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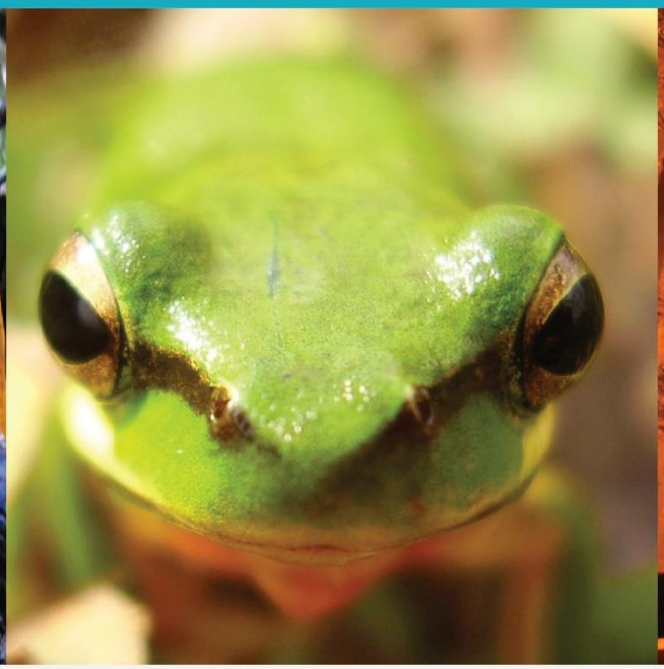

BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

At 7A, 9, 9A-11 Racecourse Rd,1-3 Faunce Street West, 38 & 50 Young Street, West Gosford

16 December 2022

(REF: 18URB09 FINAL)

BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

Proposed Bus Depot

Racecourse Road, Faunce Street West and Young Street, West Gosford

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Date:	16/12/22
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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 lot amalgamation of 14 lots at street addresses; 7A, 9, 9A-11 Racecourse Rd,1-3 Faunce Street West and 38 & 50 Young Street, West Gosford. The report utilises the streamlined assessment for a small area module given the minimum lot size has a clearing threshold of 0.25 ha, and impacts are below 1 ha total, with no mapped areas of biodiversity values being impacted. Therefore, the assessment type is a Part 4 Development (Small Area) Assessment.

The land is zoned B6 (Enterprise Corridor) in the Central Coast Local Environmental Plan (LEP); and State Environmental Planning Policy (Precincts—Regional) 2021.

The development footprint will encompass all addresses and any native vegetation on the adjacent nature strips given that there may be partial impacts by removal of poor-quality trees (safety concerns) and asset protection zones in some of the proposed site setback areas. Tree protection zones in setback areas may be compromised by cut and fill operations. Although some vegetation will be retained on these peripheral areas, the impact is unclear and for the purposes of credit calculations, it will be assumed all vegetation is to be impacted.

Development proposal

The development application seeks to construct a new bus depot comprising workshop & office buildings, bus wash & fuel bays, car parking and bus parking with electric bus charging facilities. A landscape buffer is to be provided to the periphery of the site of 10 m, however cut and fill operations to the edge will impact some trees in this buffer. In addition, parts of the eastern buffer to Young Street are to be maintained as an asset protection zone (APZ). It would be intended that native landscaping be reinstated post construction as well as weed control works to maintain the buffer.

Recorded biodiversity

As the site is being assessed as a streamlined assessment, only limited threatened species survey needs to be undertaken (for SAII entities). Vegetation communities have been surveyed using multiple BAM plots and compared with existing vegetation mapping and the Bionet vegetation community classification tool.

The site is heavily impacted by previous disturbances from cut and fill and weed invasion. There are areas of moderate condition regrowth on site. The northern regrowth area is dominated by *Casuarina glauca* that has opportunistically seeded in this location as the contours from cut and fill have made it very level and would occasionally be waterlogged, even though it's not on the lowest contours of the site.

Vegetation transects covered all vegetation on site, no threatened flora species were observed. Whilst fauna survey was not conducted, no large or distinct hollows were observed, and the on-ground log count was very low. The site may provide opportunistic foraging habitat for a number of threatened fauna, more likely those with high mobility such as bird and bat species.

Most of the narrow linear remnant of vegetation along Racecourse Road was noted as PCT 4020, equivalent to the threatened ecological community, Swamp Sclerophyll Forest on Coastal Floodplains. The dominant canopy species in this vegetation community were *Casuarina glauca* and *Angophora floribunda.* This is listed as an endangered ecological community under the *BC Act.*

The Coastal Swamp Sclerophyll Forest of New South Wales and Southeast Queensland ecological community was listed in the Endangered category of the threatened ecological communities list under the *Environment Protection and Biodiversity Conservation Act* 1999 (Cwlth) (EPBC Act) effective from 8 December 2021. The vegetation on site does not meet the condition threshold criteria as the patch size is too small and breaks in the patch are too large.

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

Whilst some of the peripheral vegetation will be retained, some degree of tree clearance is required, and APZ management along part of Young Street. As such, it was assumed all mapped vegetation on site will be impacted to some degree, however for the BAM calculator, the assumption proposed was for removal of all vegetation totalling 0.78 ha.

The impacts will result in credits required for PCT 1718 / 4020 and PCT 1841 / 3230, as well as species credits for Giant Dragonfly and Large-eared Pied Bat due to buffers from appropriate habitat types. The credit generation is detailed in Section 6, with an SAII assessment undertaken in Appendix 1.

Biodiversity Offsets Scheme (BOS) – Threshold Assessment

The proposed development exceeds the nominated threshold triggers of the area clearing threshold. Biodiversity offsets are required under the Biodiversity Offsets Scheme (BOS), however, as the impact does not exceed 1 ha (of native vegetation), it may be assessed using the small area module of the streamlined assessment.

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)	HBT credits	No HBT credits	Credits
1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and Southeast Corner Bioregions	0.05	0	1	1
1841-Coastal enriched sandstone moist forest	Not a TEC	0.73	0	6	6

Table B – Requirement for species credits

Species	Vegetation zones	Area (ha)	Credits
Large-eared Pied Bat	1841_poor, 1841_regrowth, 1718_poor	0.78	13
Giant Dragonfly	1841_poor, 1841_regrowth, 1718_poor	0.78	13

As of October 2022, accredited assessors cannot access the BOP-C payment calculator to provide an estimation of costs for credits. For estimates on credit values, the proponent may need to speak with the Biodiversity Conservation Trust (BCT). The BCT will be providing a credit costing service in early 2023 for a nominal fee.

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.
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
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
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
TEC	Threatened Ecological Community
TSC Act	*Threatened Species Conservation Act (1995)* – superseded by the *Biodiversity Conservation Act (2016)*
VMP	Vegetation Management Plan

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1. INTRODUCTION

Travers bushfire & ecology has been engaged to prepare a biodiversity development assessment report (BDAR) for the lot amalgamation of 14 lots at street addresses; 7A, 9, 9A-11 Racecourse Rd,1-3 Faunce Street West and 38 & 50 Young Street, West Gosford. The report utilises the streamlined assessment for a small area module given the lot threshold sizes. has been subject to detailed survey effort and will hereafter be referred to as the 'study area'.

The land is zoned B6 (Enterprise Corridor) in the Central Coast Local Environmental Plan (LEP); and State Environmental Planning Policy (Precincts—Regional) 2021.

The development footprint will encompass all addresses and any native vegetation on the adjacent nature strips given that there may be partial impacts by removal of poor-quality trees (safety concerns) and asset protection zones in some of the proposed site setback areas.

The area containing the proposed development, APZs and all associated impact on habitat features is hereafter referred to as the 'development footprint' (refer to Figure 1-1) which extends to Racecourse Road (west), Faunce Street West (north) and Young Street (east).

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

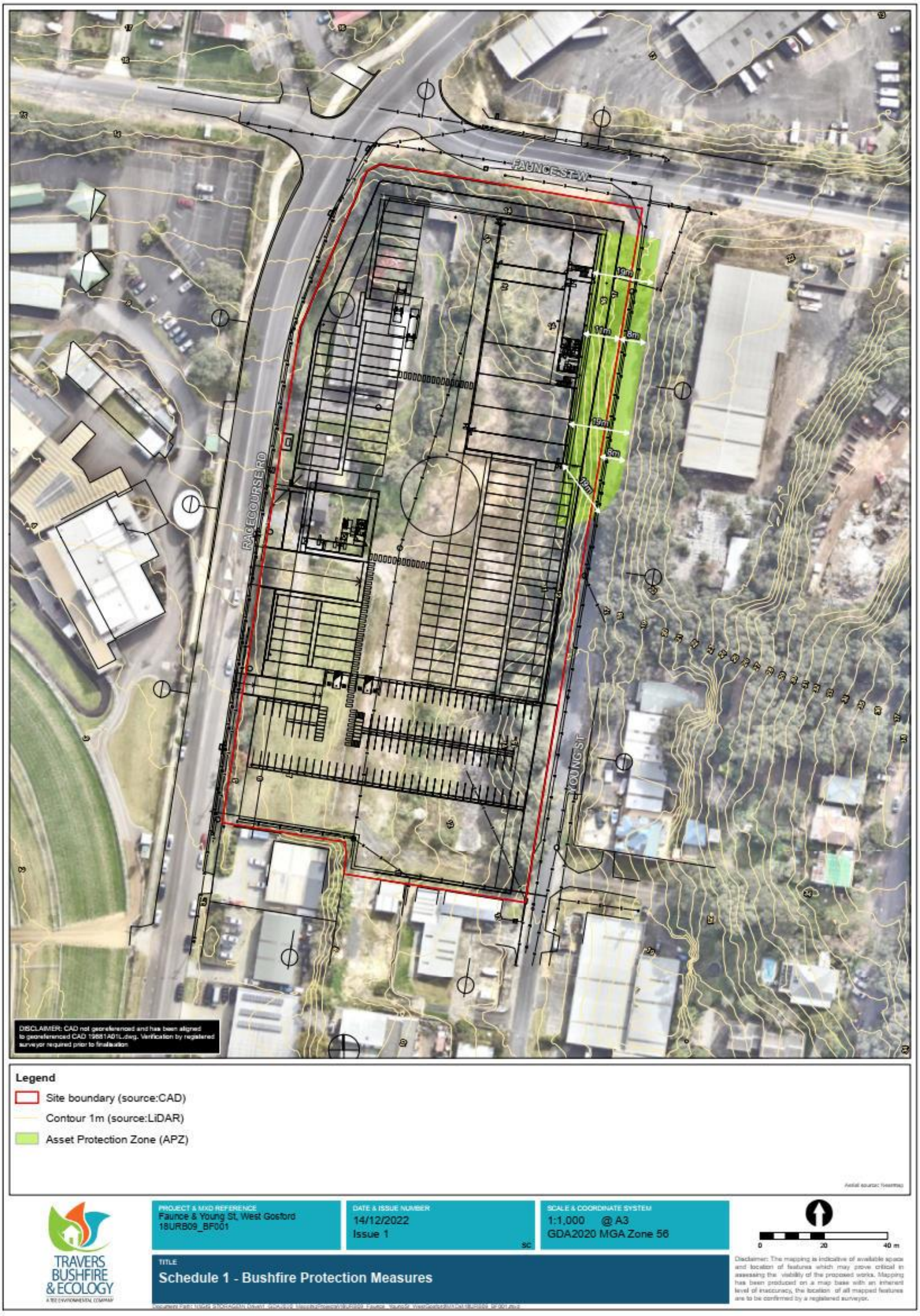

Figure 1-1 – Study area (red) and proposed APZ (green)

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 certify here that the report has been prepared on the basis of the requirements of (and information provided under) the BAM as  . Finalisation of the BAM-C was undertaken on 16 December 2022. The proponent has 14 days from this date to submit the certified BDAR.

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 of 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 1-3 and 1-4 (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	Lots 71-74/DP810836, 6/DP801261, 11 & 20/82/DP758466, 1/DP651249, 18/DP1100223, 15/DP1100216, 13-14/DP1100206, 12/DP1100110 & 16/DP1079150 – 7A, 9, 9A-11 Racecourse Rd,1-3 Faunce Street West, 38 & 50 Young Street, West Gosford, NSW, 2250.
Location description	The site is located approximately 1.3 km NNE of Gosford CBD on the eastern side of Racecourse Road. The racecourse is to the west, there is old commercial / industrial development to the north, south and partly east, and some residential lots to the east.
Area	2.1 ha approximately
Local government area	Central Coast
Zoning	B6 Enterprise Corridor
Minimum Lot size	There is no minimum lot size. It is worked on actual size.
Grid reference MGA-56	344650E 6300650N
Elevation	Approximately 4-16 m AHD
Topography	There is a gentle overall slope from west to east, although cut/fill operations have altered parts of the natural topography of the site. There is a steep grade on one of these areas in the north, and the gradient

	near Young Street is steep for 2-5m in some sections.
Catchment and drainage	The site drains to the south-east to Narara Creek then into Brisbane Water
Existing land use	Buildings, ex horse stables and car parking for the racecourse.
Is a watercourse or waterfront land impacting the site?	No
Are GDEs Present onsite?	Yes – narrow strip of vegetation along Racecourse Road in the road corridor – Swamp Sclerophyll Forest on Coastal Floodplains.
Is site mapped as a Coastal Wetland or proximity area to a Coastal Wetland?	Yes/**No**
Patch size	<5 ha, 5–24 ha, **25–100 ha** or **>100 ha** Vegetation on site, extends east across Young Street, then to Presidents Hill. There are narrow fragments of vegetation heading north across the golf course before reaching riparian remnants along Narara Creek. There is connected vegetation on the escarpment between West Gosford and Kariong / Somersby that ultimately takes the patch size well over 100 ha. If the narrow connectivity from Faunce Street West to the Golf Course was broken, the patch size would be ~35 ha. Ultimately in the BAM calculator, there is no difference in species or credit requirements between entering 35 ha or 1,000 ha.
IBRA bioregions and subregions	Sydney Basin bioregion – Wyong subregion (Figure 1-3 and Figure 1-4)
NSW landscape region	Sydney - Newcastle Coastal Alluvial Plains
Native vegetation extent in the buffer area (1500 m)	333 ha approx. and 42% Cover classes: 0–10%, 10–30%, **30–70%** and >70%
Cleared areas	Approximately 60-65% of the site contains no native vegetation. Historical photos from 1965 show a very limited amount of vegetation on site but not consistent to where vegetation is at present.
Evidence to support differences between mapped vegetation extent and aerial imagery	A Trimble GPS unit was utilised to walk the extent of the native vegetation and differentiate the boundary between remnant and regrowth vegetation.
Rivers and streams classified according to stream order	The site map (Figure 1-3) shows the study area with first, second and third order streams
Wetlands within, adjacent to and downstream of the site, including important wetlands	There are no wetlands on site. The nearest wetlands occur in the central part of the racecourse approximately 500m to the west of the site.
SEPP (Biodiversity and Conservation) 2021 – Koala Habitat Protection	Schedule 2 LGA: Yes Core Koala Habitat: No Koala SEPP applies? Yes
Connectivity features	Vegetation on site connects to partly impacted vegetation east of Young Street. This connects to a significant stage of bushland immediately east which is protected, approximately 30 ha in size. The location map (Figure 1-4) shows an overview of the extent of native vegetation in the locality.

Geology and soils	Geology; Narrabeen Group – Terrigal Formation. Interbedded laminate, shale and fine-to coarse-grained quartz0lithis sandstone; minor red claystone. Soils; Erina soil landscape. Shallow to moderately deep (<100 cm) red and brown podzolic soils on crests, upper slopes and well-drained areas; deep (150-300 cm) yellow podzolic soils and soloths on lower slopes and in areas of poor drainage.
Identification of method applied (i.e., linear or site-based)	Site based assessment

1.3 Proposed development and BOS entry pathway

Table 1-2 – Proposal details

Development type			
☐ Commercial	☐ Residential	☐ Cemetery	☐ Tourism
☐ Building DA	☑ Industrial	☐ Extension	☐ Ecotourism
☐ Subdivision (XX lots)	Type of application (EP&A Act): Part 5		
BOS entry pathway			
☐ State Significant Project	☐ Biodiversity Values Land Map trigger		
☑ Area clearing threshold	☐ Test of Significance		

The development application seeks to construct a new bus depot comprising workshop & office buildings, bus wash & fuel bays, car parking and bus parking facilities. A landscape buffer is to be provided to the periphery of the site of 10m, however cut and fill operations to the edge will impact some trees in this buffer. In addition, parts of the eastern buffer to Young Street are to be maintained as an asset protection zone (APZ). It would be intended that native landscaping be reinstated post construction as well as weed control works to maintain the buffer.

Figure 1-2 shows the development layout.

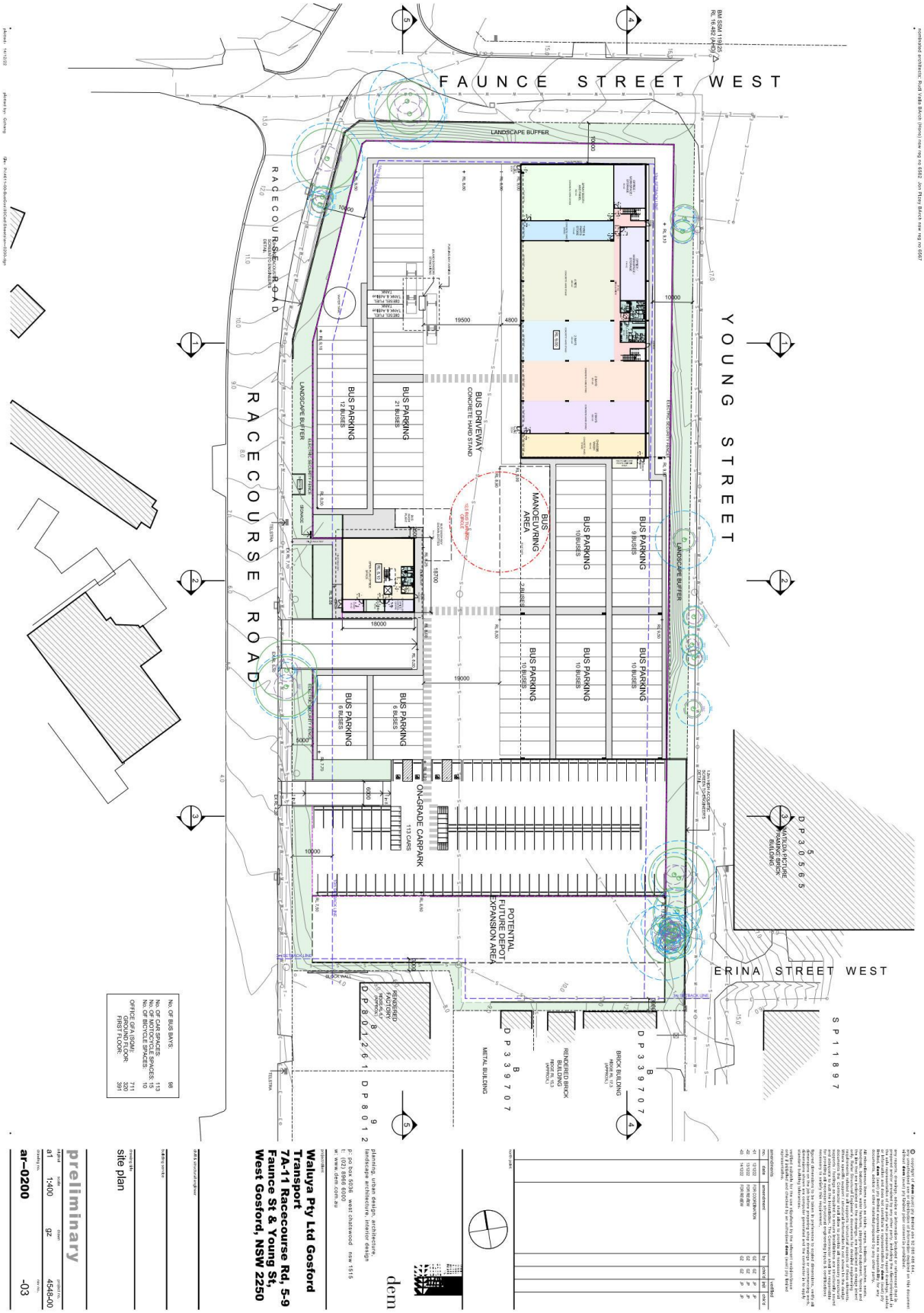

Figure 1-2 – Proposed development layout

1.4 Statutory assessment requirements

1.4.1 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*.

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 s.111 of the *EP&A Act*

1.4.2 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.

1.4.3 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 Agriculture, Water and the Environment (DAWE) 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 DAWE 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.

1.4.4 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.

1.4.5 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.

1.4.6 State Environmental Planning Policy (Biodiversity and Conservation) 2021

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

1. SEPP (Vegetation in Non-Rural Areas) 2017 (Vegetation SEPP)
2. SEPP (Koala Habitat Protection) 2020 (Koala SEPP 2020)
3. SEPP (Koala Habitat Protection) 2021 (Koala SEPP 2021)
4. Murray Regional Environmental Plan No 2—Riverine Land (Murray REP)
5. SEPP No 19—Bushland in Urban Areas (SEPP 19)

6. SEPP No 50—Canal Estate Development (SEPP 50)
7. SEPP (Sydney Drinking Water Catchment) 2011 (Sydney Drinking Water SEPP)
8. Sydney Regional Environmental Plan No 20 – Hawkesbury – Nepean River (No 2 – 1997) (Hawkesbury–Nepean River SREP)
9. Sydney Regional Environmental Plan (Sydney Harbour Catchment) 2005 (Sydney Harbour Catchment SREP)
10. Greater Metropolitan Regional Environmental Plan No 2 – Georges River Catchment (Georges River REP)
11. Willandra Lakes Regional Environmental Plan No 1 – World Heritage Property (Willandra Lakes REP).

No policy changes have been made. The SEPP consolidation does not change the legal effect of the existing SEPPs, with section 30A of the Interpretation Act 1987 applying to the transferred provisions. The SEPP consolidation is administrative. It has been undertaken in accordance with section 3.22 of the Environmental Planning and Assessment Act 1979.

The Biodiversity and Conservation SEPP:

- transfers most existing provisions from the 11 SEPPs being consolidated into chapters 2 to 12. Chapter 1 contains preliminary information and commencement details
- repeals the 11 SEPPs being consolidated.

Koala Habitat

The BC SEPP repeals the former Koala SEPPs (2020, 2021). 'Chapter 3 – Koala habitat protection 2020' contains provisions from the Koala SEPP 2020 and, as an interim measure, applies in the NSW core rural zones of RU1, RU2 and RU3, except within the Greater Sydney and Central Coast areas. 'Chapter 4 – Koala habitat protection 2021' contains the land-use planning and assessment framework from the Koala SEPP 2021 for koala habitat within Metropolitan Sydney and the Central Coast and applies to all zones except RU1, RU2 and RU3 in the short term – it will apply to all zones once the Koala SEPP 2020 is repealed.

The BC SEPP 2021 commenced on 1st March 2022. Of primary importance for this report, this SEPP now includes the former *State Environmental Planning Policy (Koala Habitat Protection) 2021* which was made and commenced on 17 March 2021. Chapter 4 of the SEPP (Biodiversity and Conservation) 2021, now covers *Koala Habitat Protection (2021)* which incorporates the *State Environmental Planning Policy (Koala Habitat Protection) 2021.*

The Koala SEPP 2021 reinstates the policy framework of SEPP Koala Habitat Protection 2019 to 83 Local Government Areas (LGA) in NSW. At this stage:

- In nine of these LGAs – Metropolitan Sydney (Blue Mountains, Campbelltown, Hawkesbury, Ku-Ring-Gai, Liverpool, Northern Beaches, Hornsby, and Wollondilly) and the Central Coast LGA – Koala SEPP 2021 applies to all zones.
- In all other identified LGAs, Koala SEPP 2021 does not apply to land zoned RU1 Primary Production, RU2 Rural Landscape or RU3 Forestry. For these land types, *State Environmental Planning Policy (Koala Habitat Protection*) 2020 applies.

For all RU1, RU2 and RU3 zoned land outside of the Sydney Metropolitan Area and the Central Coast, Koala SEPP 2020 continues to apply. This is an interim measure while new

land management and private native forestry codes are developed in line with the NSW Government's announcement on 8 March 2021.

The principles of the Koala SEPP 2021 are to:

- Help reverse the decline of koala populations by ensuring koala habitat is properly considered during the development assessment process.

- Provide a process for councils to strategically manage koala habitat through the development of koala plans of management.

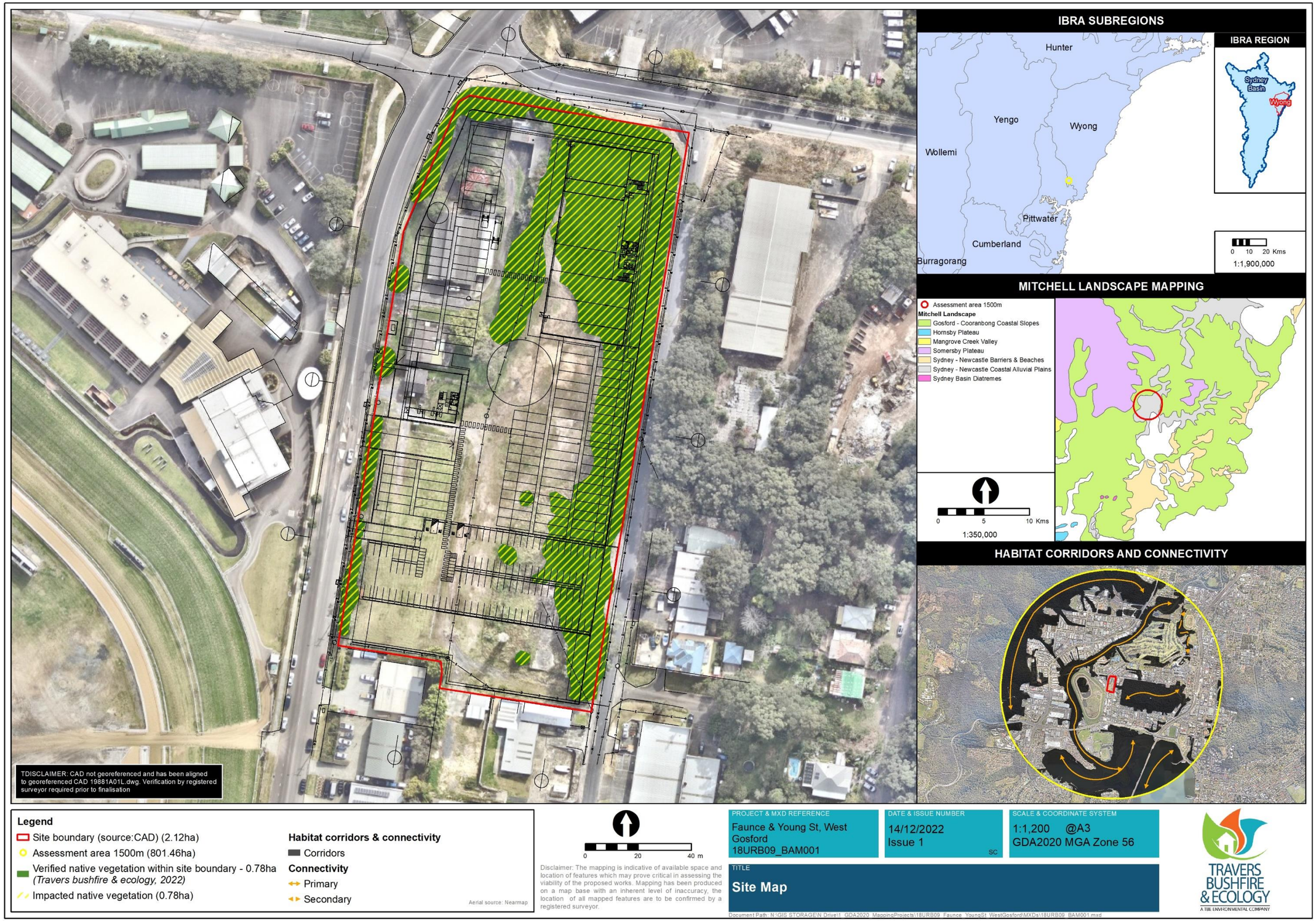

Figure 1-3 – Site map

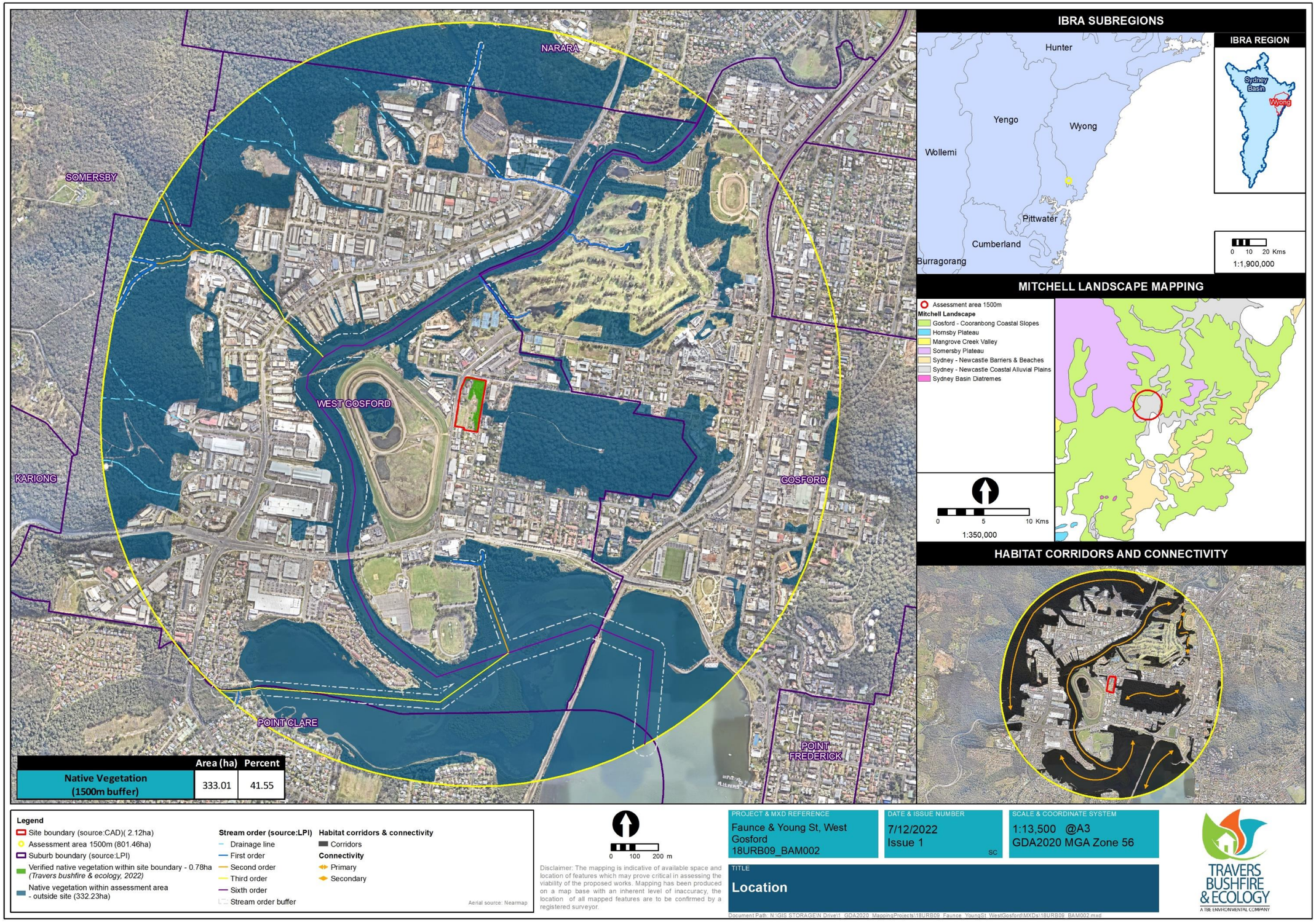

Figure 1-4 – Location map

2. SURVEY METHODOLOGY

2.1 Pre-survey information collation & resources

Documents reviewed:

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

- Supplied plans by DEM
- Bushfire Protection Assessment prepared by Travers bushfire & ecology

Technical resources utilised:

Survey guidelines

- 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)
- Species credit threatened bats and their habitats (DPIE 2018)
- Flora and Fauna Guidelines (Central Coast Council 2019)
- 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 – DPE tool for checking soil types
- DPE Planning Portal
- Mecone Mosaic
- Historical aerial photographs

Threatened species records

- BioNet database which holds data from a number of custodians (December 2022 to 10 km)
- EPBC Protected Matters Search Tool - DAWE (December 2022 to 10 km)

Vegetation mapping/resources:

- BioNet Vegetation Classification System
- DPE NSW vegetation mapping 2022

2.2 Field survey effort

Table 2-1 – 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	30 November 2022
Stratified sampling	4x BAM plots Opportunistic observations of flora species during all on-foot traverses of the development footprint.	30 November 2022 6 December 2022
Targeted searches	Targeted searches in known or potential habitats. Opportunistic searches during all on-foot traverses across the site.	30 November 2022

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

Veg zone no.	PCT	Condition	Area (ha)	Impact area (ha)	Minimum plots required	Plot sampled	Plot identifier	Plot size	Easting centroid	Northing centroid	Bearing
1	3230	Poor	0.51	0.51	1	2	Q1 Q3	40x10m / 100x10m	344653 344665	6300755 6300607	195 10
2	3230	Regrowth	0.22	0.22	1	1	Q2	20x20m / 50x20m	344671	6300747	195
3	4020	Poor	0.05	0.05	1	1	Q4	80x5m / 100x10m	344580	6300632	10

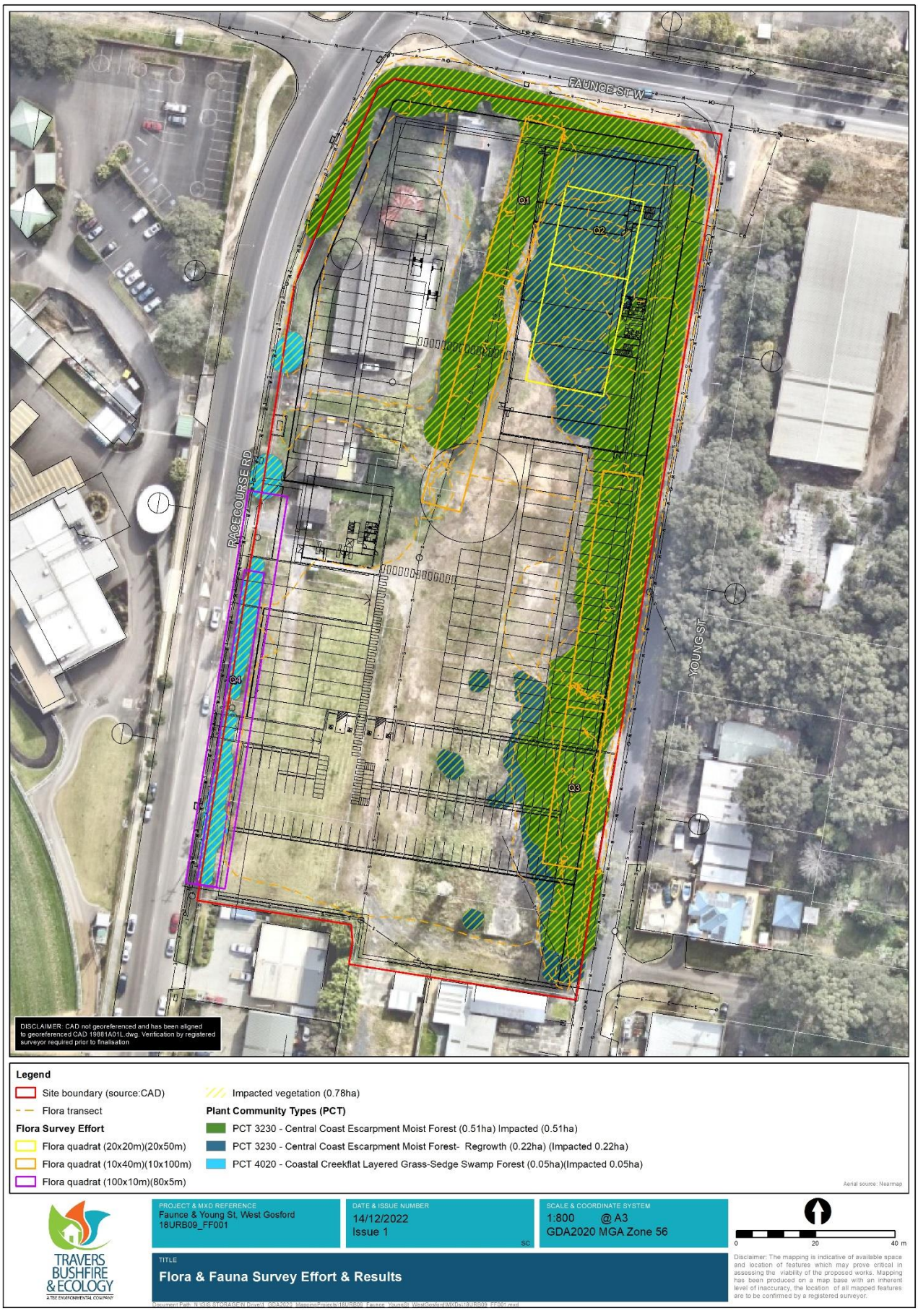

Figure 2-1 - Flora and fauna survey effort and results

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 Interim Biogeographic Regionalisation for Australia (IBRA) region and sub-region (Wyong) 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. Justification for inclusion or exclusion of each shortlisted PCT is provided in the following tables.

There were three (3) distinct zones on site. Some vegetation patches that were too small for plots or separation to a different zone were lumped with the larger patch.

Zone 1 best describes the vegetation around the north-west, northern and eastern perimeters of the site. The main canopy species are *Angophora floribunda, Glochidion ferdinandi, Banksia integrifolia* and *Eucalyptus pilularis.* This includes an area in the central-north with planted Melaleuca trees.

Zone 2 is a regrowth community. Topographically it sits on the lower edge of Zone 1. The narrow band along the south-east is very similar to Zone 1. The large patch in the north-east contains some elements of regrowth, however due to cut/fill in the past, *Casuarina glauca* is opportunistically becoming a dominant species. It still contains some elements of Zone 1 however, therefore we have kept the same PCT for both Zone 1 and 2.

Zone 3 is a narrow linear patch along Racecourse Road (south-west) 3-5m in width. The southern half is largely *Angophora floribunda* and *Glochidion ferdinandi.* The northern half is purely *Casuarina glauca. Casuarina glauca* usually sits lower in the landscape that *Angophora floribunda,* but that is not the case here. For that reason, we have not split this into a Swamp Oak Floodplain Forest community, and it's sited on a fill embankment so again, opportunistic. The *Casuarina glauca* has been lumped with the *Angophora floribunda* and *Glochidion ferdinandi* to form its own zone. Again, this area is already only 0.05 ha in total extent which makes it difficult to conduct a plot.

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

Quadrat 1 – All native species from plot put into the tool. Once the list was extracted, it was filtered to wet sclerophyll forests under formation, then all montane and south coast classes were removed. Those with the highest number of positive hits included the following list.

Table 3-1 – Shortlist of PCTs considered for Q1, 2 and 3

PCT	Formation	Class	Common name	No of matches	Justification
3145	Wet Sclerophyll Forests (Shrubby sub-formation)	North Coast Wet Sclerophyll Forests	Cumberland Bangalay x Blue Gum Riverflat Forest	8	Main canopy species are absent

PCT	Formation	Class	Common name	No of matches	Justification
3259	Wet Sclerophyll Forests (Grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	Sydney Coastal Shale-Sandstone Forest	8	Wrong geology
3230	**Wet Sclerophyll Forests (Grassy sub-formation)**	**Northern Hinterland Wet Sclerophyll Forests**	**Central Coast Escarpment Moist Forest**	**8**	**Multiple dominant species, correct IBRA subregion**
3250	Wet Sclerophyll Forests (Grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	Northern Foothills Blackbutt Grassy Forest	8	Limited dominant species present
3262	Wet Sclerophyll Forests (Grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	Sydney Turpentine Ironbark Forest	8	Main canopy species absent
3258	Wet Sclerophyll Forests (Grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	Sydney Basin Creekflat Blue Gum-Apple Forest	8	Relates to River-flat Eucalypt Forest. Not correct
3136	Wet Sclerophyll Forests (Shrubby sub-formation)	North Coast Wet Sclerophyll Forests	Blue Gum High Forest	7	Does not occur in Wyong IBRA subregion
3242	Wet Sclerophyll Forests (Grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	Lower North Ranges Turpentine Moist Forest	7	Limited dominant species present
3244	Wet Sclerophyll Forests (Grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	Lower North Spotted Gum-Mahogany-Ironbark Sheltered Forest	7	Main canopy species are absent
3249	Wet Sclerophyll Forests (Grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	Northern Bloodwood-Ironbark Moist Grassy Forest	6	Main canopy species are absent
3176	Wet Sclerophyll Forests (Shrubby sub-formation)	North Coast Wet Sclerophyll Forests	Sydney Enriched Sandstone Moist Forest	6	Not on sandstone
3137	Wet Sclerophyll Forests (Shrubby sub-formation)	North Coast Wet Sclerophyll Forests	Blue Mountains Enriched Blue Gum Moist Forest	6	Not in the Wyong IBRA subregion
3237	Wet Sclerophyll Forests (Grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	Hunter Range Blue Gum Gully Forest	6	Main canopy species are absent
3263	Wet Sclerophyll Forests (Grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests	Watagan Range Turpentine-Mahogany Grassy Forest	6	Main canopy species are absent

Quadrat 2 – The plot location covers the only area that was big enough to support a plot, however, is largely dominated by Swamp Oak due to previous cut/fill. There were limited native species in the plot making it difficult to run the tool in an accurate manner. Based off the smaller areas in the south-east of the site, it would be most appropriate to consider this as regrowth vegetation, a derivative of the adjoining PCT 3230.

Quadrat 3 - Higher number of native species and more dominant species of PCT 3230 were recorded in this plot.

Quadrat 4 – Bionet classification tool narrowed to the formation of Forested Wetlands. PCT 4020 was the best fit based on the presence of dominant on-site canopy, and widespread distribution locally of this PCT on similar landforms.

Table 3-2 – Shortlist of PCT's considered for Q4

PCT	Formation	Class	Common name	No of matches	Justification
4042	Forested Wetlands	Coastal Floodplain Wetlands	Lower North Riverflat Eucalypt-Paperbark Forest	11	Paperbarks absent from site and adjoining lands on floodplain
4021	Forested Wetlands	Coastal Floodplain Wetlands	Coastal Creekline Dry Shrubby Swamp Forest	10	Most dominant species are absent. No nearby remnants of this PCT
4058	Forested Wetlands	Coastal Floodplain Wetlands	Sydney Hinterland Red Gum Riverflat Forest	9	Not in the Wyong IBRA subregion
3983	Forested Wetlands	Coastal Swamp Forests	Central Coast Flats Mesic Swamp Forest	9	Usually occurs in sheltered floodplain gullies. Mesic elements absent
4020	**Forested Wetlands**	**Coastal Floodplain Wetlands**	**Coastal Creekflat Layered Grass-Sedge Swamp Forest**	**9**	**Local floodplain remnants on higher ground largely mapped as this PCT**
4044	Forested Wetlands	Coastal Floodplain Wetlands	Northern Creekflat Eucalypt-Paperbark Mesic Swamp Forest	9	Paperbark and mesic elements absent
4057	Forested Wetlands	Coastal Floodplain Wetlands	Sydney Creekflat Swamp Mahogany-Paperbark Forest	9	Not in the Wyong IBRA subregion

Table 3-3 – PCTs

Community	New Eastern NSW PCT equivalent	Location within site and condition	Canopy	Midstory	Ground layer	Area (ha)	Conservation status	
							BC Act	*EPBC*
PCT 1841 - Coastal enriched sandstone moist forest	PCT 3230 - Central Coast Escarpment Moist Forest	Northern and eastern perimeters Moderate, partly planted and regrowth	*Angophora floribunda. Eucalyptus pilularis, Glochidion ferdinandi, Banksia integrifolia*	*Acacia parramattensis, Pittosporum undulatum, Acacia longifolia, Commersonia fraseri, Kunzea ambigua*	*Dianella caerulea, Lomandra longifolia, Imperata cylindrica, Oplismenus aemulus, Dichelachne crinite, Kennedia rubicunda*	0.73	*nil*	*nil*
PCT 1718 – Swamp Mahogany – Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast	PCT 4020 – Central Creekflat Layered Grass-Sedge Swamp Forest	Along Racecourse Road, southern half. Poor	*Angophora floribunda, Casuarina glauca, Glochidion ferdinandi*		*Lomandra longifolia, Dianella caerulea, Imperata cylindrica*	0.05	*Swamp Sclerophyll Forest on Coastal Floodplains*	*Patch doesn't meet criteria for the equivalent community*

There is no great alignment for PCT 4020 against the former PCTs which are utilised in the BAM calculator. Although PCT 1718 is titled Swamp Mahogany – Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast, it does regularly contain the three (3) dominant trees species on site, *Angophora floribunda, Casuarina glauca* and *Glochidion ferdinandi.*

PCT 3230

Canopy – Angophora floribunda, Banksia integrifolia, Glochidion ferdinandi and *Eucalyptus pilularis* are the most dominant species. There is a planted patch of Melaleuca's in the central north, and *Casuarina glauca* is dominant is the north-east regrowth area. Alond the eastern site boundary, the canopy vegetation is mostly 12-20m in height. The canopy and mid-storey is heavily impacted in some patches by Camphor Laurel and Privets. Self seeded *Corymbia citriodora* are also very common on site.

Mid-storey – Pittosporum undulatum, Acacia longifolia, Acacia parramattensis, Acacia decurrens, Leucopogon juniperinus, Commersonia fraseri, Cupaniopsis anacardioides, Aacia ulicifolia and *Kunzea ambigua* are the more dominant shrubs and small trees observed. There are impacts from young Camphor Laurels, Privet and Lantana. In the central north area, Jasmine is prevalent in the mid-storey.

Ground layer – Imperata cylindrica, Dianella caerulea, Lomandra longifolia, Dichelachne crinita, Eragrostis brownill, Microlaena stipoides, Cynodon dactylon, Oplismenus aemulus, Kennedia rubicunda, Geitonoplesium cymosum and *Commelina cyanea* are the most common forbs, grasses, vines and other ground covers. There are moderate to heavy impacts by weeds throughout all patches.

Photo 3-1 – Planted Melaleuca trees with Camphor Laurel and Cheese Tree, Lantana and Jasmine in the central northern portion of the site

Photo 3-2 – Weedy edge of the Melaleuca planted area

Photo 3-3 – North-western corner of site

Photo 3-4 – Vegetation along Young Street

Photo 3-5 – Understorey vegetation along Plot 3

Photo 3-6 – Regrowth vegetation near the south-east corner of the site

Photo 3-7 – PCT 3230 adjacent to Plot 3

Photo 3-8 – Casuarina dominated regrowth near Plot 2

Photo 3-9 – Southern portion of PCT 4020 along Racecourse Road

Photo 3-10 – Northern portion of PCT 4020 along Racecourse Road

3.1.2 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.

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

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.

Table 3-4 – Current vegetation integrity score

Vegetation zone name	Area (ha)	Composition condition score	Structure condition score	Function condition score	Current vegetation integrity score
1841 / 3230 poor	0.51	20.4	24.2	38.2	26.6
1841 / 3230 regrowth	0.22	7.7	7.8	18	10.2
1718 / 4020 poor	0.05	34.5	34.3	48	38.4

The future vegetation integrity score is measured based on what the impact proposed is. Approximately 80% of the vegetation will be fully removed, with the remaining being impacted by APZs and tree removed due to impacts on tree protection zones from cut and fill operations. As such, whilst some vegetation will remain on the periphery of the site, it is difficult to accurately determine the proportion of canopy, mid-storey and ground layer that will not be affected, therefore we will assume a worst-case scenario of full vegetation removal.

The future vegetation integrity score for all zones shall be set to zero (0).

3.2 Fauna results

3.2.1 Fauna habitat observations

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

Table 3-5 – Observed fauna habitat

Topography				
Flat ✓	Gentle ✓	Moderate ✓	Steep ✓ for very short runs	Drop-offs
Vegetation structure				
Closed Forest	Open Forest ✓	Woodland	Heath	Grassland ✓
Disturbance history				
Fire	Under-scrubbing	Cut and fill works ✓		
Tree clearing / clearing ✓	Grazing	Existing development ✓		
Soil landscape				
DEPTH:	Deep ✓	Moderate ✓	Shallow	Skeletal
TYPE:	Clay ✓	Loam ✓	Sand	Organic
VALUE:	Surface foraging ✓	Sub-surface foraging ✓	Denning/burrowing ✓	

Topography				
WATER RETENTION:	Well Drained ✓	Damp / Moist	Waterlogged	Swamp / Soak ✓ Soaks present after heavy rains

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 ✓	Angophoras ✓	
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:	>20 cm diam.	>15 cm diam.	>9 cm diam.		
	<9 cm diam.	>8 m high	>9 m high		
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 / Grassland ✓	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 ✓	

4. BIODIVERSITY ASSESSMENT

4.1 Previous surveys and mapping reviewed

The NSW vegetation types SEED map was reviewed to investigate the local vegetation mapping and to compare on site results with determining the 'best fit' vegetation types on site. Native vegetation is not mapped on site (Figure 4-1).

Central Coast Council's online vegetation mapping was also consulted (Figure 4-2). Again, native vegetation is not mapped on site.

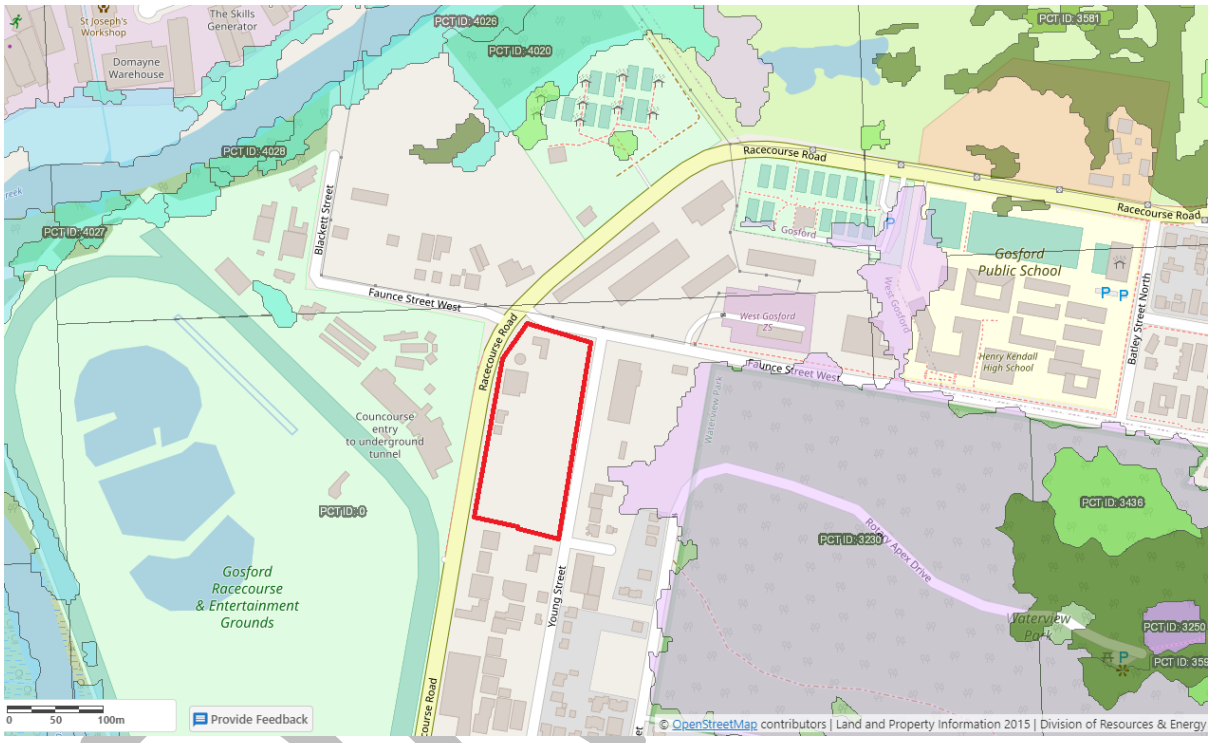

Figure 4-1 – NSW vegetation types (DPE)

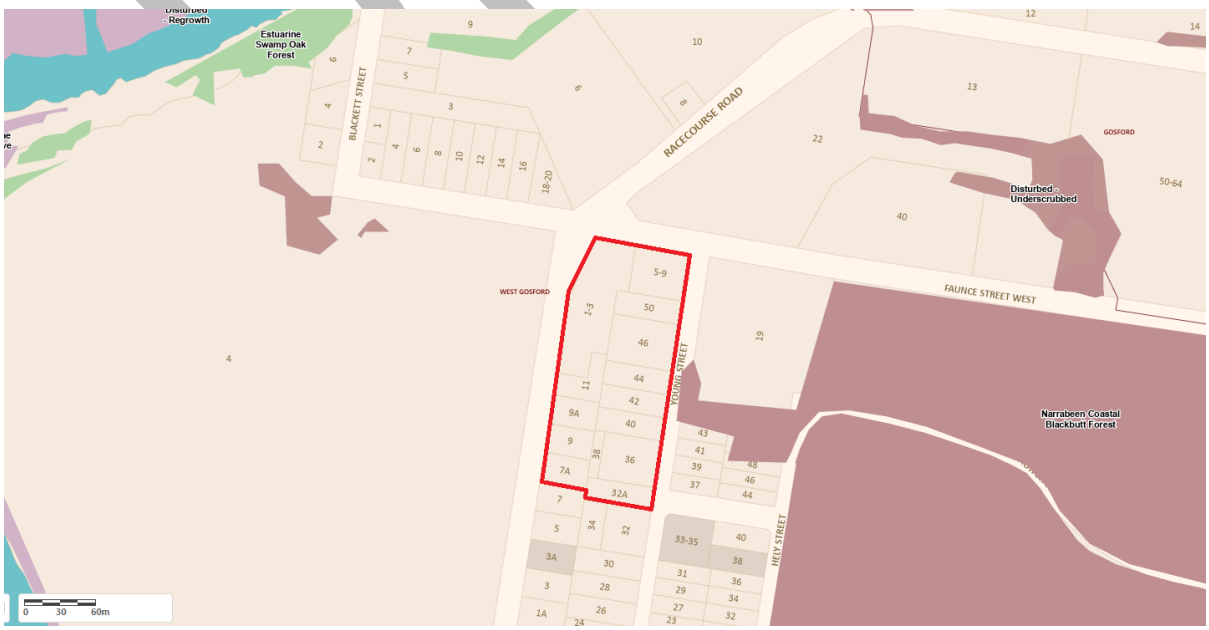

Figure 4-2 – Central Coast Council vegetation mapping

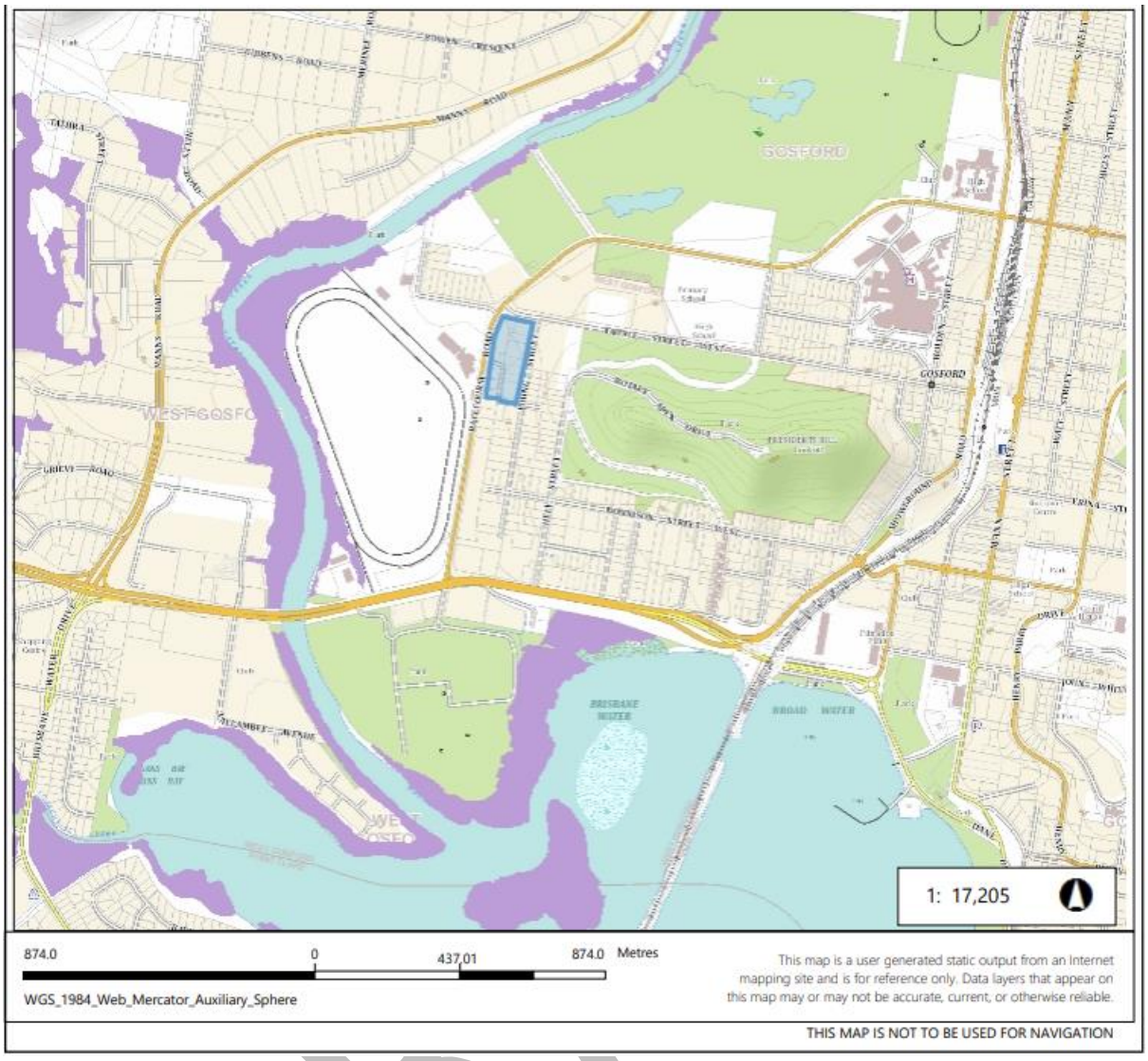

Figure 4-3 – Biodiversity values mapping (DPE) of the local area (in purple)

4.2 Biodiversity credit assessment

Exclusions based on habitat features and distributional constraints:

Exclusion of species from consideration as candidate species follows Section 5.2 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.

The new PCT nomenclature is not available to be run in the BAM calculator yet. All previous PCTs need to be used. As such, PCT 3230 is interchanged with PCT 1841, and PCT 4020 is interchanged with PCT 1718.

(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 4-1 – Ecosystem credit species (fauna)

Species	Associated PCT	Habitat constraint (Bionet - Dec 2022)	Can species be ruled out on habitat constraint	Confirmed predicted species
Regent Honeyeater (foraging)	all			yes
Dusky Woodswallow	1841			yes
Gang-gang Cockatoo (foraging)	1841			yes
Glossy Black-Cockatoo (foraging)	1841	Allocasuarina or Casuarina species	no	yes
Varied Sittella	all			yes
Spotted-tailed Quoll	all			yes
Eastern False Pipistrelle	all			yes
Little Lorikeet	all			yes
White-bellied Sea-Eagle (foraging)	1718	Waterbodies or within 1km of a waterbody or coastline	no	yes
Little Eagle (foraging)	all			yes
White-throated Needletail	all			yes
Black Bittern	1718	Waterbodies or within 40m of a waterbody	yes	no
Eastern Coastal Free-tailed Bat	all			yes
Little Bent-winged Bat (foraging)	all			yes
Large Bent-winged Bat (foraging)	all			yes
Barking Owl (foraging)	all			yes
Powerful Owl (foraging)	all			yes
Golden-tipped Bat	1718			yes
Eastern Chestnut Mouse	1718			yes
Grey-headed Flying-fox (foraging)	all			yes
Rose-crowned Fruit-Dove	1841			yes
Superb Fruit-Dove	1841			yes

Species	Associated PCT	Habitat constraint (Bionet - Dec 2022)	Can species be ruled out on habitat constraint	Confirmed predicted species
Yellow-bellied Sheathtail Bat	all			yes
Masked Owl (foraging)	1841			yes
Rosenbergs Goanna	1841			yes

The only species that can be ruled out on habitat constraints is the Black Bittern as there are no waterbodies on site or within 40mn of the site. All other species have been unfiltered and left in the BAM calculator.

(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:

Species	Associated PCT	Habitat constraint (Bionet - Dec 2022)	Can species be ruled out on habitat constraint	Is the vegetation too degraded	Is the species vagrant	Confirmed candidate species
Regent Honeyeater (breeding)		Important habitat map	yes			no
Large-eared Pied Bat		Within 2km of rock areas, old mines or tunnels	no			yes
Corunastylis sp. Charmhaven				yes		no
Genoplesium insigne				yes		no
Swift Parrot (breeding)		Important habitat map	yes			no
Little Bent-winged Bat (breeding)		Cave, tunnel, mine or culverts	yes			no
Large Bent-winged Bat (breeding)		Cave, tunnel, mine or culverts	yes			no
Stuttering Frog			yes			no
Giant Dragonfly		Within 500m of swamps	no			yes
Brush-tailed Rock-wallaby		Within 1km of rocky areas	no	yes – site closed off by fencing		no
Rhodamnia rubescens						yes
Rhodomyrtus psidiodes						yes
Thelymitra adorata				yes		no

For the threatened flora species listed above, there are no geographic constraints listed in the BAM calculator. Species may be required for survey if they occur within the IBRA subregion. For the Corunastylis, Genoplesium and Thelymitra, these all occur in the northern half of the Wyong IBRA subregion and former Wyong LGA.

1. Corunastylis sp. Charmhaven – The distribution, habitat and ecology from the threatened species profile are below.

Corunastylis sp. Charmhaven (NSW896673) is currently only known from the Wyong Shire of NSW where it is restricted to a few locations in the Charmhaven, Warnervale and Tooheys Road (Bushells Ridge) areas.

It occurs within low woodland to heathland with a shrubby understorey and ground layer. Dominants include Black She-oak (*Allocasuarina littoralis*), Prickly Tea-tree (*Leptospermum juniperinum*), Prickly-leaved Paperbark (*Melaleuca nodosa*), Narrow-leaved Bottlebrush (*Callistemon linearis*) and Zig-zag Bog-rush (*Schoenus brevifolius*).

The site is located more than 20 km south of its known distribution and the associated species listed under habitat and ecology are all absent. For the BAM calculator, the 'habitat degraded' box has been ticked as it is heavily impacted, and Council would recognise that its limited distribution and preferred habitat type in the former Gosford LGA is absent.

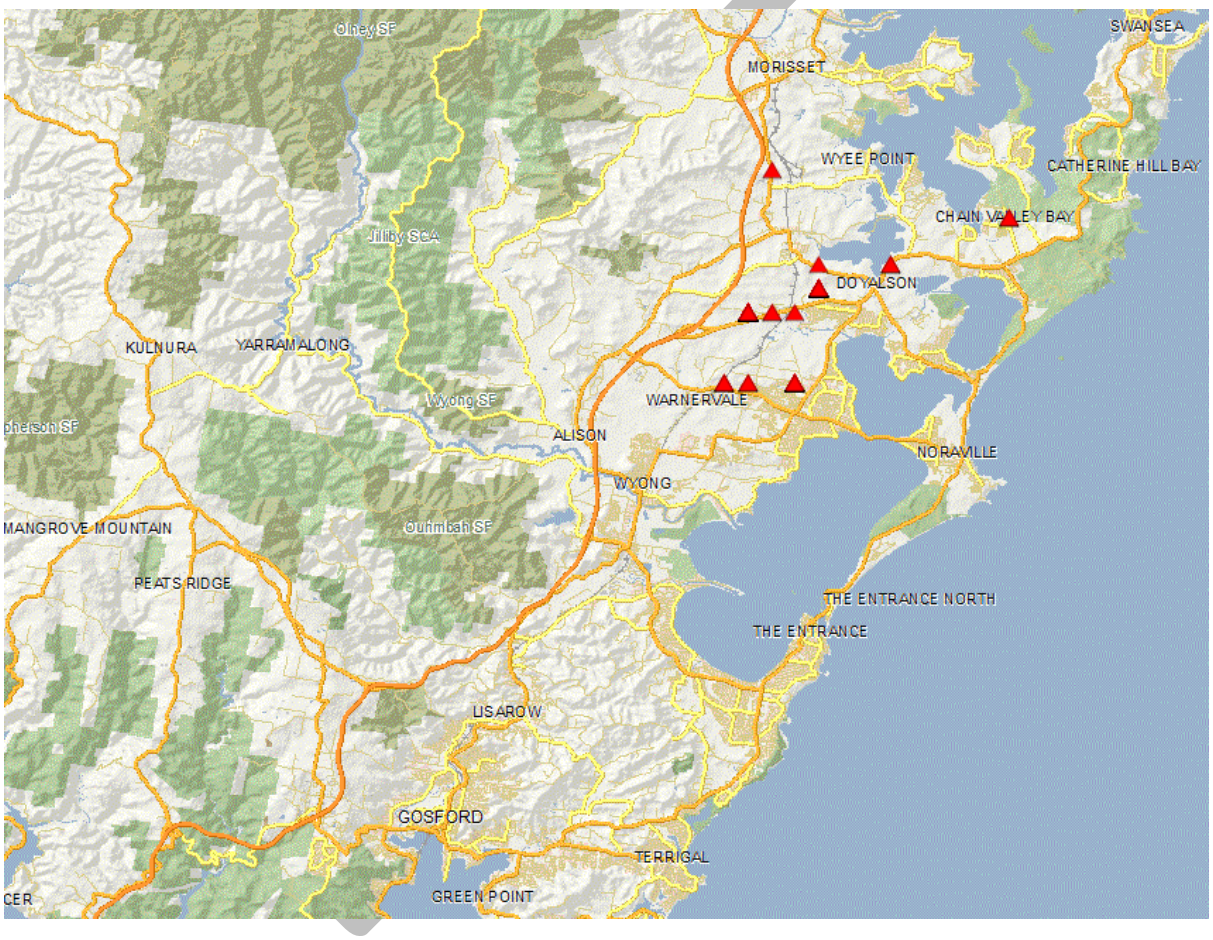

Figure 4-4 – Bionet records for Corunastylis sp. Charmhaven

2. Genoplesium insigne – Genoplesium insignis is known only from three localities between Charmhaven and Wyong. It grows in patches of *Themeda australis* amongst shrubs and sedges in heathland and forest (Jones 2001).

The site is located more than 20 km south of its known distribution. *Themeda grassland* patches were only observed in the far south-east corner of the site, less than 2m^2 in total. For the BAM calculator, the 'habitat degraded' box has been ticked as it is heavily impacted, and Council would recognise that its limited distribution and preferred habitat type in the former Gosford LGA is absent.

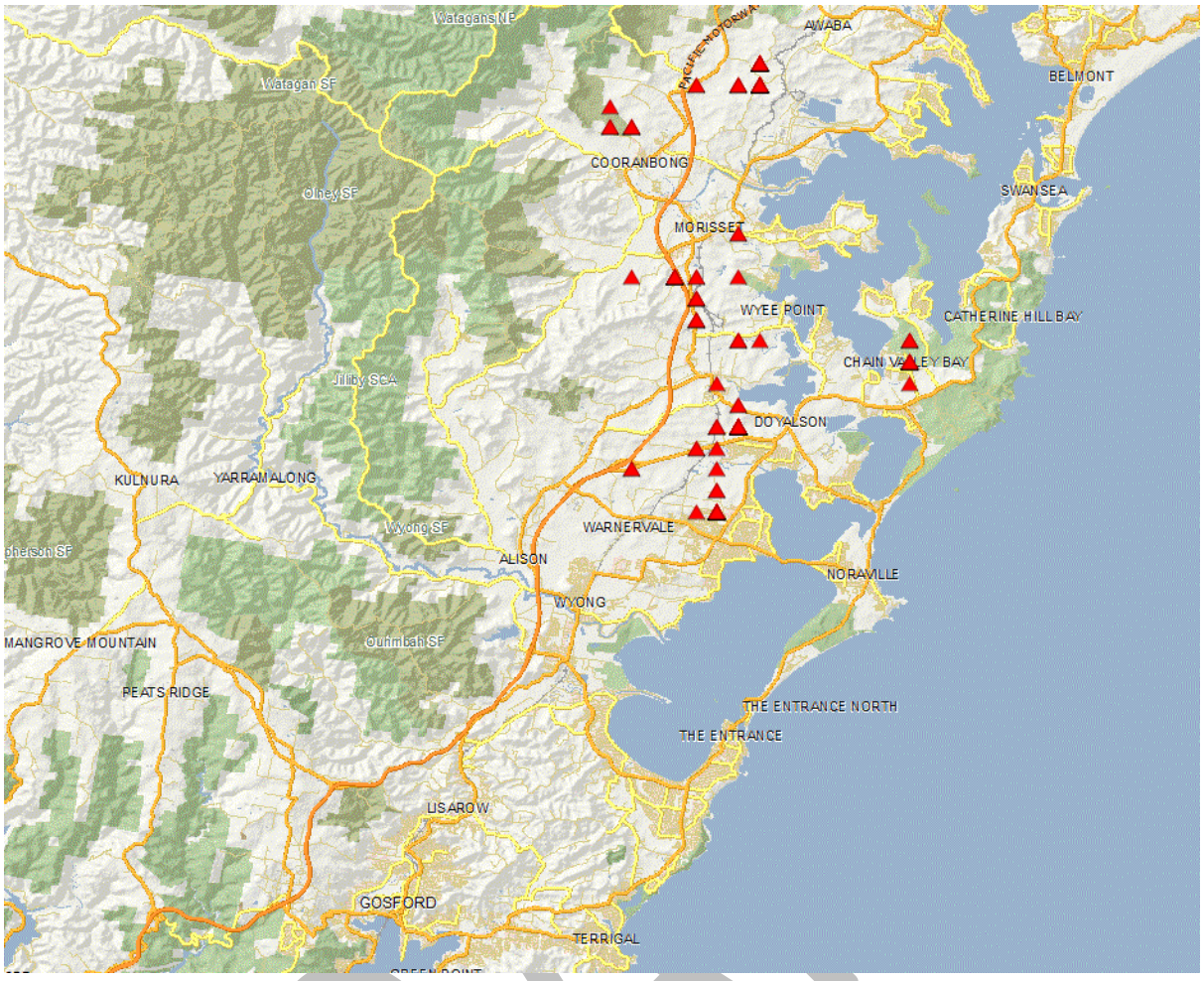

Figure 4-5 – Bionet records for Genoplesium insigne

3. ***Thelymitra adorata*** – All records occur north of Wyong in the former Wyong LGA, and outlier records near Norah Head. There is literature saying the species occurs in lower Lake Macquarie although the Bionet records don't show this. It is quite possible for the species to occur around the Wyee area given there are similar habitats of Spotted Gum Forest with a Melaleuca nodosa understorey. There are no records within the former Gosford LGA and whilst specimens readily occur in impacted areas, the 'habitat degraded' tick box has been used in the BAM calculator to rule out the species due to grounds on site being contoured.

The habitat on site is not typical of the usual ground layer associated with the species.

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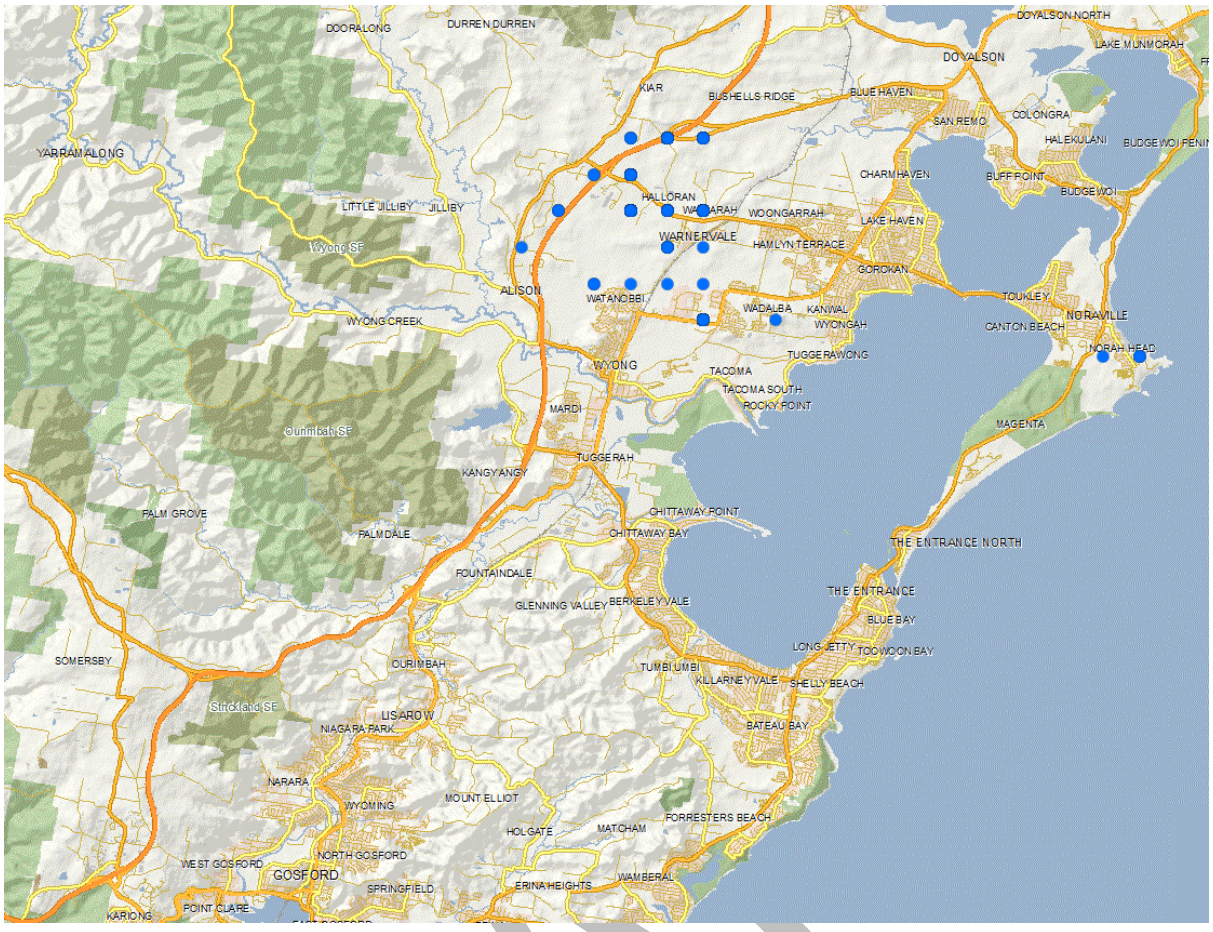

Figure 4-6 – Bionet records for Thelymita adorata

Swift Parrot and Regent Honeyeater (breeding) – Neither species are mapped on site by the important habitat maps. No further assessment is required.

Brush-tailed Rock-wallaby – There may be suitable habitat locally due to steep lands with rock outcrops located to the east on Presidents Hill, however there are no known records at this location which is rather isolated for ground-dwelling mammals. The site itself is fenced and excludes itself as being potential habitat.

Stuttering Frog – There are no riparian habitats present on site. The nearest waterbody is located 250 m to the west within the racecourse. There would be significant barriers to movement of the species from this waterbody to the site, being physical barries on the racecourse, buildings, Racecourse Road, and the lack of any vegetated habitat between the wetland and the site. For these reasons in the BAM calculator, 'habitat degraded' has been selected. No further assessment is required.

The remaining species, Giant Dragonfly, Large-eared Pied Bat, *Rhodamnia rubescens* and *Rhodomyrtus psidioides* require further consideration.

Survey for *Rhodamnia rubescens* and *Rhodomyrtus psidioides* can be undertaken during any month. The flora and fauna survey effort and results demonstrates the location of where the flora survey was undertaken, as recorded by a hand-held GPS unit. There are no large gaps where survey is absent, and the arborist report confirms no larger specimens present on site. In the BAM calculator, these two (2) species can be marked as absent based on adequate survey.

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Large-eared Pied Bat and Giant Dragonfly – The habitat attributes for both species are based on buffers to certain features which include the Busways land, and they cannot be ruled out. Both species will be assessed further as these are SAII entities.

4.3 State Environmental Planning Policy (Biodiversity and Conservation) 2021 – Koala Habitat Protection

Chapter 4 of State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Koala Habitat Protection) applies to land within LGAs listed under Schedule 2 of the Policy. As the study area falls under the Campbelltown LGA, it is considered that Koala SEPP 2021 applies to this development proposal.

Land to which this policy applies in accordance with Section 4.4 of the SEPP 2021 is as follows:

(1) This Chapter applies to each local government area listed in Schedule 2.
(2) The whole of each local government area is—
(a) in the koala management area specified in Schedule 2 opposite the local government area, or
(b) if more than 1 koala management area is specified, in each of those koala management areas.
(3) Despite subsection (1), this Chapter does not apply to—
(a) land dedicated or reserved under the National Parks and Wildlife Act 1974, or acquired under Part 11 of that Act, or
(b) land dedicated under the Forestry Act 2012 as a State forest or a flora reserve, or
(c) land on which biodiversity certification has been conferred, and is in force, under Part 8 of the Biodiversity Conservation Act 2016, or
*(d) land in the following land use zones, or an equivalent land use zone, unless the zone is in a local government area marked with an * in Schedule 2—*
(i) Zone RU1 Primary Production,
(ii) Zone RU2 Rural Landscape,
(iii) Zone RU3 Forestry.

The land is listed in Schedule 2 (Central Coast LGA) and is zoned B6 Enterprise Corridor, therefore BC SEPP 2021 applies. Please Note that SEPP 2020 applies in lands zoned as RU1, RU2 and RU3 in accordance with SEPP 2020.

There is currently no approved Koala Plan of Management (KPoM) for the LGA that this site is located in. Therefore, before council may grant consent to a development application for consent to carry out development on the land, the council must assess whether the development is likely to have any impact on Koalas or Koala habitat.

If the council is satisfied that the development is likely to have low or no impact on koalas or Koala habitat, the council may grant consent to the development application. If the council is satisfied that the development is likely to have a higher level of impact on Koalas or Koala habitat, the council must, in deciding whether to grant consent to the development application, take into account a Koala assessment report for the development.

As of December 2021, the nearest Koala record to the study area was a camera trapping record in 2018 approximately 2.17 km to the west of site. Within a 10 km radius, Koala

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populations are sporadic, with the highest concentration of records within Yengo National Park.

Under Schedule 2 of SEPP 2021, the study site falls within the Central Coast Koala Management Area. Two (2) tree species were recorded in the study area which are considered to be Koala use tree species within this Management Area under Schedule 2 of Koala SEPP 2021. These species are *Casuarina glauca* and *Eucalyptus pilularis.*

It is considered that this study area does not comprise Core Koala Habitat. Due to the lack of near and recent records, historical fragmentation of the site, barriers including fencing, roads and infrastructure it is considered highly unlikely that Koala will utilise this study site.

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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 – 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	

Table 5-2 – 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

Streamlined assessment module	Criteria for application	Does the impacted vegetation meet this criterion?	Can this module be applied?
	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	
	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 5-1 (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**: future minimum lot size is <1 ha, so clearing threshold of ≤1 ha applies. The site contains a total 0.78 ha native vegetation, so this threshold cannot be exceeded, and the criterion is met.	**Yes**
Planted native vegetation	**Is any planted native vegetation impacted?**	Yes, however the planted native vegetation occurs amongst other native vegetation which has been included as a native PCT.	no

5.1.1 Streamlined assessment module - small area

Table 5-2 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.

5.2 Potential ecological impacts

5.2.1 Prescribed impacts

The prescribed impacts are listed and described below

Table 5-3 – 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	Planted non-native trees, mostly Melaleucas, and self-seeded Corymbia citriodora Existing dwellings, garage/sheds and horse stables	Grey-headed Flying Fox	Removal of minor flowering, fruiting and seeding resources	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 and 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. Foraging behaviour for each species is stated in species profiles (DPE) 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	yes	The site occurs on the tip of a	Vegetation on site is	Removal of local foraging habitat	The proposal will not remove a core component of the local

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
		linked corridor through Presidents Hill, Gosford Golf Course then to nearby riparian areas	segregated because of fencing, so likely to be utilised by highly mobile threatened fauna, e.g., Birds and bats.	and potential removal of roosting perches	habitat connectivity, nor isolate or fragment local connectivity. The vegetation on site is poor quality, largely in a broader state of regeneration and moderately to severely impacted by high threat exotics. Connectivity to the site has been hindered by the erection of a fence around the full boundary of the site.
Waterbodies, water quality and hydrological processes	no	The nearest waterbody is approximately 250 m to the west, within the racecourse.	The Giant Dragonfly is reliant upon this feature, attracting a 500 m buffer to the waterbody	Giant Dragonfly is a potentially SAII entity. The site is unlikely to provide potential habitat due to their being no vegetation connectivity between the waterbody and the site.	Despite lack of potential habitat on site, the proponent will still need to pay for offset credits.
Wind farm development	no	n/a	n/a	n/a	n/a
Vehicle strikes	yes	Internal roads	Small terrestrial mammals and frogs as well as birds in flight.	Collision leading to injury or death	The proposal will increase internal vehicle traffic, which could potentially lead to an increase in vehicle collisions with native fauna. The traffic entering the site will be at low speeds, coming into a parking area, therefore collisions are very unlikely for most species.

5.2.2 Direct impacts

Pictorially, the impacts on trees and imposed APZ are shown on the figures below.

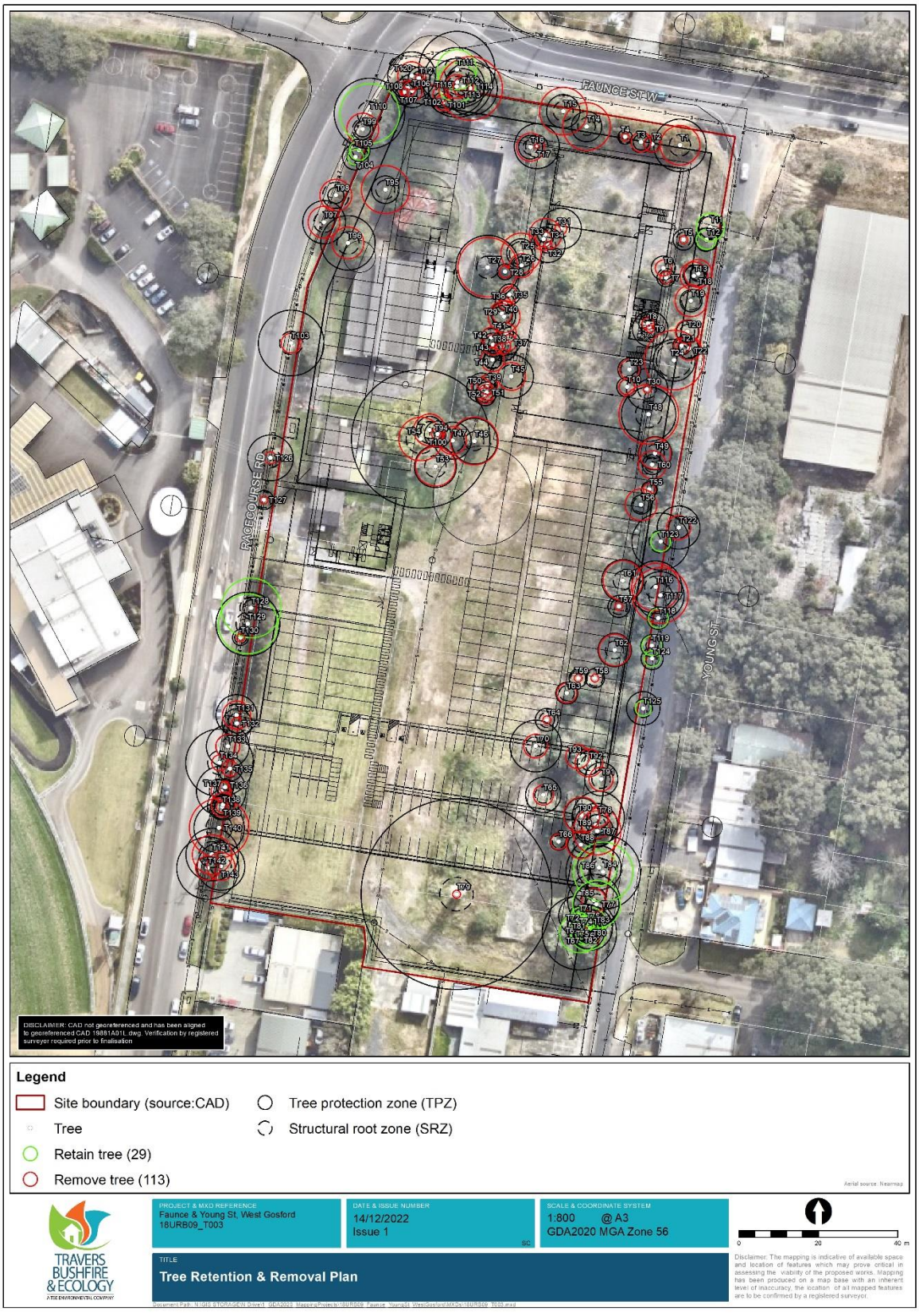

Figure 5-1 – Proposed tree impacts

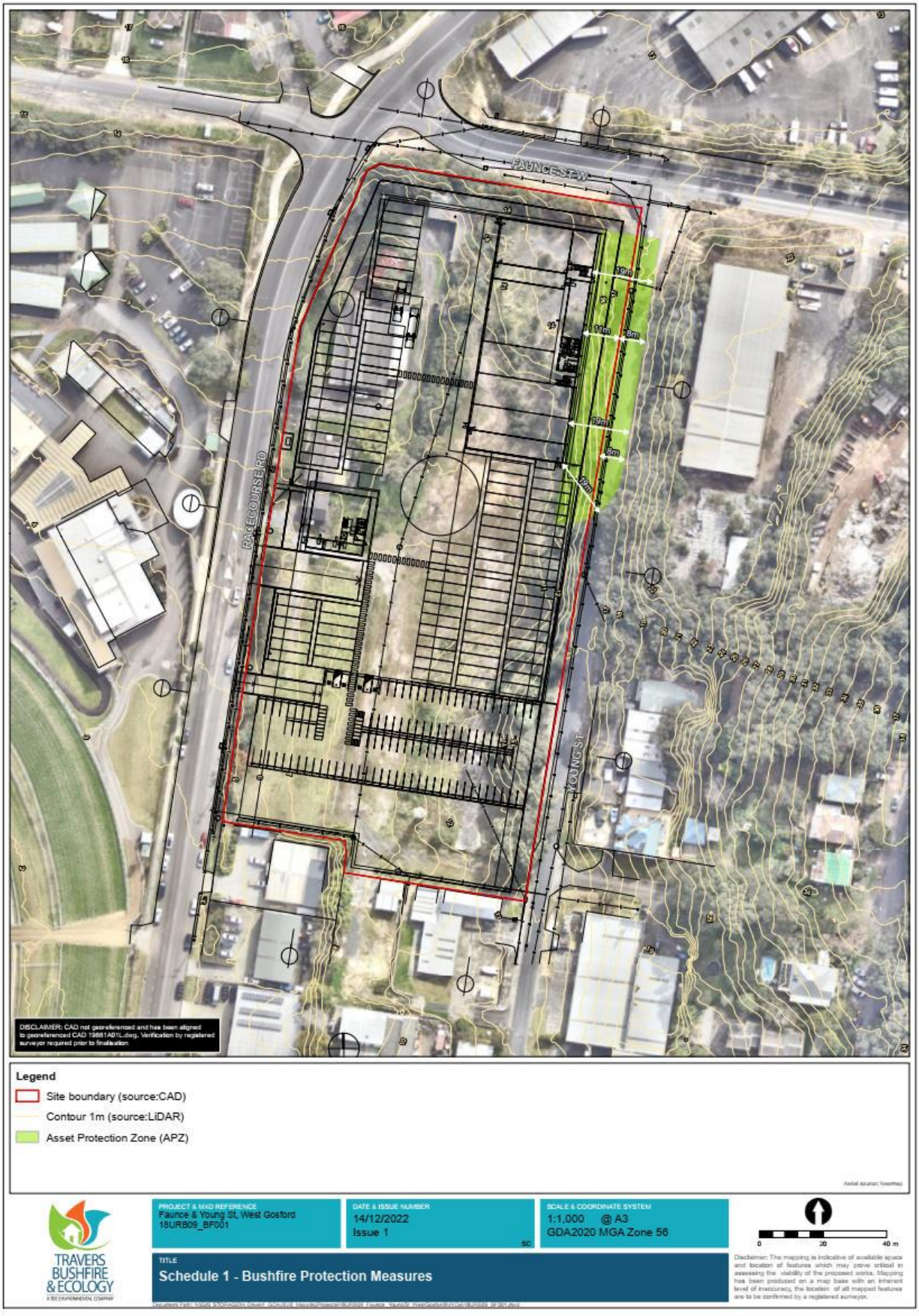

Figure 5-2 - Proposed asset protection zone

Table 5-4 – Direct impact assessment

Direct impact	*BC Act* status	SAII entity	Project phase/timing of impact	Extent (ha, number of individuals)
Removal or impacts to PCT 1841 (PCT 3230)	No	No	Demolition / clearing	0.73 ha
Removal or impacts to PCT 1718 (PCT 4020)	Yes	No	Demolition / clearing	0.05 ha
Assumed impacts to ecosystem credit species, as well as Large-eared Pied Bat and Giant Dragonfly	Yes	Yes	Demolition / clearing	0.78 ha
Removal of ~80% of assessed trees	No	No	Demolition / clearing	113 trees to be removed, subject to final design and arborist sign off
Application of an APZ to the north-east corner of site	No	No	Post construction prior to occupation then ongoing maintenance	Very few trees to be retained, mid-storey thinned, and ground layer maintained

The proposal will have some degree of affectation to all vegetation on site and as a consequence for the BAM calculations, all vegetation has been considered as having a VI score of 0 post development. Notwithstanding this, there is the intent of creating a 10 m landscape buffer around much of the periphery of the site which are the areas that contain the most native vegetation.

The direct impacts on native vegetation include full removal for all vegetation outside of the 10 m buffer. The secondary direct impacts on native vegetation will include the implementation of a small APZ to the main building along the northern portion of Young Street, therefore vegetation will require thinning to comply with APZ standards.

The tertiary direct impacts on native vegetation will be caused from cut and fill requirements that impede on the trees tree protection zone or structural root zone that occur within the 10 m landscape buffer. Many of the trees are exotic such as Camphor Laurel, however there are some older *Angophora floribunda, Eucalyptus pilularis, Glochidion ferdinandi* and seeded *Corymbia citriodora* (in particular) that will require removal due to the intended cut and fill.

The siting of works will largely be on cleared or young regrowth vegetation. The central north piece of PCT 3230 where Plot 1 was undertaken is largely planted with Melaleuca spp., although there are some other native canopy species, largely *Glochidion ferdinandi* that will be impacted. This area is severely impacted by high threat exotic species (Camphor Laurel, Privets, Asparagus Fern, Mothvine and Lantana in particular) that impede natural regeneration.

5.2.3 Indirect impacts

Table 5-5 – 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 landscape buffer on the site's perimeter.	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. This will be vegetation along Racecourse Road, southern end, PCT 1718 / 4020.	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.
Reduced inter-site connectivity	Small bird species, small arboreal mammals	Once	Lifetime of development	Clearing, construction	• Reduced cross-site movements by local and transient fauna

The site is bound by roads to three (3) sides, and existing development on the fourth side to the immediate south. The roads and existing development will provide a buffer to indirect impacts on adjacent properties in the following manner:

- Creating a gap so exotic vegetation on site has less likelihood of spreading by seed to adjoining properties
- Hydrological processes such as runoff will go directly to kerbside guttering, rather than overland flow onto adjoining properties

5.2.4 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 DPE 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:

- Large-eared Pied Bat
- Giant Dragonfly
- *Rhodamnia rubescens*
- *Rhodomyrtus psidioides*

All other SAII entities were considered in Section 4.2 (b) under Species Credit Species.

The *Rhodamnia* and *Rhodomyrtus* were able to be ruled out as target searches were conducted and they were not present. Survey can be conducted during any month, unlike some cryptic orchids that require survey during peak flowering periods in a limited timeframe.

The Large-eared Pied Bat and Giant Dragonfly could not be ruled out on habitat constraints, therefore an SAII assessment must be undertaken in accordance with Section 9.1.2 of the BAM (2020).

Large-eared Pied Bat

The Large-eared Pied Bat is species mapping polygon for breeding habitat must use high resolution aerial imagery and topographic maps to identify features on the subject land (caves, scarps, cliffs etc). Polygon must be at least 100 m wide (or 50 m radius for point locations such as caves) with the breeding habitat features (may be multiple) as the centroid (see Threatened Bat Survey Guide). All breeding habitat on or within 100 m of the subject land and the area immediately surrounding the feature must be identified.

All habitat on the subject land should also be mapped if present. Use high resolution aerial imagery and topographic maps to identify potential roost habitat features on the subject land within 2 km caves, scarps, cliffs etc. Species polygon boundary should align with PCTs on the subject land to which the species is associated that are within 2 km of identified potential roost habitat features.

There are no potential breeding habitat features within 50 m of the site. Any potential breeding habitat features would be located east of Hely Street which is just over 100 m from the eastern boundary of the site. No breeding polygons need to be mapped.

As no fauna habitat has been conducted, no potential roost habitat features could be ruled out and thus all on-site mapped vegetation forms the polygon as drawn on Figure 5-3.

Giant Dragonfly

The key habitat feature for this species is land within 500 m of a swamp. The waterbodies within the racecourse 250 m west of the site may be classed as potential habitat for the species. Creating a buffer to this feature of 500 m encompasses all of the site, and all mapped vegetation forms the polygon as drawn on Figure 5-3.

The species live in permanent swamps and bogs with some free water and open vegetation. Adults spent most of the time settled on low vegetation on or adjacent to the swamp, hunting for flying insects over the swamp and along its margins.

Females lay eggs into moss, under other soft ground layer vegetation, and into moist litter and humic soils, often associated with groundwater seepage areas within appropriate swamp and bog habitats. The species does not utilise areas of standing water wetland, although it may utilise suitable boggy areas adjacent to open water wetlands.

The lack of any vegetation in the 250 m stretch between the wetlands on the racecourse and the site would limit the likelihood of occurrence, as it would more likely stick to fringing macrophyte vegetation, or the riparian vegetation of Narara Creek less than 100 m away if it were to occur in this locality. Additionally, the description of where females lay eggs in the previous paragraph, that type of habitat is completely absent from the site. As such, the core habitat of importance for the species will not be impacted.

Vegetation communities

There are no SAII communities being impacted by the proposal.

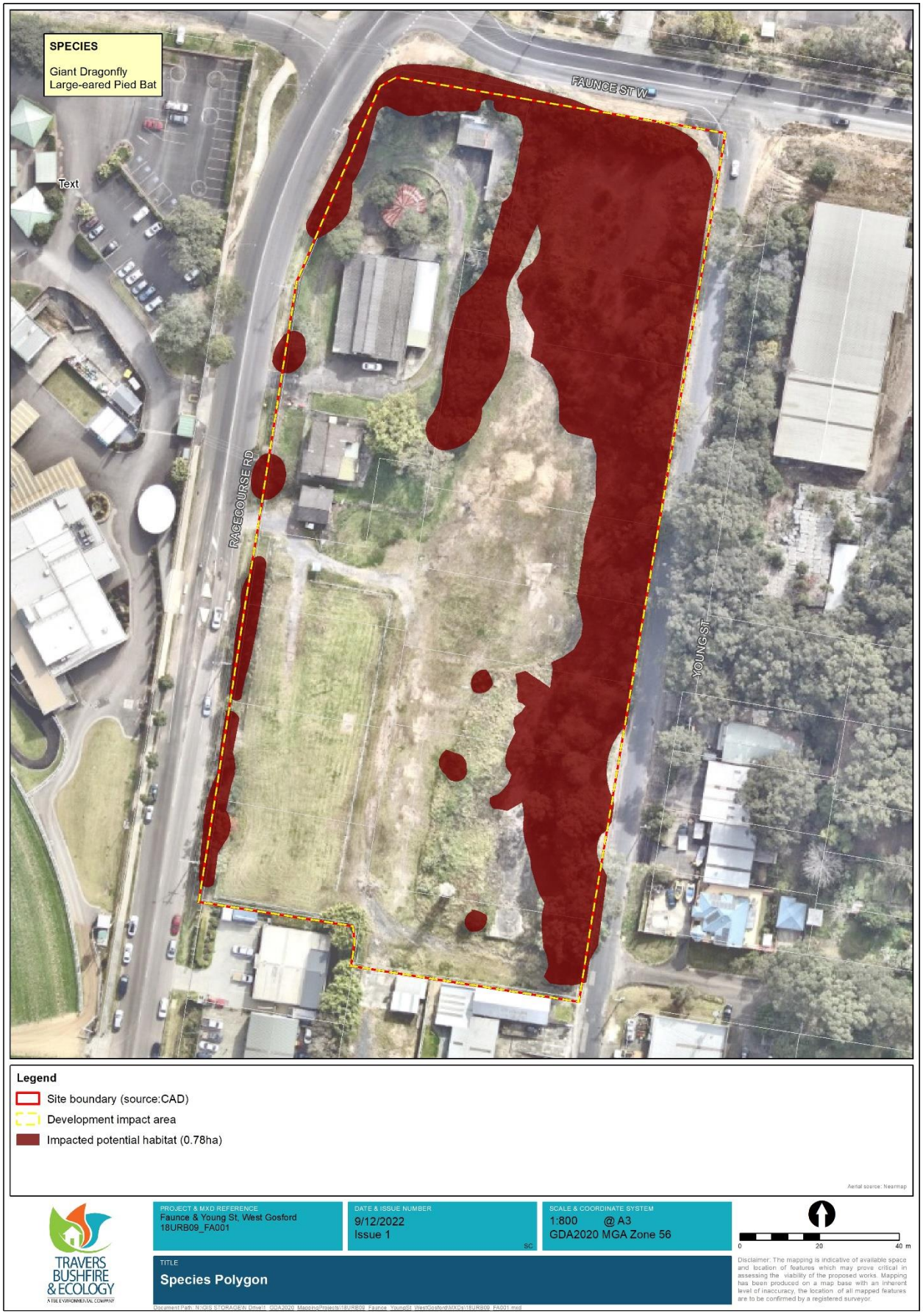

Figure 5-3 – Species polygons for Large-eared Pied Bat and Giant Dragonfly

5.3 Avoidance and minimisation actions

Avoidance measures

Avoidance actions considered by the proposal largely relate to the proposed 10 m landscape buffer to go around the perimeter of the site where trees are to be kept if safe to do so, and not impacted by cut or fill proposals. There will be encroachment into the buffer to create the require embankments, therefore requiring removal of mid-storey and ground layer vegetation. It is intended however, that once the batter is in place, it will be stabilised through native landscape planting.

Retention of trees will be difficult due to the slope and cut / fill requirement as slopes need to be minimal for the intended site use. Approximately 20% of the surveyed trees will be avoided.

The proposal avoids impacts on mapped biodiversity values land and areas of outstanding biodiversity value (AOBV).

The proposal will take advantage of already cleared, or highly disturbed land with vegetation of a low VI score.

The development is not located with any riparian area or near to wetland environments.

The site access utilises the approximate location of existing accesses off Racecourse Road, so will not need to impact vegetation along Young Street or Faunce Street West for additional site access and egress.

Minimisation measures

Landscaping is proposed on the periphery of the site to assist in maintaining a 10 m buffer to the development. Landscaping is to utilise locally occurring native species. Trees over 10 m tall should be avoided under the power lines on Racecourse Road. Currently, the existing vegetation in this location has been managed and the trees are of poor vigour as a result of ongoing pruning requirements. On the lower contours of the site along Racecourse Road (where PCT 4020 occurs), species of Swamp Sclerophyll Forest on Coastal Floodplains should be utilised. Any internal landscaping should incorporate some local native species into the landscape mix as additional foraging resources, and to minimise non-indigenous species from become garden escapes to nearby bushland.

In the location of the APZ along Young Street, most of the mature trees will be removed as they occur in the development footprint of the building, will have their TPZ impacted by >10% or are weed species, e.g., Camphor Laurel. No further tree removal is likely to be required for the APZ. Thinning of any mid-storey species, and management of the ground layer of vegetation should primarily focus on removal of exotic vegetation in the first instance to minimise clearing of native vegetation in APZs

5.4 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.

Table 5-6 – Measures to mitigate & manage impacts

Action / Technique	*Outcome*	*Timing / Frequency*	*Responsibility*
Prepare a Vegetation Management Plan (VMP) to identify mitigation actions within the outer 10 m portion of the site			
(a) Protection and enhancement of existing native vegetation after tree removal and cut/fill operations have completed • Stabilisation of embankments with native groundcovers • Prioritised weed control targeting high threat exotics • 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.	Reduce erosion hazards Replacement of exotic species with locally occurring native species Increase native species diversity Ensure fungal disease spread is minimised	Protection fencing installed prior to any vegetation removal Commencement of weed control during construction Landscaping and revegetation work commencing during or post construction. Weed control maintenance to be conducted approximately 4-6 times annually and reducing to 3 times annually once the majority of high threat exotics have been treated The VMP should have a minimum lifespan of 5 years with annual monitoring reported to Council	Project manager with VMP guided by the project ecologist Landscaper and bushland regenerator to do the physical works
(b) Manage vegetation within the APZ: • Identify and remove non-native species as a priority • Ongoing routine maintenance – tree limbing, pruning and slashing	Protection of indirect impacts on Masked Owl nest and roost trees	In Place prior to any road lighting or residential dwellings	Project manager with VMP guided by the project ecologist Bushland regenerator to do the physical works
Prepare sediment and erosion control plan to manage areas of cut and fill operations			

Action / Technique	*Outcome*	*Timing / Frequency*	*Responsibility*
(c) 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.	Maintenance of soils to prevent deposition and erosion on sloping ground where cut and fill occurs	Prior to any clearing works. Ongoing during all exposed soil stages until landscaping is completed	Project ecologist / Contractors
Arborist supervision			
(d) Arborist to mark all trees to remove with a large X on the trunk. Arborist to be present and sign off of tree removal works in accordance with the Arboricultural Impact Assessment Report	Ensure that tree protection measures are set up and followed Ensure no over clearing	Prior to and during clearing operations	Arborist
Fauna ecologist			
(e) Fauna ecologist to be on call during clearance works to be able to relocate any resident fauna to nearby conservation area if required.	Reduce potential for impact on native species	During vegetation clearance	Fauna ecologist
(f) Management of hollows and hollow-dependent fauna. Whilst hollows were not observed from the ground, there may be some small hollows in the larger trees on site. If hollows are noted during clearance works, the trees are to be marked and contact the fauna ecologist. The fauna ecologist is to be present whilst any hollows are sectionally dismantled from the selected tree, the hollow checked for fauna occupation, and animal relocated if required. The sectioned off hollow may be re-used as on-ground refugia in the landscaping areas of the site.	Protection of hollow-dependent wildlife	At time of removal	Fauna ecologist and tree removal contractor
(g) If any nest or roost is located during development works, then works should cease until safe relocation can be advised by a fauna ecologist	Prevent direct impacts on nesting and terrestrial native fauna species	At time of removal / Adaptive management required	Fauna ecologist and tree removal contractor

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 the proposal.

Credit species assessment has been undertaken in Section 4 for the potential SAII entities. These are the only ones required for assessment as this is a streamlined assessment using the small area module.

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
Coastal Enriched Sandstone Moist Forest									
1	1841_poor	26.6	0.51 ha	Moderate	PCT cleared – 67%	High	1.75	False	6
2	1841_regrowth	10.2	0.22 ha	Moderate	PCT cleared – 67%	High	1.75	False	0
Swamp Mahogany – Flax-leaved Paperbark Swamp Forest on Coastal Lowlands of the Central Coast									
3	1718_poor	38.4	0.05 ha	High	*BC Act* listing status	High	2	False	1
									Total: 7

Zero (0) credits are generated for the regrowth community as the VI score was below the threshold.

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
Large-eared Pied Bat									
1718_poor	38.4	0.05 ha	Moderate	*BC Act* listing	Very High	Species dependent	3	True	1
1841_poor	26.6	0.51 ha	Moderate	*BC Act* listing	Very High	Species dependent	3	True	10
1841_poor	10.2	0.22 ha	Moderate	*BC Act* listing	Very High	Species dependent	3	True	2
									Total: 13
Giant Dragonfly									
1718_poor	38.4	0.05 ha	High	*BC Act* listing	Very High	Species dependent	3	True	1
1841_poor	26.6	0.51 ha	High	*BC Act* listing	Very High	Species dependent	3	True	10
1841_poor	10.2	0.22 ha	High	*BC Act* listing	Very High	Species dependent	3	True	2
									Total: 13

6.2 Ecosystem credit classes

Table 6-3 – Ecosystem credit summary

PCT	TEC	Area (ha)	HBT credits	No HBT credits	Credits
1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and Southeast Corner Bioregions	0.05	0	1	1
1841-Coastal enriched sandstone moist forest	Not a TEC	0.73	0	6	6

Table 6-4 – Credit classes and like-for-like options

PCT	Vegetation Class	Trading group	TEC	Containing hollow-bearing trees?	Credits
1718	-	-	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and Southeast Corner Bioregions	No	1 - Wyong, Hunter, Pittwater and Yengo OR any IBRA subregion that is within 100 km of the outer edge of the impacted site
1721	North Coast Wet Sclerophyll Forests This includes PCT's: 661, 686, 694, 827, 1217, 1237, 1244, 1285, 1504, 1841, 1843, 1915	North Coast Wet Sclerophyll Forests - ≥ 50% - < 70% cleared group (including Tier 3 or higher threat status).	-	No	6 - Wyong, Hunter, Pittwater and Yengo OR any IBRA subregion that is within 100 km 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
Large-eared Pied Bat	1841_poor, 1841_regrowth, 1718_poor	0.78	13
Giant Dragonfly	1841_poor, 1841_regrowth, 1718_poor	0.78	13

All above-listed species need to be offset with the same species but anywhere in NSW.

6.4 Credit pricing

As of October 2022, accredited assessors cannot access the BOP-C payment calculator to provide an estimation of costs for credits. For estimates on credit values, the proponent may need to speak with the Biodiversity Conservation Trust (BCT). The BCT will be providing a credit costing service in early 2023 for a nominal fee.

7. CONCLUSIONS

This BDAR has been produced to accompany the proposed development by Busways at West Gosford, located on the corners of Racecourse Road, Faunce Street West and Young Street, within the Central Coast Council LGA.

7.1 Biodiversity Offsets Scheme (BOS) – Threshold Assessment

The report utilises the streamlined assessment for a small area module given the minimum lot size has a clearing threshold of 0.25 ha, and impacts are below 1 ha total (measured at 0.78 ha), with no mapped areas of biodiversity values being impacted. Therefore, the assessment type is a Part 4 Development (Small Area) Assessment.

Only potential SAII entities are required for consideration as species credits.

7.2 Recorded biodiversity

In respect of matters required to be considered under the *EP&A Act* and relating to the species and provisions of the *BC Act*, no threatened flora species were observed. No target fauna survey was conducted due to timing and unlikely presence of SAII entities. Where the entities could not be ruled on habitat constraints, geographic constraints or vagrancy, these were assumed present with an SAII assessment conducted in Appendix 1. This was undertaken for Giant Dragonfly and Large-eared Pied Bat. The 0.05 ha of PCT 4020 along Racecourse Road is recognised as Swamp Sclerophyll Forest on Coastal Floodplains under the *BC Act.* The vegetation was not commensurate with the equivalent *EPBC* listed community.

7.3 Impact summary

Whilst some of the peripheral vegetation will be retained, some degree of tree clearance is required, and APZ management along part of Young Street. As such, it was assumed all mapped vegetation on site will be impacted to some degree, however for the BAM calculator, the assumption proposed was for removal of all vegetation totalling 0.78 ha.

The impacts will result in credits required for PCT 1718 / 4020 and PCT 1841 / 3230, as well as species credits for Giant Dragonfly and Large-eared Pied Bat due to buffers from appropriate habitat types. The credit generation is detailed in Section 6, with an SAII assessment undertaken in Appendix 1.

7.4 Recommendations

The following recommendations are made.

Planted vegetation utilised in the landscape buffer around the perimeter of the site should focus solely on locally occurring native species. The replacement of tree along Racecourse Road is required, in place of exotic species such as Camphor Laurel. Planting on smaller trees would be preferable in this location, otherwise they will need continual trimming due to

the powerlines. Given the contour levels at this location, vegetation from Swamp Sclerophyll Forest on Coastal Floodplains would be most preferable.

Internal landscaping is less specific, although planting of fruiting trees or shrubs could benefit local bat species, fructivorous birds and other fauna species.

Whilst no hollows of any quality or size were noted, a fauna ecologist should be present or on call during the vegetation demolition to relocate any displaced fauna.

As the site is expected to be maintained as being fully fenced, the coming and going of small fauna is limited. Given the industrial setting and disturbance and narrow piece of vegetation on the perimeter being retained, there is no real benefit to creating on-ground refugia by placement of logs and similar sheltering habitat, nor is there any real benefit in nest box installation. Approximately 80% of the trees are being removed, and most in the landscape buffer being retained will not be large trees or big enough trees to support nest boxes. If however, hollows are detected during the clearing process that were not obvious during the survey, the contractors are to contact a fauna ecologist to be present during their removal. Hollow removal is to be undertaken sectionally with any resident fauna relocated to a nearby conservation area if found.

An arborist is to be appointed to sign off of tree protection fencing, and tree clearing works to ensure retained trees are adequately protected, and that no over-clearing is undertaken. Trees for removal should be clearly marked with an X on the trunk.

Refer to the mitigation measures in Section 5.4 for all other measures / details.

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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 as follows below.

Measures taken to avoid the direct and indirect impact on species at risk of SAII are outlined in Section 0. 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-eared Pied Bat				✓	The species is dependent on non-responding attribute (breeding habitat only)	TBDC
Giant Dragonfly				✓	Species is unlikely to respond to management and is therefore irreplaceable	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-eared Pied Bat - Insufficient information is available on the species' distribution and ecology to guide effective management (DPE – Saving Our Species Strategies). This is a species credit species. Species sensitivity to loss is indicated by the TDBC as 'moderate'. Species sensitivity to potential gain is 'very high'.

Surveys for this species have not been undertaken. Given the geology and topography of Presidents Hill just to the east of the site, this would provide potential habitat for the species, although no potential breeding habitat on site or directly impacted.

The *'Species credit' threatened bats and their habitats – NSW survey guide for the Biodiversity Assessment Method (The BAM Bat Guide)* outline how to define presence of important 'breeding habitat'. Species polygons for offsetting calculations have also been generated in accordance with Table 1 of this guide.

Potential breeding habitat for this species is defined by *The BAM Bat Guide* as "The PCTs associated with the species (as per the TBDC) within 100 m of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings."

Overhangs recorded nearby to the subject site are located at adjacent land to the east within Presidents Hill which exceeds 100 m distance from the proposed development footprint. Whilst providing potential temporary roosting and foraging opportunities for this species, it not expected that the subject site provides any important breeding habitat.

In conclusion, *Travers bushfire & ecology* expect that the development proposal is not likely to impact any important breeding habitat for this species. A species polygon of 2 km from rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings, encompasses the full site, or 0.78 ha of mapped native vegetation which has been considered in the BAM calculator.

Giant Dragonfly

Petalura gigantean are known from isolated swamps and streamlines or seepages in more-or-less natural condition in the eastern part of the state, with short or moderate vegetation on a deep soil base (Watson 1991). Adults are rather poor flyers and hopelessly bad at dispersing (Trueman 1997), being incapable of finding ideal habitat within 10 km of known locations. Emergence takes place in late October and the flight season runs until January, but adults are never found far from their emergence site.

The important habitat is the larval habitat, which unlike other dragonfly larvae that live in the water column, make a permanent burrow in suitably soft ground / swamp / bog / mud, catching animals as they pass the entrance (Watson 1991). Some are known from around the edges of sphagnum bogs, from tea tree swamp growing on "foul black ooze" and seepages or spring lines along creeks. The larvae stage is known to last at least 10 years but estimates of 20-30 are quite likely.

It is the combination of poor dispersal ability, long larval life and absolute need for permanent swamp with a stable water table which makes *P gigantea* so susceptible to human interference.

Potential breeding habitat for this species is defined as areas within 500 m of swamps, with the subject site being located approximately 250 m from a swamp-like area within the adjacent racecourse.

The species live in permanent swamps and bogs with some free water and open vegetation. Adults spent most of the time settled on low vegetation on or adjacent to the swamp, hunting for flying insects over the swamp and along its margins.

Females lay eggs into moss, under other soft ground layer vegetation, and into moist litter and humic soils, often associated with groundwater seepage areas within appropriate swamp and bog habitats. The species does not utilise areas of standing water wetland, although it may utilise suitable boggy areas adjacent to open water wetlands.

The lack of any vegetation in the 250 m stretch between the wetlands on the racecourse and the site would limit the likelihood of occurrence, as it would more likely stick to fringing macrophyte vegetation, or the riparian vegetation of Narara Creek less than 100 m away if it were to occur in this locality. Additionally, the description of where females lay eggs in the previous paragraph, that type of habitat is completely absent from the site. As such, the core habitat of importance for the species will not be impacted.

As per Section 9.1.2.4 of the BAM 2020 the following information, where available, is provided to identify SAII:

(a) The impact on the species' population (Principles 1 and 2) presented by:

(i) an estimate of the number of individuals (mature and immature) present in the subpopulation on the subject land (the site may intersect or encompass the subpopulation) and as a percentage of the total NSW population, and

Response: There are no recorded occurrences of these species within 10 km of the subject site.

(ii) an estimate of the number of individuals (mature and immature) to be impacted by the proposal and as a percentage of the total NSW population, or

Response: This is difficult to estimate based on current population trends and lack of sufficient survey it is also unknown if any of the species' unit of measure is area, provide data on the number of individuals within the locality, and the estimated number that will be

impacted. Based on the lack of vegetation connectivity to the site, the presence on site is still considered unlikely.

(b) impact on geographic range (Principles 1 and 3) presented by:

(i) the area of the species' geographic range to be impacted by the proposal in hectares, and a percentage of the total AOO, or EOO within NSW

Response: The TDBC does not specify the total AOO, or EOO within NSW.

(ii) the impact on the subpopulation as either: all individuals will be impacted (subpopulation eliminated); OR impact will affect some individuals and habitat; OR impact will affect some habitat, but no individuals of the species will be directly impacted

Response: As the subject site is not likely to contribute to breeding habitat, or important habitat therefore it is not expected that individuals will be directly impacted, or any suitable habitat will occur as a result of the proposal.

(iii) to determine if the persisting subpopulation that is fragmented will remain viable, estimate (based on published and unpublished sources such as scientific publications, technical reports, databases or documented field observations) the habitat area required to support the remaining population, and habitat available within dispersal distance, and distance over which genetic exchange can occur (e.g., seed dispersal) and pollination distance for the species

Response: The population will not become fragmented by the proposal. Based on the very small area of unlikely habitat to be impacted, it is not likely that this impact extent will cause the population to become less viable.

(iv) to determine changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds, estimate changes in environmental factors including changes to fire regimes (frequency, severity); hydrology, pollutants; species interactions (increased competition and effects on pollinators or dispersal); fragmentation, increased edge effects, likelihood of disturbance; and disease, pathogens and parasites. Where these factors have been considered elsewhere in relation to the target species, the assessor may refer to the relevant sections of the BDAR or BCAR.

Response: Due to the subject site being already historically fragmented and consisting of highly modified vegetation in very poor condition with no habitat features of significance being present, is not considered to be important habitat, there will be no notable changes in threats.

Appendix 2. Flora species list

Family	Scientific Name	Exotic	Common Name
Fabaceae (Mimosoideae)	*Acacia decurrens*		Black Wattle
Fabaceae (Mimosoideae)	*Acacia elongata*		Swamp Wattle
Fabaceae (Mimosoideae)	*Acacia falcata*		
Fabaceae (Mimosoideae)	*Acacia longifolia*		
Fabaceae (Mimosoideae)	*Acacia parramattensis*		Parramatta Wattle
Fabaceae (Mimosoideae)	*Acacia prominens*		Gosford Wattle
Fabaceae (Mimosoideae)	*Acacia suaveolens*		Sweet Wattle
Fabaceae (Mimosoideae)	*Acacia ulicifolia*		Prickly Moses
Polygonaceae	*Acetosa sagittata*	*	Rambling Dock
Alliaceae	*Agapanthus praecox subsp. orientalis*	*	
Asteraceae	*Ageratina adenophora*	*	Crofton Weed
Poaceae	*Andropogon virginicus*	*	Whisky Grass
Myrtaceae	*Angophora floribunda*		Rough-barked Apple
Apocynaceae	*Araujia sericifera*	*	Moth Vine
Asteraceae	*Artemisia spp.*	*	
Asparagaceae	*Asparagus aethiopicus*	*	Asparagus Fern
Asparagaceae	*Asparagus asparagoides*	*	Bridal Creeper
Asparagaceae	*Asparagus officinalis*	*	Asparagus
Poaceae	*Avena fatua*	*	Wild Oats
Poaceae	*Axonopus fissifolius*	*	Narrow-leafed Carpet Grass
Proteaceae	*Banksia integrifolia*		Coast Banksia
Asteraceae	*Bidens pilosa*	*	Cobbler's Pegs
Phyllanthaceae	*Breynia oblongifolia*		Coffee Bush
Poaceae	*Briza maxima*	*	Quaking Grass
Poaceae	*Briza minor*	*	Shivery Grass
Pittosporaceae	*Bursaria spinosa*		Native Blackthorn
Myrtaceae	*Callistemon spp.*		
Myrtaceae	*Callistemon viminalis*		Weeping Bottlebrush
Dicksoniaceae	*Calochlaena dubia*		Rainbow Fern
Cannaceae	*Canna indica*	*	Tous-les-mois Arrowroot
Casuarinaceae	*Casuarina glauca*		Swamp Oak
Poaceae	*Cenchrus clandestinus*	*	Kikuyu Grass

Family	Scientific Name	Exotic	Common Name
Gentianaceae	*Centaurium tenuiflorum*	*	Branched Centaury, Slender centaury
Anthericaceae	*Chlorophytum comosum*	*	Spider Plant
Lauraceae	*Cinnamomum camphora*	*	Camphor Laurel
Asteraceae	*Cirsium vulgare*	*	Spear Thistle
Commelinaceae	*Commelina cyanea*		Native Wandering Jew
Malvaceae	*Commersonia fraseri*		Brush Kurrajong
Asteraceae	*Conyza bonariensis*	*	Flaxleaf Fleabane
Asteliaceae	*Cordyline spp.*		
Asteraceae	*Coreopsis lanceolata*	*	Coreopsis
Myrtaceae	*Corymbia citriodora*	*	Lemon-scented Gum
Malaceae	*Crataegus monogyna*	*	Hawthorn
Iridaceae	*Crocosmia x crocosmiiflora*	*	Montbretia
Sapindaceae	*Cupaniopsis anacardioides*		Tuckeroo
Apiaceae	*Cyclospermum leptophyllum*	*	Slender Celery
Poaceae	*Cynodon dactylon*		Common Couch
Cyperaceae	*Cyperus eragrostis*	*	Umbrella Sedge
Cyperaceae	*Cyperus gracilis*		Slender Flat-sedge
Cyperaceae	*Cyperus polystachyos*		
Phormiaceae	*Dianella caerulea*		Blue Flax-lily
Phormiaceae	*Dianella longifolia*		Blueberry Lily
Poaceae	*Dichelachne crinita*		Longhair Plumegrass
Convolvulaceae	*Dichondra repens*		Kidney Weed
Poaceae	*Ehrharta erecta*	*	Panic Veldtgrass
Poaceae	*Eragrostis brownii*		Brown's Lovegrass
Poaceae	*Eragrostis curvula*	*	African Lovegrass
Myrtaceae	*Eucalyptus pilularis*		Blackbutt
Asteraceae	*Euchiton sphaericus*		Star Cudweed
Euphorbiaceae	*Euphorbia peplus*	*	Petty Spurge
Santalaceae	*Exocarpos cupressiformis*		Cherry Ballart
Asteraceae	*Gamochaeta spp.*	*	
Luzuriagaceae	*Geitonoplesium cymosum*		Scrambling Lily
Fabaceae (Faboideae)	*Genista monspessulana*	*	Montpellier Broom
Iridaceae	*Gladiolus tristis*	*	Marsh Afrikaner
Phyllanthaceae	*Glochidion ferdinandi*		Cheese Tree
Fabaceae (Faboideae)	*Glycine clandestina*		Twining glycine
Apocynaceae	*Gomphocarpus fruticosus*	*	Narrow-leaved Cotton Bush
Proteaceae	*Grevillea sericea*		Pink Spider Flower
Fabaceae (Faboideae)	*Hardenbergia violacea*		False Sarsaparilla
Araliaceae	*Hedera helix*	*	English Ivy
Euphorbiaceae	*Homalanthus populifolius*		
Apiaceae	*Hydrocotyle bonariensis*	*	

Family	Scientific Name	Exotic	Common Name
Asteraceae	*Hypochaeris radicata*	*	Catsear
Poaceae	*Imperata cylindrica*		Blady Grass
Oleaceae	*Jasminum polyanthum*	*	White Jasmine
Juncaceae	*Juncus bufonius*	*	Toad Rush
Juncaceae	*Juncus planifolius*		
Juncaceae	*Juncus spp.*		
Juncaceae	*Juncus usitatus*		
Fabaceae (Faboideae)	*Kennedia rubicunda*		Dusky Coral Pea
Myrtaceae	*Kunzea ambigua*		Tick Bush
Asteraceae	*Lactuca serriola*	*	Prickly Lettuce
Verbenaceae	*Lantana camara*	*	Lantana
Myrtaceae	*Leptospermum petersonii*		Lemon-scented Teatree
Ericaceae	*Leucopogon juniperinus*		Prickly Beard-heath
Oleaceae	*Ligustrum lucidum*	*	Large-leaved Privet
Oleaceae	*Ligustrum sinense*	*	Small-leaved Privet
Hamamelidaceae	*Liquidambar styraciflua*	*	Sweetgum
Lomandraceae	*Lomandra longifolia*		Spiny-headed Mat-rush
Myrtaceae	*Lophostemon confertus*		Brush Box
Fabaceae (Faboideae)	*Lotus spp.*	*	
Primulaceae	*Lysimachia arvensis*	*	Scarlet Pimpernel
Myrtaceae	*Melaleuca alternifolia*		
Myrtaceae	*Melaleuca bracteata*		Black Tea-tree
Poaceae	*Melinis repens*	*	Red Natal Grass
Poaceae	*Microlaena stipoides*		Weeping Grass
Malvaceae	*Modiola caroliniana*	*	Red-flowered Mallow
Araceae	*Monstera deliciosa*	*	Fruit Salad Plant
Nandinaceae	*Nandina domestica*	*	Japanese Sacred Bamboo
Davalliaceae	*Nephrolepis cordifolia*		Fishbone Fern
Apocynaceae	*Nerium oleander*	*	Oleander
Ochnaceae	*Ochna serrulata*	*	Mickey Mouse Plant
Oleaceae	*Olea europaea subsp. cuspidata*	*	African Olive
Poaceae	*Oplismenus aemulus*		
Poaceae	*Paspalum dilatatum*	*	Paspalum
Proteaceae	*Persoonia linearis*		Narrow-leaved Geebung
Pittosporaceae	*Pittosporum undulatum*		Sweet Pittosporum
Plantaginaceae	*Plantago lanceolata*	*	Lamb's Tongues
Araliaceae	*Polyscias sambucifolia*		Elderberry Panax
Rhamnaceae	*Pomaderris spp.*		
Salicaceae	*Populus alba*	*	White Poplar
Fabaceae (Faboideae)	*Pultenaea spp.*		
Malaceae	*Rhaphiolepis indica*	*	Indian Hawthorn
Rosaceae	*Rosa rubiginosa*	*	Sweet Briar

Family	Scientific Name	Exotic	Common Name
Rosaceae	*Rubus fruticosus sp. agg.*	*	Blackberry complex
Polygonaceae	*Rumex crispus*	*	Curled Dock
Poaceae	*Rytidosperma spp.*		
Cyperaceae	*Schoenus brevifolius*		
Asteraceae	*Senecio madagascariensis*	*	Fireweed
Fabaceae (Caesalpinioideae)	*Senna pendula var. glabrata*	*	
Poaceae	*Setaria parviflora*	*	
Malvaceae	*Sida rhombifolia*	*	Paddy's Lucerne
Solanaceae	*Solanum mauritianum*	*	Wild Tobacco Bush
Solanaceae	*Solanum nigrum*	*	Black-berry Nightshade
Asteraceae	*Sonchus oleraceus*	*	Common Sowthistle
Poaceae	*Sporobolus africanus*	*	Parramatta Grass
Caryophyllaceae	*Stellaria media*	*	Common Chickweed
Poaceae	*Stenotaphrum secundatum*	*	Buffalo Grass
Strelitziaceae	*Strelitzia nicolai*	*	
Asteraceae	*Taraxacum officinale*	*	Dandelion
Poaceae	*Themeda triandra*		
Apocynaceae	*Trachelospermum jasminoides*	*	
Commelinaceae	*Tradescantia fluminensis*	*	Wandering Jew
Fabaceae (Faboideae)	*Trifolium repens*	*	White Clover
Verbenaceae	*Verbena bonariensis*	*	Purpletop
Verbenaceae	*Verbena x brasiliensis*	*	Gin Case
Fabaceae (Faboideae)	*Vicia sativa*	*	Common vetch
Apocynaceae	*Vinca major*	*	Periwinkle
Iridaceae	*Watsonia meriana*	*	
Fabaceae (Faboideae)	*Wisteria sinensis*	*	Chinese wisteria
Agavaceae	*Yucca aloifolia*	*	Spanish Bayonet

Appendix 3. Plot datasheets

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BAM Site – Field Survey Form

Site Sheet no: 1 of

		Survey Name	Zone ID	Recorders			
Date	30/11/22	18URB09 WEST GOSFORD		LH			
Zone 56	Datum GDA 94	Plot ID	Q1	Plot dimensions	40x10 100x10	Photo #	
Easting	Northing	IBRA region	In m	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	8
	Shrubs	7
	Grasses etc.	3
	Forbs	✓
	Ferns	✓
	Other	✓
Sum of Cover of native vascular plants by growth form group	Trees	9.3
	Shrubs	31.6
	Grasses etc.	8.1
	Forbs	✓
	Ferns	✓
	Other	✓
High Threat Weed cover		52

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		X
50 – 79 cm		
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)	Tally space	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)	80	50	80	80	70	a	b	c	d	e	a	b	c	d	e	a	b	c	d	e
Average of the 5 subplots	72																			

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 30/11/22	18URB09 WEST GOSFORD	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	20	8		
S	2 Grevillea Conversonia fraseri	N	15	150		
	3 Ligustrum sinense	HTE	12	100		
	4 Asparagus aethiopicus	HTE	1	25		
	5 Paspalum dilatatum	HTE	8	1500		
	6 Lantana camara	HTE	3	30		
	7 Hydrocotyle bonariensis	E	5	250		
	8 Coreopsis lanceolata	E	5	1000		
S	9 Kunzea ambigua	N	3	8		
S	10 Acacia longifolia	N	7	15		
T	11 Glochidion ferdinandi	N	8	20		
	12 Ochna serrulata	HTE	0.2	12		
	13 Nandina domestica	E	0.1	5		
S	14 Pittosporum undulatum	N	0.5	2		
	15 Pennisetum clandestinum	HTE	2	350		
G	16 Lomandra longifolia	N	0.1	2		
	17 Ligustrum lucidum	HTE	1.5	10		
G	18 Cynodon dactylon	N	4	800		
G	19 Dichelachne crinita	N	4	800		
	20 Verbena bonariensis	E	2	80		
	21 Briza maxima	E	4	1200		
S	22 Grevillea sericea	N	0.1	1		
	23 Verbena brasiliensis	E	0.2	40		
	24 Jasminum polyanthemum	E	15	100		
	25 Centaurium ~~spicatum~~ tenuiflorum	E	0.1	10		
	26 Vinca major	HTE	0.3	20		
	27 Ageratina adenophora	HTE	0.5	70		
	28 Bidens pilosa	HTE	0.1	3		
	29 Montbretia	E	0.2	30		
	30 Conyza bonariensis	E	0.1	3		
	31 Briza minor	E	2	500		
	32 Plantago lanceolata	E	0.3	70		
T	33 Acacia decurrens	N	1	2		
	34 Gamochaeta spicata	E	0.1	5		
	35 Trifolium repens	E	0.1	2		
S	36 Melaleuca alternifolia	N	2	2		
	37 Ehrharta erecta	HTE	0.3	80		
	38 Cyperus eragrostis	HTE	0.1	2		
S	39 Melaleuca brachiata	N	4	1		
T	40 Acacia parramattensis	N	0.3	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, ...

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BAM Site – Field Survey Form

Site Sheet no: 1 of ____

		Survey Name	Zone ID	Recorders			
Date	30 / 11 / 22	IBRA09 WEST GOSFORD		LH			
Zone	Datum	Plot ID	Q2	Plot dimensions	20 x 20 50 x 20	Photo #	
Easting	Northing	IBRA region	In m	Midline bearing from 0 m	Magnetic °		
Vegetation Class						Confidence: H M L	
Plant Community Type				EEC: tick		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	1
	Grasses etc.	2
	Forbs	–
	Ferns	–
	Other	1
Sum of Cover of native vascular plants by growth form group	Trees	13.2
	Shrubs	3
	Grasses etc.	12
	Forbs	–
	Ferns	–
	Other	0.2
High Threat Weed cover		12.4

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		X
50 – 79 cm		
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)	Tally space	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	10	10	25	15	a	b	c	d	e	a	b	c	d	e	a	b	c	d	e
Average of the 5 subplots	15																			

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 30 / 11 / 22	18UEG09 WEST GOSFORD	Q2	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	Casuarina glauca	N	13	37		
	2	Coreopsis lanceolata	E	40	10000		
	3	Paspalum dilatatum	HTE	5	1000		
	4	Andropogon virginicus	HTE	3	600		
G	5	Dichelachne crinita	N	4	1000		
S	6	Acacia falcata	N	3	27		
	7	Verbena bonariensis	E	10	500		
	8	Centaurium ~~spicatum~~ tenuiflorum	E	2	500		
T	9	Banksia integrifolia	N	0.1	2		
G	10	Cynodon dactylon	N	8	1500		
	11	Briza minor	E	0.2	50		
	12	Plantago lanceolata	E	0.1	20		
	13	Briza maxima	E	1	200		
	14	Vicia sativa	E	0.1	1		
	15	Pennisetum (Cenchrus) clandestinum	HTE	2	800		
T	16	Acacia parramattensis	N	0.1	1		
	17	Bidens pilosa	HTE	0.2	25		
	18	Conyza bonariensis	E	0.1	5		
	19	Ageratina adenophora	HTE	0.2	15		
	20	Exotic shrub (Fabaceae)	E	0.7	5		
	21	Gladiolus tristis	E	0.1	5		
O	22	Kennedia rubicunda	N	0.2	1		
	23	Trifolium repens	E	0.1	5		
	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			
Date	30 / 11 / 22	IBURB09 WEST GOSFORD		LH			
Zone 56	Datum GDA 94	Plot ID	Q3	Plot dimensions	40 NW 100x10	Photo #	
Easting	Northing	IBRA region	In m	Midline bearing from 0 m		Magnetic °	
Vegetation Class						Confidence: H M L	
Plant Community Type				EEC: tick		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	4
	Shrubs	2
	Grasses etc.	4
	Forbs	2
	Ferns	✓
	Other	2
Sum of Cover of native vascular plants by growth form group	Trees	39
	Shrubs	2.4
	Grasses etc.	6.8
	Forbs	0.4
	Ferns	✓
	Other	0.3
High Threat Weed cover		39.4

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		x
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)	Tally space	2

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)	35	60	50	90	65	a	b	c	d	e	a	b	c	d	e	a	b	c	d	e
Average of the 5 subplots	60																			

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	30/ 11 / 22	18UR809 WEST GOSFORD	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	Angophora floribunda	N	20	10		
	2	Corymbia citriodora	E	15	30		
G	3	Imperata cylindrica	N	3	700		
	4	Rubus fruticosus	HTE	5	200		
	5	Ligustrum sinense	HTE	12	75		
S	6	Acacia longifolia	N	2	8		
T	7	Glochidion ferdinandi	N	8	40		
	8	Artemissia	E	0.2	50		
G	9	Cynodon dactylon	N	3	700		
	10	Lantana camara	HTE	5	50		
	11	Asparagus aethiopicus	HTE	0.2	15		
	12	Senna pendula var. glabrata	HTE	2	15		
	13	Stenotaphrum secundatum	HTE	2	400		
T	14	Acacia parramattensis	N	3	10		
	15	Verbena bonariensis	E	0.3	60		
O	16	Kennedia rubicunda	N	0.2	5		
G	17	Microlaena stipoides var. stipoides	N	0.3	50		
	18	Yucca aloefolia	E	0.1	2		
	19	Sida rhombifolia	E	0.2	60		
F	20	Commelina cyanea	N	0.2	40		
	21	Avena fatua	E	0.5	80		
F	22	Dichondra repens	N	0.2	50		
	23	Cyperus eragrostis	HTE	0.1	1		
	24	Ochna serrulata	HTE	0.3	12		
	25	Bidens pilosa	HTE	0.3	60		
	26	Coreopsis lanceolata	E	0.5	100		
O	27	Glycine clandestina	N	0.1	2		
	28	Setaria parviflora	E	0.1	10		
	29	Rosa rubiginosa	E	5	150		
T	30	Banksia integrifolia	N	8	15		
	31	Verbena brasiliensis	E	0.3	70		
	32	Paspalum dilatatum	HTE	0.4	80		
	33	Taraxacum officinale	E	0.1	3		
	34	Centaurium ~~spicatum~~ tenuiflorum	E	0.2	50		
	35	Lotus sp.	E	0.2	50		
	36	Briza maxima	E	0.1	25		
	37	Tradescantia fluminensis	HTE	3	500		
	38	Chlorophytum comosum	HTE	0.3	80		
	39	Acetosa sagittata	HTE	0.1	20		
	40	Cordyline sp.	E	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, ...

Oplismenus aemulus	N	0.5	100
Agapanthus praecox	E	0.1	10
Monstera deliciosa	E	0.2	2
Rhapheolepis indica	E	1	5
Asparagus asparagoides	HTE	0.2	3

Cinnamomum camphora	HTE	5	50
Ligustrum lucidum	HTE	3	40
Pittosporum undulatum			

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BAM Site – Field Survey Form

Site Sheet no: 1 of _____

		Survey Name	Zone ID	Recorders			
Date	6/12/22	18UBD59 WEST GOSFORD		LH			
Zone	Datum	Plot ID	Q4	Plot dimensions	80x5 100x10	Photo #	
Easting	Northing	IBRA region	In m	Midline bearing from 0 m	Magnetic °		
Vegetation Class						Confidence: H M L	
Plant Community Type				EEC: tick		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	4
	Shrubs	1
	Grasses etc.	3
	Forbs	3
	Ferns	✓
	Other	1
Sum of Cover of native vascular plants by growth form group	Trees	68
	Shrubs	0.3
	Grasses etc.	17.1
	Forbs	0.5
	Ferns	✓
	Other	0.1
High Threat Weed cover		39.9

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm		Y
50 – 79 cm	\	
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)	Tally space	1

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)	70	85	40	75	100	a	b	c	d	e	a	b	c	d	e	a	b	c	d	e
Average of the 5 subplots	64																			

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)

-This document has not been endorsed or approved by Office of Environment and Heritage or Muddy Boots Environmental Training-

400 m² plot: Sheet _ of _	Survey Name	Plot Identifier	Recorders
Date 6/12/22	18422B09 WEST GOSFORD	QA	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. Angophora floribunda	N	20	8			5 32 10 2 1 1 4
T	2. Glochidion ferdinandi	N	17	13			3 1 3 2 2 2 2 3 1 3 2 1 2 2 1 1
	3. Paspalum dilatatum	HTE	2	400			
G	4. Lomandra longifolia	N	2	30			2
	5. Bidens pilosa	E	0.5	120			
	6. Hydrocotyle bonariensis	E	0.3	50			
	7. Briza maxima	E	3	600			
	8. Plantago lanceolata	E	2	400			
	9. Stenotaphrum secundatum	HTE	0.2	30			
	10. Asparagus aethiopicus	HTE	12	150			0.5 3 7 2
	11. Lotus sp.	E	0.5	80			1 2 3 15 1 1 2 5
	12. Cinnamomum camphora	HTE	16	10			
	13. Cenchrus clandestinus	HTE	0.5	80			
	14. Cyperus rotundatus	E	0.1	10			
	15. Trifolium repens	E	0.1	5			
	16. Cyclospermum leptophyllum	E	0.1	10			
F	17. Dianella caerulea	N	0.3	15			
G	18. Juncus usitatus	N	0.1	5			
F	19. Caesia parviflora	N	0.1	1			
G	20. Imperata cylindrica	N	15	3000			2 1 4 7
	21. Cyperus eragrostis	HTE	0.2	15			
	22. Ligustrum lucidum	HTE	0.4	3			
	23. Rhaphiolepis indica	E	0.3	1			
	24. Taraxacum officinale	E	0.2	40			
	25. Ligustrum sinense	HTE	2	30			2 10
	26. Sonchus oleraceus	E	0.2	40			
	27. Setaria parviflora	E	0.2	50			
	28. Conyza bonariensis	E	0.1	20			
O	29. Hibbertia dentata	N	0.1	1			
S	30. Acacia ulicifolia	N	0.3	1			
T	31. Casuarina glauca	N	30	200			
	32. Centaurium ~~spicatum~~ tenuiflorum	E	0.1	25			
	33. Sida rhombifolia	E	0.1	3			
T	34. Callistemon viminalis	N	1	1			
	35. Lactuca serriola	E	0.1	2			
	36. Chloris gayana	HTE	0.5	120			
	37. Ehrharta erecta	HTE	5	1000			
	38. Araujia sericifera	HTE	0.5	25			
F	39. Commelina cyanea	N	0.1	5			
	40. Ochna serrulata	HTE	0.2	12			

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, ...

Senecio madagascariensis	HTE	0.1	2
Senna pendula	HTE	0.3	2
Exotic grass	E	0.5	120
Lysimachia arvensis	E	0.2	30

Appendix 4. Staff qualifications and experience

Team member (role)	Accreditations and qualifications	Experience	Employment history	Skills and expertise
Lindsay Holmes (Manager of Ecology) Flora field assessment, primary author and BAM calculations	• 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 21 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.	• 2007-Current: Senior Botanist, Travers bushfire & ecology • 2006-2007: Ecologist, Conacher Travers Pty Ltd • 1999-2006: Field Operations Manager, Microclimate	• 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
Michael Sheather-Reid (Managing Director) Report review	• Bachelor of Natural Resources (Hons), University of New England • Accredited Biodiversity Assessor (BAAS17085) • Accredited BioBanking Assessor (No 204) • Planning for Bushfire Protection (UTS) November 2021 • 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 • Project Management Training - NSW Dept. of Water Resources. (1994) • Public Relations Course - Marketing & Public Relations Unit NSW Dept. of Water Resources (1993) • Conflict Resolution & Neuro-linguistic Programming - Short Course - Peak Performance Pty Ltd. (1998) • Facilitation, Mediation, Presentation Training - Short Courses. Peak Performance Pty Ltd. (1995)	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 22 years.	• 2018-2022 Current Managing Director Principal Ecologist Travers Bushfire & Ecology • 2015 to 2018: General Manager (Senior Ecologist) Travers bushfire & ecology • 2007-2015 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
Sandy Cardow (GIS officer) Preparation of maps and area calculations	• 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
Corrine Edwards (Fauna Ecologist)	• Bachelor of Environmental Science and Management. (Hons) (University	Corrine has over 10 years' experience in fauna survey techniques, researching ecological interactions and identification of vertebrate fauna within a magnitude of	• 2021 – Current: Fauna Ecologist, Travers Bushfire and Ecology	• Survey techniques for all major vertebrate fauna groups

Team member (role)	Accreditations and qualifications	Experience	Employment history	Skills and expertise
Assistance with fauna matters of the BDAR	of New South Wales) (2016-2020)	Australian habitats. She is experienced in leading research projects, experimental design, data collection, data analysis and report writing.	• 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	(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. BAM-C outputs

BAM Credit Summary Report

Proposal Details

Assessment Id
00037084/BAAS17032/22/00037085

Proposal Name
Busways West Gosford

BAM data last updated *
14/10/2022

Assessor Name
Lindsay Holmes

Report Created
16/12/2022

BAM Data version *
55

Assessor Number
BAAS17032

BAM Case Status
Finalised

Date Finalised
16/12/2022

Assessment Revision
0

Assessment Type
Part 4 Developments (Small Area)

BOS entry trigger
BOS Threshold: Area clearing threshold

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

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
Coastal enriched sandstone moist forest												
1	1841_poor	Not a TEC	26.6	26.6	0.51	PCT Cleared - 67%	High Sensitivity to Gain			1.75		6

2	1841_regrowth	Not a TEC	10.2	10.2	0.22	PCT Cleared - 67%	High Sensitivity to Gain			1.75		0
											Subtotal	**6**
Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast												
3	1718_poor	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	38.4	38.4	0.05	Biodiversity Conservation Act listing status	High Sensitivity to Gain	Endangered Ecological Community	Not Listed	2.00		1
											Subtotal	**1**
											Total	**7**

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

Chalinolobus dwyeri / Large-eared Pied Bat (Fauna)									
1841_poor	26.6	26.6	0.51	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	True	10
1841_regrowth	10.2	10.2	0.22	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	True	2
1718_poor	38.4	38.4	0.05	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Vulnerable	Vulnerable	True	1
								Subtotal	**13**
Petalura gigantea / Giant Dragonfly (Fauna)									
1841_poor	26.6	26.6	0.51	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Not Listed	True	10
1841_regrowth	10.2	10.2	0.22	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Not Listed	True	2
1718_poor	38.4	38.4	0.05	Biodiversity Conservation Act listing status	Species dependent on habitat attributes	Endangered	Not Listed	True	1
								Subtotal	**13**

BAM Candidate Species Report

Proposal Details

Assessment Id 00037084/BAAS17032/22/00037085	Proposal Name Busways West Gosford	BAM data last updated * 14/10/2022
Assessor Name Lindsay Holmes	Report Created 16/12/2022	BAM Data version * 55
Assessor Number BAAS17032	Assessment Type Part 4 Developments (Small Area)	BAM Case Status Finalised
Assessment Revision 0	Date Finalised 16/12/2022	BOS entry trigger BOS Threshold: Area clearing threshold

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

List of Species Requiring Survey

Name	Presence	Survey Months
Chalinolobus dwyeri Large-eared Pied Bat	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Petalura gigantea Giant Dragonfly	Yes (assumed present)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec ☐ Survey month outside the specified months?
Rhodamnia rubescens Scrub Turpentine	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?

BAM Candidate Species Report

Rhodomyrtus psidioides Native Guava	No (surveyed)	☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☑ Nov ☐ Dec ☐ Survey month outside the specified months?

Threatened species Manually Added

None added

Threatened species assessed as not on site

Refer to BAR for detailed justification

Common name	Scientific name	Justification in the BAM-C
Brush-tailed Rock-wallaby	Petrogale penicillata	Habitat degraded
Corunastylis sp. Charmhaven (NSW896673)	Corunastylis sp. Charmhaven (NSW896673)	Species is vagrant
Large Bent-winged Bat	Miniopterus orianae oceanensis	Habitat constraints
Little Bent-winged Bat	Miniopterus australis	Habitat constraints
Regent Honeyeater	Anthochaera phrygia	Habitat constraints
Stuttering Frog	Mixophyes balbus	Habitat degraded
Swift Parrot	Lathamus discolor	Habitat constraints
Variable Midge Orchid	Genoplesium insigne	Species is vagrant
Wyong Sun Orchid	Thelymitra adorata	Species is vagrant

BAM Predicted Species Report

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00037084/BAAS17032/22/00037085	Busways West Gosford	14/10/2022
Assessor Name	Report Created	BAM Data version *
Lindsay Holmes	16/12/2022	55
Assessor Number	Assessment Type	BAM Case Status
BAAS17032	Part 4 Developments (Small Area)	Finalised
Assessment Revision	BOS entry trigger	Date Finalised
0	BOS Threshold: Area clearing threshold	16/12/2022

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

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

Common Name	Scientific Name	Vegetation Types(s)
Barking Owl	Ninox connivens	1841-Coastal enriched sandstone moist forest
		1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast
Dusky Woodswallow	Artamus cyanopterus cyanopterus	1841-Coastal enriched sandstone moist forest
Eastern Chestnut Mouse	Pseudomys gracilicaudatus	1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast
Eastern Coastal Free-tailed Bat	Micronomus norfolkensis	1841-Coastal enriched sandstone moist forest
		1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast
Eastern False Pipistrelle	Falsistrellus tasmaniensis	1841-Coastal enriched sandstone moist forest
		1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast
Eastern Osprey	Pandion cristatus	1841-Coastal enriched sandstone moist forest
		1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast
Gang-gang Cockatoo	Callocephalon fimbriatum	1841-Coastal enriched sandstone moist forest

Glossy Black-Cockatoo	Calyptorhynchus lathami	1841-Coastal enriched sandstone moist forest
Golden-tipped Bat	Phoniscus papuensis	1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast
Greater Broad-nosed Bat	Scoteanax rueppellii	1841-Coastal enriched sandstone moist forest
		1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast
Grey-headed Flying-fox	Pteropus poliocephalus	1841-Coastal enriched sandstone moist forest
		1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast
Large Bent-winged Bat	Miniopterus orianae oceanensis	1841-Coastal enriched sandstone moist forest
		1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast
Little Bent-winged Bat	Miniopterus australis	1841-Coastal enriched sandstone moist forest
		1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast
Little Eagle	Hieraaetus morphnoides	1841-Coastal enriched sandstone moist forest
		1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast
Little Lorikeet	Glossopsitta pusilla	1841-Coastal enriched sandstone moist forest
		1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast
Masked Owl	Tyto novaehollandiae	1841-Coastal enriched sandstone moist forest
Powerful Owl	Ninox strenua	1841-Coastal enriched sandstone moist forest
Regent Honeyeater	Anthochaera phrygia	1841-Coastal enriched sandstone moist forest
		1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast
Rose-crowned Fruit-Dove	Ptilinopus regina	1841-Coastal enriched sandstone moist forest
Rosenberg's Goanna	Varanus rosenbergi	1841-Coastal enriched sandstone moist forest
Spotted-tailed Quoll	Dasyurus maculatus	1841-Coastal enriched sandstone moist forest
		1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast
Superb Fruit-Dove	Ptilinopus superbus	1841-Coastal enriched sandstone moist forest
Swift Parrot	Lathamus discolor	1841-Coastal enriched sandstone moist forest
		1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast

Varied Sittella	Daphoenositta chrysoptera	1841-Coastal enriched sandstone moist forest
		1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast
White-bellied Sea-Eagle	Haliaeetus leucogaster	1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast
White-throated Needletail	Hirundapus caudacutus	1841-Coastal enriched sandstone moist forest
		1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast
Yellow-bellied Sheathtail-bat	Saccolaimus flaviventris	1841-Coastal enriched sandstone moist forest
		1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast

Threatened species Manually Added

None added

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

Common Name	Scientific Name	Plant Community Type(s)
Black Bittern	Ixobrychus flavicollis	1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast

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

BAM Vegetation Zones Report

Proposal Details

Assessment Id	Assessment name	BAM data last updated *
00037084/BAAS17032/22/00037085	Busways West Gosford	14/10/2022
Assessor Name	**Report Created**	**BAM Data version ***
Lindsay Holmes	16/12/2022	55
Assessor Number	**Assessment Type**	**BAM Case Status**
BAAS17032	Part 4 Developments (Small Area)	Finalised
Assessment Revision	**Date Finalised**	**BOS entry trigger**
0	16/12/2022	BOS Threshold: Area clearing threshold

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

Vegetation Zones

#	Name	PCT	Condition	Area	Minimum number of plots	Management zones
1	1841_poor	1841-Coastal enriched sandstone moist forest	poor	0.51	1	

2	1841_regrowth	1841-Coastal enriched sandstone moist forest	regrowth	0.22	1	
3	1718_poor	1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast	poor	0.05	1	

BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id
00037084/BAAS17032/22/00037085

Proposal Name
Busways West Gosford

BAM data last updated *
14/10/2022

Assessor Name
Lindsay Holmes

Assessor Number
BAAS17032

BAM Data version *
55

Proponent Names

Report Created
16/12/2022

BAM Case Status
Finalised

Assessment Revision
0

Assessment Type
Part 4 Developments (Small Area)

Date Finalised
16/12/2022

BOS entry trigger
BOS Threshold: Area clearing threshold

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

Potential Serious and Irreversible Impacts

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

Species
Chalinolobus dwyeri / Large-eared Pied Bat
Petalura gigantea / Giant Dragonfly

Additional Information for Approval

BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
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
1841-Coastal enriched sandstone moist forest	Not a TEC	0.7	0	6	6
1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.1	0	1	1

BAM Biodiversity Credit Report (Like for like)

1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast

Like-for-like credit retirement options

Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 837, 839, 926, 971, 1064, 1092, 1227, 1230, 1231, 1232, 1235, 1649, 1715, 1716, 1717, 1718, 1719, 1721, 1722, 1723, 1724, 1725, 1730, 1795, 1798	-	1718_poor	No	1	Wyong, Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

1841-Coastal enriched sandstone moist forest

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region

	North Coast Wet Sclerophyll Forests This includes PCT's: 661, 686, 694, 827, 1217, 1237, 1244, 1285, 1504, 1841, 1843, 1915	North Coast Wet Sclerophyll Forests >=50% and <70%	1841_poor	No	6	Wyong, Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	North Coast Wet Sclerophyll Forests This includes PCT's: 661, 686, 694, 827, 1217, 1237, 1244, 1285, 1504, 1841, 1843, 1915	North Coast Wet Sclerophyll Forests >=50% and <70%	1841_regrowth	No	0	Wyong, Hunter, Pittwater 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
Chalinolobus dwyeri / Large-eared Pied Bat	**1841_poor, 1841_regrowth, 1718_poor**	0.8	13.00
Petalura gigantea / Giant Dragonfly	**1841_poor, 1841_regrowth, 1718_poor**	0.8	13.00

Credit Retirement Options

Like-for-like credit retirement options

Chalinolobus dwyeri / Large-eared Pied Bat	Spp	IBRA subregion
	Chalinolobus dwyeri / Large-eared Pied Bat	Any in NSW
Petalura gigantea / Giant Dragonfly	Spp	IBRA subregion
	Petalura gigantea / Giant Dragonfly	Any in NSW

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id
00037084/BAAS17032/22/00037085

Proposal Name
Busways West Gosford

BAM data last updated *
14/10/2022

Assessor Name
Lindsay Holmes

Assessor Number
BAAS17032

BAM Data version *
55

Proponent Name(s)

Report Created
16/12/2022

BAM Case Status
Finalised

Assessment Revision
0

Assessment Type
Part 4 Developments (Small Area)

Date Finalised
16/12/2022

BOS entry trigger
BOS Threshold: Area clearing threshold

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

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		
Species		
Chalinolobus dwyeri / Large-eared Pied Bat		
Petalura gigantea / Giant Dragonfly		

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
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
1841-Coastal enriched sandstone moist forest	Not a TEC	0.7	0	6	6.00
1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	0.1	0	1	1.00

1718-Swamp Mahogany - Flax-leaved Paperbark swamp forest on coastal lowlands of the Central Coast

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region

	Swamp Sclerophyll Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions This includes PCT's: 837, 839, 926, 971, 1064, 1092, 1227, 1230, 1231, 1232, 1235, 1649, 1715, 1716, 1717, 1718, 1719, 1721, 1722, 1723, 1724, 1725, 1730, 1795, 1798	-	1718_poor	No	1	Wyong,Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Forested Wetlands	Tier 3 or higher threat status	1718_poor	No	1	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
1841-Coastal enriched sandstone moist forest	**Like-for-like credit retirement options**					
	Class	Trading group	Zone	HBT	Credits	IBRA region
	North Coast Wet Sclerophyll Forests This includes PCT's: 661, 686, 694, 827, 1217, 1237, 1244, 1285, 1504, 1841, 1843, 1915	North Coast Wet Sclerophyll Forests >=50% and <70%	1841_poor	No	6	Wyong,Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

	North Coast Wet Sclerophyll Forests This includes PCT's: 661, 686, 694, 827, 1217, 1237, 1244, 1285, 1504, 1841, 1843, 1915	North Coast Wet Sclerophyll Forests >=50% and <70%	1841_regrowth	No	0	Wyong,Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Wet Sclerophyll Forests (Shrubby sub-formation)	Tier 3 or higher threat status	1841_poor	No	6	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Wet Sclerophyll Forests (Shrubby sub-formation)	Tier 3 or higher threat status	1841_regrowth	No	0	IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Chalinolobus dwyeri / Large-eared Pied Bat	**1841_poor, 1841_regrowth, 1718_poor**	0.8	13.00
Petalura gigantea / Giant Dragonfly	**1841_poor, 1841_regrowth, 1718_poor**	0.8	13.00

Credit Retirement Options

Like-for-like options

Chalinolobus dwyeri/ Large-eared Pied Bat	Spp		IBRA region
	Chalinolobus dwyeri/Large-eared Pied Bat		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	Wyong, Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Petalura gigantea/ Giant Dragonfly	Spp		IBRA region
	Petalura gigantea/Giant Dragonfly		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	Wyong, Hunter, Pittwater and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.