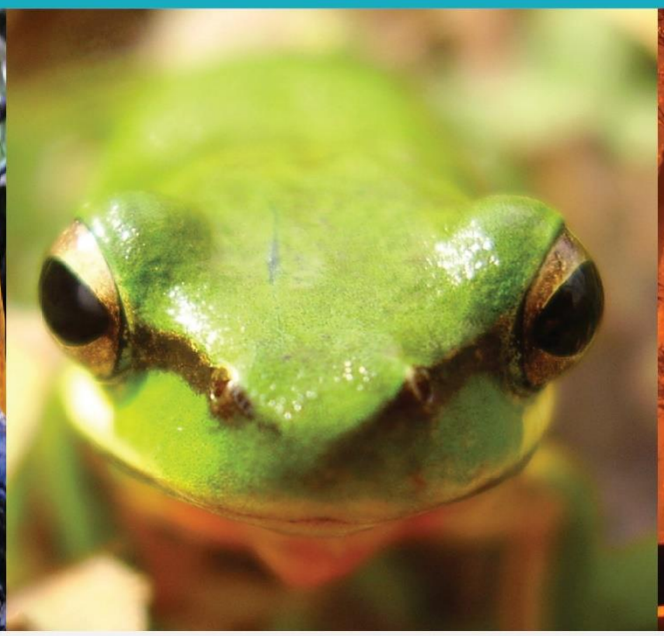
TRAVERS BUSHFIRE & ECOLOGY

A TBE ENVIRONMENTAL COMPANY


ECOLOGICAL ASSESSMENT REPORT

In support of a BDAR waiver application

Proposed Development "Narwee Parklands Care Community"

59-67 Karne Street

Narwee

27 October 2022

(REF: 22CYRE02)

ECOLOGICAL ASSESSMENT REPORT

In support of a BDAR waiver application

Proposed Residential Development

59-67 Karne Street, Narwee

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Date:	27/10/22
File:	22CYRE02

Disclaimer:

This report has been prepared to provide advice to the client on matters pertaining to the particular and specific development proposal as advised by the client and / or their authorised representatives. This report can be used by the client only for its intended purpose and for that purpose only. Should any other use of the advice be made by any person, including the client, then this firm advises that the advice should not be relied upon. The report and its attachments should be read as a whole and no individual part of the report or its attachments should be interpreted without reference to the entire report.

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 are to be confirmed by a registered surveyor.

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DEC	NSW Department of Environment and Conservation (superseded by DECC from April 2007)
DECC	NSW Department of Environment and Climate Change (superseded by DECCW from October 2009)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)
EAR	Ecological Assessment Report
EEC	endangered ecological community
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning and Assessment Act (1979)*
EPBC Act	*Environment Protection and Biodiversity Conservation Act (1999)*
FM Act	Fisheries Management Act
IBRA	Interim Biogeographic Regionalisation for Australia
LEP	local environmental plan
LGA	local government area
LLS Act	*Local Land Services Act (2013)*
NES	national environmental significance
NPW Act	*National Parks and Wildlife Act (1974)*
NRAR	Natural Resources Access Regulator (NSW)
NSW DPI	NSW Department of Industry and Investment
OEH	Office of Environment and Heritage (superseded by DPIE from August 2019)
PCT	plant community type
PFC	projected foliage cover
RFS	NSW Rural Fire Service
ROTAP	rare or threatened Australian plants
SAII	Serious And Irreversible Impacts
SEPP	State Environmental Planning Policy
SEWPAC	Commonwealth Dept. of Sustainability, Environment, Water, Population & Communities (superseded by DOEE)
SIS	species impact statement
SULE	safe useful life expectancy
TEC	threatened ecological community
TPZ	tree preservation zone
TSC Act	*Threatened Species Conservation Act (1995)* – superseded by the *Biodiversity Conservation Act (2016)*
VMP	vegetation management plan

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1. INTRODUCTION

Travers bushfire & ecology has been engaged to undertake an Ecological Assessment Report for the purposes of a BDAR waiver in relation to the State Significance Development (SSD) proposal within Lots 2 and 3 DP16063, Lot 2 DP518877, and Lots C and D DP403467, at 59-67 Karne Street, Narwee within the Canterbury-Bankstown LGA local government area (LGA). The extent of these lots is shown in Figure 1 and will hereafter be referred to as the 'study area'.

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

Figure 1 – Study area

Source: Mecone Mosaic (2022).

The proponent of the SSD proposal is Tony Chung of Opal Healthcare. His contact details are;

- Tony.Chung@opalhealthcare.com.au
- Phone: +61498634991

1.1 Purpose

Biodiversity assessment required for an SSD is described in Section 7.9 of the *BC Act*. Clause 2 of section 7.9 of this Act indicates that an application for development consent for an SSD:

- *is to be accompanied by a biodiversity development assessment report unless the Planning Agency Head and the Environment Agency Head determine that the proposed development is not likely to have any significant impact on biodiversity values.*

The purpose of this Ecological Assessment Report is to determine whether the SSD proposal is likely to have any significant impact on biodiversity values. Under Section 1.5 of the *BC Act*, biodiversity values are defined as:

- vegetation integrity, being the degree to which the composition, structure and function of vegetation at a particular site and the surrounding landscape has been altered from a near natural state
- habitat suitability, being the degree to which the habitat needs of threatened species are present at a particular site

Also, Section 1.4 of the *Biodiversity Conservation Regulation 2017* lists biodiversity values that are not included in the *BC Act.* The listed biodiversity values are described as:

- vegetation abundance, being the occurrence and abundance of vegetation at a particular site
- threatened species abundance, being the occurrence and abundance of threatened species or threatened ecological communities, or their habitat, at a particular site
- habitat connectivity, being the degree to which a particular site connects different areas of habitat of threatened species to facilitate the movement of those species across their range
- threatened species movement, being the degree to which a particular site contributes to the movement of threatened species to maintain their lifecycle
- flight path integrity, being the degree to which the flight paths of protected animals over a particular site are free from interference
- water sustainability, being the degree to which water quality, water bodies and hydrological processes sustain threatened species and threatened ecological communities at a particular site

In addition, Section 1.6 of the *Biodiversity Conservation Regulation* lists the following additional biodiversity impacts:

- the impacts of development on the following habitat of threatened species or ecological communities:
    - karst, caves, crevices, cliffs and other geological features of significance,
    - rocks,
    - human made structures,
    - non-native vegetation,
- the impacts of development on the connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range,
- the impacts of development on movement of threatened species that maintains their lifecycle,
- the impacts of development on water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development),
- the impacts of wind turbine strikes on protected animals,
- the impacts of vehicle strike on threatened species of animals or on animals that are part of a threatened ecological community.

1.1.1 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.

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

Table 1.1 provides an overview the planning, cadastral and topographical details of the study area.

Table 1 – Site features

Location	Lots 2 and 3 DP16063, Lot 2 DP518877, and Lots C and D DP403467 59-67 Karne Street, Narwee
Location description	The site is located approximately 600 m west of John Mountford Reserve. The site is surrounded on the western, eastern and northern sides by existing residential housing, and by the Richard Podmore Dog Park to the south.
Area	0.71 ha
Local government area	Canterbury-Bankstown LGA
Zoning	R3: Medium Density Residential
Grid reference MGA-56	321240E 624279N
Elevation	Approximately 22-28 m AHD
Topography	Lightly sloped from north-east to south-east, no notable topographical features within the study area

Catchment and drainage	The site is sloped from north-east to south-west and water would drain into Richard Podmore Dog Park.
Existing land use	Currently vacant

1.2.2 Landscape features

Table 1.2 examines the landscape features of the proposed development site in accordance with the BAM.

Table 2 – Landscape features

Patch size	>100 ha
IBRA bioregions and subregions	Sydney Basin bioregion – Cumberland subregion
NSW landscape region and area (ha)	Ashfield Plains
Connectivity features	There is poor connectivity to the subject land. There is existing residential development to the north, west and east, while recreational dog park exists to the south.
Geology and soils	Geology; Ashfield Shale. Soils; Birrong fluvial – deep (>250 cm) Yellow Podzolic Soils (Dy2.42, Dy3.12) and Yellow Solodic Soils (Dy3.42) on older alluvial terraces; deep (>250 cm) Solodic Soils (Dy3.42) and Yellow Solonetz (Dy3.43) on current floodplain.

1.2.3 Zoning

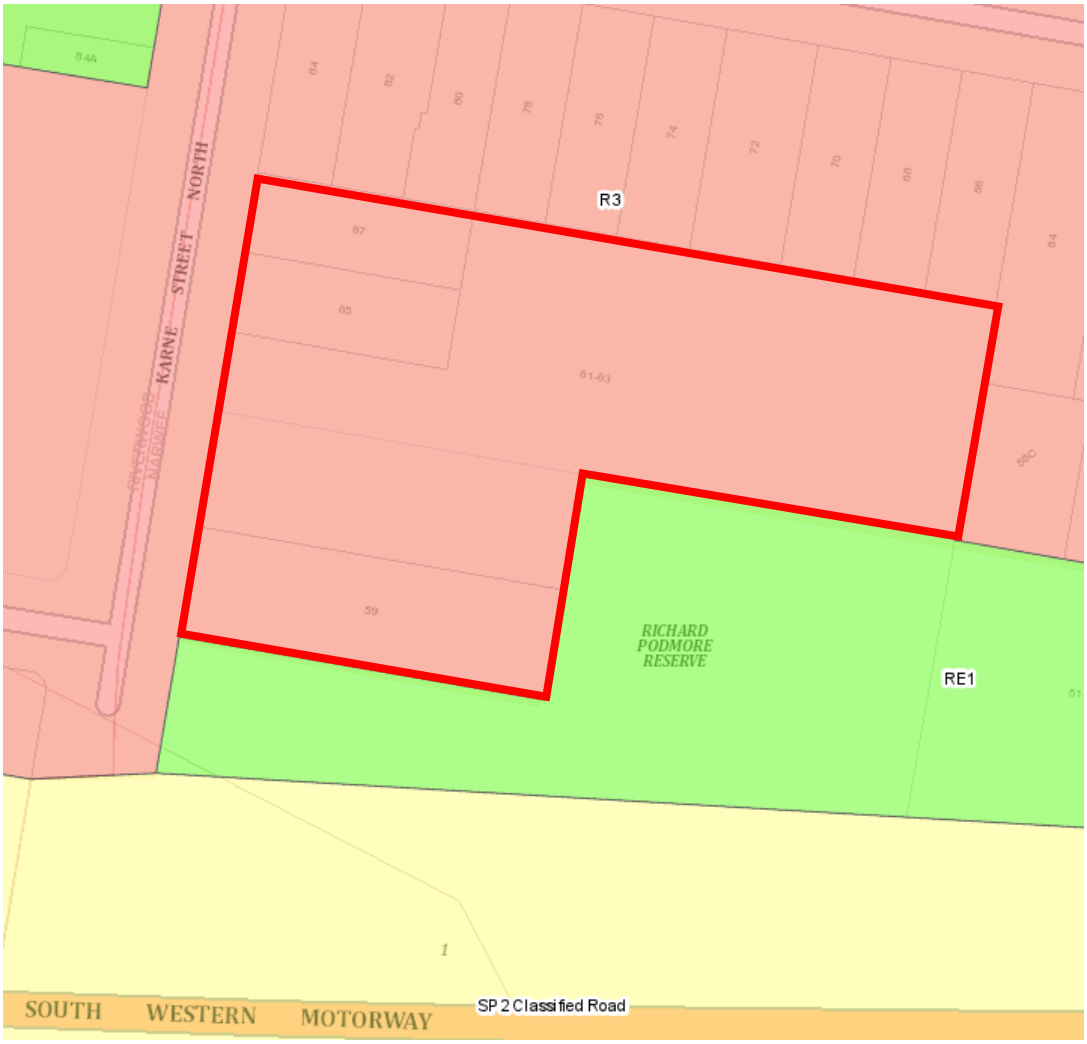

Figure 2 – Zoning

(Source: Planning Portal, 2022)

1.2.4 Proposed development

The proposed development involves the construction of a 165-bed Residential Aged Care Facility (sit plan is shown on Figure 3).

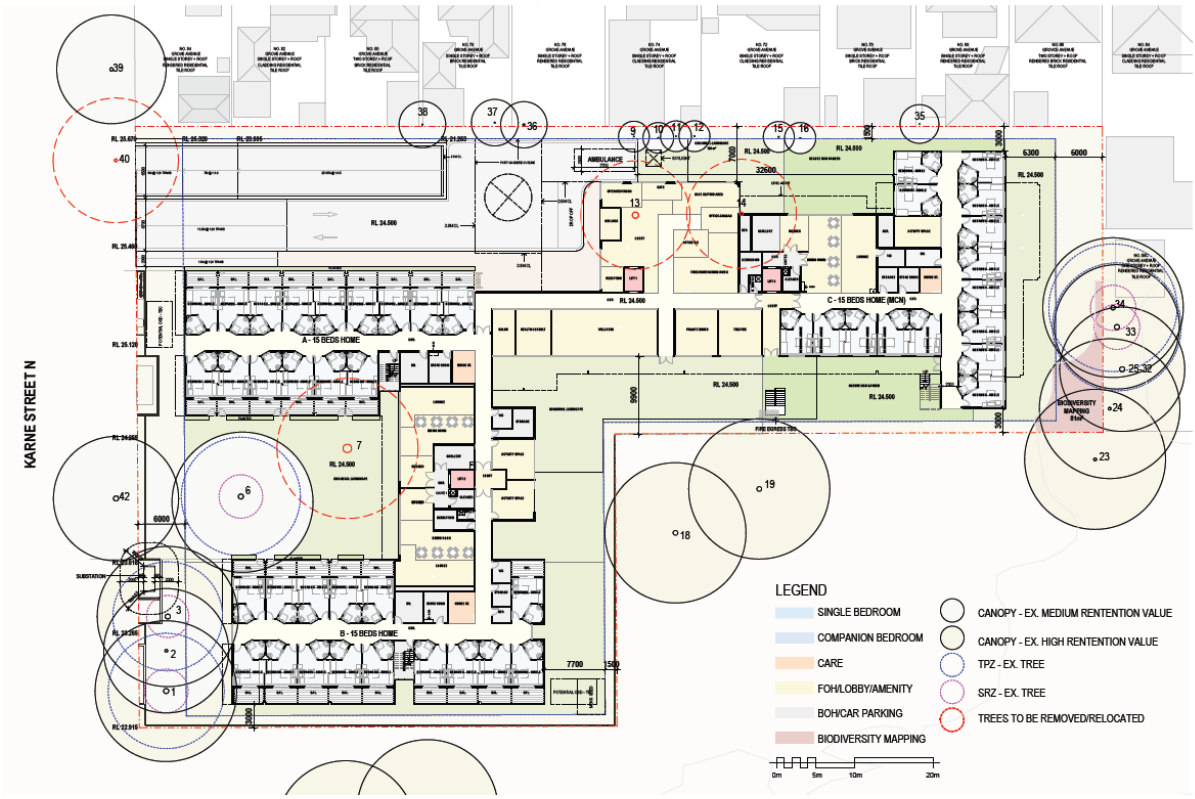

Figure 3 – Site plan (ground floor)

Figure 4 – Flora & fauna survey effort & results

2. IMPACTS ON BIODIVERSITY VALUES

Figure 5 shows that Biodiversity Values Land is mapped to the south east of the proposed development area within Lot 2 DP518877. This mapped area is also shown on Figure 4 in relation to the proposal and recoded biodiversity on site, note mapping of PCT 725 in said location. The mapped BV land appears to be associated with the overhanging *E. tereticornis* trees that are rooted in the adjoining lot. The proposed development has been designed to avoid both the overhanging trees and the mapped BV land. The BV land is also shown on the site plan in purple (Figure 3).

Detailed assessment of biodiversity values in accordance with Table 2 of *How to apply for a biodiversity development assessment report waiver for a Major Project Application* (DPIE 2019).

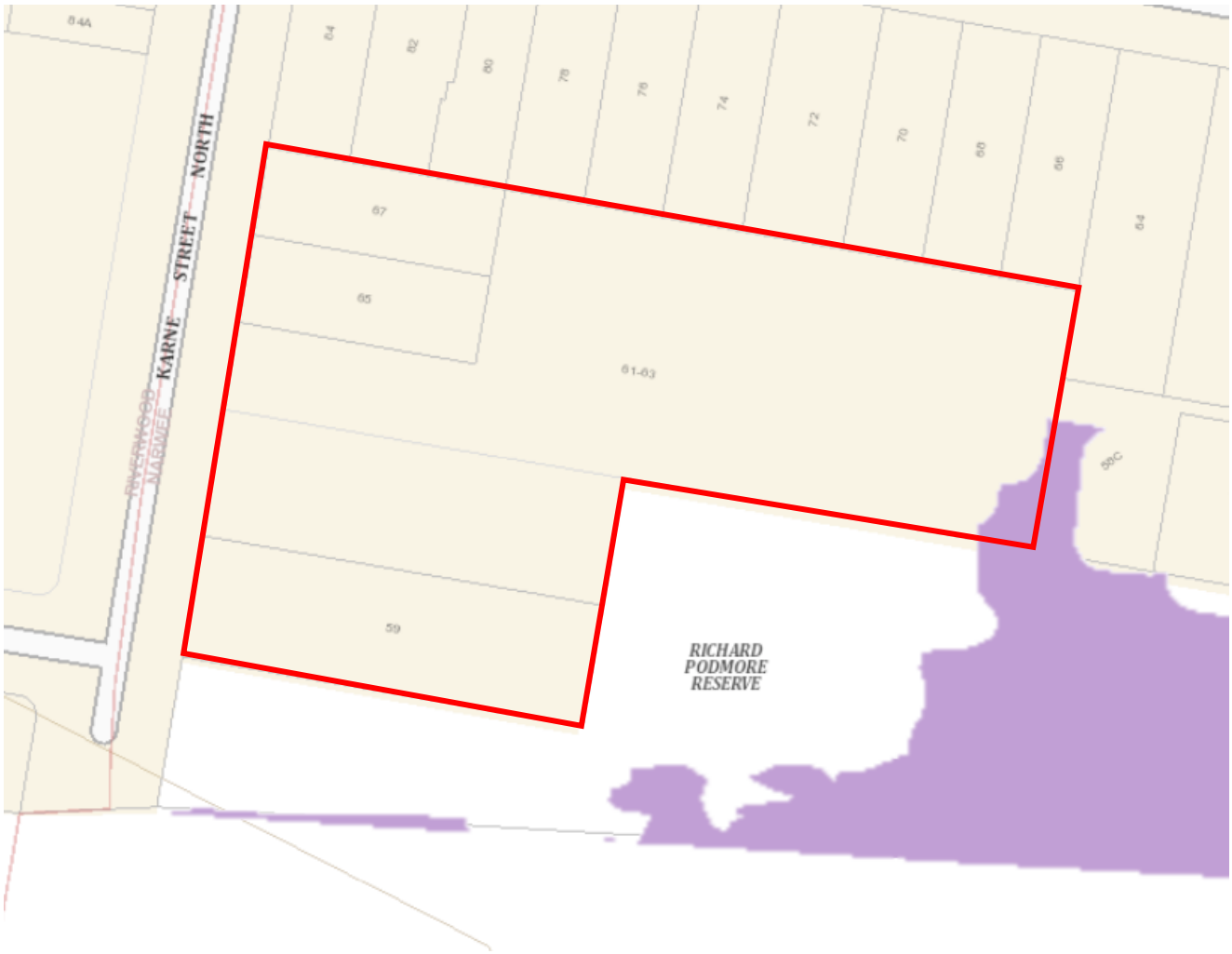

Figure 5 – Biodiversity values map

Table 3 – Impacts of the proposed development on biodiversity values

Biodiversity value	Meaning	Explain and document potential impacts including additional impacts prescribed under the *BC Regulation*
Vegetation abundance – 1.4(b) BC Regulation	Occurrence and abundance of vegetation at a particular site	Aerial imagery from 1975 shows that the site was previously developed. The majority of the site is cleared, while the large trees in the SW portion appear to be present.  *Figure 6 – Aerial imagery of the site from 1975* *(Source: NSW Historical Imagery Viewer)* Site inspection was undertaken on 16 June 2022 over a period of 2.5 hours. This involved identification of vegetation communities on site, searches for threatened flora, and assessment for threatened fauna habitat. Vegetation within the subject lot is comprised mostly of planted native vegetation. Species include *Eucalyptus microcorys, Corymbia maculata, Lophostemon confertus, Acacia* spp. and *Grevillea*

Biodiversity value	Meaning	Explain and document potential impacts including additional impacts prescribed under the *BC Regulation*
		cultivars that would not naturally occur in this location. The lot also contains some planted exotic vegetation and lawns. Some large, apparently remnant, *Eucalyptus tereticornis* are located in the neighbouring lot directly east and overhang the eastern boundary. These trees are mapped by the Sydney Metropolitan Vegetation Mapping as PCT 725, equivalent to Cooks River Castlereagh Ironbark Forest Endangered Ecological Community. These trees will not be impacted by the proposal.  ***Photo 1 – Planted E. microcorys and C. maculata trees in the west of the subject land***

Biodiversity value	Meaning	Explain and document potential impacts including additional impacts prescribed under the *BC Regulation*
		

Photo 2 – Planted native shrubs in the far west of the subject land.

Biodiversity value	Meaning	Explain and document potential impacts including additional impacts prescribed under the *BC Regulation*
		

Photo 3 – Planted Lophostemon confertus in the north of the subject land

Biodiversity value	Meaning	Explain and document potential impacts including additional impacts prescribed under the *BC Regulation*
		

Photo 4 – Subject land facing west

Biodiversity value	Meaning	Explain and document potential impacts including additional impacts prescribed under the *BC Regulation*
		

Photo 5 – Exotic trees along the northern fence line

Biodiversity value	Meaning	Explain and document potential impacts including additional impacts prescribed under the *BC Regulation*
		 ***Photo 7 – Eucalyptus tereticornis trees overhanging the eastern boundary***
Vegetation integrity 1.5(2)(a) BC Act	Degree to which the composition, structure and function of vegetation at a particular site and the surrounding landscape has been	All existing vegetation within the subject land is derived and highly disturbed. Plot data for the planted native vegetation was entered into the BAM public calculator, the results of which are shown in Table 4. The absence of any remnant native vegetation within the subject land, and highly managed midstorey and understorey results in a very low vegetation integrity score of 10.1.

<table>
<tr><th>Biodiversity value</th><th>Meaning</th><th>Explain and document potential impacts including additional impacts prescribed under the BC Regulation</th></tr>
<tr><td></td><td>altered from a near natural state</td><td>

Table 4 – Vegetation integrity of planted native vegetation

Composition condition score	Structure condition score	Function condition score	Current vegetation integrity score
3.9	7.2	37.3	10.1

Vegetation overhanging the eastern boundary appears to be remnant, but would also have a very low vegetation integrity as the midstorey and understorey are absent and highly managed. This vegetation will not be impacted by the proposal.
</td></tr>
<tr><td>Habitat suitability 1.5(2)(b) BC Act</td><td>Degree to which the habitat needs of threatened species are present at a particular site</td><td>

As the site has previously been cleared it provides very low to no potential habitat for threatened species. The whole subject land is highly modified and managed, and there is no potential for threatened flora species.

The only fauna habitat of note is a small hollow within the large *E. microcorys* in the western third of the subject land. Potential threatened species use of this hollow is limited to roosting habitat by threatened microbats. Hollow watching was undertaken for one night on Monday 27th June 2022. Max daily temperature was 15.9°C and min daily temperature was 5.9°C. The survey was conducted from 1645 to 1800. The hollow was c. 7 m high on the main trunk and hollow diameter was c. 10cm. No animals were observed entering or exiting the hollow and there was no sign of use (i.e., no scratches, scats/white wash, chewings etc.). Rainbow lorikeets were observed landing on the hollow entrance and inspecting the hollow but none entered or exited the hollow whilst the survey was undertaken.

The following potential impacts on biodiversity values as a result of the proposal are prescribed (as per clause 6.1 of the *BC Reg*) as biodiversity impacts to be assessed under the biodiversity offsets scheme:

- Karst, caves, crevices, cliffs and other geological features of significance,
</td></tr>
</table>

Biodiversity value	Meaning	Explain and document potential impacts including additional impacts prescribed under the *BC Regulation*
		These features are absent from the site. • Rocks, There are no large rocks within the site. • Human made structures, There are no human-made structures suitable to provide habitat for any threatened species. • Non-native vegetation, Non-native vegetation covers the vast majority of the site. Flowering eucalypts and *Grevillea* plants may provide minor seasonal foraging habitat for nectarivorous species including Grey-headed Flying-fox and Little Lorikeet. This foraging resource is very minor and does not likely contribute important feeding resources for these species given the presence of similar resources within the local area. • Connectivity of different areas of habitat of threatened species that facilitates the movement of those species across their range, As noted above, the site does not contain any connective values between different areas of habitat suitable for use by threatened species. • Movement of threatened species that maintains their lifecycle, The site is isolated on all aspects from areas of native vegetation or habitat by existing roads, buildings, hardstand and open parkland. The site is not of any likely importance for threatened species. As such, the proposal will not impact the movement of any threatened species.

Biodiversity value	Meaning	Explain and document potential impacts including additional impacts prescribed under the *BC Regulation*
		• Water quality, water bodies and hydrological processes that sustain threatened species and threatened ecological communities (including from subsidence or upsidence resulting from underground mining or other development), There are no water bodies present within or nearby the subject land. • Wind turbine strikes on protected animals, The proposal does not involve wind turbines and therefore there will be no impact from wind turbine strikes. • Vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community The proposal is unlikely to increase the chance of vehicle strikes on threatened species of animals or on animals that are part of a threatened ecological community.
Threatened species abundance 1.4(a) BC Regulation	Occurrence and abundance of threatened species or threatened ecological communities (TECs), or their habitat, at a particular site	Overhanging *E. tereticornis* trees are mapped by the Sydney Metropolitan Vegetation Mapping as PCT 725, equivalent to Cooks River Castlereagh Ironbark Forest Endangered Ecological Community. This TEC is highly modified with no native understorey, and will not be impacted by the proposal. No threatened species were recorded or are expected to occur within the subject land. Potential habitat for threatened species is limited to a single small hollow and very minor seasonal foraging habitat for nectarivorous species. These habitat features are unlikely to be of importance for any threatened fauna species. Figure 7 shows BioNet records for threatened fauna within 2 km of the subject lot. There are no threatened fauna records within the lot. All fauna records are flying species and the only one with potential to use the site is Grey-headed Flying Fox: planted native trees may provide very minor seasonal foraging habitat. Figure 8 shows BioNet records for threatened flora within 2 km of the subject lot. There are no threatened flora records within the lot. Records of *Acacia pubescens* are located close by, but no

Biodiversity value	Meaning	Explain and document potential impacts including additional impacts prescribed under the *BC Regulation*
		individuals of this species were observed during site inspection and the site does not provide suitable habitat for seed recruitment due to the highly modified and derived nature of the vegetation present.
Habitat connectivity 1.4(c) BC Regulation	Degree to which a particular site connects different areas of habitat of threatened species to facilitate the movement of those species across their range	The site is isolated on all aspects from areas of native vegetation or habitat by existing roads, buildings, hardstand and parkland. Likewise, the site does not contribute any connectivity values within the landscape. Figure 1 shows local connectivity relative to the study area.
Threatened species movement 1.4(d) BC Regulation	Degree to which a particular site contributes to the movement of threatened species to maintain their lifecycle	The site does not contribute any connectivity values within the landscape and as such does not contribute to the movement of threatened species across the landscape. The proposal will therefore not impact on the threatened species movement.
Flight path integrity 1.4(e) BC Regulation	Degree to which the flight paths of protected animals over a particular site are free from interference	The site is not significant for the flight paths of species that have been recorded in the locality as it already occurs in a highly fragmented landscape. Threatened microbats that may forage in the area are not likely to be impeded by the proposal. Therefore, the proposal is not likely to significantly impact on the ability of flying species to move throughout the locality.
Water sustainability 1.4(f) BC Regulation	Degree to which water quality, water bodies and hydrological	There are no water bodies present within or nearby the subject land. The site is of sufficient distance from natural waterways to avoid impacts (1.7 km), and it is expected that stormwater management will be conducted to avoid impacts to water quality, water bodies and hydrological processes.

Biodiversity value	Meaning	Explain and document potential impacts including additional impacts prescribed under the *BC Regulation*
	processes sustain threatened species and threatened ecological communities at a particular site	

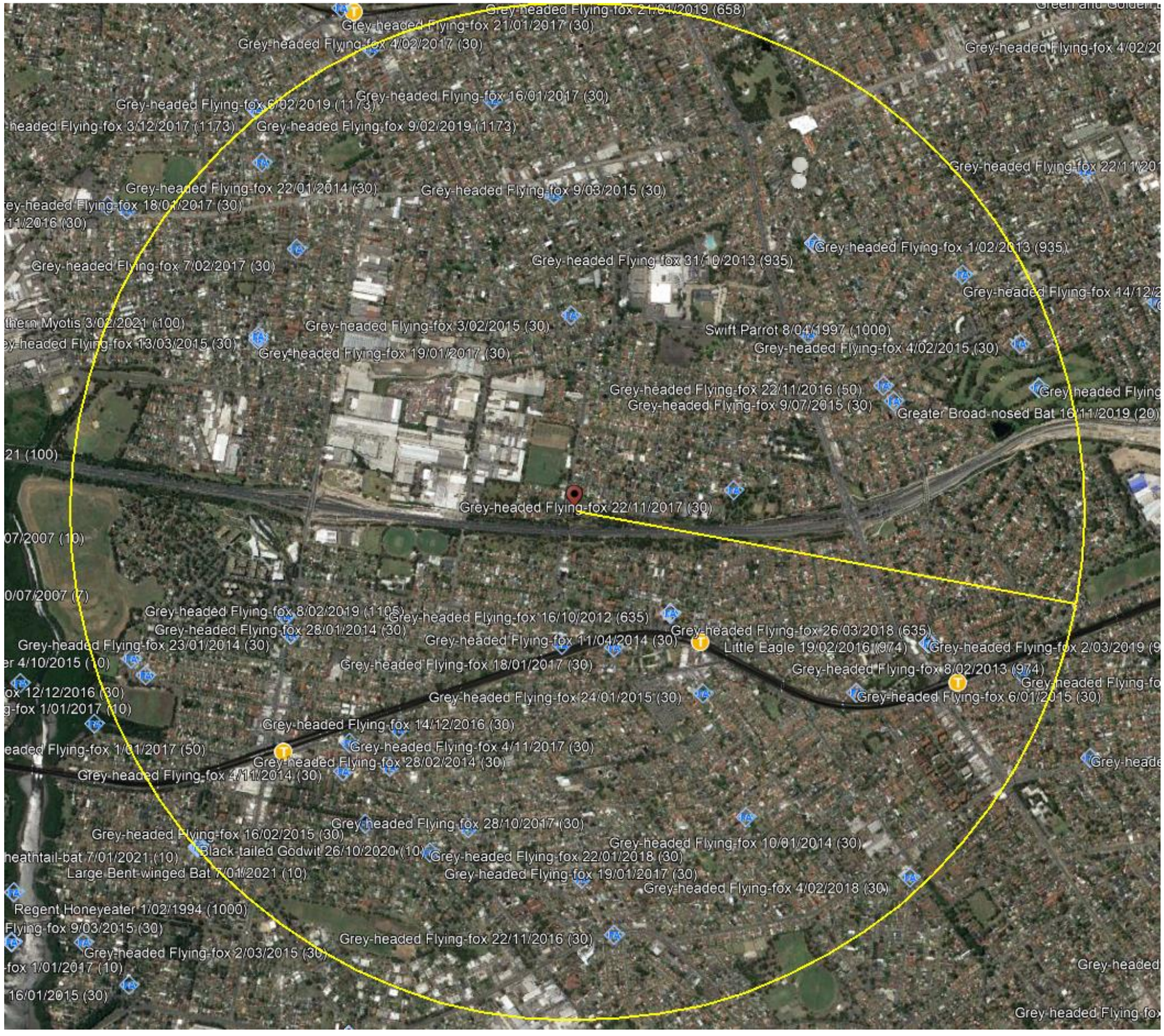

Figure 7 – Threatened fauna records within 2 km (yellow circle)

(Source: BioNet 2022)

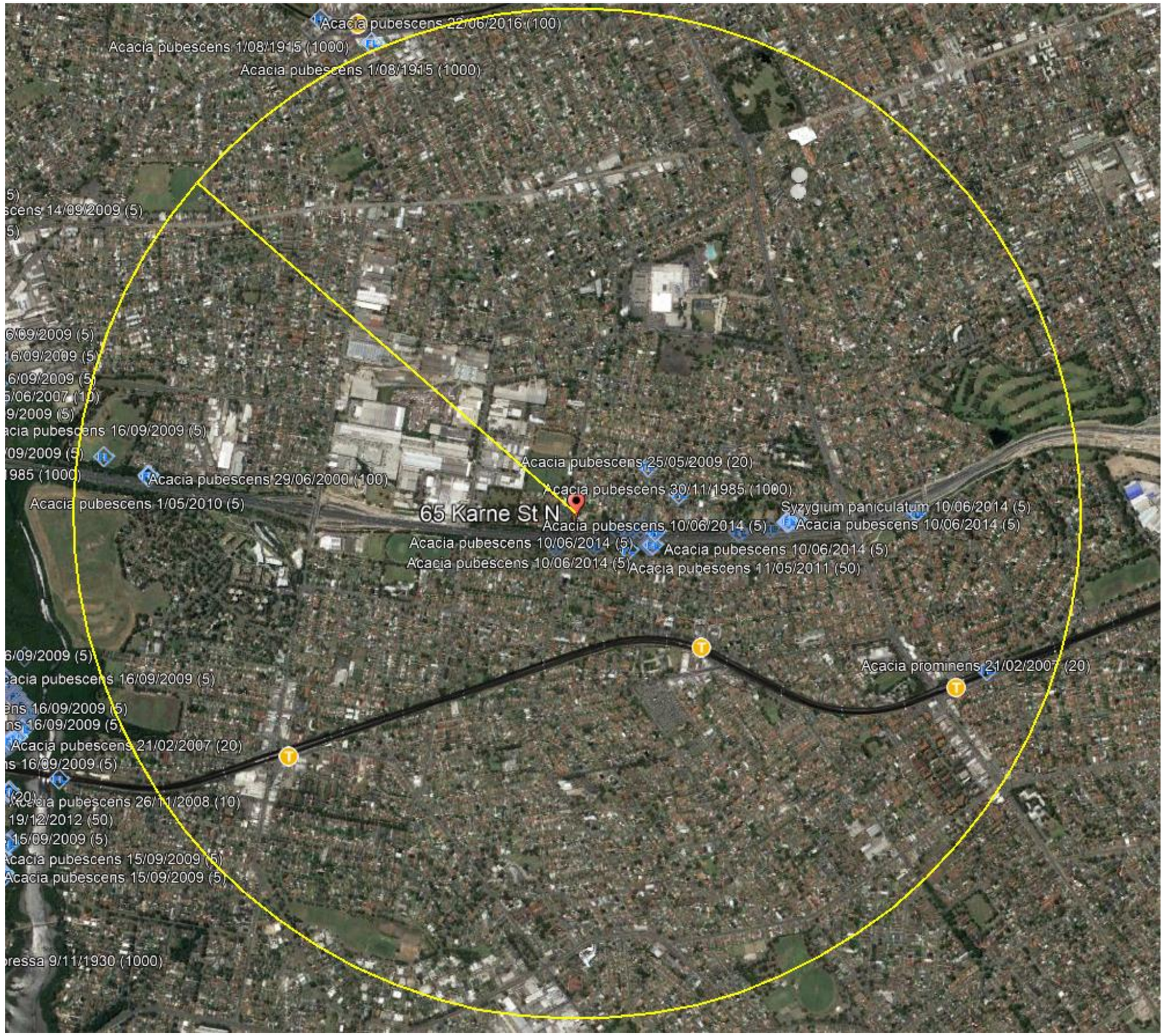

Figure 8 – Threatened flora records within 2 km (yellow circle)

(Source: BioNet 2022)

3. CONCLUSION

Travers bushfire & ecology has completed an Ecological Assessment Report (EAR) for the purposes of a BDAR waiver request in relation to the State Significance Development (SSD) proposal within at 59-67 Karne Street, Narwee within the Canterbury-Bankstown LGA local government area (LGA).

In summary, this assessment has found:

- The site is highly disturbed and previously cleared (Figure 1).
- All vegetation present within the subject lot is derived and a comprised of planted native and exotic species.
- Overhanging, remnant, *E. tereticornis* trees rooted in the neighbouring lot are mapped by the Sydney Metropolitan Vegetation Mapping as PCT 725, equivalent to Cooks River Castlereagh Ironbark Forest Endangered Ecological Community. This vegetation will not be impacted by the proposal.
- No threatened species were recorded or are expected to occur within the subject land. Potential habitat for threatened species is limited to a single small hollow and very minor seasonal foraging habitat for nectarivorous species. These habitat features are unlikely to be of importance for any threatened fauna species.

Based on this assessment, it is concluded that the proposal will not cause a significant impact on biodiversity values including threatened species. As such, a BDAR waiver request should be granted for the proposal.

Appendix 1. STAFF QUALIFICATIONS AND EXPERIENCE

Team member (role)	Accreditations and qualifications	Experience	Employment history	Skills and expertise
George Plunkett (Botanist) – primary author, flora survey	• Biodiversity Assessment Method (BAM) Assessor (Accredited Assessor no. BAAS19010) • PhD – Plant systematics, ecology and evolution • Bachelor of Science (Honours) – Ecology / Botany, University of New England (UNE), NSW • Four-wheel drive vehicle operation • Senior First Aid Certificate	George has 12 years of experience as a plant taxonomist, flora ecologist and botanist, including a PhD in plant systematics, ecology and evolution, and has a very well-developed understanding of the Australian flora.	• 2017-Current: Botanist, Travers bushfire & ecology • 2016-2017: Research Botanist, UNE • 2010-2011: Research Botanist, UNE • 2008-2009: Plant Ecologist, Ecotone Flora Fauna Consultants	• High-quality report writing • Application of the BAM and BOS • Highly experienced in botanical survey and ecological analysis • Plant identification and taxonomy • Flora and fauna assessment • Threatened species, ecological communities and endangered population surveys and analysis • Habitat tree analysis and assessment • Noxious weed identification • Tree assessment
Lindsay Holmes (Manager of Ecology) – report review	• 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
Sandy Cardow (GIS officer) – map preparation	• 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
Lachlan McRae (Fauna ecologist) – fauna survey	• Bachelor of Environmental Science and Management (majoring in Biodiversity and Ecosystems) • Bachelor of Environmental Science and Management HONOURS – 1st Class • Anabat Insight Advanced Workshop – Titley Scientific • Kaleidoscope Pro Advanced Training – Wildlife Acoustics • Drive and Recover a 4WD – Out of Town 4WD • Provide First Aid – St John Ambulance • Trim and Cut Felled Trees and Maintain Chainsaws – Chainsaw Accreditation and Safety • Mammal & Amphibian Handling & Microchipping Training – University of Newcastle and Australian Wildlife Conservancy • Advanced Reptile Keepers Licence	Lachlan has more than 5 years' experience in fauna survey techniques, threatened species target surveys, acoustic data analysis, and active call identification of vertebrate fauna within coastal habitats of NSW. He has specialist bat identification skills and experience leading threatened species field surveys in NSW, SA, & NT.	• 2017: Koala research assist – NSW National Parks and Wildlife Service • 2019 – 2021: Amphibian Research Assistant - University of Newcastle • Jan-Feb 2020: Botanical Intern - Canberra National Herbarium • July-Dec 2021: Ecology and Conservation Intern - Australian Wildlife Conservancy • 2020 – Current: Fauna Ecologist - Travers bushfire & ecology	• Threatened fauna target surveys & assessment • Flora and fauna species identification • Report writing to a high scientific standard • Bioacoustic analysis for all fauna groups • Microbat identification, harp trapping, and reference call collection • Pitfall and radiotracking surveys targeting threatened mammal species • Thorough knowledge of experimental design and statistical analysis

Appendix 2. Plot data

BAM Site – Field Survey Form

Site Sheet no: 1 of

		Survey Name	Zone ID	Recorders			
Date	16/06/22	21CYRE02		CP			
Zone	Datum	Plot ID		Plot dimensions	20 x 50	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	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
Sum of Cover of native vascular plants by growth form group	Trees	
	Shrubs	
	Grasses etc.	
	Forbs	
	Ferns	
	Other	
High Threat Weed cover		

BAM Attribute (1000 m² plot)		
DBH	# Tree Stems Count	# Stems with Hollows
80 + cm	1	1
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)	11 (2) Tally space	

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	0	60	85	2	a	b	c	d	e	a	b	c	d	e	a	b	c	d	e
Average of the 5 subplots																				

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)

400m² plot: Sheet of	Survey Name	Plot Identifier	Recorders
Date 16/6/2022	21CYRE02 Narrogin	P1	GP

GF	Top 3 natives in each GF: Full species name mandatory. All others where practicable	N	E	HTE	Cover %	Abund	voucher
	1 Corymbia maculata	✓			8	1	
	2 Acacia parramattensis	✓			4	1	
	3 Grevillea ~~robusta~~ cultivar - knoxfieldiana	✓			3	1	✓
	4 Acacia - pinaroo - baileyana	✓			5	2	✓
	5 Acacia - hakeoides - iteaphylla		✓		4	2	✓
	6 Stenotaphrum secundatum			✓	10	1000	
	7 Cenchrus clandestinus			✓	4	500	
	8 Ehrharta erecta			✓	6	100	
	9 Taraxacum officinale		✓		0.1	20	
	10 Conyza bonariensis		✓		0.1	10	
	11 Consolida ajacea	✓			1	20	
	12 Cupressus sp.		✓		4	2	
	13 Bidens pilosa			✓	0.1	20	
	14 Cynodon dactylon	✓			5	500	
	15 Cirsium vulgare		✓		0.1	5	
	16 Arctotheca calendula			✓	0.1	1	
	17 Sonchus oleraceus		✓		0.1	10	
	18 Bromus catharticus		✓		2	50	
	19 Silver Wattle - Acacia podalyriifolia	✓	✓		3	1	✓
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GF Code: see growth form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF – circle code of 'top 3'
Cover: 0.1, 0.2, 0.3..... 1, 2, 3 ..... 10, 15, 20, 25 .....100% (foliage cover): ***Note:*** *0.1% cover = 63 x 63 cm or a circle 71 cm across, 0.5% cover = 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10m.* **Abundance:** 1, 2, 3...10, 20, 30....100, 200...1000...