West Gables Planning Proposal
Biodiversity Certification Assessment Report

Stockland Development Pty Ltd

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Project Name	West Gables Planning Proposal – Biodiversity Certification Assessment Report
Project Number	22SYD1514
Project Manager	Geraint Breese
Accredited Assessor Certification	I certify that this report has been prepared on the basis of the requirements of, and information provided under, the Biodiversity Assessment Method and s.6.15 of the BC Act. In preparing this assessment I have acted in accordance with the Accredited BAM Assessor Code of Conduct. declare that I have considered the circumstances and there is no actual, perceived, or potential conflict of interest.  **Stacey Wilson** (BAAS22030) 6 December 2022
Prepared by	Alice Ridyard and Stacey Wilson (BAAS22030)
Reviewed by	Alex Gorey (BAAS#22003) and David Bonjer
Approved by	**David Bonjer**
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Template 2.8.1

Executive Summary

Eco Logical Australia Pty Ltd (ELA) was engaged by Stockland Development Pty Ltd to prepare this Biodiversity Certification Assessment Report for the rezoning and future development of a parcel of land proposed for biodiversity certification (the Biodiversity Certification Assessment Area) at Pitt Town and Boundary Road, Gables (the West Gables site). The Biodiversity Certification Assessment Area (BCAA) area includes the following lots:

- Lot 13 DP 255616
- Lot 14 DP 255616
- Lot 12 DP 1157044
- Lot 2 DP 39157
- Lot 3 DP 39157
- Lot 4 DP 39157
- Lot 5 DP 39157
- Lot 6 DP 39157
- Lot 2 DP 1213569
- Lot 1 DP 1213569
- Lot 20 DP 609902
- Lot 21 DP 609902
- Lot 10A DP 39157

The proposed BCAA is bordered by Pitt Town Road to the south and Boundary Road to the west, with future residential communities to the north, east and south.

The BCAA predominantly consisted of exotic grasslands, however, field survey identified scattered remnant and regrowth vegetation including three native plant community types:

- PCT 849 - *Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion* (Cumberland shale plains woodland)
- PCT 1395 - *Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion* (Cumberland shale - sandstone Ironbark forest)
- PCT 1071 - *Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion*

Two of these communities align with Threatened Ecological Communities (TEC) being: PCT 849 which aligns with the final determination for *Cumberland Plain Woodland in the Sydney Basin Bioregion* listed as Critically Endangered under the NSW *Biodiversity Conservation Act 2016* (BC Act)*;* and PCT 1395 which aligns with the final determination for the BC Act Critically Endangered Ecological Community *Shale Sandstone Transition Forest in the Sydney Basin Bioregion.* These PCTs also correspond to critically endangered communities under the *Environmental Protection Biodiversity Conservation Act 1999* (EPBC). However, the PCTs within the BCAA did not conform to the listing criteria primarily due to having <30% native groundcover.

No threatened flora species were recorded during targeted surveys.

Three threatened microchiropteran bats were recorded as definitely present across the BCAA during surveys including;

- *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat) – ecosystem credit species
- *Miniopterus orianae oceanensis* (Large Bent-winged Bat) – dual credit species
- *Myotis macropus* (Southern Myotis) – species credit species

And an additional four threatened microbat species were also deemed to be potentially present, including;

- *Falsistrellus tasmaniensis* (Eastern False Pipistrelle) – ecosystem credit species
- *Saccolaimus flaviventris* (Yellow-bellied sheath-tail bat) – ecosystem credit species
- *Scoteanax rueppellii* (Greater Broad-nosed Bat) – ecosystem credit species
- *Vespadelus troughtoni* (Eastern Cave Bat) – species credit species

Of these fauna species, only one requires offset to be calculated for impacts to habitat, being Southern Myotis. A species polygon has been provided for Southern Myotis and offsets calculated. Ecosystem credit species do not require the preparation of a species polygon. Dual credit species and species credit species require the preparation of a species polygon, unless there is no breeding habitat within the BCAA or within 2km of the BCAA. No breeding habitat such as caves, cliffs, disused mines or tunnels were present within the BCAA or within 2 km of the BCAA. Therefore, no species polygon For Eastern Cave Bat, and Large Bent-winged Bat was required. In addition, a hollow bearing tree (HBT) was identified in the south western portion of the BCAA. The hollow was >20 cm and was assumed to provide potential habitat for:

- *Ninox connivens* (Barking Owl)
- *Ninox strenua* (Powerful Owl)
- *Tyto novaehollandiae* (Masked Owl)
- *Tyto tenebricosa* (Sooty Owl)

A targeted owl survey was not completed, therefore the presences of these species has been assumed.

Portions of remnant vegetation are proposed for retention as Open Space Areas within the proposed BCAA. Impacts of clearing of native vegetation within the BCAA will require a total of 276 Ecosystem credit for PCTs 849, 1395 and 1071. A total of 121 species credits are required *Myotis macropus* (Southern Myotis), six (6) species credits for *Ninox connivens* (Barking Owl), six (6) species credits for *Ninox strenua* (Powerful Owl), six (6) species credits for *Tyto novaehollandiae* (Masked Owl) and ten (10) species credits for *Tyto tenebricosa* (Sooty Owl)

The proponent is proposing to meet their credit obligation by purchasing credits off the market or paying into the Biodiversity Conservation Fund.

Contents

List of Figures

List of Tables

Abbreviations

Table 1: Abbreviations

Abbreviation	Description
BAM	Biodiversity Assessment Method
BCAA	Biodiversity Certification Assessment Area
BAMC	Biodiversity Assessment Method Credit Calculator
BC Act	NSW *Biodiversity Conservation Act 2016*
BCAR	Biodiversity Certification Assessment Report
BDAR	Biodiversity Development Assessment Report
DCP	Development Control Plan
CEEC	Critically Endangered Ecological Community
CEMP	Construction and Erosion Management Plan
DCCEEW	Commonwealth Department of Climate Change, Energy the Environment and Water
DPE	NSW Department of Planning and Environment
DPIE	NSW Department of Planning, Industry and Environment (repealed, now DPE)
EEC	Endangered Ecological Community
ELA	Eco Logical Australia Pty Ltd
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
FM Act	NSW *Fisheries Management Act 1994*
GIS	Geographic Information System
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
LEP	Local Environmental Plan
LGA	Local Government Area
NSW	New South Wales
PCT	Plant Community Type
SEPP	State Environmental Planning Policy
TEC	Threatened Ecological Community
VIS	Vegetation Information System
WM Act	NSW *Water Management Act 2000*

1. Background and context to the assessment

This Biodiversity Certification Assessment Report (BCAR) has been prepared by Alice Ridyard and Stacey Wilson, an Accredited Person (BAAS22030) to apply the Biodiversity Assessment Method (BAM) under the NSW *Biodiversity Conservation Act 2016* (BC Act). All credit calculations have been undertaken using the BAM Calculator (BAMC) version 50 in parent case number 00030985.

Definitions of terminology used throughout this report are presented in Appendix A.

1.1.1. General description of the project area

This BCAR assesses the impacts of the proposed rezoning and future development of a parcel of land proposed for biodiversity certification, hereby referred to as the biodiversity certification assessment area (BCAA), at Pitt Town and Boundary Road, Gables (the West Gables site). The BCAA is defined in Figure 1, Figure 2 and Figure 3, part of which will be retained and managed for open space recreation.

This BCAR is to support a planning proposal which is to be submitted to The Hills Shire Council for the rezoning of the BCAA. The BCAA incorporates the following lots:

- Lot 13 DP 255616
- Lot 14 DP 255616
- Lot 12 DP 1157044
- Lot 2 DP 39157
- Lot 3 DP 39157
- Lot 4 DP 39157
- Lot 5 DP 39157
- Lot 6 DP 39157
- Lot 2 DP 1213569
- Lot 1 DP 1213569
- Lot 20 DP 609902
- Lot 21 DP 609902
- Lot 10A DP 39157

The proposed BCAA is bordered by Pitt Town Road to the south and Boundary Road to the west, with future residential communities to the north, east and south.

The BCAA is dominated by cleared areas which primarily consist of exotic pastures. However, remnant native plant communities occur in patches throughout the BCAA. The BCAA also includes residential dwellings, farm buildings and associated landscaped areas.

The BCAA is located entirely within the Cumberland Plain NSW (Mitchell) landscapes (Figure 2). The landscape is typified by Low rolling hills and valleys in a rain shadow area between the Blue Mountains and the coast on horizontal Triassic shales and lithic sandstones. This landscape is defined by organic sand and mud in lagoons and swamps uniform red to brown clays on volcanic hills grading to yellow harsh texture-contrast soils in valleys. (DECC 2002).

This report includes two base maps, the Site Map (Figure 1) and the Location Map (Figure 2). The area proposed for biodiversity certification is shown in Figure 3.

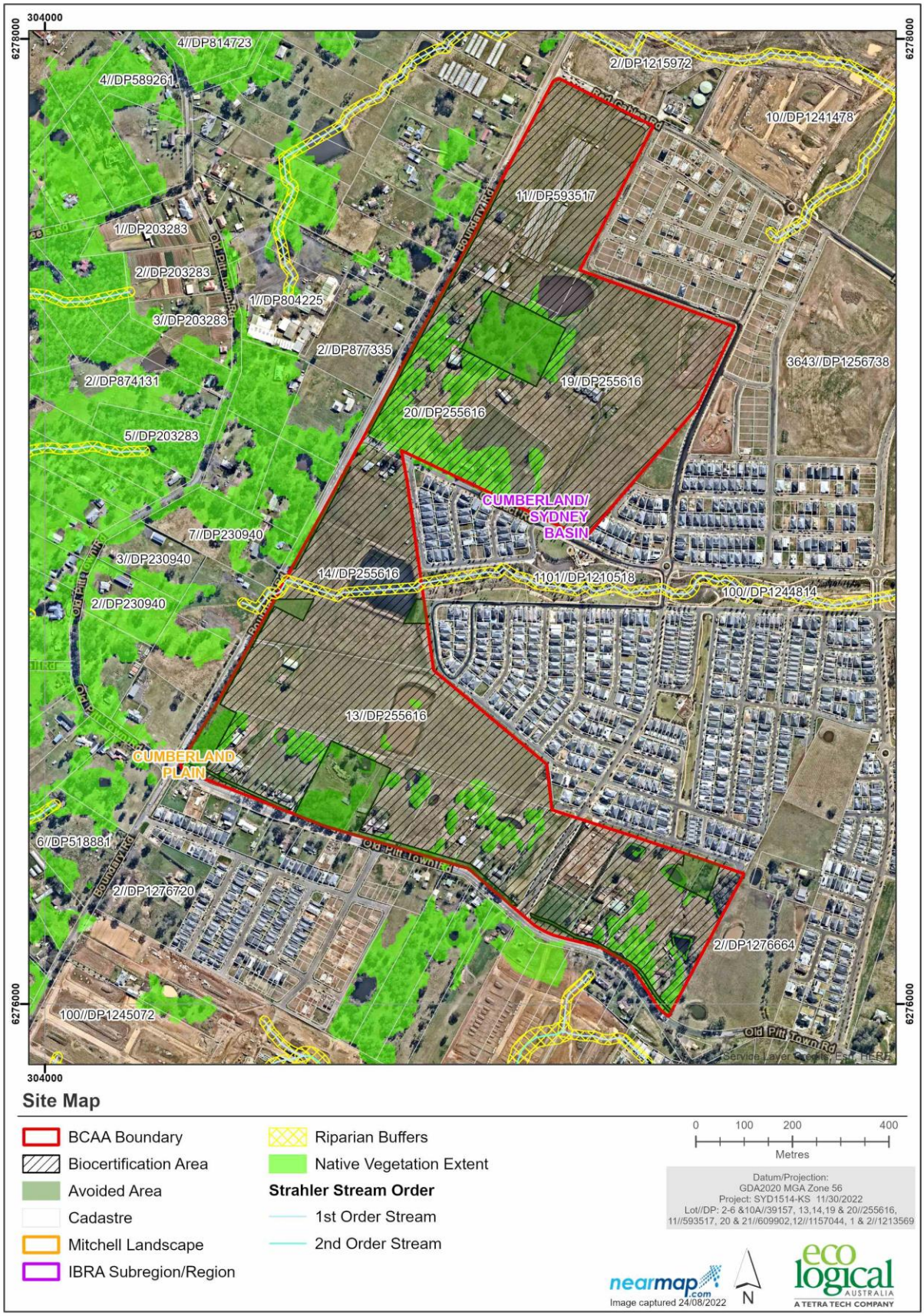

Figure 1: Site Map

Figure 2: Location Map

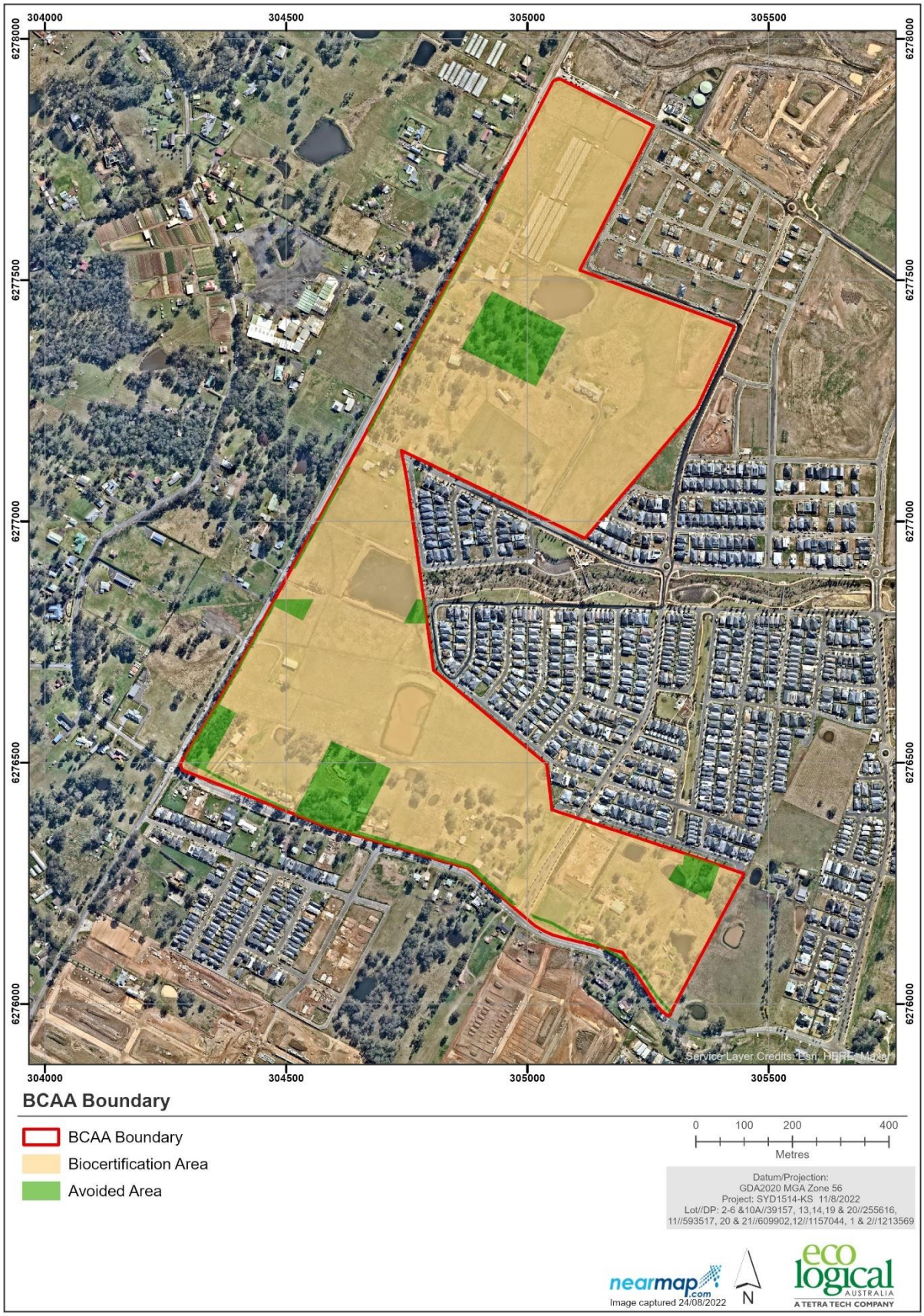

Figure 3: BCAA boundary, Proposed Certified land and Open Space Areas

1.1.2. Biodiversity Certification Assessment Area

The current zoning of the BCAA is comprised of land zoned RU6 Transition under *The Hills Local Environmental Plan 2019* (The Hills LEP) (Figure 4). This biodiversity certification application will accompany a planning proposal to rezone land within the BCAA for future residential and recreational land uses. The BCAA is proposed to be rezoned to R3 Medium Density Residential and RE1 Public Recreation land use zones.

An outline of the BCAA and concept plan footprint are presented in Figure 5 and Figure 6**.**

1.1.3. Sources of Information Used

The following information sources were reviewed as part of this report:

- Aerial mapping (SIXMaps and Nearmap)
- Biodiversity Assessment Method Calculator (Version 50)
- BioNet Vegetation Classification (2022)
- Biodiversity Values Map and threshold tool (online) (DPE 2022a) (Accessed 25 March 2022)
- BioNet Threatened Biodiversity Data Collection (TBDC)
- BioNet / Atlas of NSW Wildlife 5 km database search (NSW Department of Planning and Environment (DPE) accessed 23 March 2022)
- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act Protected Matters Search Tool 5 km database search (Department of Climate Change, Energy, the environment and Water (DCCEEW 2022) (Accessed 23 March 2022).
- Geographic information system (GIS) datasets including soil, topography, geology and drainage
- NSW Survey Guide for Threatened Frogs A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method (DPIE 2020a)
- Department of Planning and Environment (DPE 2022b) Register of Declared Areas of Outstanding Biodiversity Value
- Department of Sustainability, Environment, Water, Population and Communities. (SEWPAC). 2013. Interim Biogeographic Regionalisation for Australia (IBRA), Version 7 (Regions). Bioregional Assessment Source Dataset. August 2021.
- Department of Planning, Industry and Environment (DPIE) 2016. NSW (Mitchell) Landscapes - version 3.1.
- 'Species credit' threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Method (OEH 2018)
- Surveying threatened plants and their habitats – NSW survey guide for the Biodiversity Assessment Method (DPIE 2020b)
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities Working Draft (Department or Environment and Conservation (DEC) 2004).
- Department of the Environment, Water, Heritage and the Arts (DEWHA) (now DCCEEW) 2009. Approved Conservation Advice for Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest ecological community. Canberra, ACT: Department of the Environment, Water, Heritage and the Arts.
- State of NSW and Department of Planning, Industry and Environment 2022. Soil Landscapes from espade.environment.nsw.gov.au.
- NSW Seamless Geology Data Package 2021

- The Hills Local Environmental Plan (LEP) 2019 and
- The Hills Development Control Plan (DCP) 2012.
- National Flying-fox monitor viewer (DCCEW 2022b) (Accessed 23 March 2022)

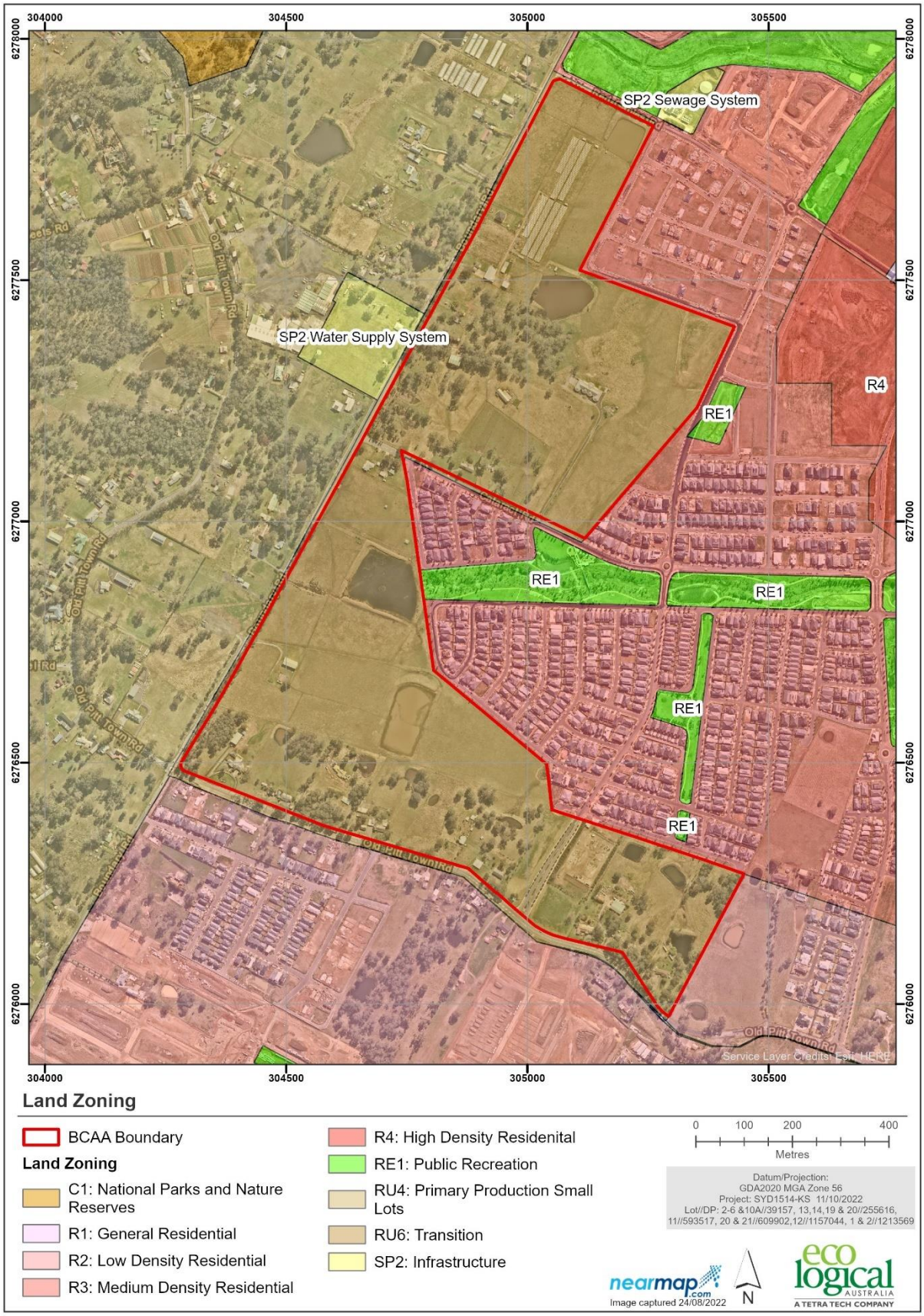

Figure 4: BCAA and current Land Zoning

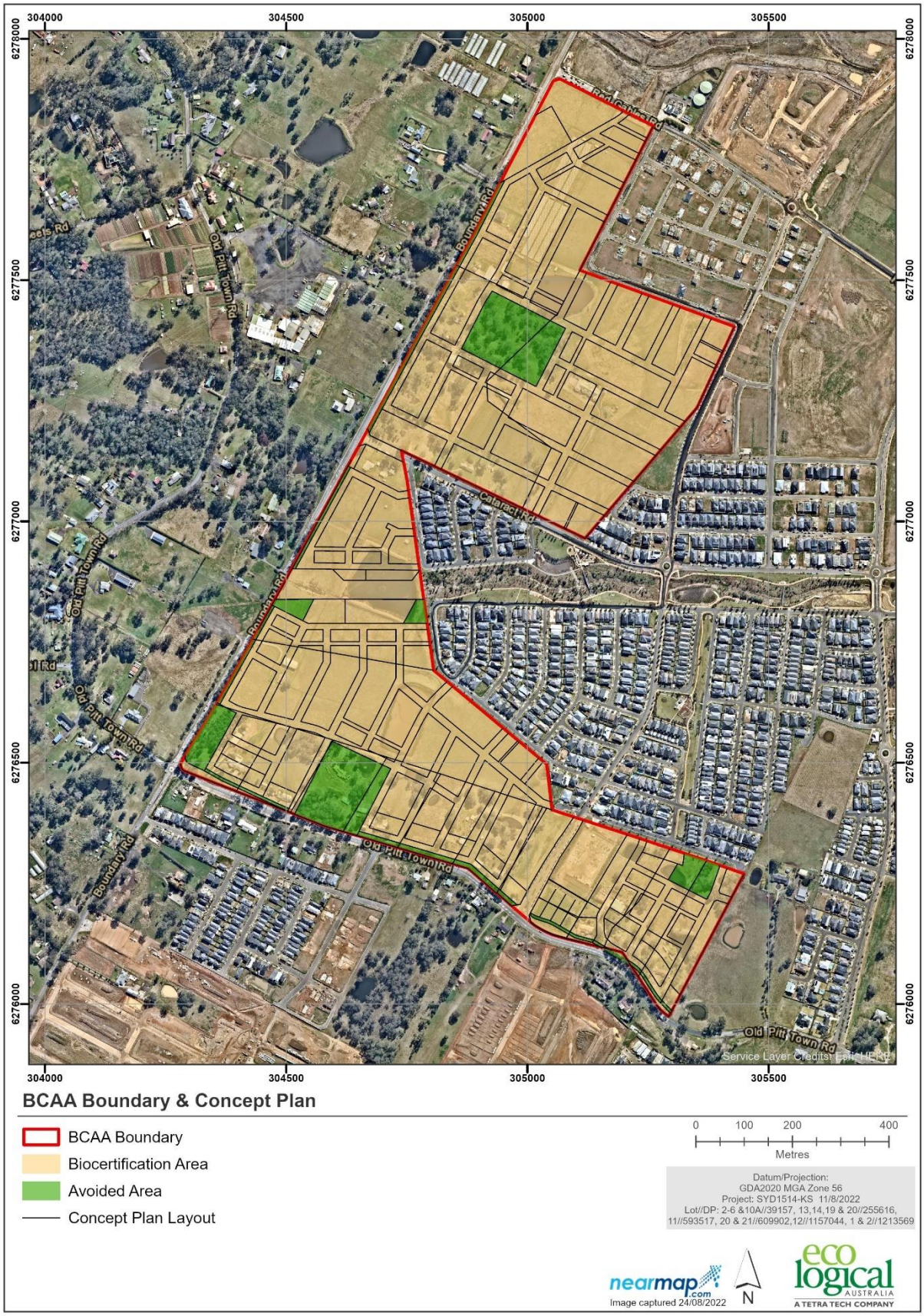

Figure 5: BCAA and Concept Plan

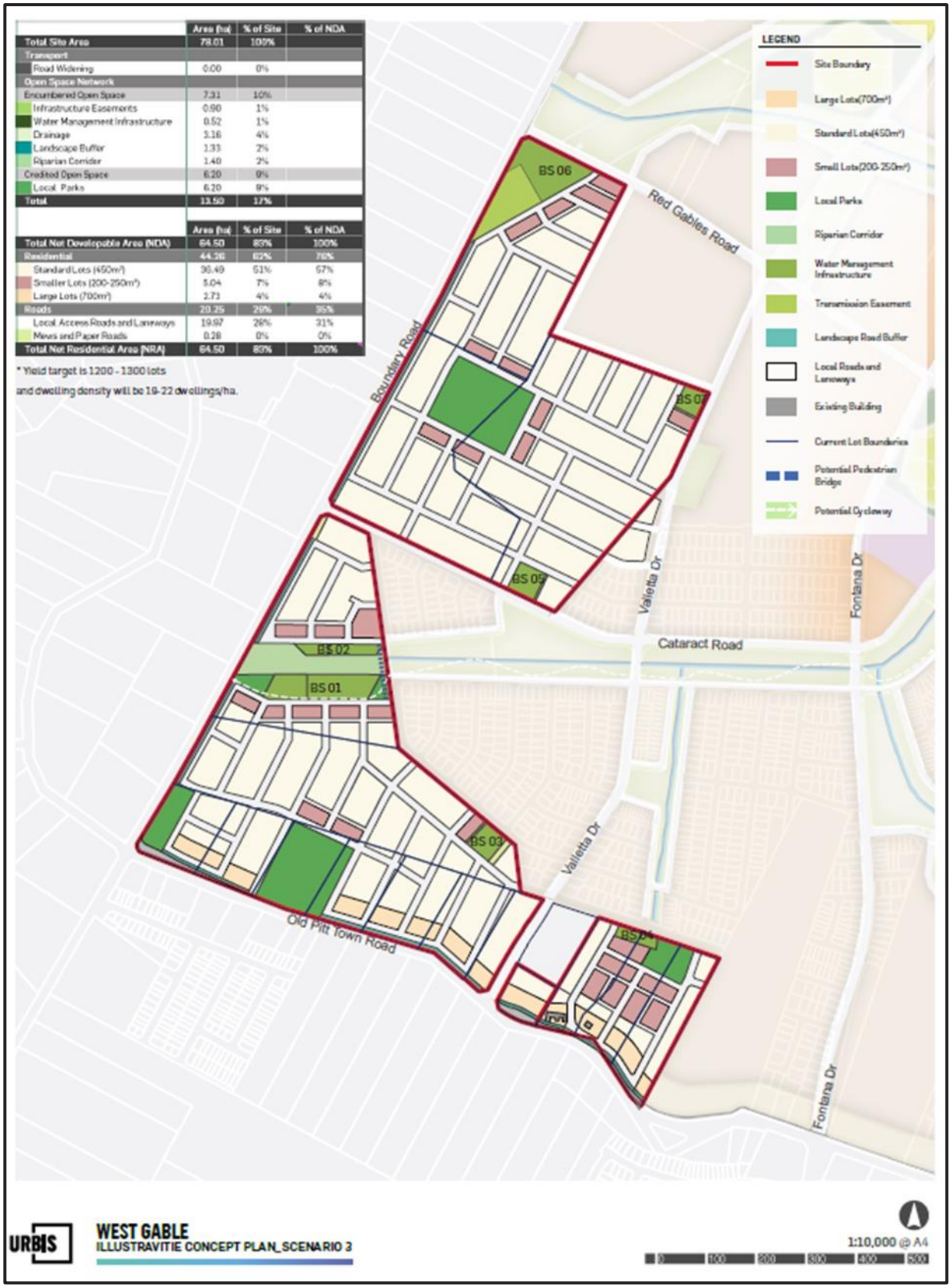

Figure 6 Draft Concept Plan for the West Gables planning proposal (URBIS 2022)

Legislative Context

Table 2: Legislative context relevant to the BCAA

Legislation	Relevance to the project
	Commonwealth
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Matters of National Environmental Significance (MNES) have been identified on or near the BCAA. Whilst a Planning Proposal is not considered an 'action' under the EPBC Act, this report assesses impacts to MNES and concludes that the development, if it were to proceed consistent with the planning proposal, is unlikely to have a significant impact on MNES.
	State
Environmental Planning and Assessment Act 1979 (EP&A Act)	This BCAR has been prepared in support of a rezoning planning proposal. The planning proposal is to be assessed in accordance with division 3.4, s 3.34 of the EP&A Act. The BCAR (this report) has been prepared for the biodiversity certification of the BCAA, which will be determined under Part 8 of the BC Act and is discussed in this table below.
Biodiversity Conservation Act 2016 (BC Act)	Biodiversity certification of the BCAA has been proposed in accordance with Part 8 of the BC Act. This report has been prepared to satisfy requirements of the BC Act and Biodiversity Assessment Method (BAM) relating to biodiversity certification.
Fisheries Management Act 1994 (FM Act)	The BCAA does not contain areas mapped as Key Fish Habitat (KFH) under the FM Act. Any future development within the BCAA will not involve impacts to KFH, will not involve harm to marine vegetation, dredging, reclamation or obstruction of fish passage. A permit or consultation under the FM Act is unlikely to be required at the DA stage.
Water Management Act 2000 (WM Act)	The proposal will impact waterfront land. Therefore, a controlled activity approval will be required when development consent is sought.
	Planning Instruments
State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP)	The BCAA does not contain any land mapped as Coastal Wetland, Coastal Wetlands Proximity Area and Coastal Environment Area under the Resilience and Hazards SEPP. No further consideration is required.
State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Biodiversity and Conservation SEPP)	The Biodiversity and Conservation SEPP provides an assessment process that is applicable at the Development Application stage. It is therefore not applicable to a Planning Proposal under Part 3 of the EP&A Act. If the site is biodiversity certified, the SEPP will not apply to the biodiversity certified land as per the BC Act. However, the following information on koala habitat is provided: The Biodiversity and Conservation SEPP came into effect on March 1, 2022, replacing the now repealed *State Environmental Planning Policy (Koala Habitat Protection) 2021* (Koala Habitat Protection SEPP), which aims to encourage the proper conservation and management of areas of natural vegetation, including areas that provide habitat for *Phascolarctos cinereus* (Koala) to ensure a permanent free-living population over their present range and reverse the current trend of Koala population decline. Developers of land with Koala habitat must consider the impact of their proposal on Koalas, and in certain circumstances, prepare individual Koala plans of management for their land. The proposed development is not located within a Local Government Area to which the Koala Habitat Protection Chapter applies.
The Hills Local Environment Plan 2019 (The Hills LEP)	The BCAA contains RU6 (Transition) zoned land under The Hills LEP. The objectives of RU6 zoning are as follows:

Legislation	Relevance to the project
	• *To protect and maintain land that provides a transition between rural and other land uses of varying intensities or environmental sensitivities.* • *To minimise conflict between land uses within this zone and land uses within adjoining zones.* • *To encourage innovative and sustainable tourist development, sustainable agriculture and the provision of farm produce directly to the public.* • *To ensure that development does not have a detrimental impact on the rural and scenic character of the land.* The proposal seeks to rezone RU6 Transition land to R3 Medium Density Residential and RE1 Public Recreation zoning. The Terrestrial Biodiversity clause in The Hills LEP 2019 does not apply to the site.

BAM Stage 1: Biodiversity Assessment

2. Landscape features and site context

The assessment area is shown in Figure 2, it is an area of 1500 m around the centre of the BCCA. This has been used to identify the site context components and landscape features, descriptions of this are provided in Table 3.

Table 3: Landscape features

Landscape feature	Description	Data Source
IBRA Region(s)	Sydney Basin	Interim Biogeographic Regionalisation for Australia, Version 7
IBRA Subregion(s)	Cumberland	Interim Biogeographic Regionalisation for Australia, Version 7
NSW (Mitchell) Landscapes	There is one Mitchell Landscapes present in the BCAA: Cumberland Plain	NSW (Mitchell) Landscapes - version 3.1 (DPIE 2016)
Rivers and streams	The following watercourses are present in the BCAA • 1st order stream	NSW LPI Waterway mapping
Estuaries and wetlands	No wetlands occur in the BCAA or in proximity to the BCAA.	NSW directory of important wetlands
Connectivity of different areas of habitat	The BCAA contains several connectivity features consisting of native vegetation and habitat. This connectivity may be used by several more mobile species, largely being diurnal birds and larger mammals. (see Figure 2). In addition to this vegetation connectivity, an unnamed 1st order stream runs through the BCAA from the west, allowing for potential connectivity for some aerial species such as microbats.	Aerial imagery
Geological features of significance and soil hazard features	The BCAA does not contain areas mapped as having Acid Sulfate Soils.	Aerial imagery Site Assessment
Areas of Outstanding Biodiversity Value	No areas of outstanding biodiversity value have been declared within the BCAA.	Register of Declared Areas of Outstanding Biodiversity Value (DPIE 2021)
Percent (%) native vegetation extent	The BCAA is approximately 80.26 ha and contains approximately 11.14 ha of native vegetation. The assessment area is 1569.01 ha and comprises 404.7 ha of native vegetation. The native vegetation cover is 26 % across the assessment area. There are no differences between the mapped vegetation extent and the aerial imagery.	Calculated using aerial imagery and ArcGIS software

Landscape feature	Description	Data Source
Patch Size	Patch size was calculated using available vegetation mapping for all patches of intact native vegetation on and adjoining the BCAA boundary. The patch size is greater than 100 ha (the maximum patch size class within the BAM). Therefore, a patch size of 101 ha has been used for the assessment.	Calculated using aerial imagery and ArcGIS software

3. Native Vegetation

3.1. Survey Effort

3.1.1. Plant Community Type Mapping

Initial vegetation survey was undertaken within the BCAA by ELA ecologists Leura Kowald and Melinda Westcook on 7 July 2021 and by Diane Campbell and Timothy Maher on 12 April 2022. This initial vegetation validation survey allowed for rapid identification of Plant Community Types (PCTs) and potential habitat for threatened species within the BCAA.

3.1.2. BAM Vegetation Integrity Plots

A total of nine full-floristic and vegetation integrity plots were surveyed to further validate and identify the PCTs on site and determine condition, consistent with the BAM, for the purpose of the BCAR. A summary of data collected for the full-floristic and vegetation integrity plots supporting the BCAR includes:

- Site ID
- Name of recorder(s)
- Date
- Plot orientation, and aspect
- Easting and northing at either end of the 50 m transect
- A plot-based 400 m^2 full floristic survey
- A plot and transect survey (20 x 50).

Within the 20 m x 20 m quadrat, the following data was collected at each plot-based full floristic survey site:

- Species scientific name
- Stratum (& layer): in which each species occurs
- Cover: an estimate of the appropriate cover measure for each recorded species: from 1-5% and then to the nearest 5%
- Abundance: A relative measure of the number of individuals or shoots of a species within the plot using the following intervals: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 50, 100, 500, 1000, or specify a number greater than 1000 if required
- Form: (T) Tree; (S) Shrub; (G) Grass and grass like (F) Forb; (E) Fern; (O) other

Within each 50 m x 20 m plot survey, the following information was collected:

- The number of large trees, tree regeneration, tree stem size class, total length of fallen logs, number of hollow-bearing trees
- Within five 1m x 1m sub-plots litter cover

All field data collected at full-floristic vegetation integrity plots is included in Appendix B and Appendix C.

Vegetation survey within the BCAA has been conducted between July 2021 and May 2022 by the personnel listed in Table 4.

Table 4: Full-floristic PCT identification plots

Date	Personnel	Survey type
7 July 2021	Leura Kowald and Melinda Westcook	BAM plots and vegetation validation
13 July 2021	Leura Kowald and Melinda Westcook	BAM plots and vegetation validation
12 April 2022	Diane Campbell and Tim Maher	BAM plots and vegetation validation
27 August 2021	Stacey Wilson and Tim Finter	BAM plots
16 May 2022	Diane Campbell and Claire Plunkett	BAM plots

A summary of floristic and vegetation integrity plots collected across PCTs is included in Table 5. Detailed plot data is provided in Appendix B and Appendix C. A map of PCTs and locations of plots within the BCAA is shown in Figure 9.

Table 5: Full-floristic PCT identification plots across the BCAA

PCT ID	PCT Name	No. of plots surveyed in BCAA
1395	Cumberland shale - sandstone Ironbark forest	7
849	Cumberland shale plains woodland	1
1071	*Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion	1
	Total no. plots undertaken within BCAA	**9**

3.1.3. Plant Community Types present

Following field surveys, data collected during vegetation validation was utilised to develop vegetation mapping for the BCAA.

A total of three PCTs were identified in the BCAA (Table 6). Justification for the selection of PCTs occurring in the BCAA is based on a quantitative analysis of full-floristic plot data and is provided in Table 7.

Table 6: Plant Community Types within the BCAA

PCT ID	PCT Name	Vegetation Formation	Vegetation Class	PCT Percent cleared (%)	Area of PCT within the BCAA (ha)
1395	Cumberland shale - sandstone Ironbark forest	Grassy Woodlands	Coastal Valley Grassy Woodlands	80.00	9.41
849	Cumberland shale plains woodland	Grassy Woodlands	Coastal Valley Grassy Woodlands	93.00	1.15

PCT ID	PCT Name	Vegetation Formation	Vegetation Class	PCT Percent cleared (%)	Area of PCT within the BCAA (ha)
1071	*Phragmites australis* and *Typha orientalis* coastal freshwater wetlands of the Sydney Basin Bioregion	Freshwater Wetlands	Coastal Freshwater Lagoons	75.00	0.57

3.2. PCT Selection Justification

In determining the PCTs for the BCAA, various attributes were considered in combination to assign vegetation to the best fit PCT. Attributes included dominant species in each stratum, community composition, soils and landscape position. Reference was made to the PCT descriptions in the BioNet Vegetation Classification, the final determination and other published documents describing the vegetation community and / or threatened ecological community.

ELA determined the native vegetation within the BCAA comprises of the following three PCTs (Table 7, Figure 7).

Table 7: PCT Selection Justification

PCT ID	PCT Name	Selection Criteria	Species relied upon for identification of vegetation type and relative abundance	Other PCTs Considered and Justification
1395	Cumberland shale - sandstone Ironbark forest	Diagnostic species, landscape position, soil, IBRA region and subregion	Occurrences of this PCT consist of a canopy of *Corymbia maculata* (Spotted Gum) and *Eucalyptus crebra* (Narrow-leaved Ironbark). An intact native midstorey was lacking, however did include some sporadic *Acacia* sp. The groundstorey contained a high cover of grass and forbs, such as *Chloris ventricosa* (Plump Windmill Grass), *Bothriochloa macra* (Red Grass) and *Aristida vagans* (Threeawn Speargrass). The above assemblage of key species and formation characteristics in combination with its Cumberland Lowlands landscape position within the Cumberland IBRA-subregion make PCT1395 the best fit community.	*PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion* – PCT 835 was considered however it was deemed to not be appropriate as this community is usually found in low lying areas around creeks and rivers. In addition, PCT 1395 did not contain characteristic canopy species of PCT 835 such as *Eucalyptus tereticornis* (Forest Red Gum), *E. amplifolia* (cabbage gum) and *Angophora floribunda* (rough-barked apple) In addition, it was not considered to be PCT 849 as the species were not consistent, the list of species is presented below.
849	Cumberland shale plains woodland	Diagnostic species, landscape position, soil, IBRA region and subregion	Occurrences of this PCT consist of a canopy dominated by remnant species *Eucalyptus moluccana* (Grey Box), *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus crebra* (Narrow-leaved Ironbark), and *Eucalyptus fibrosa* (Red Ironbark). The midstorey and groundcover contained species typical of this PCT, including *Bursaria spinosa* subsp. *spinosa* (Native Blackthorn) and *Microlaena stipoides* var. *stipoides* (Weeping Grass). The above assemblage of key species and formation characteristics in combination with its	*PCT 835 Forest Red Gum - Rough-barked Apple grassy woodland on alluvial flats of the Cumberland Plain, Sydney Basin Bioregion* – PCT 835 was considered as some species are found within both communities. However, it was deemed to not be appropriate as this community is usually found in low lying areas around creeks and rivers. Occurrences of this community is predominantly on gently undulating slopes and flats with no wat courses present.

PCT ID	PCT Name	Selection Criteria	Species relied upon for identification of vegetation type and relative abundance	Other PCTs Considered and Justification
			Cumberland Lowlands landscape position within the Cumberland IBRA-subregion make PCT849 the best fit community.	
1071	Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion - Low	Diagnostic species, landscape position, soil, IBRA region and subregion	Occurrences of this PCT lack a canopy and midstorey. The understorey is dominated by *Typha orientalis* (Broadleaf Cumbungi) and is located around the edges of artificial dams. The above assemblage of key species and formation characteristics in combination with its Cumberland Lowlands landscape position within the Cumberland IBRA-subregion and location on the edge of man-made waterbodies make PCT1071 the best fit community.	PCT 1071 is the only relevant PCT to the vegetation on site due to no other PCTs for freshwater lands being applicable within the Cumberland IBRA-subregion.

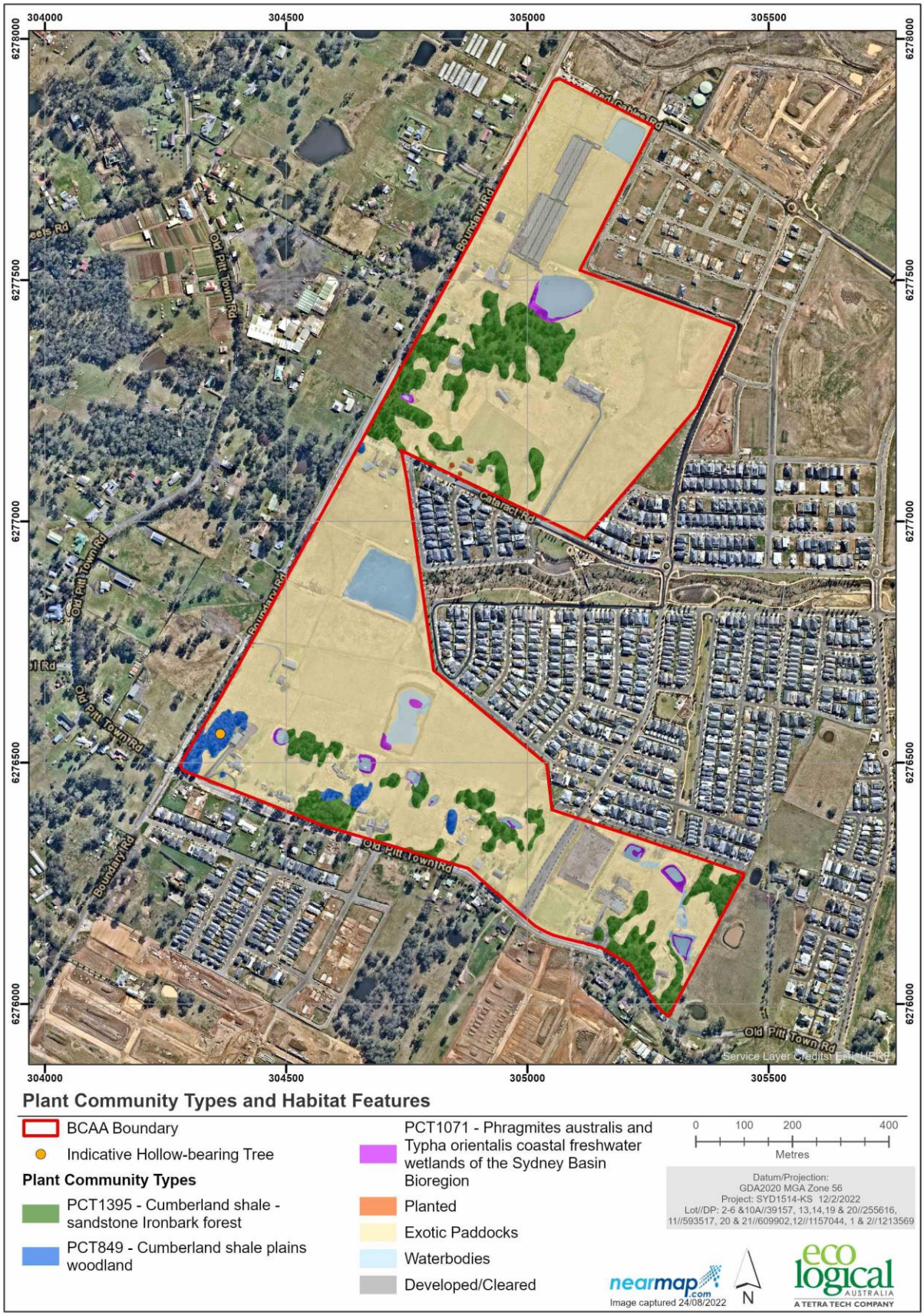

Figure 7: Validated Plant community Types within the BCAA

3.3. Vegetation Zones

A total of four native vegetation zones were present in the BCAA. Vegetation zones were classified based on condition and / or historic disturbance. A detailed description of vegetation zones is provided in Table 8. A map of vegetation zones is shown in Figure 9. Full PCT profiles for each PCT is also presented in Appendix D.

Table 8: Vegetation zones within the BCAA and the Biocertification area

Vegetation Zone	PCT	Condition	Area (ha) within BCAA	Area(ha) within Biocertification area (impact)	Description	TEC Status
VZ1	1395	Low	7.26	4.43	This zone was in low condition, showing signs of historic clearing and impacts of cattle grazing and pasture improvements. The structure of the zone was modified, with native canopy and some native groundcover present, with the midstorey absent. Where canopy was present, it consisted of *Eucalyptus crebra*. The groundcover was dominated by exotic species. Where native species were present, they were low in cover and abundance and consisted of *Dichondra repens* (Kidney Weed), *Eragrostis leptostachya* (Love Grass) and *Sporobolus creber.*	Conforms to the BC Act listed EEC Shale Sandstone Transition Forest in the Sydney Basin Bioregion. This zone does not meet the condition threshold for the TEC Shale Sandstone Transition Forest of the Sydney Basin Bioregion under the EPBC Act.
VZ2	1395	Moderate	2.15	1.83	This zone was in moderate condition. All structural layers were present, however the zone showed signs of disturbance from weed invasion and past agricultural land uses. The canopy was comprised of *Eucalyptus crebra*. The midstorey, where present, was sparse and contained *Bursaria spinosa* var. *spinosa* (Native Blackthorn). The groundcover was a mix of native and exotic species, with dominant species including *Microlaena stipoides* var. *stipoides* (Weeping Grass), *Sida rhombifolia* (Paddy's Lucerne) and *Bothriochloa macra* (Red Leg Grass).	Conforms to the BC Act listed EEC Shale Sandstone Transition Forest in the Sydney Basin Bioregion. This zone does not meet the condition threshold for the TEC Shale Sandstone Transition Forest of the Sydney Basin Bioregion under the EPBC Act due to the patch size being.
VZ3	849	Moderate	1.15	0.41	This zone was in moderate condition, showing signs of disturbance in the midstorey and groundcover layers. The canopy was diverse and consisted of *Eucalyptus moluccana* (Grey Box), *Eucalyptus crebra, Eucalyptus fibrosa* (Broad-leaved Ironbark) and *Eucalyptus tereticornis* (Forest Red Gum). The midstorey contains *Bursaria spinosa* and the groundcover contained *Brunoniella australis, Cymbopogon refractus, Dianella caerulea* var. *caerulea* and *Microlaena stipoides* var. *stipoides.* Exotic groundcover species were present and moderate in cover and included *Ehrharta erecta* (Panic Veldt	Conforms to the BC Act listed EEC Cumberland Plain Woodland in the Sydney Basin Bioregion. This zone does not meet the condition threshold for the TEC Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest under the EPBC Act.

Vegetation Zone	PCT	Condition	Area (ha) within BCAA	Area(ha) within Biocertification area (impact)	Description	TEC Status
					Grass), *Bryophyllum delagoense* (Mother of Millions), *Araujia sericifera* (Moth Vine), *Sida rhombifolia* (Paddy's Lucerne) and *Senecio madagascariensis* (Fireweed).	
VZ4	1071	Low	0.57	0.47	This zone was primarily along the edges of human-made dams and contained some native aquatic species including *Persicaria decipiens* (Slender Knotweed), *Typha orientalis* (Bulrush) *Juncus usitatus* and *Vallisneria australis* (Ribbonweed). Exotic species included *Senecio madagascariensis, Sida rhombifolia* and *Plantago lanceolata* (Plantain).	This zone does not meet the conditions for the TECs Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions, and Sydney Freshwater Wetlands in the Sydney Basin Bioregion under the BC Act. There is no associated TEC under the EPBC Act.
N/A	N/A	Cleared/Exotic Paddocks	59.47	56.27	Areas primarily used for agricultural pasture, grazing of livestock. No canopy species and groundcover dominated by exotic grasses	N/A
N/A	N/A	Developed	5.48	5.32	Agricultural buildings and dwellings	N/A
N/A	N/A	Planted	0.03	0.03	Landscaped areas of dwellings predominantly consisting of planted exotic and native vegetation	N/A
N/A	N/A	Waterbody	4.14	3.98	Farm dams	N/A
		Total	80.26	72.75		

3.4. Threatened Ecological Communities (TEC) identification and justification

All PCTs within the BCAA were assessed for consistency with any TECs listed under the BC Act and EPBC Act. Justification for consistency/inconsistencies of PCTs with TECs is provided in Table 9 and TECs are mapped in Figure 8.

Table 9: TECs within the BCAA

PCT and Condition	Area (ha) within Biocertification area	BC Act Listing	BC Act Associated TEC justification	EPBC Act Listing	EPBC Act Associated TEC justification
1395 low	4.42	*Shale Sandstone Transition Forest in the Sydney Basin Bioregion* CEEC	**Yes.** aligns with *Shale Sandstone Transition Forest in the Sydney Basin Bioregion* a critically endangered ecological community. This is due to the assemblage of key species, formation characteristics in combination with its coastal lowlands landscape position within Wyong IBRA-subregion.	*Shale Sandstone Transition Forest of the Sydney Basin Bioregion* CEEC	**No.** This zone of PCT 1395 does not meet the Condition Thresholds for the TEC under the Conservation Advice (Section 1.5.2 of DoE, 2014). The area of PCT 1395 in low condition within the BCAA is 6.61 ha and vegetation present does not meet the threshold, falling below 'Category A' as the native ground cover is <30%.
1395 moderate	1.83	*Shale Sandstone Transition Forest in the Sydney Basin Bioregion* CEEC	**Yes.** aligns with *Shale Sandstone Transition Forest in the Sydney Basin Bioregion* a critically endangered ecological community. This is due to the assemblage of key species, formation characteristics in combination with its coastal lowlands landscape position within Wyong IBRA-subregion.	*Shale Sandstone Transition Forest of the Sydney Basin Bioregion* CEEC	**No.** This zone of PCT 1395 does not meet the condition classes thresholds for the TEC Shale Sandstone Transition Forest of the Sydney Basin Bioregion under the Conservation Advice (Section 1.5.2 of DoE, 2014). The area of moderate condition PCT 1395 within the Biocertification area is 2.15 ha within in three distinct patched. Two of the patches present does not meet the threshold for 'Category A' as they are <0.5 ha. Although third patch is >0.5 ha it does not meet the threshold as the native ground cover is <30%.

PCT and Condition	Area (ha) within Biocertification area	BC Act Listing	BC Act Associated TEC justification	EPBC Act Listing	EPBC Act Associated TEC justification
849 moderate	0.41	*Cumberland Plain Woodland in the Sydney Basin Bioregion* CEEC	**Yes.** The assemblage of key species, formation characteristics in combination with its coastal lowlands landscape position within Wyong IBRA-subregion aligns with the Cumberland Plain Woodland in the Sydney Basin Bioregion.	*Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest* CEEC	**No.** This zone of PCT 849 does not meet the Condition Thresholds for the TEC Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest under the Conservation Advice (Table 1 of TSSC, 2009). The area of PCT 849 within the Biocertification area is 1.15 ha. However, the perennial understorey vegetation cover was <30% so did not meet the listing criteria under category A or B .
1071 low	0.47	*Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions - EEC* and *Sydney Freshwater Wetlands in the Sydney Basin Bioregion - EEC*	**No.** While PCT 1071 is associated with the TEC Freshwater Wetlands on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner Bioregions, and Sydney Freshwater Wetlands in the Sydney Basin Bioregion, this PCT within the BCAA was present only in constructed farm dams. They are therefore artificial wetlands and not consistent with these TECs.	NA	No associated TEC

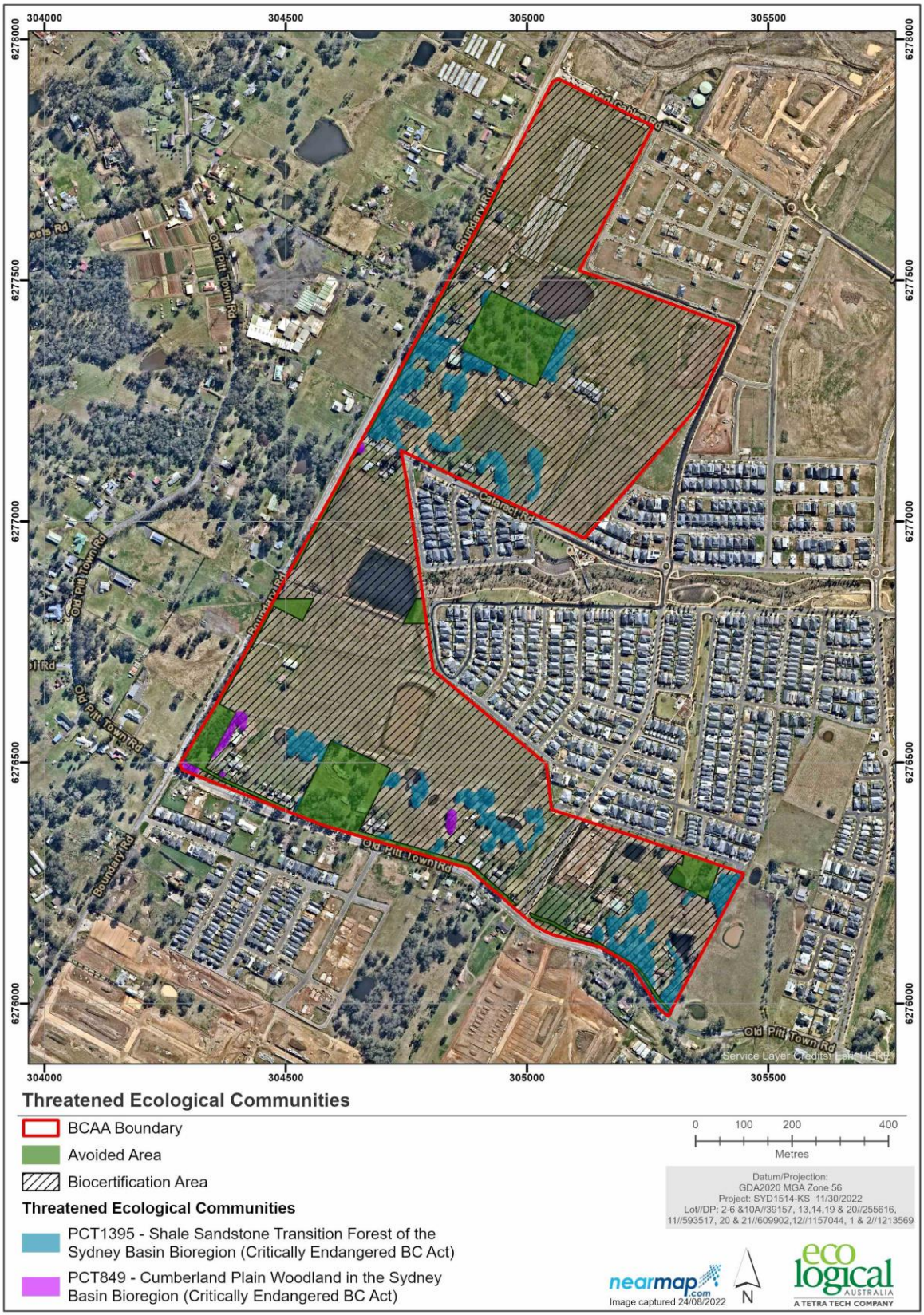

Figure 8: Threatened Ecological Communities present within the BCAA

3.5. Assessing vegetation integrity

A vegetation integrity assessment using the BAM Calculator (BAMC) was undertaken for the PCTs and zones within the Biocertification area and the results are outlined in Table 10.

Table 10: Vegetation integrity scores

Vegetation Zone	PCT ID	Condition	Area (ha)	Composition Condition Score	Structure Condition Score	Function Condition Score	Presence of Hollow bearing trees	Current vegetation integrity score
VZ_1	1395	Low	6.61	40.3	15.5	71	Yes	35.4
VZ_2	1395	Moderate	2.15	80.4	57.9	59.3	Yes	54.7
VZ_4	849	Moderate	1.15	80.4	33.8	38.6	No	47.2
VZ_5	1071	Low	0.57	40.5	9.3	-	No	19.4

3.6. Use of local data

The use of local data has not been proposed for the BCCA.

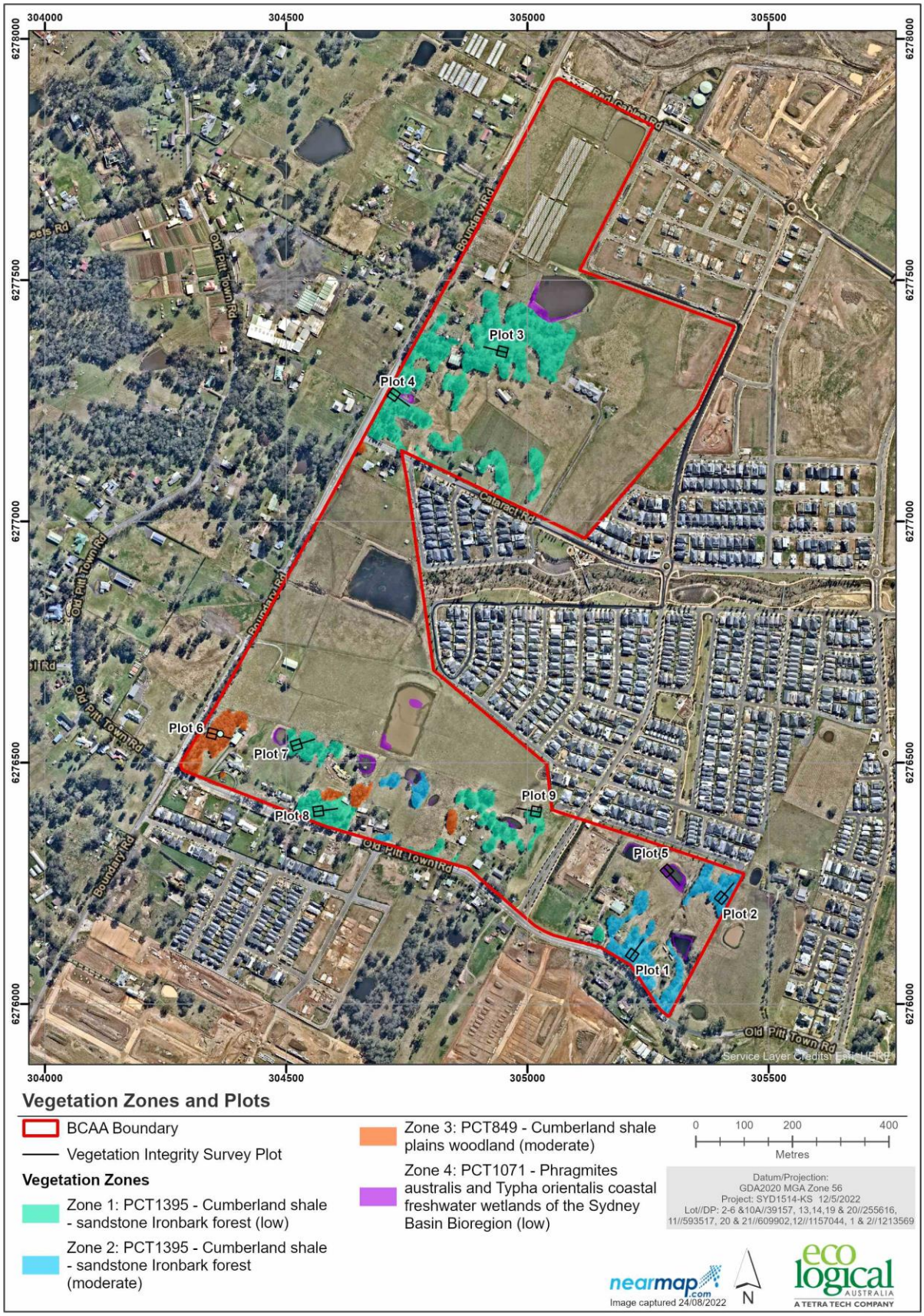

Figure 9: Plant Community Types and Vegetation Zones within the BCAA

4. Threatened species

4.1. Ecosystem credit species

Ecosystem credit species predicted to occur within the BCAA are generated by the BAMC following the input of VI data and the PCTs identified within Chapter 3. Ecosystem credit species predicted to occur at the BCAA are provided in Appendix G. Ecosystem credit species predicted to occur at the BCAA are provided in Appendix G. The ecosystem credit species have been predicted using the BAMC (NSW Government, 2019) based on the following inputs:

- Ibra region; Sydney Basin
- IBRA subregion: Cumberland
- NSW Mitchell Landscape: Cumberland Plain
- Associated PCTs: 1395, 849 and 1071
- Percentage native vegetation cover within the 1,500-metre buffer of the BCAA: YY%
- Patch size class: >100 hectares

Ecosystem credit species predicted to occur at the BCAA, their associated habitat constraints, geographic limitations and sensitivity to gain class is included in Table 11.

Ecosystem credit species which have been excluded from the assessment and relevant justification is included in Table 12.

Table 11: Predicted ecosystem credit species

Species	Common Name	Habitat Constraints	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status
Anthochaera phrygia	Regent Honeyeater (Foraging)	-	High	Critically Endangered	Critically Endangered
Artamus cyanopterus cyanopterus	Dusky Woodswallow	-	Moderate	Vulnerable	Not Listed
Botaurus poiciloptilus	Australasian Bittern	Waterbodies Brackish or freshwater wetlands	Moderate	Endangered	Endangered
Calidris ferruginea	Curlew Sandpiper (Foraging)	-	Moderate	Endangered	Critically Endangered
Callocephalon fimbriatum	Gang-gang Cockatoo (Foraging)	-	Moderate	Vulnerable	Endangered
Calyptorhynchus lathami	Glossy Black-Cockatoo (Foraging)	Presence of Allocasuarina and casuarina species	High	Vulnerable	Endangered

Species	Common Name	Habitat Constraints	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status
Chthonicola sagittata	Speckled Warbler	-	High	Vulnerable	Not Listed
Circus assimilis	Spotted Harrier	-	Moderate	Vulnerable	Not Listed
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	-	Moderate	Vulnerable	Not Listed
Daphoenositta chrysoptera	Varied Sittella	-	Moderate	Vulnerable	Not Listed
Dasyurus maculatus	Spot-tailed Quoll	-	High	Vulnerable	Endangered
Ephippiorhynchus asiaticus	Black-necked Stork	Swamps Shallow, open freshwater or saline wetlands or shallow edges of deeper wetlands within 300 m of these swamps Waterbodies, shallow lakes, lake margins and estuaries within 300 m of these waterbodies	Moderate	Endangered	Not Listed
Epthianura albifrons	White-fronted Chat	-	Moderate	Vulnerable	Not Listed
Falsistrellus tasmaniensis	Eastern False Pipistrelle	-	High	Vulnerable	Not Listed
Glossopsitta pusilla	Little Lorikeet	-	High	Vulnerable	Not Listed
Grantiella picta	Painted Honeyeater	Mistletoes present at a density of greater than five mistletoes per hectare	Moderate	Vulnerable	Vulnerable
Haliaeetus leucogaster	White-bellied Sea-Eagle (Foraging)	Within 1 km of a rivers, lakes, large dams or creeks, wetlands and coastlines	High	Vulnerable	Not Listed
Hieraaetus morphnoides	Little Eagle (Foraging)	-	Moderate	Vulnerable	Not Listed
Hirundapus caudacutus	White-throated Needletail	-	High	Not Listed	Vulnerable

Species	Common Name	Habitat Constraints	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status
Irediparra gallinacea	Comb-crested Jacana	Waterbodies Freshwater wetlands with a good surface cover of floating aquatic vegetation	Moderate	Vulnerable	Not Listed
Ixobrychus flavicollis	Black Bittern	Waterbodies Land within 40 m of freshwater and estuarine wetlands, in areas of permanent water and dense vegetation	Moderate	Vulnerable	Not Listed
Lathamus discolor	Swift Parrot (Foraging)	-	Moderate	Endangered	Critically Endangered
Limicola falcinellus	Broad-billed Sandpiper (Foraging)	-	High	Vulnerable	Not Listed
Limosa limosa	Black-tailed Godwit (Foraging)	-	High	Vulnerable	Not Listed
Lophoictinia isura	Square-tailed Kite (Foraging)	-	Moderate	Vulnerable	Not Listed
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	-	Moderate	Vulnerable	Not Listed
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	-	Moderate	Vulnerable	Not Listed
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	-	High	Vulnerable	Not Listed
Miniopterus australis	Little Bent-winged Bat (Foraging)	-	High	Vulnerable	Not Listed
Miniopterus orianae oceanensis	Large Bent-winged Bat (Foraging)	-	High	Vulnerable	Not Listed
Neophema pulchella	Turquoise Parrot	-	High	Vulnerable	Not Listed
Ninox connivens	Barking Owl (Foraging)	-	High	Vulnerable	Not Listed

Species	Common Name	Habitat Constraints	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status
Ninox strenua	Powerful Owl (Foraging)	-	High	Vulnerable	Not Listed
Pandion cristatus	Eastern Osprey (Foraging)	-	Moderate	Vulnerable	Not Listed
Petaurus australis	Yellow-bellied Glider	-	High	Vulnerable	Not Listed
Petroica boodang	Scarlet Robin	-	Moderate	Vulnerable	Not Listed
Petroica phoenicea	Flame Robin	-	Moderate	Vulnerable	Not Listed
Pteropus poliocephalus	Grey-headed Flying-fox (Foraging)	-	High	Vulnerable	Not Listed
Rostratula australis	Australian Painted Snipe		Moderate	Endangered	Endangered
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	-	High	Vulnerable	Not Listed
Scoteanax rueppellii	Greater Broad-nosed Bat	-	High	Vulnerable	Not Listed
Stagonopleura guttata	Diamond Firetail	-	Moderate	Vulnerable	Not Listed
Stictonetta naevosa	Freckled Duck	-	Moderate	Vulnerable	Not Listed
Tyto novaehollandiae	Masked Owl (Foraging)	-	High	Vulnerable	Not Listed
Tyto tenebricosa	Sooty Owl (Foraging)		High	Vulnerable	Not Listed
Varanus rosenbergi	Rosenberg's Goanna		High	Vulnerable	Not Listed

Table 12: Justification for exclusion of predicted ecosystem credit species

Species	Common Name	BC Act listing status	EPBC Act Listing status	Justification for exclusion of species
Botaurus poiciloptilus	Australasian Bittern	Endangered	Endangered	Habitat is not present in the BCAA for this species which occupies brackish or freshwater wetlands
Calidris ferruginea	Curlew Sandpiper (Foraging)	Endangered	Critically Endangered	Habitat is not present in the BCAA for this species which occupies littoral and estuarine habitats, and intertidal mudflats of sheltered coasts. The BCAA does not contain mapped important areas for this species. The mapped important areas for Migratory Shorebirds which includes

Species	Common Name	BC Act listing status	EPBC Act Listing status	Justification for exclusion of species
				Calidris ferruginea was accessed on 2 December 2022
Ephippiorhynchus asiaticus	Black-necked Stork	Endangered	Not Listed	Habitat is not present in the BCAA for this species which inhabits freshwater or saline wetlands and swamps.
Irediparra gallinacea	Comb-crested Jacana	Vulnerable	Not listed	Habitat for this species includes freshwater wetlands with good surface cover of floating aquatic vegetation. Habitat for this species is not present within the BCAA, the small dams within the BCAA have very minimal to no floating aquatic vegetation.
Ixobrychus flavicollis	Black Bittern	Vulnerable	Not Listed	Habitat is not present in the BCAA for this species which inhabits freshwater and estuarine wetlands, in areas of permanent water and dense vegetation. The dams within the BCAA do not provide dense vegetative cover for this species.
Limicola falcinellus	Broad-billed Sandpiper (Foraging)	Vulnerable	Not Listed	Suitable waterbodies are not present in the BCAA for this species which typically inhabits coastal inlets, lagoons and estuaries. The BCAA does not contain mapped important areas for this species. The mapped important areas for Migratory Shorebirds which includes *Limicola falcinellus* was accessed on 2 December 2022
Limosa limosa	Black-tailed Godwit (Foraging)	Vulnerable	Not Listed	Habitat is not present in the BCAA for this species which is primarily a coastal species. Usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats. The BCAA does not contain mapped important areas for this species. The mapped important areas for Migratory Shorebirds which includes *Limosa limosa* was accessed on 2 December 2022
Pandion cristatus	Eastern Osprey	Vulnerable	Not Listed	Habitat is not present in the BCAA for this species which inhabits coastal areas or areas with open waterbodies.

4.2. Species credit species

4.2.1. Identification of species credit species

In accordance with Appendix C, Table 13 of the BAM, the candidate species assessed for species credits were determined. Habitat assessments were undertaken during field survey to determine the likelihood of threatened species occurring within the BCAA on an intermittent or permanent basis. Habitat assessment included a search for important habitat features for threatened fauna species, such as hollow bearing trees, stags, nests, deep leaf litter and presence of mistletoe.

4.2.2. Species credit species included in this assessment

Species credit species are those threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates and therefore require further consideration through an assessment of habitat suitability.

The BAMC generated a list of species credit species. Species credit species that require further assessment within the BCAA (i.e., candidate species), their associated habitat constraints, geographic limitations and sensitivity to gain class are included in Table 13.

Table 13: Candidate species credit species

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for species to be included or excluded
Acacia bynoeana	Bynoe's Wattle	None	None	High	Endangered	Vulnerable	Included
Acacia pubescens	Downy Wattle	None	None	High	Vulnerable	Vulnerable	Include
Anthochaera phrygia	Regent Honeyeater (Breeding)	As per mapped areas	None	High	Critically Endangered	Critically Endangered	Excluded – the BCAA is not within mapped important areas for this species (checked 2 December 2022)
Burhinus grallarius	Bush Stone-curlew	Fallen/standing dead timber including logs	None	High	Endangered	Not Listed	Included
Caladenia tessellata	Thick Lip Spider Orchid	None	None	Moderate	Endangered	Vulnerable	Included
Calidris ferruginea	Curlew Sandpiper (Breeding)	As per mapped areas	None	High	Endangered	Critically Endangered	Excluded – the BCAA is not within mapped important areas for this species (checked 2 December 2022)
Callistemon linearifolius	Netted Bottle Brush	None	None	Moderate	Vulnerable	Not Listed	Included
Callocephalon fimbriatum	Gang-gang Cockatoo (Breeding)	Hollow bearing trees; Eucalypt tree species with hollows greater than 9 cm diameter	None	High	Vulnerable	Endangered	Included

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for species to be included or excluded
Callocephalon fimbriatum - *endangered population* Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas	-	None	Hornsby and Ku-ring-gai LGAs	High	Endangered Population	Not Listed	Excluded – the BCAA is not located within the geographic limitations of this endangered population
Calyptorhynchus lathami	Glossy Black-Cockatoo (Breeding)	Hollow bearing trees; Living or dead tree with hollows greater than 15cm diameter and greater than 5m above ground.	None	High	Vulnerable	Endangered	Included
Cercartetus nanus	Eastern Pygmy-possum	N/A	None	High	Vulnerable	Not Listed	Included
Chalinolobus dwyeri	Large-eared Pied Bat	Cliffs; Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels.	None	Very High	Vulnerable	Vulnerable	Excluded – habitat constraints not found with two kilometres of the BCAA.
Commersonia prostrata	Dwarf Kerrawang	None	None	High	Endangered	Endangered	Included
Cynanchum elegans	White-flowered Wax Plant	None	None	High	Endangered	Endangered	Included
Dillwynia tenuifolia	*Dillwynia tenuifolia*	None	None	Moderate	Vulnerable	Not Listed	Included

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for species to be included or excluded
Dillwynia tenuifolia - endangered population	*Dillwynia tenuifolia*, Kemps Creek	None	Bounded by Western Road, Elizabeth Drive, Devonshire Road and Cross Street, Kemps Creek in the Liverpool LGA	High	Endangered Population	Not Listed	Excluded – the BCAA is located outside the geographic limitations listed for this species
Epacris purpurascens var. *purpurascens*	*Epacris purpurascens* var. *purpurascens*	None	None	Moderate	Vulnerable	Not Listed	Included
Eucalyptus benthamii	Camden White Gum	None	None	High	Vulnerable	Vulnerable	Included
Grevillea juniperina subsp. *juniperina*	Juniper-leaved Grevillea	None	None	Moderate	Vulnerable	Not Listed	Included
Grevillea parviflora subsp. *parviflora*	Small-flower Grevillea	N/A	None	High	Vulnerable	Vulnerable	Included
Grevillea parviflora subsp. *supplicans*	*Grevillea parviflora* subsp. *supplicans*	None	North of the Great Western Highway	High	Endangered	Not Listed	Included
Gyrostemon thesioides	*Gyrostemon thesioides*	Sandy, alluvial or colluvial soil within 50 m of a water course	None	High	Endangered	Not Listed	Excluded – no alluvial or colluvial soil within 50m of watercourse of the BCAA.
Haliaeetus leucogaster	White-bellied Sea-Eagle (Breeding)	Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines	None	High	Vulnerable	Not Listed	Included

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for species to be included or excluded
Haloragis exalata subsp. *exalata*	Square Raspwort	Waterbodies. Edges of coastal lakes after flooding has removed other vegetation, creek banks within flood zone, areas close to these features subject to human disturbance including road verges and powerline easements or within 100m	None	Moderate	Vulnerable	Vulnerable	Excluded - the BCAA is not located on the edge of coastal lakes or creek banks within a flood zone.
Heleioporus australiacus	Giant Burrowing Frog	None	None	Moderate	Vulnerable	Vulnerable	Included
Hibbertia puberula	*Hibbertia puberula*	None	None	High	Endangered	Not Listed	Included
Hibbertia spanantha	Julian's Hibbertia	None	None	High	Critically Endangered	Critically Endangered	Included
Hibbertia superans	*Hibbertia superans*	None	None	High	Endangered	Nit Listed	Included
Hieraaetus morphnoides	Little Eagle (Breeding)	Nest trees - live (occasionally dead) large old trees within vegetation.	None	Moderate	Vulnerable	Not Listed	Included
Lathamus discolor	Swift Parrot (Breeding)	As per mapped areas	None	Moderate	Endangered	Critically Endangered	Excluded – the BCAA is not within mapped important areas for this species (checked 2 December 2022)

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for species to be included or excluded
Leucopogon fletcheri subsp. *fletcheri*	*Leucopogon fletcheri* subsp. *fletcheri*	Slopes nearby rocky areas or within 50 m of rocky areas. Weathered laterite over sandstone on sandstone ridges, outcrops	None	High	Endangered	Not Listed	Excluded – the BCAA does not contain slopes and rocky areas, sandstone ridges or outcropping.
Limicola falcinellus	Broad-billed Sandpiper (Breeding)	As per Important Habitat Map	None	High	Vulnerable	Not Listed	Excluded – the BCAA is not within mapped important areas for this species (checked 2 December 2022)
Limosa limosa	Black-tailed Godwit (Breeding)	As per Important Habitat Map	None	High	Vulnerable	Not Listed	Excluded – the BCAA is not within mapped important areas for this species (checked 2 December 2022)
Litoria aurea	Green and Golden Bell Frog	N/A	None	High	Endangered	Vulnerable	Included
Lophoictinia isura	Square-tailed Kite (Breeding)	Nest trees	None	Moderate	Vulnerable	Not Listed	Included

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for species to be included or excluded
Marsdenia viridiflora subsp. *viridiflora* - *endangered population*	*Marsdenia viridiflora* R. Br. subsp. *viridiflora population* in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas	None	Blacktown, Camden, Campbelltown, Canterbury-Bankstown, Cumberland, Fairfield, Liverpool and Penrith LGAs (as amended from the Determination))	Moderate	Endangered Population	Not Listed	Excluded – the BCAA is not located within the geographic limitations of this endangered population
Maundia triglochinoides	*Maundia triglochinoides*	Riparian areas/drainage lines, water ponding, man-made dams and drainage channels up to 1 m deep. Semi-permanent/ephemeral wet areas Swamps; Shallow swamps up to 1 m deep. Waterbodies; Shallow waterbodies up to 1 m deep	None	High	Vulnerable	Not Listed	Included
Melaleuca biconvexa	Biconvex Paperbark	None	None	High	Vulnerable	Vulnerable	Included
Melaleuca deanei	Deane's Paperbark	None	None	High	Vulnerable	Vulnerable	Included
Meridolum corneovirens	Cumberland Plain Land Snail	None	None	High	Endangered	Not Listed	Included

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for species to be included or excluded
Miniopterus australis	Little Bent-winged Bat (Breeding)	Caves; Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records in BioNet with microhabitat code 'IC – in cave'; observation type code 'E nest-roost'; with numbers of individuals >500; or from the scientific literature.	None	Very High	Vulnerable	Not Listed	Excluded – No caves, tunnels, mines or structures suspected to be breeding habitat were identified within the BCAA or within 2 km of the BCAA
Miniopterus orianae oceanensis	Large Bent-winged Bat (Breeding)	Caves; Cave, tunnel, mine, culvert or other structure known or suspected to be used for breeding including species records with microhabitat code "IC - in cave;" observation type code "E nest-roost;" with numbers of individuals >500	None	Very High	Vulnerable	Not Listed	Excluded – No caves, tunnels, mines or structures suspected to be breeding habitat were identified within the BCAA or within 2 km of the BCAA
Myotis macropus	Southern Myotis	Hollow bearing trees; Within 200 m of riparian zone| Other; Bridges, caves or artificial structures within 200 m of riparian zone| Waterbodies; This includes rivers, creeks, billabongs, lagoons, dams and other waterbodies on or within 200m of the site	None	High	Vulnerable	Not Listed	Included

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for species to be included or excluded
Ninox connivens	Barking Owl (Breeding)	Hollow bearing trees; Living or dead trees with hollows greater than 20 cm diameter and greater than 4m above the ground.	None	High	Vulnerable	Not Listed	Included
Ninox strenua	Powerful Owl (Breeding)	Hollow bearing trees; Living or dead trees with hollow greater than 20cm diameter	None	High	Vulnerable	Not Listed	Included
Pandion cristatus	Eastern Osprey (Breeding)	Presence of stick-nests in living and dead trees (>15m) or artificial structures within 100m of a floodplain for nesting	None	Moderate	Vulnerable	Not Listed	Included
Persicaria elatior	Tall Knotweed	Semi-permanent/ephemeral wet areas; or within 50 m of Swamps; or within 50 m of waterbodies; including wetlands, or within 50 m	None	High	Vulnerable	Vulnerable	Included
Persoonia bargoensis	Bargo Geebung	None	None	High	Endangered	Vulnerable	Included
Persoonia hirsuta	Hairy Geebung	None	None	High	Endangered	Endangered	Included
Petauroides volans	Greater Glider	Hollow bearing trees	None	High	Not Listed	Vulnerable	Included
Petaurus norfolcensis	Squirrel Glider	None	None	High	Vulnerable	Not Listed	Included
Phascolarctos cinereus	Koala (Breeding)	Presence of Koala use trees	None	High	Endangered	Endangered	Included
Pilularia novae-hollandiae	Austral Pillwort	None	None	High	Endangered	Not Listed	Included

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for species to be included or excluded
Pimelea curviflora var. *curviflora*	*Pimelea curviflora* var. *curviflora*	None	None	High	Vulnerable	Vulnerable	Included
Pimelea spicata	Spiked Rice-flower	None	None	High	Endangered	Endangered	Included
Pomaderris brunnea	Brown Pomaderris	None	None	High	Endangered	Vulnerable	Included
Pommerhelix duralensis	Dural Land Snail	None	None	High	Endangered	Endangered	Included
Pseudophryne australis	Red-crowned Toadlet	None	None	Moderate	Vulnerable	Not Listed	Included
Pteropus poliocephalus	Grey-headed Flying-fox (Breeding)	Breeding camps	None	High	Vulnerable	Vulnerable	Excluded – No breeding camps were identified within the BCAA.
Pterostylis saxicola	Sydney Plains Greenhood	None	None	Moderate	Endangered	Endangered	Included
Pultenaea pedunculata	Matted Bush-pea	None	None	High	Endangered	Not Listed	Included
Tetratheca glandulosa	*Tetratheca glandulosa*	None	None	High	Vulnerable	Not Listed	Included
Thesium australe	Austral Toadflax	None	None	Moderate	Vulnerable	Vulnerable	Included
Tyto novaehollandiae	Masked Owl (Breeding)	Hollow bearing trees; Living or dead trees with hollows greater than 20cm diameter.	None	High	Vulnerable	Not Listed	Included

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	BC Act listing status	EPBC Act Listing status	Justification for species to be included or excluded
Tyto tenebricosa	Sooty Owl (Breeding)	Caves or clifflines/ledges/Hollow bearing trees Living or dead trees with hollows greater than 20cm diameter	None	Very High	Vulnerable	Not Listed	Included
Zannichellia palustris	*Zannichellia palustris*	Waterbodies. Freshwater or slightly brackish estuarine areas (10%)	None	High	Endangered	Not Listed	Excluded – the BCAA does not contain naturally occurring freshwater bodies of water or slightly brackish estuarine areas (10%).

4.2.3. Candidate species excluded from further assessment

Any species excluded from the assessment and relevant justification is provided below in Table 12. According to BAM 5.2.3 – 2 (a) species may be excluded from assessment if one of the following applies:

- *the assessor determines that microhabitats required by a species are absent from the BCAA (or specific vegetation zone). The assessor must include a description of the microhabitats assessed as being required by the species in the BAR. This must be based on evidence such as published literature, or*
- *the assessor determines that the habitat constraints or microhabitats are degraded to the point that the species is unlikely to use the BCAA (or specific vegetation zones)".*

Table 14: Species excluded from assessment

Species	Justification for exclusion
Anthochaera Phrygia (Regent Honeyeater) (Breeding)	BCAA boundary is not within DPE mapped areas (as accessed by BOAMS on 2 December 2022).
*Callocephalon fimbriatum - endangered population (*Gang-gang Cockatoo) population in the Hornsby and Ku-ring-gai Local Government Areas	BCAA is not located within the geographic limitations of this endangered population.
Chalinolobus dwyeri (Large-eared Pied Bat)	Habitat constraints, caves and rocky overhangs, not found with two kilometres of the BCAA.
Dillwynia tenuifolia - endangered population Kemps Creek	BCAA is located outside the geographic limitations listed for this species.
Gyrostemon thesioides	Habitat constraints, alluvial or colluvial soil within 50m of watercourse, not found within the BCAA.
Haloragis exalata subsp. Exalata (Square Raspwort)	Habitat constraints, BCAA is not located on the edge of coastal lakes or creek banks within a flood zone.
Lathamus discolor (Swift Parrot) (Breeding)	BCAA boundary is not within DPE mapped areas (as accessed by BOAMS on 2 December 2022).
Leucopogon fletcheri subsp. *fletcheri*	Habitat constraints, BCAA does not contain slopes and rocky areas, sandstone ridges or outcropping.
Limicola falcinellus (Broad-billed Sandpiper) (Breeding)	BCAA boundary is not within DPE mapped areas (as accessed by BOAMS on 2 December 2022).
Limosa limosa (Black-tailed Godwit) (Breeding)	BCAA boundary is not within DPE mapped areas (as accessed by BOAMS on 2 December 2022).
Marsdenia viridiflora subsp. *viridiflora* - endangered population Bankstown, Blacktown, Camden, Campbelltown, Fairfield,	BCAA is not located within the geographic limitations of this endangered population.

Species	Justification for exclusion
Holroyd, Liverpool and Penrith local government areas	
Little Bent-winged Bat (*Miniopterus australis*) (Breeding)	Breeding habitat for this species is caves, tunnels, mines or other structures known or suspected to be used by *M. australis* including species records in the NSW BioNet Atlas with microhabitat code 'IC – in cave'; observation type code 'E nest-roost'; with numbers of individuals >500; or from the scientific literature (OEH 2018). Breeding habitat is not present within the Biocertification area, nor is habitat such as caves, tunnels or mines which are likely to be in use by this species within the vicinity of the BCAA.
Large Bent-winged Bat (*Miniopterus orianae oceanensis*) (Breeding)	Breeding habitat for this species is caves, tunnels, mines or other structures known or suspected to be used by *M. australis* including species records in the NSW BioNet Atlas with microhabitat code 'IC – in cave'; observation type code 'E nest-roost'; with numbers of individuals >500; or from the scientific literature (OEH 2018). Breeding habitat is not present within the Biocertification Area, nor is habitat such as caves, tunnels or mines which are likely to be in use by this species within the vicinity of the BCAA.
Grey-headed Flying-fox (*Pteropus poliocephalus*) (Breeding)	Breeding camps are not present within the Biocertification Area.
Zannichellia palustris	BCAA does not contain naturally occurring freshwater bodies of water or slightly brackish estuarine areas (10%).

4.2.4. Candidate species requiring further assessment

All species specified as 'Included' in Table 13 require assessment for the Biocertification area and were targeted with species specific surveys. The timing of these surveys was determined by the survey months specified in the BAMC and BioNet. These surveys are detailed within the following sections.

4.3. Targeted surveys

4.3.1. Targeted Flora Surveys - Methodology

Where suitable habitat was identified for candidate threatened flora species, targeted flora surveys were undertaken consistent with the *NSW Surveying threatened plants and their habitats* (DPIE 2020b) and within the seasonal requirements outlined in the Threatened Biodiversity Database Collection (TBDC). According to Section 5.1 Several threatened plant species may be searched for during the same traverse. To ensure detectability is not compromised it is recommended that multi-species searches be restricted to a maximum of five species in the same stratum (i.e. search for five ground species, five mid-layer species or five canopy species) per traverse. Multi-species surveys could also be grouped further, by genus, similar growth form, or species with other similar characteristics where they are likely to occupy the same stratum (DPIE 2020b).

To note, a maximum of 5 species per stratum per survey event is a recommendation only, to ensure detectability is not compromised, however, is considered dependent on the habitat suitability and conditions of the site.

The site has been surveyed appropriately for each respective threatened flora species that were likely to occur based on the degraded nature of the habitat on site. Highly experienced flora ecologists capable of undertaking comprehensive surveys for multiple species were utilised for these surveys, with particular emphasis placed on those species considered most likely to occur based on detailed habitat assessments.

Targeted survey tracks are presented in Figure 10. Targeted flora surveys involved walking in parallel transects with a separation width of 10 m within open areas of vegetation.

4.3.2. Targeted Flora – Survey Effort

Targeted survey effort (total effort hours) for species credit species were undertaken within the BCAA on the dates outlined in Table 15. The location of targeted surveys is shown on Figure 10, no threatened flora was identified during the survey.

During these surveys searches for sticks nests for candidate bird species was also undertaken. No nests were identified.

Table 15: Targeted flora surveys and effort

Dates	Surveyors	Target species	Methods employed	Total effort
05.05.2022	Diane Campbell and Alice Ridyard	*Pimelea spicata, Pimelea curviflora* subsp. *Curviflora, Acacia bynoeana,*	10m transects across suitable habitat	16 person hours
12.04.2022	Diane Campbell and Tim Maher	*Maundia triglochinoides, Persicaria, elatior Persoonia hirsuta, Persoonia nutans, Cynanchum elegans, Grevillea juniperina* subsp. *Juniperina*	10m transects across suitable habitat	16 person hours

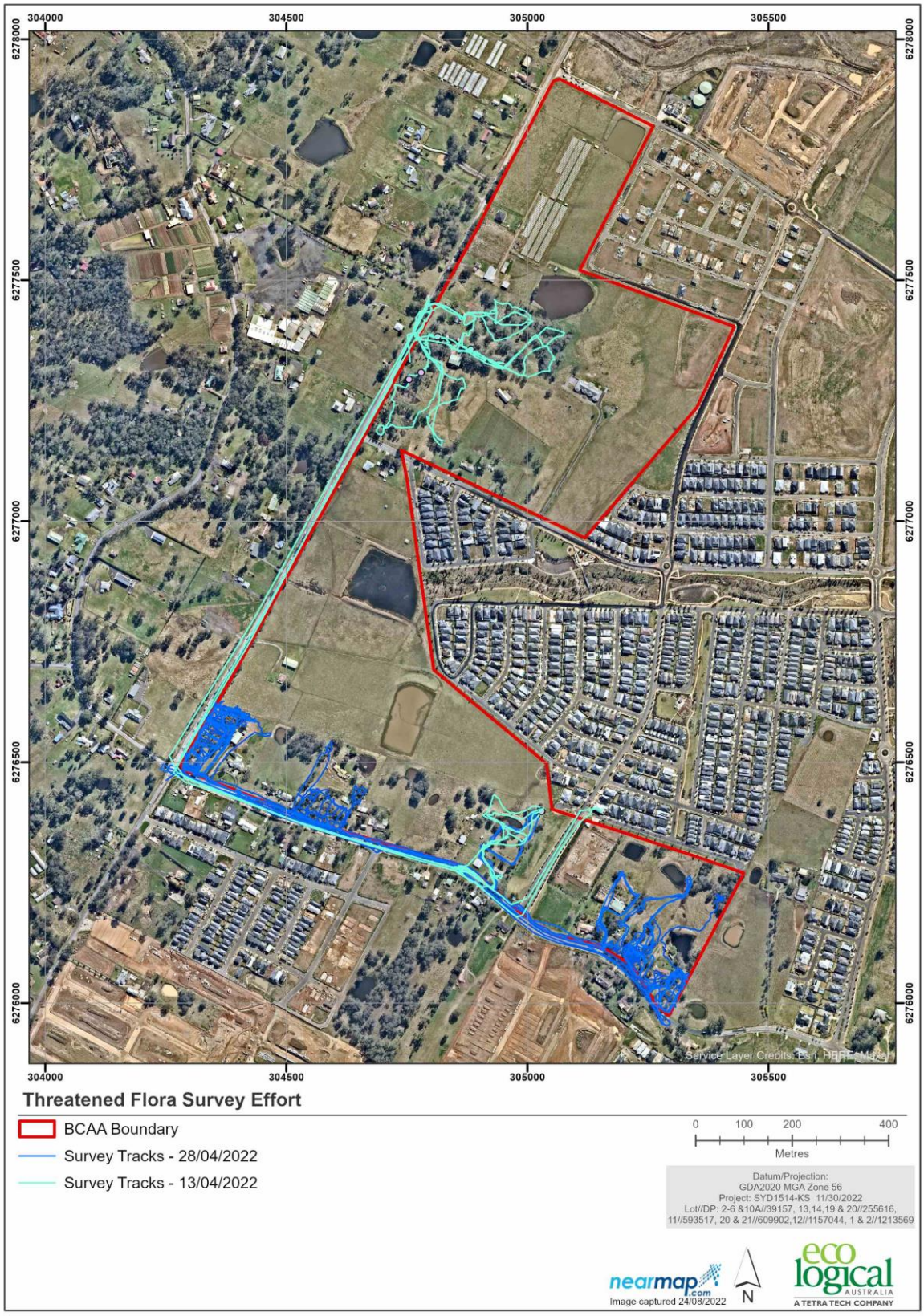

Figure 10: Threatened flora survey effort

4.3.3. Targeted Fauna Surveys Methodology

Targeted fauna survey methodology was undertaken in accordance with the following documents:

- *'Species credit' threatened bats and their habitats, NSW survey guide for the Biodiversity Assessment Method* (OEH 2018)
- *Survey Guide for Threatened Frogs, A guide for the survey of threatened frogs and their habitats for the Biodiversity Assessment Method* (DPIE 2020a)
- *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities Working Draft* (DEC 2004).
- *BioNet Threatened Biodiversity Data Collection (TBDC) (BioNet 2021)*

The BCAA is approximately 80.26 ha in size, with the Biocertification area approximately 72.75 ha and 56.27 ha of this comprising exotic grassland. Under the 2004 draft survey guidelines, minimum fauna survey effort is required per 50 ha unit. Therefore, the BCAA contained one 'survey unit'. Additional survey effort was applied to address the spatial separation and patchiness of the areas of native vegetation within the BCAA. Where available, species-specific survey requirements (which overrule the 2004 draft survey guidelines) as per BioNet (2022), were adhered to for this assessment. Further details on the methodologies utilised are provided below.

4.3.3.1. Fauna Habitat Assessment

During vegetation survey and site assessments, habitat features for threatened fauna were identified and mapped within the BCAA. This informed the methodology for targeted surveys. Habitat features of interest included:

- Hollow-bearing trees (see Photo 1)
- Nests, including nests for raptors
- Feed trees for birds and mammals
- Riparian areas and waterbodies (see Photo 2)
- Suitable roost trees for owls

Photo 1: Hollow bearing tree identified within the proposed Biocertification Area

Photo 2: Constructed dam within the proposed Biocertification Area

4.3.3.2. Mammal surveys

Nocturnal surveys involved the use of call playback, spotlighting and stag watching at multiple locations across the site. These surveys were conducted over two nights in April 2021. Calls were played for threatened mammals, including:

- *Petaurus norfolcensis* (Squirrel Glider)
- *Petauroides volans* (Greater Glider)
- *Phascolarctos cinereus* (Koala)

Call playback sequence included calls of all target species, with periods of 2-5 mins of continuous calls broadcast at ~ 110% of natural volume interspersed with periods (2-5 mins) of silence to listen between each species. Call playback was conducted over two (2) nights, to meet the survey effort provided in Table 5.8 of the DEC 2004 guidelines, which suggests two nights for gliders. Spotlighting searches on foot followed each call playback event – searching for the Squirrel Glider and Greater Glider.

Stag watches were conducted at suitable hollow bearing trees within the BCAA, observing potential roost hollows for 30 minutes prior to sunset and 60 minutes following sunset in accordance with the DEC 2044 guidelines.

The locations of the surveys are provided in Figure 11.

4.3.3.3. Amphibian surveys

Aural-visual surveys were completed along the edges of suitable frog habitat (around dams and damp/inundated grassland areas). These surveys involved spotlighting for individuals as well as surveyors listening for calls (in silence and darkness) and using call playback to illicit a response. These surveys were repeated over four nights (Figure 12Figure 11). An example of open water within the Biocertification Area is provided in Photograph 12 above.

4.3.3.4. Gastropod surveys

Targeted surveys for *Meridolum corneovirens* (Cumberland Plain Land Snail) and *Pommerhelix duralensis* (Dural Land Snail) were undertaken over two days in April 2022. This involved searching suitable habitat, native vegetation zones, including at the base of trees in leaf litter, logs and debris for the presence of live specimens or their shells (Figure **13**).

4.3.3.5. Microchiropteran bat surveys

Targeted surveys for *Myotis macropus* (Southern Myotis) were conducted over six survey nights using three Anabat Swift recorders (17 detector nights). The locations of the survey equipment are presented in Figure 14.

4.3.3.6. Stick nest

During the multiple site visits required for vegetation integrity plots, targeted flora and fauna surveys ecologist searched for stick nests. No nests were identified during all field survey.

4.3.4. Targeted Fauna – Survey Effort

Targeted surveys for species credit species were undertaken at the required survey timing as provided in Table 16 with actual survey event in green. The dates of surveys are provided in Table 17.

Table 16: Required survey timing for candidate fauna species

Species name	Common name	BC Status	EPBC Status	Survey timing											
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Burhinus grallarius	Bush Stone-curlew	E	-	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Callocephalon fimbriatum	Gang-gang Cockatoo	V	E	y	N	N	N	N	N	N	N	N	Y	Y	Y
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	V	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N
Haliaeetus leucogaster	White-bellied Sea-Eagle	V	-	N	N	N	N	N	N	Y	Y	Y	Y	Y	Y
Heleioporus australiacus	Giant Burrowing Frog	V	V	Y	Y	Y	Y	Y	N	N	N	Y	Y	Y	Y
Hieraaetus morphnoides	Little Eagle	V	-	N	N	N	N	N	N	N	Y	Y	Y	N	N
Litoria aurea	Green and Golden Bell Frog	E	-	Y	Y	Y	N	N	N	N	N	N	N	Y	Y
Lophoictinia isura	Square-tailed Kite	V	-	Y	N	N	N	N	N	N	N	Y	Y	Y	Y
Meridolum corneovirens	Cumberland Plain Land Snail	E	-	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Myotis macropus	Southern Myotis	V	-	Y	Y	Y	N	N	N	N	N	N	Y	Y	Y
Pandion cristatus	Eastern Osprey	V	-	N	N	N	Y	Y	Y	Y	Y	Y	Y	Y	N
Petauroides volans	Greater Glider	-	V	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Petaurus norfolcensis	Squirrel Glider	V	-	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Pommerhelix duralensis	Dural Land Snail	E	E	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Pseudophryne australis	Red-crowned Toadlet	V	-	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Table 17: Targeted fauna survey and effort

Dates	Surveyors	Target species	Methods employed	Total effort
24-30 March 2022	No Staff	Southern Myotis, Little Bent-winged Bat, Large Bent-winged Bat	Anabat Swift	17 survey nights
24, 28 29, and 30 March 2022	Tim Finter, Stacey Wilson, Alice Ridyard	Green and Golden Bell Frog	Call Play-back, spotlighting	16 person hours over 4 nights
13 and 20 April 2022	Stacey Wilson and James King	Cumberland Plain Land Snail and Dural Land Snail	Searches under bases of trees, leaf litter, logs and debris	15 person hours
13 and 20 April 2022	Stacey Wilson and James King	Squirrel Glider and Greater Glider	Spotlighting, Stag watch, Call Play-back	5 person hours over two nights

Figure 11: Nocturnal mammal survey effort

Figure 12 Amphibian survey effort

Figure 13 **Gastropod survey effort**

Figure 14 Microbat survey

4.3.5. Weather conditions

Weather conditions during the targeted surveys are outlined in Table 18. Rainfall data taken from station Box Hill (Mccall Gardens) (Number:67104) and other weather data (temp) was taken from Richmond RAAF (station 67105).

Table 18: Weather conditions

Date	Rainfall (mm)	Minimum temperature °C	Maximum temperature °C
24 March 2022	1.0	17.5	20.0
25 March 2022	5.0	17.4	22.6
26 March 2022	16.0	16.7	21.8
27 March 2022	6.0	15.9	22.4
28 March 2022	24.0	17.8	26.9
29 March 2022	6.0	18.8	21.9
30 March 2022	15.0	16.4	25.7
13 April 2022	0.0	16.3	22.6
20 April 2022	10.0	13.2	25.5
28 April 2022	24.0	17.8	26.9

4.3.6. Results of targeted surveys

Survey methods for each species credit species are detailed below in Table 19. Species results and subsequent assessments are also provided within this table. Comprehensive details on the requirements of species polygons are provided below in Section 4.3.7.

Table 19: Results of targeted surveys

Species Name	Common Name	Survey method	Result	Assessment
Acacia bynoeana	Bynoe's Wattle	10m transects across suitable habitat	Not detected within the Biocertification area	No further assessment required
Cynanchum elegans	White-flowered Wax Plant	10m transects across suitable habitat	Not detected within the Biocertification area	No further assessment required
Grevillea juniperina subsp. *juniperina*	Grevillea juniperina	10m transects across suitable habitat	Not detected within the Biocertification area	No further assessment required
Litoria aurea	Green and Golden Bell Frog	Aural-visual surveys and call playback	Not detected within the Biocertification area	No further assessment required
Maundia triglochinoides	*Maundia triglochinoides*	10m transects across suitable habitat	Not detected within the Biocertification area	No further assessment required
Meridolum corneovirens	Cumberland Plain Land Snail	Searches under bases of trees, leaf litter, logs and debris	Not detected within the Biocertification area	No further assessment required
Miniopterus australis	Little Bent-winged Bat	Acoustic detectors	Not detected within the Biocertification area	No further assessment required
Miniopterus orianae oceanensis	Large Bent-winged Bat	Acoustic detectors	Not detected within the Biocertification area	No further assessment required
Myotis macropus	Southern Myotis	Acoustic detectors	Detected within the Biocertification area	Species polygon prepared
Persicaria elatior	Tall Knotweed	10m transects across suitable habitat	Not detected within the Biocertification area	No further assessment required
Persoonia hirsuta	Hairy Geebung	10m transects across suitable habitat	Not detected within the Biocertification area	No further assessment required
Persoonia nutans	Nodding Geebung	10m transects across suitable habitat	Not detected within the Biocertification area	No further assessment required
Petauroides volans	Greater Glider	Spotlighting, stag watching, call playback	Not detected within the Biocertification area	No further assessment required
Petaurus norfolcensis	Squirrel Glider	Spotlighting, stag watching, call playback	Not detected within the Biocertification area	No further assessment required
Pimelea curviflora subsp. *curviflora*	Pimelea curviflora var. curviflora	10m transects across suitable habitat	Not detected within the Biocertification area	No further assessment required
Pimelea spicata	Spiked Rice-flower	10m transects across suitable habitat	Not detected within the Biocertification area	No further assessment required
Phascolarctos cinereus	Koala	Spotlighting, stag watching, call playback	Not detected within the Biocertification area	No further assessment required

Species Name	Common Name	Survey method	Result	Assessment
Pommerhelix duralensis	Dural Land Snail	Searches under bases of trees, leaf litter, logs and debris	Not detected within the Biocertification area	No further assessment required

4.3.7. Species credit species offsets and polygons

As specified in Table 19 above, one species credit species was recorded within the BCAA. In addition, one large hollow bearing tree which may provide breeding habitat for four owl species credit species was identified with the BCAA and presence has been assumed. Species credit species that are present in the proposed BCAA are outlined in the sections below**.**

4.3.7.1. Flora species credit species

There were no flora species credit species recorded within the BCAA.

4.3.7.2. Fauna species credit species

Bat call analysis recorded 'definite' calls for species credit species *Myotis Macropus* (Southern Myotis) and *Miniopterus orianae oceanensis* (Large Bent-winged Bat) and 'potential' calls for *Vespadelus troughtoni* (Eastern Cave Bat).

'Definite' calls were also recorded for *Micronomus norfolkensis* (Eastern Coastal Free-tailed Bat) and "potential" calls for *Scoteanax rueppellii* (Greater Broad-nosed Bat), *Falsistrellus tasmaniensis* (Eastern False Pipistrelle) and *Saccolaimus flaviventris* (Yellow-bellied Sheath-tailed Bat), however they are ecosystem species and offsets are therefore attributed to appropriate Plant Community Types. No further assessment is required for these species.

Southern Myotis species polygons are applied to habitat in the BCAA within 200m of a waterbody with pools/ stretches 3m or wider (see Photograph 12). The area (ha) within this polygon is provided in Table 20 below and shown in Figure 15. Only areas of PCT comprising actual habitat suitable to this species (i.e., PCTs 849, 1395, 1071) have been assessed as the species polygon for Southern Myotis.

Large Bent-winged Bat and Eastern Cave Bat species polygons are applied to habitat in the BCAA within a 100 m radius of breeding habitat (caves, disused mines, tunnels etc). These species are species credit species, however foraging habitat for these species is assessed as an ecosystem credit; with only the breeding habitat requiring species credits. Breeding habitat for these species (caves, tunnels, mines etc) is not present within the Biocertification area. As no breeding habitat is within the BCAA, a polygon is not required for these species.

A hollow bearing tree (HBT) was identified in the south western portion of the BCAA, it is presented on Figure 16. The hollow was >20 cm DBH and provide potential habitat for *Ninox connivens* (Barking Owl*), Ninox strenua* (Powerful Owl), *Tyto novaehollandiae* (Masked Owl), and *Tyto tenebricosa* (Sooty Owl). A targeted owl survey was not completed , therefore presence for these species has been assumed.

All of the four owl species have the same species polygon requirements, areas of PCT comprising actual habitat suitable to this species (i.e., PCTs 849, 1395, 1071) within a 100m of the HBT. The area (ha) within this polygon is provided in Table 20 below and shown in Figure 16.

Table 20: Species credit species included in the assessment

Species	Common Name	Species presence	Geographic limitations	Habitat (ha)	Biodiversity Risk Weighting
Myotis macropus	Southern Myotis	Yes (surveyed)	Associated PCTs within 200m of waterbodies	5.89	2.00
Ninox connivens	Barking Owl	Yes (assumed presence)	Associated PCTs within 100m of HBT	0.28	2.00
Ninox strenua	Powerful Owl	Yes (assumed presence)	Associated PCTs within 100m of HBT	0.28	2.00
Tyto novaehollandiae	Masked Owl	Yes (assumed presence)	Associated PCTs within 100m of HBT	0.28	2.00
Tyto tenebricosa	Sooty Owl	Yes (assumed presence)	Associated PCTs within 100m of HBT	0.28	3.00

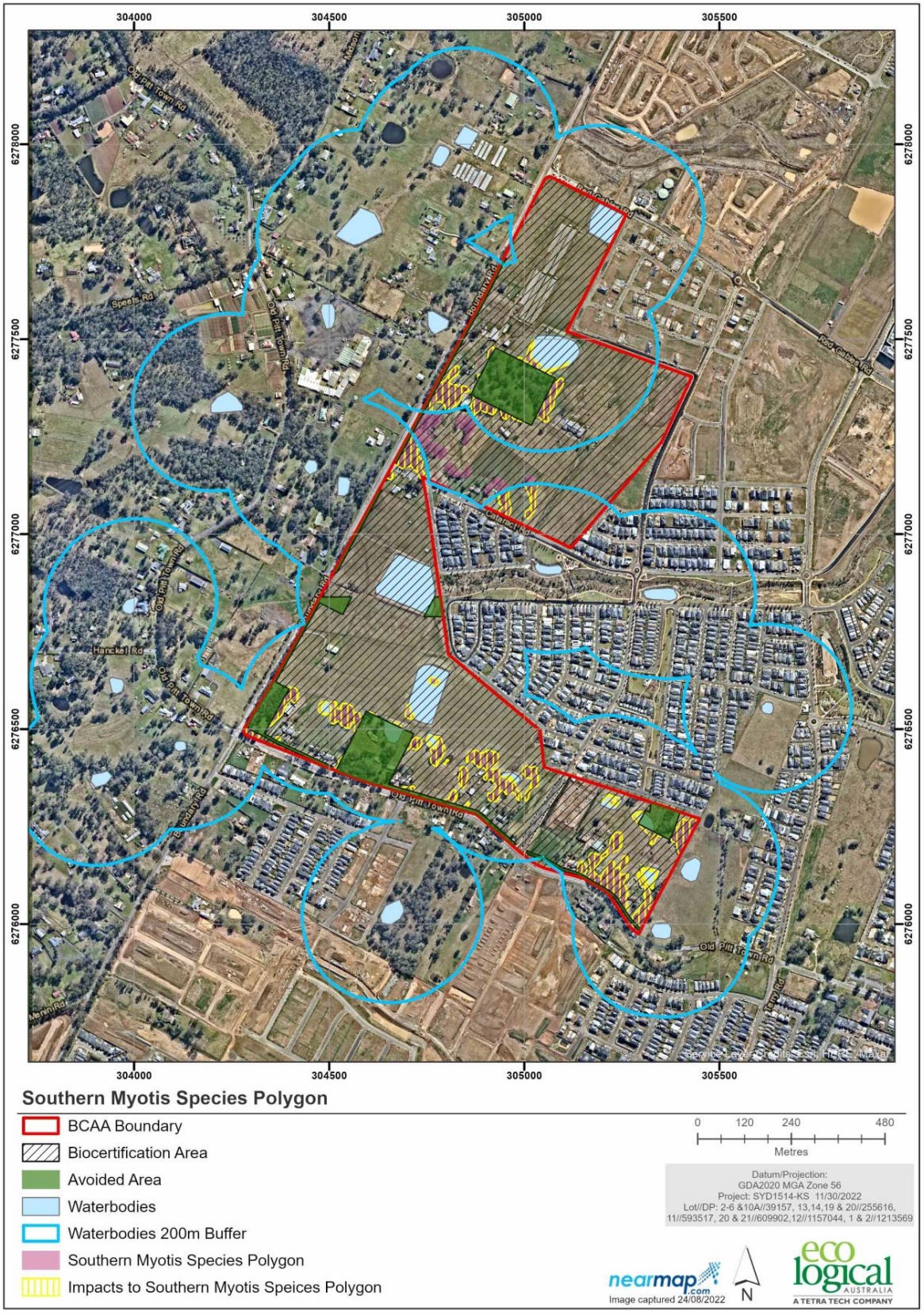

Figure 15: Species polygon – *Myotis macropus* (Southern Myotis)

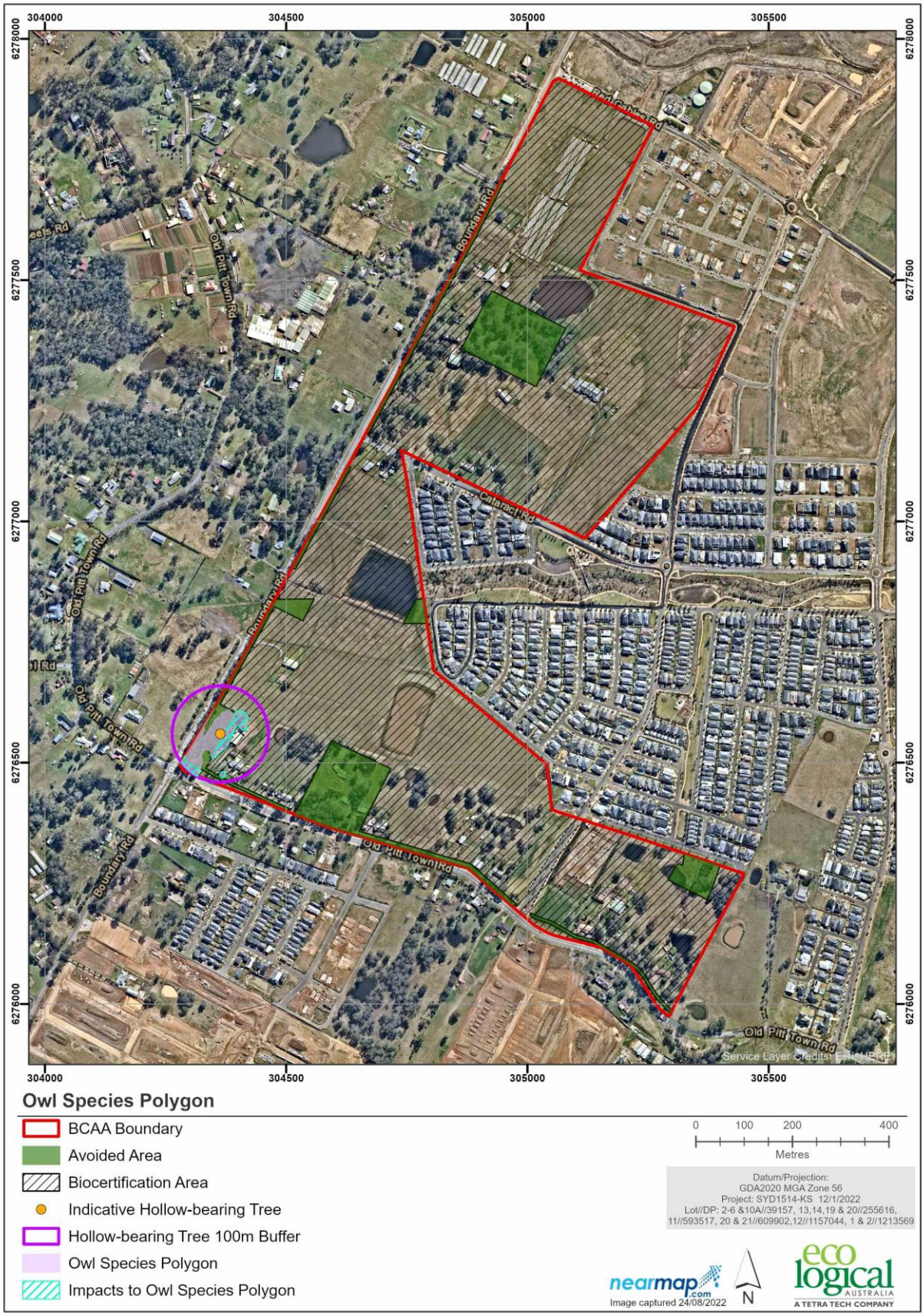

Figure 16 Owl Species Polygon

4.4. Identification of prescribed additional biodiversity impact entities

Prescribed impacts for the proposed Biocertification area and BCAA are detailed below.

4.4.1. Karst, caves, crevices, cliffs, rocks and other geological features of significance

Karst, caves, crevices, cliffs, rocks and other geological features of significance are not present within the Biocertification area or BCAA.

4.4.2. Human-made structures and non-native vegetation

No human-made structures or exotic vegetation utilised by threatened entities (as determined by targeted surveys) will be impacted within the Biocertification area or BCAA.

4.4.3. Habitat connectivity

Habitat connectivity is patchy through the Biocertification area or BCAA, with patches of vegetation towards the north and south of the BCAA (Figure 1). This low connectivity may be used by several more mobile species, largely being diurnal birds and larger mammals. The removal of these small vegetation patches is not likely to significantly reduce connectivity through the landscape.

4.4.4. Water bodies, water quality and hydrological processes

Waterbodies within the BCAA comprise of one 1st Order stream (unnamed) which runs west to east through the centre of the BCAA. The creek, at its widest, may be utilised by the threatened species Southern Myotis. Roosts for this species were not identified within the BCAA. There are several dams within the BCAA, which may be foraging habitat for the Southern Myotis.

4.4.5. Vehicle strikes

The proposed BCAA will predominantly support residential development. Increased residential development will increase the number of vehicles travelling through the BCAA and increasing the risk of vehicle strike on threatened species and other native fauna.

BAM Stage 2: Impact Assessment (biodiversity values and Prescribed Impacts

5. Avoiding and Minimising Impacts on Biodiversity Values

5.1. Locating a project to avoid and minimise impacts on biodiversity values

The development has been located in a way which avoids and minimises impacts as outlined in Table 21. Initial vegetation surveys aimed to identify the biodiversity constraints within the BCAA and aimed to identify where opportunities existed for avoidance of the higher biodiversity values.

The development has been located to avoid impacts to areas of higher biodiversity value, where possible, including the avoidance of the largest patches of intact high quality native vegetation where possible. Two previous iterations of the concept masterplan are presented in Appendix H. The proponent discussed potential approaches to retain biodiversity values within the BCAA with Hills Shire Council. This included rezoning some areas to lower residential densities and creating specific building envelopes to retain vegetation on lot. However, Council were not supportive of this approach. Therefore, avoided areas are located on vegetated road buffers and local parks

Table 21: Locating a project to avoid and minimise impacts on vegetation and habitat

Approach	How addressed and justification
Locating the proposal (including ancillary facilities) in areas lacking biodiversity values	Using the initial constraints mapping of areas of low, moderate and high biodiversity value – the proposal has been located predominantly within areas categorised as low (i.e. low biodiversity value). The proponent has tried to locate areas of high biodiversity value within areas that will be rezoned as local parks to ensure retention.
Locating the proposal (including ancillary facilities) in areas where the native vegetation or threatened species habitat is in the poorest condition	Figure 7 illustrates the large areas of cleared and modified land across the BCAA, with approximately 90% of land proposed for impact in the Biocertification area categorised as cleared, modified and of low biodiversity value. These areas are considered less likely to provide habitat for native species and threatened species.
Locating the proposal (including ancillary facilities) in areas that avoid habitat for species with a high biodiversity risk weighting or land mapped on the important habitat map, or native vegetation that is a TEC, a highly cleared PCT or an entity at risk of a serious and irreversible impact (SAII)	PCT 1395 conforms to the CEEC *Shale Sandstone Transition Forest in the Sydney Basin Bioregion* listed under the BC Act. PCT 849 conforms to the EEC *Cumberland Plain Woodland in the Sydney Basin Bioregion* listed under the BC Act. However neither of these communities conform to the relevant EPBC listing as a native groundcover is <30% or the size of vegetation patches were too small to meet the listing criteria. Both of these TEC's are relatively degraded due to past clearing and agricultural practises. However, there are areas of good and moderate condition that have been prioritised for retention. In particular the design was reorientated to retain the good condition PCT 1395 in the local park. The Biocertification area would impact one fauna species credit species (species polygon) with a biodiversity risk weighting of 2 being Southern Myotis. The habitat is primarily associated to the presence of artificial water bodies which are proposed to be removed. Although these are being removed the re-naturalisation of the first order creek which transects the BCAA is considered to provide some future foraging habitat for the species.

Approach	How addressed and justification
	In addition, a large hollow was identified within the BCAA and assumed to provide habitat for four owl species with biodiversity risk weightings of 2 to 3. The proposal has been located in a manner that will retain this tree.
Locating the proposal in areas outside of the buffer area around breeding habitat features such as nest trees or caves	A large hollow was identified within the BCAA and assumed to provide habitat for four owl species with biodiversity risk weightings of 2 to 3. The proposal has been located in a manner that will retain this tree.

5.2. Designing a project to avoid and minimise impacts on biodiversity values

The development has been designed in a way which avoids and minimises impacts as outlined in Table 22.

Table 22: Designing a project to avoid and minimise impacts on vegetation and habitat

Approach	How addressed and justification
Reducing the proposal's clearing footprint by minimising the number and type of facilities	The planning proposal scope went through multiple revisions following initial constraints assessments. Constraint's mapping, including the identification of TECs within the BCAA (such as *PCT 1395*) resulted in updates to the design of the Biocertification area to avoid patches of this PCT in moderate and high condition. In particular the design was reorientated to retain the good condition PCT 1395 in the local park.
Locating ancillary facilities in areas that have no biodiversity values	Approximately 90% of all vegetation impacts are confined to areas with little to no biodiversity values, being concentrated in areas of cleared land or exotic pasture.
Locating ancillary facilities in areas where the native vegetation or threatened species habitat is in the poorest condition (i.e. areas with the lowest vegetation integrity scores)	Approximately 90% of all vegetation impacts are confined to areas with little to no biodiversity values (exotic grasslands). These areas are considered to provide minimal habitat for threatened fauna and no habitat for threatened flora due to the intensity of grazing and exotic cover.
Locating ancillary facilities in areas that avoid habitat for species and vegetation that has a high threat status (e.g. an endangered ecological community (EEC) or critically endangered ecological community (CEEC) or is an entity at risk of a serious and irreversible impact (SAII)	No ancillary facilities have been designed at this stage of the planning proposal.
Actions and activities that provide for rehabilitation, ecological restoration and/or ongoing maintenance of retained areas of native vegetation, threatened species, threatened ecological communities and their habitat on the BCAA.	The proponent is proposing to establish local parks throughout the BCAA in areas of high biodiversity value. This would conserve the larger areas of more intact better quality vegetation present within the BCAA.

5.3. Locating a project to avoid and minimise prescribed biodiversity impacts

The development has been located in a way which avoids and minimises prescribed biodiversity impacts as outlined in Table 23.

Table 23: Locating a project to avoid and minimise prescribed biodiversity impacts

Approach	How addressed and justification
Locate surface works to avoid direct impacts on the habitat features	The Biocertification area does not comprise any identified breeding habitat in the form of caves/cliffs etc. One hollow bearing tree was identified which was assumed potential breeding habitat for forest owls. This tree will be retained. Surface works will predominantly occur within cleared exotic grassland areas (90%).
Locating the envelope of sub-surface works, both in the horizontal and vertical plane, to avoid and minimise operations beneath the habitat features, e.g., locating long wall panels away from geological features of significance or water dependent plant communities and their supporting aquifers	The proposed development within the Biocertification area will not require substantial sub-surface works that would alter ground flow or hydrological processes that affect the long-term viability of the vegetation communities outside of the BCAA. Urban barriers such as subdivisions and roads sperate the BCAA from adjacent vegetation communities.
Locating the project to avoid severing or interfering with corridors connecting different areas of habitat and migratory flight paths to important habitat or preferred local movement pathways	Connectivity across the BCAA is already highly fragmented, with partial connectivity within a patch of vegetation within the north of the BCAA and from east to west through the south of the BCAA. The vegetation in these areas comprises paddock trees and native canopy with a disturbed understorey. The removal of this vegetation in the Biocertification area will not interfere with migratory flight paths to mapped important areas of habitat. No migratory paths have been identified within the Biocertification area.

5.4. Designing a project to avoid and minimise prescribed biodiversity impacts

The development has been designed in a way which avoids and minimises prescribed biodiversity impacts as outlined in Table 24.

Table 24: Designing a project to avoid and minimise prescribed biodiversity impacts

Approach	How addressed and justification
Design of project elements to minimise interactions with threatened entities	All vegetated areas within the BCAA are listed threatened ecological entities. Updates to the design of the Biocertification area were undertaken to avoid 3.14 ha of Cumberland shale – sandstone Ironbark Forest (PCT 1395) and 0.74 ha of Cumberland shale plains woodland (PCT 849) by retaining areas of these threatened ecological communities which are mapped in varying conditions from low to high condition.
Controlling the quality of water released from the site, to avoid or minimise downstream impacts on threatened entities	Changes to stormwater or other water released from the Biocertification area and future development has not yet been assessed. Detailed stormwater modelling and treatment plan should be undertaken at the DA stage and mitigation measures implemented to ensure stormwater quantity and quality from the future development does not impact the receiving environment.

6. Assessment of Impacts

6.1. Direct impacts

The direct impacts of the development include:

- Native vegetation and threatened ecological communities are outlined in Table 25. Not included as native vegetation impacts are developed land (5.32 ha), cleared/exotic/paddocks vegetation (56.27), planted vegetation (0.03 ha) and waterbodies (3.98 ha)
- Threatened species and threatened species habitat is outlined in Table 26
- Prescribed biodiversity impacts are outlined in Section 6.4.

The Planning Proposal is to facilitate development of the site for residential and public open spaces purposes as shown in the draft Concept Masterplan (Figure 6). Such development will result in the clearing of vegetation within the proposed Biocertification area for earthworks, construction works, lay-down areas, heavy vehicle turning bay and site facilities. Mitigation and management measures will reduce the risk of any impact outside of this boundary.

Direct impacts including the final project footprint (construction and operation) are shown on Figure 5.

Table 25: Direct impacts to native vegetation

PCT ID	PCT Name	Vegetation Formation	Vegetation Class	Associated TEC	BC Act listing	EPBC Act listing	Direct impact (ha)
1395	Cumberland shale - sandstone Ironbark forest	Grassy Woodlands	Coastal Valley Grassy Woodlands	Shale Sandstone Transition Forest in the Sydney Basin Bioregion	Critically Endangered	Not Listed	6.27
849	Cumberland shale plains woodland	Grassy Woodlands	Coastal Valley Grassy Woodlands	Cumberland Plain Woodland in the Sydney Basin Bioregion	Critically Endangered	Not Listed	0.41
1071	Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion	Freshwater Wetlands	Coastal Freshwater Lagoons	Not a TEC	N/A	N/A	0.47

Table 26: Direct impacts on threatened species and threatened species habitat

Species	Common Name	Direct impact habitat (ha)	BC Act listing status	EPBC Act Listing status
Myotis macropus	Southern myotis	5.89	Vulnerable	Not Listed
Ninox connivens	Barking Owl	0.28	Vulnerable	Not Listed
Ninox strenua	Powerful Owl	0.28	Vulnerable	Not Listed
Tyto novaehollandiae	Masked Owl	0.28	Vulnerable	Not Listed
Tyto tenebricosa	Sooty Owl	0.28	Vulnerable	Not Listed

6.2. Change in vegetation integrity

The change in vegetation integrity as a result of the development is outlined in Table 27.

Table 27: Change in vegetation integrity

Veg Zone	PCT ID	Condition	Area (ha)	Current vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity
VZ_1	1395	Low	6.61	31.9	0	-31.9
VZ_2	1395	Moderate	2.15	66.2	0	-66.2
VZ_3	849	Moderate	1.15	47.2	0	-47.2
VZ_4	1071	Low	0.57	19.4	0	-19.4

6.3. Indirect impacts

The indirect impacts of the development are outlined in Table 28.

Table 28: Indirect impacts

Indirect impact	Nature (nature, and extent)	Frequency	Biodiversity affected	Duration/ Timing	Consequence & Mitigation Measures
Inadvertent impacts on adjacent habitat or vegetation	Damage to adjacent habitat and vegetation including TECs and threatened species as a result of construction or operation of development.	Daily during construction and operational phase of the project with increased residential activity adjacent to retained vegetation.	Native vegetation, threatened species habitats	Daily, during the construction phase.	Moderate Degradation of native vegetation, TECs and threatened species habitat. Mitigation and management measures will be outlined within the Construction Environmental Management Plan (CEMP).
Reduced viability of adjacent habitat due to edge effects	Location of residential development directly adjacent to retained vegetation has the potential to result in degradation of habitat and vegetation due to edge effects.	Operational phase of the project with increased residential activity adjacent to retained vegetation.	Native vegetation, threatened species habitats	Daily, for the life of the development	Moderate Degradation of native vegetation, TECs and threatened species habitat. Mitigation and management measures will be outlined within the CEMP.
Reduced viability of adjacent habitat due to noise, dust or light spill	Noise and dust created from machinery (no night works proposed therefore no light spill)	Daily during construction.	Fauna species and their habitats	Daily, during the construction phase.	Low Mitigation and management measures will be outlined within the Construction Environmental Management Plan (CEMP).
Transport of weeds and pathogens from the site to adjacent vegetation	Spread of weed seed and pathogens from incoming machinery and equipment. Spread of weeds from use of roads, garden escapes, increased human activity adjacent to retained vegetation.	Daily during construction.	Native vegetation	Long term impacts during construction and operational phase	Moderate Increased weed spread. Weed and pathogens to be managed under a CEMP.

Indirect impact	Nature (nature, and extent)	Frequency	Biodiversity affected	Duration/ Timing	Consequence & Mitigation Measures
Increased risk of starvation or exposure and loss of shade or shelter	No increase of starvation or exposure or loss of shade and shelter expected.	Daily during construction.	Fauna species, no listed threatened fauna species	Long term impacts during construction and operational phase	Low Localised loss of fauna. Native vegetation removal within the Biocertification area comprises approximately 7.15 ha. With areas of adjacent habitat available outside the BCAA area and areas to be retained within Open Space Areas, the risk of starvation or exposure is considered to be low.
Loss of breeding habitat	Native vegetation will be removed, resulting in the loss of habitat trees that may provide habitat for common fauna species.	Daily, during construction and operational phase of the project	Fauna species, no listed threatened fauna species	Long term impacts during construction and operational phase	Moderate No threatened fauna breeding habitat was identified during targeted surveys within the BCAA. Impacts to habitat will be managed under a CEMP
Trampling of threatened flora species	No threatened flora species were identified within the BCAA.	N/A	N/A	N/A	N/A.
Inhibition of nitrogen fixation and increased soil salinity	Loss of nitrogen fixating species within Biocertification area is unlikely to significantly impact nitrogen concentration in adjacent retained vegetation.	Daily during construction and operational phase of the project with increased residential activity adjacent to retained vegetation.	Nitrogen fixating species	Long term impacts during construction and operational phase	Low

Indirect impact	Nature (nature, and extent)	Frequency	Biodiversity affected	Duration/ Timing	Consequence & Mitigation Measures
Fertiliser drift	Potential for fertiliser drift from residential lawns/gardens, impacting and degrading the adjacent vegetation communities. Increased nutrients from fertiliser may impact native species and promote weed growth.	Operational phase of the project with increased residential activity adjacent to retained vegetation.	Adjacent native vegetation	The life of the project	Low Degradation and increase in weed species in retained vegetation. Degradation of threatened flora habitat. Fertiliser and increased nutrient levels within the current BCAA are not expected to significantly increase due to the project.
Rubbish dumping	Illegal dumping by workers and public leading to degradation of adjacent vegetation. Potential for rubbish to spread into adjacent vegetation and outside Biocertification area.	Daily during construction and operational phase of the project	Adjacent native vegetation and habitats.	Daily, during the construction phase and any stage during operational phase.	Moderate Degradation of adjacent habitat and vegetation. Will be managed through the CEMP
Wood collection	Potential for residents to collect wood during operational phase of future residential development.	Daily during construction and operational phase of the project	Fauna species dependent on ground litter.	Daily, during the construction phase and any stage during operational phase.	Low Loss of habitat features for fauna species leading to decline in fauna. There is very little wood available for collection within the Biocertification area.
Removal and disturbance of rocks including bush rock	Potential for disturbance during construction phase and for residents to collect bush rock during operational phase of future residential development.	Daily during construction and operational phase of the project	Adjacent native vegetation and habitats.	Daily, during the construction phase and any stage during operational phase.	Low Loss of habitat features for fauna species leading to decline in fauna. There is very little bush rock available for removal or disturbance within the BCAA.

Indirect impact	Nature (nature, and extent)	Frequency	Biodiversity affected	Duration/ Timing	Consequence & Mitigation Measures
Increase in predators	Increased residential activity may lead to an increase in pest animals such as cats.	During operational phase of the project	Native fauna	During the life of the project	Moderate Long term decline in native fauna
Increase in pest animal populations	Increased residential activity may lead to an increase in pest animals such as rats.	During operational phase of the project	Native fauna	During the life of the project	Moderate Long term decline in native fauna
Changed fire regimes	Increased occupancy in residential areas has the potential to increase fire risk and could occur at any time, although, more likely during dry, windy conditions	During operational phase of the project	Connected vegetation retained with Open Space Areas	Short-term and long-term impacts, potential throughout the life of the project /A	Low Disturbance to vegetation, loss of habitat for native fauna species. Risk of fire to be managed under Bushfire Protection IPA/OPA specifications.
Disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds.	No disturbance to any specialist breeding habitats are likely, the BCAA is not within important mapped areas of breeding habitat for threatened species.	N/A	N/A	N/A	N/A

Indirect impact	Nature (nature, and extent)	Frequency	Biodiversity affected	Duration/ Timing	Consequence & Mitigation Measures
Sedimentation and contaminated and/or nutrient rich run-off	Future development within the Biocertification area may increase runoff during construction and operation resulting in pollution and degradation of adjacent creek and waterways. Ongoing impacts due to increased hard surfaces and loss of vegetation associated with residential development will potentially lead to increased quantity and pollutants in stormwater runoff	During operational phase of the project	Adjacent vegetation and TECs and threatened species habitat	Any rainfall event during construction and operational phases.	Pollutants/contamination of downstream waterways, degradation of adjacent vegetation communities including TECs. Will be managed through the CEMP.

6.4. Prescribed biodiversity impacts

The Biocertification area has the prescribed biodiversity impacts as outlined in Table 29.

Table 29: Direct impacts on prescribed biodiversity impacts

Prescribed biodiversity impact	Description (Nature, extent and frequency)	Consequences	Justification	Additional information
Human made structures or non-native vegetation	Non-native vegetation has been recorded within the BCAA. Non-native areas were mapped as 61.63 ha of cleared/exotic/ paddocks, planted vegetation, and dwellings. There are currently occupied Human-made structures present within the Biocertification area	Removal of non-native vegetation that may provide habitat to common fauna species. Removal of derelict human made structures that may provide habitat for threatened microbat species which can utilise these as sheltering/roosting/breeding habitat	Non-native vegetation may provide minimal habitat such as shelter for small birds and reptiles. Derelict human-made structures can at times be utilised by microbat species.	No threatened fauna species were recorded during targeted surveys utilising non-native vegetation. The removal of non-native vegetation is unlikely to significantly impact any fauna species utilising the site. The human-made structures are currently occupied as houses, garden sheds or stables, as these structures are currently occupied they are unlikely to be being used as roosting or sheltering or breeding habitat by threatened fauna species.
Habitat connectivity	The proposal will result in the loss of small patches of native vegetation which provide marginal connectivity from the north to the south of the BCAA.	Localised decrease in habitat connectivity.	A narrow yet intact corridor of vegetation runs along the western boundary connecting the northern vegetation to the larger intact vegetation to the south, however, this falls outside of the BCAA boundary.	Connectivity across the BCAA is already highly fragmented, with partial connectivity from the north to the south through the centre of the BCAA comprising small disturbed vegetation patches and paddock trees.
Water bodies, water quality and hydrological processes	3.98 ha of waterbodies will be removed due to future development enabled by the Bidocertifcation.	Removal of potential foraging habitat for Southern Myotis	The waterbodies are human made farm dams and are not considered natural habitat features. The proposal also seeks to re-naturalise the first order creek which transects the BCAA. This is considered to provide some future	-

Prescribed biodiversity impact	Description (Nature, extent and frequency)	Consequences	Justification	Additional information
			foraging habitat for the Southern myotis	
Vehicle strikes	The is potential for an increase in the incidence of vehicle strike on threatened and non-threatened species within the BCAA due to increased vehicle activity resulting from residential development.	Localised death or injury to fauna species.	Future residential development following Biocertification will result in increased vehicle activity through the BCAA and increase potential vehicle strike.	-

6.5. Mitigating and managing direct and indirect impacts

Measures proposed to mitigate and manage impacts at the BCAA before, during and after construction are outlined in Table 30.

Table 30: Measures proposed to mitigate and manage impacts

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
timing works to avoid critical life cycle events such as breeding or nursing	Moderate	Low	All hollow-bearing trees within the Biocertification area are assumed to be removed, however, efforts should be made to retain all hollow-bearing trees where possible. Evidence of breeding was not recorded during targeted surveys, however pre-clearance surveys and clearance supervision should be undertaken by suitably qualified ecologist(s) to relocate potential fauna inhabitants and prevent death or injury during tree removal.	Prevent injury or death to native fauna	Prior to and during felling	Contractor, Project Ecologist
instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecological or licensed wildlife handler during clearing events	Moderate	Low	All hollow-bearing trees within the footprint are assumed to be removed, however, efforts should be made to retain all hollow-bearing trees where possible. Evidence of breeding was not recorded during targeted surveys, however pre-clearance surveys and clearance supervision should be undertaken by suitably qualified ecologist(s) to relocate potential fauna inhabitants and prevent death or injury during tree removal.	Prevent injury or death to native fauna	Prior to and during felling	Contractor, Project Ecologist
installing artificial habitats for fauna in adjacent retained vegetation and habitat or human made structures to replace the habitat resources lost and encourage animals to move from the impacted site, e.g. nest boxes	Moderate	Low	Following pre-clearance survey, nest boxes should be installed in the southern portion of 'land proposed for conservation measures' to replace hollows removed at a minimum ratio of 1:1 (i.e. 1 nest box for each hollow removed). Boxes should be chosen to match the potential threatened fauna which may utilise the area. Boxes should be installed prior to construction to allow fauna to move/be relocated to nest boxes prior to removal of hollow-bearing trees.	Provide fauna with compensatory roosting/nesting habitat to replace removed hollow-bearing trees	Prior to construction	Project Ecologist, Project Manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chain-saw, rather than heavy machinery, is preferable in situations where partial clearing is proposed	High	Low	Boundaries of the impact area to be clearly delineated with fencing, retained areas marked with "No Go" signage.	Protection of retained vegetation outside of Biocertification area.	During construction	Project Manager
sediment barriers or sedimentation ponds to control the quality of water released from the site into the receiving environment	Moderate	Low	Install sediment barriers and erosion control during and post construction to prevent runoff into onsite creeklines. Maintain controls throughout construction and undertake weekly inspections. Detailed stormwater controls should be designed and implemented through the CEMP.	Control of erosion, sedimentation and runoff of contaminated substances into adjacent waterways	Throughout life of project	Project Manager
noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise	Low	Low	Daily timing of construction activities is recommended in accordance with Table 1 of Interim Noise Guidelines (2009).	Noise impacts associated with the development will be managed in accordance with the CEMP	During construction	Project manager, contractors
light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill	Minor	Negligible	Construction works will only be undertaken during daylight hours and night lights will not be used. Lights associated with operation will be directional to avoid unnecessarily shining light into adjacent retained vegetation where possible.	Light impacts of construction will be avoided as all works will occur during daylight hours	Minor	Negligible
adaptive dust monitoring programs to control air quality	Minor	Negligible	Dust suppression measures will be implemented to limit dust on site as per the CEMP.	Mitigate dust created during construction activities	Minor	Negligible

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
programming construction activities to avoid impacts; for example, timing construction activities for when migratory species are absent from the site, or when particular species known to or likely to use the habitat on the site are not breeding or nesting	Negligible	Negligible	Not considered necessary for the Biocertification area as breeding or nesting was not recorded during targeted surveys. If breeding is identified during the pre-clearance surveys, programming may be required.	NA	NA	NA
fencing to protect significant environmental features such as riparian zones	High	Low	Temporary fencing and signage to be installed at the edge of the Biocertification area to prevent entry into the adjacent vegetation and areas to be retained. Permanent fencing should be established at the interface of the Biocertification area and proposed 'Open Space Areas' within the BCAA to prevent ongoing impacts to this area during the operational stage of the development.	No unintended clearing of adjacent vegetation to be retained.	During construction and operational phase of the development.	Site manager
hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	Minor	Negligible	All machinery will be cleaned prior to entering and exiting the Biocertification area to minimise the transport of weeds as per the CEMP. Weeds that are present within the study area that are listed under the NSW *Biosecurity Act 2015* will be managed.	Weed impacts managed	During construction	Site manager

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
staff training and site briefing to communicate environmental features to be protected and measures to be implemented	Minor	Negligible	All personnel working on the project will undertake an environmental induction as part of their site familiarisation. Including: • site environmental procedures (vegetation management, sediment and erosion control, exclusion fencing and noxious weeds) • what to do in case of environmental emergency (e.g. chemical spills, fire, injured fauna) • key contacts in the case of an environmental emergency.	Staff trained and aware of environmental issues and responsibilities on site	Construction	Site manager

6.6. Mitigating prescribed impacts

Measures proposed to mitigate and manage prescribed biodiversity impacts at the BCAA before, during and after construction are outlined in Table 31.

Table 31: Mitigation measures for prescribed biodiversity impacts

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Scheduling timing of construction activities to avoid critical life cycle events	High	Low	Threatened Southern Myotis have been recorded as utilising habitat within the Biocertification area. Pre-clearance surveys and vegetation removal should occur outside of their breeding season (November-March)	Minimise injury/death pf fauna during vegetation removal.	Prior to and during construction	Project manager / contractor, ecologist
Instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, and using a trained ecological or licensed wildlife handler during clearing, construction and maintenance activities for human made structures and non-native vegetation	High	Low	Pre-clearing surveys should be undertaken for the removal of any vegetation to remove fauna inhabitants, mark hollow bearing trees and supervise felling. Fencing should be erected around waterbodies adjacent to construction sites. Sediment barriers should be installed in all construction areas to prevent sedimentation and contaminated runoff entering creeklines and downstream wetlands. All contractors should be inducted into the site to be briefed on sensitive environmental features (including threatened flora, TECs and fauna habitat) and responsibilities in avoiding any impacts to retained vegetation.	Minimise injury/death pf fauna during vegetation removal.	Prior to and during construction	Project manager / contractor, ecologist
Erecting temporary fencing to protect significant environmental features such as karst, caves, rock outcrops and water bodies	Medium	Low	Fencing should be erected around any areas of retained vegetation, including the 'Open Space Areas'.	Prevent impacts to retained vegetation.	During construction	Project manager / contractor

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Sediment barriers or sedimentation ponds to control the quality of water released from the site into the receiving environment	High	Low	Sediment barriers should be installed in all construction areas to prevent sedimentation and contaminated runoff entering creeklines and downstream wetlands.	Prevent sedimentation and contaminated runoff entering creeklines and downstream wetlands.	During construction	Project manager / contractor
Staff training and site briefing to communicate environmental features to be protected and measures implemented to protect them	Medium	Low	All contractors should be inducted into the site to be briefed on sensitive environmental features (including threatened flora, TECs and fauna habitat) and responsibilities in avoiding any impacts to retained vegetation.	Prevent inadvertent damage to retained vegetation and habitat from construction contractors	During construction	Project manager / contractor, ecologist

7. Impact summary

Following implementation of the BAM and the BAMC, the following impacts have been determined.

7.1. Serious and Irreversible Impacts (SAII)

An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species (including endangered populations) or ecological community becoming extinct based on the following 4 principles:

- Principle 1: The impact will cause a further decline of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline
- Principle 2: The impact will further reduce the population size of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very small population size
- Principle 3: The impact is made on the habitat of the species or ecological community that is currently observed, estimated, inferred or reasonably suspected to have a very limited geographic distribution
- Principle 4: The impacted species or ecological community is unlikely to respond to measures to improve its habitat and vegetation integrity, and therefore its members are not replaceable.

These principles are set out in clause 6.7 of the Biodiversity Conservation Regulation 2017. The development has candidate Serious and Irreversible Impacts (SAII) values as outlined in Table 32 and the associated principles. Evaluation of whether impacts on candidate species are serious and irreversible on each entity is included in Table 34 and Table 36 . SAII candidate entities present within the BCAA are displayed in Figure 17.

Table 32: Candidate Serious and Irreversible Impact entities

Species / Community	Principle	Direct impact area (ha)
Cumberland Plain Woodland in the Sydney Basin Bioregion	1 and 2	0.41
Shale Sandstone Transition Forest in the Sydney Basin Bioregion	2 and 3	6.27

Table 33: Determining which Principles apply to serious and irreversible candidate entities (Clause 6.7 of the BC Regulation) for Cumberland Plain Woodland in the Sydney Basin Bioregion

Determining whether impacts are serious and irreversible	Assessment
Principle 1	
The impact will cause a further decline of a species or ecological community that is currently observed, estimated, inferred or reasonably suspected to be in a rapid rate of decline	Yes
Principle 2	

Determining whether impacts are serious and irreversible	Assessment
Does the proposal impact on a species that is a candidate entity because it has been identified as having a very small population size?	Yes

Table 34: Evaluation of an impact on a TEC (Cumberland Plain Woodland in the Sydney Basin Bioregion) consistent with 9.1.1 of the BAM

Impact Assessment Provisions	Assessment
1. the action and measures taken to avoid the direct and indirect impact on the potential entity for an SAII	The proposal has avoided 0.74 ha of the SAII within the BCAA which are proposed to be retained in Public Open Space Areas.
2a. evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal)	The most recent information about the reduction in geographic distribution of the TEC in NSW is contained in the Final Determination, which includes the following: • The total extent of Cumberland Plain Woodland was estimated to be ~8.8% of the community's pre-European distribution by Tozer in 2003 based on aerial photography from 1998. • This estimate was updated in 2007, showing a decline of ~5.2% in 9 years. There are currently no estimates of the decline in the TEC since 1970.
2b. extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC Regulation) indicated by: **i. change in community structure** **ii. change in species composition** **iii. disruption of ecological processes** **iv. invasion and establishment of exotic species** **v. degradation of habitat, and** **vi. fragmentation of habitat**	The extent of reduction in ecological function for the TEC is also found in the Final Determination, as follows: • The community structure has changed such that almost all of the remaining Cumberland Plain Woodland is considered to be regrowth forest and woodland from past clearing activities. • Species composition has changed such that remnants are largely degraded by weed invasion and regrowth stands with high densities of saplings or shrubs may supress ground flora. • Ecological processes have been disrupted by the chemical and structural modification associated with agricultural land uses and more recent expansion of urban land uses which the Cumberland Plain has historically been subjected to. The TEC has been identified as being severely fragmented.
2c. evidence of restricted geographic distribution (Principle 3, clause 6.7 (2) (c) BC Regulation), based on the TECs geographic range in NSW according to the: **i. extent of occurrence** **ii. area of occupancy, and** **iii. number of threat-defined locations.**	Cumberland Plain woodland is highly restricted to the Sydney Basin Bioregion. According to the Final Determination, it was estimated to occur within an extent of 2,810 km^2 and is known from the Auburn, Bankstown, Baulkham Hills, Blacktown, Camden, Campbelltown, Fairfield, Hawkesbury, Holroyd, Liverpool, Parramatta, Penrith and Wollondilly LGAs. These locations are all subject to threats to the TEC, including weed invasion and clearing of native vegetation
2d. evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7 (2) (d) BC Regulation).	The Final Determination states that areas where management aims to conserve the TEC suggests that it is

Impact Assessment Provisions	Assessment
	capable of some recovery, provided the soil has not been disturbed by earthworks, cultivation, fertiliser application or other means of nutrient or moisture enrichment. The Final Determination also states that opportunities for restoration of the TEC is limited, given that the majority of the former distribution of the community has been subjected to some soil disturbance.
3. Where the TBDC indicated that data is 'unknown' or 'data deficient' for a TEC for a criterion listed in subsection 9.1.1(2), the assessor must record this in the BDAR or BCAR.	N/A – all data is provided in the Final Determination as summarised above
4a. the impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal: **i. in hectares, and** **ii. as a percentage of the current geographic extent of the TEC in NSW.**	i. The total area of the TEC to be impacted is 0.41 ha. ii. A rapid GIS analysis of aerial imagery conducted as part of this assessment estimated 23,015 ha of Cumberland Plain Woodland (identified as PCT 849 or 850 by previous mapping) is present in NSW. Therefore, the area of TEC to be affected represents an estimate of <0.001% of the current geographic extent of the TEC. It should be noted that the GIS analysis used existing vegetation mapping datasets and did not include ground truthing the extent of the mapped Cumberland Plain Woodland.
4b. the extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by: **i. estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the development footprint or equivalent area for other types of proposals** **ii. describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:** **• distance between isolated areas of the TEC, presented as the average distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and** **• estimated maximum dispersal distance for native flora species characteristic of the TEC, and** **• other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development** **iii. describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s) (Section 4.3). The assessor must also include the relevant composition, structure and function condition scores for each vegetation zone.**	i. Using aerial imagery, 59 ha of Cumberland Plain Woodland were estimated from within 500 m buffer of the development footprint, excluding the 1.15 ha present within it. It should be noted that the GIS analysis used existing vegetation mapping datasets and did not include ground truthing the extent of the mapped Cumberland Plain Woodland ii. This TEC is highly fragmented in the landscape. There will be limited areas of Cumberland Plain Woodland retained within the BCAA. However there will be some areas of Shale-sandstone Transition Forest retained within the BCAA which contains some similar species assemblages to Cumberland Plain Woodland. These patches of Shale-sandstone Transition Forest will be retained as Public Open Space Areas. The retention of these patches will provide some connectivity of this TEC within the BCAA. The distance between the retained patches is approximately 930 m from north to south and 770 m from east to west if the remnants are retained. If all remnants are removed from the BCAA connectivity for Cumberland Plain Woodland would rely on vegetation that exists outside the BCAA. Pollination distances are not well characterised in Eucalypts. However, seed from characteristic canopy of the TEC mapped within the BCAA comprises *Eucalyptus crebra* (Narrow-leaved Ironbark), *Eucalyptus fibrosa* subsp. *fibrosa* (Red Ironbark) and *Eucalyptus punctata* (Grey Gum) and *Angophora floribunda* (Rough-barked Apple). Typically seed from Eucalypt species would be spread by fauna such as birds and bats. The Grey-headed Flying Fox is likely to forage within the BCAA as there is a permanent camp is approximately 19 km south west at Yarramundi (DAWE

Impact Assessment Provisions	Assessment
	2022). In one foraging night, Grey-headed Flying Fox are known to forage up to 20 kms from their camps. Therefore, as a worst-case scenario (whereby all vegetation is removed for the development footprint) it has been assumed in this instance that the potential maximum dispersal distance, which is estimated to be ~ 20 kms from the BCAA. The TEC mapped within the BCAA generally lacks a native midstorey, characteristic groundcover species for this TEC include shrubs, *Melaleuca thymifolia* and grasses and sedges, *Bothriochloa macra* (Red-leg Grass), *Aristida ramosa* (Purple Wiregrass), *Cyperus gracilis* (Slender Flat-sedge). Therefore, groundcover dispersal distances for grasses is likely to be very limited and likely to rely on what can be dispersed by wind and insects. The TEC was identified as being in moderate condition. Descriptions of the vegetation zone, as well as the vegetation integrity, composition, structure and function condition scores are presented in Section 3.5.

Table 35: Determining which Principles apply to serious and irreversible candidate entities (Clause 6.7 of the BC Regulation) for Shale Sandstone Transition Forest in the Sydney Basin Bioregion

Determining whether impacts are serious and irreversible	Assessment
Principle 2	
Does the proposal impact on a species that is a candidate entity because it has been identified as having a very small population size?	Yes
Principle 3	
Does the proposal impact on the habitat of a species or an area of an ecological community that is a candidate entity because it has a very limited geographic distribution?	Yes

Table 36: Evaluation of an impact on a TEC (Shale Sandstone Transition Forest in the Sydney Basin Bioregion) consistent with 9.1.1 of the BAM

Impact Assessment Provisions	Assessment
1. the action and measures taken to avoid the direct and indirect impact on the potential entity for an SAII	The proposal has avoided 3.14 ha of this SAII entity within the BCAA.
2a. evidence of reduction in geographic distribution (Principle 1, clause 6.7(2)(a) BC Regulation) as the current total geographic extent of the TEC in NSW AND the estimated reduction in geographic extent of the TEC since 1970 (not including impacts of the proposal)	Principle 1 does not apply to this SAII candidate entity.
2b. extent of reduction in ecological function for the TEC using evidence that describes the degree of environmental degradation or disruption to biotic processes (Principle 2, clause 6.7(2)(b) BC Regulation) indicated by:	The extent of reduction in ecological function for the TEC is described the Final Determination and the Approved Conservation Advice for Shale Sandstone Transition Forest of the Sydney Basin Bioregion, as follows:

Impact Assessment Provisions	Assessment
i. change in community structure **ii. change in species composition** **iii. disruption of ecological processes** **iv. invasion and establishment of exotic species** **v. degradation of habitat, and** **vi. fragmentation of habitat**	i. The ecological community has undergone, is observed, estimated, inferred or reasonably suspected to have undergone or is likely to undergo within a time span appropriate to the life cycle and habitat characteristics of its component species: (a) a very large reduction in ecological function, as indicated by any of the following: (d) change in community structure, (e) change in species composition, (f) disruption of ecological processes, (g) invasion and establishment of exotic species, (h) degradation of habitat, (i) fragmentation of habitat. ii. Fragmentation and urban encroachment promote changes to fire regimes. As with the neighbouring Cumberland Plain Woodland, this is likely to lead to increased shrub cover and reduced understory diversity (by fire exclusion) or elimination of some non-sprouters (increased fire frequency). iii. It has been demonstrated that threats have impacted upon functionally important species within the Shale Sandstone Transition Forest ecological community, such as the 'shale birds' and other nomadic nectarivores. The observed loss of mammal species from the ecological community is likely to have had a negative effect on ecological function, through the reduction of pollination, seed dispersal and soil engineering iv. Invasion by *Olea europea* subsp. *cuspidata* (African Olive) and *Asparagus asparagoides* (Bridal Creeper) affects an estimated 20% and 25% of remnants, respectively (M. Tozer, unpublished data). These weeds have the potential to cause significant structural and compositional changes in Shale Sandstone Transition Forest, resulting in ecosystem collapse v. The ecological community is subject to a range of ongoing threats including clearing, fragmentation and other damage associated with urbanisation; loss of ecological services associated with populations of fauna that have been lost or reduced; and inappropriate fire regimes. Climate change is likely to increase the severity of many existing threats, as well as adding new stress to the ecological community. vi. The ecological community is considered to be 'very restricted' and the fragmented nature of its distribution makes it likely that threatening processes could cause it to be lost in the immediate future.
2c. evidence of restricted geographic distribution (Principle 3, clause 6.7 (2) (c) BC Regulation), based on the TECs geographic range in NSW according to the: **i. extent of occurrence** **ii. area of occupancy, and** **iii. number of threat-defined locations.**	The Final Determination for Shale Sandstone Transition Forest in the Sydney Basin Bioregion describes the restricted geographic distribution of this TEC as follows: i. & ii The estimated current distribution of the community primarily comprises the larger remnants depicted in the maps of Tozer et al. (2010). The mapped area of Shale Sandstone Transition Forest is 9,600 ha, representing 20-40% of its original extent (Tozer et al. 2010).

Impact Assessment Provisions	Assessment
	The community has undergone a very large reduction in distribution since European settlement. Approximately 260 ha is currently represented in conservation reserves, representing <2% of its original extent. The decline that has occurred since European settlement was estimated in 2010 as 79% (DECCW, 2010). iii. According to the Final Determination, it is known from the Bankstown, Baulkham Hills, Blue Mountains, Campbelltown, Hawkesbury, Liverpool, Parramatta, Penrith, and Wollondilly Local Government Areas (LGAs). These locations are all subject to threats to the TEC, including weed invasion and clearing of native vegetation
2d. evidence that the TEC is unlikely to respond to management (Principle 4, clause 6.7 (2) (d) BC Regulation).	Principle 4 does not apply to this SAII candidate entity
3. Where the TBDC indicated that data is 'unknown' or 'data deficient' for a TEC for a criterion listed in subsection 9.1.1(2), the assessor must record this in the BDAR or BCAR.	N/A – all data is provided in the Final Determination as summarised above
4a. the impact on the geographic extent of the TEC (Principles 1 and 3) by estimating the total area of the TEC to be impacted by the proposal: **i. in hectares, and** **ii. as a percentage of the current geographic extent of the TEC in NSW.**	i. The total area of the TEC to be impacted by the development footprint is 6.26 ha. ii. From the information provided in the Final Determination, approximately 9,600 ha, ha is assumed to be is present in NSW. Therefore, the area of TEC to be affected represents an estimate of 0.06% of the current geographic extent of the TEC.
4b. the extent that the proposed impacts are likely to contribute to further environmental degradation or the disruption of biotic processes (Principle 2) of the TEC by: **i. estimating the size of any remaining, but now isolated, areas of the TEC; including areas of the TEC within 500 m of the development footprint or equivalent area for other types of proposals** **ii. describing the impacts on connectivity and fragmentation of the remaining areas of TEC measured by:** **• distance between isolated areas of the TEC, presented as the average distance if the remnant is retained AND the average distance if the remnant is removed as proposed, and** **• estimated maximum dispersal distance for native flora species characteristic of the TEC, and** **• other information relevant to describing the impact on connectivity and fragmentation, such as the area to perimeter ratio for remaining areas of the TEC as a result of the development** **iii. describing the condition of the TEC according to the vegetation integrity score for the relevant vegetation zone(s) (Section 4.3). The assessor must also include the relevant composition, structure and function condition scores for each vegetation zone.**	i. Using aerial imagery, 9.2 ha of Shale Sandstone Transition Woodland were estimated from within 500 m buffer of the development footprint, excluding the 9.4 ha present within it. It should be noted that the GIS analysis used existing vegetation mapping datasets and did not include ground truthing the extent of the mapped Shale Sandstone Transition Woodland. ii. This TEC is highly fragmented in the landscape. However there will be areas of Shale-sandstone Transition Forest retained within the BCAA. These patches will be retained as Public Open Space Areas. The retention of these patches will provide some connectivity of this TEC within the BCAA. The distance between the retained patches is approximately 930 m from north to south and 770 m from east to west if the remnants are retained. If all remnants are removed from the BCAA connectivity for Shale-sandstone Transition Forest would rely on vegetation that exists outside the BCAA. Aerial imagery suggests that there are native street trees directly adjacent to the BCAA and potential remnant vegetation approximately 1.5km to the north east of the BCCA towards Cattai Creek. Pollination distances are not well characterised in Eucalypts. However, seed from characteristic canopy of the TEC mapped within the BCAA comprises *Eucalyptus crebra* (Narrow-leaved Ironbark), *Eucalyptus fibrosa* subsp. *fibrosa* (Red Ironbark), *Eucalyptus moluccana* (Grey Box) and E

Impact Assessment Provisions	Assessment
	Eucalyptus tereticornis (Forest Red Gum). Typically seed from Eucalypt species would be spread by fauna such as birds and bats. The Grey-headed Flying Fox is likely to forage within the BCAA as there is a permanent camp is approximately 19 km south west at Yarramundi (DAWE 2022). In one foraging night, Grey-headed Flying Fox are known to forage up to 20 kms from their camps. Therefore, as a worst-case scenario (whereby all vegetation is removed for the development footprint) it has been assumed in this instance that the potential maximum dispersal distance, which is estimated to be ~ 20 kms from the BCAA. The TEC mapped within the BCAA generally lacks a native midstorey, characteristic groundcover species for this TEC include shrubs, *Bursaria spinosa* subsp. *spinosa* (Native Blackthorn) and grasses forbs and sedges, *Bothriochloa macra* (Red-leg Grass), *Aristida vagans* (Threeawn Speargrass), *Cymbopogon refractus* (Barbed-wire Grass), Themeda triandra (Kangaroo Grass), *Microlaena stipodies* var. *stipodies* (Weeping Grass), *Dichondra repens* (Kidney Weed) and *Cyperus gracilis* (Slender Flat-sedge).. Therefore, groundcover dispersal distances for grasses forbs and sedges is likely to be very limited and likely to rely on what can be dispersed by wind and insects. iii. The TEC was mapped into two condition states within the BCAA being low and moderate condition. Descriptions of the vegetation zone, as well as the vegetation integrity, composition, structure and function condition scores are presented in Section 3.5.

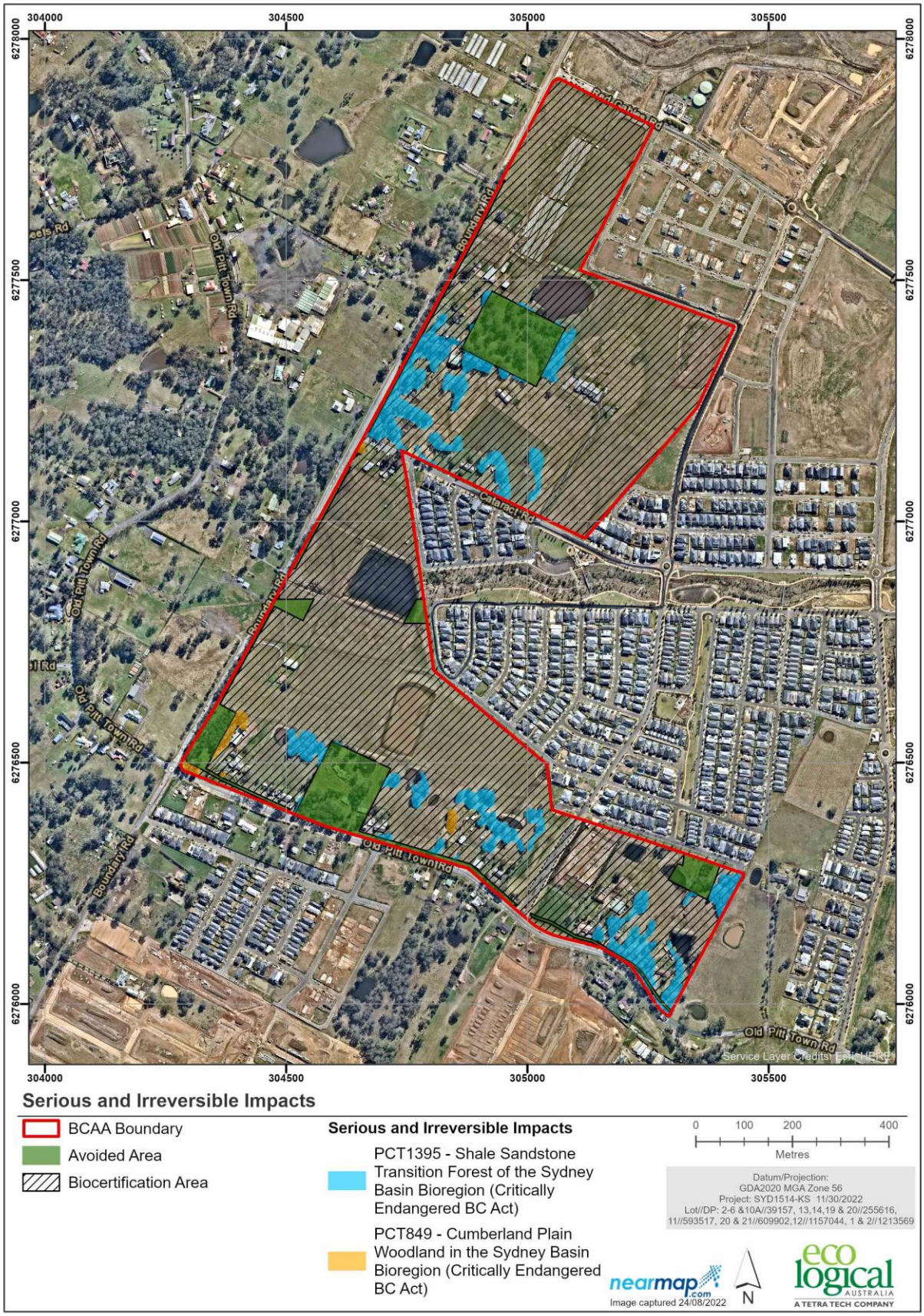

Figure 17: Serious and Irreversible Impact entities present within the BCAA.

7.2. Impacts requiring offsets

The impacts of the development requiring offset for native vegetation are outlined in Table 37 and shown on Figure 18. The impacts of the development requiring offset for species credit species and their habitat are outlined in Table 38 and Figure 19.

Table 37: Impacts to native vegetation that require offsets

Vegetation Zone	PCT ID	PCT Name	Condition	Vegetation Formation	Vegetation Class	Direct impact (ha)
VZ_1	1395	Cumberland shale - sandstone Ironbark forest	Low	Grassy Woodlands	Coastal Valley Grassy Woodlands	4.43
VZ_2	1395	Cumberland shale - sandstone Ironbark forest	Moderate	Grassy Woodlands	Coastal Valley Grassy Woodlands	1.83
VZ_3	849	Cumberland shale plains woodland	Moderate	Grassy Woodlands	Coastal Valley Grassy Woodlands	0.41
VZ_4	1071	Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion	Low	Freshwater Wetlands	Coastal Freshwater Lagoons	0.47

Table 38: Impacts on threatened species and threatened species habitat that require offsets

Species	Common Name	Direct impact - habitat (ha)	BC Act listing status	EPBC Act Listing status
Myotis macropus	Southern myotis	5.89	Vulnerable	Not Listed
Ninox connivens	Barking Owl	0.28	Vulnerable	Not Listed
Ninox strenua	Powerful Owl	0.28	Vulnerable	Not Listed
Tyto novaehollandiae	Masked Owl	0.28	Vulnerable	Not Listed
Tyto tenebricosa	Sooty Owl	0.28	Vulnerable	Not Listed

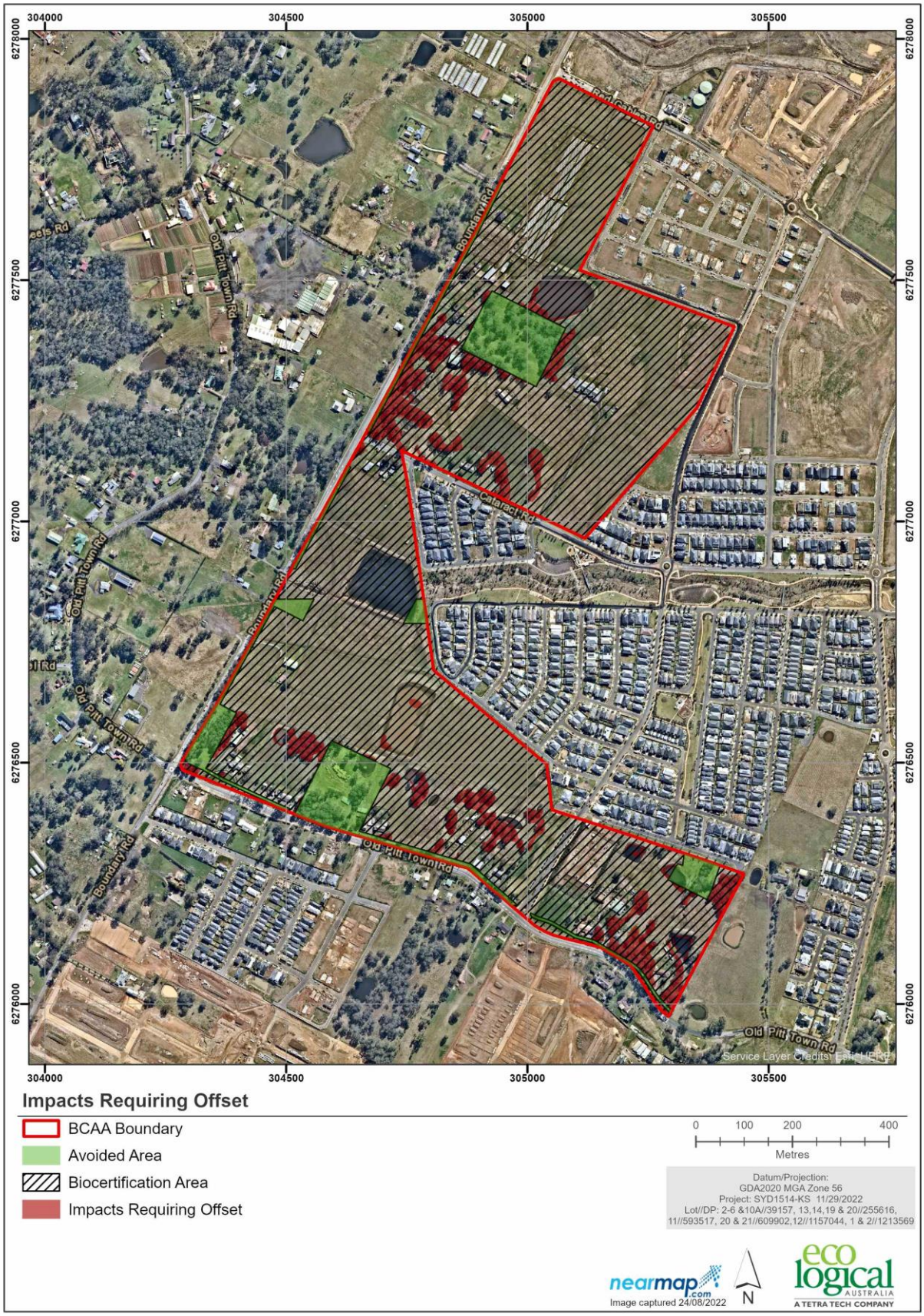

Figure 18: Impacts requiring offset

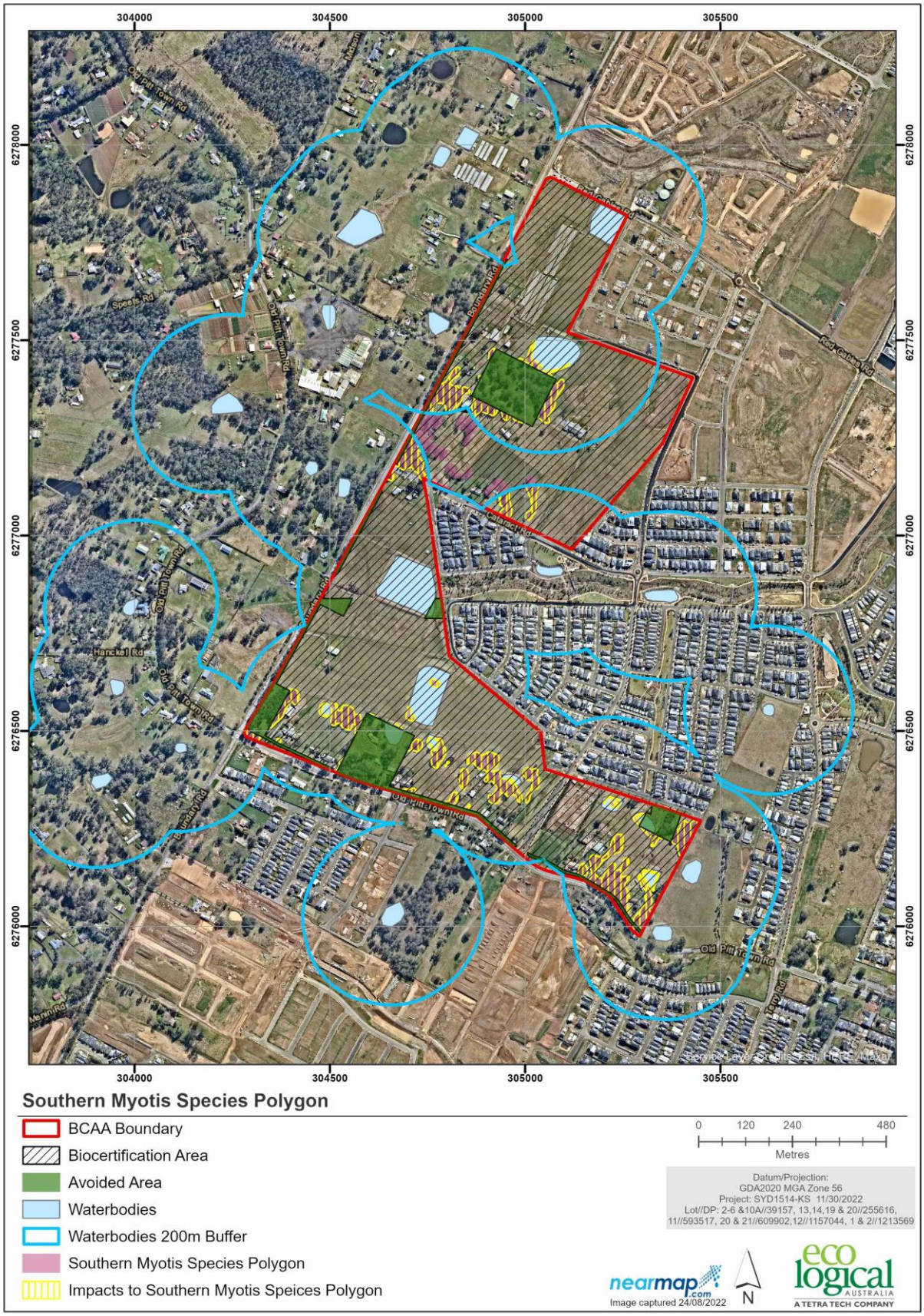

Figure 19: Impacts to *Myotis macropus* (Southern Myotis) requiring offset

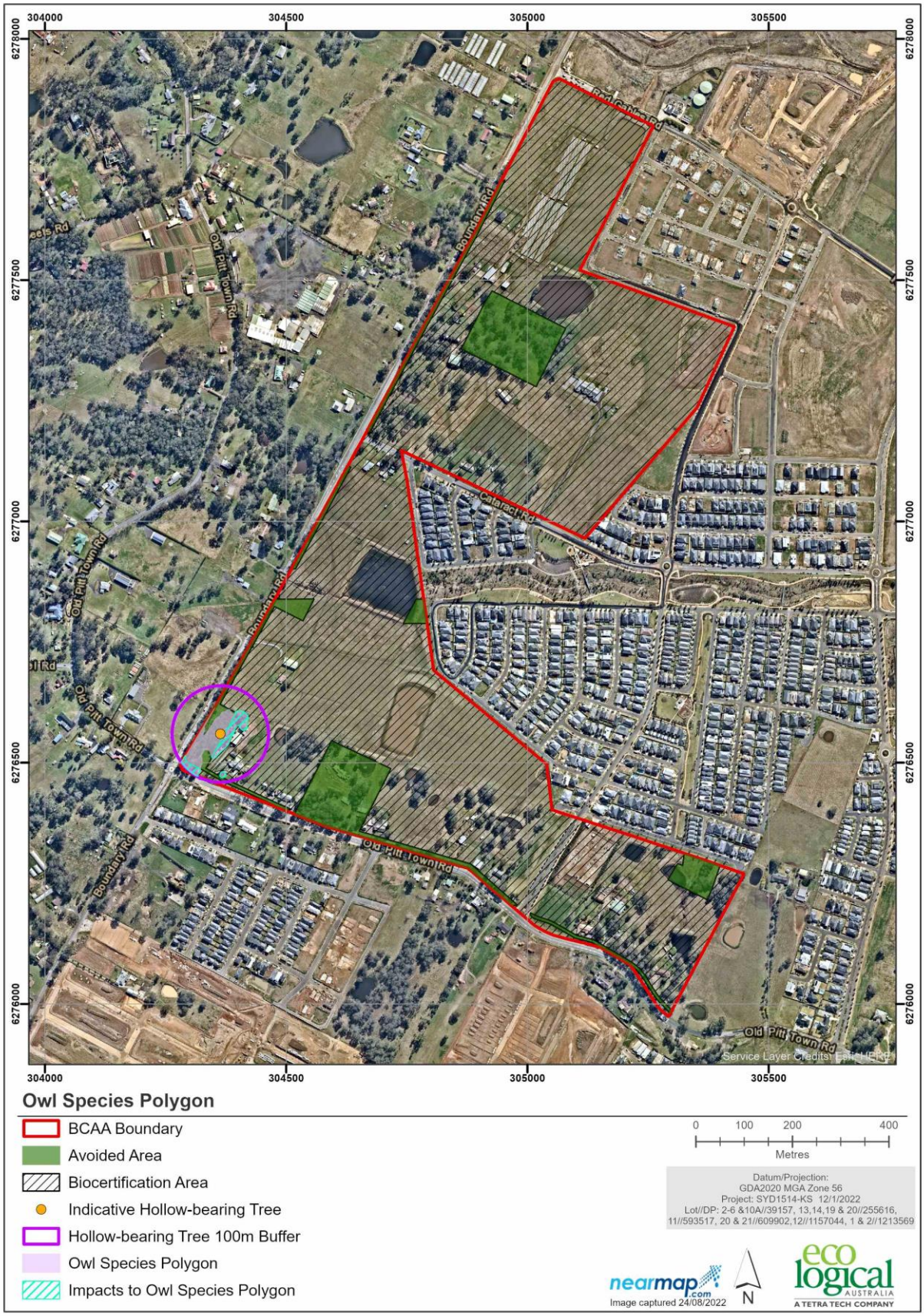

Figure 20 Impacts to Ninox connivens (Barking Owl), *Ninox strenua* (Powerful Owl), *Tyto novaehollandiae* (Masked Owl) and *Tyto tenebricosa* (Sooty Owl) requiring offset

7.3. Impacts not requiring offsets

All impacts to native vegetation will require offset. There are no areas that do not require offset in accordance with Section 9.2.1 of the BAM.

7.4. Areas not requiring assessment

Areas of land that do not contain native vegetation do not require assessment for ecosystem credit in accordance with Section 9.3 of the BAM. Areas not requiring assessment are shown on Figure 21.

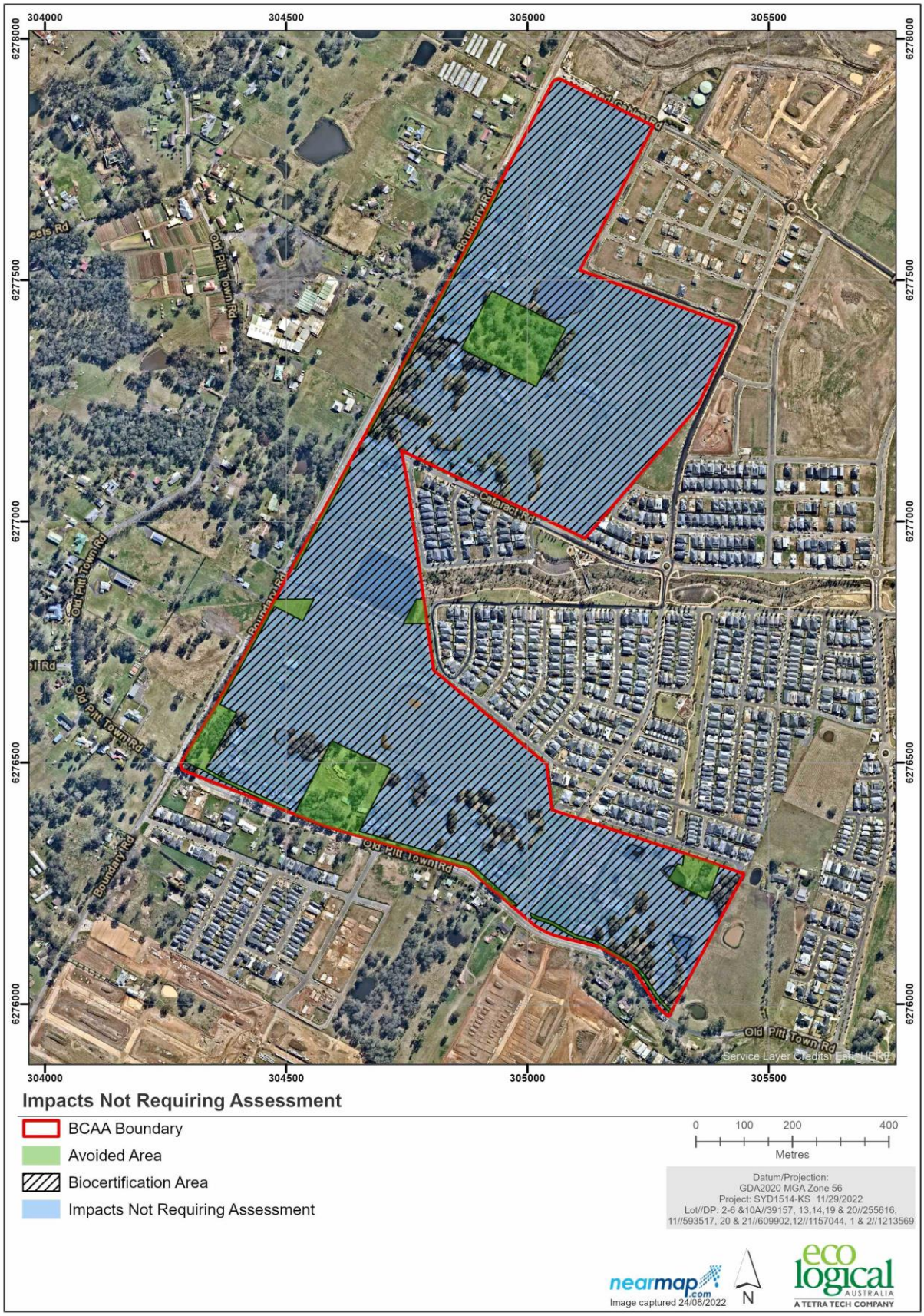

Figure 21: Areas not requiring assessment

7.5. Credit summary

The number of ecosystem credits required for the Biocertification area are outlined in Table 39. The number of species credits required for the development are outlined in Table 40. A biodiversity credit report is included in Appendix H.

Table 39: Ecosystem credits required

Vegetation Zone	PCT ID	PCT Name	Vegetation Formation	Vegetation Class	Direct impact (ha)	Credits required
VZ_1 Low	1395	Cumberland shale - sandstone Ironbark forest	Grassy Woodlands	Coastal Valley Grassy Woodlands	4.43	98
VZ_2 Mod	1395	Cumberland shale - sandstone Ironbark forest	Grassy Woodlands	Coastal Valley Grassy Woodlands	1.83	161
VZ_3 Mod	849	Cumberland shale plains woodland	Grassy Woodlands	Coastal Valley Grassy Woodlands	0.41	12
VZ_4 Low	1071	Phragmites australis and Typha orientalis coastal freshwater wetlands of the Sydney Basin Bioregion	Freshwater Wetlands	Coastal Freshwater Lagoons	0.47	5

Table 40: Species credit summary

Species	Common Name	Direct impact -habitat (ha)	Credits required
Myotis macropus	Southern Myotis	5.89	121
Ninox connivens	Barking Owl	0.28	6
Ninox strenua	Powerful Owl	0.28	6
Tyto novaehollandiae	Masked Owl	0.28	6
Tyto tenebricosa	Sooty Owl	0.28	10

8. Proposed Biodiversity Certification Strategy

The following measures outlined in Table 41 are proposed to offset biodiversity impacts as per chapter 12 of the Biodiversity Assessment Method.

Table 41: Biodiversity offset measures proposed

Measures proposed	Description	Timing
a. credits proposed to be purchased or b. financial contributions proposed to be made to the Biodiversity Conservation Fund created) and retired	This BCAR has provided a credit requirement for the proposal. Ecosystem credit species are required for PCTs 1395, 849 and 1071 and species credits are required for: • *Myotis macropus* (Southern Myotis). • *Ninox connivens* (Barking Owl) • *Ninox strenua* (Powerful Owl) • *Tyto novaehollandiae* (Masked Owl) • *Tyto tenebricosa* (Sooty Owl) A credit summary is provided in Table 39 and Table 40. The proponent is proposing to either: • Purchase and retire biodiversity credits from the market; or • Discharge the credit obligation via payment into the Biodiversity Trust Fund.	Credit purchase and retirement or payment into the fund will be made prior to commencement of works.
c. reservation of land under the NPW Act (declared strategic biodiversity certifications only)	Not applicable as this is not a strategic biodiversity certification.	n/a
d. adoption of development controls under the EP&A Act that conserve or enhance the natural environment (declared strategic biodiversity certifications only)	Not applicable as this is not a strategic biodiversity certification.	n/a
e. special infrastructure contributions that conserve or enhance the natural environment (declared strategic biodiversity certifications only)	Not applicable as this is not a strategic biodiversity certification.	n/a
f. any other measure determined to be an approved conservation measure by the Minister for Energy and Environment (declared strategic biodiversity certifications only).	Not applicable as this is not a strategic biodiversity certification.	n/a

9. Consistency with legislation and policy

Additional matters relating to impacts on flora and fauna which are not covered by the BC Act must also be addressed for the proposed BCCA. Potential MNES in accordance with the EPBC Act have been addressed below.

9.1. *Environment Protection and Biodiversity Conservation Act 1999*

The EPBC Act establishes a process for assessing the environmental impact of activities and developments where MNES may be affected. Under the Act, any action which "has, will have, or is likely to have a significant impact on a matter of MNES" is defined as a "controlled action", and requires approval from the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW), which is responsible for administering the EPBC Act.

A habitat assessment and Likelihood of Occurrence was completed for listed threatened species that represent MNES (Appendix F). The following MNES were assessed as either having the potential to occur within the BCAA, likely to occur or known from the BCAA:

- *Anthochaera phrygia* (Regent Honeyeater)
- *Lathamus discolor* (Swift Parrot)
- *Callocephalon fimbriatum* (Gang-gang Cockatoo)
- *Hirundapus caudacutus* (White-throated Needletail)
- *Pteropus poliocephalus* (Grey-headed Flying-fox).

The assessments in this section were prepared in accordance with the EPBC Act Matters of National Environmental Significance: Significant Impact Guidelines 1.1 (Department of Environment 2009). These guidelines were established to assist proponents to determine whether a proposed action is likely to result in a significant impact on a matter of national environmental significance.

It was determined that the action is unlikely to have a significant impact on the threatened species listed above.

9.1.1. Forest birds (*Anthochaera phrygia* (Regent Honeyeater) and *Lathamus discolor* (Swift Parrot)

The Regent Honeyeater and Swift Parrot are both listed as critically endangered under the EPBC Act. The distribution and habitat associations of this threatened species are presented in Appendix F. Due to similar habitat requirements of these species, a single test was undertaken for both. These species were not recorded within the BCAA during surveys. The proposed action will impact 6.68 ha of potential foraging habitat for both the Regent Honeyeater and Swift Parrot (PCTs 849 and 1395). The BCAA is not included within the DPIE mapped breeding areas for either threatened species.

Criterion	Question	Response
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:		
1)	lead to a long-term decrease in the size of a population of a species *Note: An 'important population' is a population that is necessary for a species' long-term survival and recovery.*	A 'population of a species' refers to a population, or collection of local populations, that occurs within a particular bioregion. The proposed development footprint does not support a known local population of Swift Parrot or Regent Honeyeater, however may be used occasionally by foraging individuals. No breeding habitat is present in the BCAA. The proposed action would remove 6.68 ha of vegetation, containing potential foraging habitat for the Regent Honeyeater and Swift Parrot, which would decrease the amount of foraging habitat available. No breeding habitat would be affected as part of the proposed action. The species would not rely solely on the area to be removed and can continue to access foraging habitat retained within the BCAA and surrounds. Therefore, although the proposed action would reduce the amount of foraging habitat for the population the proposed action would not lead to a long-term decrease in populations of these species.
2)	reduce the area of occupancy of the species	The proposed action would reduce the area of occupancy of these species through the direct removal of 6.68 ha of potential foraging habitat. 3.88 ha of habitat would be retained within the subject land and similar habitat is available adjacent to the action area. No breeding habitat would be removed as the Swift Parrot breeds in Tasmania and the Regent Honeyeater only breeds in three known locations: • north-east Victoria (Chiltern-Albury), • Capertee Valley (NSW) • the Bundarra-Barraba region (NSW)
3)	fragment an existing population into two or more populations	A 'population of a species' refers to a population, or collection of local populations, that occurs within a particular bioregion. The proposed biocertification area does not support a known local population of Swift Parrot or Regent Honeyeater, however may be used occasionally by foraging individuals. No breeding habitat is present in the BCAA. The Regent Honeyeater and Swift Parrot are highly mobile /migratory species which may use the vegetation for foraging within the BCAA seasonally and sporadically and are not known to occupy the BCAA as a particular population. Subsequently, the proposed action would not fragment populations of any of these species.
4)	adversely affect habitat critical to the survival of a species	The National Recovery Plan for both the Swift Parrot and the Regent Honeyeater identify critical habitat as those with a "level of site fidelity or possess[ing] phenological characteristics likely to be of importance or are otherwise identified by the recovery team". The proposed works would not impact critical habitat for the species, as site fidelity has not been

Criterion	Question	Response
		demonstrated (determined by a review of historic records) and the BCAA is not identified in the recovery plan.
5)	disrupt the breeding cycle of a population	The Swift Parrot breeds only in Tasmania. The species migrates to the mainland following the breeding cycle. The Regent Honeyeater is only known to breed in four locations across its known range, none of which are present in the BCAA. The availability of foraging habitat is an important factor for the life cycle of this species. The proposed action would remove 6.68 ha of potential foraging habitat for the Swift Parrot. Foraging habitat across the BCAA will remain. The proposed action would not result in the complete removal of foraging resources, or fragmentation of foraging habitat across the broader landscape. Swift Parrot and Regent Honeyeater will also forage in response to mass flowering events, favouring areas with an abundance of *Eucalyptus* sp. in flower. Given the sparse and is limited extent of foraging habitat in the BCAA, t is likely that the foraging habitat within the BCAA would act as supplementary habitat to larger, more intact areas. Therefore, it is unlikely that the breeding cycle of the Swift Parrot and Regent Honeyeater would be affected.
6)	modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed action would remove 6.68 ha of potential foraging habitat available for these species within the BCAA. Both species rely on relatively large areas to forage in NSW and following mass flowering events in the case of Swift Parrot, and, for the Regent Honeyeater they generally remain close to the three known breeding locations, none of which is close to the proposed action area. However, the proposed action area contains species of plant that could provide some foraging habitat for the two bird species, but not to the extent that the removal would result in the further decline of the species.
7)	result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The proposed action would not result in invasive species, such as weeds, that would be harmful to Swift Parrott or Regent Honeyeater. It is unlikely that the proposed action will result in a large increase in the number of weeds due to the current disturbed nature of the site.
8)	introduce disease that may cause the species to decline, or	Psittacine Beak and Feather Disease may cause both of these species to decline. This spread through food sharing, excrement, feather and skin particles. The proposed action would not involve the sharing of food or potentially exchange this disease material. The proposed action is therefore unlikely to introduce the disease.
9)	interfere substantially with the recovery of the species.	One threat activity identified within the National Recovery Plan for the Swift Parrot 2011 and National Recovery Plan for the Regent Honeyeater 2016 is relevant to the proposed development, habitat loss and alteration. The proposed action would remove 6.68 ha of potential foraging habitat for this species. However, this threat is considered minimal given that similar habitat would still be available for the highly mobile species within and adjacent to the site boundary, therefore not fragmenting foraging habitat or movement corridors.
Conclusion	Is there likely to be a significant impact?	No. The proposed action is unlikely to have a significant impact on the Regent Honeyeater and Swift Parrot for the following reasons: • The action will not affect known breeding habitat • Will impact 6.68 ha of foraging habitat for this species which is likely to form supplementary habitat and be used occasionally as part of a foraging resource network

Criterion	Question	Response
		• No populations would be isolated or fragmented and the life cycle of the species are not likely to be affected.

9.1.2. *Callocephalon fimbriatum* (Gang-gang Cockatoo)

The Gang-gang Cockatoo is listed as endangered species under the EPBC Act. This species was not recorded during survey, however potential foraging was identified within the BCAA. The total area of potential impact to this species is approximately 6.68 ha (PCT 849 and 1395) of potential foraging habitat for this species.

Considering that this species may foraging or breed within the BCAA a significance assessment has been undertaken in accordance with Significant impact guidelines.

Table 42: Application of Significant Impact Criteria to Gang-gang Cockatoo

Criterion	Assessment
An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:	
Criterion a: lead to a long-term decrease in the size of a population	A 'population of a species' refers to a population, or collection of local populations, that occurs within a particular bioregion. There is no known population in the BCAA. The proposed action would remove 6.68 ha of vegetation, containing potential foraging habitat for the Gang-gang Cockatoo. No breeding habitat would be affected as part of the proposed action, no breeding habitat was identified during targeted survey. The species would not rely solely on the area to be removed and can continue to access foraging habitat retained within the BCAA and surrounds, the proposed action would not lead to a long-term decrease in populations of the species.
Criterion b: reduce the area of occupancy of the species	The proposed action would reduce the area of occupancy of the Gang-gang Cockatoo through the direct removal of 6.68 ha of potential foraging habitat. Foraging habitat would be retained within the subject land and similar habitat is available adjacent to the action area. No breeding habitat would be removed.
Criterion c: fragment an existing population into two or more populations	The proposed action would remove 6.68 ha of potential foraging habitat for the species to use seasonally and sporadically. No breeding habitat would be removed. Subsequently, the proposed works would not fragment populations of the species into two or populations. The species breeds elsewhere, the last known breeding subpopulation within the Sydney metropolitan area is confined to the Hornsby and Ku-ring-gai Local Government Areas. The proposed action would not affect the species ability to breed or exchange genetic material between populations. There are no known populations or parts of populations of the Swift Parrot or Regent Honeyeater present in the proposed action area.
Criterion d: adversely affect habitat critical to the survival of a species	The Conservation Advice for Gang-gang Cockatoo states: *Habitat critical to the survival of the Gang-gang Cockatoo includes all foraging habitat during both the breeding and non-breeding season.* *In summer months, Gang-gang Cockatoos generally occur in tall mountain forests and woodlands - particularly within mature, wet sclerophyll forests, dominated by eucalypts with dense, shrubby acacia and banksia understories, often in secluded valleys.* *During winter months, Gang-gang Cockatoos rely on drier more open eucalypt forests and woodland assemblages at lower altitudes. Open eucalypt assemblages such as box-ironbark* *make up their habitat during this period. The species also relies on assemblages of river red gum (Eucalyptus camaldulensis), dense coastal thickets of Leptospermum or Casuarina, or heathland and occurs in parks, gardens, and trees beside roads*

Criterion	Assessment
	Habitat critical to the survival of this species also includes hollow bearing trees with known or potential Gang-gang Cockatoo hollow chambers that are generally around 20 cm in floor diameter, around 50.5 cm deep (range 22–90 cm) and occur between around 7.5 m (range 5–9.4 m) above the ground. One hollow-bearing tree within the BCAA may be considered appropriate for this species. The BCAA does not contain the tall, wet sclerophyll habitat described above for the summer foraging months, however the BCAA contains potential Eucalypt foraging habitat for this species which could be utilised during the winter months for this species. Whilst foraging habitat and hollow-bearing trees may be removed, the scale of the proposed works is unlikely to adversely impact this species such that it would affect their survival, as the vegetation within the BCAA is considered to be marginal winter foraging habitat.
Criterion e: disrupt the breeding cycle of a population	The species breeds elsewhere, the last known breeding subpopulation within the Sydney metropolitan area is confined to the Hornsby and Ku-ring-gai Local Government Areas. The proposed action would not affect the species ability to breed or exchange genetic material between populations. There are no records of this species previously breeding within the BCAA (according to surveys completed in 2022).
Criterion f: modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The proposed action would remove 6.68 ha of potential foraging habitat available for the species within the BCAA. Habitat for these species within and around the BCAA has been significantly modified over time and is degraded. The proposed action would result in the removal of potential foraging habitat, the proposal will increase some fragmentation to an already fragmented patch, but not to the extent that the removal would result in the further decline of the species.
Criterion g: Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	The proposal would not result in invasive species, such as weeds, that would be harmful to Gang-gang Cockatoo. It is unlikely that the proposed action will result in a large increase in the number of weeds due to the current disturbed nature of the site.
Criterion h: Introduce disease that may cause the species to decline	Gang-gang Cockatoos are susceptible to Psittacine beak and feather disease. Beak and feather disease virus is highly prevalent in a range of abundant Australian psittacines (Parrots). This spread through food sharing, excrement, feather and skin particles. The proposed action would not involve the sharing of food or potentially exchange this disease material. The proposed action is therefore unlikely to introduce the disease.
Criterion i: Interfere substantially with the recovery of the species	The Conservation Advice for this species states: '*Actions that remove habitat critical to survival would interfere with the recovery of Gang-gang Cockatoos*'. Whilst foraging habitat will be removed, the scale of the proposed works is unlikely to adversely impact this species such that it would affect their survival, as the vegetation within the BCAA is considered to be marginal winter foraging habitat. Therefore, the action is unlikely to interfere with the recovery of the species.
Conclusion	No. The proposed action is unlikely to have a significant impact on Gang-gang Cockatoos for the following reasons: • A known breeding population is not known to occur within the BCAA • The vegetation within the BCAA is considered marginal winter foraging habitat and is not considered to be foraging habitat that is critical to this species survival

Criterion	Assessment
	• The scale of the proposal is not considered to adversely affect foraging or breeding habitat critical to this species survival • The species is highly mobile and could continue to forage within the retained in the Public Open Space Areas and assessment area.

9.1.3. *Pteropus poliocephalus* (Grey-headed Flying Fox)

The Grey-headed Flying-fox is listed as vulnerable under the EPBC Act and has been previously recorded within the locality (BioNet 2021). There are records for this species within a 5 km radius of the site (BioNet 2021). There are no known camps within the BCAA, with the nearest permanent camp is approximately 19 km south west at Yarramundi (DCCEEW 2022). The camp at Yarramundi has fluctuated in size over the past 5 years and was most recently occupied by 500-2,499 individuals in 2020 (DAWE 2020b). There has also been a camp recorded at Windsor, approximately 7 km to the northwest of the BCAA at Windsor, this camp recorded over 50,000 individuals in 2019. However, this camp is not currently occupied by Grey-headed Flying-fox.

Grey-headed Flying-fox present in camps within a 20 km radius of the site may use the foraging resources available within the Biocertification Area. The potential foraging habitat within the BCAA is marginal would not be relied upon as a sole foraging resource for this species. The Grey-headed Flying-fox will utilise a range of resources within 20 km of their camps. Although the BCAA is located further than 20 km from the nearest permanent camp, it is still considered likely that the resources available in the BCAA form part of a mosaic of resources within the locality; especially when Grey-headed Flying Foxes are occupying the camp at Windsor.

Considering that Grey-headed Flying-fox is likely to forage on the *Eucalyptus crebra, C. maculata, E.fibrosa, E.moluccana* and *E.teretecornis* within the BCAA on an occasional basis, a significance assessment has been undertaken in accordance with Significant impact guidelines 1.1 under the EPBC Act (DotEE, 2013) (Table 43).

Table 43: EPBC Act Assessment for *Pteropus poliocephalus* (Grey-headed Flying-fox)

Criterion	Assessment
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
Criterion a: lead to a long-term decrease in the size of an important population of a species	The Matters of National Environmental Significance Impact Guidelines 1.1 (Commonwealth of Australia, 2013) defines an important population as a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are: • Key source populations either for breeding or dispersal • Populations that are necessary for maintaining genetic diversity, and/or • Populations that are near the limit of the species range The Grey-headed Flying-fox is considered one population due to the constant exchange of genetic material between individuals and its movement between camps throughout its entire geographic range (DCCEEW 2020c). Maternity or other roosting habitat is considered important habitat for this species. According to the National Flying-fox Monitoring Program, no Grey-headed Flying-fox camps currently occur or have ever been recorded within the BCAA (DCCEW 2022b). The nearest active Grey-headed Flying-fox camp occurs at Yarramundi approximately 19 km south west of the BCAA. The proposed action will directly remove 6.68 ha of vegetation with canopy, which comprises suitable foraging habitat for the Grey-headed Flying-fox. The Grey-headed Flying-fox is recorded as travelling long distances (up to 40 km) on feeding forays. Given the proximity of abundant habitat outside the BCAA, the removal of this potential foraging habitat would not lead to the long-term decrease in the size of an important population of Grey-headed Flying-fox.

Criterion	Assessment
Criterion b: reduce the area of occupancy of an important population	The biocetification area will reduce the extent of available foraging habitat for the Grey-headed Flying-fox. About 6.68 ha of potential foraging habitat will be removed from the BCAA. The vegetation within the BCAA may provide supplementary foraging habitat for this species. The BCAA does not contain breeding or sheltering habitat (i.e., bat camps). The Grey-headed Flying-fox is known to fly long distances (up to 40 km per night) and move between bat camps. As such this species is likely to utilise a large extent of habitat around the Yarramundi camp which may include some habitat within the BCAA and habitat in adjacent lands. Due to the extent of habitat within a 40 km radius of the known bat camps at Yarramundi, the removal of a small amount of native and non-native vegetation is unlikely to significantly reduce the extent of occupancy for this species.
Criterion c: fragment an existing important population into two or more populations	The proposed action will remove 6.68 ha of vegetation with canopy, which comprises suitable foraging habitat for the Grey-headed Flying-fox. No camps will be affected, and other areas of foraging habitat are present in the region. The species is highly mobile, and the proposed action will not fragment an existing important population into two or more populations. Whilst the potential foraging habitat may contribute as a 'stepping stone' for this highly mobile species to other more substantial foraging habitat sites, this function is unlikely to be significantly inhibited by the proposed works as there are other potential "stepping stones" 1.7 km to the west of the BCAA and 2.3 km to the east. 3.88 ha of potential foraging habitat will be retained within the BCAA. Furthermore, this species has been recorded in urban environments and is likely to continue to forage adjacent to the BCAA and across the broader locality.
Criterion d: adversely affect habitat critical to the survival of a species	Where the existence of important winter and spring flowering vegetation communities is verified in the field, they are considered habitat critical to the survival of the Grey-headed Flying-fox. Habitat critical to the survival of the Grey-headed Flying-fox may also be vegetation communities not containing the above tree species but which: • contain native species that are known to be productive as foraging habitat during the final weeks of gestation, and during the weeks of birth, lactation and conception (August to May) • contain native species used for foraging and occur within 20 km of a nationally important camp as identified on the Department's interactive flying-fox web viewer, or • contain native and or exotic species used for roosting at the site of a nationally important Grey-Headed Flying-Fox camp as identified on the Department's interactive flying-fox web viewer. The study area is approximately 17 km north of the camp at Parramatta Park. The camp at Parramatta Park has recorded numbers between 10,000 and 49,000 for the past year. Therefore, foraging habitat within the study area is consistent with habitat that would be critical to the survival of this species. While the habitat would be critical to the survival of the species, the removal of 6.68 ha of potential foraging habitat is unlikely to significantly affect the population. The adverse effects of removing about 6.68 ha of potential foraging habitat is not likely to affect the survival of the species as a whole. The species occupies a large portion of the eastern seaboard, responding to fluctuations in flowering and fruiting. The species would not solely rely on 6.68 ha of habitat to be sustained.
Criterion e: disrupt the breeding cycle of an important population	As no breeding habitat would be removed or disturbed, it is unlikely the proposed work would disrupt the breeding cycle of the important population that roosts in the Sydney basin.
Criterion f: Adversely affect habitat critical to the survival of a species; modify, destroy,	No campsites would be removed, or disturbed, and foraging habitat will remain within the BCAA, immediately adjacent to the BCAA and wider locality. The proposed action

Criterion	Assessment
remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	would therefore be unlikely to modify, destroy, remove, or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Criterion g: Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	The proposal would not result in invasive species, such as weeds, that would be harmful to Grey-headed Flying Fox. It is unlikely that the proposed action will result in a large increase in the number of weeds due to the current disturbed nature of the site.
Criterion h: Introduce disease that may cause the species to decline	Grey-headed Flying-fox are reservoirs for the Australian bat lyssavirus and can cause clinical disease and mortality in Grey-headed Flying-fox. The proposed action is unlikely to present a significant ecological stress on any camps or on individuals that may utilise the subject site and therefore the works are unlikely to introduce or exacerbate this virus or any other disease that may cause this species to decline.
Criterion i: Interfere substantially with the recovery of the species	A National Recovery Plan for the Grey-headed Flying-fox was published in 2021. No maternity camps would be removed, and the proposed action will remove 6.68 ha area of potential foraging habitat. The adverse effects of removing about 6.68 ha of potential foraging habitat is not likely to affect the survival of the species as a whole. The species occupies a large portion of the eastern seaboard, responding to fluctuations in flowering and fruiting. The species would not solely rely on 6.68 ha of habitat to be sustained. In addition 3.88 of potential foraging habitat will be retained within the development site. It is therefore unlikely the proposed action would interfere with the recovery of this species.
Conclusion	The action will not affect known breeding habitat and will only impact on a relatively small amount of potential foraging for this species. No important populations would be isolated or fragmented and the life cycle of this species is not likely to be affected.

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Appendix A Definitions

The following terminology has been used throughout this report for the purposes of describing the impacts of the proposal in the context of a biodiversity assessment in accordance with the NSW Biodiversity Assessment Method 2020. This terminology may or may not align with other technical documents associated with the proposed development.

Terminology	Definition
Biodiversity credit report	The report produced by the Credit Calculator that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a BCAA, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site.
Biodiversity Certification Assessment Area	The Biodiversity Certification Assessment Area (BCAA) comprises the parcel of land assessed in this BCAR and comprises 'land proposed for Biodiversity Certification' and 'land subject to conservation measures'.
Biocertification Area	Land proposed for Biocertification. The Biocertification area is located within the wider Biodiversity Certification Assessment Area (BCAA).
BioNet Atlas	The BioNet Atlas (formerly known as the NSW Wildlife Atlas) is the OEH database of flora and fauna records. The Atlas contains records of plants, mammals, birds, reptiles, amphibians, some fungi, some invertebrates (such as insects and snails) and some fish
Broad condition state:	Areas of the same PCT that are in relatively homogenous condition. Broad condition is used for stratifying areas of the same PCT into a vegetation zone for the purpose of determining the vegetation integrity score.
Connectivity	The measure of the degree to which an area(s) of native vegetation is linked with other areas of vegetation.
Credit Calculator	The computer program that provides decision support to assessors and proponents by applying the BAM, and which calculates the number and class of biodiversity credits required to offset the impacts of a development or created at a biodiversity stewardship site.
Development	Has the same meaning as development at section 4 of the EP&A Act, or an activity in Part 5 of the EP&A Act. It also includes development as defined in section 115T of the EP&A Act.
Development footprint	The area of land that is directly impacted on by a proposed development, including access roads, and areas used to store construction materials.
BCAA	An area of land that is subject to a proposed development that is under the EP&A Act.
Ecosystem credits	A measurement of the value of EECs, CEECs and threatened species habitat for species that can be reliably predicted to occur with a PCT. Ecosystem credits measure the loss in biodiversity values at a BCAA and the gain in biodiversity values at a biodiversity stewardship site.
High threat exotic plant cover	Plant cover composed of vascular plants not native to Australia that if not controlled will invade and outcompete native plant species.
Hollow bearing tree	A living or dead tree that has at least one hollow. A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the minimum entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. you cannot see solid wood beyond the entrance); (d) the hollow is at least 1 m above the ground. Trees must be examined from all angles.
Important wetland	A wetland that is listed in the Directory of Important Wetlands of Australia (DIWA) and SEPP 14 Coastal Wetlands

Terminology	Definition
Linear shaped development	Development that is generally narrow in width and extends across the landscape for a distance greater than 3.5 kilometres in length
Local population	The population that occurs in the study area. In cases where multiple populations occur in the study area or a population occupies part of the study area, impacts on each subpopulation must be assessed separately.
Local wetland	Any wetland that is not identified as an important wetland (refer to definition of Important wetland).
NSW (Mitchell) landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000.
Multiple fragmentation impact development	Developments such as wind farms and coal seam gas extraction that require multiple extraction points (wells) or turbines and a network of associated development including roads, tracks, gathering systems/flow lines, transmission lines
Operational Manual	The Operational Manual published from time to time by DPIE, which is a guide to assist assessors when using the BAM
Patch size	An area of intact native vegetation that: a) occurs on the BCAA or biodiversity stewardship site, and b) includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or ≤30 m for non-woody ecosystems). Patch size may extend onto adjoining land that is not part of the BCAA or stewardship site..
Proponent	A person who intends to apply for consent to carry out development or for approval for an activity.
Reference sites	The relatively unmodified sites that are assessed to obtain local benchmark information when benchmarks in the Vegetation Benchmarks Database are too broad or otherwise incorrect for the PCT and/or local situation. Benchmarks can also be obtained from published sources.
Regeneration	The proportion of over-storey species characteristic of the PCT that are naturally regenerating and have a diameter at breast height <5 cm within a vegetation zone.
Residual impact	An impact on biodiversity values after all reasonable measures have been taken to avoid, minimise or mitigate the impacts of development. Under the BAM, an offset requirement is determined for the remaining impacts on biodiversity values.
Retirement of credits	The purchase and retirement of biodiversity credits from an already-established biobank site or a biodiversity stewardship site secured by a biodiversity stewardship agreement.
Riparian buffer	Riparian buffers applied to water bodies in accordance with the BAM
Sensitive biodiversity values land map	Development within an area identified on the map requires assessment using the BAM.
Site attributes	The matters assessed to determine vegetation integrity. They include: native plant species richness, native over-storey cover, native mid-storey cover, native ground cover (grasses), native ground cover (shrubs), native ground cover (other), exotic plant cover (as a percentage of total ground and mid-storey cover), number of trees with hollows, proportion of over-storey species occurring as regeneration, and total length of fallen logs.
Site-based development	a development other than a linear shaped development, or a multiple fragmentation impact development
Species credits	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.

Terminology	Definition
BCAA	Is land to which the BAM is applied in Stage 1 to assess the biodiversity values of the land. It includes land that may be a BCAA, clearing site, proposed for biodiversity certification or land that is proposed for a biodiversity stewardship agreement.
Threatened Biodiversity Data Collection	Part of the BioNet database, published by DPIE and accessible from the BioNet website.
Threatened species	Critically Endangered, Endangered or Vulnerable threatened species as defined by Schedule 1 of the BC Act, or any additional threatened species listed under Part 13 of the EPBC Act as Critically Endangered, Endangered or Vulnerable.
Vegetation Benchmarks Database	A database of benchmarks for vegetation classes and some PCTs. The Vegetation Benchmarks Database is published by OEH and is part of the BioNet Vegetation Classification.
Vegetation zone	A relatively homogenous area of native vegetation on a BCAA, land to be biodiversity certified or a biodiversity stewardship site that is the same PCT and broad condition state.
Wetland	An area of land that is wet by surface water or ground water, or both, for long enough periods that the plants and animals in it are adapted to, and depend on, moist conditions for at least part of their life cycle. Wetlands may exhibit wet and dry phases and may be wet permanently, cyclically or intermittently with fresh, brackish or saline water
Woody native vegetation	Native vegetation that contains an over-storey and/or mid-storey that predominantly consists of trees and/or shrubs

Appendix B Vegetation Floristic Plot Data

See next page.

Species	Common Name	High Threat Weed	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Plot 8		Plot 9	
			Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Acacia decurrens	Black Wattle												0.1	1						
Acacia spp.	Wattle																0.1	1	5	2000
Ageratina adenophora	Crofton Weed	1	0.1	1																
Alternanthera denticulata	Lesser Joyweed		0.1	100			0.1	5												
Amaranthus spp.	Amaranth														0.1	1				
Anagallis spp.											0.1	2								
Andropogon virginicus	Whisky Grass	1							0.1	10										
Anredera cordifolia	Madeira Vine	1	0.5	5																
Araujia sericifera	Moth Vine	1	0.1	5	0.1	1							1	500			0.1	5		
Aristida spp.	A Wiregrass												1	500	0.1	100	0.1	20		
Aristida vagans	Threeawn Speargrass																0.5	500	0.1	50
Arthropodium milleflorum	Pale Vanilla-lily												0.1	10			0.1	10		
Asparagus asparagoides	Bridal Creeper	1											0.1	5			0.1	1		
Asperula conferta	Common Woodruff												0.1	500						
Aster subulatus	Wild Aster		0.1	20	0.1	10											0.1	10		
Asteraceae			0.1	1																
Asteraceae											0.2	50								
Avena spp.	Oats		0.1	1																
Bidens pilosa var. *pilosa*			0.1	10			0.1	20					0.2	100			0.1	10	0.1	1

Species	Common Name	High Threat Weed	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Plot 8		Plot 9	
			Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Bidens subalternans	Greater Beggar's Ticks	1	0.1	5	0.1	1	0.1	10					0.1	20						
Bothriochloa macra	Red Grass				0.5	100									0.1	50	0.1	20	0.5	500
Brassica spp.	Brassica																0.1	100		
Brunoniella australis	Blue Trumpet		0.1	5									0.2	500			0.1	50		
Bryophyllum delagoense	Mother of millions	1	0.1	10			0.1	50	0.1	20			0.5	1000						
Bursaria spinosa subsp. spinosa	Native Blackthorn				0.1	2							0.1	5						
Calotis lappulacea	Yellow Burr-daisy		0.5	50																
Capsella bursa-pastoris	Shepherd's Purse														0.1	10				
Cenchrus clandestinus	Kikuyu Grass	1			0.1	50			1	100					0.1	5				
Centaurium spp.															0.1	1				
Centella asiatica	Indian Pennywort		0.1	20							0.1	10					0.1	1		
Cheilanthes sieberi subsp. *sieberi*	Rock Fern												0.1	20						
Chloris gayana	Rhodes Grass	1					0.1	2												
Chloris truncata	Windmill Grass		0.1	10									0.1	20					0.1	20
Chloris ventricosa	Tall Chloris				0.1	100							0.1	10	0.5	500	0.4	100	0.1	50
Cirsium vulgare	Spear Thistle												0.1	20					0.1	10
Commelina cyanea	Native Wandering Jew		1	20	0.1	2	0.1	50												

Species	Common Name	High Threat Weed	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Plot 8		Plot 9	
			Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
conyza bonariensis	Flaxleaf Fleabane												0.1	20	0.1	1	0.1	10	0.1	1
Conyza spp.	A Fleabane						0.1	1												
Corymbia maculata	Spotted Gum																20	10		
Cotula australis	Common Cotula														0.1	50				
Cymbopogon refractus	Barbed Wire Grass												0.2	500						
Cynodon incompletus									0.1	20	0.5	100			0.1	10	0.1	20	0.1	500
Cyperaceae									0.5	100										
Cyperaceae									0.5	50										
Cyperaceae									0.1	10										
Cyperus brevifolius			0.5	50																
Cyperus eragrostis	Umbrella Sedge	1	0.1	5							0.2	100								
Cyperus gracilis	Slender Flat-sedge						0.5	100					0.1	5	0.1	20	0.1	100	0.1	100
Cyperus imbecillis			0.5	100	0.1	50														
Cyperus spp.					0.1	10														
Cyperus spp.							0.5	100												
Cyperus spp.							0.5	100												
Desmodium varians	Slender Tick-trefoil												0.1	100	0.1	20			0.1	50
Dianella caerulea var. *caerulea*													0.1	10						
Dianella spp.													0.1	20			0.1	1		
Dichondra repens	Kidney Weed		1	100	0.1	50	0.1	50					0.2	100	0.1	50	0.1	100	0.1	100

Species	Common Name	High Threat Weed	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Plot 8		Plot 9	
			Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Ehrharta erecta	Panic Veldtgrass	1	0.1	20	0.1	5							0.1	20	0.2	500	0.1	10		
Einadia hastata	Berry Saltbush		0.1	1	0.1	1	0.1	1							0.1	1	0.1	20		
Einadia polygonoides	Knotweed Goosefoot														0.2	500	0.1	5		
Einadia trigonos subsp. *stellulata*															0.1	10				
Eragrostis brownii	Brown's Lovegrass						0.5	100							0.1	100			0.1	500
Eragrostis curvula	African Lovegrass	1							50	1000					0.1	50	0.1	1		
Eragrostis leptostachya	Paddock Lovegrass		5	1000	0.5	100	0.1	10												
Eremophila debilis	Amulla																0.1	20		
Eucalyptus crebra	Narrow-leaved Ironbark		50	6	40	6	5	1					20	20	30	20			20	2
Eucalyptus fibrosa	Red Ironbark												10	2						
Eucalyptus moluccana	Grey Box												10	10					3	1
Eucalyptus tereticornis	Forest Red Gum								15	20			1	1						
Euchiton sphaericus	Star Cudweed																0.1	1		
Fabaceae (Faboideae)									0.1	20										
Galium spp.									0.1	10										
Gamochaeta spp.															0.1	20	0.1	5	0.1	10
Geranium solanderi var. *solanderi*					0.1	50														

Species	Common Name	High Threat Weed	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Plot 8		Plot 9	
			Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Glycine microphylla	Small-leaf Glycine				0.1	5	0.1	20					0.1	50					0.1	20
Glycine tabacina	Variable Glycine		0.1	100	0.1	20	0.5	100					0.1	100	0.1	100	0.1	50	0.1	100
Goodenia hederacea subsp. *hederacea*													0.1	1						
Hypericum gramineum	Small St John's Wort												0.1	5						
Hypochaeris albiflora																			0.1	5
Hypochaeris radicata	Catsear		0.1	10	0.1	20	0.1	1	0.1	10			0.1	50	0.1	50			0.1	5
Hypoxis spp.					0.1	10							0.1	20						
Indigofera australis	Australian Indigo												0.1	1						
Jacaranda mimosifolia	Jacaranda								0.1	1										
Juncus usitatus									0.1	20	0.2	10							0.1	10
Lepidium spp.	A Peppercress				0.1	1														
Lobelia purpurascens	whiteroot				0.1	50									0.1	10				
Lomandra filiformis subsp. *filiformis*													0.1	50	0.1	5	0.1	100		
Lomandra multiflora subsp. *multiflora*	Many-flowered Mat-rush												0.1	50						
Ludwigia peploides subsp. *montevidensis*	Water Primrose								0.1	20										
Lysimachia arvensis	Scarlet Pimpernel		0.1	5	0.1	2	0.1	20	0.1	20										
Medicago spp.	A Medic		0.1	1			0.1	2					0.1	10						

Species	Common Name	High Threat Weed	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Plot 8		Plot 9	
			Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Microlaena stipoides var. *stipoides*	Weeping Grass		0.1	100	50	1000	1	100	0.5	100			0.5	500	0.2	500	0.1	100	0.1	10
Modiola caroliniana	Red-flowered Mallow				0.1	5	0.1	5							0.1	100			0.1	5
Muellerina eucalyptoides																			0.1	1
Nymphaeaceae											0.5	20								
Olea europaea subsp. *cuspidata*	African Olive												0.1	5						
Onopordum acanthium subsp. *acanthium*	Scotch Thistle		0.1	3	0.1	3			0.1	2					0.1	20	0.1	20		
Opuntia spp.													0.1	10			0.1	5		
Oxalis perennans			0.1	20	0.1	50	0.1	5					0.1	20	0.1	20	0.1	20	0.1	50
Panicum effusum	Hairy Panic				0.5	100							0.1	5					0.1	100
Panicum simile	Two-colour Panic						20	1000												
Paspalidium distans			0.5	100									0.1	500			0.1	5		
Paspalum conjugatum	Johnston River Grass						0.1	50												
Paspalum dilatatum	Paspalum	1	0.5	100	0.1	100	1	1000	0.5	100			0.1	20	0.1	10				
Paspalum urvillei	Vasey Grass						15	1000												
Persicaria decipiens	Slender Knotweed								1	100	0.1	2								
Phyllanthus virgatus	Wiry Spurge				0.1	3							0.1	5					0.1	5

Species	Common Name	High Threat Weed	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Plot 8		Plot 9	
			Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Plantago lanceolata	Lamb's Tongues		2	100	0.1	10	1	100			0.1	5	0.1	50	0.1	50				
Poaceae							0.1	10												
Poaceae							0.1	1												
Prunus spp.									0.1	2										
Richardia stellaris																	0.1	5	0.1	20
Rumex brownii	Swamp Dock						0.1	1							0.1	1				
Rytidosperma racemosum var. *racemosum*	Wallaby Grass				0.1	5							0.1	5						
Senecio madagascariensis	Fireweed	1	0.1	10	0.1	20	1	1000	0.1	20	0.1	10	0.1	20	0.1	100	0.1	10	0.1	1
Senecio spp.	Groundsel, Fireweed		0.1	2																
Setaria pumila	Pale Pigeon Grass		20	100	0.1	50	1	100	5	100			0.1	10	0.1	100				
Sida rhombifolia	Paddy's Lucerne		5	500	30	1000	10	100	5	500	0.1	1	0.1	500	0.2	500	0.5	100	0.1	5
Sisymbrium officinale	Hedge Mustard		0.1	1	0.1	1	0.1	1												
Solanum linnaeanum	Apple of Sodom																0.1	10		
Solanum nigrum	Black-berry Nightshade		0.1	2			0.1	1							0.1	5				
Solanum pseudocapsicum	Madeira Winter Cherry				0.1	1									0.1	5	0.1	10		
Solanum sisymbriifolium							0.5	5												

Species	Common Name	High Threat Weed	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Plot 8		Plot 9	
			Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance	Cover	Abundance
Solanum spp.															0.1	1				
Solenogyne bellioides	Solengyne												0.1	20	0.1	5				
Soliva sessilis	Bindyi												0.1	50	0.1	100			0.1	50
Sonchus oleraceus	Common Sowthistle																		0.1	5
Sporobolus africanus	Parramatta Grass		1	100	0.5	50			0.5	100					0.1	5	0.1	5		
Sporobolus creber	Slender Rat's Tail Grass		0.1	5			15	1000							0.1	20			0.1	1
Stachys arvensis	Stagger Weed														0.1	5				
Stellaria media	Common Chickweed														0.1	5			0.1	10
Stenotaphrum secundatum	Buffalo Grass	1											0.1	10						
Tagetes minuta	Stinking Roger						0.1	1												
Taraxacum officinale	Dandelion		0.1	10																
Themeda triandra					0.1	2							0.5	500						
Trifolium repens	White Clover		0.1	20											0.1	50				
Typha orientalis	Broad-leaved Cumbungi								5	500	25	100								
Vallisneria australis	Eelweed										0.2	100								
Verbena bonariensis	Purpletop		0.1	20			5	100	0.5	20					0.1	10				
Wahlenbergia gracilis	Sprawling Bluebell												0.1	1	0.1	10	0.1	50	0.1	20

Appendix C Vegetation Integrity Plot Data

Location						
Zone	Plot no.	PCT ID	Condition	Eastings	Northings	Bearing
VZ_2	1	1395	Moderate	305210	6276091	36
VZ_2	2	1395	Moderate	305394	6276211	40
VZ_1	3	1395	Low	304957	6277347	284
VZ_1	4	1395	Low	304714	6277266	126
VZ_4	5	1071	Low	305281	6276282	0
VZ_3	6	849	Moderate	304335	6276563	104
VZ_1	7	849	Moderate	304513	6276532	70
VZ_1	8	1395	Low	304555	6276391	80
VZ_1	9	1395	Low	305025	6276395	280

Composition (number of species)							
Zone	Plot no.	Tree	Shrub	Grass	Forb	Fern	Other
VZ_2	1	1	0	6	9	0	1
VZ_2	2	1	1	9	9	0	2
VZ_1	3	1	0	8	6	0	2
VZ_1	4	1	0	3	3	0	0
VZ_4	5	0	0	2	3	0	0
VZ_3	6	5	2	12	13	1	3
VZ_1	7	1	0	8	12	0	2
VZ_1	8	1	2	8	10	0	1
VZ_1	9	2	1	10	4	0	4

Structure (Total cover %)							
Zone	Plot no.	Tree	Shrub	Grass	Forb	Fern	Other
VZ_2	1	50.0	0.0	6.3	3.1	0.0	0.1
VZ_2	2	40.0	0.1	52.0	0.9	0.0	0.2
VZ_1	3	5.0	0.0	38.1	0.6	0.0	0.6
VZ_1	4	15.0	0.0	5.6	1.2	0.0	0.0
VZ_4	5	0.0	0.0	25.2	0.4	0.0	0.0
VZ_3	6	41.1	0.2	3.0	1.5	0.1	0.3
VZ_1	7	30.0	0.0	1.3	1.3	0.0	0.2

Structure (Total cover %)							
VZ_1	8	20.0	0.2	1.5	1.0	0.0	0.1
VZ_1	9	23.0	5.0	1.4	0.4	0.0	0.4

Function											
Zone	Plot no.	Large Trees*	Hollow trees	Litter Cover	Length Fallen Logs	Tree Stem 5- 9	Tree Stem 10-1 9	Tree Stem 20-2 9	Tree Stem 30-49	Tree Stem 50-79	Tree Regen	High Threat Weed Cover
VZ_2	1	1	2	92	6	0	0	0	1	1	0	1.7
VZ_2	2	3	5	100	5	0	1	1	0	1	0	0.6
VZ_1	3	4	6	100	0	0	0	0	1	1	0	2.3
VZ_1	4	4	0	0	3	1	1	1	1	1	1	51.8
VZ_4	5	0	0	0	0	0	0	0	0	0	0	0.3
VZ_3	6	0	0	17.2	1	1	1	1	1	0	1	2.1
VZ_1	7	1	1	3.4	1	1	1	1	1	0	0	0.6
VZ_1	8	1	0	76	0	1	1	1	1	1	1	0.5
VZ_1	9	3	0	11.4	2	0	0	0	1	1	0	0.1

Appendix D Condition thresholds for Cumberland Plain Woodland to be listed under the EPBC Act.

Category and rationale	Thresholds
A. Core thresholds that apply under most circumstances: patches with an understorey dominated by natives and a minimum size that is functional and consistent with the minimum mapping unit size applied in NSW.	Minimum patch[3] size is ≥0.5ha; **AND** ≥50% of the perennial understorey vegetation cover[4] is made up of native species.
OR	
B. Larger patches which are inherently valuable due to their rarity.	The patch size is ≥5ha; **AND** ≥30% of the perennial understorey vegetation cover is made up of native species.
OR	
C. Patches with connectivity to other large native vegetation remnants in the landscape.	The patch size is ≥0.5 ha; **AND** ≥30% of the perennial understorey vegetation cover is made up of native species; **AND** The patch is contiguous[5] with a native vegetation remnant (any native vegetation where cover in each layer present is dominated by native species) that is ≥5ha in area.
OR	
D. Patches that have large mature trees or trees with hollows (habitat) that are very scarce on the Cumberland Plain.	The patch size is ≥0.5 ha in size; **AND** ≥30% of the perennial understorey vegetation cover is made up of native species; **AND** The patch has at least one tree with hollows per hectare or at least one large tree (≥80 cm dbh) per hectare from the upper tree layer species outlined in the Description and Appendix A.

[3] A *patch* is defined as a discrete and continuous area that comprises the ecological community, outlined in the Description. Patches should be assessed at a scale of 0.04 ha or equivalent (e.g. 20m x 20m plot). The number of plots (or quadrats or survey transects) per patch must take into consideration the size, shape and condition across the site. Permanent man-made structures, such as roads and buildings, are typically excluded from a patch but a patch may include small-scale disturbances, such as tracks or breaks or other small-scale variations in native vegetation that do not significantly alter the overall functionality of the ecological community, for instance the easy movement of wildlife or dispersal of spores, seeds and other plant propagules.

[4] *Perennial understorey vegetation cover* includes vascular plant species of the ground and shrub layers (as outlined in the *Description* and Appendix A) with a life-cycle of more than two growing seasons (Australian Biological Resources Study, 2007). Measurements of perennial understorey vegetation cover exclude annuals, cryptogams, leaf litter or exposed soil (although these are included in a patch of the ecological community when they do no alter functionality as per footnote 3 and the *Description* and *Condition Thresholds* are met).

[5] *Contiguous* means the woodland patch is continuous with, or in close proximity (within 100 m), of another patch of vegetation that is dominated by native species in each vegetation layer present.

Figure 22: Condition thresholds and categories for patches of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest ecological community (Advice to the Minister for the Environment, Heritage and the Arts from the Threatened Species Scientific Committee (the Committee) on an Amendment to the List of Threatened Ecological Communities under the Environment Protection and Biodiversity.

Appendix E Condition thresholds for Shale-sandstone Transition Forest to be listed under the EPBC Act.

1.5.2 Condition thresholds

Condition classes and thresholds provide guidance for when a patch of a threatened ecological community retains sufficient conservation values to be considered as a Matter of National Environmental Significance, as defined under the EPBC Act. This means that the referral, assessment and compliance provisions of the EPBC Act are focussed on the most valuable elements of the ecological community. Very degraded patches that do not meet the condition thresholds will be largely excluded from national protection.

Although very degraded/modified patches are not protected as the ecological community listed under the EPBC Act, it is recognised that patches that do not meet the condition thresholds may still retain important natural values and may be protected through State and local laws or schemes. Therefore, these patches should not be excluded from recovery and other management actions. Suitable recovery and management actions may improve these patches to the point that they may be regarded as part of the ecological community fully protected under the EPBC Act. Management actions should, where feasible, also aim to restore patches to meet the high quality condition thresholds.

For Shale Sandstone Transition Forest, categories A and B are considered moderate quality condition class and the minimum thresholds for a patch of the ecological community to be subject to the referral, assessment and compliance provisions of the EPBC Act. Categories C and D are considered high condition class and the minimum thresholds for a patch of Shale Sandstone Transition Forest to be regarded as an example of high quality condition.

<table>
<tr><th>Category and Rationale</th><th colspan="3">Thresholds</th></tr>
<tr><td rowspan="2">A. Moderate condition class
Represented by medium to large-size patch as part of a larger native vegetation remnant and/or with mature trees</td><td colspan="3">Patch size ≥0.5ha
And
≥30% of the perennial understorey vegetation cover is made up of native species.
And</td></tr>
<tr><td>The patch is contiguous with a native vegetation remnant (any native vegetation where cover in each layer present is dominated by native species) ≥1ha in area.</td><td>Or</td><td>The patch has at least one tree with hollows or at least one large locally indigenous tree (>80cm dbh).</td></tr>
<tr><td>B. Moderate condition class
Represented by medium to large size patch with high quality native understorey</td><td colspan="3">Patch size ≥0.5ha
And
≥50% of the perennial understorey vegetation cover is made up of native species.</td></tr>
<tr><td>C. High condition class
Represented by medium to large size patch with very high quality native understorey</td><td colspan="3">Patch size ≥0.5ha
And
≥70% of the perennial understorey vegetation cover is made up of native species.</td></tr>
<tr><td>D. High condition class
Represented by larger size patch with high quality native understorey</td><td colspan="3">Patch size ≥2ha
And
≥50% of the perennial understorey vegetation cover is made up of native species.</td></tr>
<tr><td colspan="4">Perennial understorey vegetation cover includes vascular plant species of both the ground layer and mid/shrub layer (where present) with a lifecycle of more than two growing seasons. Measurements of perennial understorey vegetation cover exclude annuals, cryptogams, leaf litter or exposed soil.
Contiguous means the patch of the ecological community is continuous with, or in close proximity (within 100 m) to another area of vegetation that is dominated by native species in each vegetation layer present.</td></tr>
</table>

Figure 23 :Department of Environment (DoE) 2014. Approved Conservation Advice (including listing advice) for Shale Sandstone Transition Forest of the Sydney Basin Bioregion (EC25R). Canberra: Department of the Environment

Appendix F EPBC Act Likelihood of Occurrence

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database search. Five terms for the likelihood of occurrence of species are used in this report. This assessment was based on database or other records, presence or absence of suitable habitat, features of the proposal site, results of the site inspection and professional judgement. Some Migratory or Marine species identified from the Commonwealth database search have been excluded from the assessment, due to lack of habitat. The terms for likelihood of occurrence are defined below:

- 'known' = the species was or has been observed on the site
- 'likely' = a medium to high probability that a species uses the site
- 'potential' = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur
- 'unlikely' = a very low to low probability that a species uses the site
- 'no' = habitat within the BCAA and in the vicinity is unsuitable for the species.

A significance assessment was conducted for threatened species or ecological communities that were recorded within the BCAA or had a higher likelihood of occurring and were not recorded during the site visit. It is noted that some threatened fauna species that are highly mobile, wide ranging and vagrant may use portions of the BCAA intermittently for foraging. For these fauna species, the habitat present and likely to be impacted is not considered to be important to the threatened species, particularly in relation to the amount of similar habitat remaining in the surrounding landscape. As such, a test of significance in reference to State or Commonwealth legislation was not considered necessary.

The records column refers to the number of records occurring within 5 km of the study area, as provided by the Atlas of NSW Wildlife (BioNet) and Protected Matters Search Tool database search.

Information provided in the habitat associations' column has primarily been extracted (and modified) from the Commonwealth Species Profile and Threats Database and the NSW Threatened Species Data Collection.

Table 44: Likelihood of occurrence assessment for threatened flora and fauna species

Scientific Name	Common Name	EPBC Act Status	Habitat	No. records within 5 km of the BCAA	Likelihood of occurrence within the BCAA	Habitat within subject site directly or indirectly impacted	Impact Assessment Required
FLORA							
Acacia bynoeana	Bynoe's Wattle	V	Found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. Heath or dry sclerophyll forest on sandy soils.	4	No – suitable habitat (Heath /sandy soils) not present within the BCAA for this species	No	No
Acacia pubescens	Downy Wattle	V	Restricted to the Sydney region around the Bankstown-Fairfield-Rookwood and Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. Open woodland and forest, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland. Occurs on alluviums, shales and at the intergrade between shales and sandstones.	71	Potential – correct habitat associations exist, and records exists within 5 km of the study area. However, this species was not identified during the targeted surveys	No	No
Allocasuarina glareicola	-	E	Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Castlereagh woodland on lateritic soil. Found in open woodland with *Eucalyptus parramattensis*, *Eucalyptus fibrosa*, *Angophora bakeri*, *Eucalyptus sclerophylla* and *Melaleuca decora*.	0	Unlikely – no known records of this species within 5 km of the BCAA and the species was not identified during targeted surveys	No	No

Scientific Name	Common Name	EPBC Act Status	Habitat	No. records within 5 km of the BCAA	Likelihood of occurrence within the BCAA	Habitat within subject site directly or indirectly impacted	Impact Assessment Required
Cynanchum elegans	White-flowered Wax Plant	E	Dry rainforest; littoral rainforest; *Leptospermum laevigatum*-Banksia *integrifolia* subsp. *integrifolia* (Coastal Tea-tree– Coastal Banksia) coastal scrub; *Eucalyptus tereticornis* (Forest Red Gum) or *Corymbia maculata* (Spotted Gum) open forest and woodland; and *Melaleuca armillaris* (Bracelet Honeymyrtle) scrub.	0	Unlikely – no known records of this species within the region and the species and species was not identified during targeted surveys.	No	No
Darwinia biflora	-	V	Recorded in Ku-ring-gai, Hornsby, Baulkham Hills and Ryde local government areas, in an area bounded by Maroota, North Ryde, Cowan and Kellyville. Woodland, open forest or scrub-heath on the edges of weathered shale-capped ridges, where these intergrade with Hawkesbury Sandstone.	1	Unlikely – the BCAA is outside the known distribution of this species and species was not identified during targeted surveys	No	No
Eucalyptus nicholii	Narrow-leaved Black Peppermint	V	New England Tablelands from Nundle to north of Tenterfield. Dry grassy woodland, on shallow soils of slopes and ridges.	1	Unlikely – the BCAA is outside the distribution of this species	No	No

Scientific Name	Common Name	EPBC Act Status	Habitat	No. records within 5 km of the BCAA	Likelihood of occurrence within the BCAA	Habitat within subject site directly or indirectly impacted	Impact Assessment Required
Eucalyptus sp. *Cattai*	-	CE	Occurs in The Hills Local Government Area, with known populations occurring within the area bounded by Kellyville - Maraylya – Glenorie. Occurs as a rare emergent tree in scrub, heath and low woodland on sandy soils, usually as isolated individuals or occasionally in small clustered groups. The sites at which it occurs are generally flat and on ridge tops Associated soils are laterised clays overlying sandstone.	273	Unlikely – although the BCAA occurs within the correct LGA the site is not located on ridgetops where this species primarily occurs and species not identified during targeted surveys.	No	No
Genoplesium baueri	Bauer's Midge Orchid	E	The species has been recorded from locations between Ulladulla and Port Stephens. About half the records were made before 1960 with most of the older records being from Sydney suburbs including Asquith, Cowan, Gladesville, Longueville and Wahroonga. No collections have been made from those sites in recent years. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded at locations now likely to be within the following conservation reserves: Berowra Valley Regional Park, Royal National Park and Lane Cove National Park. May occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments. Grows in dry sclerophyll forest and moss gardens over sandstone.	0	No – the BCAA is outside of the Sydney suburbs where this species has been previously recorded and outside the reserves where it is currently known to occur. The species was not identified within the BCAA during targeted surveys	No	No

Scientific Name	Common Name	EPBC Act Status	Habitat	No. records within 5 km of the BCAA	Likelihood of occurrence within the BCAA	Habitat within subject site directly or indirectly impacted	Impact Assessment Required
Haloragis exalata subsp. *exalata*	Wingless Raspwort	V	Disjunct distribution in the Central Coast, South Coast and North Western Slopes botanical subdivisions of NSW. Protected and shaded damp situations in riparian habitats.	0	No – the BCAA is outside the species known distribution of this species.	No	No
Isotoma fluviatilis subsp. *fluviatilis*	-	X	Currently known from only one property at Erskine Park in the Penrith LGA. Previously sighted at Homebush and at Agnes Banks. Damp places on the Cumberland Plain, including freshwater wetland, grassland/alluvial woodland, and alluvial woodland/shale plains woodland.	1	No – the BCAA is outside the species known distribution and habitat within the BCAA and species not found during targeted surveys.	No	No
Lasiopetalum joyceae	-	V	Restricted to the Hornsby Plateau south of the Hawkesbury River, between Berrilee and Duffys Forest. Heath on lateritic to shaley ridgetops over sandstone.	0	No – the BCAA does not contain suitable landform features and vegetation communities for this species.	No	No
Melaleuca deanei	Deane's Paperbark	V	Ku-ring-gai/Berowra area, Holsworthy/Wedderburn area, Springwood (in the Blue Mountains), Wollemi National Park, Yalwal (west of Nowra) and Central Coast (Hawkesbury River) areas. Heath on sandstone.	0	No – the BCAA does not contain suitable landform features and vegetation communities for this species.	No	No

Scientific Name	Common Name	EPBC Act Status	Habitat	No. records within 5 km of the BCAA	Likelihood of occurrence within the BCAA	Habitat within subject site directly or indirectly impacted	Impact Assessment Required
Persicaria elatior	Tall Knotweed	V	In south-eastern NSW recorded from Mt Dromedary, Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). Beside streams and lakes, swamp forest or disturbed areas.	0	Unlikely – no record of species in region and not identified during targeted survey.	No	No
Persoonia hirsuta	Hairy Geebung	E	Scattered distribution around Sydney, from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. Sandy soils in dry sclerophyll open forest, woodland and heath on sandstone.	0	No – the BCAA does not contain suitable landform features and vegetation communities for this species.	No	No
Pimelea curviflora var. *curviflora*		V	Confined to the coastal area of the Sydney and Illawarra regions between northern Sydney and Maroota in the north-west and Croom Reserve near Albion Park in the south. Woodland, mostly on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes.	22	Potential, correct habitat associations and records within 5 km of the BCAA however species not identified during targeted survey	No	No – species not identified during targeted survey

Scientific Name	Common Name	EPBC Act Status	Habitat	No. records within 5 km of the BCAA	Likelihood of occurrence within the BCAA	Habitat within subject site directly or indirectly impacted	Impact Assessment Required
Pimelea spicata	Spiked Rice-flower	E	Two disjunct areas; the Cumberland Plain (Marayong and Prospect Reservoir south to Narellan and Douglas Park) and the Illawarra (Landsdowne to Shellharbour to northern Kiama). Well-structured clay soils. *Eucalyptus moluccana* (Grey Box) communities and in areas of ironbark on the Cumberland Plain. Coast Banksia open woodland or coastal grassland in the Illawarra.	1	Potential – the BCAA is located within the Cumberland Plain and has the correct vegetation communities. However this species was not recorded during targeted surveys.	No	No -
Pomaderris brunnea	Rufous Pomaderris	V	In NSW, found around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. It also occurs near Walcha on the New England tablelands. Moist woodland or forest on clay and alluvial soils of flood plains and creek lines.	0	Unlikely – the BCAA does not contain any flood plains or creeklines. Species was not identified during targeted surveys.	No	No
Prostanthera askania	Tranquility Mintbush	E	Moist sclerophyll forest and warm temperate rainforest on Narrabeen sandstone and derived alluvial soils.		No - the BCAA does not contain the correct habitat associations for this species to occur.	No	No
Pterostylis saxicola	Sydney Plains Greenhood	E	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. Small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines, adjacent to sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	1	Unlikely - the BCAA does not contain sock shelves or cliff lines which is known habitat for this species. The species was not identified within the BCAA during targeted survey	No	No

Scientific Name	Common Name	EPBC Act Status	Habitat	No. records within 5 km of the BCAA	Likelihood of occurrence within the BCAA	Habitat within subject site directly or indirectly impacted	Impact Assessment Required
Pultenaea parviflora	-	V	Endemic to the Cumberland Plain. Mainly from Windsor to Penrith and east to Dean Park, with outlier populations at Kemps Creek and Wilberforce. Dry sclerophyll forest, especially Castlereagh Ironbark Forest, Shale Gravel Transition Forest and transitional areas where these communities adjoin Castlereagh Scribbly Gum Woodland.	93	Likely – the BCAA is within the known distributions for this species contains the correct habitat associations and, there are records within 5 km.	No - this species was not identified within the BCAA during targeted surveys.	No
Rhizanthella slateri	Eastern Australian Underground Orchid	E	In NSW, currently known from fewer than 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. Sclerophyll forest in shallow to deep loams.	0	No – the BCAA is not within any known location for this species.	No	No
Rhodamnia rubescens	Scrub Turpentine	CE	Known to occur from coastal districts of NSW north from Batemans Bay to Bundaberg in Queensland, and occasionally extends inland onto the escarpment up to 600 m above sea level in areas with rainfall of 1,000-1,600 mm. All rainforest sub-forms except cool temperate rainforest. Wet sclerophyll associations in rainforest transition zones (including open forest of *Eucalyptus tereticornis* and *E. bosistoana* in the Sydney region) and creek side riparian associations.	0	No - the BCAA does not contain rainforests, wet sclerophyll forest or transitional rainforest to sclerophyll forest and is unlikely to occur within the BCAA.	No	No

Scientific Name	Common Name	EPBC Act Status	Habitat	No. records within 5 km of the BCAA	Likelihood of occurrence within the BCAA	Habitat within subject site directly or indirectly impacted	Impact Assessment Required
Syzygium paniculatum	Magenta Lilly Pilly	V	Only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. Subtropical and littoral rainforest on gravels, sands, silts and clays.	0	No – the BCAA is not within known distributions for this species (coastal) and does not contain suitable vegetation communities for this species.	No	N
Thesium australe	Austral Toadflax	V	Grassland on coastal headlands or grassland and grassy woodland away from the coast.	0	No – the BCAA is not within known distributions for this species (coastal) and does not contain suitable vegetation communities for this species.	No	No
Zieria involucrate	-	V	North and west of Sydney; recent records come from 22 populations in the catchments of the Macdonald, Colo and Hawkesbury Rivers between Melon Creek and Mogo Creek in the north to Little Cattai Creek (Hillside) and Wheeny Creek (Colo) in the south and from a single population in the upper Blue Mountains north of Katoomba. Also historically recorded south of Springwood Valley Heights and north-west of Kurrajong in the eastern Blue Mountains. Wet sclerophyll forest on mid- to lower slopes and valleys; some populations extend upslope into drier vegetation.	0	No – habitat within the BCAA not present within the BCAA for this species.	No	No

Scientific Name	Common Name	EPBC Act Status	Habitat	No. records within 5 km of the BCAA	Likelihood of occurrence within the BCAA	Habitat within subject site directly or indirectly impacted	Impact Assessment Required
FAUNA							
Actitis hypoleucos	Common Sandpiper	M	Coastal wetlands and some inland wetlands, especially muddy margins or rocky shores. Also estuaries and deltas, lakes, pools, billabongs, reservoirs, dams and claypans, mangroves.	0	Unlikely – known to feed in naturally occurring coastal wetlands which are not present within the BCCA and no known records within 5 km of the BCCA	No	No
Anthochaera phrygia	**Regent Honeyeater**	**CE**	**Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of *Casuarina cunninghamiana* (River Oak).**	**4**	**Potential foraging habitat and known records within the area**	**Yes – impact to potential foraging habitat**	**Yes**
Apus pacificus	Fork-tailed Swift	M	Riparian woodland., swamps, low scrub, heathland, saltmarsh, grassland, Spinifex sandplains, open farmland and inland and coastal sand-dunes.	1	Unlikely – minimal records of species in region and minimal habitat present within the BCCA	No	No
Ardenna pacifica	Wedge-tailed Shearwater	M	The wedge-tailed shearwater breeds in colonies on small tropical islands. Breeding seasons vary depending on location, with synchronised breeding seasons more common at higher latitudes. Northern Hemisphere birds begin breeding around February, and Southern Hemisphere birds begin around September.	1	Unlikely – known to feed pelagically and does not breed on the mainland	No	No

Scientific Name	Common Name	EPBC Act Status	Habitat	No. records within 5 km of the BCAA	Likelihood of occurrence within the BCAA	Habitat within subject site directly or indirectly impacted	Impact Assessment Required
Botaurus poiciloptilus	Australasian Bittern	E	Permanent freshwater wetlands with tall, dense vegetation, particularly *Typha* spp. (bullrushes) and *Eleocharis* spp. (spikerushes).	2	Unlikely – minimal records of species in region and constructed dams within the BCCA are considered marginal habitat.	No – impact to PCT 1071, however vegetation is not dense enough to provide suitable habitat for this species. Furthermore the constructed dams PCT 1071 is adjacent to is considered marginal habitat for this species	No
Calidris acuminata	Sharp-tailed Sandpiper	M	Shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation.	5	Unlikely – no natural wetlands within or surrounding the BCAA	No	No
Calidris melanotos	Pectoral Sandpiper	M	Shallow fresh to saline wetlands, including coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	0	Unlikely – no record of species in region and no natural wetlands, swamps, saltmarshes or bays within the BCAA. Only a small impact to constructed dams which is unlikely to serve as habitat for this species	No	No

Scientific Name	Common Name	EPBC Act Status	Habitat	No. records within 5 km of the BCAA	Likelihood of occurrence within the BCAA	Habitat within subject site directly or indirectly impacted	Impact Assessment Required
Callocephalon fimbriatum	**Gang-gang Cockatoo**	**E**	**Tall mountain forests and woodlands in summer; in winter, may occur at lower altitudes in open eucalypt forests and woodlands, and urban areas.**	**8**	**Potential foraging and breeding habitat exists within the BCAA,**	**Yes – impact to foraging habitat and potential breeding habitat**	**Yes**
Chalinolobus dwyeri	Large-eared Pied Bat	V	Wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country.	5	No – species not detected in Ultrasonic Analysis within BCAA	Yes – foraging habitat only, breeding features for this species are not present within the BCAA.	No
Dasyurus maculatus	Spotted-tailed Quoll	E	Rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	0	Unlikely – no record of species in region, very limited midstorey cover present in BCAA for this species.	No	No

Scientific Name	Common Name	EPBC Act Status	Habitat	No. records within 5 km of the BCAA	Likelihood of occurrence within the BCAA	Habitat within subject site directly or indirectly impacted	Impact Assessment Required
Pandion haliaetus	Eastern Osprey	M	The breeding range of the Eastern Osprey extends around the northern coast of Australia (including many offshore islands) from Albany in Western Australia to Lake Macquarie in NSW; with a second isolated breeding population on the coast of South Australia, extending from Head of Bight east to Cape Spencer and Kangaroo Island. Eastern Ospreys occur in littoral and coastal habitats and terrestrial wetlands of tropical and temperate Australia and offshore islands. They are mostly found in coastal areas but occasionally travel inland along major rivers, particularly in northern Australia	0	Unlikely – no record of species in region and habitat associations are not present within the BCCA	No	No
Gallinago hardwickii	Latham's Snipe	M	Freshwater, saline or brackish wetlands up to 2000 m above sea-level; usually freshwater swamps, flooded grasslands or heathlands.	11	Unlikely – no natural wetlands within or surrounding the BCCA	No	No
Heleioporus australiacus	Giant Burrowing Frog	V	Heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based.	0	Unlikely – preferred breeding habitat (soaks or pools within first or second order streams, hanging swamps) are not present within the BCCA and no records of species in region.	No	No

Scientific Name	Common Name	EPBC Act Status	Habitat	No. records within 5 km of the BCAA	Likelihood of occurrence within the BCAA	Habitat within subject site directly or indirectly impacted	Impact Assessment Required
Hirundapus caudacutus	White-throated Needletail	M	Occur most often over open forest and rainforest, as well as heathland, and remnant vegetation in farmland.	4	Unlikely – minimal records of species in region.	Yes – foraging habitat only, however forage aerially, at heights up to 'cloud level. In addition the species breeds in Siberia, therefore breeding habitat is not present within the BCAA.	No
Pycnoptilus floccosus	Pilotbird	V	Pilotbirds are strictly terrestrial, living on the ground in dense forests with heavy undergrowth. Largely sedentary, they are typically seen hopping briskly over the forest floor and foraging on damp ground or among leaf-litter	0	Unlikely – no record of species in region and habitat associations are not present within the BCCA	No	No
Hirundo rustica	Barn Swallow	M	Non-breeding migrant from northern hemisphere. Vagrant to eastern NSW. Open country, agricultural land, railways, towns. This swallow avoids heavily wooded or precipitous areas and densely built-up locations.	1	Unlikely – BCAA is in an urbanised area which this species tends to avoid. There are also minimal records for this species in the region.	No - the BCCA is unlikely to serve as habitat for this species	No

Scientific Name	Common Name	EPBC Act Status	Habitat	No. records within 5 km of the BCAA	Likelihood of occurrence within the BCAA	Habitat within subject site directly or indirectly impacted	Impact Assessment Required
Lathamus discolor	**Swift Parrot**	**CE**	**Migrates from Tasmania to mainland in Autumn-Winter. In NSW, the species mostly occurs on the coast and south west slopes. Box-ironbark forests and woodlands.**	**14**	**Likely – suitable foraging habitat detected within the BCAA. BCAA not within DPE mapped breeding areas (as accessed by BOAMS on 10.11.2022).**	**Yes (foraging only)**	**Yes**
Limosa lapponica	Bar-tailed Godwit	M	Intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons, bays, seagrass beds, saltmarsh, sewage farms and saltworks, saltlakes and brackish wetlands near coasts, sandy ocean beaches, rock platforms, and coral reef-flats. Rarely inland wetlands, paddocks and airstrips.	1	Unlikely – the BCAA is outside of the known and predicted distribution for this species and does not contain any large rivers or estuaries.	No	No
Litoria aurea	Green and Golden Bell Frog	V	Marshes, dams and stream-sides, particularly those containing *Typha* spp. (bullrushes) or *Eleocharis* spp. (spikerushes). Some populations occur in highly disturbed areas.	6	No – not identified during targeted surveys.	No	No
Monarcha melanopsis	Black-faced Monarch	M	Rainforest, open eucalypt forests, dry sclerophyll forests and woodlands, gullies in mountain areas or coastal foothills, Brigalow scrub, coastal scrub, mangroves, parks and gardens.	0	Unlikely – no record of species in region and habitat associations are not present within the BCAA	No	No

Scientific Name	Common Name	EPBC Act Status	Habitat	No. records within 5 km of the BCAA	Likelihood of occurrence within the BCAA	Habitat within subject site directly or indirectly impacted	Impact Assessment Required
Motacilla flava	Yellow Wagtail	M	Swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land, lawns.	0	Unlikely – no record of species in region and habitat associations are not present within the BCAA	No	No
Myiagra cyanoleuca	Satin Flycatcher	M	Eucalypt-dominated forests, especially near wetlands, watercourses, and heavily-vegetated gullies.	0	Unlikely – no record of species in region and habitat associations are not present within the BCAA	No	No
Calidris ferruginea	Curlew Sandpiper	CE, M	Occurs along the entire coast of NSW, and sometimes in freshwater wetlands in the Murray-Darling Basin. Littoral and estuarine habitats, including intertidal mudflats, non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	0	Unlikely – no record of species in region and natural freshwater and/or estuarine habitats present within the BCAA.	No	No
Numenius madagascariensis	Eastern Curlew	CE, M	Estuaries, bays, harbours, inlets and coastal lagoons, intertidal mudflats or sandflats, ocean beaches, coral reefs, rock platforms, saltmarsh, mangroves, freshwater/brackish lakes, saltworks and sewage farms.	0	Unlikely – no record of species in region and habitat associations are not present within the BCAA	No	No

Scientific Name	Common Name	EPBC Act Status	Habitat	No. records within 5 km of the BCAA	Likelihood of occurrence within the BCAA	Habitat within subject site directly or indirectly impacted	Impact Assessment Required
Falco hypoleucos	Grey Falcon	V	The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. The breeding range has contracted since the 1950s with most breeding now confined to arid parts of the range. There are possibly less than 5000 individuals left. Population trends are unclear, though it is believed to be extinct in areas with more than 500mm rainfall in NSW. Usually restricted to shrubland, grassland and wooded watercourses of arid and semi-arid regions, although it is occasionally found in open woodlands near the coast.	0	Unlikely – no record of species in region.	No	No
Petrogale penicillata	Brush-tailed Rock-wallaby	V	Rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges.	0	Unlikely – no record of species in region and habitat associations are not present within the BCAA	No	No
Phascolarctos cinereus	Koala	V	In NSW it mainly occurs on the central and north coasts with some populations in the west of the Great Dividing Range. There are sparse and possibly disjunct populations in the Bega District, and at several sites on the southern tablelands. Eucalypt woodlands and forests.	1	Unlikely – scattered feed trees present, however the landscape is highly urbanised and fragmented such that it is highly unlikely for Koalas to be present	No - the habitat within the BCAA is degraded such that it is unlikely to serve as habitat for Koala	No

Scientific Name	Common Name	EPBC Act Status	Habitat	No. records within 5 km of the BCAA	Likelihood of occurrence within the BCAA	Habitat within subject site directly or indirectly impacted	Impact Assessment Required
Pluvialis squatarola	Grey Plover	M	Mudflats, saltmarsh, tidal reefs and estuaries.	2	Unlikely – minimal records of species in region and habitat associations are not present within the BCAA	No	No
Pommerhelix duralensis	Dural Land Snail	E	Shale influenced habitat specialist, which occurs in low densities along the northwest fringes of the Cumberland Plain on shale-sandstone transitional landscapes	8	No – species not detected during targeted surveys for this species	No	No
Pseudomys novaehollandiae	New Holland Mouse	V	Open heathlands, woodlands and forests with a heathland understorey, vegetated sand dunes.	0	Unlikely – no record of species in region and habitat associations are not present within the BCAA	No	No
Prototroctes maraena	Australian Grayling	V	Most observations have been from the NSW south coast, from the Shoalhaven River to the Victorian border. Spends its larval stages in marine water and its adult life mainly in freshwater.	0	No – rivers and streams that would serve as habitat for this species are not present within the BCAA	No	No
Pteropus poliocephalus	**Grey-headed Flying-fox**	**V**	**Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops.**	**33**	**Likely – seasonal foraging habitat available within the site. No camps observed within the BCAA**	**Yes (impact to foraging habitat for this species)**	**Yes**

Scientific Name	Common Name	EPBC Act Status	Habitat	No. records within 5 km of the BCAA	Likelihood of occurrence within the BCAA	Habitat within subject site directly or indirectly impacted	Impact Assessment Required
Rhipidura rufifrons	Rufous Fantail	M	Wet sclerophyll forests, subtropical and temperate rainforests. Sometimes drier sclerophyll forests and woodlands.	0	Unlikely – no record of species in region and habitat associations are not present within the BCAA	No	No
Rostratula australis	Australian Painted Snipe	E	In NSW most records are from the Murray-Darling Basin. Other recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. Swamps, dams and nearby marshy areas.	0	Unlikely – no natural wetlands within or surrounding the BCAA and no records in region	No	No
Tringa glareola	Wood Sandpiper	M	Well-vegetated, shallow, freshwater wetlands, such as swamps, billabongs, lakes, pools and waterholes; inundated grasslands; floodplains; irrigated crops; sewage ponds; reservoirs; large farm dams; bore drains; rarely brackish wetlands and saltmarsh.	1	Unlikely – small dams within the BCAA contain limited vegetation.	Yes - impact to constructed dams, however these dams are unlikely to constitute habitat for this species	No - impact to constructed dams is considered marginal
Tringa nebularia	Common Greenshank	M	Terrestrial wetlands (swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans, saltflats, sewage farms and saltworks dams, inundated rice crops and bores) and sheltered coastal habitats (mudflats, saltmarsh, mangroves, embayments, harbours, river estuaries, deltas, lagoons, tidal pools, rock-flats and rock platforms).	0	Unlikely – no record of species in region and habitat associations are not present within the BCAA	No	No

Scientific Name	Common Name	EPBC Act Status	Habitat	No. records within 5 km of the BCAA	Likelihood of occurrence within the BCAA	Habitat within subject site directly or indirectly impacted	Impact Assessment Required
Petaurus australis australis	Yellow-bellied Glider (south-eastern)	V	Tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils.	0	No – the BCAA does not contain vegetation type associated with this species distribution	No	No
Petauroides volans	Greater Glider	V	The Greater Glider is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollow. The greater glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species	0	No – the BCAA does not contain vegetation type associated with this species distribution	No	No
Tringa stagnatilis	Marsh Sandpiper	M	Swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, intertidal mudflats, sewage farms and saltworks, reservoirs, waterholes, soaks, bore-drain swamps and flooded inland lakes.	2	Unlikely – minimal records in region and natural waterbodies associated with this species are not present within the BCAA	No	No

Appendix G Ultrasonic Analysis Report

Appendix H Development of Design

Ownership	Class (PCT 849 & 1395)	Existing Area Vegetation	Vegetation to be retained (ha) for Scenario 3	Vegetation to be removed(ha) for Scenario 3	Total site area(ha)
Stockland	High	0.62	0.62	0.00	71.03
	Medium	0.88	0.40	0.48	
	Low	6.98	2.24	4.72	
	Total Impact Area	8.58	3.24	5.21	
Allam	High	0.00	0.00	0.00	6.98
	Medium	0.54	0.18	0.36	
	Low	0.06	0.00	0.06	
	Total Impact Area	0.60	0.18	0.42	
Total		9.18	3.41	5.63	78.01

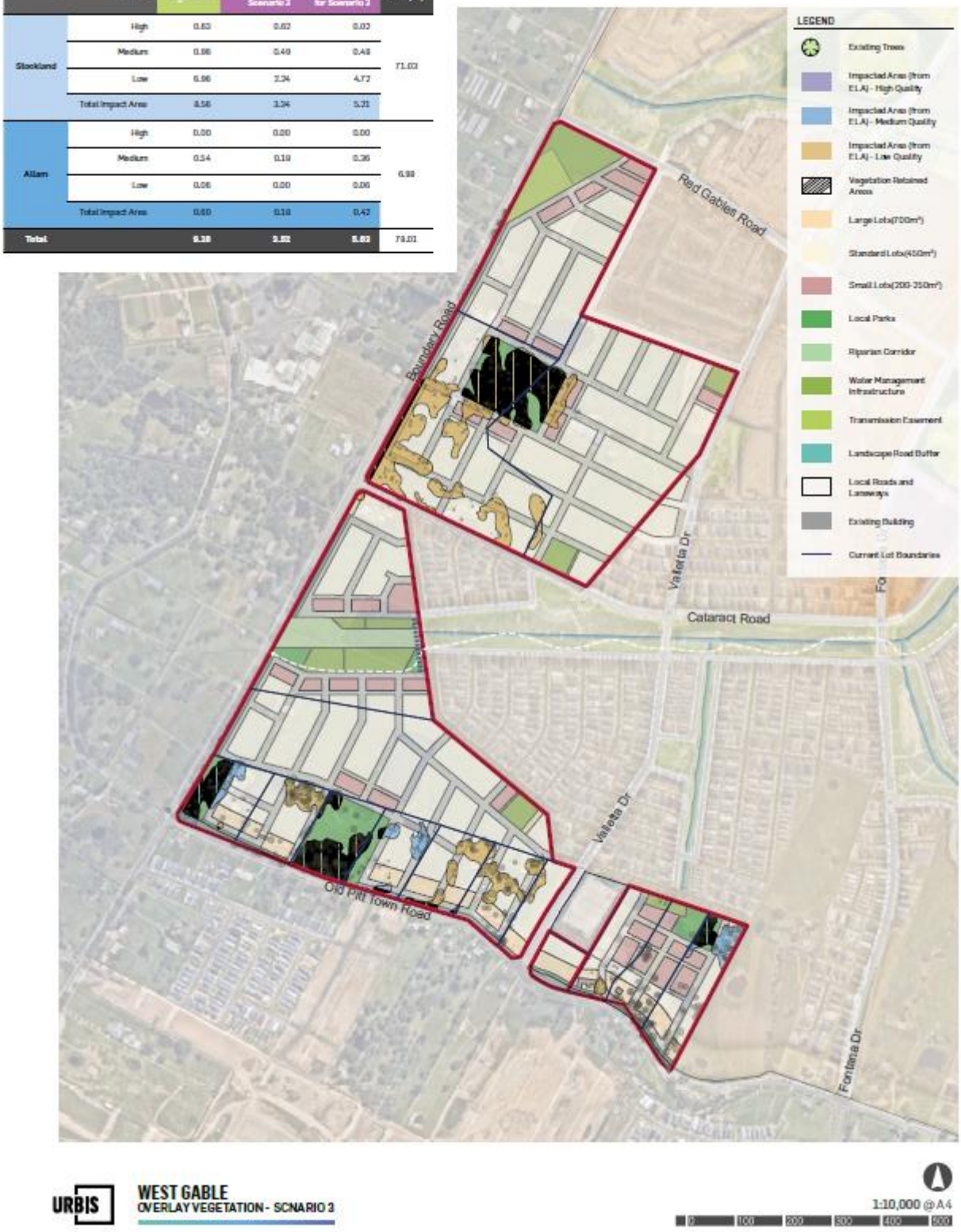

Figure 24 Concept Design May 2022

OPEN SPACE AREA & CATCHMENT

SCENARIO 2

	CONCEPT PLAN					
	Area (ha)	% of Site*	% for Useable Area	Useable Area(ha)	Benchmark	Difference
Local Parks	5.45	7%	100%	5.45	6.6	-1.15
Riparian Corridor	0.90	1%	20%	0.18		
Water Management Infrastructure	4.64	6%		0.93		
Transmission Easements	1.40	2%		0.28		
Boundary Road Buffer	1.40	1%		0.09		
Total	**12.85**	**17%**		**6.93**	**6.6**	**+0.33**

USEABLE OPEN SPACE

Greater Liverpool Bankstown – Place Transformation Strategy
25/08/2022

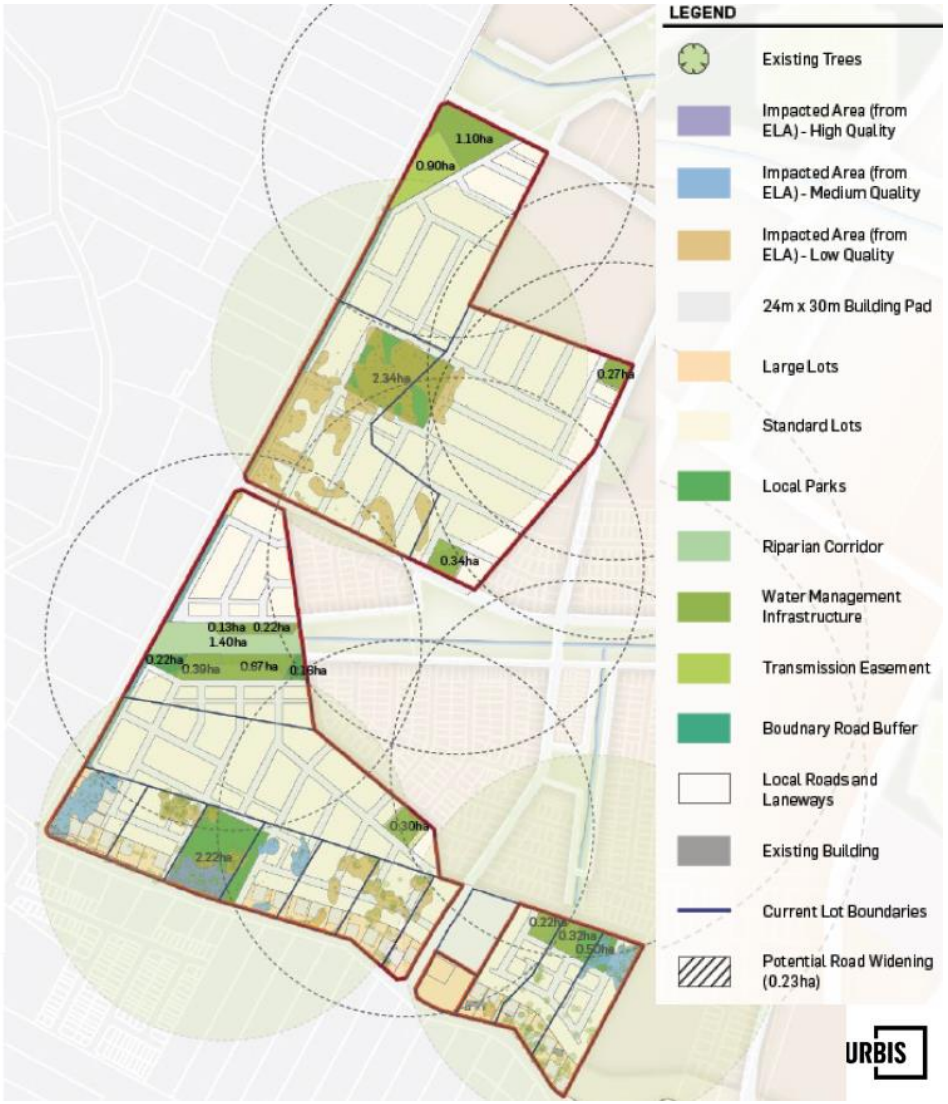

Figure 25 Concept Plan 2 - Retaining Vegetation on Large Lots (Council would not consider vegetation retained on lot to be avoided)

Appendix I Ecosystem species report.

Appendix J Biodiversity credit report

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