint totals an area of 129.2ha. Stages 2 and 3 of the Hanley Creek Road residential subdivision will be the final stage of the development and are the subject of the application. 4.7 ha of native vegetation will be selectively cleared to facilitate the subject development. Both hollow bearing trees and koala feed trees are to be avoided where possible. 6.5 ha of vegetation around the site's western boundaries is to be retained within the sites designated conservation area. The majority of the sites koala feed trees are located within the designated conservation areas.

A site assessment by a qualified ecologist occurred on the 29 June 2023 to confirm that there would be no impacts on Koalas or koala habitat as a result of the proposal. Targeted surveys for koala were repeated in September 2024, using the Spot Assessment Technique (SAT) in accordance with DPE (2022) Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide, as follows:

A central tree was located and marked. Moving outwards from the centre tree, 29 of the nearest trees (in suitable habitat) were identified.

- A radial search for koala scats was undertaken beneath each of the 30 trees, within a prescribed search area extending 1 m from the base of each tree. Scat search effort was a minimum of two person-minutes for each tree.

- A total of 3 SAT surveys were undertaken. Considering that the impact area is 4.7 ha, this would satisfy the minimum effort when dividing the approx. number of ha by 2.25 as stated in DPE (2022). SAT locations were also spaced out in accordance with



the 150 m grid spacing requirement in DPE (2022). This survey method was combined with additional spotlighting in September 2024. No evidence of koalas was identified from these targeted surveys. The site inspections concluded that the proposed development would not have a significant impact on koalas or koala habitat.

2.1.3 Site Condition

The development footprint has largely been located in the centre of the site, which is predominately covered by exotic pasture grasses and weeds. A patch of regenerating forest occurs adjacent to the southern boundary of the site. Four (4) drainage canals occur from Cangon Creek, which pass through the north of the site. These canals drain through the site to toward the south. They are classed as 1st and 2nd order watercourses (in accordance with the Strahler stream ordering system in Appendix 3 of the BAM). The site is surrounded by similar rural land with large open areas of exotic pasture and patches of remnant forest. The site does not contain important mapped areas for threatened species or any mapped biodiversity values. Despite adequate surveying, no threatened species were located on the site.



Koala Habitat within the Site and Local Area

As part of the NSW Koala Strategy, DPIE (NSW Department of Planning, Industry and Environment) have developed the first statewide Koala Habitat Information Base which provides statewide spatial data on koala habitat, likelihood, koala preferred trees and koala sightings for New South Wales. The Koala Habitat Information Base is made up of several layers of spatial information. These include:

- The Koala Habitat Suitability Model – predicts the probability of finding koala habitat at any location
- The Koala Tree Suitability Index – indicates the probability of finding a tree species that koalas are known to use for food or shelter
- Koala Likelihood Map and Koala Likelihood Confidence Map – predicts the likelihood of finding a koala at a location
- Areas of regional koala significance (ARKS) – identify regions mapped as having key koala populations with potential for long-term viability
- Native Vegetation of NSW – a high precision (5-metre scale) surface that discriminates between native tree cover, non-native vegetation, urban environments and water bodies.
- Koala sightings recorded in NSW BioNet.

The Koala Habitat Information Base, along with the Koala Development Application map, have been used to determine the overall importance of the site area to a local Koala population.

2.1.4 Koala Habitat Suitability Model

The Koala Habitat Suitability Model (KHSM) predicts the spatial distribution of potential koala habitat across NSW using a value between 0 and 1 (i.e. a higher value represents a higher probability that a specific location will contain habitat suitable for koalas) (DPIE 2019). See Figure 2-2 below for Koala Habitat Suitability in NSW.

Vegetation within the site as well as vegetation further to the north and east is mapped as low – moderate Koala habitat suitability. However, vegetation immediately to the site's south and west is mapped as relatively high Koala habitat suitability. Refer to Figure 2-3 for Koala Habitat Suitability within the site.

Figure 2-1: Koala Habitat Suitability Model (KHSM) of NSW (DPIE 2019)

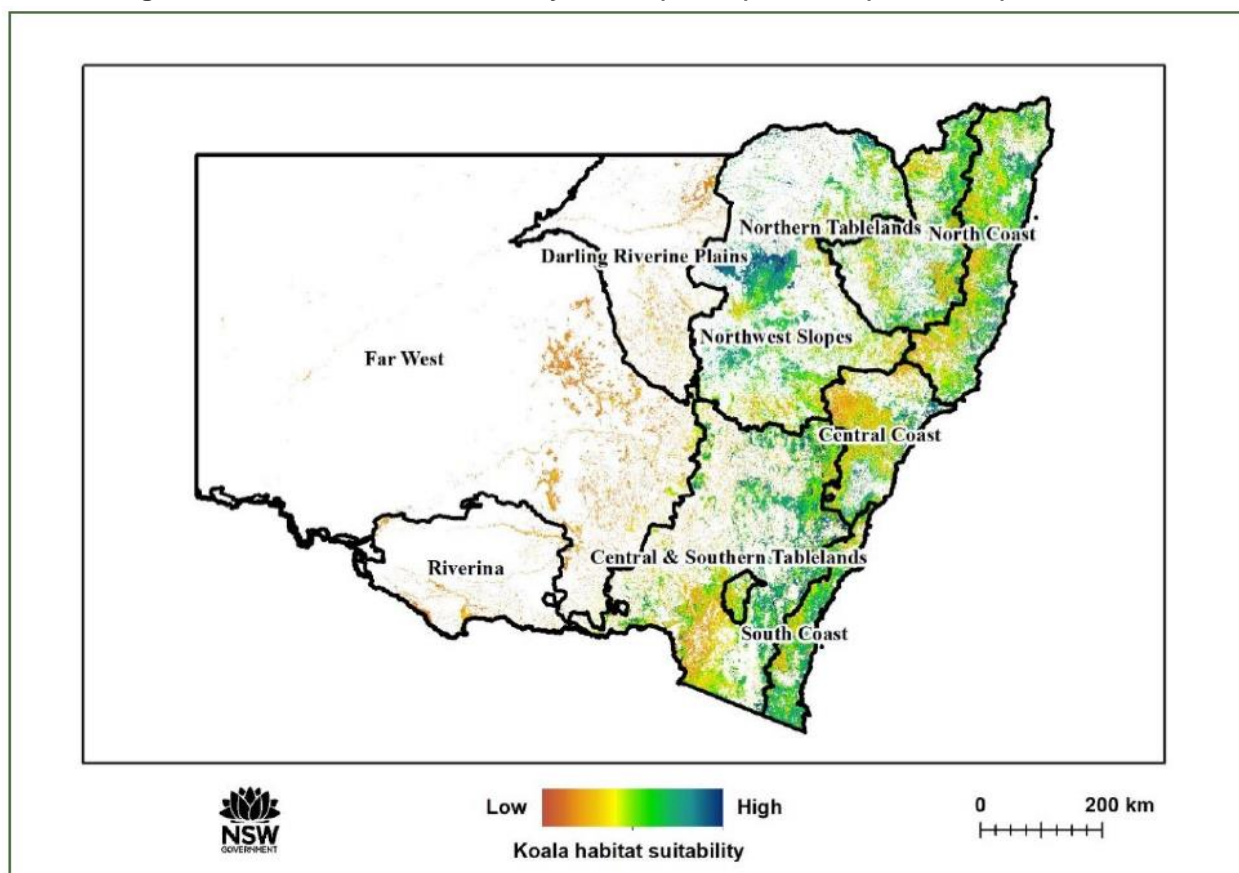
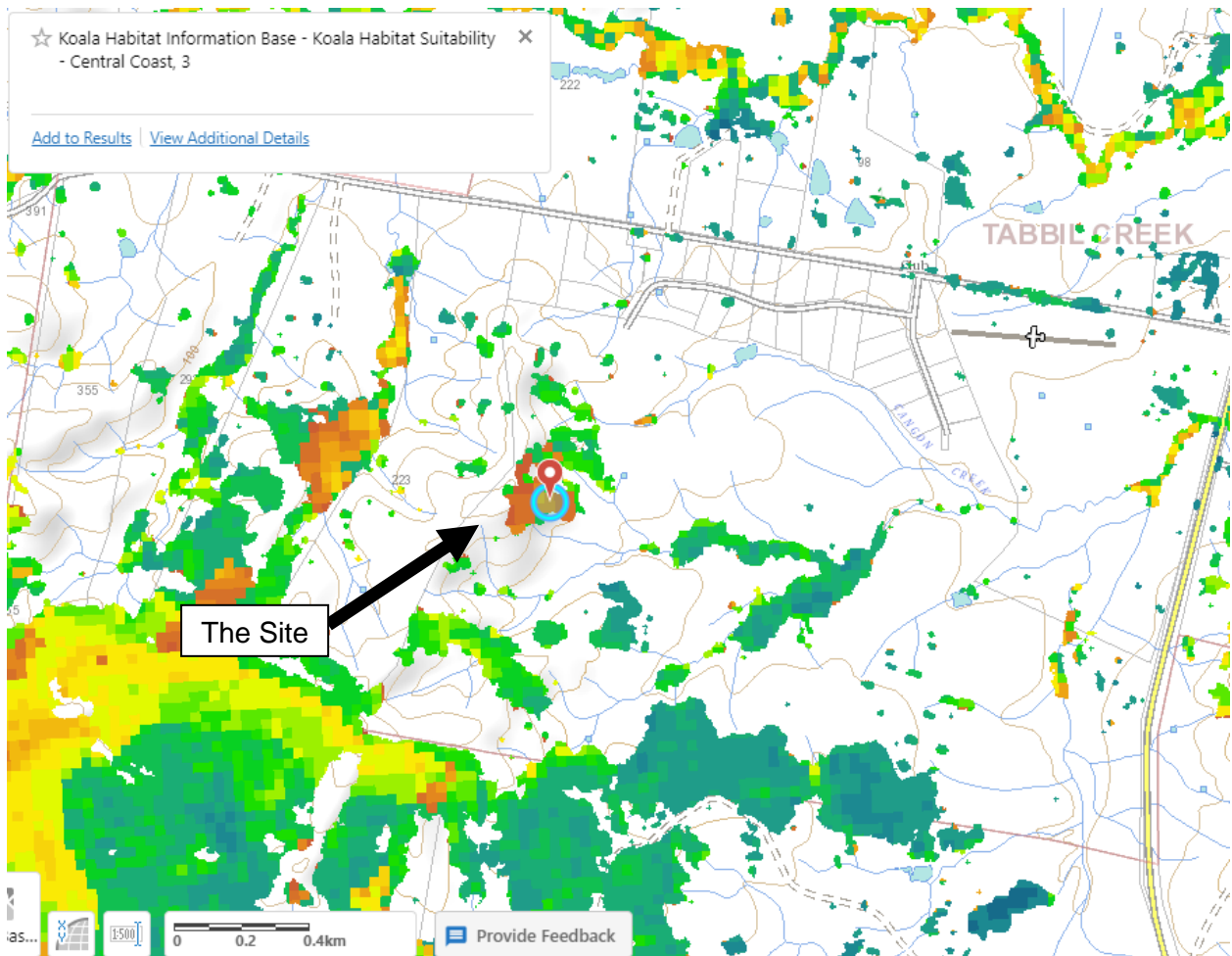


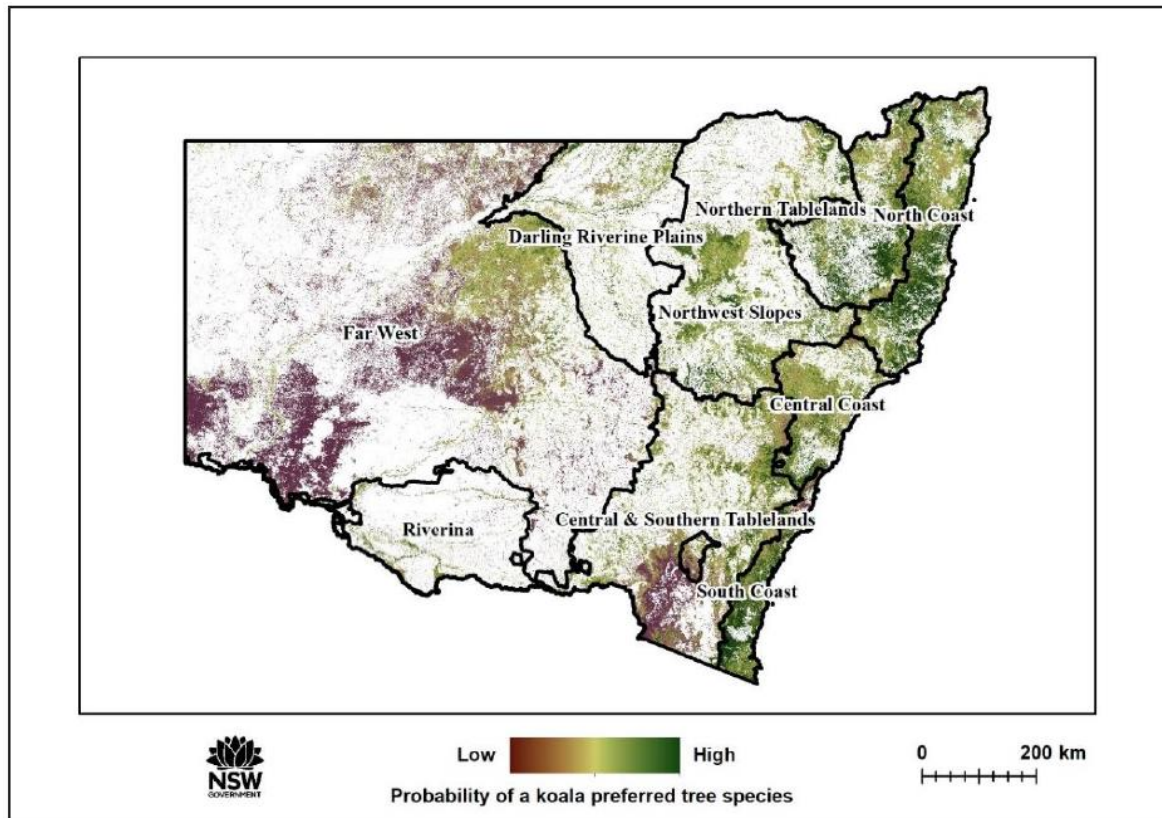
Figure 2-3: Koala Habitat Suitability Model (KHSM) of subject site (DPIE 2019)



2.1.5 Koala Tree Suitability Index

The Koala Tree Index (KTI) predicts the probability, using a value between 0 and 1, of finding a tree species that koalas are known to prefer for food or shelter at any location (DPIE 2019). See Figure 2-4 below for State-wide map illustrating the Koala Tree Index v1.0 for each region.

Figure 2-2: Koala Tree Index v1.0 of NSW (DPIE 2019)



2.1.6 Koala Likelihood Map and Koala Likelihood Confidence Map

The Koala Likelihood Map (KLM) predicts the likelihood of finding a koala across a 10-square-kilometre grid covering NSW, based on available arboreal mammal records from the past 20 years. Each grid cell is assigned a value for the likelihood of koalas (p) based on a binomial distribution with each record being a koala (K) or another arboreal mammal. The proportion of all records within a cell (N) (all subject species including koalas) that are koalas represents the likelihood: $p = K/N$. This provides the relative likelihood of koalas being recorded, with a value between 0 (no koalas) and 1; i.e. a higher value represents a higher relative likelihood. See Figure 2-6 below for the Koala Likelihood Map (Likelihood Layer) of NSW.

In addition to the likelihood layer, the Koala Likelihood Map also includes a confidence layer representing the relative confidence in the koala likelihood estimates. Each cell is assigned a relative confidence level (high, moderate or low) for p based on the exact 95% confidence interval. See Figure 2-8 below for the Koala Likelihood Map (Confidence Layer) of NSW.

The above information was sourced from the Koala Habitat Information Base Technical Guide (DPIE 2019).

The site and surrounding area have been mapped as having a low likelihood of Koala occurrence (Likelihood = 0.00 – 0.25) with a high degree of confidence on the Koala Likelihood Map (see Figures 2-5 and 2-6 below).

Figure 2-5: Koala Likelihood Map (Likelihood Layer) of NSW (DPIE 2019)

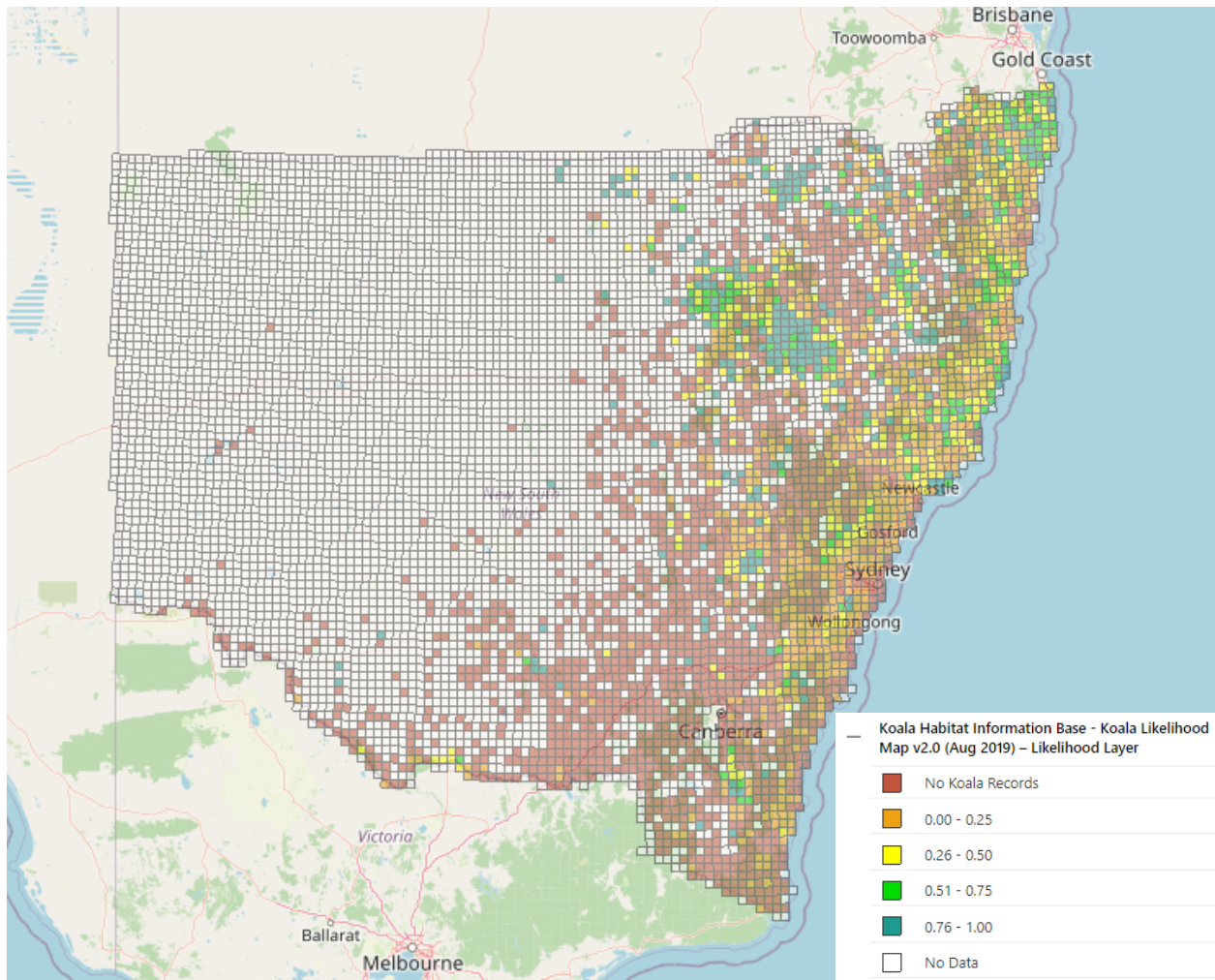
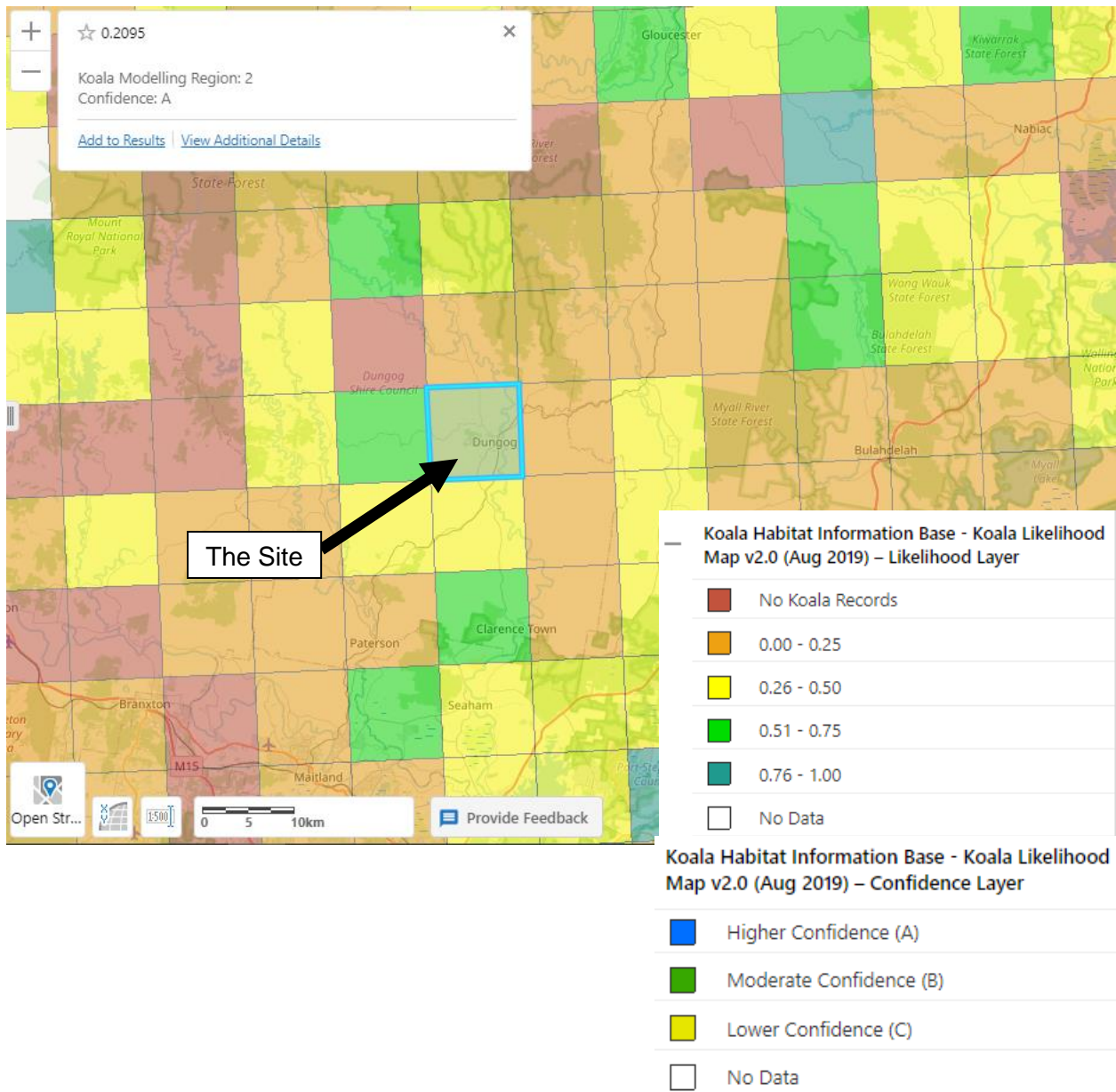


Figure 2-6: Extract of the Koala Likelihood Map (Likelihood Layer) of the site (SEED)



2.1.7 Native Vegetation of NSW

The vegetation extent of NSW spatial layer “combines the best available information on the extent of vegetation in NSW. This provides an important ecological map to identify tree cover from other terrain elements. It is mapped at a scale (5 metres) that individual tree crowns are delineated in addition to contiguous tree cover. It is based on the 2011, 5-metre NSW Woody Vegetation Extent with updates based on high-resolution imagery interpretation. Candidate native grasslands have also been mapped using visual interpretation of high-resolution imagery. The layer also delineates softwood forest plantations and water bodies” (DPIE 2019). See Figure 2-7 below for extent of native vegetation across NSW.

The vegetation within the site contains primarily candidate native grassland with tree cover and tree cover matrix scattered throughout the southern area of the site and growing in density. See Figure 2-8 below for native vegetation extent across the site.

Figure 2-7: Map illustrating the extent of native vegetation across NSW (DPIE 2019)

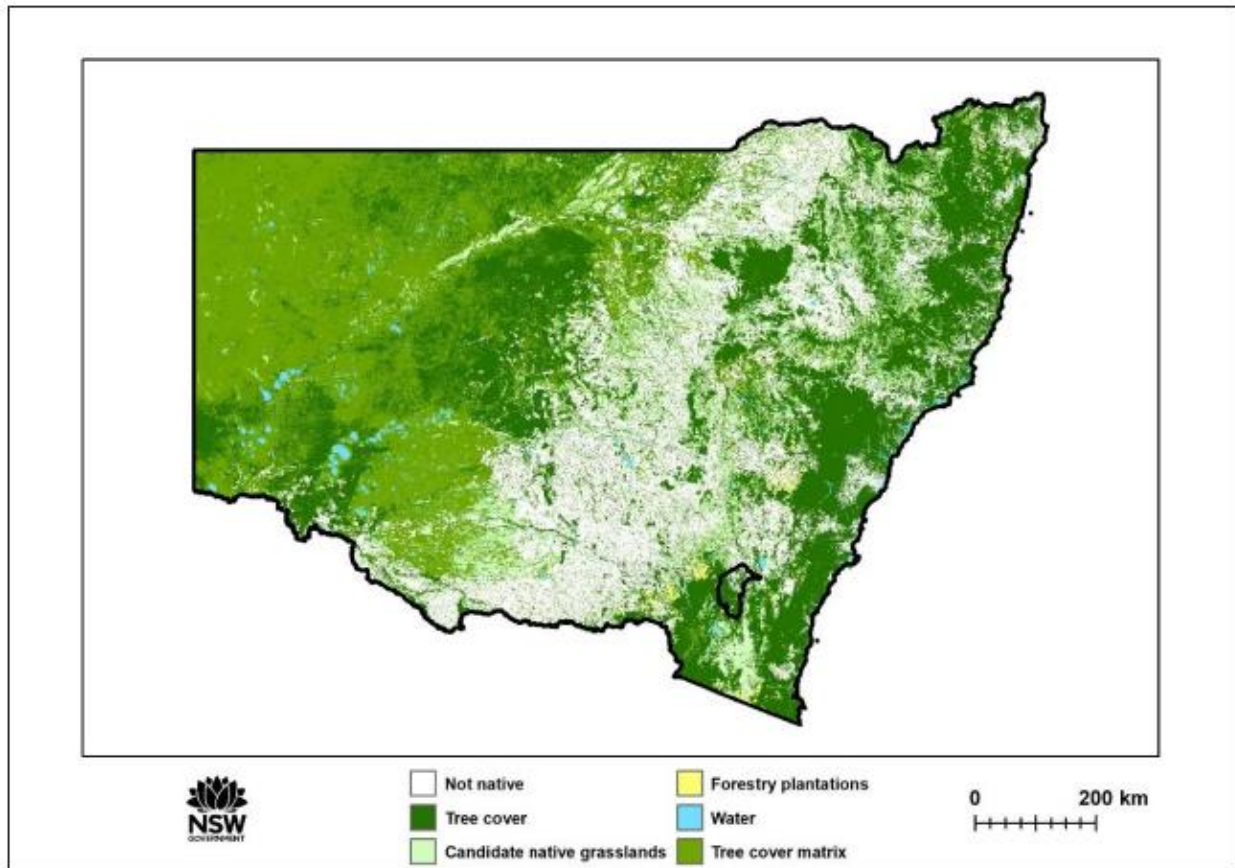
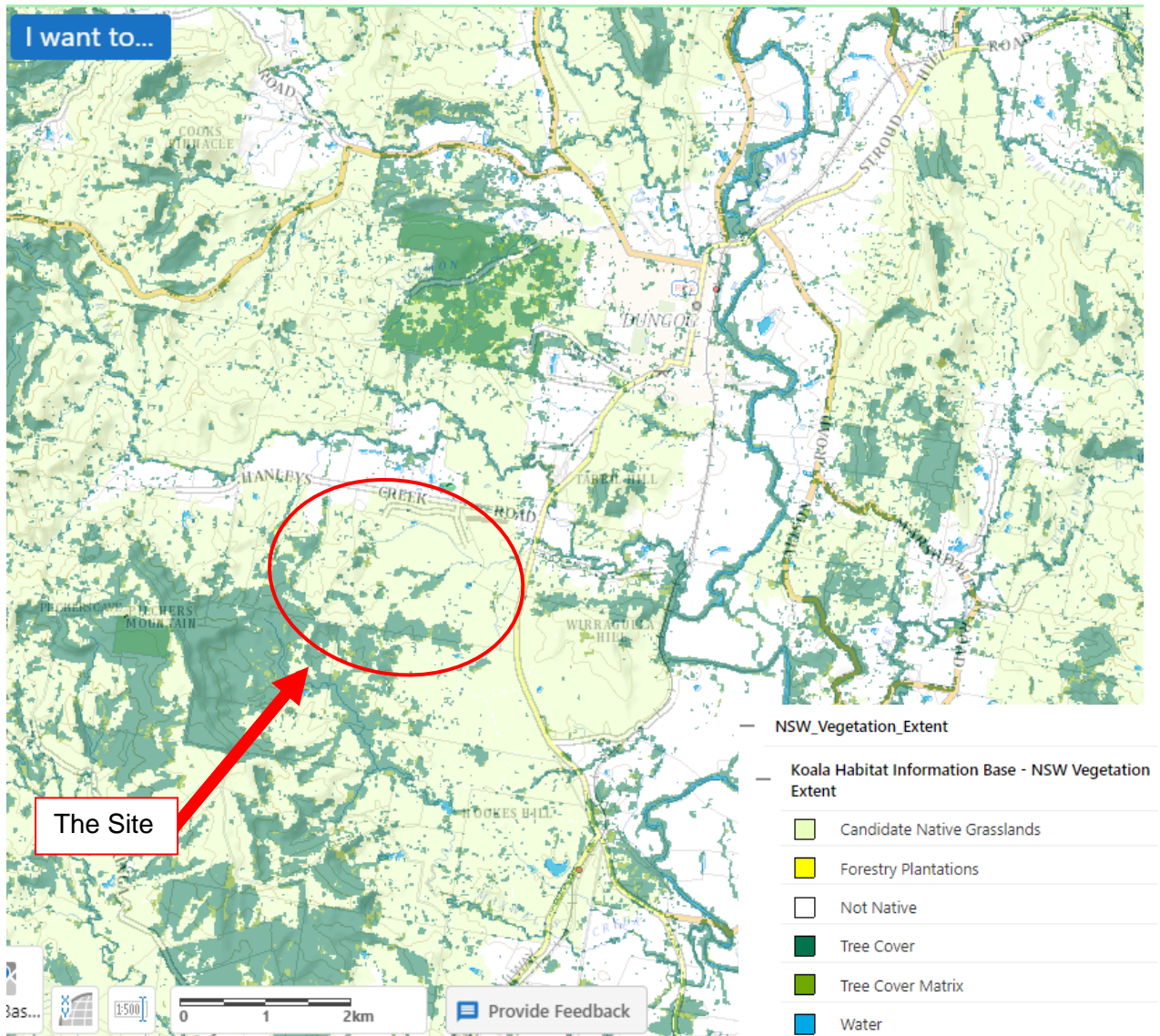


Figure 2-8: Extent of native vegetation within the site (SEED)



2.1.8 Areas of regional koala significance (ARKS)

Areas of regional koala significance (ARKS) use information on koala occurrence to identify key koala populations and management areas with potential for long-term viability. They also identify priority threats to key koala populations at the regional scale (DPIE 2019). See Figure 2-12 below for Areas of regional koala significance in NSW.

Less than half the site is mapped as containing regional koala significance (see Figure 2-9 and Figure 2-10 below). A narrow strip of regional koala significance passes around Dungog and into the eastern area of the subject site. The proposal will not impede Koalas from traversing through the site or travelling between these areas (see section 2.2.7).

Figure 2-9: Areas of regional koala significance in NSW (DPIE 2019)

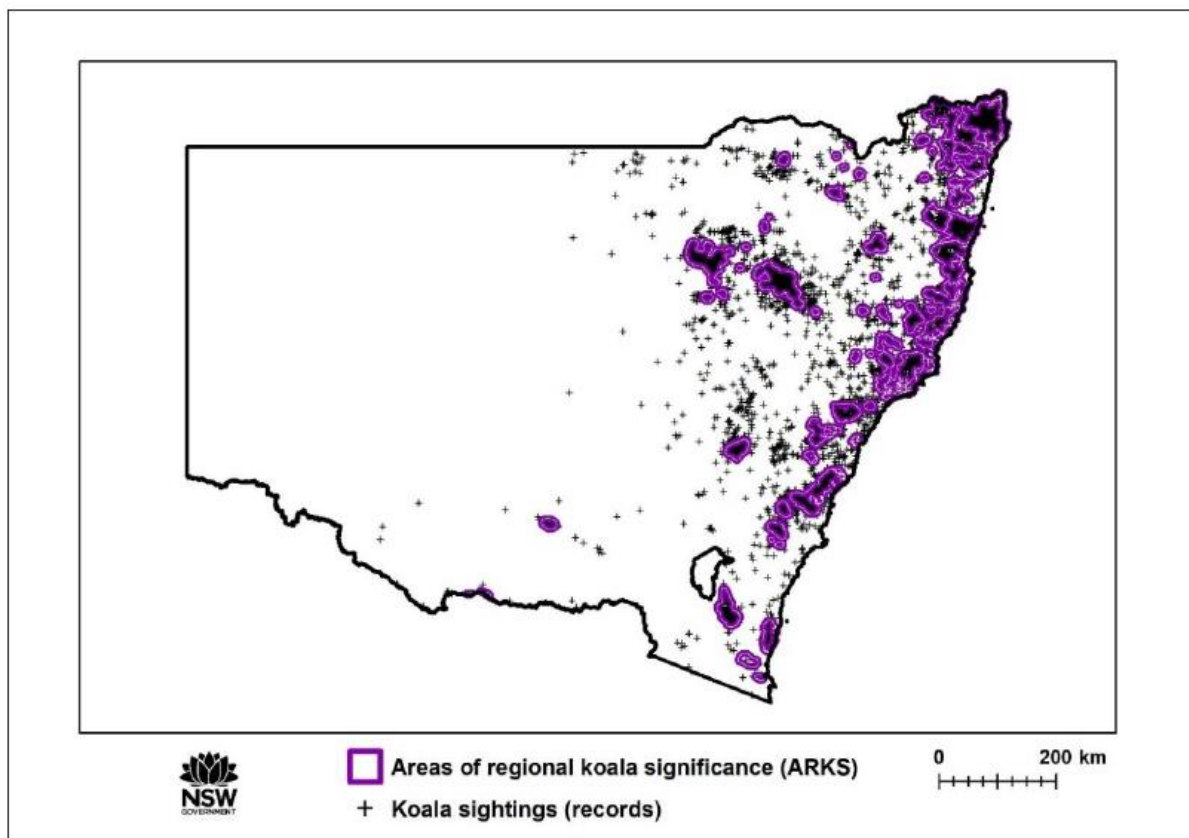
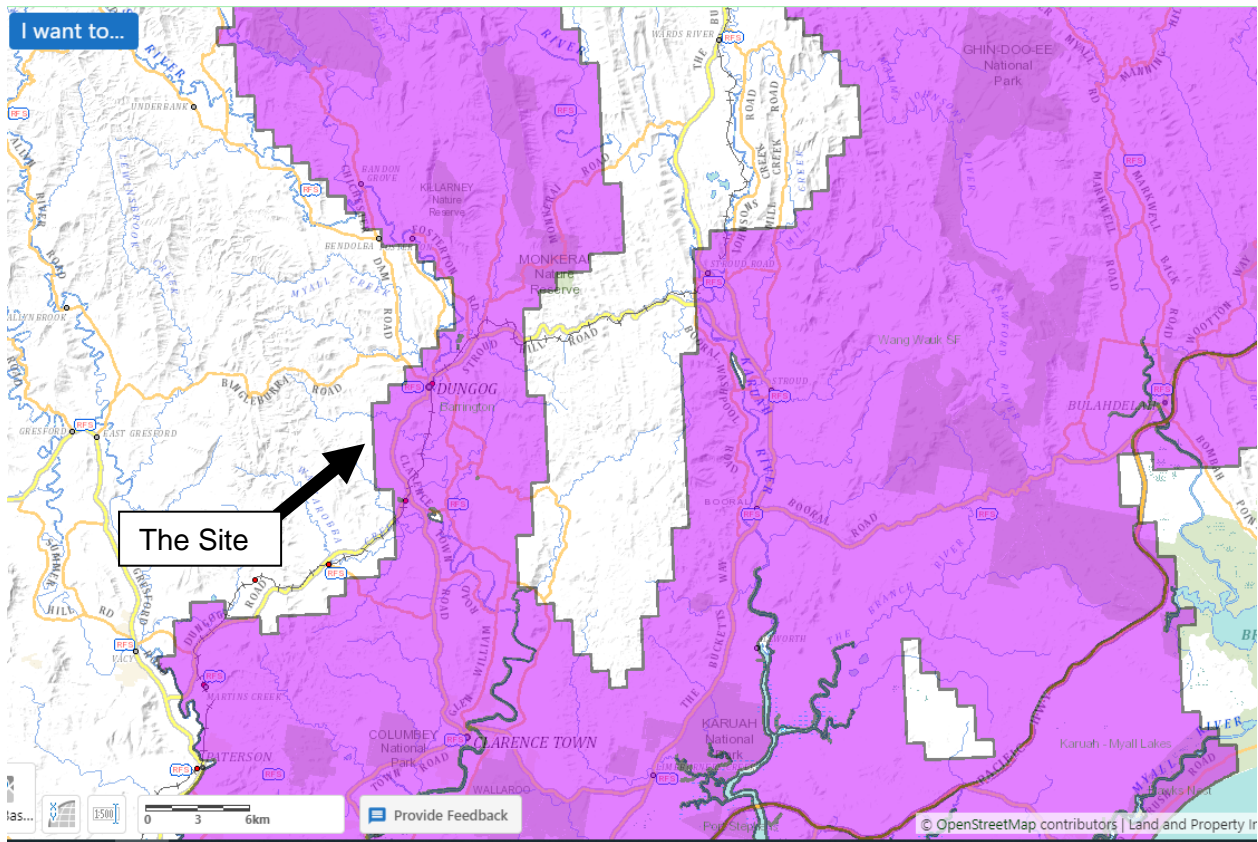


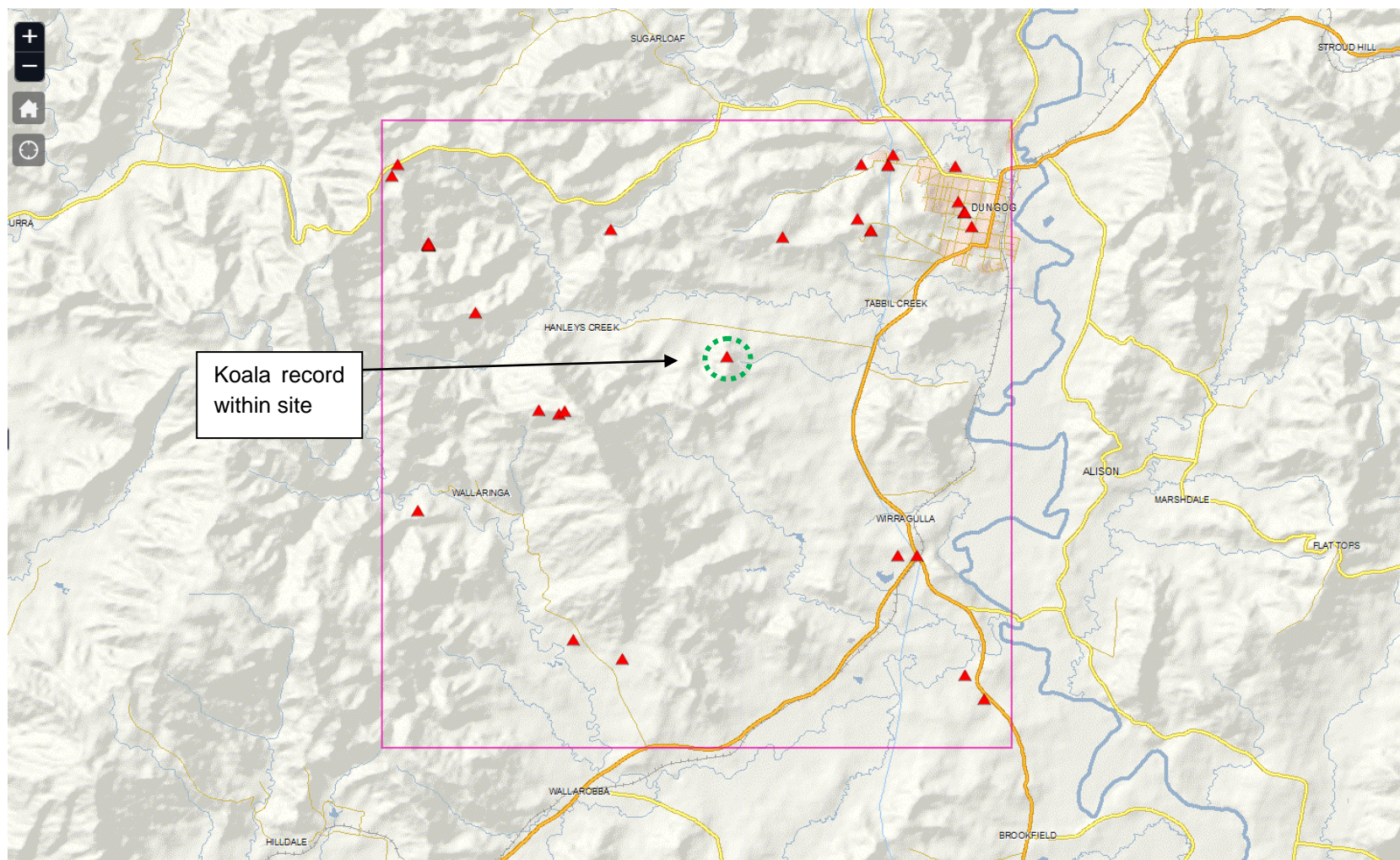
Figure 2-3: Areas of regional koala significance near the site (SEED)



2.1.9 Koala sightings recorded in NSW BioNet.

There is one (1) Koala record (latest record from 2004) listed by BioNet Atlas within the subject site amongst 26 others within a 10km radius of the site ranging from the 1980's to recent years with the vast majority of records occurring in a close proximity to Dungog. See Figure 2-15 below for all BioNet records for Koalas in a 10km radius of the site.

Figure 2-15: BioNet records within 10 km of the subject site





2.1.10 Corridors and Connectivity

The site's native vegetation is one of many patches of regenerating forest in the Dungog area. Hanleys Creek and the surrounding areas have been extensively cleared for agricultural purposes. The nearest relatively large area of intact bushland occurs ~4.1 km to the west of the site.

Movement corridors and habitat connectivity has been maintained within the site by conserving 6.5 ha of vegetation within the site's conservation areas and 14.7 ha of native vegetation within the site.

See Figures 2-16 for a snapshot of surrounding habitat and connectivity.



2.2 Summary of Koala Habitat Values

The following summarises the site's Koala habitat value based on information obtained from the Koala Habitat Information Base, BioNet and Nearmap satellite imagery:

- Vegetation within the site as well as vegetation further to the north and east is mapped as low – moderate Koala habitat suitability. However, vegetation immediately to the site's south and west is mapped as relatively high Koala habitat suitability.
- The site and surrounding area have been mapped as having a low likelihood of Koala occurrence (Likelihood = 0.00 – 0.25) with a high degree of confidence on the Koala Likelihood Map.
- The vegetation within the site contains primarily candidate native grassland with tree cover and tree cover matrix scattered throughout the southern area of the site and growing in density.
- Less than half the site is mapped as containing regional koala significance. A narrow strip of regional koala significance passes around Dungog and into the eastern area of the subject site. The proposal will not impede Koalas from traversing through the site or travelling between these areas (see section 2.2.7).
- There is one (1) Koala record (latest record from 2004) listed by BioNet Atlas within the subject site amongst 26 others within a 10km radius of the site ranging from the 1980's to recent years with the vast majority of records occurring in a close proximity to Dungog.
- Movement corridors and habitat connectivity has been maintained within the site by conserving 6.5 ha of vegetation within the sites conservation areas and 14.7 ha of native vegetation within the site.



2.3 Importance of the site area to a local Koala population

Based on the information obtained from the Koala Habitat Information Base which is summarised in section 2.3 above, the site is mapped as containing native vegetation that is considered to have a low – moderate suitability for Koala habitat, a high probability of containing some preferred Koala feed trees, a low likelihood that Koalas occur onsite given only a small area of the site is mapped as an area of regional koala significance.

Corymbia maculata (Spotted Gum), *Eucalyptus paniculata* (Grey Ironbark) and *Eucalyptus Tereticornis* (Forest Red Gum) are prominent canopy species within the development footprint. Whereas *Eucalyptus moluccana* (Grey Box), *Eucalyptus punctata* (Grey Gum) and *Eucalyptus globulus* (Southern Blue Gum) are scattered individually over the site.

The North Coast Koala Management Area ranks its koala feed trees in the following ascending order: Occasional use, Significant use, High use and High preferred use.

Corymbia maculata (Spotted Gum) and *Eucalyptus paniculata* (Grey Ironbark) are common species within the site. Both of these trees are listed as Significant use. *Eucalyptus tereticornis* (Forest Red Gum) is one of the major components of the site's vegetation, a preferred local food tree. The proposed subdivision has been designed to avoid dense patches of vegetation within the site. Dense populations of these species are primarily located within the designated conservation areas.

Eucalyptus moluccana (Grey Box) and *Eucalyptus punctata* (Grey Gum) are both listed as High preferred use koala feed trees. These trees are however not prominent within the development footprint. These species should therefore not have a high removal with avoidance being a priority.

The proposed development footprint has been designed to minimize vegetation removal. A total of 4.7 ha of vegetation will be directly impacted by selective clearing for APZs within the development footprint. This is compared to 6.5 ha to be retained within the site conservation areas.

There is potential for koalas to occur in the Hanleys Creek area, due to the various records occurring within the Dungog LGA, particularly an area east of Cambra, approximately 13.5km to the east of the site, as well as the presence of multiple koala use trees on site.

The vegetation within the development footprint is predominantly open grassland with scattered patches of vegetation which expand toward the south of the site. Vegetation to the south of the site connects to a larger expanse of vegetation to the west of the site which eventually leads into Mount Royal National Park.



The vegetation within the site has connectivity to potential habitat extending to the south and west of the site. However, in consideration of the scattered nature of vegetation onsite, the low likelihood of koala occurrence and sparse mature preferred koala feed trees onsite, as well as the results from the koala SAT surveys and spotlighting undertaken; it is considered that the site is not particularly important for a local koala population.



3 IMPACT AVOIDANCE

Section 3 of this report aims to address criteria 3 - 8 of a Tier 2 development application as defined in section 3.2 of the Koala Habitat Protection Guideline. Refer to Appendix B for the Koala Habitat Protection Guideline.

3.1 Site Selection

The proposal includes a 1 into 88 lot Torrens Title residential subdivision which makes up Stage 2 and 3 of the Hanley Creek Road rural lifestyle development. The subdivision will provide development space for the construction of 88 dwellings as well as associated infrastructure such as site access, services and asset protection zones (APZ).

The location of the proposed residential subdivision has been chosen over other areas of the site for a number of reasons;

1. The location allows for a logical progression of Stage 1 of the residential subdivision;
2. The location has been strategically positioned over predominantly open grassland to avoid areas of native vegetation over the site; and
3. The location of the proposed lots allows building envelopes to be positioned out of the sites central patch of native vegetation.

The establishment APZs around each building envelope within the development footprint will inevitably require some of the potential Koala habitat to be selectively cleared. However, this area has been minimised as much as practicable. Additionally, koala feed trees are to be avoided where practicable.

3.2 Avoid and Minimise Impacts on Koala Habitat

The proposed development footprint totals 129.2 ha of land. A total of 4.7 ha of native vegetation will be selectively cleared to facilitate the subject development. Koala feed trees are to be retained where possible.

The development has been located in the centre of the site, which is predominately covered by exotic pasture grasses and weeds. 6.5 ha of land around the sites western boundaries is to be retained within the sites designated conservation area. The sites most heavily vegetated areas lie within the conservation area.

The strategic positioning of the proposed development allows impacts to local ecosystems within the site to be significantly minimised. 6.5 ha of PCT 3446



is to be retained within the site's conservation area. This is in addition to 14.7 ha to be retained within the development footprint.

The vegetation within the designated conservation area within Lot 338 contains a higher density of native flora species and is in much better condition than the area of the development footprint. The proposal would also not will not sever, fragment or isolate any areas of habitat or impact on the function of any local corridor.

In addition, potential direct impacts can be minimised by undertaking a tree retention and removal plan for the proposed APZ. Trees would carefully be selected trees for retention within the proposed APZ with the aim of addressing the criteria below;

- Retain as many trees as possible whilst complying with the provisions of PBP 2019;
- Trees selected for retention will be prioritised by the following;
 - Hollow-bearing or habitat trees
 - Preferred Koala feed trees
 - Mature trees chosen over younger trees
 - Retaining a mix of tree species to retain biodiversity value

Overall, with the above mitigation measures undertaken, the proposal would not fragment existing koala habitat, impact the ability of koalas to move throughout the surrounding area or impact the recovery and expansion of local koala populations.



4 IMPACT ASSESSMENT

Section 4 of this report aims to address criteria 9 of a Tier 2 development application as defined in section 3.2 of the Koala Habitat Protection Guideline. Refer to Appendix B for the Koala Habitat Protection Guideline.

The following sections 4.1 to 4.3 outline the direct, indirect and existing potential impacts on a local Koala population.

4.1 Direct Impacts

- 4.7 ha of native vegetation removal of PCT 3446

4.2 Indirect Impacts

- Inadvertent impacts on adjacent vegetation
 - Edge effects
 - Potential accidental damage during clearing
- Transport of weeds into the site
- Sedimentation and contaminated and/or nutrient rich run-off during construction

4.3 Existing Impacts

- Potential vehicle strike
- Potential dog attack
- Weed infestation
- Erosion

4.4 Assessment of Impacts

When compared to the size of the conservation area of 21 ha, the 4.7 ha of native vegetation to be selectively cleared is not considered a significant impact on koala population.

The 4.7 ha of native vegetation proposed to be cleared is relatively small compared to the total size of the development footprint being 129.2 ha. Vegetation to be directly impacted by the proposed building envelopes, APZ and internal roads includes 4.7 of PCT 3446 Lower North Foothills Ironbark-Box-Gum Grassy Forest.

The positioning of the proposed residential subdivision has been chosen to impact the least vegetation on site as possible. It is noted that these areas are to be selectively cleared to avoid koala feed trees and hollow bearing trees where possible. The sites most ecologically valuable land is to be retained within the 6.5 hectares of designated conservation land within Lot 338. The proposal would not fragment existing koala habitat, impact the ability of koalas to move across the landscape or impact the recovery and expansion of local koala populations.

Stage 1 of the subject residential subdivision has been completed. Stage 1 contains 31 lots, most of which have been developed with dwellings are occupied by existing residents. Therefore some potential impacts are already existing such as potential vehicle strike, pool drowning, dog attack, weed infestation and rubbish within the development footprint. The proposal would not increase the risk of these potential impacts occurring.

Overall, the potential impacts on a local koala population or potential koala habitat is considered to be minimal and certainly not significant.

5 MANAGEMENT MEASURES

Section 4 of this report aims to address criteria 10 - 13 of a Tier 2 development application as defined in section 3.2 of the Koala Habitat Protection Guideline. Refer to Appendix B for the Koala Habitat Protection Guideline.

5.1 Management Measures

Management measures for the direct and indirect impacts on koalas and koala habitat are provided below.

Table 5-1 Management Measures

Impact	Management Measures
Removal of potential Koala feed trees / habitat	<p>Trees would carefully be selected trees for retention within the proposed APZ with the aim of addressing the criteria below;</p> <ul style="list-style-type: none"> • Retain as many trees as possible whilst complying with the provisions of PBP 2019; • Trees selected for retention will be prioritised by the following; <ul style="list-style-type: none"> ○ Hollow-bearing or habitat trees ○ Preferred Koala feed trees ○ Mature trees chosen over younger trees ○ Retaining a mix of tree species to retain biodiversity value <p>A suitably qualified and experienced ecologist will supervise all vegetation removal to ensure;</p> <ul style="list-style-type: none"> • No Koalas are within trees at the time of clearing • Trees are removed in accordance with the tree retention and removal plan
<p>Inadvertent impacts on adjacent vegetation</p> <ul style="list-style-type: none"> • Edge effects • Potential accidental damage during clearing 	<p>A suitably qualified and experienced ecologist will supervise all vegetation removal to ensure;</p> <ul style="list-style-type: none"> • Trees are felled away from adjoining vegetation
Sedimentation and contaminated and/or nutrient rich run-off	<p>Hydrological and erosion / sediment controls should be implemented during construction works to maintain the quality and quantity of pre-development water flows into downstream areas.</p>
Transport of weeds into the site and existing weed	<p>Appropriate weed control measures must be implemented during and post construction of the</p>

infestation	development, including the following: <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. • Vehicles, machinery and equipment must be free from weed material (including seeds) before entering the construction corridor.
Dumped rubbish within the proposed APZ	All rubbish is to be removed from the proposed APZ
Potential vehicle strike	Residents should keep driving speed to ≤40 km/h
Potential dog attack	Dogs excluded from koala habitat areas and only allowed off leash in areas established as not being habitat.

5.2 Compensatory Measures

Criteria 11 of a Tier 2 development application as defined in section 3.2 of the Koala Habitat Protection Guideline, states that; *“Compensatory measures are only used once it has been demonstrated that options to avoid, minimise and manage impacts to koala habitat have been exhausted.”*

Principle 6 of the Koala Habitat Protection SEPP states;

6. *Use compensatory (i.e., offsetting) measures only where they can be shown to meet the aim of the SEPP.*

The aim of the SEPP is to *“... encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline”*

In this case, no compensatory measures are recommended because the proposed development is not considered to significantly impact a local koala population or potential koala habitat. The recommended management measures are considered sufficient enough to avoid and/or minimise any potential impacts to a degree that compensatory measures would be considered excessive and unnecessary.

As discussed in previous section 2.4 of this report; given the highly degraded state of the site’s vegetation, the low likelihood of koala occurrence and the low ranking of koala feed trees within the site, it is considered that the site is not particularly important for a local koala population. Overall, the potential impacts on a local koala population or potential koala habitat is considered to be minimal and certainly not significant.

No further provisions of the Koala Habitat Protection SEPP apply.



6 REFERENCES

- Canfield P (1990) Disease studies on New South Wales koalas. In *Biology of the koala* edited by A K Lee, K A Handasyde and G D Sanson. Surrey Beatty and Sons Pty. Limited. Pp249-254
- Department of Environment and Climate Change NSW (2008) *Recovery Plan for the Koala (Phascolarctos cinereus)*. Approved Plan, November 2008. Department of Environment and Climate Change, Sydney.
- DPIE (2019) *Koala Habitat Information Base Technical Guide*. NSW Department of Planning, Industry and Environment. Published September 2019.
- DPIE (2020) *Koala Habitat Protection Guideline: Implementing State Environmental Planning Policy (Koala Habitat Protection) 2019*. NSW Department of Planning, Industry and Environment. Published March 2020.
- Hume I A (1990) Biological basis for the vulnerability of koalas to habitat fragmentation. In *Koala Summit Management Koalas in New South Wales* Proceedings of the Koala Summit held at the University of Sydney 1988. Ed D Lunney, C A Urquhart and P Reed. NSW National Parks and Wildlife Service, Sydney. Pp 32-39
- Martin R W and Handasyde K A (1995) Koala *Phascolarctos cinereus*. *Mammals of Australia*. Ed. R Strahan. Australia Museum / Reed Publications, Chatswood. pp. 196-198.
- Mitchell P (1990) The home ranges and social activity of koalas – a quantitative analysis. In *Biology of the Koala* edited by A K Lee, K A Handasyde and G D Sanson. Surrey Beatty and Sons Pty. Limited. pp 171-187
- Reed P C and Lunney D (1990) Habitat loss: the key problem for the long-term survival of koalas in New South Wales. In *Koala Summit Management Koalas in New South Wales*. Proceedings of the Koala Summit held at the University of Sydney 1988. Ed D Lunney, C A Urquhart and P Reed. NSW National Parks and Wildlife Service, Sydney. pp 9-31
- Reed P C, Lunney D and Walker P (1990) A 1986-1987 survey of the Koala *Phascolarctos cinereus* (Goldfuss) in New South Wales and an ecological interpretation of its distribution. In *Biology of the Koala* edited by A K Lee, K A Handasyde and G D Sanson. Surrey Beatty and Sons Pty. Limited. pp 55-74



APPENDIX A QUALIFICATIONS

Curriculum Vitae

Sarah Jones

Ecologist / Bushfire Consultant

B.Env.Sc, G.Dip.DBPA

BPAD-A Certified Practitioner (BPD-PA-26512)



Qualifications / Licences

- Bachelor of Environmental Science (The University of Newcastle)
- Graduate Diploma in Design for Bush Fire Prone Areas (University of Western Sydney)
- *BAAS18020 Accredited Assessor, as required by the Biodiversity Conservation Regulation 2017 and accredited to apply the BAM*
- NSW Scientific Licence SL100533
- Fire Protection Authority of Australia (FPAA) Member
- BPAD- A (Alternate Solutions) Bushfire Planning and Design Certified Practitioner – Certification No: PBD-PA-26512
- RFS / PIA NSW Consulting Planners Bushfire Training Course
- WorkCover NSW OHS General Induction for Construction Work in NSW

Areas of Expertise

Sarah Jones is an ecologist and bushfire planning specialist with over 18 years ecological experience within both the consulting, and the government sector. Sarah is an Accredited Biodiversity Assessor and has an extensive range of Ecological Assessment reporting experience and ecological field experience. Experience within the consulting industry has primarily included a wide range of flora and fauna assessment disciplines as required by a wide range of public and private clients. Sarah has a strong grounding in threatened flora and fauna species, endangered ecological communities and populations. She has experience in the preparation of environment impact assessments in terrestrial environments, constraints and opportunities reporting, flora and fauna monitoring and survey, vegetation and conservation management plans. Sarah Jones is accredited to Biodiversity Development Assessment Reports (BDAR) and Tests of Significance (5-part test) to assess biodiversity / flora and fauna / ecological impacts when undertaking Development Applications (DA) and Major Projects / State Significant Developments (SSD) in New South Wales.

Sarah Jones is a (Bushfire Planning and Design) BPAD-A Certified Practitioner through Fire Protection Australia (FPA). BPAD Accredited Practitioners are recognised by industry, regulators, fire agencies, end-users and the community as providers of professional bushfire assessment, planning, design and advice services. The Scheme provides an enhanced level of confidence for government and the community that practitioners are accredited by a suitably robust scheme that is administered by the peak national body for fire safety.

Sarah Jones has qualifications and experience in Bushfire Planning and Design, Bushfire Attack Level (BAL) assessments, Complying and Development Application

Firebird ecoSultants Pty Ltd

Level 1, 146 Hunter Street Mall, Newcastle NSW 2300

PO Box 354, Newcastle NSW 2300

P: 02 4910 3939

M: 0414 465 990

E: sarah@firebirdeco.com.au



Firebird ecoSultants Pty Ltd
ABN-16 105 985 993

assessments) in accordance with Planning for Bush Fire Protection (PBP), the Building Code of Australia (BCA) and Australian Standards AS3959-2018.

Employment History

Bushfire Consultant & Ecologist
Firebird ecoSultants Pty Ltd
Jan 2011 to present

Consultant Role Development Planner –
(Flora and Fauna)
Lake Macquarie City Council
June 2013 –February 2015
Previous temporary role August - October
2012

Senior Bushfire Consultant / Ecologist
RPS Group plc.
June 2006 to Jan 2011

Development Planner (Flora & Fauna)
Lake Macquarie City Council
Jan 2005 to Sept 2005

Ecologist / Bushfire Consultant
Harper Somers O'Sullivan
Nov 2001 to Jan 2005

Ecologist
Ecotone Environmental Consultants,
Waratah, NSW
Jan 2001 – Nov 2001

Volunteer Environmental Educator
Community Partnership Newcastle City Council
Sept 2000 – Dec 2000

Firebird ecoSultants Pty Ltd

Level 1, 146 Hunter Street Mall, Newcastle NSW 2300
PO Box 354, Newcastle NSW 2300

P: 02 4910 3939 M: 0414 465 990 E: sarah@firebirdeco.com.au



APPENDIX B KOALA HABITAT PROTECTION GUIDELINE



Koala Habitat Protection Guideline

Implementing State Environmental Planning Policy
(Koala Habitat Protection) 2019



Dan Lunney DPIE

Published by NSW Department of Planning, Industry and Environment

dpie.nsw.gov.au

Title: Koala Habitat Protection Guideline

Subtitle: Implementing State Environmental Planning Policy (Koala Habitat Protection) 2019

First published: October 2020

© State of New South Wales through Department of Planning, Industry and Environment 2020. You may copy, distribute, display, download and otherwise freely deal with this publication for any purpose, provided that you attribute the Department of Planning, Industry and Environment as the owner. However, you must obtain permission if you wish to charge others for access to the publication (other than at cost); include the publication in advertising or a product for sale; modify the publication; or republish the publication on a website. You may freely link to the publication on a departmental website.

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (February 2020) and may not be accurate, current or complete. The State of New South Wales (including the NSW Department of Planning, Industry and Environment), the author and the publisher take no responsibility, and will accept no liability, for the accuracy, currency, reliability or correctness of any information included in the document (including material provided by third parties). Readers should make their own inquiries and rely on their own advice when making decisions related to material contained in this publication.

Table of Contents

Part 1. Background	2
1.1 Aim of the SEPP	2
1.2 Purpose of this Guideline	2
1.3 Principles of this Guideline	2
1.4 Where does this Guideline apply?	2
1.5 Koala Habitat Definitions	4
1.6 SEPP Maps	4
1.7 Legislative Framework	6
1.8 Monitoring and Review	8
Part 2. Koala Plans of Management	9
2.1 Process for Koala Plans of Management	9
2.2 Definitions of Koala Habitat in Broader Landscape Terms	11
2.3 Part LGA Koala Plans of Management	12
2.4 What must be included in a Koala Plan of Management	12
2.5 Consultation requirements for KPOMs	13
2.6 Amending a KPOM	15
Part 3. The Development Assessment Process Under the SEPP	16
3.1 Tier 1 - Low or no direct impact development	16
3.2 Tier 2 - development applications impacting koalas and/or core koala habitat	18
3.3 Template for Koala Assessment Reports	21
Appendix A: Koala Tree Species List (as per Schedule 2 of the SEPP)	23
Appendix B: Detailed Criteria for Preparing Koala Plans of Management	36
Appendix C: Survey Methods for Identifying Core Koala Habitat	43
Glossary	51
References	53
Links Referenced in this Guideline	53

Introduction

The koala (*Phascolarctos cinereus*) is an iconic Australian marsupial. Koala populations in NSW are declining and vulnerable to extinction. As with many threatened species, koalas and their habitat are managed under a variety of legislation and policy. In 1995, the NSW planning system introduced a dedicated state environmental planning policy to protect koala habitat.

State Environmental Planning Policy (Koala Habitat Protection) 2019 (the SEPP) encourages the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of population decline. The SEPP was made under the *Environmental Planning and Assessment Act 1979* (EP&A Act) and replaces the previous State Environmental Planning Policy No 44 - Koala Habitat Protection (SEPP 44).

This Guideline is made in accordance with the SEPP to guide consent authorities, professionals and the community to understand and implement the SEPP's requirements. The Guideline has two key aims:

- To guide councils on how to prepare Koala Plans of Management (KPOM).
- To standardise processes for applicants and consent authorities when preparing and assessing development applications applicable to the SEPP.

This Guideline has three parts with supporting appendices:

Part 1 – Background

Introduces this Guideline and provides background information on how the SEPP is applied.

Part 2 –Koala Plans of Management

Provides guidance to councils on preparing a Koala Plan of Management.

Part 3 – The Development Assessment Process under the SEPP

Establishes requirements for applicants and councils when preparing and assessing development applications relevant to the SEPP.

Part 1. Background

1.1 Aim of the SEPP

The SEPP is one of a number of NSW Government initiatives that seeks to address the declining population status of koalas in NSW. It does this through conservation and management of koala habitat as part of the planning and development assessment process. The overarching aim of the SEPP is to:

“... encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline.” The Guideline supports this aim.

1.2 Purpose of this Guideline

The Guideline supports the SEPP’s aim by:

1. Guiding councils on how to prepare and what to include in their KPOMs.
2. Defining criteria and requirements for applicants to follow and councils to implement when preparing and assessing development applications (if a council does not have a KPOM in place for that land).
3. Setting out the process for identifying core koala habitat.
4. Informing the wider community about the SEPP’s role in protecting koalas and their habitat.

1.3 Principles of this Guideline

There are seven key planning principles that help define the criteria and requirements set out in this Guideline:

1. Understand and identify koala habitat values including landscape connectivity (such as habitat extent and habitat linking areas).
2. Avoid inappropriate or intensifying land uses in koala habitat areas through landscape planning and site selection.
3. Encourage the conservation and management of areas with natural vegetation that can provide habitat for koalas.
4. Minimise potential impacts to koalas and their habitat through appropriate design that maintains the function of core koala habitat and avoids any fragmentation or direct loss.
5. Implement best practice measures through the planning system to manage identified threats to koalas and their habitat (such as those listed in Part 3).
6. Use compensatory (i.e. offsetting) measures only where they can be shown to meet the aim of the SEPP.
7. Use adaptive management strategies to monitor, evaluate and deliver appropriate planning outcomes for koalas in their local setting.

1.4 Where does this Guideline apply?

The Guideline applies to the same local government areas listed in Schedule 1 of the SEPP. These are:

Armidale Regional, Ballina, Bathurst Region, Bega Valley, Bellingen, Berrigan, Blayney, Blue Mountains, Bourke, Brewarrina, Byron, Cabonne, Campbelltown, Central Coast, Central

Darling, Cessnock, Clarence Valley, Coffs Harbour, Coonamble, Dungog, Edward River, Eurobodalla, Federation, Forbes, Gilgandra, Glen Innes Severn, Goulburn Mulwaree, Greater Hume, Gunnedah, Gwydir Shire, Hawkesbury, Hilltops, Hornsby, Inverell, Kempsey, Ku-ring-gai, Kyogle, Lake Macquarie, Leeton, Lismore, Lithgow, Liverpool, Liverpool Plains, Lockhart, Maitland, Mid-Coast, Mid-Western Regional, Moree Plains, Murray River, Muswellbrook, Nambucca, Narrabri, Narrandera, Narromine, Newcastle, Northern Beaches, Oberon, Parkes, Port Macquarie-Hastings, Queanbeyan-Palerang, Port Stephens, Richmond Valley, Shoalhaven, Singleton, Snowy Monaro Regional, Snowy Valleys, Tamworth Regional, Tenterfield, Tweed, Upper Hunter, Upper Lachlan, Uralla, Wagga Wagga, Walcha, Walgett, Warren, Warrumbungle, Weddin, Wentworth, Wingecarribee, Wollondilly, Wollongong, Yass Valley.

The SEPP does not apply to land dedicated or reserved under the *National Parks and Wildlife Act 1974* (or acquired under Part 11 of that Act), land dedicated under the *Forestry Act 2012* as State forest or a flora reserve or land that has been biodiversity certified.

The Guideline is to be applied in two ways:

1. By councils preparing Koala Plans of Management (Part 2 of the Guideline)
2. By landholders and councils when preparing and assessing a development application (Part 3 of the Guideline). If a council has an approved Koala Plan of Management that applies to the land, the landholder is required to consider that Plan rather than Part 3 of this Guideline.

Under Clause 8 of the SEPP, the development application must be consistent with the approved koala plan of management that applies to the land. This applies to land of any size, not just land over 1 hectare.

Under Clause 9 of the SEPP i.e. where there is no approved Koala Plan of Management that applies to the land, Part 3 of the Guideline applies if the land:

- a. contains core koala habitat (determined using Appendix C), and
- b. has an area of more than 1 hectare, or
- a. has, together with any adjoining land (meaning in the next cadastre) with the same owner, an area of more than 1 hectare. This is regardless of whether or not the development application applies to the whole, or only part, of the land.

The SEPP only applies to activities requiring development consent from councils under Part 4 of the EP&A Act. Exempt or complying development or other activities like land management which is not associated with a development application are managed under other State policies or other legislation (such as the *Local Land Services Act 2013*, or *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017*) and do not need to consider the SEPP or this Guideline.

For more information about the NSW Land Management and Biodiversity Framework visit Local Land Services website www.lls.nsw.gov.au or Environment, Energy and Science website www.environment.nsw.gov.au.

Applications for State Significant Development and State Significant Infrastructure are not assessed by councils under Part 4 of the EP&A Act, therefore the SEPP and Guideline do not apply.

1.5 Koala Habitat Definitions

Definition of Core Koala Habitat under the SEPP

Clause 4 of the SEPP defines **core koala habitat** as:

- a) an area of land which has been assessed by a suitably qualified and experienced person in accordance with the Guideline as being highly suitable koala habitat and where koalas are recorded as being present at the time of assessment of the land as highly suitable koala habitat, or
- b) area of land which has been assessed by a suitably qualified and experienced person in accordance with the Guideline as being highly suitable koala habitat and where koalas have been recorded as being present in the previous 18 years.

Please see the '**Notes about the definition**' box in Appendix C for further information.

1.6 SEPP Map

The SEPP includes a map layer, **Site Investigation Area Map for Koala Plans of Management**. The map layer identifies areas that are likely to contain tree species listed under Schedule 2 of the SEPP and excludes areas that have a low probability of containing habitat that may be suitable for koalas.

The purpose of the map is to direct councils to certain areas it **must** focus its surveying effort to identify core koala habitat for the purpose of including in a Koala Plan of Management. Areas outside of the Map cannot be identified core koala habitat.

The Site Investigation Area Map for Koala Plans of Management is part of the SEPP. The map will be updated regularly.

The map can be accessed by the public from councils or the Department.

How the Site Investigation Area Map was developed

The Koala Habitat Information Base was used to develop a map that identifies areas that are likely to have koala use trees.

- In 2018, the Department identified 137 koala tree species in 'A review of koala tree use across New South Wales'.
- In 2019, consultation with koala experts led to the list being refined to 123 species in the Koala Habitat Information Base Technical Guide.

These 123 species were categorised into nine distinct regions, according to what koalas prefer to use in various areas. The number of species used by koalas in each region ranges from nine in the Riverina region to 65 in the Central Coast region.

The map was restricted by the application of the SEPP and so only captures land in the LGAs listed in Schedule 1 of the SEPP. The map also excludes the lands that the SEPP does not apply to, such as national parks and state forests.

The Site Investigation Area Map was developed by excluding:

1. the LGAs where the SEPP does not apply (consistent with schedule 1 of the SEPP)
2. land dedicated or reserved under the *National Parks and Wildlife Act 1974*, or acquired under Part 11 of that Act (as set in clause 5 of the SEPP)
3. land dedicated under the *Forestry Act 2012* as a State forest or flora reserve (as set in clause 5 of the SEPP)
4. cleared areas using the NSW Native Vegetation Extent 5m Raster v1.2 – the NSW Native Vegetation extent map provides a high precision surface that differentiates native tree cover from native grasslands, non-native areas, forestry plantation and water bodies areas that the Koala Habitat Information Base has identified as having a low probability of koala use trees.

How core koala habitat is treated under the SEPP

Core koala habitat

Core koala habitat identified through the Development Application (DA) or Koala Plan of Management (KPoM) process will influence the way development is determined on that land.

For example, land that is identified and mapped as core koala habitat through an approved KPoM will be a key consideration in determining whether a proposed development (under a DA) reasonably considers impact on core koala habitat. Clause 8(2) of the SEPP requires the determination of the DA to be consistent with the KPoM.

Additionally, core koala habitat identified in an approved KPoM will be used to update the Biodiversity Values Map made under the *Biodiversity Conservation Regulation 2017*.

Alternatively, DAs **must** consider this Guideline if they are:

- in an LGA covered by the SEPP, and
- the landholding is more than 1 hectare, and
- on land without an approved KPoM.

If all three criteria are met, the development proponent must engage a suitably qualified person to survey the land affected by the development proposal for core koala habitat in accordance with Appendix C. Core koala habitat identified through this process has no effect on other legislation or mapping, unlike core koala habitat identified in an approved KPoM.

1.7 Legislative Framework

In addition to the SEPP, koalas and their habitat are protected by an interrelated framework of legislation. Compliance with this Guideline and the SEPP does not affect a person's obligation to separately consider the requirements of other related legislation.

Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act), the Australian Government's central piece of environmental legislation, lists the NSW, Queensland and ACT populations of koalas as vulnerable species. This means that approval is needed under this Act for proposed actions that will have, or are likely to have, significant impact on koalas. According to the 'EPBC Act referral guidelines for the vulnerable koala,' the loss of 20 hectares or more of high-quality habitat critical to the survival of the species is highly likely to have a significant impact for the purposes of the EPBC Act.

Environmental Planning and Assessment Act 1979

The EP&A Act provides the framework for the NSW planning system, including the creation of policies for specific matters of state or regional significance through State Environmental Planning Policies (SEPPs). The Act also requires consent authorities such as councils to take into consideration a range of factors when determining whether to approve a development, including the likely environmental impacts of a development on natural and built environments. The EP&A Act interacts with Part 7 of the *Biodiversity Conservation Act 2016* (BC Act) (outlined below) in relation to biodiversity assessment and approvals under the EP&A Act.

Biodiversity Conservation Act 2016

The purpose of the BC Act is to maintain a healthy, productive and resilient environment, consistent with the principles of ecologically sustainable development. The Act provides a range of protection measures for threatened species in NSW, including koalas.

The *Biodiversity Conservations Regulation 2017* (BC Regulation) (made under the BC Act) makes provision for a Biodiversity Values (BV) Map that is published by the NSW Environment Agency Head. Core koala habitat identified in an approved KPOM is one type of land that is included on the BV Map. The BV Map can be viewed in the [Biodiversity Values Map and Threshold \(BMAT\) Tool](#).

The BC Act requires the applicant to undertake a biodiversity impact assessment in accordance with a methodology known as a Biodiversity Assessment Method (BAM) for a range of development proposals including any development proposal that:

- involves clearing any native vegetation on land mapped as having biodiversity values (on the BV map).
- exceeds the clearing area thresholds (cl. 7.2 BC Regulation) on any land.
- is otherwise likely to significantly affect threatened species (or their habitats).

This assessment must set out measures to (preferentially) avoid, minimise, or (lastly) offset any impacts to biodiversity value (any offsets are measured as credits and managed through the Biodiversity Offsets Scheme). Development approvals must include a condition that requires the offsets to be met prior to the development proceeding. Where the impacts of a proposal are 'serious and irreversible', a consent or determining authority must refuse consent for development

(except for state significant projects where it is a consideration before determining the proposal). The requirements under the BC Act are in addition to those required under the SEPP.

Local Land Services Act 2013

The LLS Act provides the regulatory framework for the management of native vegetation in NSW. It applies to rural land outside the Sydney metropolitan area and Newcastle LGA.

The amendment to the LLS Act in 2017 also introduced a Land Management Code which enables code-based clearing of vegetation on regulated land. Where code-based clearing is not allowed, an approval is required from the Native Vegetation Panel.

State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017

The *State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017* (Vegetation SEPP) establishes a framework for the clearing of vegetation not associated with a development application in certain areas. It generally applies to non-rural areas of the State - the Sydney metropolitan area and Newcastle LGA, as well as all other land in NSW that is zoned for urban or environmental purposes. The Vegetation SEPP does not apply to National Parks or State Forests.

The Vegetation SEPP and the LLS Act perform comparable functions in relation to regulating native vegetation clearing. Where the clearing of native vegetation is not associated with a development application, the Vegetation SEPP requires that clearing above specified thresholds, known as the Biodiversity Offset Scheme threshold) is approved by the Native Vegetation Panel constituted under the LLS Act. Below these thresholds, the Vegetation SEPP allows councils to regulate clearing through a permit system.

Rural Fires Act 1997

Clearing that does not require consent

The *Rural Fires Act 1997* (RF Act) provides the regulatory framework for the management of native vegetation in NSW for bushfire hazard reduction. Bushfire hazard reduction work can be carried out despite any requirement for a license, approval, consent or authorisation made by any Act or instrument under any other Act (including the BC Act and EP&A Act) if:

- The work is undertaken in accordance with a bushfire risk management plan for the land, and
- There is a bushfire hazard reduction certificate for the work and the work is undertaken in accordance with conditions specified in the certificate, and
- The work is carried out in accordance with the provisions of any bushfire code applying to the land specified in the certificate.

The 10/50 Code contains some restrictions to hazard reduction clearing on core koala habitat identified in a council Koala Plan of Management, e.g., only Low intensity fire can be used, and no trees can be cleared. Unless the land is identified as core koala habitat, clearing in line with a Hazard Reduction Certificate does not need to consider the Koala SEPP.

Clearing requiring development consent

A consent authority is required to consider bush fire protection measures for development applications in accordance with the legislated document *Planning for Bush Fire Protection 2019*. This document is used to determine the construction requirements for a single dwelling and its associated Asset Protection Zone.

On bushfire-prone land consent authorities will generally undertake a site-specific assessment in accordance with Planning for Bushfire Protection to determine the extent of any Asset Protection Zone.

1.8 Monitoring and Review

This Guideline will be reviewed within 24 months of publication on the Department's website and may be updated if necessary. The SEPP map may also be occasionally updated as new information becomes available.

Part 2. Koala Plans of Management

A plan of management for koalas that covers an entire LGA (or part of an LGA) is referred to as a Koala Plan of Management (KPoM). The purpose of KPoMs is to enable councils to take a strategic approach in identifying and protecting koala habitat, including core koala habitat.

There are several key assumptions underpinning this part's approach:

- Priority should be given to protecting areas defined as core koala habitat. These areas are known to be used by koalas and are therefore considered the most important to the SEPP's goals. Core koala habitat **must** only be identified in areas on the SEPP's Site Investigation Area for Koala Plans of Management Map (SIA for KPoMs Map).
- Consideration of areas with other habitat values may still be important. These areas may serve certain functions necessary for the long-term survival of koala populations e.g. habitat linkages, or sites that contribute to population expansion and recovery. These areas can be identified anywhere in the local government area, and do not have to correspond with land identified on the SIA for KPoMs Map. However, they do not have the same regulatory implications as land identified as core koala habitat.
- Development controls should be tightest within areas of core koala habitat, with a focus on avoiding direct loss of habitat, corridors and other refugia.

Effect of Koala Plans of Management

Clause 8 of the SEPP specifies that where there is an approved KPoM that applies to the land to which a development application has been made, the council's determination of the DA **must** be consistent with the approved KPoM. This includes all land, not only land over 1 hectare within core koala habitat.

Land identified as 'core koala habitat' in the KPoM, consistent with the definition in the SEPP will also be included on the Biodiversity Values Map under the *Biodiversity Conservation Regulation 2017*. This means that a development proposal on core koala habitat or the clearing of native vegetation in areas where SEPP (Vegetation in Non-Rural Areas) 2017 applies will trigger the Biodiversity Offset Scheme Threshold and will require Native Vegetation Panel approval.

The approval of a KPoM does not affect the applicant's or council's responsibility to consider the requirements of any other related legislation. This was also the case under the now repealed SEPP 44.

2.1 Process for Koala Plans of Management

KPoMs are prepared under Part 3 of the SEPP and **must** be developed in accordance with this Guideline. Council **must** consult with the Coordinator General of the Environment, Energy and Science Division of the Department of Planning, Industry and Environment, and the Chief Executive Officer of Local Land Services during the process of developing a KPoM (see clause 12 of the SEPP). Council **must** also identify and consult with key stakeholders, such as affected landholders, community groups and other relevant agencies while developing the KPoM.

Council **must also** exhibit the proposed KPoM for a minimum period of 90 days and allow a landholder affected by the proposed designation an additional 60 days to prepare a submission against the proposed core koala habitat designation. A letter or email **must** be sent to all landholders in proposed core koala habitat, outlining any impacts such a designation would have on their ability to undertake activity on their land and the exhibition period during which they may make a submission.

The council endorsed plan, and all required documents (as outlined under Part 2 of this Guideline), **must** then be submitted to the Department for the Secretary's approval. Before determining the

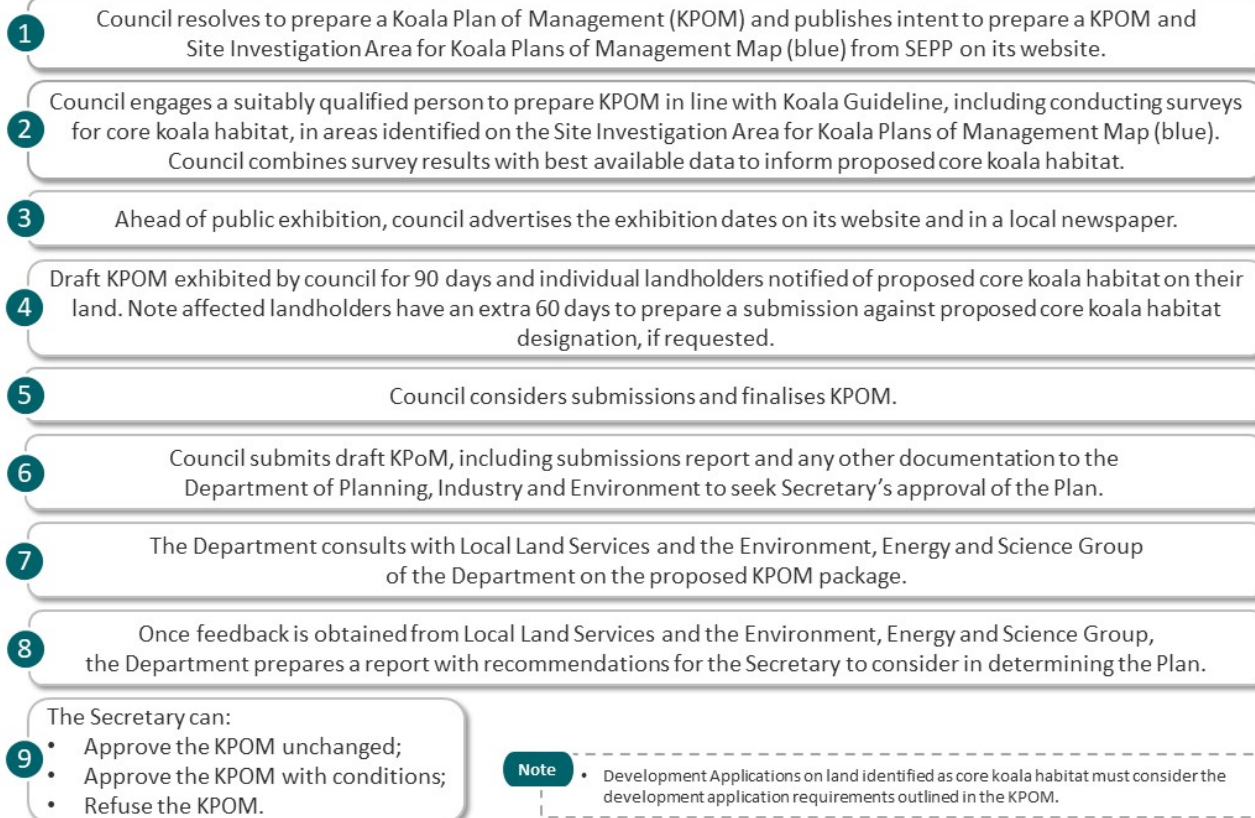
plan, the Secretary must refer it to the Chief Executive Officer of Local Land Services and the Coordinator General of the Environment, Energy and Science Division of the Department of Planning, Industry and Environment in line with clause 14(3) of the SEPP. The plan must be approved by the Secretary of the Department of Planning, Industry and Environment (DPIE) before it takes effect.

In some cases, the Secretary may issue a **conditional approval** for the KPoM, subject to certain changes being made. Council **must** make these changes before the KPOM is published and takes effect.

If a council is interested in preparing a KPoM, it **must** contact the relevant DPIE Local and Regional Planning team or Greater Sydney Place and Infrastructure team and the Environment, Energy and Science Group. Councils **must** also consult with the Environment, Energy and Science division of the DPIE and Local Land Services while developing the KPoM (in line with clause 12 of the SEPP), particularly with respect to the adequacy of studies and survey, prior to proceeding to developing management strategies.

A summary of the KPoM preparation process is illustrated on the following page.

Koala Plans of Management (KPOM) Process



2.2 Definitions of Koala Habitat in Broader Landscape Terms

Councils may identify core koala habitat consistent with the definition in the SEPP. While councils can also identify other types of koala habitat, only core koala habitat has regulatory impact in other parts of the NSW legislative framework.

These other types of koala habitat can be identified outside the bounds of the Site Investigation Area for Koala Plans of Management Map. This is important since the definition of core koala habitat may be limiting at a landscape level, where the following issues arise:

- Identifying habitat at a landscape level generally requires different types of data available at a scale that can be reasonably gathered and applied to broad-scale areas. The state-wide Koala Habitat Information Base provides data to help councils identify koala habitat in their local government area and guide their local mapping.
- KPOMs aim to deliver strategic outcomes requiring attributes broader than species presence (noting that some areas which may not currently be occupied by koalas may be important in terms of connectivity, dispersal, seasonal movement, drought or fire refuge, or recovery). KPOMs are most effective in preventing contributors to population decline from site-based, incremental or cumulative impacts.

At a landscape scale, habitat assessments **should** identify all habitats important or potentially important to koalas with regard to several factors, not limited to those used to define core koala habitat in the SEPP.

Further discussion on habitat mapping for KPOMs is provided in Appendix B.

2.3 Part LGA Koala Plans of Management

In some circumstances it may be appropriate for councils to prepare a KPoM for only a portion of an LGA. As a priority, these plans should focus on areas where threats to koalas and their habitat are greatest, e.g. where land uses are expanding or intensifying rapidly. Accordingly, while councils are **encouraged** to consider the entire LGA when developing a KPoM, part LGA plans may be appropriate where the study area:

- is of a sufficient size to identify core koala habitat, threats, management recommendations and habitat protection mechanisms in a regional context.
- incorporates known koala populations in their entirety.
- utilises both ecological and physical characteristics to determine an appropriate study area boundary rather than relying on cadastral boundaries.
- enables a strategic planning approach to be developed for managing and restoring koala habitat and the abatement of threats, which meet the aim of the SEPP.

Council **must** seek advice from DPIE, and the Coordinator General of the Environment, Energy and Science Division of the Department of Planning, Industry and Environment well as the Chief Executive Officer of Local Land Services to determine if a part LGA KPoM is appropriate for the proposed area. The procedures for preparing a part LGA KPoM are the same as those detailed for a whole LGA Plan.

The Coordinator General of the Environment, Energy and Science Division of the Department as well as the Chief Executive Officer of Local Land Services **must** be consulted when preparing a KPoM for part of an LGA. The remaining part of the LGA would remain subject to any other legislative requirements for individual development applications under the SEPP.

Using a KPoM to streamline DAs

There may be circumstances where a council is able to determine there is known koala habitat and presence in a part of its LGA. It may seek to protect this habitat through a KPoM, while also switching off consideration of the SEPP in the rest of the LGA.

In this instance, it may be appropriate to develop a KPoM for the entire LGA but specify that land outside of the priority mapped areas (these priority areas might include core koala habitat or other regionally relevant koala habitat), still forms the area considered to be covered by an approved KPoM. This will allow many DAs in the council area to not have to consider the SEPP.

2.4 What **must** be included in a Koala Plan of Management

KPoMs **must** (at a minimum):

1. Identify and map present koala populations and (if possible) past populations from historical records (i.e. BioNet). Note BioNet records from Dan Lunney's 2006 community survey and any records with a locational accuracy of more than 1,000 metres are **not** to be considered.
2. Identify and map koala habitat based on the principles in this Guideline (outlined in section 1.3). 'Core koala habitat' **must** be mapped consistent with the definition in the SEPP to ensure protection in the broader legislative framework. For KPoMs this means the area **must** also be identified on the Site Investigation Area for Koala Plans of Management Map (other types of habitat such as regionally relevant habitat capable of sustaining koalas or 'corridors' can occur outside of the mapped area).
3. Identify threatening processes and aim for no net loss of core koala habitat within the area covered by the plan over the long-term.
4. Establish procedures to secure and manage koala populations into the future.

5. Specify any requirements additional to those required by the Biodiversity Assessment Method for development applications in core koala habitat, and in areas with other habitat types and values.
6. Specify requirements for activity assessments and planning proposals (rezoning proposals) in core koala habitat, and in areas with other habitat types and values.

In meeting the requirements listed above, a KPoM **should** address the seven key planning principles identified in Section 1.3 of this Guideline.

When a council provides the KPoM for the Secretary's approval, it **must** submit Geographic Information System (GIS) data of any core koala habitat identified in the plan. This is so the core koala habitat can be mapped on the Biodiversity Values Map under the Biodiversity Conservation Regulation 2017 if it is approved. Data must be supplied in accordance with the GIS data requirements of the DPIE as published on its website (<https://www.planning.nsw.gov.au/Plans-for-your-area/Local-Planning-and-Zoning/Mapping-standards-and-requirements>).

In addition to GIS data, council **must** also provide the Department with the submissions report, the results of any surveys, and any other documents that informed the preparation of the KPoM, including any relevant information provided by impacted landholders.

Appendix B contains more detail on the information that should be included in a KPoM. Councils **can** set out development application criteria in the KPoM or **choose** to apply the development application criteria in Part 3 to mapped areas of koala habitat in the KPoM. Councils **must** specify in their KPoMs if they choose to follow the criteria in Part 3 of the Guideline.

What not to include - clearing for bushfire protection / managing vegetation

Clearing for bushfire hazard reduction is managed under other legislation including the *Rural Fires Act 1997* and the 10/50 Code. Councils **must** not include provisions to manage clearing for bushfire hazard reduction in their KPoMs to avoid potential conflicts with other legislation.

The Rural Fire Service may consider any core koala habitat in an approved Koala Plan of Management when undertaking or approving hazard reduction clearing under the Rural Fires Act. Councils **must** provide GIS data for all areas of core koala habitat identified in an approved KPoM to the Rural Fire Service to help determine where restrictions relating to bushfire hazard reduction might apply.

Likewise, a KPoM **must** not introduce provisions designed to manage vegetation in the LGA that would otherwise be managed through other legislation (such as the council's development control plan or other SEPPs). Any provisions relating to the management of vegetation should only be considered where they directly relate to koala habitat and the koala tree species listed in Schedule 2 of the SEPP.

Clause 6A of the Koala SEPP allows clearing to form an asset protection zone if this occurs as part of a DA for a dwelling damaged or destroyed in bushfire. Clearing of vegetation to the minimum extent necessary for the purposes of forming an asset protection zone required to rebuild a bushfire damaged or destroyed home does not need to consider the SEPP or address this Guideline. For more information, see Part 3 of this Guideline.

2.5 Consultation requirements for KPoMs

Public exhibition

Council **must** exhibit the proposed KPoM for a minimum period of 90 days. This is a requirement under clause 13 of the SEPP. During this time, government agencies, local residents and members of the public can comment on the proposed KPoM.

Writing to landholders

Council **must** notify by post or email, all landholders within proposed core koala habitat in the draft KPoM and clearly detail the implications for land identified as core koala habitat if the KPoM is approved. Councils **must** consult with Local Land Services on preparing such correspondence in engaging with landholders.

The correspondence to landholders **must** clearly state the procedure for contesting the proposed core koala habitat designation. The process that allows landholders to contest the proposed designation of core koala habitat on their land was introduced by the Koala SEPP and was not previously available under SEPP 44. Landholders who wish to contest proposed core koala habitat on their land must provide evidence that the land does not contain core koala habitat, using the survey method in Appendix C. Alternatively, the landholder can request council use its suitably qualified and experienced person to conduct a survey in accordance with Appendix C at no cost to the landholder.

In some cases, it may be adequate for the landholder to provide evidence such as photographs that the land is clearly not core koala habitat and a survey is not required to be conducted at all (e.g. because the site has been completely cleared of vegetation, or the only vegetation is a monoculture plantation such as a macadamia farm). This process is also detailed in Appendix C.

Extending the exhibition period

In some cases, landholders in areas of proposed core koala habitat may need more than 90 days to gather and present evidence to council that their land does not contain core koala habitat (e.g. if they have been unable to find a suitably qualified person to conduct a survey). In this case, the landholder must write to the council within the 90 day exhibition period and request an extension of up to 60 days to facilitate lodgement of their objection. Council **must** provide the landholder with 60 days but may provide a longer extension if appropriate.

Using stakeholder feedback

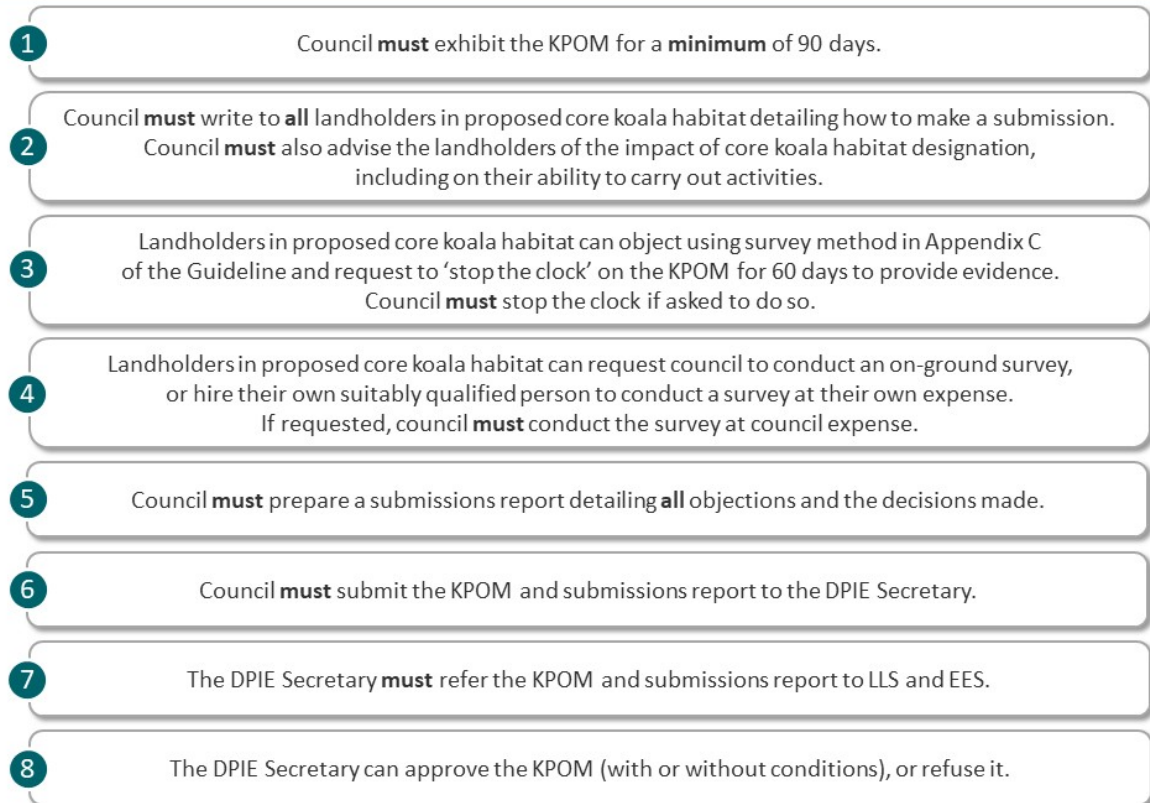
It may be appropriate for council to make changes to the KPoM in response to feedback to the exhibition. These changes **must** be detailed and justified in the submissions report.

The objections and any evidence submitted by a landholder **must** be detailed in the submissions report, along with council's response which clearly details the action taken (e.g. removing or maintaining the core koala habitat designation) and a justification for the decision.

The submissions report **must** be provided when the draft KPoM is submitted for the Secretary's determination, along with any other documents relevant to the plan (such as survey results or local koala studies).

The consultation process is summarised in the flow chart below:

Consultation Process for Koala Plans of Management



2.6 Amending a KPOM

Councils may occasionally amend an approved KPOM (e.g. to incorporate new evidence or information about the distribution of koala populations in the local government area). Clause 14A of the SEPP allows a KPOM to be amended or replaced by a subsequent koala plan of management.

Depending on the scope and scale of the changes, an amended KPOM may require re-exhibition following the consultation procedures outlined in the SEPP. For example, if a council wishes to update outdated references to legislation or make minor editing changes (such as spelling, grammar and punctuation), it is likely the KPOM will not require re-exhibition.

However, re-exhibition will likely be necessary if a council proposes to change development application provisions or change areas of identified core koala habitat. Councils are **encouraged** to discuss proposed amendments with the Department prior to finalising any changes to a KPOM. Amending KPOMs **must** be approved by the Secretary of the Department. Re-exhibition of the KPOM is at the discretion of the Secretary.

Part 3. The Development Assessment Process Under the SEPP

This part of the Guideline outlines the development assessment requirements for any development application to which the SEPP applies and where there is no approved KPOM 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.

This guidance is intended to assist both:

- Applicants in understanding how the SEPP applies to their development, the level of information that is needed to support their development application, and the criteria that needs to be addressed.
- Councils in assessing the adequacy of information supporting a development application and the considerations relevant to their determination.

Note: If a KPOM applies to the land that is subject to a DA, the DA **must** consider the requirements outlined in the KPOM instead of this Guideline (this applies to land of any size, not just land over 1 hectare).

The requirements of this section are structured into two parts.

- Tier 1 is for low or no direct impact development proposals and **does not require any surveys or reports**, and
- Tier 2 is for development proposals that are not able to demonstrate that the development has a low or no direct impact on koalas or koala habitat. Tier 2 **requires a suitably qualified and experienced person to undertake a survey for core koala habitat and prepare a Koala Assessment Report** to be provided with the development application.

Rebuilding after bushfire

Clause 6A of the Koala SEPP allows clearing to form an asset protection zone if this occurs as part of a development application to rebuild a dwelling damaged or destroyed in bushfires. Clearing to the minimum extent necessary for the purpose of forming an asset protection zone for the rebuilding of a bushfire damaged or destroyed home does not need to consider the SEPP or address this Guideline.

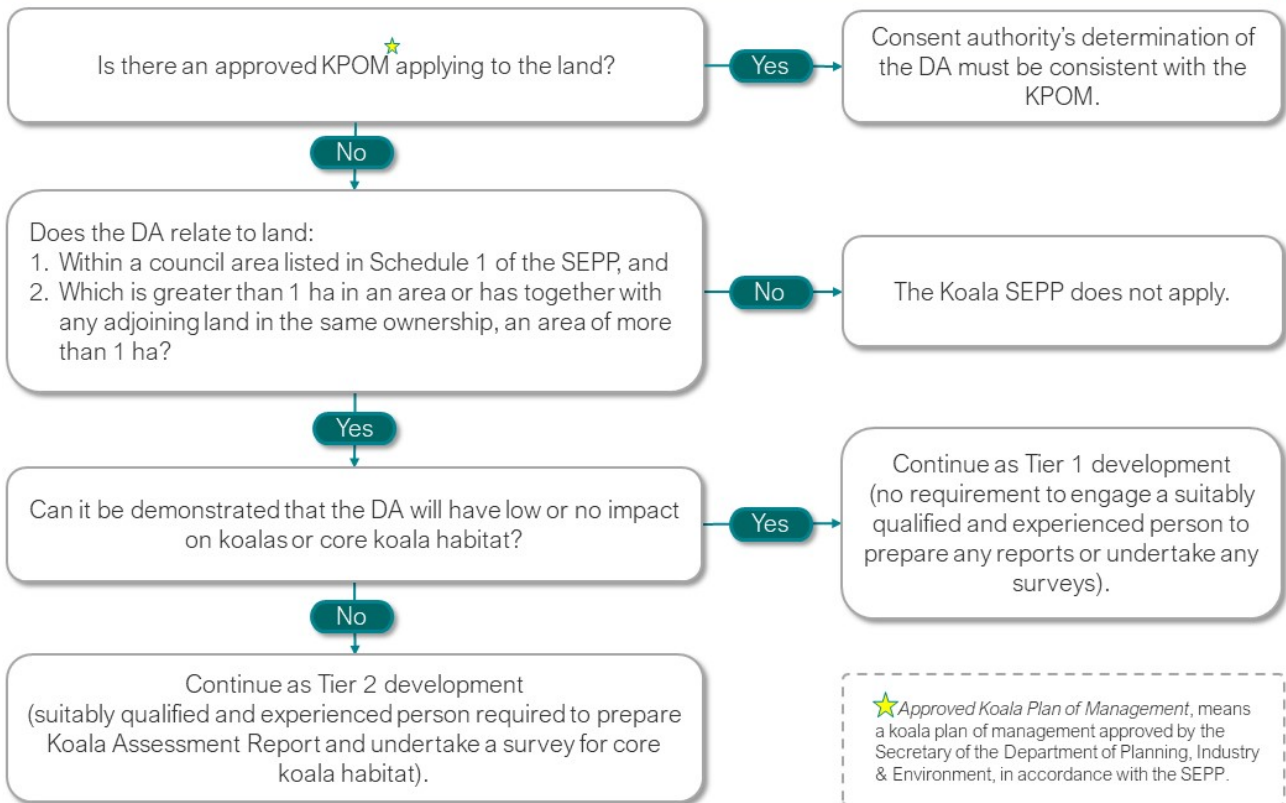
The objective of this clause is to enable the replacement of a lawfully erected dwelling house that has been damaged or destroyed by a bush fire to be rebuilt without having to consider the SEPP.

The SEPP **does not apply** to land forming part of an asset protection zone cleared for a dwelling house if—

- (a) the dwelling house is replacing a lawfully erected dwelling house damaged or destroyed by a bush fire, and
- (b) the development application for the replacement dwelling house is made to the consent authority no later than 5 years after the day the bush fire caused the damage or destruction, and
- (c) the asset protection zone is cleared in accordance with *Planning for Bush Fire Protection*.

The flowchart below provides an overview of the development application pathway.

Koala SEPP Development Assessment Pathways



3.1 Tier 1 - Low or no direct impact development

The Tier 1 process is for development which can be demonstrated to have low or no impact on koalas or koala habitat as follows:

1. onsite or aerial photography is sufficient evidence to demonstrate that the development does not involve and will not result in clearing of regionally relevant trees of the species listed in Schedule 2 of the Koala SEPP, and
2. the development is below the Biodiversity Offsets Scheme threshold under the BC Act, or
3. council agrees the proposed development will have low or no impact on koalas or koala habitat on a case by case basis.

If the development cannot either meet **the first two criteria OR criteria 3** above, it must progress as a Tier 2 development application.

Tier 1 development does not require the landholder to engage a suitably qualified and experienced person to prepare any reports or conduct any surveys. This differentiates the Tier 1 process from the Tier 2 process which requires a suitably qualified and experienced person to conduct a survey for core koala habitat and prepare a Koala Assessment Report.

Management measures to address key risks

Development issues **must** be assessed on a case-by-case basis and different councils may apply prescriptions that align with broader considerations relevant to their council area.

Councils are **encouraged** to develop requirements within their development control plans that specifically deal with koala habitat management issues as this will provide more detailed and tailored information around what is expected in the local area.

3.2 Tier 2 - Development applications impacting koalas and/or core koala habitat

Development applications which are likely to impact koalas and/or koala habitat and do not meet the Tier 1 criteria **must** address the following criteria summarised below against each of the seven planning principles. Tier 2 development applications require a suitably qualified and experienced person (as defined in the SEPP and detailed in this Guideline) to conduct a survey for core koala habitat, in accordance with Appendix C of this Guideline.

A Koala Assessment Report addressing the criteria **must** accompany any development application to which Tier 2 applies. A suggested template for a Koala Assessment Report is provided in section 3.3 below. The Koala Assessment Report **must** be prepared by a suitably qualified and experienced person, defined in the SEPP.

The level of detail required in the Koala Assessment Report must be commensurate with the likely impact the development application is likely to have on koala habitat including habitat connectivity. For example, a Koala Assessment Report supporting a development application that may impact a small number of koala use trees will not need to be as extensive as one that may impact on a large number of trees and/or are critical to habitat connectivity.

Principle 1. Understand koala habitat values

Criteria 1. *The site is established as containing core koala habitat if a site area survey undertaken by a suitably qualified and experienced person in accordance with Appendix C has identified the presence of core koala habitat.*

Criteria 2. *Further analysis is undertaken in order to understand the broader values of the core koala habitat, including information about the koala population using the habitat and any specific ecological functions the habitat might serve.*

Key questions which need to be addressed in meeting this criterion include:

- What is known about the size, health and viability of the koala population?
- What is known about the generational persistence of the local koala populations? This should be informed by a record analysis to determine population trends and persistence over time.
- What is the broader landscape context of the habitat within the site area? For instance, is it contiguous with broader areas of habitat or relatively isolated, and what are the likely regional movement patterns of koalas using the site area?
- Does the site area contain particular values likely to serve an important ecological function for koalas? For instance, does it provide linkage between other habitats or serve as a habitat buffer to broader areas?
- Could the habitat area and/or koala population using the site area be important to the recovery of the koala? For instance, does the habitat contain features that might provide refuge during droughts, extreme heat, or fire? Or is the population considered to be healthy, robust or showing relatively low incidence of disease?
- Drawing on evidence presented, what significance are the values of the site to preserving the existing koala population and supporting recovering and expanding populations?

Principle 2. Avoid intensifying land use in koala habitat areas through appropriate landscape planning and site selection

Criteria 3. *Site selection for development takes into account koala habitat values.*

In addressing this criterion, the development application needs to answer:

- How has the development footprint avoided core koala habitat?
- What feasible alternative site selections were assessed as part of the process?

Principle 3. Encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas

Criteria 4. *Development avoids the direct loss of core koala habitat within the site area and avoids fragmentation*

Criteria 5. *Core koala habitat is excluded from the development footprint*

Principle 4. Minimise potential direct impacts to koalas through koala sensitive design

Criteria 6. *Development avoids direct impacts to core koala habitat within the site area.*

In addressing this criterion, the development application needs to show:

- How direct impacts to core koala habitat are minimised so as to not fragment existing core koala habitat. This includes the ability for koalas to move across the landscape or impact the recovery and expansion of koala populations.

Criteria 7. *Where some loss of core koala habitat cannot be avoided (and provided it is consistent with all other criteria), development is designed in a way that retains higher value areas across the site and avoids fragmentation of habitat within the site area and more broadly within the region.*

For instance, this might mean prioritising the retention of koala trees with a diameter at breast height over bark (DBHOB) greater than 250 mm, or areas of core koala habitat that are in better condition, show signs of koala tree recruitment, are better connected with habitat more broadly, or contain features that might be important for refuge.

Note: a “tree” is taken to be a plant with a DBHOB of 10 cm or greater.

Criteria 8. *Development is undertaken in a way that maintains the potential function of the core koala habitat.*

For instance, if the koala habitat within the site area has been identified as an important linkage corridor, development should be undertaken in a way that enables the continued movement of koalas.

Principle 5. Implement best practice measures for the management of identified risks to koalas.

Criteria 9. *All relevant indirect impacts to koalas and koala habitat associated with the development are identified.*

Potential indirect impacts which may be relevant include (but are not limited to): dog attacks, vehicle strikes, drowning in pools, increased risk of fire, introduction or spread of disease, disturbance, and impediments to movement.

When considering potential indirect impacts, it is important to look at areas beyond the site that are likely to be affected by the proposal.

Criteria 10. *Development uses best practice management measures to address the potential impacts considered likely to pose an increased risk to koalas or their habitat.*

The types of measures or controls used to address impacts will vary depending on the nature of the development, the relative importance of the site area to koalas, and the extent and magnitude of impacts.

The specific requirements may be guided by development control plans relevant to each council area. See Table 1 above for examples of the types of measures that might be used to address the indirect impacts.

Principle 6. Use compensatory measures only where they can be shown to better promote the aim of the SEPP

Criteria 11. *Compensatory measures are only used once it has been demonstrated that options to avoid, minimise and manage impacts to core koala habitat have been exhausted.*

Criteria 12. *Where there is any direct loss of habitat or compromise in the potential function of a koala habitat area (and provided it is consistent with all other criteria outlined here), suitable compensatory measures are provided.*

Determining the suitability of any proposed compensatory measures should be guided by the overall aim of the SEPP. Advice from the Department's Environment, Energy and Science division or from a suitably qualified person, may be called on.

Principle 7. Use adaptive management strategies to monitor, evaluate and deliver appropriate planning outcomes for koalas

Criteria 13. *The development application includes a monitoring, adaptive management and reporting component against the key outcomes.*

3.3 Template for Koala Assessment Reports

Koala Assessment Reports **must** include the following information for a standard approach across NSW. These reports **must** accompany a development application subject to the SEPP.

Please note that the level of detail required in a Koala Assessment Report needs to be commensurate with the amount of impact a development application is likely to have on koala use trees and habitat. For example, a Koala Assessment Report supporting a development application that may impact a small number of koala use trees will not need to be as extensive as one that may impact on a large number of trees and/or are critical to habitat connectivity.

Introduction
Describe the nature of the proposed development.
Define how the SEPP applies to the proposed development.
Koala habitat values – addressing criteria 1 and 2
Describe the site area, including the general environment and condition, location and extent of the development area and any other areas that may be directly or indirectly impacted by the proposed development.
Provide details of koala survey as undertaken in accordance with Appendix C. This should include details of the results of the koala surveys, including how the site area meets the definition of core koala habitat and mapping that shows habitat areas and koala records within the site area and adjoining areas.
Describe the site context (including mapping showing habitat that might be associated with vegetation in the adjoining landscape and records within the vicinity of the site area) and provide an analysis of the koala habitat values (including how koalas might use the site area and the relative importance of the site area to a local koala population).
Measures taken to avoid impacts to koalas – addressing criteria 3, 4, 5 ,6, 7 and 8
Describe the site selection process, including how koala habitat was taken into account and any avoidance outcomes achieved through this process.
Describe how the proposed development avoids or minimises direct impacts to koala habitat and habitat function within the site area.
Analysis of potential impacts – addressing criteria 9
Identify the residual direct impacts to koalas and koala habitat within the site area, including the nature and extent of impacts and the likely implications for the viability of a local koala population.
Identify the relevant potential indirect impacts to koalas and koala habitat within the site area and adjacent habitat areas, including the nature and extent of potential indirect impacts and the likely implications for the viability of a local koala population.
Plan to manage and protect koalas and their habitat – addressing criteria 10, 11, 12 and 13
Describe the management measures that will be implemented as part of proposed construction and operations to manage the direct and indirect impacts identified. These measures should be outcomes focussed and include performance targets.
Describe any compensatory measures that will be delivered, including an analysis of the suitability of these measures against criteria 9 and 10.
Outline a plan for monitoring, adaptive management and reporting against the key outcomes and performance targets.
6. References

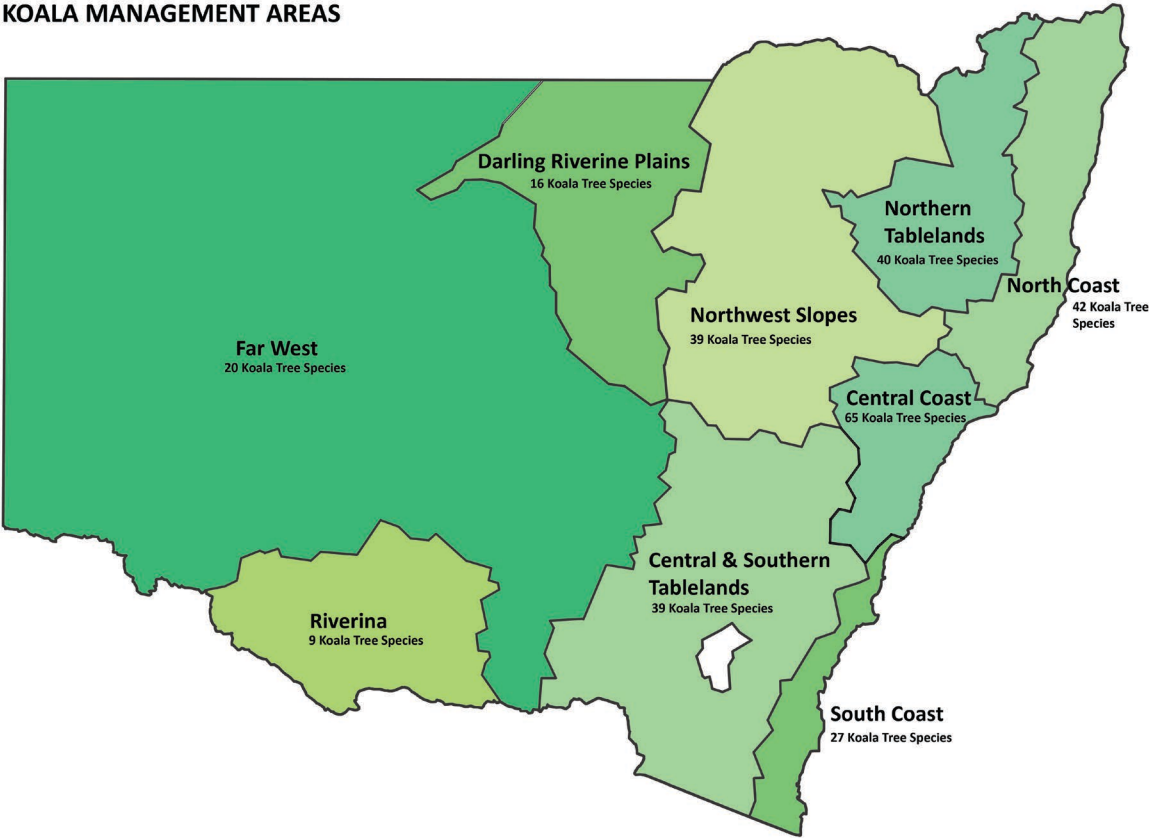
Include a list of all references cited in the report.

7. Appendices

Include any additional information or supplementary material relevant to the DA proposal.

Appendix A: Koala Use Tree Species List (as per Schedule 2 of the SEPP)

KOALA MANAGEMENT AREAS



Central and Southern Tablelands koala management area

Scientific name	Common name
<i>Eucalyptus agglomerata</i>	Blue-leaved Stringybark
<i>Eucalyptus albens</i>	White Box
<i>Eucalyptus amplifolia</i>	Cabbage Gum
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum
<i>Eucalyptus bosistoana</i>	Coast Grey Box
<i>Eucalyptus bridgesiana</i>	Apple Box
<i>Eucalyptus camaldulensis</i>	River Red Gum
<i>Eucalyptus conica</i>	Fuzzy Box

<i>Eucalyptus cypellocarpa</i>	Monkey Gum
<i>Eucalyptus dalrympleana</i>	Mountain Gum
<i>Eucalyptus dealbata</i>	Tumbledown Red Gum
<i>Eucalyptus dives</i>	Broad-leaved Peppermint
<i>Eucalyptus elata</i>	River Peppermint
<i>Eucalyptus eugenioides</i>	Narrow-leaved Stringybark
<i>Eucalyptus fibrosa</i>	Broad-leaved Red Ironbark
<i>Eucalyptus globoidea</i>	White Stringybark
<i>Eucalyptus goniacalyx</i>	Bundy
<i>Eucalyptus macrorhyncha</i>	Red Stringybark
<i>Eucalyptus maidenii</i>	Maiden's Blue Gum
<i>Eucalyptus mannifera</i>	Brittle Gum
<i>Eucalyptus melliodora</i>	Yellow Box
<i>Eucalyptus microcarpa</i>	Western Grey Box
<i>Eucalyptus nortonii</i>	Large-flowered Bundy
<i>Eucalyptus obliqua</i>	Messmate
<i>Eucalyptus oblonga</i>	Stringybark
<i>Eucalyptus paniculata</i>	Grey Ironbark
<i>Eucalyptus pauciflora</i>	White Sally, Snow Gum
<i>Eucalyptus piperita</i>	Sydney Peppermint
<i>Eucalyptus polyanthemus</i>	Red Box
<i>Eucalyptus punctata</i>	Grey Gum

<i>Eucalyptus quadrangulata</i>	White-topped Box
<i>Eucalyptus radiata</i>	Narrow leaved Peppermint
<i>Eucalyptus rossii</i>	Inland Scribbly Gum
<i>Eucalyptus rubida</i>	Candlebark
<i>Eucalyptus sclerophylla</i>	Hard-leaved Scribbly Gum
<i>Eucalyptus sideroxylon</i>	Mugga Ironbark
<i>Eucalyptus sieberi</i>	Silvertop Ash
<i>Eucalyptus tereticornis</i>	Forest Red Gum
<i>Eucalyptus viminalis</i>	Ribbon Gum

Central Coast koala management area

Scientific name	Common name
<i>Allocasuarina littoralis</i>	Black She-oak
<i>Allocasuarina torulosa</i>	Forest Oak
<i>Angophora bakeri</i>	Narrow-leaved Apple
<i>Angophora costata</i>	Smooth-barked Apple
<i>Angophora floribunda</i>	Rough-barked Apple
<i>Casuarina glauca</i>	Swamp Oak
<i>Corymbia eximia</i>	Yellow Bloodwood
<i>Corymbia gummifera</i>	Red Bloodwood
<i>Corymbia maculata</i>	Spotted Gum
<i>Eucalyptus acmenoides</i>	White Mahogany
<i>Eucalyptus agglomerata</i>	Blue-leaved Stringybark
<i>Eucalyptus albens</i>	White Box
<i>Eucalyptus amplifolia</i>	Cabbage Gum
<i>Eucalyptus beyeriana</i>	Beyer's Ironbark

<i>Eucalyptus blakelyi</i>	Blakely's Red Gum
<i>Eucalyptus bosistoana</i>	Coast Grey Box
<i>Eucalyptus botryoides</i>	Bangalay
<i>Eucalyptus camaldulensis</i>	River Red Gum
<i>Eucalyptus camfieldii</i>	Camfield's Stringybark
<i>Eucalyptus canaliculata</i>	Large-fruited Grey Gum
<i>Eucalyptus capitellata</i>	Brown Stringybark
<i>Eucalyptus carnea</i>	Thick-leaved Mahogany
<i>Eucalyptus considaniana</i>	Yertchuk
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
<i>Eucalyptus cypellocarpa</i>	Monkey Gum
<i>Eucalyptus deanei</i>	Mountain Blue Gum
<i>Eucalyptus eugenioides</i>	Narrow-leaved Stringybark
<i>Eucalyptus fibrosa</i>	Broad-leaved Red Ironbark
<i>Eucalyptus glaucina</i>	Slaty Red Gum
<i>Eucalyptus globoidea</i>	White Stringybark
<i>Eucalyptus grandis</i>	Flooded Gum
<i>Eucalyptus haemastoma</i>	Broad-leaved Scribbly Gum
<i>Eucalyptus imitans</i>	Eucalyptus imitans
<i>Eucalyptus largeana</i>	Craven Grey Box
<i>Eucalyptus longifolia</i>	Woollybutt
<i>Eucalyptus macrorhyncha</i>	Red Stringybark
<i>Eucalyptus melliodora</i>	Yellow Box
<i>Eucalyptus michaeliana</i>	Brittle Gum
<i>Eucalyptus microcorys</i>	Tallowwood
<i>Eucalyptus moluccana</i>	Grey Box
<i>Eucalyptus oblonga</i>	Stringybark

<i>Eucalyptus paniculata</i>	Grey Ironbark
<i>Eucalyptus parramattensis</i>	Parramatta Red Gum
<i>Eucalyptus pilularis</i>	Blackbutt
<i>Eucalyptus piperita</i>	Sydney Peppermint
<i>Eucalyptus propinqua</i>	Small-fruited Grey Gum
<i>Eucalyptus punctata</i>	Grey Gum
<i>Eucalyptus quadrangulata</i>	White-topped Box
<i>Eucalyptus racemosa</i>	Narrow-leaved Scribbly Gum
<i>Eucalyptus resinifera</i>	Red Mahogany
<i>Eucalyptus robusta</i>	Swamp Mahogany
<i>Eucalyptus saligna</i>	Sydney Blue Gum
<i>Eucalyptus scias</i>	Large-fruited Red Mahogany
<i>Eucalyptus sclerophylla</i>	Hard-leaved Scribbly Gum
<i>Eucalyptus siderophloia</i>	Grey Ironbark
<i>Eucalyptus sideroxylon</i>	Mugga Ironbark
<i>Eucalyptus sieberi</i>	Silvertop Ash
<i>Eucalyptus signata</i>	Scribbly Gum
<i>Eucalyptus sparsifolia</i>	Narrow-leaved Stringybark
<i>Eucalyptus squamosa</i>	Scaly Bark
<i>Eucalyptus tereticornis</i>	Forest Red Gum
<i>Eucalyptus umbra</i>	Bastard White Mahogany
<i>Eucalyptus viminalis</i>	Ribbon Gum
<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark
<i>Syncarpia glomulifera</i>	Turpentine

Darling Riverine Plains koala management area

Scientific name	Common name
<i>Callitris glaucophylla</i>	White Cypress Pine

<i>Eucalyptus albens</i>	White Box
<i>Eucalyptus camaldulensis</i>	River Red Gum
<i>Eucalyptus chloroclada</i>	Dirty Gum
<i>Eucalyptus conica</i>	Fuzzy Box
<i>Eucalyptus coolabah</i>	Coolibah
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
<i>Eucalyptus dealbata</i>	Tumbledown Red Gum
<i>Eucalyptus dwyeri</i>	Dwyer's Red Gum
<i>Eucalyptus largiflorens</i>	Black Box
<i>Eucalyptus melanophloia</i>	Silver-leaved Ironbark
<i>Eucalyptus melliodora</i>	Yellow Box
<i>Eucalyptus microcarpa</i>	Western Grey Box
<i>Eucalyptus pilligaensis</i>	Narrow-leaved Grey Box
<i>Eucalyptus populnea</i>	Bimble Box, Poplar Box
<i>Eucalyptus sideroxylon</i>	Mugga Ironbark

Far West koala management area

Scientific name	Common name
<i>Angophora floribunda</i>	Rough-barked Apple
<i>Callitris glaucophylla</i>	White Cypress Pine
<i>Casuarina cristata</i>	Belah
<i>Eucalyptus albens</i>	White Box
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum
<i>Eucalyptus camaldulensis</i>	River Red Gum
<i>Eucalyptus chloroclada</i>	Dirty Gum
<i>Eucalyptus coolabah</i>	Coolibah
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
<i>Eucalyptus dealbata</i>	Tumbledown Red Gum

<i>Eucalyptus intertexta</i>	Gum Coolibah
<i>Eucalyptus largiflorens</i>	Black Box
<i>Eucalyptus melanophloia</i>	Silver-leaved Ironbark
<i>Eucalyptus melliodora</i>	Yellow Box
<i>Eucalyptus microcarpa</i>	Western Grey Box
<i>Eucalyptus moluccana</i>	Grey Box
<i>Eucalyptus pilligaensis</i>	Narrow-leaved Grey Box
<i>Eucalyptus populnea</i>	Bimble Box
<i>Eucalyptus sideroxylon</i>	Mugga Ironbark
<i>Geijera parviflora</i>	Wilga

North Coast koala management area

Scientific name	Common name
<i>Allocasuarina torulosa</i>	Forest Oak
<i>Angophora floribunda</i>	Rough-barked Apple
<i>Corymbia gummifera</i>	Red Bloodwood
<i>Corymbia henryi</i>	Large-leaved Spotted Gum
<i>Corymbia intermedia</i>	Pink Bloodwood
<i>Corymbia maculata</i>	Spotted Gum
<i>Eucalyptus acmenoides</i>	White Mahogany
<i>Eucalyptus amplifolia</i>	Cabbage Gum
<i>Eucalyptus bancroftii</i>	Orange Gum
<i>Eucalyptus biturbinata</i>	Grey Gum
<i>Eucalyptus campanulata</i>	New England Blackbutt
<i>Eucalyptus canaliculata</i>	Large-fruited Grey Gum
<i>Eucalyptus carnea</i>	Thick-leaved Mahogany
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
<i>Eucalyptus eugenoides</i>	Narrow-leaved stringybark

<i>Eucalyptus fibrosa</i>	Broad-leaved Red Ironbark
<i>Eucalyptus glaucina</i>	Slaty Red Gum
<i>Eucalyptus globoidea</i>	White Stringybark
<i>Eucalyptus grandis</i>	Flooded Gum
<i>Eucalyptus laevopinea</i>	Silver-top Stringybark
<i>Eucalyptus largeana</i>	Craven Grey Box
<i>Eucalyptus microcorys</i>	Tallowwood
<i>Eucalyptus moluccana</i>	Grey Box
<i>Eucalyptus nobilis</i>	Forest Ribbon Gum
<i>Eucalyptus pilularis</i>	Blackbutt
<i>Eucalyptus placita</i>	Grey Ironbark
<i>Eucalyptus planchoniana</i>	Bastard Tallowwood
<i>Eucalyptus propinqua</i>	Small-fruited Grey Gum
<i>Eucalyptus psammitica</i>	Bastard White Mahogany
<i>Eucalyptus punctata</i>	Grey Gum
<i>Eucalyptus resinifera</i>	Red Mahogany
<i>Eucalyptus robusta</i>	Swamp Mahogany
<i>Eucalyptus rummeryi</i>	Steel Box
<i>Eucalyptus saligna</i>	Sydney Blue Gum
<i>Eucalyptus scias</i>	Large-fruited Red Mahogany
<i>Eucalyptus seeana</i>	Narrow-leaved Red Gum
<i>Eucalyptus siderophloia</i>	Grey Ironbark
<i>Eucalyptus signata/Eucalyptus racemosa</i>	Scribbly Gum/Narrow-leaved Scribbly Gum
<i>Eucalyptus tereticornis</i>	Forest Red Gum
<i>Eucalyptus tindaliae</i>	Stringybark
<i>Eucalyptus umbra</i>	Bastard White Mahogany
<i>Melaleuca quinquenervia</i>	Broad-leaved Paperbark

Northwest Slopes koala management area

Scientific name	Common name
<i>Angophora floribunda</i>	Rough-barked Apple
<i>Callitris glaucophylla</i>	White Cypress Pine
<i>Casuarina cristata</i>	Belah
<i>Eucalyptus albens</i>	White Box
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum
<i>Eucalyptus bridgesiana</i>	Apple Box
<i>Eucalyptus caleyi</i>	Drooping Ironbark
<i>Eucalyptus caliginosa</i>	Broad-leaved Stringybark
<i>Eucalyptus camaldulensis</i>	River Red Gum
<i>Eucalyptus canaliculata</i>	Large-fruited Grey Gum
<i>Eucalyptus chloroclada</i>	Dirty Gum
<i>Eucalyptus conica</i>	Fuzzy Box
<i>Eucalyptus coolabah</i>	Coolibah
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
<i>Eucalyptus dalrympleana</i>	Mountain Gum
<i>Eucalyptus dealbata</i>	Tumbledown Red Gum
<i>Eucalyptus dwyeri</i>	Dwyer's Red Gum
<i>Eucalyptus exserta</i>	Peppermint
<i>Eucalyptus fibrosa</i>	Broad-leaved Red Ironbark
<i>Eucalyptus goniocalyx</i>	Bundy
<i>Eucalyptus laevopinea</i>	Silver-top Stringybark
<i>Eucalyptus largiflorens</i>	Black Box
<i>Eucalyptus macrorhyncha</i>	Red Stringybark
<i>Eucalyptus mannifera</i>	Brittle Gum
<i>Eucalyptus melanophloia</i>	Silver-leaved Ironbark
<i>Eucalyptus melliodora</i>	Yellow Box

<i>Eucalyptus microcarpa</i>	Western Grey Box
<i>Eucalyptus moluccana</i>	Grey Box
<i>Eucalyptus nobilis</i>	Forest Ribbon Gum
<i>Eucalyptus parramattensis</i>	Parramatta Red Gum
<i>Eucalyptus pauciflora</i>	White Sally, Snow Gum
<i>Eucalyptus pilligaensis</i>	Narrow-leaved Grey Box
<i>Eucalyptus polyanthemos</i>	Red Box
<i>Eucalyptus populnea</i>	Bimble Box/Poplar Box
<i>Eucalyptus prava</i>	Orange Gum
<i>Eucalyptus punctata</i>	Grey Gum
<i>Eucalyptus quadrangulata</i>	White-topped Box
<i>Eucalyptus sideroxylon</i>	Mugga Ironbark
<i>Eucalyptus viminalis</i>	Ribbon Gum

Northern Tablelands koala management area

Scientific name	Common name
<i>Allocasuarina littoralis</i>	Black She-oak
<i>Angophora floribunda</i>	Rough-barked Apple
<i>Callitris glaucophylla</i>	White Cypress Pine
<i>Eucalyptus acaciiformis</i>	Wattle-leaved Peppermint
<i>Eucalyptus albens</i>	White Box
<i>Eucalyptus amplifolia</i>	Cabbage Gum
<i>Eucalyptus biturbinata</i>	Grey Gum
<i>Eucalyptus blakelyi</i>	Blakely's Red Gum
<i>Eucalyptus bridgesiana</i>	Apple Box
<i>Eucalyptus brunnea</i>	Mountain Blue Gum
<i>Eucalyptus caleyi</i>	Drooping Ironbark
<i>Eucalyptus caliginosa</i>	Broad-leaved Stringybark

<i>Eucalyptus camaldulensis</i>	River Red Gum
<i>Eucalyptus campanulata</i>	New England Blackbutt
<i>Eucalyptus crebra</i>	Narrow-leaved Ironbark
<i>Eucalyptus dalrympleana</i>	Mountain Gum
<i>Eucalyptus dealbata</i>	Tumbledown Red Gum
<i>Eucalyptus eugenioides</i>	Narrow-leaved Stringybark
<i>Eucalyptus laevopinea</i>	Silver-top Stringybark
<i>Eucalyptus macrorhyncha</i>	Red Stringybark
<i>Eucalyptus melanophloia</i>	Silver-leaved Ironbark
<i>Eucalyptus melliodora</i>	Yellow Box
<i>Eucalyptus michaeliana</i>	Brittle Gum
<i>Eucalyptus microcorys</i>	Tallowwood
<i>Eucalyptus moluccana</i>	Grey Box
<i>Eucalyptus nicholii</i>	Narrow-leaved Black Peppermint
<i>Eucalyptus nobilis</i>	Forest Ribbon Gum
<i>Eucalyptus nova-anglica</i>	New England Peppermint
<i>Eucalyptus obliqua</i>	Messmate
<i>Eucalyptus pauciflora</i>	White Sally, Snow Gum
<i>Eucalyptus prava</i>	Orange Gum
<i>Eucalyptus radiata</i>	Narrow leaved Peppermint
<i>Eucalyptus saligna</i>	Sydney Blue Gum
<i>Eucalyptus sideroxylon</i>	Mugga Ironbark
<i>Eucalyptus stellulata</i>	Black Sally
<i>Eucalyptus subvelutina</i>	Broad-leaved Apple
<i>Eucalyptus tereticornis</i>	Forest Red Gum
<i>Eucalyptus viminalis</i>	Ribbon Gum
<i>Eucalyptus williamsiana</i>	Eucalyptus williamsiana

<i>Eucalyptus youmanii</i>	Youman's Stringybark
----------------------------	----------------------

Riverina koala management area

Scientific name	Common name
<i>Callitris glaucophylla</i>	White Cypress Pine
<i>Casuarina cristata</i>	Belah
<i>Eucalyptus albens</i>	White Box
<i>Eucalyptus camaldulensis</i>	River Red Gum
<i>Eucalyptus intertexta</i>	Gum Coolibah
<i>Eucalyptus largiflorens</i>	Black Box
<i>Eucalyptus melliodora</i>	Yellow Box
<i>Eucalyptus microcarpa</i>	Western Grey Box
<i>Eucalyptus populnea</i>	Bimble Box

South Coast koala management area

Scientific name	Common name
<i>Allocasuarina littoralis</i>	Black She-oak
<i>Angophora floribunda</i>	Rough-barked Apple
<i>Corymbia gummifera</i>	Red Bloodwood
<i>Corymbia maculata</i>	Spotted Gum
<i>Eucalyptus agglomerata</i>	Blue-leaved Stringybark
<i>Eucalyptus baueriana</i>	Blue Box
<i>Eucalyptus bosistoana</i>	Coast Grey Box
<i>Eucalyptus consideniana</i>	Yertchuk
<i>Eucalyptus cypellocarpa</i>	Monkey Gum
<i>Eucalyptus elata</i>	River Peppermint
<i>Eucalyptus eugenioides</i>	Narrow-leaved Stringybark
<i>Eucalyptus fastigata</i>	Brown Barrel

<i>Eucalyptus globoidea</i>	White Stringybark
<i>Eucalyptus longifolia</i>	Woollybutt
<i>Eucalyptus maidenii</i>	Maiden's Blue Gum
<i>Eucalyptus muelleriana</i>	Yellow Stringybark
<i>Eucalyptus obliqua</i>	Messmate
<i>Eucalyptus paniculata</i>	Grey Ironbark
<i>Eucalyptus pilularis</i>	Blackbutt
<i>Eucalyptus piperita</i>	Sydney Peppermint
<i>Eucalyptus punctata</i>	Grey Gum
<i>Eucalyptus saligna</i>	Sydney Blue Gum
<i>Eucalyptus sclerophylla</i>	Hard-leaved Scribbly Gum
<i>Eucalyptus sieberi</i>	Silvertop Ash
<i>Eucalyptus tereticornis</i>	Forest Red Gum
<i>Eucalyptus tricarpa</i>	Mugga (Red) Ironbark
<i>Eucalyptus viminalis</i>	Ribbon Gum

Appendix B: Detailed Criteria for Preparing Koala Plans of Management

This appendix:

- Outlines the steps councils are **encouraged** to follow when developing a KPoM.
- Provides guidance about the methodology for identifying and mapping koala habitat including core koala habitat across the plan area.
- Provides a standard structure for KPoMs that **must** be followed to ensure Plans are robust and consistent across NSW.

Steps for Developing KPoMs

The following steps provide a **suggested** process for initiating and developing a KPoM. They don't necessarily need to be taken in the same order but doing so will help efficiently finalise a KPoM.

The steps are:

1. Scope and project plan:
 - a. Determine the need for a KPoM
 - b. Define the proposed plan area and available data/mapping to inform identification of core koala habitat
 - c. Identify key issues and risks
 - d. Project plan to include tasks, resourcing and timeframes
2. Discuss the proposed KPoM with DPIE (Planning and Assessments Group and Environment, Energy and Science Group as early as possible and continue throughout the development of the Plan. Formal consultation during development of the plan with Local Land Services and the Environment, Energy and Science Group of the Department of Planning, Industry and Environment **must** occur and is a requirement of the SEPP (Clause 12).
3. Prepare background studies and surveys to establish habitat and presence of koalas within the plan area. This is discussed further below.
4. Establish a koala working group to engage with key stakeholders including the local community, researchers and other organisations. This is a critical part of the process and provides the opportunity to gather further information about koalas, and test and develop management approaches. Early engagement with impacted landholders and land managers is required since they may be able to advise on the presence of koalas and/or koala habitat on their land.
5. Draft the plan by building on the technical background information and input from key stakeholders. A standard structure for KPoMs is provided below.
6. Consult with DPIE regarding the draft plan and its consistency with the SEPP so that any major issues can be resolved before public exhibition.
7. Give the community an opportunity to have their say. Public consultation **must** include:
 - a. informing landholders in all areas of proposed core koala habitat.
 - b. prior to the exhibition period commencing Councils **must** contact impacted landholders by letter or email and outline the process for contesting the proposed designation (i.e., the landholder can commission a suitably qualified person to undertake a survey for core koala habitat on their land or by requiring council access the land to verify survey results).

The SEPP also requires the draft KPoM to be publicly exhibited for at least 90 days. A submissions report detailing results of the exhibition must be submitted to the Secretary with the KPoM. Any comments received during public consultation must be considered in finalising the Plan.

8. Finalise the plan and seek approval from the Secretary of DPIE. This includes supplying GIS data for any core koala habitat identified in the plan, and all other documents relevant to the plan (including a report on any surveys).
9. Implement the plan once approved by the Secretary. This should include monitoring and review.

Identifying and Mapping Core Koala Habitat

Identifying and mapping core koala habitat are the critical foundations of KPoMs (see step 3 above). The use of scientific survey, research and current imagery in existing maps allows for the most reliable identification of core koala habitat. This provides a strong base for making informed planning decisions.

As Part 2 of this Guideline mentions, the definition of core koala habitat under the SEPP is limiting at a landscape level. It is therefore appropriate for KPoMs to identify important or potentially important habitat to koalas with regard to several factors outside of those used to define core koala habitat. These should include:

- the presence of koala trees (the SEPP's Site Investigation Area for Koala Plans of Management Map can be used).
- the presence of highly suitable habitat.
- past and present koala records.
- dispersal or seasonal movement requirements.
- corridors important for maintaining connectivity.
- drought or fire refuges.

The Koala Habitat Information Base provides information on koala habitat suitability across a region, the likelihood of koala tree presence, the likelihood of koala occurrence in an area, information on areas of regional koala significance and for historical records of koala sightings in NSW. The Information Base can also assist in identifying and mapping core koala habitat in a KPOM.

What mapping is required?

A KPOM **must** include a map (or a series of maps) that identifies core koala habitat. Where possible, it must also categorise that habitat and identify corridors and other important areas such as drought refuge areas. High quality mapping will facilitate the analysis of koala habitat categories against other factors, such as land tenure and land use zones. This can greatly contribute to identifying potential areas of conflicting land use (e.g. core koala habitat identified on land zoned or proposed to be zoned to permit intensified development).

How should mapping be done?

The methods used for mapping must be fit for purpose and tailored to the region where the plan is being prepared. This is critical so that the approach to mapping accommodates regional variation in koala populations and habitat throughout NSW. The methods in Appendix C **must** be used when identifying land which contains core koala habitat.

However, it is necessary that a KPOM specify a range of habitat types based on tree species identified in the SEPP as well as the findings of field surveys and record analysis. In order to identify core koala habitat for the purpose of a KPOM, the following general procedures **must** be followed:

1. Production of a vegetation map identifying plant community types (PCTs) at a suitable scale and accuracy. The vegetation map should include both floristic and structural characteristics.
2. Analysis of existing BioNet (excluding any of Dan Lunney's 2006 community survey records and any records with a locational accuracy of more than 1,000 metres) records providing both recent and historical locations of koalas.
3. Field survey (consistent with Appendix C, where core koala habitat is concerned) to determine koala presence and activity and identify which tree species and associated plant community types koalas use in the study area.

Mapping can then be produced which identifies categories of koala habitat and identifies corridors and other areas of importance such as drought refuge areas.

Principles to guide the identification of koala habitat (including habitat other than core koala habitat)

There is no one size fits all approach to the definition of koala habitat at a landscape scale. As for the mapping method, the categories should be tailored to the KPOM region.

Guiding principles

- Given the impact of bushfires to koala populations and their habitat across NSW, a precautionary approach should be taken in identifying core koala habitat as:
 - post fire, occupied areas may not be re-occupied until the habitat recovers and provides suitable structure and browse, regardless of survey methods.
 - in terms of historical records, the lack of NSW BioNet records does not mean koalas have not been there, just not recorded.
- The Koala Habitat Information Base (<https://datasets.seed.nsw.gov.au/dataset/koala-habitat-information-base>) should be used to identify which areas are likely to have suitable koala habitat, koala use trees and which areas are likely occupied by koalas. The information base can also guide where to focus local surveys efforts.
- Koala habitat mapping should be informed by local surveys and fine scale mapping to identify vegetation communities that contain trees that koalas are known to use in that region (see Appendix C).
- Survey sites and effort should be informed by the variability of vegetation communities in the local government area and across all land tenures.
- Survey design must be based on scientifically rigorous methods suitable to the study area (see Appendix C).
- Categories of mapped koala habitat should use classes appropriate to the region that is informed by recent studies.
- Historical and recent distribution of koalas in the local government area should be identified through an analysis of NSW BioNet records and local field survey of areas that have had low to no survey effort in the past.
- Identify and map habitat that connects areas that are occupied by koalas.
- Identify and map suitable habitat that is currently unoccupied (areas for population expansion or recolonisation).
- Identify and map areas of koala habitat other than core koala habitat important for providing refuge in a changing climate (i.e. drought and bushfire).
- Identify what is known about the generational persistence of the local koala populations through an analysis of records to determine population trends and persistence over time. The assessment of historical koala records can provide an indication of where koalas are distributed throughout the landscape, where koala populations have persisted over time, and where koalas are no longer being recorded.

Core koala habitat

The final element of the mapping process is to identify areas of core koala habitat (as defined by the SEPP) based on evidence of koala presence or historical records and the presence of highly suitable koala habitat. Any areas of core koala habitat in a KPoM **must** occur within the SEPP's Site Investigation Area for Koala Plans of Management Map. Councils are required to publish the SEPP's Site Investigation Area for Koala Plans of Management Map on their website when they commence the preparation of a KPoM.

Any surveys conducted at the time of preparing the KPoM **must** be undertaken using the methods outlined in Appendix C of this Guideline. Council can use the best available data where it is unable to gain access to land for a physical survey.

Identifying requirements for planning proposals, development applications and activities affecting koala habitat

The KPoM **must** outline the requirements for:

1. planning proposals in core koala habitat and other koala habitat important for maintaining connectivity and function of core koala habitat.
2. development assessment for a development application on land to which the KPoM applies. For development applications in mapped core koala habitat, the Biodiversity Offsets Scheme will automatically apply. For developments in other mapped koala habitat, these requirements should consider the criteria in section 3.2 of this Guideline.

Standard Structure for KPoMs

A standard structure for KPoMs is provided below (Table 1). KPoMs **must** at least include the following information to ensure a standard approach across NSW. Other additional information specific to the Plan area can also be included as needed.

Table 1: Standard structure for KPoMs

Standard Structure for KPoMs	
Section 1	
Purpose	<p>Defines the purpose of the KPoM.</p> <p>In particular this must include meeting the aims of the SEPP which are to “encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline”.</p> <p>The secondary purpose of a KPoM should relate to the seven planning principles outlined in this Guideline.</p>

Standard Structure for KPoMs

Objectives	<p>Defines the objectives of the KPoM.</p> <p>In the interests of consistency, the following objectives are recommended:</p> <ul style="list-style-type: none"> • Manage the long-term sustainability and recovery of koalas and their habitat. • Identify and list the preferred koala food tree species likely to be found in the plan area and map koala habitat. • Ensure that there is no net loss of koala habitat at a bioregional scale and (where appropriate) create, manage and/or restore koala habitat linkages to allow for safe koala movement across the landscape. • Minimise and manage threats affecting koalas and their habitat. • Provide consistent assessment criteria for the processing of development applications, including guidelines for koala habitat assessment and food tree and koala habitat retention. <p>Additional objectives may be added so long as they are not inconsistent with the above.</p>
Legislative context	Describes the main legislation and planning instruments which are relevant to the operation of the Plan and which relate to the management and conservation of koalas and their habitats.
Who is affected by the plan	Clearly describes who is affected by the plan. For example, landholders in areas of core koala habitat, local environment and conservation groups, etc.
What is the status of koalas in the plan area	Summarises the status of the koala population in the plan area. Detailed technical information supporting this summary can be provided as appendices.
What are the threats to koalas in the plan area	Identifies and describes the threatening processes affecting koalas and koala habitat within the plan area. For example, habitat clearing, fragmentation and degradation, feral predators, roads and traffic, disease and natural disasters.
Section 2 – General provisions	
Land to which the plan applies	Clearly describes the land to which the plan applies.
Land to which the plan does not apply	Clearly describes the land to which the plan does not apply.
Koala habitat mapping	<p>Summarises the koala habitat mapping undertaken as part of developing the plan.</p> <p>Clearly describes that areas mapped as core koala habitat have been mapped consistent with the definition in the SEPP and includes maps of other habitat categories (where appropriate). Detailed technical information supporting this summary should be provided as appendices.</p>
Relationship to other koala plans of management	Describes the relationship of the plan to other koala plans of management that may be in place.
Duration of the plan	Defines the duration of this version of the plan. Must include provisions for review as appropriate.

Section 3 – Management and monitoring activities

Standard Structure for KPoMs

Management / monitoring activities and actions	<p>Provides a non-regulatory framework for management activities that complement the development assessment framework outlined in Section 4 of the Plan. These management activities help:</p> <ul style="list-style-type: none"> • minimise threats to koalas and their habitat that are not related to development activity. • increase the amount of koala habitat in the KPoM area. • maintain and, where possible, improve the quality of koala habitat in the plan area. • ensure effective implementation and monitoring of the Plan. • community and landholders to manage and increase koala habitat corridors and habitat. <p>Koala management in the plan area should not be limited to forested areas. It should extend over areas of fragmented habitat which support a koala population and identified links between koala habitats.</p> <p>Specific actions should be defined in table format across the following management activities:</p> <ul style="list-style-type: none"> • Implementation and monitoring • Regulatory processes • Restoration and management • Communication and education • Road and traffic management • Dog management • Koala health and welfare • Bushfire management • Funding • Research <p>For each specific action, the following information should be provided:</p> <ul style="list-style-type: none"> • Clear description of the action • Priority (high, medium, low) • Target start date • Indicative duration of the action • Indicative budget • Funding source
---	---

Section 4 – Development assessment framework

When is the development assessment framework triggered?	<p>Defines when the development assessment framework is triggered. This must be for any areas identified as core koala habitat in the KPoM and is recommended for other koala habitat important for maintaining habitat connectivity and function.</p>
Assessment pathways	<p>Defines the assessment pathways that are relevant to the development application. These may be different in different council areas. For development applications in mapped core koala habitat, the Biodiversity Offsets Scheme will automatically apply. Councils should also consider identifying assessment pathways for other categories of koala habitat to help meet the objectives of the KPoM.</p>

Standard Structure for KPoMs

Koala Habitat development applications	Describes the information that needs to be included with development applications.
Development design measures for the protection of koalas	<p>Describes the measures that can be put in place during the design of proposed developments to protect koalas and core koala habitat. It must include descriptions of measures to:</p> <ul style="list-style-type: none"> • protect koalas from the impacts of development. • avoid direct impacts to koala habitat including core koala habitat. • mitigate and manage potential indirect impacts to core koala habitat. • offset any unavoidable, residual impacts. <p>These measures should also be consistent with the best practice koala planning guideline being developed under the NSW Koala Strategy.</p>
Assessment criteria	Defines the criteria that council will consider in assessing development applications. This could take into consideration the criteria in 3.2 of this Guideline.
Section 5– Planning proposals that affect mapped koala habitat	
Planning proposal in mapped koala habitat	Defines requirements for planning proposals in core koala habitat and other koala habitat important for maintaining connectivity and function.
Other	
Glossary	Defines important terms used in the KPoM.
Technical appendices	Technical appendices should be included as appropriate. For example, the detailed methodology and results of the koala habitat mapping.
Identification of authors	The plan should list the authors of the plan as well as any field personnel that worked on the plan. The qualifications of these people should be stated in the document.

Appendix C: Survey Methods for Identifying Core Koala Habitat

The following survey methods **must** be applied to identify the presence of core koala habitat for Tier 2 development application proponents, landholders objecting to core koala habitat in draft KPoMs, and for councils preparing KPoMs.

For **development applications**, this survey process is relevant:

- on land to which the SEPP applies, which is 1 hectare or more, and
- where there is no approved KPoM applying to the land, and
- where the development is a Tier 2 development because it cannot be demonstrated to have low or no impact on koalas or koala habitat using the Tier 1 criteria.

However, in some instances it may be appropriate for a Tier 2 development application proponent to provide evidence to council that a survey is not required since the land clearly does not contain core koala habitat (e.g. because it has been cleared of all trees or contains only monoculture plantations such as a macadamia farm). This is detailed below.

The survey process is relevant to **landholders** who wish to make an objection to a draft KPoM:

- Where a landholder wishes to dispute their land forming part of core koala habitat in a draft KPoM which is on exhibition for public submissions.

Note: The landholder can commission their own suitably qualified person at their expense, or request council conducts the survey for core koala habitat. Council can use the suitably qualified person who prepared the KPoM, or another suitably qualified person at their discretion. This is only relevant for the KPoM process – when proposing core koala habitat in a draft KPoM, councils **must** undertake on-ground surveys if requested by the landholder at council's expense but are not required to do so for the development application process.

The survey process is relevant to **councils** wishing to identify core koala habitat in a KPoM where the land is also identified on the Site Investigation Area for Koala Plans of Management Map.

Councils do **not** need to physically survey every landholding in their LGA they propose to identify as core koala habitat. However a physical survey in one or more areas of the LGA in accordance with this appendix must inform the KPoM. In accordance with the SEPP, councils are able to use the best available data to identify core koala habitat where they are unable to gain access to land they would otherwise seek to survey.

In all of the above instances (apart from where a survey is not required as evidence has been provided the land clearly does not contain core koala habitat), the flora and fauna survey **must** be conducted by a **suitably qualified and experienced person** (see below).

The survey **must** be undertaken in accordance with the below procedure to determine if the area meets the definition of core koala habitat in the SEPP.

core koala habitat means:

- a) an area of land which has been assessed by a suitably qualified and experienced person in accordance with the Guideline as being highly suitable koala habitat and where koalas are recorded as being present at the time of assessment of the land as highly suitable koala habitat, or
- b) area of land which has been assessed by a suitably qualified and experienced person in accordance with the Guideline as being highly suitable koala habitat and where koalas have been recorded as being present in the previous 18 years.

Notes about the definition:

- **An area of land is defined as** – including both the development footprint and the surrounding area that may have indirect impacts from the development (that is contained within the subject lot and adjoining land within the same ownership). The SEPP applies to both direct and indirect impacts to habitat on the site area, therefore all habitat on the landholding needs to be considered even if no vegetation is to be cleared, however this does not mean all habitat must be surveyed – see below.

For development applications, to determine the size of the surrounding area that needs to be surveyed, the suitably qualified person needs to consider the extent of potential indirect impacts from the development, such as vehicle strikes, drowning in pools, increased risk of fire, disturbance, and impediments to movement. It is not always necessary to survey the entire landholding,

- the suitably qualified person needs to describe the site area in their survey report and the justification for the description.
- historical koala occupation of the site area is determined by considering koala records within the last 18 years, within the following maximum distances from the external boundary of the site area:
 - 2.5 kilometres of the site (for North Coast, Central Coast, Central Southern Tablelands, South Coast KMAs).
 - 5 kilometres of the site (for Darling Riverine Plains, Far West, North West Slopes, Riverina, Northern Tablelands KMAs).
- This appendix outlines the survey methodologies to be applied to establish whether an area contains core koala habitat when undertaking a development application or preparing a KPoM.
- The suitably qualified person needs to describe the site area in their survey report and the justification for the description.
- Historical koala occupation of the site area is determined by considering koala records within the last 18 years.
- 'Recorded' means recorded in the form of BioNet records. Note BioNet records with a locational accuracy of more than 1,000 metres are **not** to be considered under the SEPP.
- 18 years represents three koala generations as recommended by the *Guidelines for Using the IUCN Red List Categories and Criteria* (2019). The IUCN Guidelines were adopted by the NSW Government as part of the Common Assessment Method for listing nationally threatened species in Australia. The IUCN Guidelines specify that three generations is the appropriate threshold for determining species persistence in an area.

Suitably qualified and experienced person

This is taken to mean a person with a minimum undergraduate qualification in natural sciences, ecology, environmental management, forestry or similar from a university and with a minimum 3 years' experience in environmental assessment, including field identification of plant and animal species and habitat.

The person must have as a minimum the following experience in conducting koala surveys:

- Greater than 10 surveys
- Experience in using the koala presence survey methods identified below
- Can accurately identify preferred koala use trees
- Can distinguish between koala faecal pellets and those from other species that may present similar characteristics

The person's skills in koala survey **must** be demonstrable by relevant qualifications and the following:

- a history of experience in koala habitat / population assessments and associated survey methods, and/or
- a resume giving details of koala survey projects conducted over the previous 10 years, including employers' names and periods of employment (where relevant).

The experience and qualifications of the surveyor **must** be documented in the koala assessment report.

A note on the BioNet records

All records entered into BioNet go through an automatic validation process where the record is validated against the accepted geographic distribution of the species. If the record occurs within an area that is not part of the accepted distribution, its record status will be marked as invalid until it is reviewed by the accountable officer.

Records entered into BioNet carry information about the observer who made the sighting as well as the individual who uploaded the data to BioNet so that any queries about records can be sent back to the appropriate person.

This Guideline sets out that only BioNet koala records with a high standard of validity and locational accuracy may be used to identify core koala habitat and is specifically limited to records with an accuracy level of 1,000 metres or better.

A note for preparing KPOMs – before proceeding with surveys, first identify suitable areas for survey effort

The Site Investigation Area Map for Koala Plans of Management identifies areas that are likely to have koala use trees and excludes areas with a low probability of koala habitat. This map identifies areas councils should investigate when identifying core koala habitat in a KPOM and the extent to which core koala habitat can be identified.

Councils **should** also use other spatial information and data that is available to help them further refine the areas that are a priority for on ground surveys.

This includes:

- Koala Habitat Information Base data layers
- State Vegetation Type Map
- Plant Community Type mapping
- Local vegetation maps
- Local koala surveys and records
- Land use maps

The prioritisation of sites for on ground survey **should** consider a range of variables such as where there is a likelihood of high suitability koala habitat, historical koala records, and low or no previous on-ground survey of koala presence. Site accessibility and level of disturbance should also be taken into consideration to identify priority locations for on ground surveys.

Councils also **must** seek and gain the written consent of landholders to undertake surveys on the land. Where access to land is restricted, councils should investigate other appropriate sites.

The number and location of the on-ground surveys **must** be based on scientifically rigorous methods suitable for producing landscape scale habitat maps.

For mapping Core Koala Habitat across the landscape in KPOMs

The on-ground survey results **must** be used in combination with the best available data to map core koala habitat across the landscape.

Core koala habitat are areas captured by the Site Investigation Area Map for Koala Plans of Management where there is:

- highly suitable koala habitat and koala presence, or
- highly suitable koala habitat and a koala record or records from the last 18 years, within the following maximum distances from the external boundary of the survey site:
 - 2.5 kilometres (for North Coast, Central Coast, Central Southern Tablelands, South Coast KMAs)
 - 5 kilometres (for Darling Riverine Plains, Far West, North West Slopes, Riverina, Northern Tablelands KMAs)

Councils **must** use the data from local surveys along with koala records and other published spatial data to map core koala habitat across the landscape. This includes using robust scientific methods to extrapolate the results of the on-ground surveys.

The maps of core koala habitat (in a GIS data format) **must** be provided to the Environment, Energy and Science Division of the Department of Planning, Industry and Environment for updating the Biodiversity Values Map and any koala and flora survey records are to be added to the NSW BioNet.

Councils **must** also provide other data that was generated from local surveys to the Department to inform future reviews of the tree lists in schedule 1 and the Site Investigation Area for KPOMs Map.

Survey methodology

PART A

Presence of highly suitable koala habitat

The native vegetation of the site area **must** be mapped into Plant Community Types (PCTs) based on a full floristic survey following Sivertsen, 2009, *Native Vegetation Interim Type Standard*.

Each PCT then must be sampled individually for the presence of koala use trees listed for the relevant Koala Management Area (KMA) in Schedule 2 of the SEPP (see Appendix A). A list of which LGAs occurs in each KMA is provided in Schedule 1 of the SEPP.

A suitable sampling method must be used to enable the tree species composition of each PCT (on average) to be calculated. A number of methods can be used dependent on size of the site area, tree density and uniformity of vegetation. These are:

1. Quadrats can be selected within each PCT either randomly or along a selected transect. Quadrats need to be of sufficient size to enable a minimum of at least 20 trees to be counted (at least 20 x 20 metres) and of sufficient number to allow a robust statistical determination of the percentage of tree species present in the lower, mid and upper stratum. The number and size of quadrats chosen will depend on the size of the site and the vegetation present and **must** be justified in the koala assessment report.
2. Transects can be randomly selected through each vegetation unit, identifying and counting all trees within a selected distance either side of the transect line (usually 20 either side). Transects **must** be of sufficient length to sample enough trees to allow a statistical determination of the percentage of tree species present, with a minimum of 100 trees if present. The number and length of transects chosen will depend on the size of the site area and the vegetation present and **must** be justified in the koala assessment report.

Results of the sampling within each PCT must be shown separately and not summed for the overall site. Where 15% or greater of the total number of trees within any PCT are the regionally

relevant species of those listed in Schedule 2 (see Appendix A), the site meets the definition of highly suitable koala habitat.

If highly suitable koala habitat has been established (via the above survey), then the suitably qualified person **must** undertake Part B of the survey to determine if koalas are present or have been recorded as being present in the last 18 years.

Notes about the vegetation survey:

A “tree” is taken to be a plant with a diameter at breast height over bark (DBHOB) of 10 cm or greater.

Appendix A of this Guideline provides a list of the tree species as per Schedule 2 of the SEPP.

Only the trees listed for the relevant region must be surveyed for.

The calculation of the percentage of tree species must be completed within each PCT present on the site area and not averaged or totalled across the site. A result of 15% or greater in **any** individual PCT meets the definition of highly suitable koala habitat.

PART B

i) Koala presence

Where koalas or evidence of their presence (for example a koala scat) are recorded through surveys and the site contains highly suitable koala habitat, the habitat is considered core koala habitat.

Koala presence **must** be determined through surveys of the site area.

The survey method **should** be selected based on which is most appropriate for the site and the conditions at the time of survey. The surveyors should refer to detailed koala survey guidelines where available to determine the appropriate survey method and the scale of the survey.

For all sites, surveys must include:

1. Searches for scats following (Phillips and Callaghan 2011) the Scat Assessment Technique (SAT) at a maximum grid spacing of 250 m. Grid spacing can be smaller than 250m to ensure there are sufficient sampling points in all PCTs.

Further information on using this method:

- Survey must not be undertaken within three days of heavy rainfall (the Bureau of Meteorology defines “heavy precipitation days as days with daily precipitation ≥ 10 mm”).
- Survey must be stratified across the different PCTs on the site to ensure sufficient sampling points occur in all possible koala habitat
- The grid must be placed to maximise the number of points to be sampled

OR

2. Use of detection dogs where:
 - the underlying spatial design considerations of the (Phillips and Callaghan 2011) SAT approach are adhered to.
 - search times are standardised (min 20 minutes / site).

Further information on using this method:

- Use of conservation detection dogs is preferred on sites with deep leaf litter or very dense understory vegetation.
- Conservation detection dogs should not be used in extreme weather or humidity or where feral predator baits are suspected to be present, and no less than one hour after feeding.

- Welfare of the conservation detection dog must be considered and monitored at all stages including adequate rest periods, protection from bright sunshine, and provision of water when working.
- Conservation detection dogs and their handlers must meet minimum standards of training and experience and be assessed and accredited as a team. Assessment must include demonstrated competency in:
 - reliably commanding and handling the dog.
 - reliably demonstrating koala odour recognition and response in accordance with nominated and appropriate indication type (e.g. passive, freeze, dig/scratch, etc.).
 - reliably demonstrating non-target disinterest.
 - reliably demonstrating behaviour that does not harm koalas.
 - selecting and applying a search methodology.
 - The handler must have the relevant approvals and permits.
- Conservation detection dogs and their handler must have previous field survey experience in koala detection.
 - Accreditation must be provided by an independent party and must be documented.

and one of the following survey techniques:

1. Spotlighting following Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC), 2011, *Survey Guidelines for Australia's Threatened Mammals*, comprising:
 - At least 2 separate transects be undertaken per 5 hectares that are each 200m long, and at least 100m apart, in most likely koala habitat on site.
 - At least one transect must be placed in each PCT known to provide habitat for koalas, even if the PCT is less than 100m wide.
 - The survey being undertaken at a walking speed of approximately 10m/ per min
 - Searches undertaken over 2 consecutive nights.

Further information on using this method:

- Spotlighting can be especially suitable for detecting koalas that occur at low densities.
 - Spotlighting should not be used if the site supports dense vegetation (e.g. wet sclerophyll) or in steep terrain (e.g. >30 slope).
 - Spotlighting must not be undertaken during windy or wet conditions.
2. Call playback at 2 locations on separate nights per site (only between September and November).
 - Calls should be played at least 3 times followed by 5 minutes of listening, at a minimum of two locations.
 - Locations should be separated by 800m to 1km intervals on larger sites or min of 500m on smaller sites.
 - Locations should be selected to minimise background noise (i.e. away from roads).

Further information on using the method

- Call playback is not suitable for small sites less than 50 ha. Use of the technique on small sites increases the risk of false positives (i.e. koalas calling from locations beyond the site boundary).
- Given the technique relies on male response it must only be used during peak breeding season (September to November).
- Survey must not be undertaken on wet or windy nights.

3. Passive acoustic recording (as per Law et al. 2019), placed at intervals of a minimum of 500m and maximum of 1000m, in a grid pattern, across all suitable habitat on the site (only between September and November).
 - For sites 100ha or less, recorders must remain in place for at least 7 nights without rain.
 - For sites with greater than 100ha, recorders must remain in place for 14 nights without rain.
 - Scanning recordings for koala calls must be undertaken by a recognised bioacoustics expert or scanned manually by an appropriately experienced person.

Further information on using this method:

- Passive acoustic recording is not suitable for small sites less than 50ha. Use of the technique on small sites increases the risk of false positives (i.e. koalas calling from locations beyond the site boundary).
- Given the technique relies on male response it must only be used during peak breeding season (September to November).
- Must not be undertaken on wet or windy nights.

ii) Koala records

In addition to site survey, there must also be a consideration of existing records spanning the previous 18 years (3 koala generations). The site area is considered to contain habitat that meets the definition of core koala habitat, provided the site contains highly suitable koala habitat (identified via the above survey) and where a record or records exist within the last 18 years, within the following maximum distances from the external boundary of the survey site:

- 2.5 kilometres of the site (for North Coast, Central Coast, Central Southern Tablelands, South Coast KMAs)
- 5 kilometres of the site (for Darling Riverine Plains, Far West, North West Slopes, Riverina, Northern Tablelands KMAs)

These distances reflect the estimated median home ranges of koalas within coastal and inland locations. In NSW, home ranges can vary greatly; some ranges have been recorded as low as 1-1.5 ha (AMBS, 2012), while others over 100 ha (McAlpine et al., 2006). Koalas studied in south-east Queensland moved on average 3.5km (and up to 10.6km) in their first breeding season (Dique et al., 2003), and male koalas translocated to sites across Western Victoria travelled up to 120km (as the crow flies) from where they were released over a six-month period (McIlwee, 2003).

Records within these maximum distances **must** only be considered after a careful examination of the broader landscape. That is, within areas of contiguous habitat or between areas of habitat with connectivity. For example, a record from 2.5km from the subject site **must** not be used if natural or artificial landscape features would prevent koalas from the area with the record ever moving to the site (e.g. due to large rivers, roads, fences or built up areas). The suitably qualified and experienced person **must** consider this carefully and provide evidence justifying record inclusion or exclusion (e.g. local studies, surveys, landscape observations, peer reviewed academic literature).

A description of the record (Bionet, SightingKey, or catalogNumber, source, date, accuracy, associated observations) must be provided in the koala assessment report (only relevant to development applications).

Note that Schedule 1 of the SEPP identifies which KMA is applicable to your local government area.

Results of investigations, site surveys and justification of survey methods and conclusions **must** be fully detailed in the survey report. Areas identified as core koala habitat **must** be clearly defined and mapped.

Where core koala habitat is identified, the assessment report and maps of core koala habitat (in a GIS data format) **must** be provided to the Environment, Energy and Science Division of the Department of Planning, Industry and Environment for updating the Biodiversity Values Map and any koala and flora survey records are to be added to the NSW BioNet.

Alternative process for landholders where a survey may be unwarranted

There may be situations where engaging a suitably qualified and experienced person to conduct a survey for core koala habitat in accordance with this appendix is not necessary. For example, if the site does not contain any trees or contains only species comprising a monoculture plantation such as a macadamia or avocado farm.

If a landholder believes a survey is not necessary because the land obviously does not contain core koala habitat, the following evidence may be presented to council:

- Aerial imagery (satellite photographs) of the subject land with date and time stamps, showing the land does not contain any trees
- Aerial imagery of the subject land and on-ground photographs showing vegetation on the site is clearly not of the species listed in Schedule 2 of the SEPP (e.g. because the vegetation comprises apple orchards and is clearly not comprised of Eucalyptus species).
- The land is an authorised plantation approved under the Plantations and Reafforestation Act and listed on the public register and/or it is a plantation with an existing development approval for harvesting rights (and no change in development type is being proposed). The landholder must provide evidence of the plantation approvals and authorisations.

Following the council's review of this evidence, the council may determine that it agrees with the landholder and because the site clearly does not contain core koala habitat, a survey is not required.

However, if evidence fails to satisfy council that the land does not contain core koala habitat, council will request the landholder proceeds with the usual process and engages a suitably qualified and experienced person to conduct a survey for core koala habitat.

Note: The landholder also has the option of requesting council conducts a survey for core koala habitat, where their land has been identified as such in a draft KPoM on exhibition. Council can use the suitably qualified person who prepared the KPoM, or another suitably qualified person at their discretion.

Glossary

Term	Definition
BC Act	<i>Biodiversity Conservation Act 2016.</i>
Biodiversity Offsets Scheme	a framework under the BC Act to avoid, minimise and offset impacts on biodiversity from development and clearing, and should ensure that land that is used to offset impacts is secured in-perpetuity.
BioNet Record	<p>NSW BioNet is the repository for biodiversity data managed by the Department of Planning, Industry and Environment.</p> <p>All records entered into BioNet go through an automatic validation process where the record is validated against the accepted geographic distribution of the species. If the record occurs within an area that is not part of the accepted distribution, its record status will be marked as invalid until it is reviewed by the accountable officer.</p> <p>Records entered into BioNet carry information about the observer who made the sighting as well as the individual who uploaded the data to BioNet so that any queries about records can be sent back to the appropriate person.</p> <p>This Guideline sets out that only BioNet koala records with a high standard of validity and locational accuracy may be used to identify core koala habitat and specifically excludes records with an accuracy level greater than 1,000 metres.</p>
Core koala habitat	<p>Clause 4 of the SEPP defines core koala habitat as:</p> <ul style="list-style-type: none"> a) an area of land which has been assessed by a suitably qualified and experienced person in accordance with the Guideline as being highly suitable koala habitat and where koalas are recorded as being present at the time of assessment of the land as highly suitable koala habitat, or b) area of land which has been assessed by a suitably qualified and experienced person in accordance with the Guideline as being highly suitable koala habitat and where koalas have been recorded as being present in the previous 18 years. <p>Please note core koala habitat is established through a survey undertaken by a suitably qualified and experienced person undertaken in accordance with Appendix C, or through the use of the best available data (when identifying core koala habitat in a KPOM where the council is unable to obtain access to land – see Appendix C).</p>
DA	Development application.
DPI&E	NSW Department of Planning, Industry and Environment.
EES Division	Environment, Energy and Science Division of DPIE (formerly Office of Environment and Heritage).
EP&A Act	<i>Environmental Planning and Assessment Act 1979.</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999.</i>

Term	Definition
Highly suitable koala habitat	Where 15% or greater of the total number of trees within any PCT are the regionally relevant species of those listed in Schedule 2 (see Appendix A).
KMA	Koala Management Area. These are the regions listed in the Schedules of the SEPP and were derived from the Koala Tree Species Index as part of the Koala Habitat Information Base. Sometimes also referred to as Koala Modelling Region (KMR).
KPoM	Koala Plan of Management.
LGA	Local Government Area.
LLS Act	<i>Local Land Services Act 2013</i> .
Site area	Includes both a development footprint and the broader area of land on which the development is proposed (i.e. the subject lot). When undertaking a survey for core koala habitat in accordance with Appendix C or D, the broader area of land (extending beyond the cadastre boundaries of the subject lot) will be considered when using the maximum distances from koala records. The controls within the SEPP apply to both direct and indirect impacts and all possible habitat on the site area therefore needs to be considered even if no vegetation is to be cleared.
Site Investigation Area for Koala Plans of Management Map	The Site Investigation Area for Koala Plans of Management Map in the SEPP available to the public through council or the Department.
Suitably qualified and experienced person	<p>suitably qualified and experienced person means a person who has—</p> <ul style="list-style-type: none"> (a) a tertiary qualification in ecology, environmental management, forestry or other equivalent qualifications, and (b) experience in flora and fauna identification, survey and management, including experience in conducting koala surveys in accordance with the techniques specified in the Guideline. <p>This is further detailed in Appendix C.</p>

References

- AMBS 2012. Investigation of the Impact of Roads on Koalas: Final Report. Report prepared for the NSW Roads and Maritime Services: Australian Museum Business Services.
- DECC. 2008. Recovery plan for the koala (*Phascolarctos cinereus*). Department of Environment and Climate Change.
- Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) 2011. Survey Guidelines for Australia's Threatened Mammals.
- Dique, D. S., Thompson, J., Preece, H. J., De Villiers, D. L. & Carrick, F. N. 2003. Dispersal patterns in a regional koala population in south-east Queensland. *Wildlife Research*, 30, 281-290.
- Law, B., Gonsalves, L., Bilney, R., Peterie, J., Pietsch, R., Roe, P., and Trusking, A. 2019. Using Passive Acoustic Recording and Automated Call Identification to Survey Koalas in the Southern Forests of New South Wales. *Australian Zoologist*
- Mcalpine, C. A., Rhodes, J. R., Callaghan, J. G., Bowen, M. E., Lunney, D., Mitchell, D. L., Pullar, D. V. & Possingham, H. P. 2006. The importance of forest area and configuration relative to local habitat factors for conserving forest mammals: a case study of koalas in Queensland, Australia. *Biological Conservation*, 132, 153-165
- Mcilwee, A. 2003. Post-release monitoring of surgically sterilised and relocated Koalas, Mt Eccles National Park, Victoria. Unpublished report, Parks Victoria, Melbourne.
- NSW Chief Scientist and Engineer 2016. Report of the Independent Review into the Decline of Koala Populations in Key Areas of NSW.
- Phillips, S. & Callaghan, J. 2011. The Spot Assessment Technique: a tool for determining localised levels of habitat use by Koalas *Phascolarctos cinereus*. *Australian Zoologist*, 35(3), 774-780. Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC) 2011
- Sivertsen, 2009. Native Vegetation Interim Type Standard, Department of Environment, Climate Change and Water NSW, Sydney

Links Referenced in this Guideline

- Local Land Services

www.lls.nsw.gov.au

- Biodiversity Values Map (BV Map)

<https://www.lmbc.nsw.gov.au/Maps/index.html?viewer=BOSETMap>

- Mapping Standards and Requirements

<https://www.planning.nsw.gov.au/Plans-for-your-area/Local-Planning-and-Zoning/Mapping-standards-and-requirements>

- The Koala Habitat Information Base

<https://datasets.seed.nsw.gov.au/dataset/koala-habitat-information-base>

Appendix J: Assessment under the Environment Protection and Biodiversity Conservation Act

The Commonwealth EPBC Act requires approval for actions that are likely to have a significant impact on Matters of National Environmental Significance (MNES). There are seven MNES that are triggers for Commonwealth assessment and approval. The MNES and study area-specific responses are as follows:

World Heritage Areas – The site is not within or near a World Heritage Area.

National Heritage Places – The site is not within or near a National Heritage Place.

Wetlands of International Importance (declared Ramsar wetlands) – The Hunter Estuary Wetlands occur 30-40 km downstream of the site. The proposal is unlikely to impact on this wetland, provided that standard sediment and erosion control methods, as well as storm water management measures are employed.

Listed Threatened Species and Ecological Communities – The Subject Site contains one EPBC Act listed TEC, being Central Hunter Valley Eucalypt Forest. Several threatened species listed under the EPBC Act may occur in the area (see the EPBC Protected Matters Search Tool results in Appendix K). Of these, the site may provide potential habitat for the following fauna species (based on a review of the species predicted to occur in the area, their known distributions and the site's habitat potential). Note that threatened flora species were ruled out by targeted surveys as documented in the BDAR.

- *Anthochaera phrygia* (Regent Honeyeater)
- *Callocephalon fimbriatum* (Gang-gang Cockatoo)
- *Calyptorhynchus lathami lathami* (South-eastern Glossy Black-Cockatoo)
- *Climacteris picumnus victoriae* (Brown Treecreeper (south-eastern))
- *Hirundapus caudacutus* (White-throated Needletail)
- *Lathamus discolor* (Swift Parrot)
- *Melanodryas cucullata cucullata* (South-eastern Hooded Robin)
- *Stagonopleura guttata* (Diamond Firetail)
- *Dasyurus maculatus maculatus* (SE mainland population) (Spotted-tailed Quoll)
- *Notamacropus parma* (Parma Wallaby)
- *Phascolarctos cinereus* (Koala)
- *Pteropus poliocephalus* (Grey-headed Flying-fox)

Impact assessments under the EPBC Act, in accordance with the DoE (2013) *Significant Impact Guidelines 1.1 - Matters of National Environmental Significance* (which are provided in full below), were undertaken for the TEC and species; these impact assessments concluded that the proposal would not have had a significant impact on the assessed TEC and species.

Listed Migratory Species – Six listed migratory species have the potential to occur within the study area (based on a review of the species predicted to occur in the area and the site's habitat potential). These include:

- *Hirundapus caudacutus* (White-throated Needletail)
- *Motacilla flava* (Yellow Wagtail)
- *Rhipidura rufifrons* (Rufous Fantail)

Impact assessments under the EPBC Act (which are provided in full below) were undertaken for these species; these impact assessments concluded that the proposal would not have a significant impact on the assessed species.



Commonwealth Marine Area – The site does not occur near any Commonwealth marine areas.

Commonwealth Land – The proposal will not impact on any Commonwealth lands.

The Great Barrier Reef Marine Park – Not applicable

Overall, it is considered unlikely that any MNES would be significantly impacted by the proposal and thus referral to the Commonwealth DoE is not necessary.

VULNERABLE SPECIES SIGNIFICANT IMPACT CRITERIA – *Calyptorhynchus lathami* lathami (South-eastern Glossy Black-Cockatoo)

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- ***Lead to a long-term decrease in the size of an important population of a species***

C. lathami lathami inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (*A. torulosa*) are important foods. It depends on large hollow-bearing eucalypts for nest sites. The site does not contain *Allocasuarina* and *Casuarina* trees but it does contain hollow-bearing trees.

The majority of the site's habitat (including hollow-bearing trees) will be retained and protected in perpetuity, within the proposed conservation area or (where it occurs within residential lots) by a s.88B covenant under the *Conveyancing Act 1919*. There are also plans to allow natural restoration of cleared areas within the 21 ha conservation area, and this will lead to a significant net benefit in terms of native vegetation and habitat coverage across the site.

It is therefore concluded that the proposal is unlikely to lead to a long-term decrease in the size of an important population of the species.

- ***Reduce the area of occupancy of an important population***

As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. Therefore, it is concluded that the proposal is unlikely to reduce the area of occupancy of an important population.

- ***Fragment an existing important population into two or more populations***

The proposals plan to retain and restore native vegetation in the site will ensure that habitat connectivity is maintained and in fact enhanced. The project is therefore unlikely to fragment an existing important population into two or more populations.

- ***Adversely affect habitat critical to the survival of a species***

Habitat critical to the survival of *C. lathami lathami* includes foraging habitat containing sheoaks (*Allocasuarina* spp. and *Casuarina* spp.) and breeding habitat containing potential nest hollows that are >8 m above ground, in branches >30 cm in diameter, in a branch or stem no more than 450 from vertical, and with a minimum entrance diameter of >15 cm (Department of Climate Change, Energy, Environment and Water (DCCEEW), 2022a). As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. The site does not contain sheoaks but it does contain hollow-bearing trees. As outlined above, the proposal will lead to a significant increase in the native

vegetation and habitat across the site. The project is therefore unlikely to adversely affect habitat critical to the survival of the species.

- ***Disrupt the breeding cycle of an important population***

For the reasons stated above, the project is unlikely to disrupt the breeding cycle of an important population.

- ***Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline***

For the reasons stated above, the project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

- ***Result in invasive species that are harmful to a vulnerable species becoming established in the species' habitat***

Not likely. Cats and foxes are already known to occur in the area.

- ***Introduce disease that may cause the species to decline***

There are no known diseases that present a threat to *C. lathami lathami* that may be introduced on the site.

- ***Interfere substantially with the recovery of the species***

For the reasons stated above, the project is unlikely to interfere substantially with the recovery of the species.

VULNERABLE SPECIES SIGNIFICANT IMPACT CRITERIA – Woodland birds (*Climacteris picumnus victorae* (Brown Treecreeper (south-eastern), *Stagonopleura guttata* (Diamond Firetail))

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- ***Lead to a long-term decrease in the size of an important population of a species***

C. picumnus victorae inhabits eucalypt woodlands (including Box-Gum Woodland) and dry open forest. It is typically found in the inland slopes and plains, inland of the Great Dividing Range, but it may sometimes occur on the coastal ranges and plains. Fallen timber is an important habitat component for foraging. *S. guttata* is typically found in grassy eucalypt woodlands and open forest, as well as mallee and native or derived grassland. It isn't commonly found in coastal areas, though there are records from near Sydney, the Hunter Valley and the Bega Valley. The site would provide potential habitat for both species.

The majority of the site's habitat (including hollow-bearing trees) will be retained and protected in perpetuity, within the proposed conservation area or (where it occurs within residential lots) by a s.88B covenant under the *Conveyancing Act 1919*. There are also plans to allow natural restoration of cleared areas within the 21 ha conservation area, and this will lead to a significant net benefit in terms of native vegetation and habitat coverage across the site.

It is therefore concluded that the proposal is unlikely to lead to a long-term decrease in the size of an important population of these species.

- ***Reduce the area of occupancy of an important population***

As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. Therefore, it is concluded that the proposal is unlikely to reduce the area of occupancy of an important population.

- ***Fragment an existing important population into two or more populations***



The proposals plan to retain and restore native vegetation in the site will ensure that habitat connectivity is maintained and in fact enhanced. The project is therefore unlikely to fragment an existing important population into two or more populations.

- ***Adversely affect habitat critical to the survival of a species***

No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat for *C. picumnus victoriarum* and *S. guttata* (DCCEEW, 2023a and DCCEEW, 2023b).

- ***Disrupt the breeding cycle of an important population***

For the reasons stated above, the project is unlikely to disrupt the breeding cycle of an important population.

- ***Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline***

For the reasons stated above, the project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that these species are likely to decline.

- ***Result in invasive species that are harmful to a vulnerable species becoming established in the species' habitat***

Not likely. Cats and foxes are already known to occur in the area.

- ***Introduce disease that may cause the species to decline***

There are no known diseases that present a threat to these species that may be introduced on the site.

- ***Interfere substantially with the recovery of the species***

For the reasons stated above, the project is unlikely to interfere substantially with the recovery of these species.

VULNERABLE SPECIES SIGNIFICANT IMPACT CRITERIA – *Hirundapus caudacutus* (White-throated Needletail)

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- ***Lead to a long-term decrease in the size of an important population of a species***

H. caudacutus is an aerial species (where it forages for aerial insects) and because of this, conventional foraging habitat descriptions are inapplicable. It is however, mostly recorded above wooded areas including open forest and rainforest, and may also fly between trees or in clearings, below the canopy. It can also occur over heathland, and sometimes (but less often) over grasslands, swamps, sandy beaches and around coastal cliffs. *H. caudacutus* typically roosts in trees in forests and woodlands, amongst dense foliage and occasionally hollows. *H. caudacutus* breeds in Asia and spends the non-breeding season in Australasia, mainly in Australia. It is widespread throughout eastern and south-eastern Australia. In NSW, it occurs in all coastal regions and extends inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. The site may provide potential habitat.

The majority of the site's habitat (including hollow-bearing trees) will be retained and protected in perpetuity, within the proposed conservation area or (where it occurs within

residential lots) by a s.88B covenant under the *Conveyancing Act 1919*. There are also plans to allow natural restoration of cleared areas within the 21 ha conservation area, and this will lead to a significant net benefit in terms of native vegetation and habitat coverage across the site.

It is therefore concluded that the proposal is unlikely to lead to a long-term decrease in the size of an important population of the species.

- ***Reduce the area of occupancy of an important population***

As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. Therefore, it is concluded that the proposal is unlikely to reduce the area of occupancy of an important population.

- ***Fragment an existing important population into two or more populations***

The proposals plan to retain and restore native vegetation in the site will ensure that habitat connectivity is maintained and in fact enhanced. The project is therefore unlikely to fragment an existing important population into two or more populations.

- ***Adversely affect habitat critical to the survival of a species***

No Critical Habitat as defined under section 207A of the EPBC Act has been identified or included in the Register of Critical Habitat for *H. caudacutus* (Threatened Species Scientific Committee, 2019).

- ***Disrupt the breeding cycle of an important population***

For the reasons stated above, the project is unlikely to disrupt the breeding cycle of an important population.

- ***Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline***

For the reasons stated above, the project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

- ***Result in invasive species that are harmful to a vulnerable species becoming established in the species' habitat***

For the reasons stated above, the project is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the species' habitat.

- ***Introduce disease that may cause the species to decline***

There are no known diseases that present a threat to *H. caudacutus* that may be introduced on the site.

- ***Interfere substantially with the recovery of the species***

For the reasons stated above, the project is unlikely to interfere substantially with the recovery of the species.

VULNERABLE SPECIES SIGNIFICANT IMPACT CRITERIA – *Pteropus poliocephalus* (Grey-headed Flying-fox)

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- ***Lead to a long-term decrease in the size of an important population of a species***

P. poliocephalus forages in a wide range of habitat across eastern NSW. It roosts in large aggregations or 'camps', usually in riparian areas. The site contains potential foraging habitat. There are no flying fox camps in or near the site.



The majority of the site's habitat will be retained and protected in perpetuity, within the proposed conservation area or (where it occurs within residential lots) by a s.88B covenant under the *Conveyancing Act 1919*. There are also plans to allow natural restoration of cleared areas within the 21 ha conservation area, and this will lead to a significant net benefit in terms of native vegetation and habitat coverage across the site.

It is therefore concluded that the proposal is unlikely to lead to a long-term decrease in the size of an important population of the species.

- ***Reduce the area of occupancy of an important population***

As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. Therefore, it is concluded that the proposal is unlikely to reduce the area of occupancy of an important population.

- ***Fragment an existing important population into two or more populations***

The proposals plan to retain and restore native vegetation in the site will ensure that habitat connectivity is maintained and in fact enhanced. The project is therefore unlikely to fragment an existing important population into two or more populations.

- ***Adversely affect habitat critical to the survival of a species***

Habitat critical to the survival of *P. poliocephalus* includes vegetation communities that contain *Eucalyptus tereticornis*, *E. albens*, *E. crebra*, *E. fibrosa*, *E. melliodora*, *E. paniculata*, *E. pilularis*, *E. robusta*, *E. seeana*, *E. sideroxylon*, *E. siderophloia*, *Banksia integrifolia*, *Castanospermum australe*, *Corymbia citriodora citriodora*, *C. eximia*, *C. maculata*, *Grevillea robusta*, *Melaleuca quinquenervia* or *Syncarpia glomulifera* (Department for Environment and Water (SA), 2021). As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. Therefore, the project is unlikely to adversely affect habitat critical to the survival of the species.

- ***Disrupt the breeding cycle of an important population***

For the reasons stated above, the project is unlikely to disrupt the breeding cycle of an important population.

- ***Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline***

For the reasons stated above, the project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

- ***Result in invasive species that are harmful to a vulnerable species becoming established in the species' habitat***

For the reasons stated above, the project is unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the species' habitat.

- ***Introduce disease that may cause the species to decline***

Not likely.

- ***Interfere substantially with the recovery of the species***

For the reasons stated above, the project is unlikely to interfere substantially with the recovery of the species.

VULNERABLE SPECIES SIGNIFICANT IMPACT CRITERIA – *Notamacropus parma* (Parma Wallaby)

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- ***Lead to a long-term decrease in the size of an important population of a species***

N. parma inhabits moist eucalypt forest with thick, shrubby understorey, often with nearby grassy areas, rainforest margins and occasionally drier eucalypt forest. The site may contain potential marginal habitat.

The majority of the site's habitat will be retained and protected in perpetuity, within the proposed conservation area or (where it occurs within residential lots) by a s.88B covenant under the *Conveyancing Act 1919*. There are also plans to allow natural restoration of cleared areas within the 21 ha conservation area, and this will lead to a significant net benefit in terms of native vegetation and habitat coverage across the site.

It is therefore concluded that the proposal is unlikely to lead to a long-term decrease in the size of an important population of the species.

- ***Reduce the area of occupancy of an important population***

As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. Therefore, it is concluded that the proposal is unlikely to reduce the area of occupancy of an important population.

- ***Fragment an existing important population into two or more populations***

The proposals plan to retain and restore native vegetation in the site will ensure that habitat connectivity is maintained and in fact enhanced. The project is therefore unlikely to fragment an existing important population into two or more populations.

- ***Adversely affect habitat critical to the survival of a species***

Habitat critical to the survival of *N. parma* includes the following: occupied forested habitat; unoccupied forested areas adjacent or near known occurrences, which can provide future habitat for natural range expansion, dispersal or translocation; and areas of habitat that supported the species in the past, but from which they are now absent (DCCEEW, 2022b). As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. Therefore, the project is unlikely to adversely affect habitat critical to the survival of the species.

- ***Disrupt the breeding cycle of an important population***

For the reasons stated above, the project is unlikely to disrupt the breeding cycle of an important population.

- ***Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline***

For the reasons stated above, the project is unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

- ***Result in invasive species that are harmful to a vulnerable species becoming established in the species' habitat***

Not likely. Cats, foxes and dogs are known to already occur in the area.

- ***Introduce disease that may cause the species to decline***

Not likely.

- ***Interfere substantially with the recovery of the species***



For the reasons stated above, the project is unlikely to interfere substantially with the recovery of the species.

ENDANGERED SPECIES SIGNIFICANT IMPACT CRITERIA – *Callocephalon fimbriatum* (Gang-gang Cockatoo)

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

- ***Lead to a long-term decrease in the size of a population***

In NSW, *C. fimbriatum* is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. In spring and summer (breeding season), it is generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In autumn and winter, it often moves to lower altitudes in drier more open eucalypt forests and woodlands, particularly box-gum and box-ironbark assemblages, or in dry forest in coastal areas and often found in urban areas. The site may provide potential habitat during the non-breeding autumn and winter months.

The majority of the site's habitat (including hollow-bearing trees) will be retained and protected in perpetuity, within the proposed conservation area or (where it occurs within residential lots) by a s.88B covenant under the *Conveyancing Act 1919*. There are also plans to allow natural restoration of cleared areas within the 21 ha conservation area, and this will lead to a significant net benefit in terms of native vegetation and habitat coverage across the site.

It is therefore concluded that the proposal is unlikely to lead to a long-term decrease in the size of a population.

- ***Reduce the area of occupancy of the species***

As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. Therefore, it is concluded that the proposal would not reduce the area of occupancy of the species.

- ***Fragment an existing population into two or more populations***

The proposals plan to retain and restore native vegetation in the site will ensure that habitat connectivity is maintained and in fact enhanced. The project is therefore unlikely to fragment an existing population into two or more populations.

- ***Adversely affect habitat critical to the survival of a species***

Habitat critical to the survival of *C. fimbriatum* includes all foraging habitat during both the breeding and non-breeding season (DAWE, 2022a). As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. It is therefore unlikely adversely affect habitat critical to the survival of the species.

- ***Disrupt the breeding cycle of a population***

C. fimbriatum generally breeds in spring and summer in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Therefore the proposal is unlikely to disrupt the breeding cycle of a population.

- ***Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline***

As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. The proposal is thus not expected to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

- ***Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat***

The proposal is not likely to result in the establishment of harmful species. Cats and foxes are known to already occur in the area.

- ***Introduce disease that may cause the species to decline, or***

Not likely.

- ***Interfere with the recovery of the species***

For all the reasons stated above, the proposal is unlikely to interfere with the recovery of the species.

ENDANGERED SPECIES SIGNIFICANT IMPACT CRITERIA – *Melanodryas cucullata cucullata* (South-eastern Hooded Robin)

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

- ***Lead to a long-term decrease in the size of a population***

M. cucullata cucullata inhabits lightly wooded country, usually open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. It requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. The site may provide potential habitat.

The majority of the site's habitat (including hollow-bearing trees) will be retained and protected in perpetuity, within the proposed conservation area or (where it occurs within residential lots) by a s.88B covenant under the *Conveyancing Act 1919*. There are also plans to allow natural restoration of cleared areas within the 21 ha conservation area, and this will lead to a significant net benefit in terms of native vegetation and habitat coverage across the site.

It is therefore concluded that the proposal is unlikely to lead to a long-term decrease in the size of a population.

- ***Reduce the area of occupancy of the species***

As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. Therefore, it is concluded that the proposal would not reduce the area of occupancy of the species.

- ***Fragment an existing population into two or more populations***

The proposals plan to retain and restore native vegetation in the site will ensure that habitat connectivity is maintained and in fact enhanced. The project is therefore unlikely to fragment an existing population into two or more populations.

- ***Adversely affect habitat critical to the survival of a species***

No critical habitat (as defined under s.207A of the EPBC Act) has been identified or included on the Register of Critical Habitat for *M. cucullata cucullata* (DCCEEW, 2023c).

- ***Disrupt the breeding cycle of a population***



As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. Therefore, the proposal is unlikely to disrupt the breeding cycle of a population.

- ***Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline***

As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. The proposal is thus not expected to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

- ***Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat***

The proposal is not likely to result in the establishment of harmful species. Cats and foxes are known to already occur in the area.

- ***Introduce disease that may cause the species to decline, or***

Not likely.

- ***Interfere with the recovery of the species***

For all the reasons stated above, the proposal is unlikely to interfere with the recovery of the species.

ENDANGERED SPECIES SIGNIFICANT IMPACT CRITERIA – *Dasyurus maculatus maculatus* (SE mainland population) (Spotted-tailed Quoll)

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

- ***Lead to a long-term decrease in the size of a population***

D. maculatus maculatus inhabits a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. It uses hollow-bearing trees, fallen logs, other animal burrows, small caves and rock outcrops as den sites. The site may provide potential habitat.

The majority of the site's habitat (including hollow-bearing trees) will be retained and protected in perpetuity, within the proposed conservation area or (where it occurs within residential lots) by a s.88B covenant under the *Conveyancing Act 1919*. There are also plans to allow natural restoration of cleared areas within the 21 ha conservation area, and this will lead to a significant net benefit in terms of native vegetation and habitat coverage across the site.

It is therefore concluded that the proposal is unlikely to lead to a long-term decrease in the size of a population.

- ***Reduce the area of occupancy of the species***

As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. Therefore, it is concluded that the proposal would not reduce the area of occupancy of the species.

- ***Fragment an existing population into two or more populations***

The proposals plan to retain and restore native vegetation in the site will ensure that habitat connectivity is maintained and in fact enhanced. The project is therefore unlikely to fragment an existing population into two or more populations.

- ***Adversely affect habitat critical to the survival of a species***

Habitat critical to the survival of *D. maculatus maculatus* includes large patches of forest with adequate denning resources and relatively high densities of medium-sized mammalian prey (Department of Environment, Land, Water and Planning, 2016). As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. It is therefore unlikely adversely affect habitat critical to the survival of the species.

- ***Disrupt the breeding cycle of a population***

As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. Therefore, the proposal is unlikely to disrupt the breeding cycle of a population.

- ***Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline***

As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. The proposal is thus not expected to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

- ***Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat***

The proposal is not likely to result in the establishment of harmful species. Cats and foxes are known to already occur in the area.

- ***Introduce disease that may cause the species to decline, or***

Not likely.

- ***Interfere with the recovery of the species***

For all the reasons stated above, the proposal is unlikely to interfere with the recovery of the species.

ENDANGERED SPECIES SIGNIFICANT IMPACT CRITERIA – *Phascolarctos cinereus* (Koala)

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

- ***Lead to a long-term decrease in the size of a population***

P. cinereus Inhabit eucalypt woodlands and forests. It feeds on the foliage of more than 70 eucalypt species and 30 non-eucalypt species, but in any one area will select preferred browse species. The site contains one preferred feed tree species for the area, being *E. tereticornis*.

The majority of the site's habitat will be retained and protected in perpetuity, within the proposed conservation area or (where it occurs within residential lots) by a s.88B covenant under the *Conveyancing Act 1919*. There are also plans to allow natural restoration of cleared areas within the 21 ha conservation area, and this will lead to a significant net benefit in terms of native vegetation and habitat coverage across the site.



It is therefore concluded that the proposal is unlikely to lead to a long-term decrease in the size of a population.

- ***Reduce the area of occupancy of the species***

As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. Therefore, it is concluded that the proposal would not reduce the area of occupancy of the species.

- ***Fragment an existing population into two or more populations***

The proposals plan to retain and restore native vegetation in the site will ensure that habitat connectivity is maintained and in fact enhanced. The project is therefore unlikely to fragment an existing population into two or more populations.

- ***Adversely affect habitat critical to the survival of a species***

Habitat critical to the survival of *P. cinereus* includes both coastal and inland areas that are typically characterised by (DAWE, 2022b). As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. It is therefore unlikely adversely affect habitat critical to the survival of the species.

- ***Disrupt the breeding cycle of a population***

As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. Therefore, the proposal is unlikely to disrupt the breeding cycle of a population.

- ***Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline***

As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. The proposal is thus not expected to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

- ***Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat***

The proposal is not likely to result in the establishment of harmful species. Cats, foxes and dogs are known to already occur in the area.

- ***Introduce disease that may cause the species to decline, or***

Not likely.

- ***Interfere with the recovery of the species***

For all the reasons stated above, the proposal is unlikely to interfere with the recovery of the species.

CRITICALLY ENDANGERED SPECIES SIGNIFICANT IMPACT CRITERIA – *Lathamus discolor* (Swift Parrot)

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

- ***Lead to a long-term decrease in the size of a population***

L. discolor migrates to the Australian south-east mainland between February and October. On the mainland it occurs in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as *Eucalyptus robusta*, *Corymbia maculata*, *C. gummifera*, *E. tereticornis*, *E. sideroxylon*, and *E. albens*. Commonly used lerp infested trees include *E. microcarpa*, *E. moluccana*, *E. pilularis*, and *E. melliodora*. The site is not within a 'mapped important area' for *L. discolor*, however, it contains potential non-breeding habitat, having several favoured feed trees (*C. maculata*, *E. tereticornis*, *E. moluccana*).

The majority of the site's habitat will be retained and protected in perpetuity, within the proposed conservation area or (where it occurs within residential lots) by a s.88B covenant under the *Conveyancing Act 1919*. There are also plans to allow natural restoration of cleared areas within the 21 ha conservation area, and this will lead to a significant net benefit in terms of native vegetation and habitat coverage across the site.

It is therefore concluded that the proposal is unlikely to lead to a long-term decrease in the size of a population.

- **Reduce the area of occupancy of the species**

In NSW, *L. discolor* mostly occurs on the coast and south-west slopes. According to BioNet, the geographic range within NSW extends along the whole NSW coast and inland to Narrabri (in the north), Wilcannia (in mid NSW) and Mildura (in southern NSW). Using this extent, it is estimated that the area of occupancy (AOO) in NSW would be approximately 27 million hectares. The total area of habitat that would be impacted the proposal is 4.7 ha, which would constitute <0.00001% of the total AOO in NSW. Overall, the area affected is insignificant, and the proposal is unlikely to reduce the area of occupancy of the species.

- **Fragment an existing population into two or more populations**

The proposal would not cause fragmentation of a subpopulation and is highly unlikely to affect the species' viability, as the area of habitat removal is very minor (i.e., <0.00001% of the total AOO in NSW). Further, the proposal will lead to a significant increase in the native vegetation and habitat across the site. Therefore the proposal is unlikely to fragment an existing population into two or more populations.

- **Adversely affect habitat critical to the survival of a species**

Habitat critical to the survival of *L. discolor* includes breeding and foraging habitat in Tasmania and foraging habitat on the Australian mainland containing preferred foraging species including *E. leucoxyton*, *E. tricarpa*, *E. sideroxylon*, *E. macrocarpa*, *E. albens*, *E. melliodora*, *E. robusta*, *E. tereticornis*, *E. pilularis*, and *Corymbia maculata* (DCCEEW, 2024). The proposal will lead to a significant increase in the native vegetation and habitat across the site. It is unlikely that the proposal would adversely affect habitat critical to the survival of the species.

- **Disrupt the breeding cycle of a population**

L. discolor breeds in Tasmania. The proposal is not likely to disrupt the breeding cycle of a population.

- **Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline**

The area of habitat removal is very minor (i.e., <0.00001% of the total AOO in NSW). Further, the proposal will lead to a significant increase in the native vegetation and habitat across the site. The proposal is not expected to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.



- ***Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat***

The proposal is not likely to result in the establishment of harmful species. Cats and foxes are likely to already occur in the area.

- ***Introduce disease that may cause the species to decline***

Not likely.

- ***Interfere with the recovery of the species***

For all the reasons stated above, the proposal is unlikely to interfere with the recovery of the species.

CRITICALLY ENDANGERED SPECIES SIGNIFICANT IMPACT CRITERIA – *Anthochaera phrygia* (Regent Honeyeater)

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

- ***Lead to a long-term decrease in the size of a population***

A. phrygia mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. Within its current distribution there are four known key breeding areas where the species is regularly recorded. These are the Bundarra-Barraba, Capertee Valley and Hunter Valley districts in NSW, and the Chiltern area in north-east Victoria. The site may contain potential habitat.

The majority of the site's habitat will be retained and protected in perpetuity, within the proposed conservation area or (where it occurs within residential lots) by a s.88B covenant under the *Conveyancing Act 1919*. There are also plans to allow natural restoration of cleared areas within the 21 ha conservation area, and this will lead to a significant net benefit in terms of native vegetation and habitat coverage across the site.

It is therefore concluded that the proposal is unlikely to lead to a long-term decrease in the size of a population.

- ***Reduce the area of occupancy of the species***

As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. Therefore, it is concluded that the proposal would not reduce the area of occupancy of the species.

- ***Fragment an existing population into two or more populations***

The proposals plan to retain and restore native vegetation in the site will ensure that habitat connectivity is maintained and in fact enhanced. The project is therefore unlikely to fragment an existing population into two or more populations.

- ***Adversely affect habitat critical to the survival of a species***

Habitat critical to the survival of *A. phrygia* includes any breeding or foraging areas where the species is likely to occur and any newly discovered breeding or foraging locations (Department of Environment, 2016). As outlined above, the proposal will lead to a significant

increase in the native vegetation and habitat across the site. Therefore, it is unlikely that the proposal would adversely affect habitat critical to the survival of the species.

- ***Disrupt the breeding cycle of a population***

As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. Therefore, the proposal is not likely to disrupt the breeding cycle of a population.

- ***Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline***

As outlined above, the proposal will lead to a significant increase in the native vegetation and habitat across the site. The proposal is not expected to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

- ***Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat***

The proposal is not likely to result in the establishment of harmful species. Cats and foxes are likely to already occur in the area.

- ***Introduce disease that may cause the species to decline***

Not likely.

- ***Interfere with the recovery of the species***

For all the reasons stated above, the proposal is unlikely to interfere with the recovery of the species.

MIGRATORY SPECIES SIGNIFICANT IMPACT CRITERIA – *Hirundapus caudacutus* (White-throated Needletail)

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- ***Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species***

H. caudacutus is an aerial species (where it forages for aerial insects) and because of this, conventional foraging habitat descriptions are inapplicable. It is however, mostly recorded above wooded areas including open forest and rainforest, and may also fly between trees or in clearings, below the canopy. It can also occur over heathland, and sometimes (but less often) over grasslands, swamps, sandy beaches and around coastal cliffs. *H. caudacutus* typically roosts in trees in forests and woodlands, amongst dense foliage and occasionally hollows. *H. caudacutus* breeds in Asia and spends the non-breeding season in Australasia, mainly in Australia. It is widespread throughout eastern and south-eastern Australia. In NSW, it occurs in all coastal regions and extends inland to the western slopes of the Great Divide and occasionally onto the adjacent inland plains. The site may provide potential habitat.

The majority of the site's habitat (including hollow-bearing trees) will be retained and protected in perpetuity, within the proposed conservation area or (where it occurs within residential lots) by a s.88B covenant under the *Conveyancing Act 1919*. There are also plans to allow natural restoration of cleared areas within the 21 ha conservation area, and this will lead to a significant net benefit in terms of native vegetation and habitat coverage across the site.



Therefore, the proposal is unlikely to substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for the migratory species.

- ***Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species***

For the reasons stated above, the proposal is unlikely to result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species

- ***Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.***

For the reasons stated above, the project is unlikely to seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of the species.

MIGRATORY SPECIES SIGNIFICANT IMPACT CRITERIA – *Motacilla flava* (Yellow Wagtail)

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- ***Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species***

M. flava inhabits open country near water. The site may provide potential habitat. The majority of the site's habitat will be retained and protected in perpetuity, within the proposed conservation area or (where it occurs within residential lots) by a s.88B covenant under the *Conveyancing Act 1919*. There are also plans to allow natural restoration of cleared areas within the 21 ha conservation area, and this will lead to a significant net benefit in terms of native vegetation and habitat coverage across the site.

Therefore, the proposal is unlikely to substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for the migratory species.

- ***Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species***

For the reasons stated above, the proposal is unlikely to result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species

- ***Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.***

For the reasons stated above, the project is unlikely to seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of the species.

MIGRATORY SPECIES SIGNIFICANT IMPACT CRITERIA – *Rhipidura rufifrons* (Rufus Fantail)

An action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- ***Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species***

R. rufifrons is found in rainforest, dense wet forests, swamp woodlands and mangroves, preferring deep shade, and is often seen close to the ground. During migration, it may be found in more open habitats or urban areas. The site may provide potential marginal habitat. The majority of the site's habitat will be retained and protected in perpetuity, within the proposed conservation area or (where it occurs within residential lots) by a s.88B covenant under the *Conveyancing Act 1919*. There are also plans to allow natural restoration of cleared areas within the 21 ha conservation area, and this will lead to a significant net benefit in terms of native vegetation and habitat coverage across the site.

Therefore, the proposal is unlikely to substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for the migratory species.

- ***Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species***

For the reasons stated above, the proposal is unlikely to result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species

- ***Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.***

For the reasons stated above, the project is unlikely to seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of the species.

REFERENCES

DAWE (2022a). *Conservation Advice for Callocephalon fimbriatum (Gang-gang Cockatoo)*. Australian Government, Canberra.

DAWE (2022b). *Conservation Advice for Phascolarctos cinereus (Koala) combined populations of Queensland, New South Wales and the Australian Capital Territory*. Australian Government, Canberra.

DCCEEW (2022a). *Conservation Advice for Calyptorhynchus lathami lathami (South-eastern Glossy Black Cockatoo)*. Australian Government, Canberra.

DCCEEW (2022b). *Conservation Advice for Notamacropus parma (Parma wallaby)*. Australian Government, Canberra.

DCCEEW (2023a). *Conservation Advice for Climacteris picumnus victoriae (brown treecreeper (south-eastern))*. Australian Government, Canberra.

DCCEEW (2023b). *Conservation Advice for Stagonopleura guttata (diamond firetail)*. Australian Government, Canberra.



DCCEEW (2023c). *Conservation Advice for Melanodryas cucullata cucullata (hooded robin (south-eastern))*. Australian Government, Canberra.

DCCEEW (2024). *National Recovery Plan for the Swift Parrot Lathamus discolor*. Australian Government, Canberra.

Department of Environment (2016). *National Recovery Plan for the Regent Honeyeater (Anthochaera phrygia)*. Australian Government, Canberra.

Department of Environment, Land, Water and Planning (2016). *National Recovery Plan for the Spotted-tailed Quoll Dasyurus maculatus*. Australian Government, Canberra.

Department for Environment and Water (SA) (2021). *National Recovery Plan for the Grey-headed Flying-fox Pteropus poliocephalus*. Australian Government, Canberra.

Threatened Species Scientific Committee (2019). *Conservation Advice Hirundapus caudacutus White-throated Needle-tail*. Australian Government, Canberra.

APPENDIX J - EPBC IMPACT ASSESSMENT

Central Hunter Valley Eucalypt Forest and Woodland – EPBC Assessment	Response
<p>Profile: The Central Hunter Valley Eucalypt Forest and Woodland is listed as Critically Endangered on the EPBC Act.</p> <p>This community comprises of eucalypt woodland or forest with an open to sparse shrub understorey and grassy ground cover and mostly occurs on soils derived from Permian sediments. The community occurs in Hunter Valley and Goulburn Valley in the north east of NSW in the Hunter River Catchment. Dominant canopy species include <i>Corymbia maculata</i>, <i>Eucalyptus dawsonii</i>, <i>Eucalyptus moluccana</i> and <i>Eucalyptus crebra</i>. A shrubby understorey includes <i>Bursaria spinosa</i>, <i>Acacia amblygona</i>, <i>Acacia decora</i>, <i>Acacia implexa</i>, <i>Breynia oblongifolia</i>, <i>Daviesia genistifolia</i>, <i>Daviesia ulicifolia</i>, <i>Notelaea microcarpa</i> and <i>Pultenaea spinosa</i>. Groundlayer is grassy with species likely to occur including <i>Cheilanthes sieberi</i>, <i>Desmodium varians</i>, <i>Dichondra repens</i>, <i>Eremophila debilis</i>, <i>Lomandra multiflora</i>, <i>Aristida ramosa</i>, <i>Cymbopogon refractus</i> and <i>Microlaena stipoides</i>.</p>	
Reduce the extent of the ecological community	The proposal will reduce the extent of the community by 1.26ha. This community occurs in one condition class, the extent within the study area has been classified as moderate.
Fragment or increase fragmentation of an ecological community	It is considered unlikely that the results of the project will significantly increase the existing fragmentation of this community in the locality. To the south and west of the study area, this community will remain connected to other extensive areas of the same community.
Adversely affect habitat critical to the survival of an ecological community	The proposed area of EEC to be removed has been classified as moderate quality, however, only a small portion of this community i.e., 4.1 ha occurs within lots with only approximately 1.26 ha required to be removed.
Modify or destroy abiotic (non-living) factors necessary for the community's survival, including reduction in groundwater, or substantial alterations to surface water drainage patterns	The proposal is not likely to result in a reduction of groundwater.
<p>Cause a substantial change in the species composition of an occurrence of an ecological community, including decline or loss of functionally important species</p> <p>(i) assisting invasive species, that are harmful to the listed ecological community to become established</p> <p>(ii) causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community</p>	<p>i) Currently there is a moderate weed invasion of exotic grasses and weeds. The project will implement management measures to ensure that the weeds that currently occur are not further spread into retained areas of this community.</p> <p>(ii) Current land use of agricultural practices are currently occurring within the community. Best practice sediment, erosion and pollutant control procedures will be implemented by the project. Therefore, the project is unlikely to inhibit the growth of species that occur within this community.</p>
Interfere with the recovery of an ecological community	The proposal is unlikely to interfere with the recovery of this ecological community, it is extensive in occurrence

	in the locality.
Conclusion	The proposal is reducing the extent of this ecological community by 1.26ha of moderate quality. It is considered that the project is unlikely to result in a significant impact on this endangered ecological community at a Commonwealth level.