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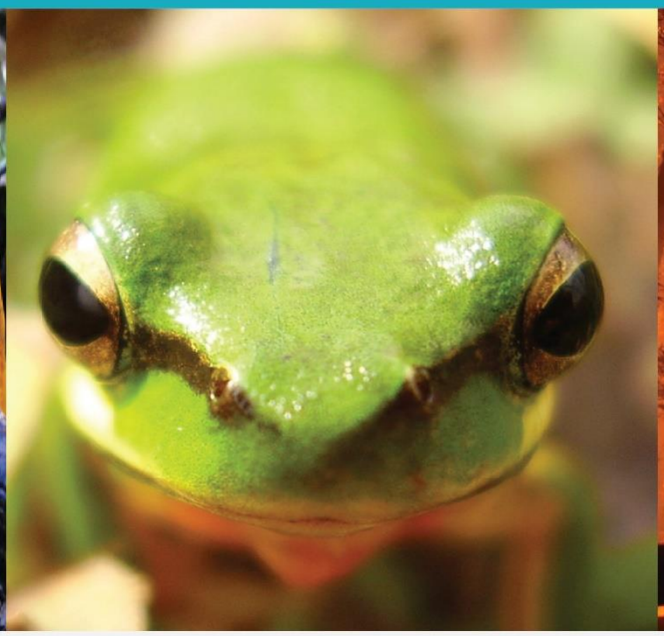


BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

Streamlined assessment – Small Area Module

Proposed Rezoning

Part Lot 5, 6, 7, 15, 16 and 17 DP 11133

87-97 Castle Hill Road, and 121-131 Oratava Avenue,

West Pennant Hills

27 May 2024

(REF: MEC03INT)

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Part Lot 5, 6, 7, 15, 16 and 17 DP 11133, 87-97 Castle Hill Road, and 121-131 Oratava Avenue, West Pennant Hills

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Date:	24/05/24
File:	MEC03INT

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Disclaimer:

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The mapping is indicative of available space and location of features which may prove critical in assessing the viability of the proposed works. Mapping has been produced on a map base with an inherent level of inaccuracy, the location of all mapped features is to be confirmed by a registered surveyor.

EXECUTIVE SUMMARY

Travers bushfire & ecology has been engaged to prepare a biodiversity development assessment report (BDAR) for the proposed rezoning of 87-97 Castle Hill Road, and 121-131 Oratava Avenue, West Pennant Hills. The entire area bounded by Part Lot 5, 6, 7, 15, 16 and 17 DP 11133 has been subject to detailed survey effort and will hereafter be referred to as the 'study area'.

The area of direct impact from the development will hereafter be referred to as the 'development footprint'. This includes the future footprint for residential development as well as room for an asset protection zone (APZ).

The development footprint and natural bushland contained within the Cumberland State Forest and considered for suitability of habitat for threatened species will be referred to as the 'study area'. The 'development footprint' alternatively refers to the two (2) areas under potential direct impacts associated with the rezoning.

Given that these are two separate development footprint locations at the northern and southern extremities of the study area and that more detailed ecological investigations were undertaken within and immediately surrounding these two sites, then the study area was separated into a northern and southern 'study area' relevant to each portion proposed for rezoning.

Planning proposal

The planning proposal seeks to de-register and divest some RU3 (Forestry) lands which are part of the Cumberland State Forest, to R2 lands. The location of these lands is adjacent to the entry points off Castle Hill Road and Oratava Avenue (West Pennant Hills) that are sited next to existing R2 lands. The envisioned outcome of the rezoning to R2 low density residential development is consistent with adjoining lands to the east and west from the same roads. The total area to be rezoned is approximately 0.71 ha.

Recorded biodiversity

Ecological survey and assessment have been undertaken in accordance with the *Biodiversity Assessment Methodology* 2020 (BAM) as well as relevant legislation including the *Environmental Planning and Assessment Act 1979* (*EP&A Act*), the *Biodiversity Conservation Act 2016* (*BC Act*), the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) and the *Fisheries Management Act 1994* (*FM Act*).

In respect of matters required to be considered under the *EP&A Act* and relating to the species / provisions of the *BC Act,* the following threatened species or threatened communities have been recorded either in, or near to the development footprint:

- Powerful Owl (2024)
- Little Lorikeet (2018)
- Gang-gang Cockatoo (2018 & 2019)
- Grey-headed Flying-fox (2018 & 2019)
- Little Bent-winged Bat (2020)
- Large Bent-winged Bat (2020)
- Greater Broad-nosed Bat (2018)

- Dural Land Snail (2024)
- *Eucalyptus scoparia* (planted specimens only)
- *Eucalyptus nicholii* (planted specimens only, as per the Arborist report, although not identified during the botanical survey)
- *Syzygium paniculatum* (planted specimens only)
- Blue Gum High Forest in the Sydney Basin Bioregion
- Sydney Turpentine Ironbark Forest in the Sydney Basin Bioregion

In respect of matters required to be considered under the *EPBC Act*, the following threatened species or threatened communities have been recorded either in, or near to the development footprint:

- Grey-headed Flying-fox
- *Eucalyptus scoparia* (planted specimens only)
- *Eucalyptus nicholii* (planted specimens only, as per the Arborist report, although not identified during the botanical survey)
- *Syzygium paniculatum* (planted specimens only)
- Blue Gum High Forest of the Sydney Basin Bioregion
- Turpentine-Ironbark Forest of the Sydney Basin Bioregion

In respect of matters relative to the *FM Act*, no suitable habitat for threatened marine or aquatic species was observed within the development footprint.

Impact assessment (*BC Act, EPBC Act* and *FM Act*)

Avoidance, minimisation and mitigation measures have been considered in section 5 of the document.

The size of the area to be rezoned is approximately 0.71 ha. This includes remnant native vegetation comprising Blue Gum High Forest and Sydney Turpentine Ironbark Forest, as well as planted (predominately) native vegetation, and some cleared areas, with native vegetation comprising approximately 0.55 ha of the 0.71 ha. A high proportion of these lands shows previous clearing and management, as well as more intact areas (northern site) that are heavily impacted by weed invasion, where much of the mid-storey has been replaced by exotic species such as *Celtis sinensis* (Chinese Hackberry).

A BDAR was prepared for the site in 2020 with most field data coming from early 2019. As this data is just over five (5) years old, new plot data for the BAM calculator was collected in May 2024 in very similar locations to previous data collections to address the current vegetative conditions of the site.

The BDAR has been revised to a streamlined assessment type on the basis that impacts to native vegetation are below the 1 ha threshold and the site is not core koala habitat. The previous document likely used BAM 2017 which is no longer available for use, and the plant community types (PCTs) needed revalidation as the PCT numbers previously used have recently been superseded.

The development footprint needs to include an area used for future development footprints and a suitable APZ, and it has been assumed that the full development footprint would be impacted. Whilst a reasonable native biomass can be retained in an APZ, it will be assumed as a full impact because there is always potential that native vegetation in managed areas could succumb to attrition. This is highly unlikely in the short-term, but a possibility in the long-term.

The planning proposal will impact 0.55 ha of native vegetation of which 0.45 ha will be offset through the BOS, which includes impacts to three (3) different Plant Community Types (PCTs):

- 0.16 ha of PCT 3136 (Blue Gum High Forest)
- 0.29 ha of PCT 3262 (Sydney Turpentine Ironbark Forest)
- 0.10 ha of planted native vegetation

Streamlined BDAR's only need to consider potential SAII entities for species credits, however we have undertaken previous broad studies in earlier years, as well as known recordings in the Cumberland State Forest to run through the BAM calculator to determine species credits.

The assessment of serious and irreversible impacts is set out under Section 6.7.2 of the *BC Reg 2017* to guide the determining authority on this decision. These principles have been reviewed and assessed in Appendix 1 and Appendix 2.

There will be no significant impact on matters listed under the *FM Act*.

As the proposal will result in the reduction in extent of both Blue Gum High Forest and Turpentine–Ironbark Forest, it may constitute a significant impact on matters of national environmental significance. As such, a referral to Department of Climate Change, Energy, the Environment and Water is recommended to determine if further EPBC assessment if required.

Biodiversity Offsets Scheme (BOS) – Threshold assessment

The proposed development exceeds the nominated threshold triggers of impacting Biodiversity Values Land. Therefore, biodiversity offsets are required under the Biodiversity Offsets Scheme (BOS).

BAM Calculator results

The BAM Calculator provides a means of objectively determining the loss of biodiversity as a result of a proposed development. The credits required (Table A & B) are the number of credits needed to be 'retired' to offset residual impacts.

Table A – Requirement for ecosystem credits

PCT	TEC	Area (ha)	Credits
3136 - Blue Gum High Forest	Blue Gum High Forest in the Sydney Basin Bioregion	0.16	6
3262 - Sydney Turpentine Ironbark Forest	Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion	0.29	5

Table B – Requirement for species credits

Species	Area (ha)	Credits
Ninox strenua / Powerful Owl	0.45	9
Pommerhelix duralensis / Dural Land Snail	0.45	9

The pricing of credits can vary greatly over time and it is advised that the proponent use the online Biodiversity Offset Payment Calculator tool to determine the current pricing of credits (https://www.lmbc.nsw.gov.au/offsetpaycalc).

LIST OF ABBREVIATIONS

APZ	asset protection zone
BAM	Biodiversity Assessment Method (2020)
BAR	Biodiversity Assessment Report
BC Act	*Biodiversity Conservation Act (2016)*
BC Reg	*Biodiversity Conservation Regulation (2017)*
BCAR	Biodiversity Certification Assessment Report
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offset Scheme
BPA	bushfire protection assessment
BSSAR	Biodiversity Stewardship Site Assessment Report
CEEC	Critically endangered ecological community
CM Act	*Coastal Management Act 2016*
DAWE	Department of Agriculture, Water and the Environment (superseded by DCCEEW)
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DCP	development control plan
DEC	NSW Department of Environment and Conservation (superseded by DECC from April 2007)
DECC	NSW Department of Environment and Climate Change (superseded by DECCW from October 2009)
DECCW	NSW Department of Environment, Climate Change and Water (superseded by OEH from April 2011)
DEWHA	Commonwealth Department of Environment, Water, Heritage & the Arts (superseded by SEWPAC)
DOEE	Commonwealth Department of Environment & Energy (superseded by DAWE)
DPE	NSW Department of Planning and Environment
DPHI	NSW Department of Planning, Housing and Infrastructure
DPIE	NSW Department of Planning, Industry and Environment (superseded by DPE Dec 2021)
EEC	endangered ecological community
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act (1979)*
EPBC Act	*Environment Protection and Biodiversity Conservation Act (1999)*
FM Act	Fisheries Management Act
IBRA	Interim Biogeographic Regionalisation for Australia
LEP	local environmental plan
LGA	local government area
LLS Act	*Local Land Services Act (2013)*
NES	national environmental significance
NPW Act	*National Parks and Wildlife Act (1974)*
NRAR	Natural Resources Access Regulator (NSW)
NSW DPI	NSW Department of Industry and Investment
OEH	Office of Environment and Heritage (superseded by DPIE from August 2019)
PCT	plant community type
PFC	projected foliage cover
RFS	NSW Rural Fire Service
ROTAP	rare or threatened Australian plants
SAII	Serious And Irreversible Impacts
SEPP	State Environmental Planning Policy
SEWPAC	Commonwealth Dept. of Sustainability, Environment, Water, Population & Communities (superseded by DOEE)
SIS	species impact statement
SULE	safe useful life expectancy
TEC	threatened ecological community
TPZ	tree preservation zone
TSC Act	*Threatened Species Conservation Act (1995)* – superseded by the *Biodiversity Conservation Act (2016)*
VMP	vegetation management plan

TABLE OF CONTENTS

Figures

Tables

Appendices

1. INTRODUCTION

Travers bushfire & ecology has been engaged to undertake a biodiversity development assessment within Part Lot 4, 5, 6, 7, 15, 16 and 17 DP 11133, at 87-97 Castle Hill Road, and 121-131 Oratava Avenue,, West Pennant Hills within The Hills Shire Council local government area (LGA). The extent of this entire lot is shown in Figure 1-1 below. This lot is subject to a proposed development application and will hereafter be referred to as the 'study area'.

The area proposed for rezoning is hereafter referred to as the 'development footprint' (refer to Figure 1-3).

The proposal shall be assessed under the *Biodiversity Conservation Act* (*BC Act*), 2016.

Figure 1-1 – Study area (red) and rezoning area (yellow)

1.1 Purpose

The purpose of this Biodiversity Development Assessment Report (BDAR) is to undertake assessment of impact on biodiversity, including threatened species, populations and ecological communities. Consequently, the following tasks have been completed:

- Undertake botanical survey to describe the vegetation communities and their conditions
- Undertake fauna habitat survey for the detection and assessment of fauna and their potential habitats
- Complete targeted surveys for threatened species, populations and ecological communities
- Prepare a BDAR in accordance with the requirements of the:
    a) *Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act),*
    b) *Biodiversity Conservation Act 2016 (BC Act),*
    c) *Biodiversity Conservation Regulation 2017 (BC Reg.),*
    d) *Fisheries Management Act 1994 (FM Act)*, and
- Prepare a BDAR in accordance with the Biodiversity Assessment Methodology (BAM) 2020

1.1.1 Certification of BAM compliance

Section 6.15 of the *BC Act* regarding the currency of a BDAR requires:

(1) A biodiversity assessment report cannot be submitted in connection with a relevant application unless the accredited person certifies in the report that the report has been prepared on the basis of the requirements of (and information provided under) the biodiversity assessment method as at a specified date and that date is within 14 days of the date the report is so submitted.

(2) A relevant application is an application for planning approval, for vegetation clearing approval, for biodiversity certification or in respect of a biodiversity stewardship agreement.

Lindsay Holmes (BAAS 17032) is an accredited person under the *BC Act.* I L Holmes certify here that the report has been prepared on the basis of the requirements of (and information provided under) the BAM. I declare I have no conflicts of interest with this proposal. The BAM calculator files were finalised on 27.5.24 which means the proposal must be submitted within 14 days of this date.

1.1.2 Terminology

Throughout this report the terms development footprint and study area are used. It is important to have a thorough understanding of these terms as they apply to the assessment.

Development footprint means the area directly affected by the proposal. It has the same meaning as “subject land” defined below.

Study area is the portion of land that encompasses all surveys undertaken and is usually all land contained within the designated property boundary. The study area extends as far as is necessary to assess all important biodiversity values known and likely to occur within the subject land and includes the development footprint and any additional areas which are likely to be affected by the proposal, either directly or indirectly.

Subject land is land to which the BAM is applied in Stage 1 to assess the biodiversity values. It includes land that may be a development site, clearing site, proposed for biodiversity

certification or land that is proposed for a biodiversity stewardship agreement. In this case, it refers to the area designated as the development footprint and has the same meaning for the purposes of this report. The terms “subject land” and “development footprint are interchangeable in this regard.

Direct impacts are those that directly affect the habitat and individuals. They include, but are not limited to, death through clearing, predation, trampling, poisoning of the animal/plant itself and the removal of suitable habitat. When applying each factor, consideration must be given to all of the likely direct impacts of the proposed activity or development.

Indirect impacts occur when project-related activities affect species, populations or ecological communities in a manner other than direct loss. Indirect impacts can include loss of individuals through starvation, exposure, predation by domestic and/or feral animals, loss of breeding opportunities, loss of shade/shelter, deleterious hydrological changes, increased soil salinity, erosion, inhibition of nitrogen fixation, weed invasion, fertiliser drift, or increased human activity within or directly adjacent to sensitive habitat areas. As with direct impacts, consideration must be given, when applying each factor, to all the likely indirect impacts of the proposed activity or development.

1.2 Site description

1.2.1 Site overview and landscape features

Table 1-1 provides an overview the planning, cadastral and topographical details of the study area and an overview of the site and surrounds is shown on Figure 1-4 and Figure 1-5 (site and location maps). Table 1-1 also examines the landscape features of the proposed development site in accordance with the BAM.

Table 1-1 – Site and landscape features

Location	Part Lot 4, 5, 6, 7, 15, 16 and 17 DP 11133, 87-97 Castle Hill Road, and 121-131 Oratava Avenue, West Pennant Hills
Location description	There are two (2) sites, northern area and southern area, both located within the Cumberland State Forest at West Pennant Hills. The northern area includes part Lot 4, 5, 6 and 7 adjacent to the northern boundary of the State Forest along Castle Hill Road. The southern area includes part Lot 15, 16 and 17.
Area	Impact area is approximately 0.5 ha
Local government area	The Hills Shire Council
Zoning	RU3 - Forestry. Proposing R2 – Low Density Residential
Minimum lot size	40 ha currently, although the proposal seeks a refinement to a minimum lot size of 1,140m^2 for the northern site, and 1,700m^2 for the southern site
Grid reference MGA-56	Northern area - 318300E 6264900N / Southern area – 318500E 6263900N
Elevation	Northern area – 160 m / Southern area – 110 m AHD
Topography	Northern area - situated on a moderate sloping ridgetop / Southern area – situated on a relatively flat slope leading towards a riparian line.
Catchment and drainage	Catchment – Darling Mills Creek

Existing land use	There are some existing dwellings and previous vegetation clearance within the proposed rezoning areas.
Is a watercourse or waterfront land impacting the site?	No
Are GDEs Present onsite?	No
Is site mapped as a Coastal Wetland or proximity area to a Coastal Wetland?	No
Patch size	c. 380 ha
IBRA bioregions and subregions	Sydney Basin bioregion – Cumberland subregion (Figure 1-4 - Site mapFigure 1-4 and Figure 1-5)
NSW landscape region and area (ha)	Pennant Hills Ridges
Native vegetation extent in the buffer area (1500 m)	151 ha approx. and 14% Cover classes: 0–10%, **10–30%,** 30–70% and >70%
Cleared areas	There is small, cleared areas associated with the existing buildings in both the northern and southern study areas. The southern area is managed with a combination of remnant and planted trees as well as landscaping along the southern edge and around the dwelling. Parts of the northern area around the dwelling are also managed with a combination of remnant and planted trees as well as landscaping. The southern half of the northern area is remnant disturbed bushland.
Evidence to support differences between mapped vegetation extent and aerial imagery	Mapped vegetation closely matches aerial imagery. Unmapped vegetation is exotic.
Rivers and streams classified according to stream order	The site map shows the local streams and their stream orders. The northern area is approximately 250 m from a 1st order stream. The southern area is approximately 100 m south of a 2nd order stream.
Wetlands within, adjacent to and downstream of the site, including important wetlands	There are no wetlands within either the northern or southern areas or near the development footprint.
SEPP (Biodiversity and Conservation) 2021 – Koala Habitat Protection	Schedule 2 LGA: No Core Koala Habitat: No Koala SEPP applies? No
Connectivity features	The Cumberland State Forest and adjoining former IBM land contains extensive Sydney Turpentine Ironbark Forest and Blue Gum High Forest. There is fragmented connectivity along Castle Hill Road to the east, and along tributaries of Darling Mills Creek to the south-west. The location map shows an overview of the extent of native vegetation in the locality.
Geology and soils	Geology; Wianamatta Shales cover most of the Cumberland State Forest, with Hawkesbury Sandstone near the southern boundary. Soils; Glenorie Soil Landscape The sites are not located in areas of geological significance or upon significant soils hazard areas.

Identification of method applied (i.e. linear or site-based)	Site based assessment

1.3 Development history

A rezoning review application (RR-2024-1 – The Hills LGA – PP-2023-2300) was submitted in February 2024 seeking to amend The Hills Local Environmental Plan (LEP) 2019 on land at 87-97 Castle Hill Road & 121-131 Oratava Avenue, West Pennant Hills to:

- Rezone the sites from RU3 Forestry to R2 Low Density Residential;
- Introduce a maximum building height of 9m; and
- Amend the minimum lot size from 40 ha to 1,140m^2 for the northern area, and 1,700m^2 for the southern area.

The Strategic Planning Panel of the Sydney Central City Planning Panel determined that the proposal should proceed to Gateway determination because the proposal has demonstrated strategic merit and subject to changes site specific merit. In making this decision, the Panel considered the request and advice provided by Council, the proponent and the Department of Planning, Housing and Infrastructure.

The Panel recommended that prior to the planning proposal being submitted for a Gateway determination, it is to be revised to address the following:

- Amend the minimum lot size to 1,140m^2 for the Northern site and 1,700m^2 for the Southern site; and
- Update the Biodiversity Development Assessment Report, arborist report and vegetation management plan.

This report is being prepared to address the above recommendations.

1.4 Biodiversity Offsets Scheme (BOS)

The *BC Act* repeals the *Threatened Species Conservation Act 1995*, the *Nature Conservation Trust Act 2001* and the animal and plant provisions of the *National Parks and Wildlife Act 1974*. Together with the *Biodiversity Conservation Regulation 2017*, the *BC Act* establishes a new regulatory framework for assessing and offsetting biodiversity impacts on proposed developments and clearing. It establishes a framework to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offsets Scheme (BOS). Where development consent is granted, the authority may impose as a condition of consent an obligation to retire a number and type of biodiversity credits determined under the Biodiversity Assessment Method (BAM).

Where development consent is granted, the authority may impose as a condition of consent an obligation to retire a number and type of biodiversity credits determined under the BAM.

The Biodiversity Offsets Scheme applies to:

- local development (assessed under Part 4 of the *Environmental Planning and Assessment Act 1979*) that triggers the Biodiversity Offsets Scheme Threshold or is likely to significantly affect threatened species based on the test of significance in section 7.3 of the *Biodiversity Conservation Act 2016*
- state significant development and state significant infrastructure projects, unless the Secretary of the Department of Planning, Industry and Environment and the

environment agency head determine that the project is not likely to have a significant impact
- biodiversity certification proposals
- clearing of native vegetation in urban areas and areas zoned for environmental conservation that exceeds the Biodiversity Offsets Scheme threshold and does not require development consent
- clearing of native vegetation that requires approval by the Native Vegetation Panel under the *Local Land Services Act 2013*
- activities assessed and determined under Part 5 of the *Environmental Planning and Assessment Act 1979* (generally, proposals by government entities) if proponents choose to 'opt in' to the Scheme.

Proponents will need to supply evidence relating to the triggers for the Biodiversity Offsets Scheme Threshold and the test of significance (where relevant) when submitting their application to the consent authority.

1.5 Threshold assessment

The Biodiversity Offsets Scheme applies to local development (assessed under Part 4 of the *Environmental Planning and Assessment Act 1979*) that **is likely to significantly affect threatened species**. Local development is likely to significantly affect threatened species and require a biodiversity development assessment report (section 7.7 of the *Biodiversity Conservation Act 2016*) if impacts either:

- exceed the Biodiversity Offsets Scheme threshold (BC Act, section 7.4); the threshold includes clearing on land within the Biodiversity Values Map or clearing of an area that exceeds the threshold.
- are carried out on an Area of Outstanding Biodiversity Value (AOBV)
- are likely to significantly affect threatened species, ecological community.

The BOS includes three (3) elements to the threshold test – an area trigger, a Biodiversity Values Land Map trigger and the Test of Significance. If impacts exceed at least one of these triggers, the Biodiversity Offset Scheme applies to the proposed clearing.

1.5.1 Biodiversity Values Land Map

Biodiversity Values Land have been mapped within the study area – an offset is required under this trigger. Figure 1-2 below shows the site (blue) in relation to those areas (coloured mauve) as having biodiversity values.

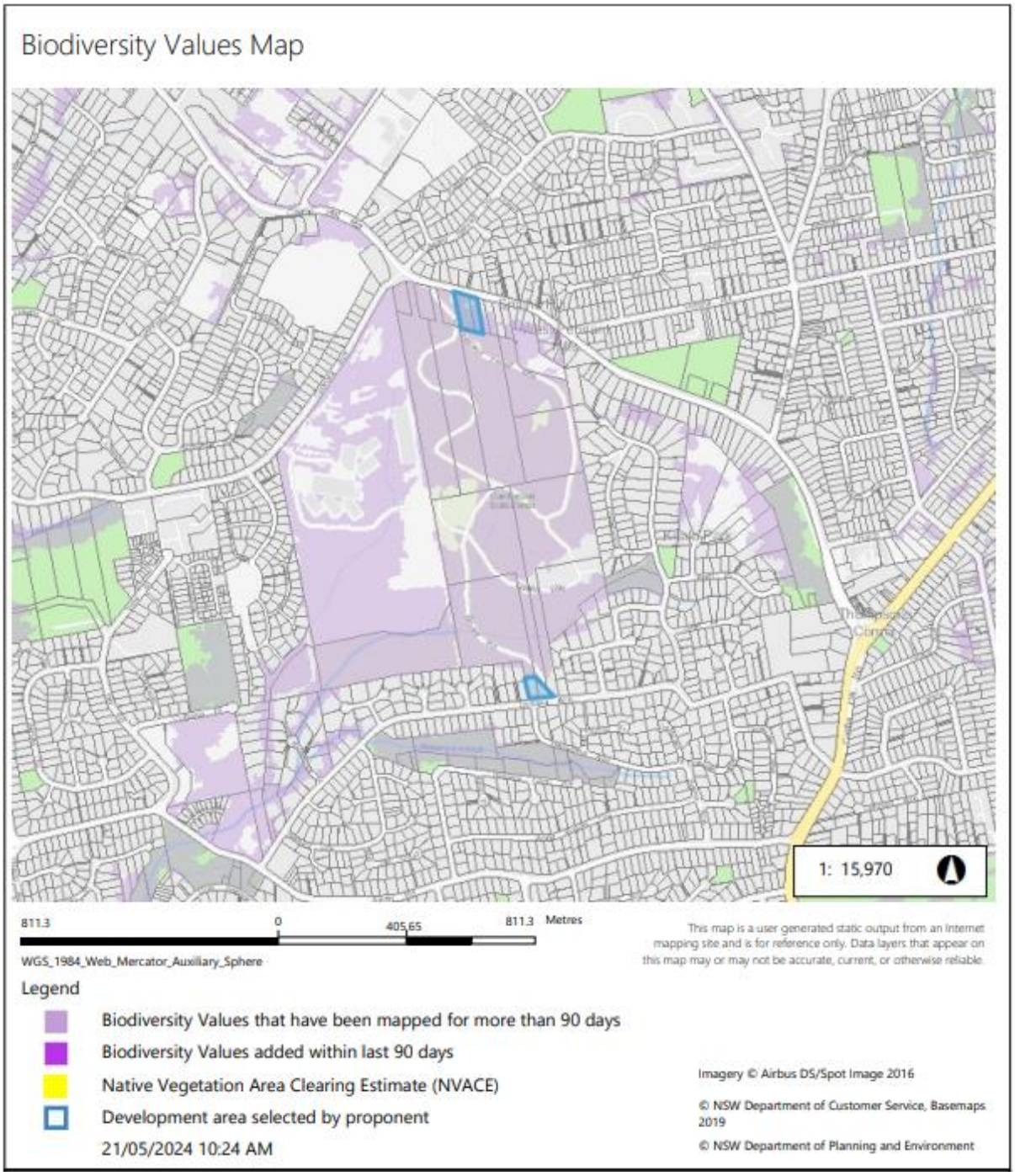

Figure 1-2 – Biodiversity values land (purple) relative to the development footprint (blue) approximately

(Source: DCCEEW– Biodiversity Values Map – May 2024)

1.5.2 Area clearing threshold

The area threshold varies depending on the minimum lot size (shown in the Lot Size Maps made under the relevant Local Environmental Plan (LEP)), or actual lot size (where there is no minimum lot size provided for the relevant land under the LEP).

Table 1-2 - BOS Entry Threshold Report

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 ALL BV Mapping within the development footprinted added in the last 90 days?** (dark purple mapping only, no light purple mapping present)	no
1.3	**Date of expiry of dark purple 90 day mapping**	N/A
1.4	**Is the Biodiversity Values Map threshold exceeded?**	yes
2. Area Clearing Threshold - Results Summary (Biodiversity Conservation Regulation Section 7.2)		
2.1	**Size of the development or clearing footprint**	1,315.6 sqm
2.2	**Native Vegetation Area Clearing Estimate (NVACE)** (within development/clearing footprint)	1,152.5 sqm
2.3	**Method for determining Minimum Lot Size**	LEP
2.4	**Minimum Lot Size** (10,000sqm = 1ha)	400,000 sqm
2.5	**Area Clearing Threshold** (10,000sqm = 1ha)	10,000 sqm
2.6	**Does the estimate exceed the Area Clearing Threshold?** (NVACE results are an estimate and can be reviewed using the Guidance)	no

Table 1-2 identifies that the BOS entry threshold report has determined the area threshold based on the minimum lot size of 40 ha, and the area clearing threshold for which the BOS applies is 1 ha. Clearing of 'native vegetation' that exceeds 1 ha will require a biodiversity offset to be obtained. Note that 'native vegetation' includes planted native species. The development proposal will require the clearing of 0.55 ha of native vegetation, therefore offsetting will not be required under this trigger.

1.6 Proposed development and BOS entry pathway

Table 1-3 – Proposal details

Development type			
☐ Commercial	☑ Residential (proposed rezoning)	☐ Cemetery	☐ Tourism
☐ Building DA	☐ Industrial	☐ Extension	☐ Ecotourism
☐ Subdivision (XX lots)	☑ Non-government development and not a state significant development		
BOS entry pathway			
☐ State Significant Project	☑ Biodiversity Values Land Map trigger		
☐ Area clearing threshold	☐ Test of Significance		

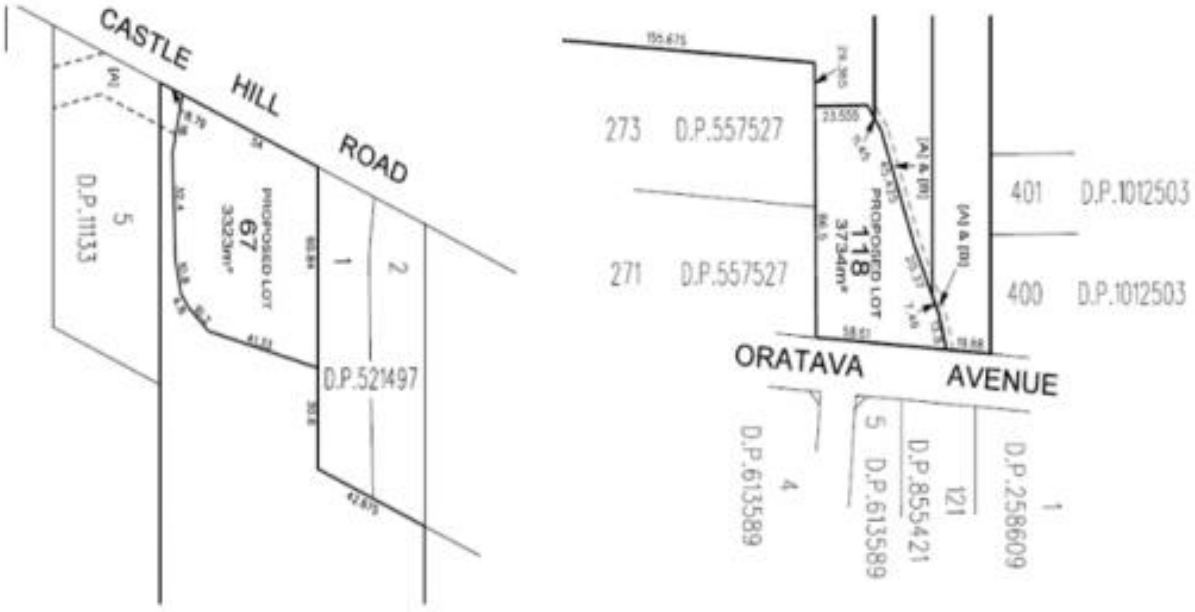

Figure 1-3 – Proposed rezoning areas (north-left, south-right)

1.7 Statutory assessment requirements

1.7.1 Environmental Planning and Assessment Act 1979 (EP&A Act)

Prior to any development taking place in New South Wales a formal assessment needs to be made of the proposed work to ensure it complies with relevant planning controls and, according to its nature and scale, confirm that it is environmentally and socially sustainable. State, regional and local planning legislation indicates the level of assessment required, and outlines who is responsible for assessing the development. The development assessment and consent system is outlined in Part 4 and the infrastructure and environmental impact assessment system is outlined in Part 5 of the *EP&A Act*.

1.7.2 Biodiversity Conservation Act 2016 (BC Act)

The *BC Act* repeals the *Threatened Species Conservation Act 1995*, the *Nature Conservation Trust Act 2001* and the animal and plant provisions of the *National Parks and Wildlife Act 1974*.

The *BC Act* and the *BC Reg* establishes a regulatory framework for assessing and offsetting impacts on biodiversity values due to proposed developments and clearing. It establishes a framework to avoid, minimise and offset impacts on biodiversity from development through the Biodiversity Offsets Scheme. Where development consent is granted, the authority may impose as a condition of consent an obligation to retire a number and type of biodiversity credits determined under the new Biodiversity Assessment Method (BAM).

The BOS applies to:

- local development (assessed under Part 4 of the *Environmental Planning and Assessment Act 1979*) that triggers a BOS threshold or is likely to significantly affect threatened species based on the test of significance in section 7.3 of the *Biodiversity Conservation Act 2016*

- state significant development and state significant infrastructure projects, unless the Secretary of the Department of Planning, Industry and Environment and the environment agency head determine that the project is not likely to have a significant impact
- biodiversity certification proposals
- clearing of native vegetation in urban areas and areas zoned for environmental conservation that exceeds a BOS threshold and does not require development consent
- clearing of native vegetation that requires approval by the Native Vegetation Panel under the *Local Land Services Act 2013*
- activities assessed and determined under Part 5 of the *Environmental Planning and Assessment Act 1979* (generally, proposals by government entities) if proponents choose to 'opt in' to the Scheme.

Proponents will need to supply evidence relating to the triggers for the BOS thresholds and the test of significance (where relevant) when submitting their application to the consent authority.

Development consent cannot be granted for non-State significant development under Part 4 of the *EP&A Act* if the consent authority is of the opinion, it is likely to have serious and irreversible impacts (SAII) on biodiversity values. The determination of SAII is to be made in accordance with principles prescribed section 6.7 of the *BC Regulation 2017*. The principles have been designed to capture those impacts which are likely to contribute significantly to the risk of extinction of a threatened species or ecological community in New South Wales.

The threatened species test of significance is used to determine if a development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. It is applied as part of the Biodiversity Offsets Scheme entry requirements and for Part 5 activities under the *Environmental Planning and Assessment Act* (*EP&A Act*), 1979.

The test of significance is set out in s.7.3 of the *BC Act.* If the activity is likely to have a significant impact or will be carried out in a declared area of outstanding biodiversity value, the proponent must either apply the Biodiversity Offsets Scheme or prepare a species impact statement (SIS).

The environmental impact of activities that will not have a significant impact on threatened species will continue to be assessed under the *EP&A Act*

1.7.3 Fisheries Management Act 1994 (FM Act)

The *FM Act* provides a list of threatened aquatic species that require consideration when addressing the potential impacts of a proposed development. Where a proposed activity is located in an area identified as critical habitat, or such that it is likely to significantly affect threatened species, populations, ecological communities, or their habitats, an SIS is required to be prepared.

1.7.4 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)

The *EPBC Act* requires that Commonwealth approval be obtained for certain actions. It provides an assessment and approvals system for actions that have a significant impact on matters of *national environmental significance* (NES). These may include:

- World Heritage Properties and National Heritage Places
- Wetlands of International Importance protected by international treaty
- Nationally listed threatened species and ecological communities

- Nationally listed migratory species
- Commonwealth marine environment

Actions are projects, developments, undertakings, activities, and series of activities or alteration of any of these. An action that needs Commonwealth approval is known as a controlled action. A controlled action needs approval where the Commonwealth decides the action would have a significant effect on an NES matter.

Where a proposed activity is located in an area identified to be of NES, or such that it is likely to significantly affect threatened species, ecological communities, migratory species or their habitats, then the matter needs to be referred to the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) for assessment. In the case where no listed federal species are located on site then no referral is required. The onus is on the proponent to make the application and not the Council to make any referral.

A threshold criterion applies to specific NES matters which may determine whether a referral is or is not required, such as for the *EPBC*-listed ecological communities Cumberland Plain Woodland and Shale-Gravel transition Forest. Consultation with DCCEEW may be required to determine whether a referral is or is not required. If there is any doubt as to the significance of impact or whether a referral is required, a referral is generally recommended to provide a definite decision under the *EPBC Act* thereby removing any further obligations in the case of 'not controlled' actions.

A significant impact is regarded as being:

> *important, notable, or of consequence, having regard to its context or intensity and depends upon the sensitivity, value, and quality of the environment which is impacted and upon the duration, magnitude, and geographical extent of the impacts. A significant impact is likely when it is a real or not a remote chance or possibility.*

Source: EPBC Policy Statement

Guidelines on the correct interpretation of the actions and assessment of significance are located on the department's web site http://www.environment.gov.au/epbc/publications.

1.7.5 Coastal Management Act 2016 (CM Act)

The *Coastal Management Act* (*CM Act,* 2016) establishes the framework and overarching objects for coastal management in New South Wales. The Act commenced on 29 June 2018 and replaces the previous *Coastal Protection Act* (1979).

The purpose of the *CM Act* is to manage the use and development of the coastal environment in an ecologically sustainable way, for the social, cultural and economic well-being of the people of New South Wales.

The *CM Act* also supports the aims of the *Marine Estate Management Act 2014*, as the coastal zone forms part of the marine estate.

The *CM Act* defines the coastal zone, comprising four (4) coastal management areas:

1. coastal wetlands and littoral rainforests area; areas which display the characteristics of coastal wetlands or littoral rainforests that were previously protected by SEPP 14 and SEPP 26
2. coastal vulnerability area; areas subject to coastal hazards such as coastal erosion and tidal inundation

3. coastal environment area; areas that are characterised by natural coastal features such as beaches, rock platforms, coastal lakes and lagoons and undeveloped headlands. Marine and estuarine waters are also included
4. coastal use area; land adjacent to coastal waters, estuaries and coastal lakes and lagoons.

The *CM Act* establishes management objectives specific to each of these management areas, reflecting their different values to coastal communities.

1.7.6 Licences

Individual staff members of *Travers bushfire & ecology* are licensed under Clause 20 of the *National Parks and Wildlife (Land Management) Regulation 1995* and Sections 120 & 131 of the *National Parks and Wildlife Act 1974* to conduct flora and fauna surveys within service and non-service areas. NPWS Scientific Licence Numbers: SL100848.

Travers bushfire & ecology staff are licensed under an Animal Research Authority issued by the NSW Department of Primary Industries. This authority allows *Travers bushfire & ecology* staff to conduct various fauna surveys of native and introduced fauna for the purposes of environmental consulting throughout New South Wales

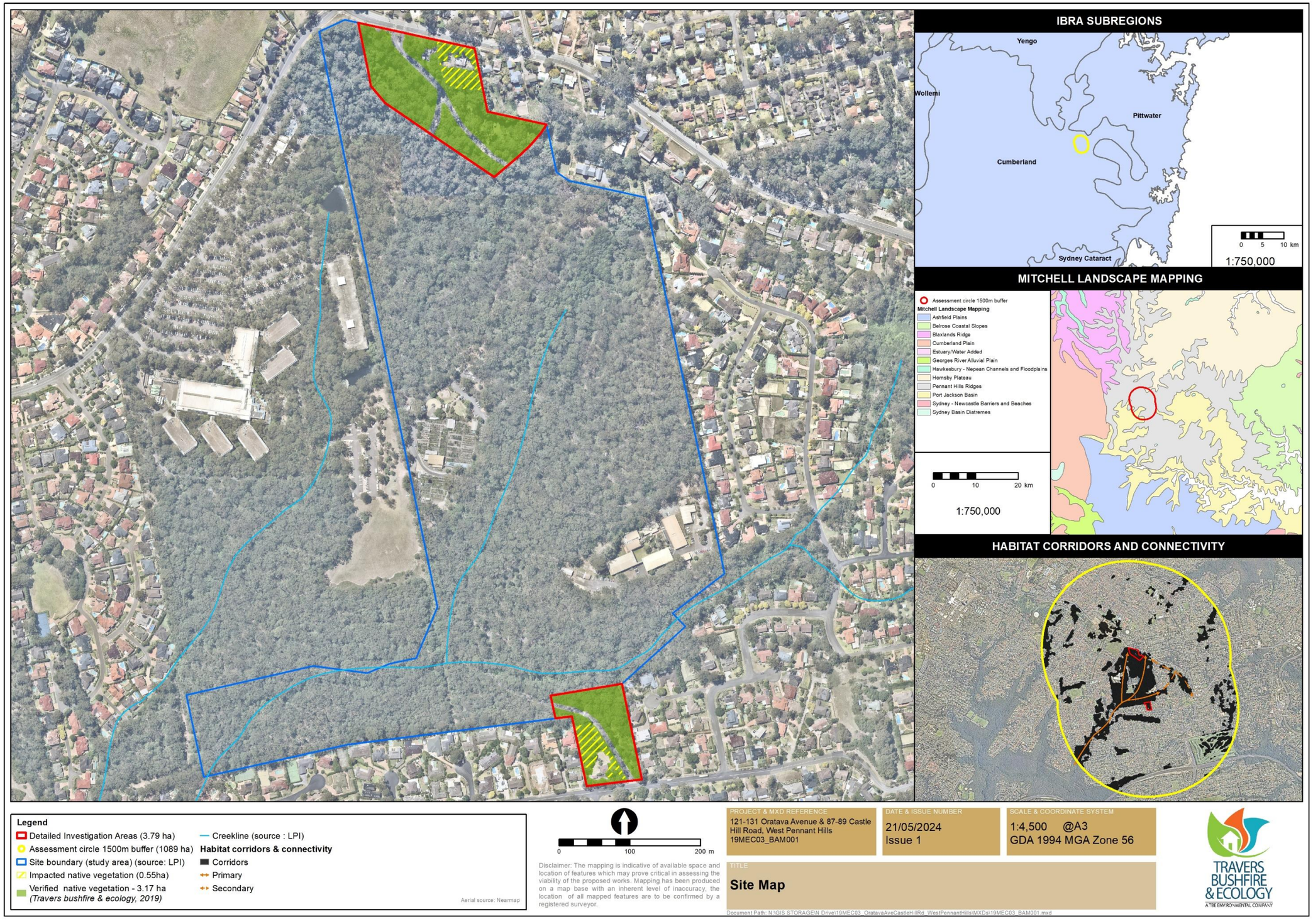

Figure 1-4 - Site map

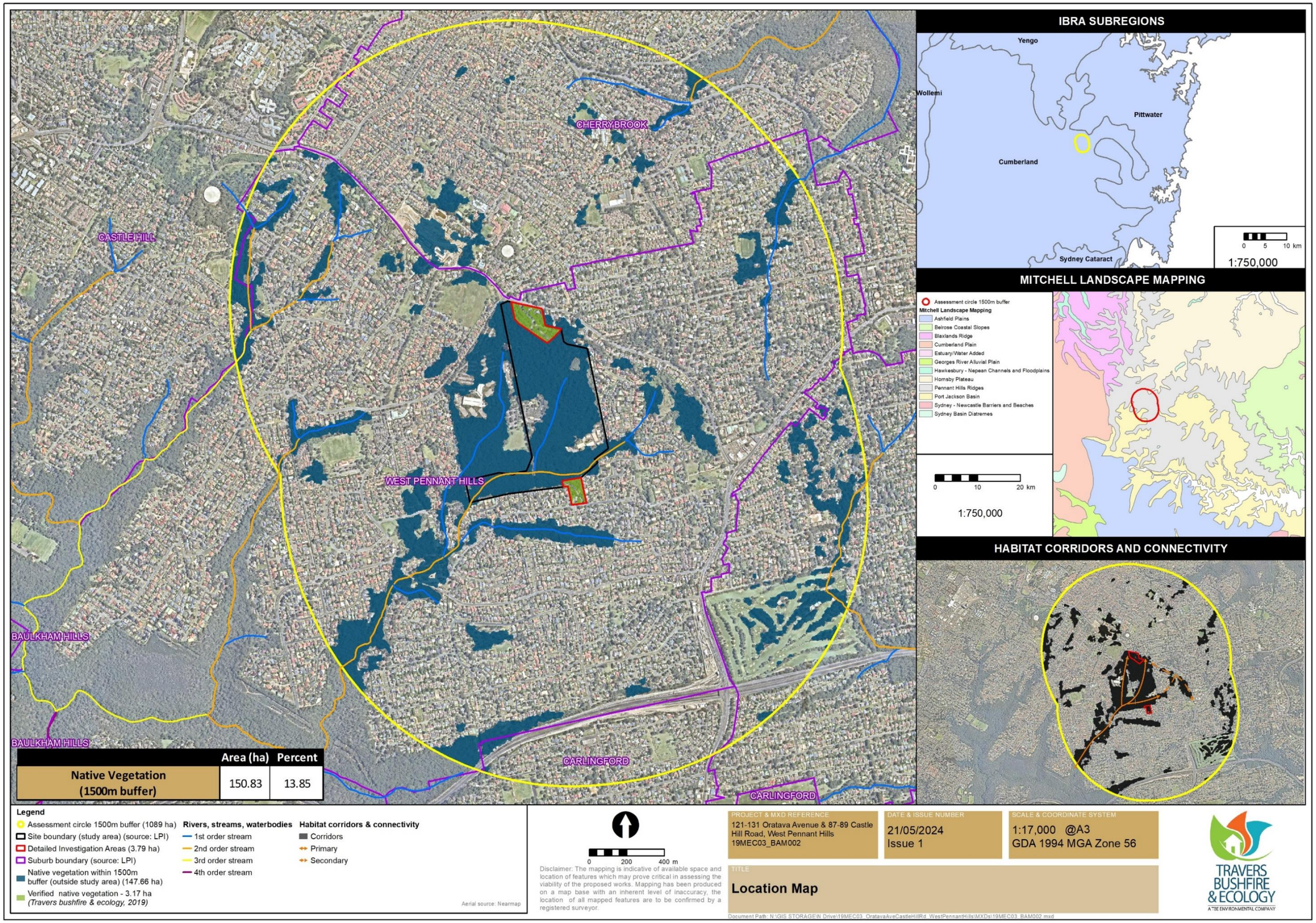

Figure 1-5 - Location map

2. SURVEY METHODOLOGY

2.1 Presurvey information collation & resources

Documents reviewed:

The following documents, reports and information sources were utilised in the preparation of this report:

- Rezoning review record of decision strategic planning panel of the Sydney central city planning panel, RR-2024-1 – The Hills LGA – PP-2023-2300 (2024)
- Tree Assessment Report prepared by ArborSite (March 2024)
- Vegetation Management Plan prepared by Travers bushfire & ecology (May 2024)
- Biodiversity Development Assessment Report prepared by Travers bushfire & ecology (September 2020)

Technical resources utilised:

Survey guidelines

- Survey guidelines for Australia's threatened birds (DEWHA 2010)
- Survey guidelines for Australia's threatened fish (DEWHA 2011)
- Survey guidelines for Australia's threatened frogs (DEWHA 2010)
- Survey guidelines for Australia's threatened mammals (DEWHA 2011)
- Survey guidelines for Australia's threatened bats (DEWHA 2010)
- Survey guidelines for Australia's threatened reptiles (DEWHA 2011)
- Matters of National Environmental Significance (Commonwealth of Australia 2013)
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities 2004 (working draft), Department of Environment and Conservation (DEC)
- Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna – Amphibians (DECC – April 2009a)
- Hygiene Protocol for the Control of Diseases in Frogs (DECC 2008)
- Region based guide to the echolocation calls of Microchiropteran bats (DEC 2004)
- Species credit threatened bats and their habitats (DPIE 2018)
- Field survey methods: Best practice field survey methods for environmental consultants and surveyors when assessing proposed development sites or other activities on sites containing threatened species, populations or ecological communities (OEH 2004)
- Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method (DPIE 2020)

Mapping resources

- Aerial photographs (Google Earth Pro / Spatial Information Exchange / NearMap)
- Topographical maps (scale 1:25,000)
- LiDAR data for contours (Land and Property Information, est. 2015 estimated)
- ESpade – DCCEEW tool for checking soil types

Threatened species records

- BioNet database which holds data from a number of custodians (May 2024 to 10 km)

- Atlas of Living Australia (NCRIS/GBIF 2017)
- Birdata (Birdlife Australia 2017)
- NSW Bird Atlas (NSWBA 2017)
- OZCAM (Online Zoological Collection of Australian Museums 2017)
- EPBC Protected Matters Search Tool - DCCEEW (May 2024 to 10 km)

Vegetation mapping/resources:

- BioNet Vegetation Classification System
- DCCEEW 2022 – Standard Vegetation Type Map (Eastern NSW)

2.2 Flora survey methodology

2018

Initial flora survey was undertaken on 9 February 2018. A random meander search was undertaken in accordance with Cropper (1993) to create a broad species list. Whilst a large number of exotic landscaping species were noted and identified during the random meander searches, no specific survey was undertaken for these species. Therefore, not all of the exotic species within the study area will appear on the species list in .

A review of the Atlas of NSW Wildlife, BioNet (OEH January 2018) was undertaken prior to the botanical survey to identify threatened species previously recorded within 10 km of the development footprint and determine whether target searches were needed to be undertaken. Target searches for relevant threatened species were undertaken where applicable during the random meander and stratified surveys. Three (3) plots of 20 m x 20 m were undertaken to assist in determining the vegetation types present.

2019

In January 2019 the database was reviewed again prior to re-collection of data in accordance with BAM. Three (3) BAM plots were undertaken and threatened flora species searches within the proposed rezoning sites.

All observed plant species are listed in Appendix 5.

BAM plots collect the following information:

- Native overstorey, mid-storey and ground cover recorded for all observed species and an estimate of stems
- Stratum (and layer): stratum and layer in which each species occurs
- Growth form: growth form for each recorded species
- Species name: scientific name and common name
- Percent projected foliage cover of the understorey strata and exotic vegetation

The following information was collected at each of the three (3) 20 m x 50 m transect plot sites:

- Number of trees with hollows visible from the ground within the 20 m x 50 m plot
- The total length of fallen logs >10 cm in diameter within the 20 m x 50 m plot
- The proportion of regenerating overstorey species within the vegetation zone
- Number of large trees
- Estimates of leaf litter cover, in 1 m x 1 m subplots at five (5) locations along the 50 m central transect

The vegetation types observed in the study area were converted to their relevant plant community type (PCT). They were then stratified based on vegetation type and condition.

Initial survey in 2018 identified the vegetation in the southern study area as a combination of Blue Gum High Forest (BGHF), and planted and derived vegetation. A plot in this area confirms that it is Sydney Turpentine Ironbark Forest (STIF) in a managed and modified form.

The native vegetation types on site were considered to be either BGHF or STIF, both threatened ecological communities (TECs) under the *BC Act* and *EPBC Act*.

2020

Additional survey was undertaken on 15 July 2020. This involved a fourth BAM plot in planted native vegetation in the northern study area, refinement of vegetation community boundaries, plus seasonal threatened species survey in both study areas. The plot conducted was 10 m x 100 m to fit into the narrow vegetation zone. An updated BioNet search was undertaken prior to site inspection to determine if any recent records of threatened flora were within the vicinity.

2024

To align with current assessment standards, surveys conducted five years ago require updated survey. Consequently, for the purposes of this assessment, data from 2018 and 2019 has been omitted.

BAM plots were conducted near those collected in 2019 to include 1 plot in each native vegetation PCT zone. This has been undertaken to assess the current conditions of the sites.

The BAM plot data was collected on May 14 and May 15, 2024. Target threatened species searches for conducted in the northern site on May 14, and in the southern site on May 15.

Further information on the vegetation communities is provided in Section 3.

All plot sheets utilised for the BAM calculator are in Appendix 3.

2.3 Fauna survey methodology

Diurnal birds

Two (2) diurnal bird census points were undertaken within the northern study area and another two (2) census points were undertaken within the southern study area during January 2018 survey. The census points undertaken closest to the road frontage for both locations were both replicated during January 2019 survey. A minimum of 30 minutes of survey was undertaken at each census point in an area radiating out to between 30–50 m.

Bird census points were selected to give an even spread and representation across the site and its communities (refer to Figure 2-1 and Figure 2-2). Census points were also commenced in locations where bird activity was apparent, as often different small bird species are found foraging together. Opportunistic diurnal bird survey was conducted between census points and whilst undertaking other diurnal surveys including 2020 diurnal survey time.

Recent June 2020 updated surveys were mostly opportunistic birding observations whilst undertaking other surveys, this included covering the dawn chorus on the 05/06/20 and dusk chorus on the 20/06/20.

All seeding Allocasuarina trees located within the detailed investigation areas were searched for chewed cones indicating foraging activity.

Nocturnal birds

Given the suitability of habitat present Masked Owl (Tyto novaehollandiae), Powerful Owl (Ninox strenua), Barking Owl (Ninox connivens) and Sooty Owl (Tyto tenebricosa) were targeted by call-playback techniques during initial nocturnal survey on 31st January 2018.

The 2018 surveys included searches for significant habitat trees within the detailed investigation zones. Two of these trees were identified as significant given their large hollows and potential suitability for nesting by Powerful Owl. A search for owl activity around these hollows was undertaken however initial surveys did not align with the Powerful Owl breeding period.

Subsequently June 2020 survey undertaken during the early Powerful Owl nesting period checked previously identified potential trees as well as extending searches of potential nesting locations further through the Cumberland State Forest area. Proximate perches and roosting habitat to these was also searched for male activity. The initial site visit on the 5/6/20 was commenced in the early hours before dawn to determine if the male was giving up a roost location. As calls were not heard the second site visit concentrated on activity searches close to trees considered as potential nesting locations. Activity and trees categorised as either 'high' or 'low' potential Powerful Owl nest trees are identified on Figure 2-1 and Figure 2-2.

Additional May 2024 survey was undertaken during the early Powerful Owl nesting period to identify if the Powerful Owl breeding pair were currently occupying their known historical nesting tree. Searches included inspecting previously identified nest, potential nest trees as well as extending searches of potential nesting locations further through the Cumberland State Forest area. Proximate perches and roosting habitat to these was also searched for male activity. Stag-watching of the previously identified nest tree was also undertaken.

Bats

Passive ultrasonic recording for microbats was undertaken during the nocturnal survey period on 31st January 2018. Overnight passive ultrasonic recording was undertaken for two consecutive nights from the 8th January 2019. Whilst out of the recognised survey period for microbats, overnight passive ultrasonic recording was also undertaken on 5 June 2020 and one consecutive night on 5 June 2020.

Significant Habitat Tree (SHT1) is a large stag that has had limbs cut and managed next to the communications tower in the northern study area. As this was the closest potential microbat roost to the development footprint this tree was stag-watched in the dusk period during January 2018 survey and an ultrasonic bat recorder was placed below.

Invertebrates

The study area contains vegetation communities that support habitat for the Dural Land Snail (*Pommerhelix duralensis*) therefore target searches in suitable habitat locations was undertaken during 2018 & 2019 surveys. This predominantly included turning of logs, stumps, artificial refuse and rocks where present.

Additional habitat and opportunistic searches targeting Dural Land Snail were undertaken in recent 2024 survey. Locations of Dural Land Snail observations are provided on Figure 2-2.

Habitat trees

Significant habitat trees were initially searched for within and close to the detailed investigation areas during January 2018 surveys. 'Significant' habitat trees are defined as trees containing only large hollows suitable for use by owls and/or containing several good quality hollows typically consisting of more than one medium (10-30cm) sized hollow. A tree may also be considered significant where evidence of use by select fauna is found such as Yellow-bellied Glider sap feed tree, raptor nest, or owl roost.

Data such as the number of hollows present in each size category (or other reason for selection), tree species, diameter at breast height, canopy spread, and overall height were collected on a Trimble handheld GPS unit and a metal tag with the significant habitat tree number was placed on the trunk for field relocation purposes.

January 2019 survey included detailed searches for all other hollows located only within the two (2) development footprint areas and thus potentially directly impacted cavities.

June 2020 survey included searches for all other potential Powerful Owl nesting trees within the remaining Cumberland State Forest study area. This was in attempt to determine the nesting location at this time and ensure sufficient setbacks from the development proposal.

A summary of significant habitat tree results within the detailed investigations areas (of which were only found in the northern area) as well as all other hollow-bearing trees within both development footprints is provided in Table 3-5. The remaining trees containing large hollows considered either of ‘low’ or ‘high’ potential for Powerful owl are shown on Figure 2-1 and Figure 2-2.

2.4 Field survey effort

Table 2-1 and Table 2-2 below detail the flora and fauna survey effort undertaken for the study area.

Table 2-1 – Fauna survey effort

Fauna group	Date	Weather conditions	Survey technique(s)	Time effort (24hr)
Diurnal birds	31/1/18	8/8 cloud, light-mod S wind, no rain, temp 21°C	Diurnal census x4 & opportunistic	6hrs 5min 1325 - 2030
	8/1/19	1/8 cloud, light NE wind, no rain, temp 26°C	Diurnal census x2 & opportunistic	3hrs 20min 1100 - 1420
	5/6/20	0/8 cloud, no wind, no rain, temp 8°C	Diurnal opportunistic	1hr 30min 0615 - 0745
	30/6/20	0/8 cloud, no wind, no rain, temp 14-18°C	Diurnal opportunistic	7hrs 1030 - 1730
Nocturnal birds	31/1/18	8/8 cloud, mod-gusty S wind, no rain, temp 20-19°C	Spotlighting	1hr 40min 2030 - 2210
			Call playback (Section 2.5 species)	Commenced @ 2050
	5/6/20	0/8 cloud, no wind, no rain, 4/4 moon, temp 8°C	Pre-dawn owl calls	1hr 15min 0500 - 0615
	30/6/20	0/8 cloud, no wind, no rain, 3/4 moon, temp 14-13°C	Stag-watching	1hr 15min 1715 - 1830
	15/5/24	4/8 cloud, light 7 NNE wind, no rain, temp 22-18°C	Diurnal inspection of nest tree and suitable hollows, Stag-watching	2hrs 40min 1500-1740
Arboreal mammals	31/1/18	8/8 cloud, mod-gusty S wind, no rain, temp 20-19°C	Stag-watching / Spotlighting	1hr 40min 2030 - 2210
			Call playback (Section 2.5 species)	Commenced @ 2110
	5/6/20	0/8 cloud, no wind, no rain, 4/4 moon, temp 8°C	Pre-dawn calls	1hr 15min 0500 - 0615
	30/6/20	0/8 cloud, no wind, no rain, 3/4 moon, temp 14-13°C	Dusk calls	1hr 15min 1715 - 1830
Terrestrial mammals	31/1/18	8/8 cloud, mod-gusty S wind, no rain, temp 20-19°C	Spotlighting	1hr 40min 2030 - 2210
Bats	31/1/18	8/8 cloud, mod-gusty S wind, no rain, temp 20-19°C	Stag-watching / Spotlighting	1hr 40min 2030 - 2210

Fauna group	Date	Weather conditions	Survey technique(s)	Time effort (24hr)
			Ultrasonic microbat recording (Passive monitoring) x2	3hrs 2030 - 2200
	8-9/1/19	Mostly fine	Ultrasonic microbat recording (Passive monitoring) x2	Overnight for x2 nights
	5-6/6/20	0/8 cloud, no wind, no rain, 4/4 moon, temp <8°C	Ultrasonic microbat recording (Passive monitoring) x2	Overnight for x1 nights
Reptiles	31/1/18	8/8 cloud, light-mod S wind, no rain, temp 21°C	Habitat search, opportunistic	6hrs 5min 1325 - 2030
	8/1/19	1/8 cloud, light NE wind, no rain, temp 26°C	Habitat search, opportunistic	3hrs 20min 1100 - 1420
	30/6/20	0/8 cloud, no wind, no rain, temp 14-18°C	Diurnal opportunistic	7hrs 1030 - 1730
Amphibians	31/1/18	8/8 cloud, mod-gusty S wind, no rain, temp 20-19°C	Spotlighting & call identification	1hr 40min 2030 - 2210
	30/6/20	0/8 cloud, no wind, no rain, 3/4 moon, temp 14-13°C	Dusk calls	1hr 15min 1715 - 1830
Molluscs	31/1/18	8/8 cloud, light-mod S wind, no rain, temp 21°C	Habitat search, opportunistic	6hrs 5min 1325 - 2030
	8/1/19	1/8 cloud, light NE wind, no rain, temp 26°C	Habitat search, opportunistic	3hrs 20min 1100 - 1420
	15/5/24	4/8 cloud, light 7 NNE wind, no rain, temp 22-18°C	Habitat search, opportunistic	40min 1400-1440

Table 2-2 – Flora survey effort

Flora survey	Survey technique(s)	Dates
Vegetation communities	- Survey of the boundaries of all communities – field verification, plotting vegetation boundaries on aerial photographs.	9 Feb 2018, 2 Jan 2019 15 July 2020, 14-15 May 2024
Stratified sampling	- Three (3) 20m x 20m quadrats spaced throughout the development footprint in areas of bushland. Opportunistic observations of flora species during all on-foot traverses of the development footprint. - Three (3) BAM plots. Opportunistic observations of flora species during all on-foot traverses of the development footprint. - One (1) BAM plot. Opportunistic observations of flora species during all on-foot traverses of the development footprint. - Three (3) BAM plots.	9 Feb 2018 2 Jan 2019 15 July 2020 14-15 May 2024

Targeted searches	- Targeted searches in known or potential habitats. - Opportunistic searches during all on-foot traverses across the site.	9 Feb 2018, 2 Jan 2019, 15 July 2020, 14-15 May 2024

Table 2-3 – Plot and transect survey effort – development footprint

Veg zone no.	Vegetation type	PCT	Condition	Area (Ha)	Minimum plot transect sites required	Plot transect sites sampled
1	Blue Gum High Forest	3136	moderate-good	0.13	1	1
2	Blue Gum High Forest	3136	managed-derived	0.03	1	1
3	Sydney Turpentine Ironbark Forest	3262	managed-derived	0.29	1	1
4	Planted native vegetation	n/a	derived	0.10	n/a	n/a

Table 2-4 – Plot location details

Veg zone no.	PCT	Condition	Area (ha)	Minimum plots required	Plot sampled	Plot identifier	Plot size	Easting centroid	Northing centroid	Bearing
1	3136	moderate-good	0.13	1	1	Q1	20 m x 50 m	318305.0198 E	6264882.438 N	334.7918
2	3136	managed	0.03	1	1	Q2	20 m x 50 m	318333.6395 E	6264824.489 N	135.6283
3	3262	managed	0.29	1	1	Q3	20 m x 50 m	318490.1456 E	6263955.312 N	293.4665

2.5 Survey limitations

It is important to note that field survey data collected during the survey period is representative of species occurring within the development footprint for that occasion. Due to effects of fire, breeding cycles, migratory patterns, camouflage, weather conditions, time of day, visibility, predatory and / or feeding patterns, increased species frequency or richness may be observed within the development footprint outside the nominated survey period. Habitat assessments based on the identification of micro-habitat features for various species of interest, including regionally significant and threatened species, have been used to minimise the implications of this survey limitation.

Given the limited potential for threatened species to occur on site because of the heavily disturbed (and partly removed understorey), together with long-term and ongoing management of quite a bit of the development footprint, it is unlikely that there are any significant limitations of this study.

Flora survey limitations

The species list does not include all household or exotic garden / landscaping species and those species which could not be identified at the time of the survey past genus level. Cryptic species not flowering at the time of the survey may not be observed during survey outside of peak flowering periods.

Survey found several individuals of Syzygium, most likely planted as part of landscaping or revegetation works. Some individuals were identified as the non-threatened S. australe based on possessing the diagnostic characteristics “young leafy twigs 4-angled to shortly 4-winged, wings joining above each node to produce a small pocket” as per NSW Flora Online(http://plantnet.rbgsyd.nsw.gov.au/cgibin/NSWfl.pl?page=nswfl&lvl=sp&name=Syzygium~australe). These diagnostic traits are visible at all times of year, and are the primary distinguishing features between *S. australe* and *S. paniculatum*. The individuals of *Syzygium* did not possess 4-angled or winged twigs and are considered to most likely be planted cultivars of *S. paniculatum*. These individuals were not fruiting or flowering (in 2019 when first observed) so positive determination could not be given, but given their location within a planted garden setting, we do not consider that they form part of the naturally occurring population of this species. During May 2024, three (3) specimens were fruiting at that time.

As this species is readily available in plant nurseries, and any removed individuals can be easily replaced, we do not consider that the loss of four (4) planted individuals requires offsetting under the BOS. As they have not been planted as part of a species recovery program, no credits should be required for these planted individuals. As such, this species is treated as absent in the BAM-C.

Eastern Australian Underground Orchid was prompted by the BAM calculator as this species has an association with PCT 3136. It was determined that this species only has the potential of occurring within vegetation zone 3136_mod_good as 3136_managed is too degraded to support this species. This species requires survey within the months of September – November. As survey was undertaken during May, this species has been assumed present within the appropriate vegetation zone 3136_mod-good only.

All other species with potential to occur we surveyed in the appropriate period and can be ruled out.

Table 2-5 – Survey adequacy for species credit species (flora)

Common name	*BC Act*	Potential to occur (presence status) / habitat	Preferred survey period (DCCEEW)	Actual survey period	Survey sufficient to rule out presence
Rhodamnia rubescens	CE	Yes	All months	Jan, Feb, July, May	Yes
Darwinia peduncularis	V	No	All months	N/A	Yes, see Section 4.2
Haloragodendron lucasii	E	No	All months	N/A	Yes, see Section 4.2
Julian's Hibbertia	CE	Unlikely. Lacking typical canopy species associations	Oct-Nov	May	Yes, see Section 4.2
Eastern Australian Underground Orchid	CE	Yes	Sep-Nov	May	No

Fauna survey limitations

Following recent fauna surveys, there are no survey limitations considered for threatened fauna including species credit species identified by the BAM-C.

2.6 Accuracy of identification

Images of specimens of Dural Land Snail located during 2024 survey were sent to Michael Shae for confirmation. The results of this confirmed the presence of Dural Land Snail within the subject site. Locations of Dural Land Snail observations are provided in Figure 2-1 and 2-2.

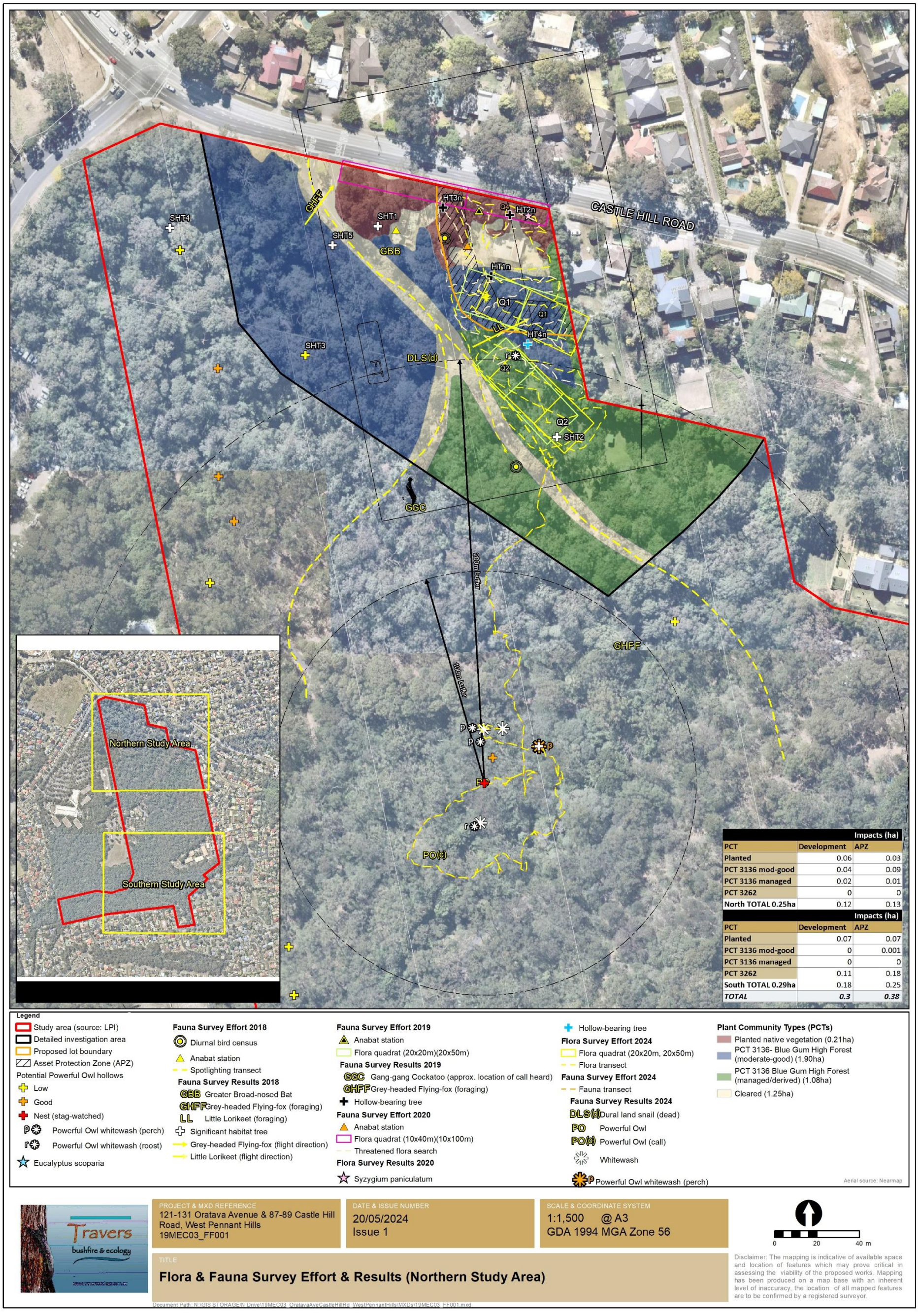

Figure 2-1 – Flora and fauna survey effort and results (Northern Lot)

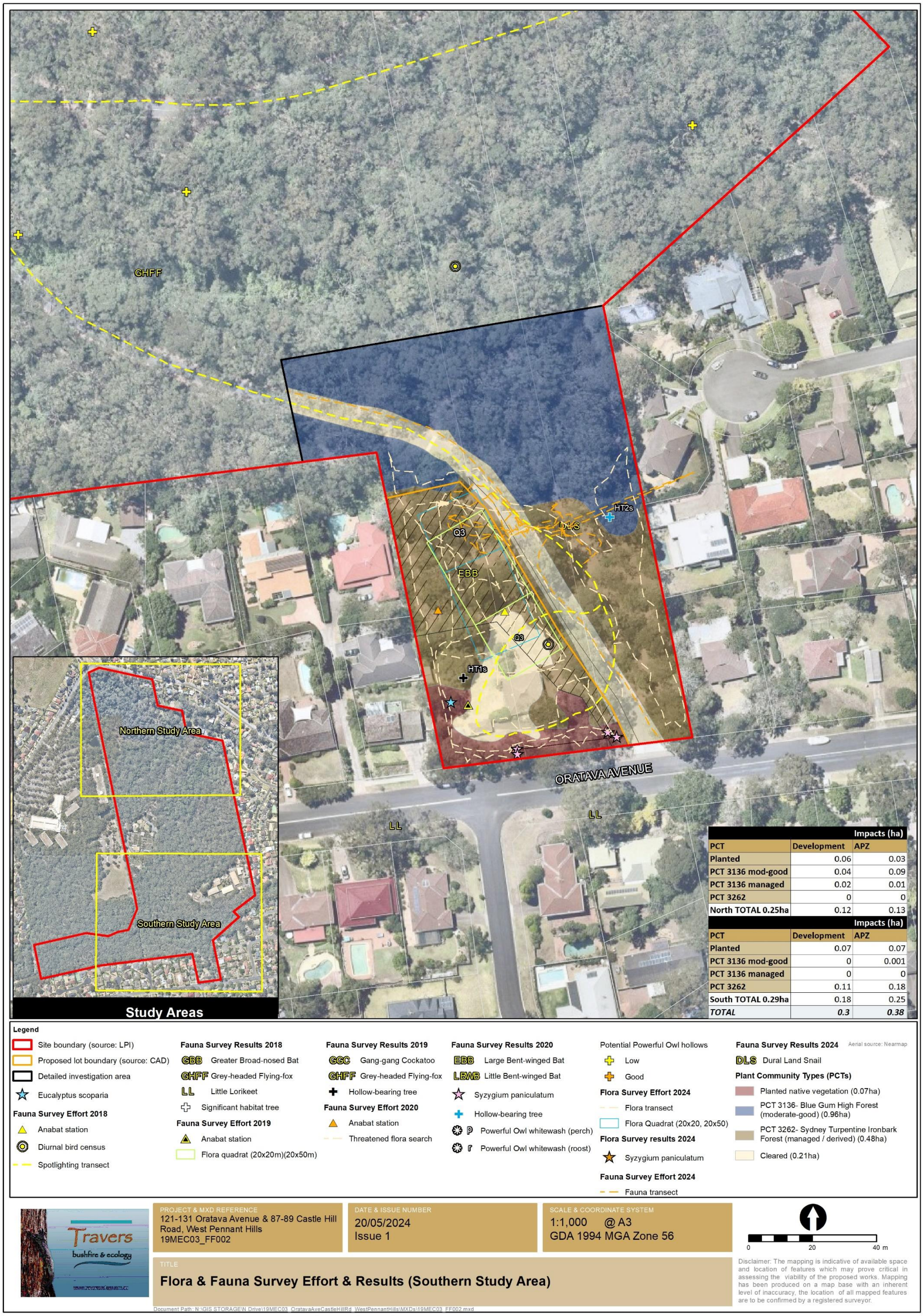

Figure 2-2 – Flora and fauna survey effort and results (Southern Lot)

3. SURVEY RESULTS

3.1 Flora results

3.1.1 Plant community types (PCTs)

Evidence used to identify a PCT

Evidence used to identify the PCTs within the site: the entire list of PCTs was exported from the online BioNet Vegetation Classification Tool. Dominant canopy species, mid-stratum species, ground cover species, and Sydney Basin Interim Biogeographic Regionalisation for Australia (IBRA) region and sub-region (Cumberland) information were utilised to produce a short list of potential PCTs. Final PCTs were then chosen based on species composition and presence, and similarity to descriptive attributes and distributional information provided in the BioNet Vegetation Classification Tool.

Zones 1 and 2

2019 - The identification of the most suitable PCT was based upon filtering for PCTs with *Eucalyptus saligna* and *Eucalyptus pilularis* as upper storey species in the Cumberland IBRA subregion. This produced a shortlist of four (4) PCTs: 1237, 1245, 1841 and 1915. PCT 1245 is restricted to the Illawarra Escarpment, with a northern limit in the Hacking River valley, so can be ruled out on locational features. PCT 1841 occurs on sandstone and can be ruled out given the site occurs on shale geology. PCT 1915 occurs on coastal flats and adjoining toe slopes which does not fit the edaphic features of the site and can also be ruled out.

2024 – The above-listed PCTs have been recently decommissioned, although the corresponding valid PCT is 3136, Blue Gum High Forest. A reasonable proportion of native species observed in Zones 1 and 2 are included in the Scientific Committee's final determinations for Blue Gum High Forest in the Sydney Basin Bioregion TEC.

Zone 3

2019 – The identification of the most suitable PCT was based upon filtering for PCTs within the Cumberland IBRA subregion with *Eucalyptus pilularis* and *Syncarpia glomulifera* as upper strata species and *Acacia parramattensis* and *Pittosporum undulatum* as mid strata species. This produced a single PCT, PCT 1281. This PCT is consistent with the 2016 OEH mapping.

2024 – All native species identified in Q3 were entered into the Bionet Vegetation Classification Tool which produced a list of potential candidate PCTs. All native species occur in PCTs 4025, 3258 and 3262. PCT 4025 is a coastal floodplain wetland and can be ruled out on the vegetation class. For PCT 3258, the species that commonly occur with a frequency of >20% were largely absent from the site, indicating a poor correlation. The revised classification of PCT 1281 included a split of the complex to PCT 3136 and 3262. Whilst Turpentine trees were not present in the vegetation plot, there were a higher proportion of species from PCT 3262 than 3136 present.

Zone 4

This is a vegetation community comprised of native and non-native trees/shrubs that have been planted as well as landscaping species. This vegetation zone occurs around the existing dwellings in both the northern and southern site.

Zone 4 may be included in *prescribed impacts.*

Table 3-1 provides a summary of the PCT occurring within the development site, including vegetation formation, percent cleared within and extent within the development site.

All plot sheets utilised for the BAM calculator are in Appendix 3.

Table 3-1 – PCTs

PCT code	PCT name	Species relied upon	Vegetation formation	Vegetation class	% Cleared	Area within development site (ha)	TEC status
3136	Blue Gum High Forest	*E. saligna, E. pilularis* and understorey vines	Wet Sclerophyll Forests (Shrubby sub-formation)	North Coast Wet Sclerophyll Forests	99	0.16 to be impacted (0.06 total impact; 0.1 APZ management)	Blue Gum High Forest: critically endangered under the *BC Act* and *EPBC Act*
3262	Sydney Turpentine Ironbark Forest	Geological change and *E. pilularis, S. glomulifera, Acacia parramattensis, Pittosporum undulatum*	Wet Sclerophyll Forests (Grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	96	0.29 to be impacted (0.11 total impact; 0.18 APZ management)	Sydney Turpentine Ironbark Forest: critically endangered under the *BC Act* and *EPBC Act*

3.1.2 Vegetation descriptions of observed communities

The following vegetation communities were identified within the study area through ground truthing. Threatened ecological communities are denoted with 'TEC'.

- PCT 3136 – Blue Gum High Forest - TEC
- PCT 3262 – Sydney Turpentine Ironbark Forest – TEC
- Planted native vegetation

PCT 3136 – Blue Gum High Forest

This vegetation community is located in the northern and southern study areas but restricted more closely to the riparian line in the southern study area outside of the development footprint.

Canopy – *Eucalyptus saligna, Syncarpia glomulifera, Angophora floribunda* and *Eucalyptus pilularis* are the most dominant canopy species to a height of 20–40 m tall. The projected foliage cover (PFC) averages approximately 30–50%.

Mid-storey – *Pittosporum undulatum, Acacia implexa, Polyscias sambucifolia, Trema tomentosa, Brachychiton acerifolius, Allocasuarina torulosa, Alphitonia excelsa, Pittosporum revolutum, Glochidion ferdinandi, Acacia decurrens* and *Ficus coronata* with a height generally below 12 m and a highly variable PFC dependent upon the level of disturbance. Exotic species were very frequent within the northern study area which included species such as *Celtis sinensis, Cinnamomum camphora, Ligustrum sinense* and *Ligustrum lucidum.*

Ground layer and vines – *Pteridium esculentum, Clematis aristata, Eustrephus latifolius, Morinda jasminoides, Entolasia marginata, Pandorea pandorana, Calochlaena dubia, Pellaea falcata, Cayratia clematidea, Commelina cyanea, Dianella caerulea, Entolasia stricta, Blechnum cartilagineum, Plectranthus parviflorus, Stephania japonica, Dichondra repens, Doodia aspera, Microlaena stipoides, Oplismenus imbecillis* and *Lobelia purpurascens.*

Photo 1 – Vegetation along the western portion of Q1

Photo 2 – Managed understorey for recreation in Q2

PCT 3262 - Sydney Turpentine Ironbark Forest

The community is located in the southern study area as a managed and modified vegetation type with a mixture of native and planted trees, cleared patches and impacted ground layer (weeds and lawn).

Canopy – *Eucalyptus saligna,* and *Eucalyptus pilularis* with planted *Eucalyptus microcorys* and other Eucalypts to a height of 20–33 m. The PFC averages approximately 10–20% due to previous clearing and disturbances.

Mid-storey – There is an irregular mid-storey containing *Pittosporum undulatum, Bursaria spinosa, Melia azedarach, Acacia implexa, Allocasuarina torulosa* and *Acacia parramattensis.* There are other planted shrubs such as *Callistemon viminalis, Syzygium* spp. and *Murraya paniculata* that make up the mid-storey. The PFC for native species is less than 10%.

Ground layer – *Microlaena stipoides, Wahlenbergia gracilis, Pandorea pandorana, Eragrostis brownii, Dichondra repens, Cayratia clematidea, Veronica plebeia, Clematis aristata, Oplismenus aemulus, Desmodium varians, Glycine clandestina, Commelina cyanea, Leucopogon juniperinus, Oplismenus imbecillis, Lobelia purpurascens, Dichondra repens, Lomandra longifolia, Echinopogon caespitosis* and *Eustrephus latifolius.*

Photo 3 – Managed vegetation in Q3, just north of the existing dwelling

Planted Native Vegetation

This describes the northern portion of the northern study area and is comprised of planted native vegetation.

Canopy - *Eucalyptus grandis, Corymbia tessellaris* and *Corymbia maculata* providing 50% PFC.

Mid-storey - *Leptospermum petersonii, Callistemon salignus, Lophostemon confertus, Backhousia citriodora, Syzygium* spp., *Melia azedarach, Clematis aristata* and *Alectryon subcinereus* provide 20–30% PFC. Exotic species are present in low abundance.

Ground layer – *Oplismenus aemulus, Dichondra repens, Cyperus gracilis, Microlaena stipoides,* and *Veronica plebeia* provide 11% PFC.

The southern portion of the southern study area is comprised of planted native and non-native vegetation.

Canopy – *Eucalyptus scoparia, Pinus radiata, Corymbia tessellaris Araucaria bidwillii, Eucalyptus microcorys* and *Corymbia citriodora,* 12-24m tall and 15-20% PFC.

Mid-storey – *Syzygium paniculatum* and landscaping species in gardens, otherwise absent.

Ground layer – Largely exotic with a very low proportion of *Dichondra repens, Microlaena stipodes, Veronica plebeia* and *Lobelia purpurascens.*

Photo 4 – Planted native vegetation within quadrat 4 of 2020

3.1.3 Vegetation integrity assessment

A vegetation integrity assessment is an assessment on the site's condition. Vegetation patches are broken into zones of roughly equal quality and then surveyed by transect plots. The number of required transect plots is dependent upon the size of the zone.

Vegetation zone area (ha)	Minimum number of plots/transects
<2	1 plot/transect
>2–5	2 plots/transects
>5–20	3 plots /transects
>20–50	4 plots/transects
>50–100	5 plots/transects
>100–250	6 plots/transects
>250–1000	7 plots/transects; more plots may be needed if the condition of the vegetation is variable across the zone
>1000	8 plots/transects; more plots may be needed if the condition of the vegetation is variable across the zone

Once data from the transect plot has been collected, the composition of native plant species per growth form is assessed, along with numbers of stems, percentages of exotic or high threat exotic species present, number and sizes of native tree stems, litter cover, rock cover, cryptogram cover, hollows and fallen logs. Therefore, the vegetation integrity assessment is a measure of composition, structure and function.

Once data from the transect plot has been collected, the composition of native plant species per growth form is assessed, along with numbers of stems, percentages of exotic or high threat exotic species present, number and sizes of native tree stems, litter cover and fallen logs.

The vegetation integrity score is obtained using equations and weightings based upon a number of entities to calculate scores for composition, structure and function, for an overall current vegetation integrity score.

Figure 2-1 and Figure 2-2 shows the location of the plots in relation to the impacted areas.

Table 3-2 – Current vegetation integrity score

Vegetation zone name	Area (ha)	Composition condition score	Structure condition score	Function condition score	Current vegetation integrity score
3136 mod-good	0.13	81.1	54.3	65	65.9
3136 - managed	0.03	34.2	16.8	24.1	24.1
3262 - managed	0.29	24.4	14.7	53.2	26.7

The future vegetation integrity score is measured assuming there will be limited vegetation retained in APZs or fence line impact areas. Also, despite mechanisms such as VMP's being enforced, they are not in perpetuity which means that retained trees or clumps of vegetation may succumb to edge effects and attrition. As such, the entire site will be treated as fully impacted to cover a worse-case scenario.

Given the above clarification, the future vegetation integrity score will be 0 as indicated in Table 3-3.

Table 3-3 – Future vegetation integrity score

Vegetation zone name	Area (ha)	Composition condition score	Structure condition score	Function condition score	Future vegetation integrity score
3136 mod-good	0.13	0	0	0	-65.9
3136 - managed	0.03	0	0	0	-24.1
3262 - managed	0.29	0	0	0	-26.7

Each vegetation zone is divided into two management zones: APZ and full impact.

Within the APZ areas it is assumed that there will be limited vegetation retained in compliance with Inner Protection Area (IPA) APZ standards. However, vegetation within APZs will be managed with a VMP enforced, this does not ensure vegetation will be maintained in perpetuity.

The *Standards for Asset Protection Zones* (RFS, 2005) provides the following vegetation maintenance guidelines for IPAs.

Fuel loads within the IPA are to be maintained so they do not exceed 4t/ha.

Trees are to be maintained to ensure;

- Canopy cover does not exceed 15%
- Trees (at maturity) do not touch or overhang the building
- Tree canopies (at maturity) should be well spread out and not form a continuous canopy
- Lower limbs should be removed up to a height of 2 m above ground
- Preference should be given to smooth barked and evergreen trees.

Shrubs are to be maintained to ensure;

- Large discontinuities or gaps in vegetation
- Shrubs should not be located under trees
- Shrubs should not form more than 10% of ground cover
- Clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of vegetation.

Grass is to be maintained to ensure:

- A height of 10 cm or less
- Leaves and debris are removed.

3.2 Fauna results

3.2.1 Fauna habitat observations

The fauna habitats present within the site are identified within the following table.

Table 3-4 – Observed fauna habitat

Topography				
Flat ✓	Gentle ✓	Moderate ✓	Steep	Drop-offs
Vegetation structure				
Closed Forest	Open Forest ✓	Woodland	Heath	Grassland ✓
Disturbance history				
Fire	Under-scrubbing ✓	Cut and fill works ✓		
Tree clearing ✓	Grazing			
Soil landscape				
DEPTH:	Deep ✓	Moderate ✓	Shallow	Skeletal
TYPE:	Clay ✓	Loam ✓	Sand	Organic ✓
VALUE:	Surface foraging ✓	Sub-surface foraging ✓	Denning/burrowing ✓	
WATER RETENTION:	Well Drained ✓	Damp / Moist	Water-logged	Swamp / Soak
Rock habitat				
CAVES:	Large	Small	Deep	Shallow
CREVICES:	Large	Small	Deep	Shallow
ESCARPMENTS:	Winter / late sunny aspects		Shaded winter / late aspects	
OUTCROPS:	High Surface Area Hides	Med. Surface Area Hides	Low Surface Area Hides	
SCATTERED / ISOLATED:	High Surface Area Hides	Med. Surface Area Hides	Low Surface Area Hides	
Feed resources				
FLOWERING TREES:	Eucalypts ✓	Corymbias ✓	Melaleucas	

	Banksias	Acacias ✓		
SEEDING TREES:	Allocasuarinas ✓	Conifers ✓		
WINTER FLOWERING EUCALYPTS:	C. maculata ✓	E. crebra	E. globoidea	E. sideroxylon
	E. squamosa	E. grandis ✓	E. multicaulis	E. scias
	E. robusta	E. tereticornis	E. agglomerata	E. siderophloia ✓
FLOWERING PERIODS:	Autumn ✓	Winter ✓	Spring ✓	Summer ✓
OTHER:	Mistletoe ✓	Figs / Fruit	Sap / Manna ✓	Termites
Foliage protection				
UPPER STRATA:	Dense ✓	Moderate ✓	Sparse	
MID STRATA:	Dense ✓	Moderate ✓	Sparse	
PLANT / SHRUB LAYER:	Dense	Moderate ✓	Sparse ✓	
GROUNDCOVERS:	Dense ✓	Moderate	Sparse	
Hollows / logs				
TREE HOLLOWS:	Large ✓	Medium ✓	Small ✓	
TREE HOLLOW TYPES	Spouts / branch ✓	Trunk ✓	Broken Trunk ✓	Basal Cavities	Stags ✓
GROUND HOLLOWS:	Large	Medium	Small ✓	
Vegetation debris				
FALLEN TREES:	Large ✓	Medium ✓	Small ✓	
FALLEN BRANCHES:	Large ✓	Medium	Small ✓	
LITTER:	Deep	Moderate ✓	Shallow ✓	
HUMUS:	Deep	Moderate ✓	Shallow ✓	
Drainage catchment				
WATER BODIES	Wetland(s)	Soak(s)	Dam(s)	Drainage line(s)	Creek(s) ✓	River(s)
RATE OF FLOW:	Still ✓	Slow ✓	Rapid	
CONSISTENCY:	Permanent	Perennial ✓	Ephemeral ✓	
RUNOFF SOURCE:	Urban / Industrial	Parkland ✓	Grazing	Natural ✓
RIPARIAN HABITAT:	High quality	Moderate quality ✓	Low quality	Poor quality
Artificial habitat				
STRUCTURES:	Sheds ✓	Infrastructure	Equipment	
SUB-SURFACE	Pipe / culvert(s)	Tunnel(s)	Shaft(s)	
FOREIGN MATERIALS:	Sheet	Pile / refuse ✓		

3.2.2 Habitat tree data

Significant habitat trees were initially searched within the northern and southern detailed investigation areas during January 2018 survey. No significant habitat trees were found in the southern detailed investigation area. Five were recorded in the northern detailed investigation area. This data is provided in the first part of Table 3-5. Significant habitat trees are defined as trees containing large hollows suitable for use by owls and/or containing a number of good quality hollows typically consisting of more than one medium (10–30 cm) sized hollow. A tree may also be considered significant where evidence of specific use by a threatened fauna is found.

All other hollow-bearing trees were identified in the two development footprint areas (under potential direct impacts from the rezoning) during January 2019 survey. This data is provided in the second part of Table 3-5.

Table 3-5 – Habitat tree data

Tag no.	Common name	DBH (cm)	Spread (m)	Height (m)	Vigour (%)	Hollows recorded
Significant Habitat Trees in detailed investigation areas						
SHT1 (T30)	Stag	95	1	20	0	1x 0-5 cm trunk split, 2x 5-10 cm trunk hollows, 2x 10-15 cm trunk hollows
SHT2 (T51)	Blackbutt	33	7	21	50	1x 0-5 cm low trunk hollow, wear & cleared cavity indicating potential microbat use
SHT3	Sydney Blue Gum	130	21	38	70	2x 10-15 cm branch spout, 1x15-20 cm branch hollow (good), 1x 15-20 cm branch spout hollow (good), 1x 20-30 cm trunk hollow (good & large internal cavity)
SHT4	Sydney Blue Gum	80	20	45	60	1x 5-10 cm branch spout, 1x 10-15 cm branch spout, 1x 20-30 cm trunk hollow (good)
SHT5	Sydney Blue Gum	120	26	34	65	1x 5-10 cm trunk, 2x 10-15 cm branch spout
Hollow-bearing Trees in development footprints (s = south, n = north)						
HT1s	Snow In Summer	35,45	11	12	90	1x 0-5 cm low trunk
HT1n	stag	60	1	8	0	1x 0-5 cm cut branch, 1x 10-15 cm trunk, much exfoliated bark
HT2n	Lemon-scented Gum	39	12	20	80	1x 0-5 cm cut branch
HT3n	stag	23,24, 25,30	10	12	0	1x 0-5 cm trunk

4. BIODIVERSITY ASSESSMENT

4.1 Previous surveys and mapping reviewed

The following regional vegetation mapping and reports were examined to identify the potential vegetation communities and other threatened biodiversity with potential to occur for assessment.

Native Vegetation Mapping of the Cumberland Plain (NPWS 2002, Figure 4-1) maps the following communities within the study area:

- Blue Gum High Forest
- Sydney Turpentine Ironbark Forest
- Turpentine - Ironbark Margin Forest

The Hills Shire Council online vegetation mapping (2008, Figure 4-2) maps the following communities within the study area:

- Blue Gum High Forest
- Sydney Turpentine Ironbark Forest

The Native Vegetation of the Sydney Metropolitan Area (OEH 2016, Figure 4-3) maps the following communities within the study area:

- Blue Gum High Forest equivalent to PCT 1237 Sydney Blue Gum - Blackbutt - Smooth-barked Apple moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin Bioregion
- Sydney Turpentine Ironbark Forest equivalent to PCT 1281 Turpentine - Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion

DCCEEW 2022 State Vegetation Type Map (Eastern NSW), Figure 4-4, denotes the following vegetation communities in the study area:

- PCT 3136 Blue Gum High Forest
- PCT 3262 Sydney Turpentine Ironbark Forest

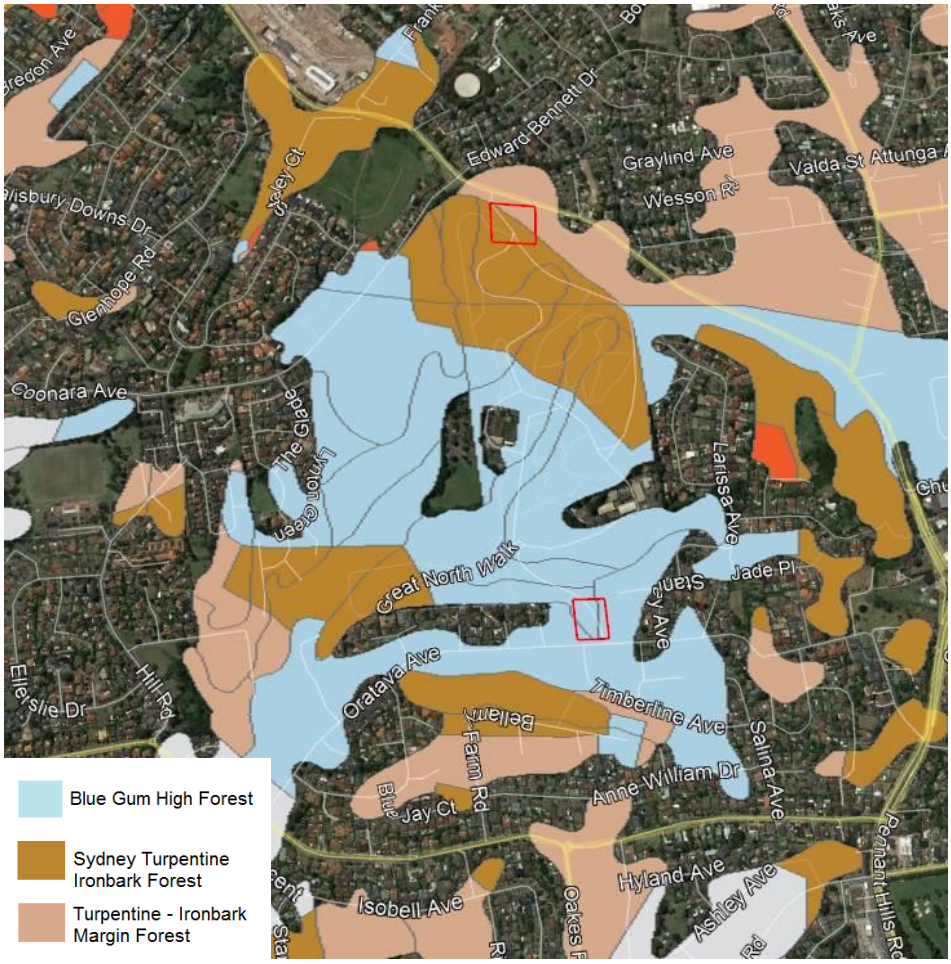

Figure 4-1 – NPWS 2002 vegetation mapping

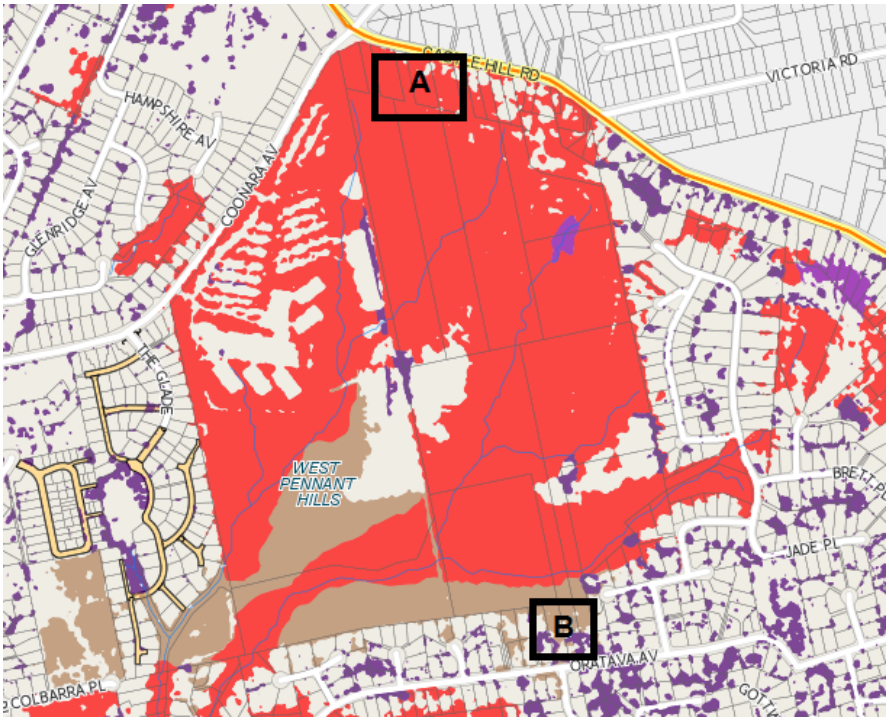

Figure 4-2 - 2008 Council vegetation mapping
Bright red denotes Blue Gum High Forest
Brown denotes Sydney Turpentine Ironbark Forest

Figure 4-3 - 2016 OEH vegetation mapping

Dark green denotes Blue Gum High Forest

Light green denotes Sydney Turpentine Ironbark Forest

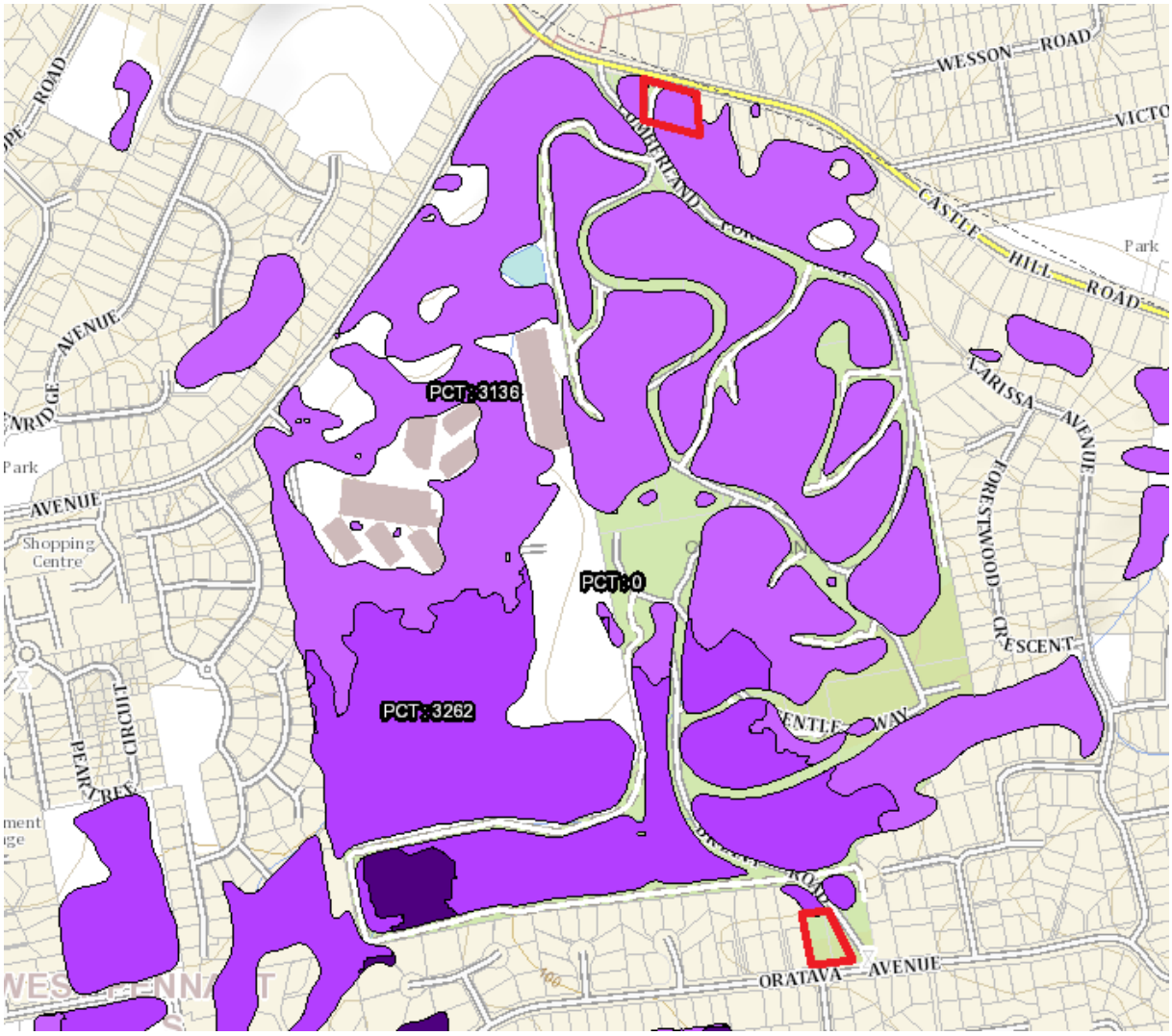

Figure 4-4 - DCCEEW 2022 vegetation mapping

4.2 Flora

(a) Species credit species

Based upon the BAM calculator, the following predicted threatened species were considered as candidate species for species credit calculation:

Table 4-1 – Species credit species (flora)

Scientific name	Associated PCTs	Geographic limitations or habitat limitations	Habitat degraded or micro habitats absent	Confirmed candidate species	Survey Adequacy			Presence / absence Notes
					Required survey effort and period	Actual survey effort and period	Survey Compliant (yes / no)	
Darwinia peduncularis	3262	Rocky areas or within 50m of rocky areas – these are absent	No	No	N/A	N/A	N/A	Absent – habitat constraints absent from the site
Haloragodendron lucasii	3262	Seepage zone or within 100 m – absent. Hornsby or Ku-Ring-gai LGAs – no, the site is in The Hills	No	No	N/A	N/A	N/A	Absent – habitat constraints absent from the site
Julian's Hibbertia	3136	Nil	Yes	No	N/A	N/A	N/A	Canopy species associations are absent.
Eastern Australian Underground Orchid	3136	No	Yes	No	N/A	N/A	N/A	Absent – historical land use would have removed habitat for the species
Rhodamnia rubescens	3136, 3262	No	No	Yes	All Months	May	Yes	Absent - survey

Exclusions based on habitat features and distributional constraints:

Exclusion of species from consideration as candidate species follows Section 5.1 of the BAM. Candidate species can be excluded from further consideration if:

- The distribution of the species does not include the IBRA subregion within which the subject land is located.
- the subject land is outside any geographic limitations of the species distribution based on information from the threatened biodiversity profile search webpage. If no geographic limitations are listed for the species, then this step is not applicable.
- none of the habitat constraints for the species as provided in the TBDC are present in a vegetation zone or subject land.
- the species is a vagrant in the IBRA subregion.

After carrying out a field assessment, a candidate species can also be excluded if:

- the microhabitats required by a species are absent from the subject land (or specific vegetation zone).
- the habitat constraints or microhabitats are degraded to the point that the species is unlikely to use the subject land (or specific vegetation zones).

If a candidate species cannot be excluded based on the above criteria, targeted survey must be undertaken, the species assumed present or an expert report obtained that states that the species is unlikely to be present on the subject land or specific vegetation zones.

Planted threatened species do not require offsetting. Offsetting is not required for noted species *Syzygium paniculatum, Eucalyptus scoparia,* and an observed *Eucalyptus nicholii* by the arborist.

Excluded species are mentioned below:

Hibbertia spanantha

This species is known from only a few select locations in Sydney, but with records located within 5 km of the site, it can't be ruled out on geographic distribution. The Julian's hibbertia occurs in the Tall Open-Forest and Open-Forest as the structural formations described by Specht et al. (1995). All known populations occur under a dominant tree canopy of *Eucalyptus pilularis, E. resinifera, Corymbia gummifera* and *Angophora costata*. Only *E. pilularis* was documented during field observations and therefore it is considered that the study site lacks the dominant canopy species this species has a strong association with. It also appears that the locations of known sites are much closer to sandstone boundaries due to the presence of the Corymbia and Angophora, and these attributes are not present in the development footprint. Given the above, this species has been excluded and does not require further assessment.

Haloragodendron lucasii

This species was prompted by the BAM calculator however this species habitat constraints include "*seepage zone or within 100 m*". No rocky areas were observed within 50m of the study site. There is also a geographic limitation for the species, being within the Hornsby and Ku-Ring-gai LGAs. The site occurs outside of this range and as such these species does not require any further assessment.

Darwinia peduncularis

This species was prompted by the BAM calculator however this species habitat constraints include "*rocky areas or within 50 m of rocky areas*". No seepage zones were observed within 100m of the study site and as such these species does not require any further assessment.

Rhizanthella slateri (Eastern Underground Orchid)

Underground orchid species appear to be ecologically distinct. For example, *R. slateri* occurs in relatively moist, shady eucalypt woodland of central-eastern Australia (Jones, 2006) and flowers above ground.

A current accurate estimate of the number of individuals is not documented, although as per principle 2, the population may be in the vicinity of 50-250 individuals.

The underground orchid does not appear to have any distinct vegetation associations, and Bionet includes it as a potential for the PCTs on site to host such species.

The likelihood of occurrence was considered to be low – unlikely given the management practices within the development footprint, as well as moderate to high influxes of exotic species comprising the ground layer of vegetation. It also appears that a small portion of the northern study area has had the terrain altered in the past. Based on the current land uses and vegetation condition, it was originally considered that PCT 3136_mod-good zone may provide potential habitat.

Investigating historical land use of the area currently containing PCT 3136_mod-good, it was noted that there has been history of land clearing of this entire area, with some of this once containing crops. The photo below is a historical imaged from 1951. It appears that the vegetation started to become denser from the 1960s onwards, but the continued disturbances would have likely depleted any seed bank for the species, and given the lack of any local observations of the species, it was considered that the species was unlikely to occur.

Note on *Syzygium paniculatum*:

The development footprint provides low potential habitat for this species. Targeted survey was undertaken outside of the DPIE-advised period of April–Jun. This survey found several individuals of *Syzygium*, most likely planted as part of landscaping (in Zone 4) or revegetation

works (in the southern parts of Zone 4). All but two of these individuals were identified as the non-threatened *S. australe* based on possessing the diagnostic characteristics "young leafy twigs 4-angled to shortly 4-winged, wings joining above each node to produce a small pocket" as per NSW Flora Online (http://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=sp&name=Syzygium~australe). These diagnostic traits are visible at all times of year, and are the primary distinguishing features between *S. australe* and *S. paniculatum.*

These individuals were not fruiting or flowering so positive determination could not be given initially, but in May 2024, specimens were fruiting. Given their location within a planted garden setting, we consider that they are planted and do not form part of the naturally-occurring population of this species. As this species is readily available in plant nurseries, and any removed individuals can be easily replaced, we do not consider that the loss of two planted individuals requires offsetting under the BOS. As they have not been planted as part of a species recovery program, no credits should be required for these planted individuals. As such, this species is treated as absent in the BAM-C. This is in line with the guidelines in the draft updated BAM (Biodiversity Assessment Method Draft for exhibition – 2019).

(b) Local data

Local data has not been used in this case.

(c) Expert reports

Expert reports have not been utilised for flora on this project.

4.3 Fauna

(a) Ecosystem credit species

Based upon the BAM calculator and field surveys to date, the following threatened fauna species were considered as predicted species for ecosystem credit calculation:

Table 4-2 – Ecosystem credit species (fauna)

Common name	Associated PCT	Habitat constraint (Bionet - May 2024)	Habitat constraint presence	Confirmed predicted species
Black Bittern	3136, 3262	Land within 40 m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation	Absent	No
Black-chinned Honeyeater	3262	No habitat constraints	N/A	Yes
Black-necked Stork	3136, 3262	Shallow, open freshwater or saline wetlands or shallow edges of deeper wetlands within 300m of these Shallow lakes, lake margins and estuaries within 300m of these waterbodies	Absent	No
Brown Treecreeper	3136, 3262	No habitat constraints	N/A	Yes

Common name	Associated PCT	Habitat constraint (Bionet - May 2024)	Habitat constraint presence	Confirmed predicted species
Diamond Firetail	3262	No habitat constraints	N/A	Yes
Dusky Woodswallow	3136, 3262	No habitat constraints	N/A	Yes
Eastern Coastal Free-tailed Bat	3136, 3262	No habitat constraints	N/A	Yes
Eastern Osprey (foraging)	3262	No habitat constraints	N/A	Yes
Flame Robin	3136, 3262	No habitat constraints	N/A	Yes
Gang-gang Cockatoo (foraging)	3136, 3262	No habitat constraints	N/A	Yes
Grey-headed Flying-fox (foraging)	3136, 3262	No habitat constraints	N/A	Yes
Large Bent-winged Bat (foraging)	3136, 3262	No habitat constraints	N/A	Yes
Little Bent-winged Bat (foraging)	3136, 3262	No habitat constraints	N/A	Yes
Little Eagle (foraging)	3136, 3262	No habitat constraints	N/A	Yes
Little Lorikeet	3136, 3262	No habitat constraints	N/A	Yes
Painted Honeyeater	3136, 3262	Mistletoes present at a density of greater than five mistletoes per hectare	Absent	No
Regent Honeyeater (foraging)	3136, 3262	No habitat constraints	N/A	Yes
Rosenberg's Goanna	3136, 3262	No habitat constraints	N/A	Yes
South-eastern Glossy BlackCockatoo	3136, 3262	Presence of Allocasuarina and casuarina species	Present	Yes
South-eastern Hooded Robin	3136, 3262	No habitat constraints	N/A	Yes
Speckled Warbler	3136, 3262	No habitat constraints	N/A	Yes
Spotted-tailed Quoll	3136, 3262	No habitat constraints	N/A	Yes
Square-tailed Kite (foraging)	3136, 3262	No habitat constraints	N/A	Yes
Superb Fruit Dove	3136	No habitat constraints	N/A	Yes

Common name	Associated PCT	Habitat constraint (Bionet - May 2024)	Habitat constraint presence	Confirmed predicted species
Swift Parrot (foraging)	3136, 3262	No habitat constraints	N/A	Yes
Varied Sittella	3136, 3262	No habitat constraints	N/A	Yes
White-bellied Sea-Eagle (foraging)	3136, 3262	"Within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines"	Present	Yes
White-throated needletail	3136, 3262	No habitat constraints	N/A	Yes
Yellow-bellied Sheathtail-bat	3136, 3262	No habitat constraints	N/A	Yes

Black Bittern: The subject land is not within 40 m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation Therefore, this species can be excluded as a predicted species.

Black-necked Stork: No shallow, open freshwater or saline wetlands or shallow edges of deeper wetlands within 300m or shallow lakes, lake margins and estuaries within 300m of these waterbodies were observed within 300m of the subject land. Therefore, this species can be excluded as a predicted species.

Painted Honeyeater: no living mistletoes were observed within the subject land, so the density is less than five per hectare. Therefore, this species can be excluded as a predicted species.

Additional ecosystem species

The Greater Broad-nosed Bat was manually added to ecosystem credits sue to a previous recording.

(b) Species credit species

Based upon the BAM calculator and field surveys to date, the following predicted threatened fauna species were considered as candidate species for species credit calculation:

Table 4-3 – Species credit species (fauna)

Common name	Associated PCTs	IBRA subregion / geographic restriction	Habitat constraint (Bionet – May 2024)	Confirmed candidate Species (yes / no)	Survey adequacy			Presence / absence
					Required survey effort and period	Actual survey effort and period	Survey compliant (yes / no)	
Dural Land Snail	3136, 3262	-	No habitat constraint	No (manually added due to incidental sighting)	-	-	N/A	Present (survey)
Powerful Owl	3136, 3262		☑ Hollow bearing trees ☑ a living or dead tree with a hollow >20 cm diameter that occurs >4 metres above the ground	No (manually added due to incidental sighting)	-	-	N/A	Present (survey)
Large-eared Pied Bat	3136, 3262	-	☐ Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, ☐ or within two kilometres of old mines or tunnels	No	-	-	-	Absent (no breeding habitat)
Little Bent-winged Bat (breeding)	3136, 3262	-	☐ Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave'; ☐ observation type code 'E nest-roost'; ☐ with numbers of individuals >500; ☐ or from the scientific literature	No	-	-	-	Absent (no breeding habitat)
Large Bent-winged Bat (breeding)	3136, 3262	-	☐ Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave' ☐ observation type code 'E nest-roost' ☐ with numbers of individuals >500 ☐ or from the scientific literature	No	-	-	-	Absent (no breeding habitat)
Regent Honeyeater (breeding)	3136, 3262	-	☐ as per mapped areas ☐ Other	No	-	-	-	Absent (area not mapped)
Swift Parrot (breeding)	3136, 3262	-	☐ as per mapped areas ☐ Other	No	-	-	-	Absent (area not mapped)

Exclusions based on habitat features and distributional constraints:

Exclusion of species from consideration as candidate species follows Section 5.1 of the BAM. Candidate species can be excluded from further consideration if:

- The distribution of the species does not include the IBRA subregion within which the subject land is located.
- the subject land is outside any geographic limitations of the species distribution based on information from the threatened biodiversity profile search webpage. If no geographic limitations are listed for the species, then this step is not applicable.
- none of the habitat constraints for the species as provided in the TBDC are present in a vegetation zone or subject land.
- the species is a vagrant in the IBRA subregion.

After carrying out a field assessment, a candidate species can also be excluded if:

- the microhabitats required by a species are absent from the subject land (or specific vegetation zone).
- the habitat constraints or microhabitats are degraded to the point that the species is unlikely to use the subject land (or specific vegetation zones).

If a candidate species cannot be excluded based on the above criteria, targeted survey must be undertaken, the species assumed present or an expert report obtained that states that the species is unlikely to be present on the subject land or specific vegetation zones.

Excluded species:

Excluded species based on the absence of breeding habitat:

- *Large Bent-winged Bat and Little Bent-winged Bat* – The TBDC (*DCCEEW* 2024) identifies the breeding habitat constraints for these species as *cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding*; *with numbers of individuals >500; or from the scientific literature*. Whilst both of these species were recorded, there are no such potential breeding habitat present in the study area that may be utilised by either species.

- *Large*-eared *Pied Bat* – The TBDC (*DCCEEW* 2024) identifies the breeding habitat constraints for these species as *within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.* No such potential breeding habitat present in the study area that may be utilised by either species.

- *Gang-gang Cockatoo* – An individual Gang-gang Cockatoo was recorded by call during initial botanical surveys in 2018. No hollows within the or close to development footprints were considered suitable for Gang-gang Cockatoo. Given this survey observation is more than 5 years old and there is no suitable breeding habitat within proximity to the subject site, this species is not included in offset calculations.

Inclusions based on of survey

- *Dural Land Snail* – The Dural Land Snail is not listed as an SAII entity and therefore was not considered a candidate species credit species and does not require assessment under the streamlined assessment module requirements. However, Dural

Land Snail was incidentally observed within the subject lot and consequently has been included requiring biodiversity offsets.

- Powerful Owl – A breeding pair of Powerful Owl were observed during survey undertaken in 2024 survey. No Powerful Owl or medium-large hollows suitable for nesting/roosting by these species are present within the development footprint however, the species polygon for Powerful Owl must be drawn to include all vegetation zones; 1. within 800 m (being the approximate home range) from the location of a detected owl, and 2. containing a living or dead tree with a hollow >20cm diameter that occurs >4m above the ground. As such Powerful Owl has been included in biodiversity offsets including all associated vegetation within 800m of the Powerful Owl detection locations and suitable trees as described above.

Excluded species based on the absence of important mapped habitat:

Swift Parrot – The site is not mapped as containing important habitat for this species on the BAM - Important Areas (*DCCEEW*) mapping.

Regent Honeyeater – The site is not mapped as containing important habitat for this species on the BAM - Important Areas (*DCCEEW*) mapping.

(c) Local data

Local data has not been used in this case.

(d) Expert reports

Expert reports have not been utilised for fauna on this project.

5. IMPACT ASSESSMENT

5.1 Streamlined assessment modules

The BAM contains three streamlined assessment modules that are set out in Appendices B, C and D of the BAM. The streamlined assessment modules include specific requirements to assess the impacts on biodiversity values for the purpose of preparing a BDAR. These streamlined assessment modules may be used where the proposal impacts on:

a) scattered trees (Appendix B)

b) a small area (Appendix C)

c) planted native vegetation, where the planted native vegetation was planted for purposes such as street trees and other roadside plantings, windbreaks, landscaping in parks and gardens, and revegetation for environmental rehabilitation (Appendix D)

Appendices B, C and D of the BAM set out the circumstances where each of the streamlined assessment modules can be used to assess a proposal and the specific assessment requirements.

The streamlined assessment modules for scattered trees and planted native vegetation may be used in conjunction with the full BAM to assess particular parts of the subject land under a single BDAR.

Table 5-1 – Streamlined assessment modules

Streamlined assessment module	Criteria for application	Does the impacted vegetation meet this criterion?	Can this module be applied?
Scattered trees	Scattered trees are defined as species listed in the tree growth form group that: **a.** have a percent foliage cover that is less than 25% of the benchmark for tree cover for the most likely plant community type and are on category 2-regulated land and surrounded by category 1-exempt land on the Native Vegetation Regulatory Map under the LLS Act, or	No	no
	b. have a DBH of greater than or equal to 5 cm and are located more than 50 m away from any living tree that is greater than or equal to 5 cm DBH, and the land between the scattered trees is comprised of vegetation that are all ground cover species on the widely cultivated native species list, or exotic species or human-made surfaces or bare ground, or	No	

Streamlined assessment module	Criteria for application	Does the impacted vegetation meet this criterion?	Can this module be applied?
	c. are three or fewer trees that have a DBH of greater than or equal to 5 cm and are within a distance of 50 m of each other, that in turn, are greater than 50 m away from the nearest living tree that is greater than or equal to 5 cm DBH, and the land between the scattered trees is comprised of vegetation that are all ground cover species on the widely cultivated native species list, or exotic species or human-made surfaces or bare ground.	No	
Small area	If biodiversity values mapped for core koala habitat, then small area streamlined assessment cannot be used Is the area of native vegetation clearing less than or equal to the thresholds as shown in Table 5-2 (BAM Table 12)? This depends on minimum or actual lot size: **For lot size <1 ha, threshold is ≤1 ha** For lot size 1–40 ha, threshold is ha ≤2 ha For lot size 40–1000 ha, threshold is ≤3 ha For lots size 1000 ha, threshold is ≤5 ha	**Yes**: The minimum lot size is currently 40 ha. Impacts less than 1 ha to native vegetation can use the small area module for assessment. The proposal will impact less than 1 ha of vegetation so this module can be applied	Yes
Planted native vegetation	Is any planted native vegetation impacted?	Yes	Yes

Table 5-2 – Area clearing limits for application of the small area development module

Minimum lot size associated with the property *	Maximum area clearing limit for application of the small area development module
Less than 1 ha	≤1 ha
Less than 40 ha but not less than 1 ha	≤2 ha
Less than 1000 ha but not less than 40 ha	≤3 ha
1000 ha or more	≤5 ha
*shown in the lot size maps made under the relevant local environmental plan (LEP), or actual lot size (where there is no minimum lot size provided for the relevant land under the LEP	

5.1.1 Streamlined assessment module - small area

Table 5-1 identifies that the small area streamlined assessment module can be used when preparing a BDAR for any future impacts on native vegetation within the site. This will still require offsetting through the BOS, but candidate species credit species that are not at risk of an SAII and are not incidentally recorded on the subject land do not require further assessment or offsets.

5.1.2 Streamlined assessment module - planted native vegetation

Planted native vegetation occurs in both the northern and southern sites for varied extents. The planted vegetation includes a mixture of native and non-native species, although predominately native, such as different Eucalyptus and Corymbia that would not naturally occur in the area or within PCT 3136 and 3262. It also includes landscaped garden beds adjacent to the existing dwellings. Appendix D of the BAM can be applied to this vegetation. In this case, assessment of the planted native vegetation answers yes to question 5 of the *D.1 Decision-making key*:

> *"Is the native vegetation (including individuals of a threatened flora species) planted for functional, aesthetic, horticultural or plantation forestry purposes? This includes examples such as: windbreaks in agricultural landscapes, roadside plantings (including street trees, median strips, roadside batters), landscaping in parks, gardens and sport fields/complexes, macadamia plantations or teatree farms?"*

As such, Chapters 4 and 5 of the BAM (i.e. plot-based survey and assessment for ecosystem and species credits) are not required, and the vegetation will only need to be assessed for use by threatened fauna. No offsets will be required for impacts on the planted vegetation.

5.2 Avoidance and minimisation actions

The following strategies and actions have been undertaken to either avoid or minimise impacts on biodiversity values:

Avoidance of direct and indirect impacts

The proposal has been located and designed to avoid or minimise direct and indirect impacts on native vegetation, threatened species, threatened ecological communities and their habitat by:

- The proposal will avoid ~20ha, or 99%, of the BGHF contained within Cumberland State Forest. The northern site is located in the most disturbed area with lower vegetation integrity scores that is not currently managed through weed control by the State Forest.
- The proposal will avoid ~17.5 ha, or 98%, of the STIF within Cumberland State Forest. The southern site is located where there is an existing dwelling and landscaped gardens and planted trees primarily, with only a small number of remnant trees in the northern portion of the site, that could largely be retained insitu.
- Development areas have been located taking advantage of the existing cleared areas supporting the two existing dwellings.
- The access driveway to the northern lot is located on existing cleared and planted vegetation areas.
- The proposal does not directly impact any known roosting or breeding hollows for Powerful Owl.
- The proposal avoids impacts to threatened flora species. Only planted specimens that would not occur naturally were located.
- The proposal avoids any direct impacts to riparian zones, wetlands and groundwater dependent ecosystems.

The following minimisation actions are recommended:

- Avoid removal of the planted Turpentine trees along the eastern boundary of the northern investigation area (separating residences further east) that provide potential Powerful Owl roosting habitat as well as screening of light overflows from the urban landscape.

- Avoid development within 200 m of any current or previously known breeding trees occupied by the local Powerful Owl pair.

5.3 Mitigation measures

The following mitigation measures are recommended to avoid, minimise or ameliorate the above potential ecological impacts, address threatening processes and to guide a more positive ecological outcome for threatened species and their associated habitats. A VMP is to be submitted with the updated proposal (May 2024) to address on-site ecological management works to be undertaken pre, during and post construction of the future residences proposed.

Table 5-3 – Measures to mitigate & manage impacts

Action / Technique	Outcome	Timing / Frequency	Responsibility
Prepare a Vegetation Management Plan (VMP) to identify mitigation actions within the site, to ensure impacts are managed and minimised wherever possible			
Retention of native trees within the site, outside of the likely construction footprint. Arborist to identify all trees to be retained, and adequate tree protection zone measures to be enforced.	Maintain shade. Reduce impacts to remnant trees. Maintain a viable seed source of local native trees.	Pre-construction.	Arborist, project ecologist.
Maintenance of any remnant vegetation outside of the construction footprint to APZ inner protection area standards. Limit the bushfire risk to new dwellings but retain individual trees and small clumps of native shrubs and groundcovers where possible.	Compliance with bushfire matters. Retention of limited vegetation within the site, outside of the construction footprint.	Ongoing.	Project manager, project ecologist, bushland regenerator.
Target weed control of high threat exotic species and other invasive species outside of the construction footprint as a priority in reducing fuel loads and unwanted spread elsewhere outside of the site.	Reduce fuel loads. Reduce seeding and spread of plants into the Cumberland State Forest.	For the duration of the VMP. Weed control should be undertaken by a bushland regeneration crew on a regular basis.	Project manager, project ecologist, bushland regenerator.

Action / Technique	Outcome	Timing / Frequency	Responsibility
Standard Phytophthora cinnamomi protocol applies to the cleaning of all plant, equipment, hand tools and work boots prior to delivery onsite to ensure that there is no loose soil or vegetation material caught under or on the equipment and within the tread of vehicle tyres. Any equipment onsite found to contain soil or vegetation material is to be cleaned in a quarantined work area or wash station and treated with fungicides.	Minimise the potential for Phytophthora to be bought externally to the site and spread through the Cumberland State Forest.	During vegetation removal and the construction phase.	Project manager.
Protection of Powerful Owl nesting and roosting habitat to the south of the northern investigation area. Use of lighting baffles on any new lighting (if installed) to direct light down and away shining directly into the Cumberland State Forest.	Protection of indirect impacts on Powerful Owl nest and roost trees	In place prior to any road lighting or residential dwellings	Project manager and contractors.
Sediment and erosion control measures in accordance with Managing Urban Stormwater: Soils and Construction (Landcom 2004) to minimise impact of possible sedimentation to local drainage lines. This is particularly warranted in the northern investigation area where slopes are well-defined. The southern investigation area is relatively flat and likelihood of sediment deposition and erosion is low.	Maintain integrity of nearby riparian habitat and natural topsoil soil by preventing deposition.	Prior to any clearing works. Ongoing during all exposed soil stages until landscaping is completed	Project ecologist and Contractors.
Construction activities are to be intermittently supervised on-site and monitored. All staff involved with the development shall undergo an induction and training program to reinforce the ecological and environmental objectives of the development.	Ensure that the recommendations of the BDAR are implemented.	Prior to and during habitat clearance and construction of services.	Project ecologist.
Prior to any habitat removal, a comprehensive search for fauna and habitat is to be undertaken to relocate any terrestrial individuals and identify any important nesting to be protected until fledging.	Reduce potential for impact on native species.	Immediately prior to land clearance.	Project ecologist.

Action / Technique	Outcome	Timing / Frequency	Responsibility
Management of hollows and hollow-dependent fauna: The felling of hollow-bearing trees is to be conducted under the supervision of a fauna ecologist to ensure appropriate animal welfare procedures are taken, particularly for threatened species. Hollows of high quality or with fauna recorded residing within should be dismantled for relocation and all hollows should be inspected for occupation, signs of previous activity and potential for reuse.	Protection of hollow-dependent wildlife.	At time of removal.	Project ecologist or fauna ecologist.
Constructed nest boxes should target recorded hollow-dependent threatened species (and their prey species). Boxes should be constructed all of weatherproof timber (marine ply), fasteners and external paint and appropriately affixed to a recipient tree under the guidance of a fauna ecologist.	Protection of hollow-dependent wildlife.	Prior to hollow removal.	Project ecologist or fauna ecologist.
If a threatened species is found to be occupying the hollow at the time of removal, then this hollow section is to be reattached to a recipient tree within the nearby conservation areas as selected and directed by the fauna ecologist. The welfare and temporary holding of the residing animal(s) is at the discretion of the fauna ecologist.	Priority protection of hollow-dependent threatened species.	At time of removal.	Project ecologist or fauna ecologist.
The relocated hollow section and nest boxes should be well secured in the recipient tree in a manner that will not compromise the current or future health of that tree.	Ensure hollow integrity is maintained.	Time of installation.	Project ecologist or fauna ecologist.
Monitoring of nest boxes and relocated hollows.	Ensure hollow integrity is maintained.	Each year for 5 years.	Project ecologist.
If any fauna species, a nest or roost is located during development works, then works should cease until safe relocation can be advised by a contact fauna ecologist	Prevent direct impacts on nesting and terrestrial native fauna species.	At time of removal / Adaptive management required.	Project ecologist and/or contractors.

Action / Technique	Outcome	Timing / Frequency	Responsibility
Prior to any habitat removal, a search for living Dural Land Snail specimens within the development areas is to be undertaken by a fauna ecologist following rainfall. Recovered specimens are to be relocated into retained habitat areas and a monitoring of success undertaken. A snail relocation and mitigation protocol is to be prepared by the project ecologist. A snail expert should be engaged to oversee the final snail relocation / monitoring plan preparation; and its eventual implementation and monitoring.	Reduce potential for impact on Dural Land Snail	Immediately prior to land clearance.	Project ecologist.
The initial demolition involving the removal of roofing and cladding on the abandoned dwellings should be undertaken under the supervision of a fauna ecologist to prevent any impacts on potential roosting activity during the diurnal period. Where such activity is found or temporarily disturbed, appropriate measures to prevent further disturbance and effectively recover / relocate the roosting individual(s) should be carefully undertaken. If any other fauna species, a nest or roost is located during development works, then works in the immediate area should cease until safe relocation can be advised by a contact fauna ecologist.	Reduce potential for impact on roosting microbats	Immediately prior to demolition	Project ecologist.
Future native landscaping should be sensitive to the surrounding environment, and predominately utilise species of Blue Gum High Forest origin in the northern site, and Sydney Turpentine Ironbark Forest in the southern site.	Reduce the likelihood of garden escapes into remnant adjacent bushland areas.	Post construction.	Project ecologist and contractors.

5.4 Potential ecological impacts

5.4.1 Prescribed impacts

Table 5-4 – Prescribed impacts

Feature	Present (yes / no)	Description of feature characteristics and location	Threatened species or community using or dependent on feature	Potential impact	Predicted consequences and justification
Karst, caves, crevices, cliffs, rocks or other geological features of significance	no	n/a	n/a	n/a	n/a
Human-made structures or non-native vegetation	yes	Man-made structures & planted non-native trees	Grey-headed Flying-fox, threatened microbats	Removal of man-made structures, minor flowering, fruiting and seeding resources	Existing old dwellings are present within both development footprints in the north and south. These dwellings are currently abandoned and unlighted providing a higher opportunity for microbat roosting use. All three recorded threatened microbats are known to utilise building structures for roosting. An inspection around the perimeter of both buildings during surveys found no obvious signs or evidence of roosting activity. This was also supplemented with the placement of ultrasonic recorders facing both buildings during surveys, which also did not record any notable levels of activity that would suggest roosting. A careful demolition process of these buildings is advised to effectively recover any roosting microbats at this time. Threatened species with potential to occur that are known to utilise non-native vegetation include Grey-headed Flying-fox, which is known to forage on flowering a fruiting trees. As this habitat is well represented within the surrounding locality it is considered that the proposal will not hinder the foraging behaviour and therefore there will be no consequences of these impacts.

Feature	Present (yes / no)	Description of feature characteristics and location	Threatened species or community using or dependent on feature	Potential impact	Predicted consequences and justification
					Foraging behaviour for each species is stated in species profiles (DCCEEW) and the TBDC (BioNet). Based on these profiles, the removal of non-native vegetation from the site is not expected to have a significant impact on any entity being assessed under the BAM.
Habitat connectivity	no	n/a	n/a	n/a	n/a
Waterbodies, water quality and hydrological processes	no	n/a	n/a	n/a	n/a
Wind farm development	no	n/a	n/a	n/a	n/a
Vehicle strikes	unlikely as there will only be driveways to the future dwellings; no roads shall be constructed	n/a	n/a	n/a	n/a

5.4.2 Direct impacts

Table 5-5 – Direct impact assessment

Direct impact	*BC Act* status	SAII entity	Project phase/timing of impact	Extent (ha, number of individuals)
Removal of PCT 3136 and 3262	CEEC	Yes	Demolition / clearing	0.45 ha
Removal of up to four (4) hollow-bearing trees providing potential roosting and breeding habitat for hollow-dependent fauna	Various	No	Demolition / clearing	Up to four (4) hollow-bearing trees

Direct impact	*BC Act* status	SAII entity	Project phase/timing of impact	Extent (ha, number of individuals)
Removal of foraging resources for ecosystem species listed in section 4.3 (fauna)	Various	No	Demolition / clearing	0.45 ha

5.4.3 Indirect impacts

Table 5-6 – Indirect impact assessment

Indirect impact description	Impacted entities (PCT, species, TEC)	Frequency	Duration	Project phase/ timing of impact	Likelihood and consequences
Edge effects	All retained vegetation within c. 10 m of development	Constant	Lifetime of development	Clearing, construction and ongoing	• Increased soil nutrients from changes to runoff that may provide further opportunities for weeds. • Spill-over from noise, activity, scent and lighting effects. • Inappropriate use of remaining native vegetation areas such as additional clearing, dumping of materials and waste.
Concentrated stormwater runoff from solid surfaces and subsequent increased flows	All retained vegetation, watercourses and habitat downslope of the development	During rainfall events	Lifetime of development	Clearing, construction and ongoing	• Potential increased flow, nutrient and sediment loads that may provide further opportunities for weeds within retained vegetation. • Potential increased flow, nutrient and sediment loads within watercourses on site.

Indirect impact description	Impacted entities (PCT, species, TEC)	Frequency	Duration	Project phase/ timing of impact	Likelihood and consequences
Reduced inter-site connectivity	Small bird species, arboreal mammals	Once	Lifetime of development	Clearing, construction	• Reduced cross-site movements by local and transient fauna

5.4.4 Serious & Irreversible Impacts (SAIIs)

An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community most at risk of extinction. Threatened species and communities that are potential for serious and irreversible impacts are identified in the BioNet TBDC, and a list is provided on the *DCCEEW* webpage: https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/local-government-and-other-decision-makers/serious-and-irreversible-impacts-of-development. The principles for determining serious and irreversible impacts are set out under Section 9.1 of the BAM.

SAII entities recorded or with potential to occur within the study area include:

Table 5-7 –SAII species recorded or with potential to occur

Species / TEC (Scientific name)	Species (Common name)	*BC Act*	Potential to occur
Eucalyptus scoparia	Wallangarra White Gum	E1	recorded – planted specimens
Miniopterus schreibersii subsp. *oceanensis*	Large Bent-winged Bat	E	recorded
Miniopterus australis	Little Bent-winged Bat	E	recorded
Lathamus discolor	Swift parrot	E	✓
Rhizanthella slateri	Eastern Australian Underground Orchid	CE	unlikely
Anthochaera phrygia	Regent honeyeater	E	low

Species:

The SAII assessment provisions for threatened species are outlined under Section 9.1.2 of the BAM (2020) and have been applied to the recorded Large Bent-winged Bat and Little Bent-winged Bat within Appendix 1 of this report. An assessment has also been undertaken for Large-eared Pied Bat and Eastern Cave Bat as prompted by the BAM calculator. As a result of this assessment, it is considered that the proposal will not likely cause an SAII on these species or other fauna species considered.

The site also does not likely support any breeding habitat or likely important roosting/foraging for other candidate SAII species with potential to occur including Swift Parrot or Regent Honeyeater.

As part of the rezoning process, we will not be undertaking a significance assessment upon any entities. We do advise however that as the *Eucalyptus scoparia* are planted specimens, we believe they do no not require consideration as an SAII.

The ecological data profiles of each of the remaining above listed candidate SAII species has been reviewed. The site does not likely support any breeding habitat or otherwise important roosting/foraging for these candidate species considered with potential to occur, therefore the proposal is not considered likely to cause serious and irreversible impacts.

Communities:

The SAII assessment provisions for TECs are outlined under Section 9.1.1 of the BAM (2020) and have been applied to the recorded BGHF and STIF within Appendix 2 of this report.

Figure 5-1 - Species polygons

6. BAM CREDIT RESULTS

6.1 Ecosystem credits and species credits

Ecosystem credits and species credits that measure the impact of the development on biodiversity values have been calculated, assuming full removal of vegetation for roads, removal of trees and shrubs for fence lines with retention of some ground layer species and thinning of vegetation in APZs reducing both cover and abundance. The result of this means that all impacted areas will still have some future biodiversity value, and as such, the future vegetation integrity score will be above 0. There will be a significant drop in the scores, but as they still retain some value, the number of credits required is less. Future vegetation integrity score for each vegetation zone at the development site is shown in Section 3.1.3.

Credit species assessment has been undertaken in Section 4. Some species are considered for species credits, particularly if potential breeding habitat is compromised or impacted.

Ecosystem credits for plant community types (PCTs), ecological communities and threatened species habitat is shown below in Table 6-1. Species credits for threatened species are shown in Table 6-2

Table 6-1 – Requirement for ecosystem credits

Zone	Vegetation zone name	Vegetation integrity loss	Area	Sensitivity to loss	Sensitivity to loss(Justification)	Sensitivity to gain class	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Blue Gum High Forest in the Sydney Basin Bioregion									
1	3136_mod -good	24.1	0.13ha	Very High	PCT Cleared - 99%	High	2.5	True	5
2	3136_managed	65.9	0.03ha	Very High	PCT Cleared - 99%	High	2.5	True	1
									Subtotal: 6
Sydney Turpentinelronbark Forest in the Sydney Basin Bioregion									
3	3262_man aged	26.7	0.29	Very High	PCT Cleared - 96%	High	2.5	True	5
									Total: 11

Table 6-2 – Requirement for species credits

Vegetation zone name	Habitat condition (vegetation integrity) loss	Area / Count	Sensitivity to loss	Sensitivity to loss (Justification)	Sensitivity to gain	Sensitivity to gain (Justification)	Biodiversity risk weighting	Potential SAII	Species credits
Ninox strenua / Powerful Owl (Fauna)									
3136_mod_good	65.9	0.13	Moderate	BCA listing status	High	Species dependant on habitat features	2	False	4
3136_managed	24.1	0.03	Moderate	BCA listing status	High	Species dependant on habitat features	2	False	1
3262_managed	26.7	0.29	Moderate	BCA listing status	High	Species dependant on habitat features	2	False	4
									Subtotal: 9
Pommerhelix duralensis / Dural Land Snail (Fauna)									
3136_mod_good	65.9	0.13	High	BCA listing status	High	Ecology or response to management is poorly	2	False	4
3136_managed	24.1	0.03	High	BCA listing status	High	Ecology or response to management is poorly	2	False	1
3262_managed	26.7	0.29	High	BCA listing status	High	Ecology or response to management is poorly	2	False	4
									Subtotal: 9

6.2 Ecosystem credit classes

Table 6-3 – Ecosystem credit summary

PCT	TEC	Area (ha)	Credits
3136 - Blue Gum High Forest	Blue Gum High Forest in the Sydney Basin Bioregion	0.16	6
3262 - Sydney Turpentine Ironbark Forest	Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion	0.29	5

Table 6-4 – Credit classes for PCT 877 and 1395 - Like for like options

PCT	TEC	Containing hollow-bearing trees?	Credits
3136	Blue Gum High Forest in the Sydney Basin Bioregion	Yes	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometres of the outer edge of the impacted site.
3262	Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion	No	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometres of the outer edge of the impacted site.

6.3 Species credit classes

Table 6-5 – Species credit summary

Species	Vegetation zones	Area (ha)	Credits
Ninox strenua / Powerful Owl (Fauna)	3136_mod-good, 3136_managed, 3262_managed	0.45	9
Pommerhelix duralensis / Dural Land Snail (Fauna)	3136_mod-good, 3136_managed, 3262_managed	0.45	9

All above-listed species need to be offset with the same species but anywhere in NSW. The pricing of credits can vary greatly over time and it is advised that the proponent use the online Biodiversity Offset Payment Calculator tool to determine the current pricing of credits (https://www.lmbc.nsw.gov.au/offsetpaycalc).

7. CONCLUSIONS

This BDAR has been produced to accompany the proposed rezoning at Part Lot 4, 5, 6, 7, 15, 16 and 17 DP 11133, 87-97 Castle Hill Road, and 121-131 Oratava Avenue,, West Pennant Hills.

7.1 Recorded biodiversity

Ecological survey and assessment has been undertaken in accordance with the *Biodiversity Assessment Methodology* 2020 (BAM) as well as relevant legislation including the *Environmental Planning and Assessment Act 1979* (*EP&A Act*), the *Biodiversity Conservation Act 2016* (*BC Act*), the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) and the *Fisheries Management Act 1994* (*FM Act*).

In respect of matters required to be considered under the *EP&A Act* and relating to the species / provisions of the *BC Act,* the following threatened species or threatened communities have been recorded either in, or near to the development footprint:

- Powerful Owl (2024)
- Little Lorikeet (2018)
- Gang-gang Cockatoo (2018 & 2019)
- Grey-headed Flying-fox (2018 & 2019)
- Little Bent-winged Bat (2020)
- Large Bent-winged Bat (2020)
- Greater Broad-nosed Bat (2018)
- Dural Land Snail (2024)
- *Eucalyptus scoparia* (planted specimens only)
- *Eucalyptus nicholii* (planted specimens only, as per the Arborist report, although not identified during the botanical survey)
- *Syzygium paniculatum* (planted specimens only)
- Blue Gum High Forest in the Sydney Basin Bioregion
- Sydney Turpentine Ironbark Forest in the Sydney Basin Bioregion

In respect of matters required to be considered under the *EPBC Act*, the following threatened species or threatened communities have been recorded either in, or near to the development footprint:

- Grey-headed Flying-fox
- *Eucalyptus scoparia* (planted specimens only)
- *Eucalyptus nicholii* (planted specimens only, as per the Arborist report, although not identified during the botanical survey)
- *Syzygium paniculatum* (planted specimens only)
- Blue Gum High Forest of the Sydney Basin Bioregion
- Turpentine-Ironbark Forest of the Sydney Basin Bioregion

In respect of matters relative to the *FM Act*, no suitable habitat for threatened marine or aquatic species was observed within the development footprint.

7.2 Impact summary

Avoidance, minimisation and mitigation measures have been considered in section 5 of the document.

The size of the area to be rezoned is approximately 0.71 ha. This includes remnant native vegetation comprising Blue Gum High Forest and Sydney Turpentine Ironbark Forest, as well as planted (predominately) native vegetation, and some cleared areas, with native vegetation comprising approximately 0.5 ha of the 0.71 ha. A high proportion of these lands shows previous clearing and management, as well as more intact areas (northern site) that are heavily impacted by weed invasion, where much of the mid-storey has been replaced by exotic species such as *Celtis sinensis* (Chinese Hackberry).

A BDAR was prepared for the site in 2020 with most field data coming from early 2019. As this data is just over five (5) years old, new plot data for the BAM calculator was collected in May 2024 in very similar locations to previous data collections to address the current vegetative conditions of the site.

The BDAR has been revised to a streamlined assessment type on the basis that impacts to native vegetation are below the 1 ha threshold and the site is not core koala habitat. The previous document likely used BAM 2017 which is no longer available for use, and the plant community types (PCTs) needed revalidation as the PCT numbers previously used have recently been superseded.

The development footprint needs to include an area used for future development footprints and a suitable APZ, and it has been assumed that the full development footprint would be impacted. Whilst a reasonable native biomass can be retained in an APZ, it will be assumed as a full impact because there is always potential that native vegetation in managed areas could succumb to attrition. This is highly unlikely in the short-term, but a possibility in the long-term.

The planning proposal will impact 0.55 ha of native vegetation, which requires offsets to Plant Community Types (PCTs):

- 0.16 ha of PCT 3136 (Blue Gum High Forest)
- 0.29 ha of PCT 3262 (Sydney Turpentine Ironbark Forest)

Vegetation assessed but not requiring offsetting:

- 0.10 ha of planted native vegetation

Streamlined BDAR's only need to consider potential SAII entities for species credits, however we have undertaken previous broad studies in earlier years, as well as known recordings in the Cumberland State Forest to run through the BAM calculator to determine species credits.

The assessment of serious and irreversible impacts is set out under Section 6.7.2 of the *BC Reg 2017* to guide the determining authority on this decision. These principles have been reviewed and assessed in Appendix 1 and Appendix 2.

There will be no significant impact on matters listed under the *FM Act*.

As the proposal will result in the reduction in extent of both Blue Gum High Forest and Turpentine–Ironbark Forest, it may constitute a significant impact on matters of national environmental significance. As such, a referral to Department of Climate Change, Energy, the Environment and Water is recommended to determine if EPBC assessment if required.

7.3 Biodiversity Offsets Scheme (BOS) – Threshold Assessment

As the proposal triggers the area clearing threshold and impacts on Biodiversity Values land, entry into the Biodiversity Offsets Scheme (BOS) is required under Section 7.14 of the *BC Act*.

Based on the assessment in this BDAR, offset credits are required for:

- Impacts on 0.16 ha of PCT 3136 (Blue Gum High Forest)
- Impacts on 0.29 ha of PCT 3262 (Sydney Turpentine Ironbark Forest)
- Species credits for Dural Land Snail, Powerful Owl and Eastern Australian Underground Orchid

Note: Some of these species credits are required because of assumption of presence. Additional targeted survey in the appropriate survey period can be used to determine actual presence or absence, which would potentially alter the credit requirements (see Table 4-1 and Table 4-3 for survey adequacy).

Planted native vegetation has been assessed using Appendix D of the BAM in Section 5.1.2 of this BDAR. No offset credits are required for planted native vegetation.

7.4 Recommendations

Mitigation measures are listed in section 5.3. The main recommendation was to implement the mitigation measures as detailed in the VMP. This is being prepared in association and to be submitted with this BDAR.

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Appendix 1. SAII impact assessment - species

The additional impact assessment provisions for threatened species to determine a Serious and Irreversible Impact (SAII) are outlined under Section 9.2 of the BAM (2020) and have been applied to the recorded Large Bent-winged Bat and Little Bent-winged Bat as follows below.

Measures taken to avoid the direct and indirect impact on species at risk of SAII are outlined in Section 5.2. We have consulted the Threatened Biodiversity Data Collection (TBDC) and other sources to enable the application of the four principles set out in clause 6.7 of the *BC Reg*. For the species considered this is summarised as follows:

Common Name	Principle				Justification	Reference
	1	2	3	4		
Large Bent-winged Bat				✓	The species is dependent on non-responding attribute (breeding habitat only)	TBDC
Little Bent-winged Bat				✓	The species is dependent on non-responding attribute (breeding habitat only)	TBDC

The criteria as specified in Section 9.1.2.4 of the BAM required to be considered for candidate SAII species nominated is with respect to Principles 1–3 only. As these do not apply to the recorded microbat species a summary is provided below:

Large Bent-winged Bat & **Little Bent-winged Bat** – These species are allocated to species credit class for breeding habitat only. Species sensitivity to loss is indicated by the TBDC as 'moderate'. Species sensitivity to potential gain for breeding is 'very high'. Species sensitivity to potential gain for foraging is 'high'.

The Large Bent-winged Bat and Little Bent-winged Bat were recorded foraging at both passive ultrasonic recording devices within the study area during 2020 survey. The recorded locations are shown on Figure 2-1 and 2-2.

'Potential breeding habitat' as defined by *The BAM Bat Guide* for these species includes "caves, tunnels, mines or other structures known or suspected to be used". No such habitat exists within the study area or nearby, therefore there will be no likely SAII on Large Bent-winged Bat or Little Bent-winged Bat.

Due to the migratory nature of these species to breeding caves within inland regions of the state, the local populations are difficult to predict at any time. These species are expected to be well represented in the locality with regular recordings. There are however man-made buildings located within the study area. Roosting is not expected within the abandoned buildings based on field observations, but if roosting was occurring, this would only be expected to be a small number of individuals.

The existing buildings on site will be demolished. Supervision of demolition of outer claddings is recommended to be undertaken by a fauna ecologist in the unexpected case of any roosting presence. Any individuals recovered will be appropriately protected until their voluntary relocation or temporarily housed and relocated as appropriate. It should be noted here however, this presence is not expected based on survey inspections and results and such measures are simply to facilitate an appropriate precautionary approach.

Appendix 2. SAII impact assessment - communities

The additional impact assessment provisions for threatened ecological communities (TECs) to determine a Serious and Irreversible Impact (SAII) are outlined under Section 9.1.1 of the BAM (2020) and have been applied to the recorded TECs, Blue Gum High Forest (BGHF) and Sydney Turpentine Ironbark Forest (STIF).

Measures taken to avoid the direct and indirect impact on species at risk of SAII are outlined in Section 5.2. We have consulted the Threatened Biodiversity Data Collection (TBDC) and other sources to enable the application of the four principles set out in clause 6.7 of the *BC Reg*.

TEC Name	Principle				Reference
	1	2	3	4	
BGHF	✓	✓	✓		https://www2.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/clear-and-develop-land/serious-irreversible-impacts
STIF	✓	✓			

The additional impact assessment provisions for threatened ecological communities (TECs) to determine a Serious and Irreversible Impact (SAII) are outlined under Section 9.1.1 of the BAM (2020) and have been applied to the recorded Blue Gum High Forest (BGHF) and Sydney Turpentine-Ironbark Forest (STIF) as follows:

Measures taken to avoid the direct and indirect impact on species at risk of SAII are outlined in Section 5.2. We have consulted the Threatened Biodiversity Data Collection (TBDC) and other sources to enable the application of the four principles set out in clause 6.7 of the *BC Reg*.

Blue Gum High Forest

(a) The action and measures taken to avoid the direct and indirect impact on the potential entity for an SAII

The primary development footprint for future dwellings is located on land that is currently managed or highly disturbed with a high degree of exotic species, suffering edge effects and a lack of management.

In review of the 1951 aerial photography shown in section 4.2, it is evident that this northern study area has been used for residential purposes including crops in the past. It is only with more recent decades that the land use has changed and vegetation to the south of the existing dwelling has been allowed to regenerate. The larger trees in the far south of the northern area occur in an area that would be utilised for APZ managed. It is highly likely that the majority of the trees could be retained in the APZ as the canopy cover is below benchmark figures for the PCT. Clearing out all the exotic species in the low strata and sub-canopy such as *Celtis sinensis* and Privets, would greatly improve the characteristics of the community, and reduce further spread of these invasive species to remnants being conserved in the Cumberland State Forest.

A VMP is to be prepared with the DA that specifically addresses conservation priorities on site, particularly the protection and improvement of retained BGHF, and ensure that

impacts from the proposal do not have adverse effects on adjoining land in the Cumberland State Forest.

(b) The area (ha) and condition of the TEC to be impacted directly and indirectly by the proposed development. The condition of the TEC is to be represented by the vegetation integrity score for each vegetation zone

0.16 ha of BGHF will be impacted by the proposal. The break down of impacts is replicated below from the flora survey effort and results figures. It should be noted that the majority of impacts will be caused through the application of an APZ which does not necessarily require full removal of vegetation. In this instance, the removal of high threat exotic species will largely keep the vegetation to compliant fuel loads for an inner protection area. As there was no guarantee of the remnant in the APZ being retained in perpetuity, it must be considered as impacted.

		Impacts (ha)
PCT	Development	APZ
Planted	0.06	0.03
PCT 3136 mod-good	0.04	0.09
PCT 3136 managed	0.02	0.01
PCT 3262	0	0
North TOTAL 0.25ha	0.12	0.13
		Impacts (ha)
PCT	Development	APZ
Planted	0.07	0.07
PCT 3136 mod-good	0	0.001
PCT 3136 managed	0	0
PCT 3262	0.11	0.18
South TOTAL 0.29ha	0.18	0.25
TOTAL	***0.3***	***0.38***

For moderate-good condition vegetation, the VI score was 65.9. For the managed portion, the VI score was 24.1.

(c) A description of the extent to which the impact exceeds the threshold for the potential entity that is specified in the Guidance to assist a decision-maker to determine a serious and irreversible impact

Thresholds for BGHF have not yet been provided by DCCEEW.

(d) The extent and overall condition of the potential TEC within an area of 1000 ha, and then 10,000 ha, surrounding the proposed development footprint

The following figures are based on the Native Vegetation of the Cumberland Plain mapping (2002):

Table A3.1 – Extant BGHF within 1,000 ha and 10,000 ha

Canopy cover	Extant area within 1,000 ha (ha)	Extant area within 10,000 ha (ha)
>10% cover	34.90	70.11
<10% cover	112.62	513.92
Total	**147.52**	**584.03**

Vegetation condition is not described in the DCCEEW 2022 mapping. Bionet describes the extent of BGHF as only 111 ha which does not compare at all with former estimates (1,309 ha). It also will regularly NOT include individual or small clumps of trees in urban areas that Council would typically classify as BGHF.

(e) An estimate of the extant area and overall condition of the potential TEC remaining in the IBRA subregion before and after the impact of the proposed development has been taken into consideration

The following figures are based on the Native Vegetation of the Cumberland Plain mapping (2002):

Table A3.2 – Extant BGHF within the Cumberland IBRA sub-region

Canopy cover	Extant area - Cumberland IBRA sub-region (ha)
>10% cover	151.04
<10% cover	1158.00
Total	**1309.04**

The proposed development will reduce the extent of BGHF by 0.16 ha, which is 0.01% of the estimated extant BGHF within the Cumberland IBRA sub-region.

(f) An estimate of the area of the potential TEC that is in the reserve system within the IBRA region and the IBRA subregion

The following figures are based on the Native Vegetation of the Cumberland Plain mapping (2002):

Table A3.3 – Extant BGHF within the reserve system

Area within the reserve system	Extant area of BGHF (ha)
Sydney IBRA region	39.49
Cumberland IBRA sub region	36.91

(g) The development, clearing or biodiversity certification proposal's impact on:

i. ***abiotic factors critical to the long-term survival of the potential TEC; for example, how much the impact will lead to a reduction of groundwater levels or the substantial alteration of surface water patterns***

Abiotic factors will be impacted at an insignificant level and are not considered likely to be critical this community's survival. There are no groundwater dependant ecosystems within the study area and the proposed development should not alter groundwater levels or surface water patterns.

ii. ***characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of understorey species or harvesting of plants***

Characteristic and functionally important species to be impacted include *Eucalyptus saligna, Syncarpia glomulifera, Angophora floribunda* and *Eucalyptus pilularis*. Although characteristic of this TEC, these species are common and widespread, and their removal in isolation is not considered significant.

iii. ***the quality and integrity of an occurrence of the potential TEC through threats and indirect impacts including, but not limited to, assisting invasive flora and fauna species to become established or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species in the potential TEC***

Establishment of invasive flora and fauna is possible due to the presence of such species, however it is not expected that invasive species will increase in abundance due to the proposal, particularly through the implementation of the proposed VMP.

APZ management will have a reduction in quality for 0.1 ha of BGHF.

The proposed future land use is for residential use and as such the overall management of the site is not likely to change significantly given that dwellings are already present in both north and south study areas. As such, increased mobilisation of fertilisers, herbicides or other chemicals or pollutants is not likely to become any more frequent than is currently the case.

(h) Direct or indirect fragmentation and isolation of an important area of the potential TEC

The proposal will impact on small areas on the extremity of a large bushland reserve surrounded by urban development. The proposed development will remove some vegetation in these areas but as they do not form part of a connective corridor, it will not further fragment or isolate an important area of the potential TEC.

(i) The measures proposed to contribute to the recovery of the potential TEC in the IBRA subregion.

The adjoining Cumberland State Forest promotes ongoing weed control and management of their lands to ensure longevity of the community in the locality.

Sydney Turpentine-Ironbark Forest

(a) The action and measures taken to avoid the direct and indirect impact on the potential entity for an SAII

The Native Vegetation of the Cumberland Plain (NPWS 2002) maps approximately 17.49 ha of STIF within the Cumberland State Forest. The proposal will avoid impacts on ha, or 98.3%, of this BGHF. The proposal has been located in the most highly disturbed areas of the Cumberland State Forest, and particularly takes most advantage of already cleared and modified areas surrounding existing dwellings. The 0.29 ha of impact is predominately upon remnant trees, with a some planted trees mixed in, no mid-storey, and managed ground layer that has been historically managed for several decades.

A VMP is to be prepared that specifically addresses conservation priorities on site, particularly the protection and improvement of retained STIF.

(b) The area (ha) and condition of the TEC to be impacted directly and indirectly by the proposed development. The condition of the TEC is to be represented by the vegetation integrity score for each vegetation zone

The proposal will remove 0.11 ha of low-quality, managed / derived STIF. A further 0.18 ha will be modified to comply with APZ requirements. Vegetation Integrity scores are provided in Section 3.1.3.

(c) A description of the extent to which the impact exceeds the threshold for the potential entity that is specified in the Guidance to assist a decision-maker to determine a serious and irreversible impact

Thresholds for STIF have not yet been provided by DPIE.

(d) The extent and overall condition of the potential TEC within an area of 1,000 ha, and then 10,000 ha, surrounding the proposed development footprint

The following figures are based on the Native Vegetation of the Cumberland Plain mapping (2002):

Table A3.4 – Extant STIF within 1,000 ha and 10,000 ha

Canopy cover	Extant area within 1,000 ha (ha)	Extant area within 10,000 ha (ha)
>10% cover	37.50	98.86
<10% cover	53.06	389.61
Total	**90.56**	**488.47**

Vegetation condition is not described in the DCCEEW 2022 mapping. Bionet describes the extent of STIF as 1,038 ha which is very close to the 2002 former estimate of 1,067 ha. It also will regularly NOT include individual or small clumps of trees in urban areas that Council would typically classify as STIF.

(e) An estimate of the extant area and overall condition of the potential TEC remaining in the IBRA subregion before and after the impact of the proposed development has been taken into consideration

The following figures are based on the Native Vegetation of the Cumberland Plain mapping (2002):

Table A3.5 – Extant STIF within the Cumberland IBRA sub-region

Canopy cover	Extant area - Cumberland IBRA sub-region (ha)
>10% cover	215.58
<10% cover	851.87
Total	**1067.45**

The proposed development will reduce the extent of STIF by 0.11 ha, which is 0.01% of the estimated extant STIF within the Cumberland IBRA sub-region. A further 0.18 ha will be modified to comply with APZ requirements.

(f) An estimate of the area of the potential TEC that is in the reserve system within the IBRA region and the IBRA subregion

The following figures are based on the Native Vegetation of the Cumberland Plain mapping (2002):

Table A3.6 – Extant STIF within the reserve system

Area within the reserve system	Extant area of STIF (ha)
Sydney IBRA region	19.23
Cumberland IBRA sub region	19.11

The following paragraph has been taken from the Scientific Committee's final determination for STIF - Remnants of Sydney Turpentine-Ironbark Forest are poorly represented in the formal reserve network, and unreserved areas are subject to the threat of vegetation clearing. An estimated 280 ha of STIF (less than 1% of the pre-European extent) is distributed among 15 reserves (with a minimum area of 0.5 ha) under the management of the NSW National Parks and Wildlife Service (Tozer et al. 2010; BMCC 2003; Smith and Smith 2008; NSW OEH 2013a). This includes 112 ha in Bargo SCA, 49 ha in Blue Mountains NP, 25 ha in Lane Cove NP and 22 ha in Newington NR. A further 254 ha occurs in Crown Reserves and 36 ha is preserved in perpetuity under Biobanking or Conservation Agreements. The total area under reservation is estimated to be 570 ha, equivalent to less than 2% of the estimated pre-1750 distribution or 20% of the remaining extent.

(g) The development, clearing or biodiversity certification proposal's impact on:

i. ***abiotic factors critical to the long-term survival of the potential TEC; for example, how much the impact will lead to a reduction of groundwater levels or the substantial alteration of surface water patterns***

Abiotic factors will be impacted at an insignificant level and are not considered likely to be critical this community's survival. There are no groundwater dependant ecosystems within the study area and the proposed development should not alter groundwater levels or surface water patterns.

ii. ***characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of understorey species or harvesting of plants***

Characteristic and functionally important species to be impacted include *Eucalyptus saligna* and *Eucalyptus pilularis*. Although characteristic of this TEC, these species are common and widespread, and their removal in isolation is not considered significant.

iii. ***the quality and integrity of an occurrence of the potential TEC through threats and indirect impacts including, but not limited to, assisting invasive flora and fauna species to become established or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species in the potential TEC***

Establishment of invasive flora and fauna is possible due to the presence of such species, however it is not expected that invasive species will increase in abundance due to the proposal, particularly through the implementation of the proposed VMP.

APZ management will have a reduction in quality for 0.18 ha of STIF.

The proposed future land use is for residential use and as such the overall management of the site is not likely to change significantly given that dwellings are already present in both north and south study areas. As such, increased mobilisation of fertilisers, herbicides or other chemicals or pollutants is not likely to become any more frequent than is currently the case.

(h) Direct or indirect fragmentation and isolation of an important area of the potential TEC

The proposal will impact on small areas on the extremity of a large bushland reserve surrounded by urban development. The proposed development will remove some vegetation in these areas but as they do not form part of a connective corridor, it will not further fragment or isolate an important area of the potential TEC.

(i) The measures proposed to contribute to the recovery of the potential TEC in the IBRA subregion

The adjoining Cumberland State Forest promotes ongoing weed control and management of their lands to ensure longevity of the community in the locality.

Appendix 3. Plot datasheets

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BAM Site – Field Survey Form | Site Sheet no: 1 of

		Survey Name	Zone ID	Recorders			
Date	14.5.24	MEC33 West Pennant Hills		LH			
Zone	Datum	Plot ID	Q1	Plot dimensions	20×20 5×20	Photo #	✓
Easting	Northing	IBRA region		Midline bearing from 0 m		Magnetic?	
Vegetation Class						Confidence: H M L	
Plant Community Type				EEC:		Confidence: H M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	6
	Shrubs	8
	Grasses etc.	4
	Forbs	6
	Ferns	4
	Other	8
Sum of Cover of native vascular plants by growth form group	Trees	50.1
	Shrubs	18.1
	Grasses etc.	3.4
	Forbs	1.3
	Ferns	5.8
	Other	3.2
High Threat Weed cover		38.8

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	0	
50 – 79 cm	UNTIN 9	
30 – 49 cm	✓	
20 – 29 cm	✓	
10 – 19 cm	✓	
5 – 9 cm	✓	
< 5 cm	✓	n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	4, 15, 2, 4, 4	29

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30.... 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	90 75 95 100 95	a b c d e	a b c d e	a b c d e
Average of the 5 subplots	93			

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

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

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

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

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400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 14/5/24	MEC03 Hest Plantation Hills	01	LH

GF Code		Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	Voucher
	1	Cinnamomum camphora	HTE	1.5	10		
	2	Tradescantia albiflora fluminensis	HTE	20	3000		
O	3	Cayratia clematidea		0.5	40		
	4	Celtis sinensis	E	25	150		
	5	Eriobotrya japonica	E	2	7		
G	6	Entolasia stricta		0.5	150		
F	7	Dianella caerulea		0.5	50		
	8	Lantana camara	HTE	0.1	1		
	9	Rubus fruticosus	HTE	3	60		
	10	Araujia sericifera	HTE	0.2	15		
	11	Ehrharta erecta	HTE	3	750		
T	12	Eucalyptus saligna		20	3		
T	13	Allocasuarina littoralis		12	8		
S	14	Pittosporum undulatum		3	5		
Q	15	Smilax glyciphylla		0.3	10		
	16	Solanum pseudocapsicum	E	0.3	40		
S	17	Homalanthus populifolius		0.1	5		
	18	Jacaranda mimosifolia	E	0.3	3		
O	19	Stephania japonica		1	25		
	20	Asparagus aethiopicus	HTE	0.2	20		
F	21	Plectranthus parviflorus		0.1	20		
	22	Sida rhombifolia	E	0.1	15		
S	23	Ficus coronata		10	30		
	24	Abutilon	E	2	20		
	25	Ligustrum sinense	HTE	0.2	1		
	26	Ligustrum lucidum	HTE	0.5	2		
	27	Yucca sp.	E	0.1	2		
S	28	Rubus parvifolius		0.1	5		
Fern	29	Calochlaena dubia		5	700		
O	30	Einstrephus latifolius		0.2	2		
F	31	Sigesbeckia orientalis		0.1	1		
O	32	Clematis aristata		0.5	15		
T	33	Eucalyptus pilularis		4	1		
G	34	Microlaena stipoides var stipoides		0.3	50		
	35	Asparagus asparagoides	HTE	0.1	2		
S	36	Myrsine variabilis		3	2		
O	37	Morinda jasminoides		0.3	10		
Fern	38	Pellaea falcata		0.5	50		
O	39	Pandorea pandorana		0.3	15		
O	40	Marsdenia suaveolens		0.1	1		

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF = circle code if 'top 3'.**

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); *Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, .:., 1000, ...

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 14/5/24	Mt West Pennant Hill	Q1	LH

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
T	1 Brachychiton acerifolius		4	2		
T	2 Eucalyptus sp. (?)		10	2		
Fern	3 Doodia aspera		0.2	30		
S	4 Denhamia silvestris		0.3	10		
	5 Passiflora edulis	E	0.1	1		
S	6 Breynia oblongifolia		1.5	10		
G	7 Opl. imemen imbecillis		2.5	400		
F	8 Lobelia purpurascens		0.2	40		
S	9 Polyscias sambucifolia		0.1	1		
F	10 Dichondra repens		0.3	50		
F	11 Geranium homeanum		0.1	5		
	12 Lonicera japonica	HTE	0.2	10		
T	13 Glochidion ferdinandi		0.1	1		
Fern	14 Adiantum aethiopicum		0.1	5		
G	15 Oplismenus aemulus		0.1	15		
	16					
	17					
	18					
	19					
	20					
	21					
	22					
	23					
	24					
	25					
	26					
	27					
	28					
	29					
	30					
	31					
	32					
	33					
	34					
	35					
	36					
	37					
	38					
	39					
	40					

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF = circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); *Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m.*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

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BAM Site – Field Survey Form

Site Sheet no: 1 of

Survey Name	Zone ID	Recorders
MEC03 West Rendamthills		LH

Date		Zone	Datum	Plot ID		Plot dimensions	20x20 50x20m	Photo #	✓
	14/5/24				02				
Easting	Northing	IBRA region		Midline bearing from 0 m		Magnetic °			

Vegetation Class		Confidence: H M L
Plant Community Type	EEC:	Confidence: H M L

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	3
	Shrubs	2
	Grasses etc.	5
	Forbs	5
	Ferns	1
	Other	4
Sum of Cover of native vascular plants by growth form group	Trees	23
	Shrubs	4
	Grasses etc.	7.3
	Forbs	1.5
	Ferns	0.3
	Other	0.0
High Threat Weed cover		64

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	1 1	
50 – 79 cm	11 2	1 1
30 – 49 cm	✓	
20 – 29 cm	✓	
10 – 19 cm		
5 – 9 cm		
< 5 cm		n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)		0

Counts apply when the **number of tree stems** within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a **multi-stemmed tree**, only the largest stem is included in the count/estimate. **Stems may be dead and may be shrubs.**

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	30	15	15	10	35	a	b	c	d	e	a	b	c	d	e	a	b	c	d	e
Average of the 5 subplots	21																			

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

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

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

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 14/5/24	MEC03 Lord Pennant Hills	G2	LH

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund.	stratum	voucher
T	1 Glochidion ferdinandi		2	3		
G	2 Dianella caerulea		2	200		
	3 Stellaria media	E	4	1500		
	4 Solva secalis	E	1	400		
	5 Oxalis corniculata	E	1	300		
	6 Taraxacum officinale	E	1.5	400		
	7 Trifolium repens	E	0.2	40		
	8 Axonopus fissifolius	HTE	60	10000		
G	9 Oplismenus aemulus		2	500		
	10 Plantago lanceolata	E	0.1	10		
	11 Asparagus aethiopicus	HTE	0.1	1		
	12 Cenchrus clandestinus	HTE	0.2	30		
	13 Paspalum dilatatum	HTE	0.1	2		
G	14 Cynodon dactylon		2	500		
	15 Modiola caroliniana	E	0.5	100		
F	16 Dichondra repens		1	250		
	17 Sonchus oleraceus	E	0.1	3		
	18 Sporobolus africanus	E	0.1	2		
	19 Senecio madagascariensis	HTE	0.1	2		
	20 Hypochaeris radicata	E	0.1	10		
	21 Ehrharta erecta	HTE	0.5	150		
F	22 Lobelia purpurascens		0.1	10		
G	23 Microlaena stipoides var. stipoides		0.3	80		
F	24 Geranium homeanum		0.1	10		
O	25 Desmodium varians		0.3	50		
G	26 Lomandra longifolia		1	7		
F	27 Veronica plebeia		0.2	40		
F	28 Hydrocotyle peduncularis		0.1	40		
	29 Sida rhombifolia	E	0.1	10		
Fern	30 Pellaea falcata		0.3	50		
O	31 Glycine clandestina		0.2	30		
T	32 Eucalyptus saligna		18	4		
O	33 Parsonsia straminea		0.3	5		
S	34 Hymenanthera dentata		2	3		
G	35 Pittosporum undulatum		2	1		
	36 Tradescantia albiflora fluminensis	HTE	3	500		
O	37 Clematis aristata		0.1	2		
	38 Zantedeschia aethiopica	E	0.2	4		
T	39 Eucalyptus paniculata		3	1		
	40					

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF = circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); *Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m.*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

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BAM Site – Field Survey Form

Site Sheet no: 1 of

		Survey Name	Zone ID	Recorders			
Date	15 5 24	MEC03 Mat Remnant #1W		LH			
Zone	Datum	Plot ID	C03	Plot dimensions	20 x 20 50 x 20cm	Photo #	✓
Easting	Northing	IBRA region		Midline bearing from 0 m		Magnetic °	
Vegetation Class						Confidence: H M L	
Plant Community Type				EEC:		Confidence: H M L	

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

BAM Attribute (400 m² plot)		Sum values
Count of Native Richness	Trees	2
	Shrubs	0
	Grasses etc.	3
	Forbs	6
	Ferns	0
	Other	3
Sum of Cover of native vascular plants by growth form group	Trees	17.5
	Shrubs	0
	Grasses etc.	8.1
	Forbs	4.9
	Ferns	0
	Other	0.4
High Threat Weed cover		4.7

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

Counts apply when the **number of tree stems** within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. **Tree stems must be living.**

For **hollows**, count only the presence of a stem containing hollows. For a **multi-stemmed tree**, only the largest stem is included in the count/estimate. **Stems may be dead and may be shrubs.**

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	15	15	45	20	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average of the 5 subplots	20																			

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

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

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

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)			
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness			
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs) NR=not recent (3-10yrs), O=old (>10yrs)

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400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 15/5/24	MEC03 West Pennant Hills	Q3	LH

GF Code	Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable		N, E or HTE	Cover	Abund	stratum	voucher
T	1	Eucalyptus saligna		15	1		
	2	Jacaranda mimosifolia	E	1	1		
	3	Stenotaphrum secundatum	E	75	10000		
F	4	Dichondra repens		4	800		
G	5	Cyperus gracilis		0.1	20		
	6	Modiola caroliniana	E	1.5	300		
G	7	Oplismenus aemulus		5	1200		
O	8	Clematis aristata		0.2	15		
	9	Ehrharta erecta	HTE	3	800		
	10	Hypochaeris radicata		0.5	150		
	11	Oxalis corniculata	E	0.1	30		
	12	Trifolium repens	E	0.2	60		
F	13	Hydrocotyle ~~sibthorpioides~~ tripartita		0.2	40		
	14	Soliva sessilis	E	0.1	20		
	15	Lysimachia arvensis	E	0.1	5		
	16	Taraxacum officinale	E	0.3	80		
	17	Viola (African Violet)	E	0.3	80		
	18	Oxalis latifolia	E	0.1	30		
	19	Araujia sericifera	HTE	0.1	2		
F	20	Lobelia purpurascens		0.2	40		
O	21	Eustrephus latifolius		0.1	1		
	22	~~Abutilon Exotic~~ Passiflora tarminiana	E	4	4		
O	23	Cayratia clematidea		0.1	5		
	24	Sonchus oleraceus	E	0.1	5		
	25	Axonopus fissifolius	HTE	1.5	300		
	26	Poa annua	E	0.1	20		
	27	Sporobolus africanus	E	0.1	20		
	28	Paspalum dilatatum	HTE	0.1	5		
G	29	Microlaena stipoides var. stipoides		3	800		
T	30	Brachychiton ~~discolor~~ populneus		2.5	1		
	31	Plantago lanceolata	E	0.1	5		
F	32	Centella asiatica		0.2	50		
F	33	Einadia hastata		0.2	30		
	34	Bidens pilosa	HTE	0.1	5		
	35	Sida rhombifolia	E	0.1	5		
	36	Euphorbia peplus	E	0.1	10		
F	37	Veronica plebeia		0.1	5		
	38						
	39						
	40						

GF Code: see Growth Form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF = circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); *Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*.

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

BAM Site – Field Survey Form

Site Sheet no: 1 of ____

Survey Name	Plot Identifier	Recorders
18 Cessnock Cumberland Plain Corridor	Q1	LH

Date	Zone	Datum	IBRA region	Photo #	Zone ID
02/01/19	56	GDA96			

Easting	Northing	Dimensions	Orientation of midline from the 0 m point.
		20 x 20 / 50 x 20m	Magnetic °

		Confidence
Vegetation Class	Wet Sclerophyll	H M L
Plant Community Type	EEC: ✓ BGHF	Confidence: (H) M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

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

BAM Attribute (20 x 50 m plot) dbh	Euc*	Non Euc	Hollows†
large trees for Euc* & Non Euc 80 + cm	1 Euc*	Non Euc	Hollows†
50 – 79 cm	6		
30 – 49 cm	✓		
20 – 29 cm	✓		
10 – 19 cm	✓		✓ 1
5 – 9 cm	✓		n/a
< 5 cm	✓		n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	Tally space		total 23

Tree Stems Count

Record number of **living** eucalypt* (Euc*) and **living native** non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

† Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the **number of living tree stems** within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30..., 100, 200, 300

For a **multi-stemmed tree**, only the largest living stem is included in the count/estimate. For **hollows** count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	75 70 40 70 80	5 2 2 2 2	2 2 2 2 2	0 0 0 0 0
Average of the 5 subplots	67	2.6	2	0

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

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

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

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)	2	O	Some open canopy
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage	1	R	Large branches down
Weediness	3	R	Many species of weeds and around 50% cover
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Form version 5 - designed March 2017

Printed 31 August 2017

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 02/01/19	18FNS602 Cumberland SF	Q1	LH

GF Code		Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
	1	Syncarpia glomulifera	N	12	4	C	
	2	Tradescantia fluminensis	HTE	30	1000	G	
	3	Solanum pseudocapsicum	E	2	120	G	
	4	Pittosporum undulatum	N	10	7	M	
	5	Grevillea robusta	N	2.5	1	C	
	6	Sida rhombifolia	E	1.5	170	G	
	7	Cayratia clematidea	N	4	250	G	
	8	Solanum mauritianum	E	0.8	2	M	
	9	Eucalyptus obliqua	N	10	3	C	
	10	Pteridium esculentum	N	0.3	12	G	
	11	Eucalyptus sp. (peppermint like)	N	2.5	1	C	
	12	Eustrephus latifolius	N	1	30	G	
	13	Acacia implexa	N	1	1	M	
	14	Clematis aristata	N	3	100	M	
	15	Polyscias sambucifolia	N	0.5	8	M	
	16	Ligustrum sinense	HTE	2	70	M	
	17	Jacaranda mimosifolia	E	2	2	M	
	18	Brachychiton acerifolius	N	8	16	M	
	19	Ligustrum lucidum	HTE	2	40	M	
	20	Asparagus aethiopicus	HTE	1	8	G	
	21	Morinda jasminoides	N	0.4	4	M	
	22	Passiflora edulis	E	0.4	5	M	
	23	Vernonia cinerea	N	0.1	1	G	
	24	Ehrharta erecta	HTE	1	440	G	
	25	Celtis sinensis	E	4	13	M	
	26	Hairy shrub	N	0.3	2	G	
	27	Araujia sericifera	HTE	1.5	35	M	
	28	Nephrolepis cordifolia	N	0.2	6	G	
	29	Sticherus flabellatus	N	0.1	2	G	
	30	Abutilon	E	0.7	4	M	
	31	Cinnamomum camphora	HTE	1.5	14	M	
	32	Asparagus plumosus	HTE	0.2	1	M	
	33	Yucca sp	E	0.5	6	M	
	34	Entolasia marginata	N	5	1200	G	
	35	Pandorea pandorana	N	0.8	12	M	
	36	Calochlaena dubia	N	1.5	65	G	
	37	Microlaena stipoides	N	0.8	125	G	
	38	Eriobotrya japonica	E	0.3	1	M	
	39	Olea europea/wisp. data	HTE	0.1	1	M	
	40	Melia azedarch	N	1	1	M	

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Form version 5 - designed March 2017 Printed 31 August 2017

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 02/01/19	BFCNCWD2 Cumberland SF	Q1	LH

GF Code		Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
	1	Pellaea falcata	N	0.1	6	G	
	2	ficinia arenaria	N	1.5	3	M	
	3	Trema tomentosa	N	0.5	3	M	
	4	Rubus fruticosus	HTE	15	150	G	
	5	Oplismenus hirtellus	N	0.5	40	G	
	6	Nandina domestica	E	0.1	1	G	
	7	Lomandra longifolia	N	0.2	3	G	
	8	Oplismenus imbecilis	N	2.5	350	G	
	9	Alphitonia excelsa	N	0.7	1	M	
	10	Lantana camara	HTE	0.2	9	M	
	11	Stephania japonica	N	2.5	20	M	
	12	Dodonaea aspera	N	0.5	60	G	
	13	Eucalyptus pilularis	N	4	1	C	
	14	Dichondra repens	N	2	200	G	
	15	Bidens pilosa	HTE	0.2	70	G	
	16	Ageratina adenophora	HTE	0.3	13	G	
	17	Dianella caerulea	N	0.1	3	G	
	18	Praxelis clematidea	HTE	0.1	1	G	
	19	Oxalis sp. Clathifolia possibly)	HTE	0.1	5	G	
	20	Sigesbeckia orientalis	N	0.1	1	G	
	21	Pratia purpurascens	N	0.4	50	G	
	22	Ochna serrulata	HTE	0.3	15	G	
	23						
	24						
	25						
	26						
	27						
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	30						
	31						
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	33						
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	36						
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	38						
	39						
	40						

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:** 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Form version 5 - designed March 2017 Printed 31 August 2017

BAM Site – Field Survey Form

Site Sheet no: 1 of

Survey Name	Plot Identifier	Recorders
18FCNSW07 Cumberland SF	Q2	LH

Date	Zone	Datum	IBRA region	Photo #	Zone ID
02/01/19	56	GDA 94			

Easting	Northing	Dimensions	Orientation of midline from the 0 m point.
		20x20 / 50x20m	Magnetic °

	Confidence
Vegetation Class	H M L
Plant Community Type — EEC: ✓ BGHF MsAiRed	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

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

BAM Attribute (20 x 50 m plot) dbh	Euc*	# Tree Stems Count: Non Euc	Hollows†
large trees for Euc* & Non Euc 80 + cm	4 Euc*	Non Euc	Hollows†
50 – 79 cm	1		
30 – 49 cm	5		
20 – 29 cm	5		
10 – 19 cm	x		✓ 1
5 – 9 cm	x		n/a
< 5 cm	x		n/a
Length of logs (m) (≥10 cm diameter, >50 cm in length)	Tally space		total 4

Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately

* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*

† Record total number of stems by size class with hollows (including dead stems/trees)

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30..., 100, 200, 300

For a multi-stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)	Bare ground cover (%)	Cryptogam cover (%)	Rock cover (%)
Subplot score (% in each)	20 75 40 45 45	40 5 40 10 40	2 1 1 2 1	0 0 0 0 0
Average of the 5 subplots	44	27	1.6	0

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

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

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

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)	3	0	Managed park - like landscape
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage			
Weediness	3	R	
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Form version 5 - designed March 2017

Printed 31 August 2017

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 02/01/19	18FCNSW102 Cumberland SF	002	LH

GF Code		Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
	1	Corymbia maculata	N	4	2	C	
	2	Eucalyptus saligna	N	7	4	C	
	3	Eucalyptus (peppermint)	N	1-2	1	M	
	4	Exotic Pine Sapium	E	1-2	1	M	
	5	Pandorea pandorana	N	1-2	7	M	
	6	Clematis aristata	N	1	8	T	
	7	Sonchus oleraceus	E	0.1	3	G	
	8	Microlaena stipoides	N	5	1100	G	
	9	Oxalis corniculata	HTE	0.2	120	G	
	10	Lagenifera stipitata	N	1	150	G	
	11	Ehrharta erecta	HTE	8	1500	G	
	12	Axonopus fissifolius	HTE	0.3	50	G	
	13	Eragrostis africanus	E	0.1	25	G	
	14	Geranium homeanum	N	0.3	45	G	
	15	Sida rhombifolia	E	0.2	50	G	
	16	Cyperus gracilis	N	0.1	25	G	
	17	Solanum nigrum	E	0.2	40	G	
	18	Lomandra longifolia	N	0.2	2	G	
	19	Centella asiatica	N	0.2	60	G	
	20	Dianella caerulea	N	0.2	6	G	
	21	Taraxacum officinale	E	4	750	G	
	22	Trema tomentosa	N	0.3	1	M	
	23	Cayratia clematidea	N	0.3	12	M	
	24	Dichondra repens	N	0.8	150	G	
	25	Asparagus aethiopicus	E	0.1	1	G	
	26	Stephania japonica	N	0.3	2	G	
	27	Tradescantia fluminensis	HTE	1.2	40	G	
	28	Einadia polygonoides	N	0.2	40	G	
	29	Commelina cyanea	N	0.2	20	G	
	30	Sigesbeckia orientalis	N	0.1	5	G	
	31	Paspalum urvillei	E	0.5	80	G	
	32	Modiola caroliniana	E	0.3	60	G	
	33	Cynodon dactylon	N	3	500	G	
	34	Veronica plebeia	N	0.3	100	G	
	35	Glycine tabacina	N	0.1	15	G	
	36	Plantago lanceolata	E	0.1	3	G	
	37	Gamochaeta spicata	E	0.1	1	G	
	38	Euphorbia peplus	E	0.1	2	G	
	39	Pennisetum clandestinum	HTE	35	5000	G	
	40	Digitaria sanguinalis	E	0.2	30	G	

Acmena smithii N 0.4 2 M

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Trifolium repens E 0.3 15 G
Homolanthus populneus N 1 1 M
Acacia floribunda N 1 1 M
Grevillea sp. N 0.1 . G
Lomandra hystrix N 0.2 3 G
Bromus catharticus E 0.1 . G

BAM Site – Field Survey Form

Site Sheet no: 1 of

Survey Name	Plot Identifier	Recorders
18FCNSW02 Cumberland SF	Q3	LH

Date	Zone	Datum	IBRA region	Photo #	Zone ID
02/01/18	56	GDA 94			

Easting	Northing	Dimensions	Orientation of midline from the 0 m point.
		20 x 20 / 50 x 20 m	Magnetic °

Vegetation Class		Confidence: H M L
Plant Community Type	EEC:	Confidence: H M L

Record easting and northing from the plot marker. If applicable, orient picket so that perforated rib points along direction of midline.
Dimensions (Shape) of 0.04 ha base plot inside 0.1 ha FA plot should be identified, magnetic bearing taken along midline.

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

BAM Attribute (20 x 50 m plot) dbh	Euc*	Non Euc	Hollows†	# Tree Stems Count
large trees for Euc* & Non Euc 80 + cm	1			Record number of living eucalypt* (Euc*) and living native non-eucalypt (Non Euc) stems separately
50 – 79 cm				* includes all species of *Eucalyptus*, *Corymbia*, *Angophora*, *Lophostemon* and *Syncarpia*
30 – 49 cm	✓			† Record total number of stems by size class with hollows (including dead stems/trees)
20 – 29 cm	✓			
10 – 19 cm	✓			
5 – 9 cm			n/a	
< 5 cm			n/a	
Length of logs (m) (≥10 cm diameter, >50 cm in length)	Tally space			total 11

Counts must apply to each size class when the number of living tree stems within the size class is ≤ 10. Estimates can be used when the number of living tree stems within a class is > 10. Estimates should draw from the number series: 10, 20, 30..., 100, 200, 300

For a multi-stemmed tree, only the largest living stem is included in the count/estimate. For hollows count only the presence of a stem containing hollows, not the count of hollows in that stem. Only count as 1 stem per tree where tree is multi-stemmed. The hollow-bearing stem may be a dead stem.

BAM Attribute (1 x 1 m plots)	Litter cover (%)					Bare ground cover (%)					Cryptogam cover (%)					Rock cover (%)				
Subplot score (% in each)	20	20	20	80	25	2	5	5	15	5	a	b	a	a	b	0	0	0	0	0
Average of the 5 subplots	27					6.8					1					0				

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots located on alternate sides and 5 m from the plot midline at the locations 5, 15, 25, 35, and 45 m along the midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Within these 1 m x 1 m plots assessors may also record the cover of rock, bare ground and cryptogam soil crusts. Collection of these data is optional - the data do not currently contribute to assessment scores, they hold potential value for future vegetation integrity assessment attributes and benchmarks, and for enhancing PCT description

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

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

Plot Disturbance	Severity code	Age code	Observational evidence:
Clearing (inc. logging)	3	O	
Cultivation (inc. pasture)			
Soil erosion			
Firewood / CWD removal			
Grazing (identify native/stock)			
Fire damage			
Storm damage	2	R	
Weediness	3	R	
Other			

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

Form version 5 - designed March 2017

Printed 31 August 2017

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 02/01/19	18BCANSW02 Cumberland SF	03	LH

GF Code		Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
	1	Eucalyptus saligna	N	8	4	C	
	2	Tilia azedarach	N	0.7	1	M	
	3	Pittosporum undulatum	N	4	8	M	
	4	Axonopus fissifolius	HTE	0.3	30	G	
	5	Taraxacum officinale	E	1.5	500	G	
	6	Oxalis corniculata	E	0.2	100	G	
	7	Acacia implexa	N	0.1	1	M	
	8	Hahnbergia gracilis	N	0.1	1	G	
	9	Modiola caroliniana	E	0.1	25	G	
	10	Microlaena stipoides	N	0.7	150	G	
	11	Einadia hastata	N	0.1	4	G	
	12	Pandorea pandorana	N	4	15	M	
	13	Araujia sericifera	HTE	0.7	25	M	
	14	Solanum nigrum	E	0.1	3	G	
	15	Murraya paniculata	E	1.2	2	M	
	16	Stenotaphrum secundatum	HTE	65	2500	G	
	17	Eragrostis brownii	N	0.1	10	G	
	18	Asparagus aethiopicus	HTE	0.1	3	G	
	19	Conyza bonariensis	E	0.1	12	G	
	20	Corymbia maculata	N	3	1	C	
	21	Dichondra repens	N	0.5	150	G	
	22	Cayratia clematidea	N	0.5	20	G	
	23	Jasminum polyanthum	E	1	20	M	
	24	Nandina domestica	E	0.1	1	M	
	25	Angophora bakeri	N	0.5	1	M	
	26	Callistemon viminalis	N	0.8	1	M	
	27	Ehrharta erecta	HTE	0.3	100	G	
	28	Richardia stellaris	E	0.1	40	G	
	29	Allocasuarina torulosa	N	0.8	1	M	
	30	Eucalyptus microcorys	N	3	1	C	
	31	Lomandra stipitata	N	0.3	100	G	
	32	Paspalum urvillei	E	0.6	100	G	
	33	Vernonia petiolaris	N	0.2	50	G	
	34	Acaena novae-zelandiae	N	0.1	50	G	
	35	Lysimachia arvensis	E	0.1	15	G	
	36	Opismenus aemulus	N	1	125	G	
	37	Sonchus oleraceus	E	0.1	1	G	
	38	Clematis aristata	N	0.4	12	G	
	39	Hypochaeris radicata	E	0.1	15	G	
	40	Desmodium varians	N	1.5	200	G	

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Form version 5 - designed March 2017 Printed 31 August 2017

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 02/05/19	IBFCNEW02 Cumberland sf	Q3	LH

GF Code		Top 3 native species in each growth form group: Full species name mandatory All other native and exotic species: Full species name where practicable	N, E or HTE	Cover	Abund	stratum	voucher
	1	Glycine clandestina	N	0.3	30	G	
	2	Acacia parramattensis	N	2	2	M	
	3	Ligustrum sinense	HTE	0.2	5	M	
	4	Tradescantia fluminensis	HTE	0.2	20	G	
	5	Echinopogon caespitosus	N	0.1	2	G	
	6	Lomandra longifolia	N	0.8	8	G	
	7	Pratia purpurascens	N	0.5	100	G	
	8	Ochna serrulata	HTE	0.2	15	M	
	9	Eucalyptus pilularis	N	0.5	1	C	
	10	Ligustrum lucidum	HTE	0.1	2	M	
	11	Eustrephus latifolius	N	0.3	2	M	
	12	Lilium formosum	E	0.1	3	G	
	13	Sporobolus africanus	E	0.1	10	G	
	14	~~Acacia implexa~~	N	0.1	1	M	
	15	Oplismenus imbecillis	N	0.1	5	G	
	16	Bidens pilosa	HTE	0.1	1	F	
	17	Commelina cyanea	N	0.1	2	G	
	18	Bursaria spinosa	N	0.1	1	M	
	19	Leucopogon juniperinus	N	0.2	3	G	
	20						
	21						
	22						
	23						
	24						
	25						
	26						
	27						
	28						
	29						
	30						
	31						
	32						
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	36						
	37						
	38						
	39						
	40						

GF Code: see Growth Form definitions in Appendix 1 **N:** native, **E:** exotic, **HTE:** high threat exotic **GF – circle code** if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); ***Note:*** *0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m*

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

Form version 5 - designed March 2017 Printed 31 August 2017

Appendix 4. Staff qualifications and experience

Team member (role)	Accreditations and qualifications	Experience	Employment history	Skills and expertise
George Plunkett (Botanist) Original BAM-C and BDAR author	• Biodiversity Assessment Method (BAM) Assessor (Accredited Assessor no. BAAS19010) • PhD – Plant systematics, ecology and evolution • Bachelor of Science (Honours) – Ecology / Botany, University of New England (UNE), NSW • Four-wheel drive vehicle operation • Senior First Aid Certificate	George has 15 years of experience as a plant taxonomist, flora ecologist and botanist, including a PhD in plant systematics, ecology and evolution, and has a very well-developed understanding of the Australian flora.	• 2017-2023: Botanist, Travers bushfire & ecology • 2016-2017: Research Botanist, UNE • 2010-2011: Research Botanist, UNE • 2008-2009: Plant Ecologist, Ecotone Flora Fauna Consultants	• High-quality report writing • Application of the BAM and BOS • Highly experienced in botanical survey and ecological analysis • Plant identification and taxonomy • Flora and fauna assessment • Threatened species, ecological communities and endangered population surveys and analysis • Habitat tree analysis and assessment • Noxious weed identification • Tree assessment
Lindsay Holmes (Principal Ecologist) Current BAM-C and BDAR author Flora survey	• Biodiversity Assessment Method (BAM) Assessor (BAAS17032) • Bachelor of Science – Biology, James Cook University, Qld • Bush Regeneration II Certificate, Ourimbah TAFE • NSW WorkCover OHS Construction Induction • Senior First Aid Certificate • BioBanking Assessor (No. 199)	Lindsay has 25 years of experience as a flora ecologist and bushland regeneration supervisor and has expertise in botanical survey, ecological analysis, maintain and improve analysis, biometric analysis and geo-plotting of ecological data.	• 2023-current: Principal Ecologist, Travers bushfire & ecology • 2007-2023: Senior Botanist, Travers bushfire & ecology • 2006-2007: Ecologist, Conacher Travers Pty Ltd • 1999-2006: Field Operations Manager, Microclimate (Bushland regeneration)	• Highly experienced in botanical survey and ecological analysis • Vegetation management planning • Flora and fauna assessment • Species impact statement • Threatened species, ecological communities and endangered population surveys and analysis • Preparation of BioBanking and Biodiversity Development Assessment Reports • Riparian, bushland and wetland restoration • Habitat tree analysis and assessment • Noxious weed identification and control • SULE assessment

Team member (role)	Accreditations and qualifications	Experience	Employment history	Skills and expertise
Corey Mead (Contract fauna ecologist) Original fauna surveys	• Southern Cross University – B. App. Sc. • BAM Accredited Assessor (BAAS.19050) • Accredited BioBanking Assessor (No.231) • NSW NPWS – Introduction to ArcView GIS • First Aid Certificate (St John's Ambulance Service) • Class C vehicle, Boat & Divers Licences • Risk Assessment Training (Taronga Zoo) • NSW RFS – Firefighters Certificate • Report Writing – Pollack Learning Alliance • Frog, Reptile & Bat Survey, ID & Mgt Training – NSW Forestry • Anabat Techniques Training – Titley Scientific – Smiths Lake • Cert III – Building & Carpentry (assist in construction of nest boxes)	Corey has developed extensive specialist knowledge over 25 years in fauna survey techniques, threatened species target surveys, data analysis and visual and call identification of vertebrate fauna within coastal habitats of NSW.	• Nov 20 – Present – Contract Fauna Ecologist (*TreeHouse Ecology*) • Oct 07 – Nov 20 – Senior Fauna Ecologist – Travers Bushfire & Ecology • Jan 06 – Oct 07 – Field Tech / Fauna Ecologist – Conacher Travers Environmental Consultants • Feb 03 – Jan 06 – Head Reptile Keeper – Australian Reptile Park • Jan 03 – Sept 05 – Visitor Services Officer – National Parks & Wildlife Service • Dec 02 – Jan 03 – Marine Turtle Project Officer – National Park & Wildlife Service • Aug 00 – Feb 03 – Venom Room Attendant – Australian Reptile Park • Nov 99 – Feb 00 – Waste Minimisation Education Officer – Manly Council • Apr 97 – Sept 00 – Environmental Education Officer – Australian Reptile Park	• Remote and independent terrestrial vertebrate surveys • Threatened fauna target surveys & assessment • Microbat Call Identification & active monitoring • AnalookW, Anapocket, Insight & CFC Read bat analysis software • Kaleidoscope Pro song-meter clustering & classifier analysis • Advanced song classifiers for threatened owls, frogs & gliders • Squirrel Glider radio-tracking surveys • Project Ecologist during habitat clearance • Habitat tree assessment / audits • Advanced reptile captive management • Fire trail audits & bushfire risk analysis • Advanced venomous snake handling & training • Education/training program development • GPS data transfer and management • Scientific License & Animal Ethics License administration

Team member (role)	Accreditations and qualifications	Experience	Employment history	Skills and expertise
Michael Sheather-Reid (Managing Director) Project manager	• Bachelor of Natural Resources (Hons), University of New England • BioBanking Assessor • Engineering Assistant – CAD Drafting • MUSIC Modelling – Stormwater quality and quantity modelling (RMIT) • Bush Regeneration II Certificate, Ryde TAFE • NSW WorkCover OHS Construction Induction • Chemical Handling Certificate, Ryde TAFE	Michael has a wealth of experience in environmental consulting and on ground management of bushland, wetland and riparian habitats having undertaken environmental assessment, ecological consultancy and restoration in both the private and public sectors for over 30 years.	• 2007- Current: Senior Ecologist, Travers bushfire & ecology • 2004 -2007: Senior Ecologist, Conacher Travers Pty Ltd • 2002-2004: Project Manager, Urban Bushland Management Projects Pty Ltd • 1999-2002: Project Manager Sustainable Vegetation Management Pty Ltd • 1995-1999: Managing Director Sheather-Reid & Associates Pty Ltd • 1996-1997: NSW Landcare Liaison Officer, Australian Conservation Foundation • 1992-1995: Environmental Officer, Dept. Land & Water Conservation • 1990-1992: Scientific Officer Dept. of Water Resources	• Ecological assessment • Rezoning studies • Biodiversity offset planning • Restoration management and coordination • Biotic and soil translocation • Watercourse assessment • Project ecologist services • *EPBC Act* referrals • Controlled Activity Approvals • Vegetation management plans
Anna Giles (GIS Officer) Reproduction of GIS Figures	• Bachelor of Environmental Science (1*st* Class Hons) (Deakin University) • PhD- National Marine Science Centre- “the uses of drone mapping to reveal aquatic environmental change” • PEPL <25kg Remote Pilots License (Aeronautical Radio Operator Certificate) (CASA Ref: AK ARN: 1051010) • First AID and CPR • Open Water Diver Certificate	Anna has a deep passion for environmental conservation which led her to study Wildlife Conservation and Biology (Hons) and has a Doctor in Philosophy in Landscape Ecology.	• 2023- Current: GIS officer, Travers bushfire & ecology • 2022-2023: GIS consultant, Everick Geospatial NSW • 2022-2023: Aquarium Guide- Solitary Island Aquarium • 2020-2023: Research Assistant, Southern Cross University	• Geographic Information Systems Geographic Information Systems • Data management and analysis • Spatial databases and database administration • GPS • Cartography • Natural resource management • Client liaison
Sandy Cardow (GIS officer) Reproduction of GIS Figures	• Bachelor of Science (Biological Sciences) (Macquarie University)	Sandy has over twenty years of experience in Spatial Information (Geographic Information Systems (GIS)), which includes preparation of mapping in local government roles and has completed a Bachelor of Science (Biological Sciences).	• 2017 – Current: GIS Officer, Travers bushfire & ecology • 2014 – 2017: GIS Consultant, Forestry Corp. NSW • 2005 – 2011: GIS Analyst, Forests NSW • 2002 – 2005: GIS Data Librarian, Forests NSW • 2000 – 2002: GIS Operator, Forests NSW • 2000 – 2002: GIS Data Import / Export Officer, Forests NSW • 1999 2000: GIS Project Officer DECC • 1998 – 1999: GIS Support Officer DECC • 1998 – 1999: Wildlife Atlas Data Entry Officer DECC	• Geographic Information Systems • Data management and analysis • Spatial databases and database administration • GPS • Cartography • Natural resource management • Client liaison

Team member (role)	Accreditations and qualifications	Experience	Employment history	Skills and expertise
Corrine Edwards (Fauna Ecologist) BDAR co-author Assist with BAM calculator	• Bachelor of Environmental Science and Management. (Hons) (University of New South Wales) (2016-2020)	Corrine has over 10 years' experience in fauna survey techniques, researching ecological interactions and identification of vertebrate fauna within a magnitude of Australian habitats. She is experienced in leading research projects, experimental design, data collection, data analysis and report writing.	• 2021 – Current: Fauna Ecologist, Travers Bushfire and Ecology • 2020 – Recipient of the Marilyn Fox Environmental Science Prize • 2019 – 2020: Research scholarship fellow at the Fowlers Gap Research Station • 2019 – Research assistant at University of NSW • 2015-2016 – Reptile Research Assistant, Adelaide Museum • 2014 – 2015 Amphibian Research Assistant, University of Western Australia • 2012-14 – Reptile Zookeeper – Australian Reptile Park	• Survey techniques for all major vertebrate fauna groups (including threatened species target searches) • Fauna identification, morphology and behaviour • Fauna field assessment • Microhabitat identification • Project ecology • Experimental design and statistical analysis • Scientific report writing

Appendix 5. Flora And Fauna Species Lists

The plants observed within the vegetation communities of the study area are listed below

Family	Scientific name	Common name
Trees		
Mimosaceae	*Acacia decurrens*	Black Wattle
Mimosaceae	*Acacia parramattensis*	Parramatta Wattle
Mimosaceae	*Acacia schinoides*	-
Aceraceae	*Acer* sp. (cultivar)*	Maple
Myrtaceae	*Acmena smithii*	Lillypilly
Sapindaceae	*Alectryon subcinereus*	Native Quince
Sapindaceae	*Alectryon tomentosus*	Hairy Bird's Eye, Bed-jacket
Casuarinaceae	*Allocasuarina littoralis*	Black She-oak
Casuarinaceae	*Allocasuarina torulosa*	Forest Oak
Rhamnaceae	*Alphitonia excelsa*	Red Ash
Myrtaceae	*Angophora bakeri*	Narrow-leaved Apple
Myrtaceae	*Angophora costata*	Smooth-barked Apple
Myrtaceae	*Angophora floribunda*	Rough-barked Apple
Araucariaceae	*Araucaria* sp.	-
Myrtaceae	*Backhousia citriodora*	Lemon Myrtle
Myrtaceae	*Backhousia myrtifolia*	Scrub Turpentine
Sterculiaceae	*Brachychiton acerifolius*	Illawarra Flame Tree
Cunoniaceae	*Callicoma serratifolia*	Black Wattle
Myrtaceae	*Callistemon salignus*	-
Fabaceae	*Castanospermum australe*	Black Bean
Ulmaceae	*Celtis sinensis**	Chinese Hackberry
Lauraceae	*Cinnamomum camphora**	Camphor Laurel

Family	Scientific name	Common name
Rutaceae	*Citrus* sp.*	-
Myrtaceae	*Corymbia citriodora*	Lemon-scented Gum
Myrtaceae	*Corymbia maculata*	Spotted Gum
Myrtaceae	*Corymbia sp.*	-
Malaceae	*Eriobotrya japonica**	Loquat
Myrtaceae	*Eucalyptus fibrosa*	Broad Leaved Ironbark
Myrtaceae	*Eucalyptus grandis*	Flooded Gum
Myrtaceae	*Eucalyptus microcorys*	Tallowwood
Myrtaceae	*Eucalyptus paniculata*	Grey Ironbark
Myrtaceae	*Eucalyptus pilularis*	Blackbutt
Myrtaceae	*Eucalyptus saligna*	Sydney Blue Gum
Myrtaceae	*Eucalyptus scoparia*^{TS}	Wallangarra White Gum
Myrtaceae	*Eucalyptus* sp. (piperita?)	-
Santalaceae	*Exocarpos cupressiformis*	Native Cherry
Moraceae	*Ficus coronata*	Sandpaper Fig
Oleaceae	*Fraxinus angustifolia**	Claret Ash
Phyllanthaceae	*Glochidion ferdinandi*	Cheese Tree
Proteaceae	*Grevillea robusta*	Silky Oak
Bignoniaceae	*Jacaranda mimosifolia**	Jacaranda
Lythraceae	*Lagerstroemia indica**	Crepe Myrtle
Oleaceae	*Ligustrum lucidum**	Large-leaved Privet
Hamamelidaceae	*Liquidambar styraciflua**	Sweet Gum
Myrtaceae	*Melaleuca styphelioides*	Prickly-leaved Tea Tree
Meliaceae	*Melia azedarach* var. *australasica*	White Cedar
Pinaceae	*Pinus radiata**	Radiata or Monterey Pine
Pittosporaceae	*Pittosporum undulatum*	Sweet Pittosporum

Family	Scientific name	Common name
Myrtaceae	*Syncarpia glomulifera*	Turpentine
Myrtaceae	*Syzygium australe*	Brush Cherry
Myrtaceae	*Syzygium paniculatum*[TS]	Magenta Lillypilly
Shrubs		
Mimosaceae	*Acacia floribunda*	Sally Wattle
Mimosaceae	*Acacia implexa*	Hickory
Euphorbiaceae	*Breynia oblongifolia*	Coffee Bush
Pittosporaceae	*Bursaria spinosa* var. *spinosa*	Native Blackthorn
Myrtaceae	*Callistemon viminalis*	Weeping Bottlebrush
Asteliaceae	*Cordyline stricta*	Narrow-leaf Palm Lily
Fabaceae	*Genista monspessulana**	Montpellier Broom
Proteaceae	*Grevillea* sp. (cultivar)*	-
Malvaceae	*Hibiscus sp.* (cultivar)*	Hibiscus
Euphorbiaceae	*Homalanthus populifolius*	Bleeding Heart
Verbenaceae	*Lantana camara**	Lantana
Myrtaceae	*Leptospermum petersonii**	Lemon Scented Tea-tree
Epacridaceae	*Leucopogon juniperinus*	Prickly Beard-heath
Oleaceae	*Ligustrum lucidum**	Large-leaved Privet
Oleaceae	*Ligustrum sinense**	Small-leaved Privet
Araceae	*Monstera deliciosa**	Fruit-salad Plant
Rutaceae	*Murraya paniculata**	Orange Jessamine
Primulaceae	*Myrsine variabilis*	-
Berberidaceae	*Nandina domestica**	Sacred Bamboo
Oleaceae	*Notelaea longifolia*	Mock Olive
Ochnaceae	*Ochna serrulata**	Mickey Mouse Plant
Oleaceae	*Olea europaea* subsp. *cuspidata**	African Olive

Family	Scientific name	Common name
Pittosporaceae	*Pittosporum multiflorum*	Orange Thorn
Pittosporaceae	*Pittosporum revolutum*	Yellow Pittosporum
Plumbaginaceae	*Plumbago sp.**	-
Araliaceae	*Polyscias sambucifolia*	Elderberry Panax
Rhamnaceae	*Pomaderris sp.*	-
Malaceae	*Rhaphiolepis indica**	Indian Hawthorn
Ericaceae	*Rhododendron* sp. (cultivar)*	Azalea
Rosaceae	*Rubus fruticosus* sp. agg.*	Blackberry Complex
Rosaceae	*Rubus parvifolius*	Native Raspberry
Fabaceae	*Senna septemtrionalis*	Arsenic bush
Solanaceae	*Solanum mauritianum**	Wild Tobacco
Ulmaceae	*Trema tomentosa* var. *aspera*	Native Peach
Lamiaceae	*Westringia fruticosa*	Coast Westringia
Rutaceae	*Zieria smithii*	Sandfly Zieria
Groundcovers		
Malvaceae	*Abutilon oxycarpum*	Straggly Lantern-bush
Rosaceae	*Acaena novae-zelandiae*	Bidgee-widgee
Asteraceae	*Ageratina adenophora**	Crofton Weed
Asparagaceae	*Asparagus aethiopicus**	Asparagus Fern
Asparagaceae	*Asparagus plumosus**	
Poaceae	*Axonopus fissifolius**	Narrow-leafed Carpet Grass
Asteraceae	*Bidens pilosa**	Cobbler's Pegs
Blechnaceae	*Blechnum cartilagineum*	Gristle Fern
Poaceae	*Bromus cartharticus**	Prairie Grass
Dicksoniaceae	*Calochlaena dubia*	Rainbow Fern
Cyperaceae	*Carex fascicularis*	Tassel Sedge

Family	Scientific name	Common name
Poaceae	*Cenchrus clandestinus**	Kikuyu
Apiaceae	*Centella asiatica*	Indian Pennywort
Commelinaceae	*Commelina cyanea*	Native Wandering Jew
Asteraceae	*Conyza bonariensis**	Flaxleaf Fleabane
Asteraceae	*Conyza sumatrensis**	Fleabane
Poaceae	*Cynodon dactylon*	Common Couch
Cyperaceae	*Cyperus gracilis*	-
Phormiaceae	*Dianella caerulea* var. *caerulea*	Flax Lily
Convolvulaceae	*Dichondra repens*	Kidney Weed
Poaceae	*Digitaria sanguinalis**	Crab Grass
Blechnaceae	*Doodia aspera*	Rasp Fern
Poaceae	*Ehrharta erecta**	Panic Veldtgrass
Chenopodiaceae	*Einadia trigonos* subsp. *trigonos*	Fishweed
Poaceae	*Eleusine tristachya**	Goose Grass
Poaceae	*Entolasia marginata*	Bordered Panic
Poaceae	*Entolasia stricta*	Wiry Panic
Poaceae	*Eragrostis brownii*	Brown's Lovegrass
Poaceae	*Eragrostis curvula**	African Lovegrass
Euphorbiaceae	*Euphorbia peplus**	Spurge
Asteraceae	*Gamochaeta spicata**	Cudweed
Asteraceae	*Hypochaeris radicata**	Flatweed
Poaceae	*Imperata cylindrica* var. *major*	Blady Grass
Juncaceae	*Juncus usitatus*	Common Rush
Asteraceae	*Lagenifera stipitata*	-
Liliaceae	*Lilium formosanum**	Formosan Lily
Lobeliaceae	*Lobelia purpurascens*	Whiteroot

Family	Scientific name	Common name
Lomandraceae	*Lomandra hyrstix*	Mat-rush
Lomandraceae	*Lomandra longifolia*	Spiky-headed Mat-rush
Fabaceae	*Lotus suaveolens**	Hairy Bird's Foot Trefoil
Primulaceae	*Lysimachia arvensis**	Scarlet Pimpernel
Poaceae	*Microlaena stipoides* var. *stipoides*	Weeping Grass
Malvaceae	*Modiola caroliniana**	Red-flowered Mallow
Davalliaceae	*Nephrolepis cordifolia**	Fish-bone Fern
Poaceae	*Oplismenus aemulus*	Basket Grass
Poaceae	*Oplismenus imbecillis*	-
Oxalidaceae	*Oxalis corniculata**	Yellow Wood Sorrel
Poaceae	*Paspalum urvillei**	Vasey Grass
Sinopteridaceae	*Pellaea falcata*	Sickle Fern
Plantaginaceae	*Plantago debilis*	Slender Plantain
Plantaginaceae	*Plantago lanceolata**	Ribwort
Lamiaceae	*Plectranthus parviflorus*	Cockspur Flower
Acanthaceae	*Pseuderanthemum variabile*	Pastel Flower
Dennstaedtiaceae	*Pteridium esculentum*	Bracken
Rubiaceae	*Richardia stellaris**	-
Malvaceae	*Sida rhombifolia**	Paddy's Lucerne
Asteraceae	*Sigesbeckia orientalis*	Indian Weed
Solanaceae	*Solanum nigrum**	Black Nightshade
Solanaceae	*Solanum pseudocapsicum**	-
Poaceae	*Sporobolus africanus**	Parramatta Grass
Poaceae	*Stenotaphrum secundatum**	Buffalo Grass
Gleicheniaceae	*Sticherus flabellatus*	Umbrella Fern
Asteraceae	*Taraxacum officinale**	Dandelion

Family	Scientific name	Common name
Commelinaceae	*Tradescantia fluminensis**	Wandering Jew
Fabaceae	*Trifolium repens**	White Clover
Asteraceae	*Vernonia cinerea* var. *cinerea*	-
Plantaginaceae	*Veronica plebeia*	Creeping Speedwell
Plantaginaceae	*Veronica persica*	Creeping Speedwell
Agavaceae	*Yucca* sp.*	-
Vines		
Apocnyaceae	*Araujia sericifera**	Mothvine
Vitaceae	*Cayratia clematidea*	Native Grape
Ranunculaceae	*Clematis aristata*	Old Man's Beard
Fabaceae	*Desmodium varians*	-
Luzuriagaceae	*Eustrephus latifolius*	Wombat Berry
Fabaceae	*Glycine clandestina*	Twining Glycine
Fabaceae	*Glycine tabacina*	Variable Glycine
Fabaceae	*Hardenbergia violacea*	False Sarsparilla
Oleaceae	*Jasminum polyanthum**	Jasmine
Rubiaceae	*Morinda jasminoides*	-
Bignoniaceae	*Pandorea pandorana*	Wonga Vine
Apocynaceae	*Parsonsia straminea*	Common Silkpod
Passifloraceae	*Passiflora edulis**	Common Passionfruit
Passifloraceae	*Passiflora suberosa**	Cork Passionflower
Smilacaceae	*Smilax australis*	Lawyer Vine
Menispermaceae	*Stephania japonica* var. *discolor*	Snake Vine
*** denotes exotic species** **TS denotes threatened species**		

Fauna species observed throughout the duration of fauna surveys are listed below.

Common name	Scientific name	Method observed
Birds		**Jan 2018 & Jan 2019, June 2020 & May 2024**
Australian King Parrot	*Alisterus scapularis*	O W
Australian Magpie	*Cracticus tibicen*	OW
Australian Owlet-nightjar	*Aegotheles cristatus*	W[PR]
Australian Raven	*Corvus coronoides*	O W
Bell Miner	*Manorina melanophrys*	O W
Brown Gerygone	*Gerygone mouki*	W
Brown Thornbill	*Acanthiza pusilla*	O W
Crimson Rosella	*Platycercus elegans*	OW
Eastern Rosella	*Platycercus eximius*	O W
Eastern Yellow Robin	*Eopsaltria australis*	O W
Eastern Whipbird	*Psophodes olivaceus*	W
Galah	*Eolophus roseicapillus*	O W
Gang-gang Cockatoo [TS]	*Callocephalon fimbriatum*	W
Green Catbird	*Ailuroedus crassirostris*	W
Grey Butcherbird	*Cracticus torquatus*	O W
Grey Fantail	*Rhipidura albiscapa*	O W
Laughing Kookaburra	*Dacelo novaeguineae*	O W
Little Corella	*Cacatua sanguinea*	OW
Little Lorikeet [TS]	*Glossopsitta pusilla*	O W
Masked Lapwing	*Vanellus miles*	W
Musk Lorikeet	*Glossopsitta concinna*	O W
Noisy Miner	*Manorina melanocephala*	O W
Pied Currawong	*Strepera graculina*	W
Powerful Owl [TS]	*Ninox strenua*	E O W Z
Rainbow Lorikeet	*Trichoglossus haematodus*	O W

Common name	Scientific name	Method observed
Satin Bowerbird	*Ptilonorhynchus violaceus*	OW
Silvereye	*Zosterops lateralis*	O W
Spotted Turtle-Dove *	*Streptopelia chinensis*	O W
Spotted Pardalote	*Pardalotus punctatus*	W
Sulphur Crested Cockatoo	*Cacatua galerita*	O W
Superb Fairy-wren	*Malurus cyaneus*	O W
Tawny Frogmouth	*Podargus strigoides*	O
Welcome Swallow	*Hirundo neoxena*	O
White-browed Scrubwren	*Sericornis frontalis*	O W
White-throated Needletail TS/MS	*Hirundapus caudacutus*	O W
Yellow-faced Honeyeater	*Caligavis chrysops*	W
Mammals		
Cat (feral)*	*Felis catus*	O
Common Brushtail Possum	*Trichosurus vulpecula*	O
Common Ringtail Possum	*Pseudocheirus peregrinus*	O
Domesticated Dog *	*Canis lupus familiaris*	O
Eastern Freetail-bat	*Mormopterus ridei*	UPR
Gould's Wattled Bat	*Chalinolobus gouldii*	U
Greater Broad-nosed Bat TS	*Scoteanax rueppellii*	UPR
Grey-headed Flying-fox TS	*Pteropus poliocephalus*	O
Large Bent-winged Bat TS	*Miniopterus orianae oceanensis*	U
Little Bent-winged Bat TS	*Miniopterus australis*	U
Little Forest Bat	*Vespadelus vulturnus*	U
White-striped Mastiff-bat	*Austronomus australis*	U
Reptiles		
Delicate Skink	*Lampropholis delicata*	O
Red-bellied Black Snake	*Pseudechis porphyriacus*	O

Common name	Scientific name	Method observed
Amphibians		
Common Eastern Froglet	*Crinia signifera*	W
Spotted Marsh Frog	*Limnodynastes tasmaniensis*	WPR

E - Nest/roost	H - Hair/feathers/skin	P - Scat
F - Tracks/scratchings	K - Dead	Q - Camera
FB - Burrow	O - Observed	T - Trapped/netted
G - Crushed cones	OW - Obs & heard call	U - Anabat/ultrasound

Appendix 6. BAM-C outputs

BAM Vegetation Zones Report

Proposal Details

Assessment Id	Assessment name	BAM data last updated *
00048240/BAAS17032/24/00048241	West Pennant Hills - Cumberland State Forest	14/03/2024
Assessor Name	Report Created	BAM Data version *
Lindsay Holmes	27/05/2024	67
Assessor Number	Assessment Type	BAM Case Status
BAAS17032	Part 4 Developments (Small Area)	Open
Assessment Revision	Date Finalised	BOS entry trigger
1	To be finalised	BOS Threshold: Biodiversity Values Map

* 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	3136_mod-good	3136-Blue Gum High Forest	mod-good	0.13	1	

2	3136_managed	3136-Blue Gum High Forest	managed	0.03	1	
3	3262_managed	3262-Sydney Turpentine Ironbark Forest	managed	0.29	1	

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00048240/BAAS17032/24/00048241	West Pennant Hills - Cumberland State Forest	14/03/2024
Assessor Name	**Report Created**	**BAM Data version ***
Lindsay Holmes	27/05/2024	67
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS17032	Part 4 Developments (Small Area)	Open
Assessment Revision	**BOS entry trigger**	**Date Finalised**
1	BOS Threshold: Biodiversity Values Map	To be 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.

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-chinned Honeyeater (eastern subspecies)	Melithreptus gularis gularis	3262-Sydney Turpentine Ironbark Forest
Brown Treecreeper (eastern subspecies)	Climacteris picumnus victoriae	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
Diamond Firetail	Stagonopleura guttata	3262-Sydney Turpentine Ironbark Forest
Dusky Woodswallow	Artamus cyanopterus cyanopterus	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
Eastern Osprey	Pandion cristatus	3262-Sydney Turpentine Ironbark Forest
Flame Robin	Petroica phoenicea	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
Gang-gang Cockatoo	Callocephalon fimbriatum	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest

Greater Broad-nosed Bat	Scoteanax rueppellii	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
Grey-headed Flying-fox	Pteropus poliocephalus	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
Large Bent-winged Bat	Miniopterus orianae oceanensis	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
Little Bent-winged Bat	Miniopterus australis	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
Little Eagle	Hieraaetus morphnoides	3262-Sydney Turpentine Ironbark Forest
Little Lorikeet	Glossopsitta pusilla	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
Regent Honeyeater	Anthochaera phrygia	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
Rosenberg's Goanna	Varanus rosenbergi	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
South-eastern Glossy Black-Cockatoo	Calyptorhynchus lathami lathami	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
South-eastern Hooded Robin	Melanodryas cucullata cucullata	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
Speckled Warbler	Chthonicola sagittata	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
Spotted-tailed Quoll	Dasyurus maculatus	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
Square-tailed Kite	Lophoictinia isura	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
Superb Fruit-Dove	Ptilinopus superbus	3136-Blue Gum High Forest
Swift Parrot	Lathamus discolor	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
Varied Sittella	Daphoenositta chrysoptera	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
White-bellied Sea-Eagle	Haliaeetus leucogaster	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
White-throated Needletail	Hirundapus caudacutus	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest

Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest

Threatened species Manually Added

Common Name	Scientific Name
Greater Broad-nosed Bat	Scoteanax rueppellii

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

Common Name	Scientific Name	Plant Community Type(s)
Black Bittern	Ixobrychus flavicollis	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
Black-necked Stork	Ephippiorhynchus asiaticus	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest
Painted Honeyeater	Grantiella picta	3136-Blue Gum High Forest
		3262-Sydney Turpentine Ironbark Forest

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
Black Bittern	Ixobrychus flavicollis	Habitat constraints
Black-necked Stork	Ephippiorhynchus asiaticus	Habitat constraints
Painted Honeyeater	Grantiella picta	Habitat constraints

BAM Credit Summary Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00048240/BAAS17032/24/00048241	West Pennant Hills - Cumberland State Forest	14/03/2024
Assessor Name	Report Created	BAM Data version *
Lindsay Holmes	27/05/2024	67
Assessor Number	BAM Case Status	Date Finalised
BAAS17032	Open	To be finalised
Assessment Revision	Assessment Type	BOS entry trigger
1	Part 4 Developments (Small Area)	BOS Threshold: Biodiversity Values Map

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

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

Zone	Vegetation zone name	TEC name	Current Vegetation integrity score	Change in Vegetation integrity (loss / gain)	Area (ha)	Sensitivity to loss (Justification)	Species sensitivity to gain class	BC Act Listing status	EPBC Act listing status	Biodiversity risk weighting	Potential SAII	Ecosystem credits
Blue Gum High Forest												
1	3136_mod-good	Blue Gum High Forest in the Sydney Basin Bioregion	65.9	65.9	0.13	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	5

2	3136_managed	Blue Gum High Forest in the Sydney Basin Bioregion	24.1	24.1	0.03	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	1
											Subtotal	**6**
Sydney Turpentine Ironbark Forest												
3	3262_managed	Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion	26.7	26.7	0.29	Population size	High Sensitivity to Gain	Critically Endangered Ecological Community	Not Listed	2.50	True	5
											Subtotal	**5**
											Total	**11**

Species credits for threatened species

Vegetation zone name	Habitat condition (Vegetation Integrity)	Change in habitat condition	Area (ha)/Count (no. individuals)	Sensitivity to loss (Justification)	Sensitivity to gain (Justification)	BC Act Listing status	EPBC Act listing status	Potential SAII	Species credits
Ninox strenua / Powerful Owl (Fauna)									
3136_mod-good	65.9	65.9	0.13	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	4

3136_managed	24.1	24.1	0.03	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	1
3262_managed	26.7	26.7	0.29	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Not Listed	False	4
								Subtotal	**9**
Pommerhelix duralensis / Dural Land Snail (Fauna)									
3136_mod-good	65.9	65.9	0.13	Biodiversity Conservation Act listing status	Ecology or response to management is poorly known	Endangered	Endangered	False	4
3136_managed	24.1	24.1	0.03	Biodiversity Conservation Act listing status	Ecology or response to management is poorly known	Endangered	Endangered	False	1
3262_managed	26.7	26.7	0.29	Biodiversity Conservation Act listing status	Ecology or response to management is poorly known	Endangered	Endangered	False	4
								Subtotal	**9**

BAM Candidate Species Report

Proposal Details

Assessment Id 00048240/BAAS17032/24/00048241	Proposal Name West Pennant Hills - Cumberland State Forest	BAM data last updated * 14/03/2024
Assessor Name Lindsay Holmes	Report Created 27/05/2024	BAM Data version * 67
Assessor Number BAAS17032	Assessment Type Part 4 Developments (Small Area)	BAM Case Status Open
Assessment Revision 1	Date Finalised To be finalised	BOS entry trigger BOS Threshold: Biodiversity Values Map

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List of Species Requiring Survey

Name	Presence	Survey Months
Ninox strenua Powerful Owl	Yes (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☑ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Pommerhelix duralensis Dural Land Snail	Yes (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☑ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

BAM Candidate Species Report

Rhodamnia rubescens Scrub Turpentine	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☑ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?

Threatened species Manually Added

Common Name	Scientific Name
Powerful Owl	Ninox strenua
Dural Land Snail	Pommerhelix duralensis

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Darwinia peduncularis	Darwinia peduncularis	Habitat constraints
Eastern Australian Underground Orchid	Rhizanthella slateri	Refer to BAR
Haloragodendron lucasii	Haloragodendron lucasii	Habitat constraints
Julian's Hibbertia	Hibbertia spanantha	Refer to BAR
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
Regent Honeyeater	Anthochaera phrygia	Habitat constraints
Swift Parrot	Lathamus discolor	Habitat constraints

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id

00048240/BAAS17032/24/00048241

Proposal Name

West Pennant Hills - Cumberland State Forest

BAM data last updated *

14/03/2024

Assessor Name

Lindsay Holmes

Assessor Number

BAAS17032

BAM Data version *

67

Proponent Name(s)

Report Created

27/05/2024

BAM Case Status

Open

Assessment Revision

1

Assessment Type

Part 4 Developments (Small Area)

Date Finalised

To be finalised

BOS entry trigger

BOS Threshold: Biodiversity Values Map

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Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Blue Gum High Forest in the Sydney Basin Bioregion	Critically Endangered Ecological Community	3136-Blue Gum High Forest
Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion	Critically Endangered Ecological Community	3262-Sydney Turpentine Ironbark Forest

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
Ephippiorhynchus asiaticus / Black-necked Stork
Grantiella picta / Painted Honeyeater
Ixobrychus flavicollis / Black Bittern

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
3136-Blue Gum High Forest	Blue Gum High Forest in the Sydney Basin Bioregion	0.2	1	5	6.00
3262-Sydney Turpentine Ironbark Forest	Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion	0.3	0	5	5.00

3136-Blue Gum High Forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Blue Gum High Forest in the Sydney Basin Bioregion This includes PCT's: 3136	-	3136_mod-good	No	5	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	Blue Gum High Forest in the Sydney Basin Bioregion This includes PCT's: 3136	-	3136_managed	Yes	1	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
3262-Sydney Turpentine Ironbark Forest	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion This includes PCT's: 3262	-	3262_managed	No	5	Cumberland,Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Ninox strenua / Powerful Owl	**3136_mod-good, 3136_managed, 3262_managed**	0.5	9.00
Pommerhelix duralensis / Dural Land Snail	**3136_mod-good, 3136_managed, 3262_managed**	0.5	9.00

Credit Retirement Options

Like-for-like options

Ninox strenua/ Powerful Owl	Spp	IBRA region
	Ninox strenua/Powerful Owl	Any in NSW
	Variation options	

	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Pommerhelix duralensis/ Dural Land Snail	Spp	IBRA region	
	Pommerhelix duralensis/Dural Land Snail	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Endangered	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00048240/BAAS17032/24/00048241

Proposal Name
West Pennant Hills - Cumberland State Forest

BAM data last updated *
14/03/2024

Assessor Name
Lindsay Holmes

Assessor Number
BAAS17032

BAM Data version *
67

Proponent Names

Report Created
27/05/2024

BAM Case Status
Open

Assessment Revision
1

Assessment Type
Part 4 Developments (Small Area)

Date Finalised
To be finalised

BOS entry trigger
BOS Threshold: Biodiversity Values Map

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Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Blue Gum High Forest in the Sydney Basin Bioregion	Critically Endangered Ecological Community	3136-Blue Gum High Forest
Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion	Critically Endangered Ecological Community	3262-Sydney Turpentine Ironbark Forest
Species		

Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
Ephippiorhynchus asiaticus / Black-necked Stork
Grantiella picta / Painted Honeyeater
Ixobrychus flavicollis / Black Bittern

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

BAM Biodiversity Credit Report (Like for like)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
3136-Blue Gum High Forest	Blue Gum High Forest in the Sydney Basin Bioregion	0.2	1	5	6
3262-Sydney Turpentine Ironbark Forest	Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion	0.3	0	5	5

3136-Blue Gum High Forest	**Like-for-like credit retirement options**					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Blue Gum High Forest in the Sydney Basin Bioregion This includes PCT's: 3136	-	3136_mod-good	No	5	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Blue Gum High Forest in the Sydney Basin Bioregion This includes PCT's: 3136	-	3136_managed	Yes	1	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
3262-Sydney Turpentine Ironbark Forest	**Like-for-like credit retirement options**					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion This includes PCT's: 3262	-	3262_managed	No	5	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Like for like)

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Ninox strenua / Powerful Owl	**3136_mod-good, 3136_managed, 3262_managed**	0.5	9.00
Pommerhelix duralensis / Dural Land Snail	**3136_mod-good, 3136_managed, 3262_managed**	0.5	9.00

Credit Retirement Options

Like-for-like credit retirement options

Ninox strenua / Powerful Owl	Spp	IBRA subregion
	Ninox strenua / Powerful Owl	Any in NSW
Pommerhelix duralensis / Dural Land Snail	Spp	IBRA subregion
	Pommerhelix duralensis / Dural Land Snail	Any in NSW