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Appin (Part) Precinct

Version 1 Plan - Biodiversity Assessment

Prepared for Walker Corporation Pty Ltd and Walker Group Holdings Pty Ltd | 19 October 2022

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Document control

Project number	Client	Project manager	LGA
7320	Walker Corporation Pty Ltd and Walker Group Holdings Pty Ltd	Luke Baker	Wollondilly

Version	Author	Review	Status	Comments	Date
Rev2	Luke Baker, Ryan Seberi	Walker Corporation	Rev 1		10 October 2022

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Niche Environment and Heritage Pty Ltd (ACN 137 111 721)
Enquiries should be addressed to Niche Environment and Heritage
PO Box 2443, Parramatta NSW 1750, Australia
Email: info@niche-eh.com

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Glossary and list of abbreviations

Term or abbreviation	Definition
BAM	Biodiversity Assessment Methodology
BAM -C	Biodiversity Credit Calculator
BC Act	NSW *Biodiversity Conservation Act 2016*
BOS	NSW Biodiversity Offsets Scheme
CEEC	Critically Endangered Ecological Community
CPCP	Cumberland Plain Conservation Plan
DAWE	Department of Agriculture, Water and Environment
DPE	Department of Planning and Environment (formerly DPIE)
DPIE	Department of Planning, Industry and Environment (formerly DECCW, DECC, DEC, OEH, now DPE)
EEC	Endangered Ecological Community
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ha	Hectare/s
IBRA	Interim Biogeographic Regionalisation for Australia
km	Kilometres
Locality	The Subject Land and surrounds, nominally a 10 kilometre radius from the Subject Land.
m	Metre/s
MNES	Matters of National Environmental Significance
PCT	Plant Community Type
SAII	Serious and Irreversible Impact, as defined under the BC Act.
Subject Land	Walker Corporation Landholdings as shown on Figure 1.
TEC	Threatened Ecological Community

1. Introduction

1.1 The Appin Project

Greater Sydney's population is projected to grow to approximately 6.1 million by 2041 – over a million more people than currently live in the region.

The NSW Government has identified Growth Areas as major development areas that will assist in accommodating this growth. The Greater Macarthur Growth Area (GMGA) is one such growth area and is a logical extension of the urban form of south-west Sydney. The GMGA is divided into precincts. The Appin Precinct and North Appin Precincts are the southernmost land release precincts of the GMGA. The goal is to deliver 21,000+ dwellings.

The land is to be rezoned and released for development to achieve this goal. A submission has been prepared by Walker Corporation Pty Limited and Walker Group Holdings Pty Limited (the Proponent) to rezone 1,378 hectares of land (the site) within the Appin Precinct from RU2 Rural Landscape to the following zones:

- Urban Development Zone - Zone 1 Urban Development (UD)
- Special Purposes Zone - Zone SP2 Infrastructure (SP2)
- Conservation Zone - Zone C2 Environmental Conservation (C2).

The zonings are shown on the Appin (Part) Precinct Plan (the precinct plan). 'The precinct plan' will be incorporated into the State Environmental Planning Policy (Precincts – Western Parkland City) 2021 and contain the provisions (clauses and maps) that will apply to 'the site.' 'The precinct plan' envisages the delivery of 12,000+ new homes.

A structure plan has been prepared for the site and is shown on the Appin (Part) Precinct Structure Plan (the structure plan). It identifies staging and the first stage to be developed – Release Area 1. Release Area 1 is anticipated to deliver 3,500+ dwellings.

The submission is aligned with strategic land use planning, State and local government policies and infrastructure delivery. The development potential is tempered by a landscape-based approach that protects the environment and landscape values, shaping the character of new communities. A series of residential neighbourhoods are to be delivered within the landscape corridors of the Nepean and Cataract Rivers, supported by local amenities, transit corridors and community infrastructure.

1.2 Context

Niche Environment and Heritage Pty Ltd (Niche) have been engaged by the Proponent to prepare a Biodiversity Assessment for the Appin Vale Sub Precinct Plan for the Appin and North Appin Precincts.

The Appin (Part) Precinct is situated within the core of the Appin and North Appin Precinct. It is bound by Wilton Road to the east, the Nepean River to the west and Ousedale Creek to the north. The Proponent's 1,284 ha landholdings are wholly contained within the Appin (Part) Precinct Plan.

The Appin (Part) Precinct Plan is the area to which the Precinct Plan will apply to and is proposed to be zoned for conservation, urban development and infrastructure. Within the proposed urban development zone, 12,000+ dwellings can be delivered.

The Appin (Part) Precinct Plan establishes the statutory planning framework permitting the delivery of a range of residential typologies, retail, education, business premises, recreation areas, and infrastructure services and provides development standards that development must fulfil.

The Precinct Plan establishes the statutory planning framework permitting the delivery of a range of residential typologies, retail, education, business premises, recreation areas, and infrastructure services and provides development standards that development must fulfil.

The Subject Land occurs within an area that is applicable to the Department of Planning and Environment (DPE) (DPIE 2022) Cumberland Plain Conservation Plan (CPCP). To support the Appin Vale Sub Precinct and the associated structure plan, the Proponent have prepared a re-zoning submission.

Walker Corporation's re-zoning application is also to support a location for the proposed East-West Connection Road, and the North-South Connection.

Through consultation with DPE, it was determined that a Biodiversity Assessment would be required for the re-zoning application, in order to identify areas of biodiversity value across the Subject Land and quantify the potential impacts associated with the proposal.

This Biodiversity Assessment assesses the potential impacts to biodiversity as a result of the proposed UD Urban Development Zone; and separately summarises the potential impacts associated with the East-West Connection Road, and North-South Connection Road that are proposed as a SP2 Infrastructure zone. This Biodiversity Assessment also outlines the approach to mitigation measures associated with the development of the Subject Land with reference to the CPCP.

1.3 Location and Cumberland Plain Conservation Plan

Walker Landholding is approximately 1,284 hectares (ha) within the Appin Vale Sub Precinct Boundary (Figure 1).

The Subject Land occurs within the Wollondilly Local Government Area (LGA) and Greater Macarthur Growth Area which the NSW Government has identified as a key area for urban growth to support Western Sydney for the next 36 years. The DPE is progressing the approvals required for the development of the Growth Areas, and as part of the biodiversity approvals required, the DPIE has finalised the CPCP to provide long-term certainty for biodiversity and development in Western Sydney.

Urban capable land is described in the CPCP as 'certified-urban capable land' which will be subject to strategic biodiversity certification for development under Part 8 of the NSW *Biodiversity Conservation Act 2016* (BC Act). It is our understanding that development in these areas do not require further site by site biodiversity assessment, so long as the approved conservation program detailed in the CPCP is implemented by the DPE.

The CPCP land categories that occur on the Proponents landholdings are shown on Figure 2, and summarised in Table 1.

Approximately 749.2 ha of the Proponents landholdings (subject land) is 'certified-urban capable land' (Table 1).

Table 1. CPCP Land category and assessment requirements

CPCP land category	Description as stated in CPCP	Area (ha) Proponents Landholdings
Certified—Urban Capable Land	Urban capable land will be subject to strategic biodiversity certification for development under Part 8 of the BC Act. Development in these areas does not require further site by site biodiversity assessment, so long as the approved conservation program detailed in the Plan is implemented by the department.	749.2
Non-certified land		
Avoided land	Avoided land is avoided from development due to identified biodiversity values on the site, or because the land cannot legally or feasibly be developed due to its topography or due to an environmental feature such as a riparian corridor. In this instance, 'avoidance' refers to the approach the department has undertaken to avoid and minimise the impacts to biodiversity from development in the nominated areas, as required under the BC Act and EPBC Act.	443.3
Excluded land	Excluded land is excluded from NSW strategic biodiversity certification and strategic assessment under the EPBC Act. These areas will not receive any biodiversity approvals under the Plan due to any of the following factors: • the land is already developed for urban use • development is already underway on this land under a separate process • the land is environmentally protected, including reserves and offset sites • Commonwealth land sites (such as the Defence Establishment Orchard Hills) • there are roads or easements on this land • it has specific urban zoning such as business, industrial, residential or special purpose (either already developed or to be developed).	91.2
Total		**1,283.9**[1]

1.4 Proposed structure plan

As stated in the CPCP, '*Zoning will be used to enforce the certified-urban capable land and identify which land is available in each nominated area for development. Environmental conservation zoning will protect areas that have been avoided for biodiversity reasons. Zoning will be implemented through the proposed State Environmental Planning Policy (SEPP) for strategic conservation planning or the relevant place based Environmental Planning Instrument (EPI). Re-zoning for development will occur over time, informed by the relevant strategic plan or structure plan and consistent with the certified-urban capable land under the CPCP*'.

The Proponent propose the re-zoning plan as shown on Figure 3 to support the future development of the Subject Land. The Proponent have proposed SP2 Infrastructure within areas that are not certified as part of the CPCP process.

The Proponent's justification for the placement of infrastructure within the non-certified area is detailed in the zoning application documents prepared by the Proponent, and summarised in section 3 of this report.

[1] Lot areas calculated from the Digital Cadastral Database and subject to detailed survey. Note that the CPCP layer provided by DPE does not neatly match the cadastre layer in some areas – this result in very minor differences in area calculations.

Development that occurs outside the certified-urban capable land is not part of the biodiversity certification associated with the CPCP. Future development within these areas will require a modification or series of modifications to the Biodiversity certification under Part 8 of the BC Act, or consideration under the applicable sections of the Environmental Planning and Assessment Act 1979 (NSW) (EP&A Act).

The Proponents proposal against the CPCP land categories has been provided in Table 2.

The area proposed for the East-West Connection Road and the North-South Connection Road is located partially within non-certified land. The Proponent is proposing these corridors be zoned as 'SP2 Infrastructure' in order to support the future development of the Greater Macarthur Growth Area.

The development of the proposed East-West Connection Road and the North-South Connection Road may meet the definition of '*essential infrastructure*' for the CPCP. Any essential development outside of the certified-urban capable land will need to comply with Appendix A of the CPCP - '*Appendix A. Guidelines for essential infrastructure development*', and obtain all required NSW biodiversity approvals. '*Appendix A. Guidelines for essential infrastructure development*' includes specific commitments and requirements to avoid, mitigate and offset impacts to Matters of National Environmental Significance (MNES) and other relevant EPBC Act matters such as: limiting cumulative direct impacts over the life of the Plan from essential infrastructure to Shale Sandstone Transition Forest within non-certified land to no more than 20 hectares in the Greater Macarthur Growth Area.

The Proponents zoning proposal for the Appin Vale Sub Precinct is show on Figure 3, Figure 4 and summarised in Table 2 below.

Table 2. Proposed zoning areas

Final CPCP land category	Proposed scheme rezoning	Area (ha)[2]	Total (ha)
Not certified			
Avoided land	C2 Environmental Conservation	433.4	443.3
	SP2 Infrastructure UD Urban Development	8.99	
Excluded land	C2 Environmental Conservation	21.87	91.2
	SP2 Infrastructure	0.17	
	UD Urban Development	69.21	
Certified			
Certified - urban capable land	SP2 Infrastructure	10.4	749.2
	UD Urban Development	738.96	
Grand Total		**1,283.9**	**1,283.9**

1.5 Purpose of this assessment

To assist in the preparation of the zoning application the Proponent consulted with Planning NSW on the 24th of September 2021. Planning NSW provided the following advice[3] in relation to the approach to the biodiversity assessment:

"*A flora and fauna assessment is still required to inform the structure planning. Therefore as part of the TAP process, the re-zoning of the land should be supported by a biodiversity assessment that includes an assessment of impacts to biodiversity across site including the location road crossings, open space and walkways in areas referred to below by Walkers. In addition, the biodiversity assessment should also include mitigation measures (including in the certified area), measures proposed to protect conservation areas and assessment of consistency with the OCSE Campbelltown Koala report.*

While there are no standard requirements for flora and fauna assessment EES suggests that Stages 1 and 2 of the biodiversity assessment method can be used. These two stages provide:

- *a method for the assessment of biodiversity values*
- *guidance on how a proponent can avoid and minimise potential biodiversity impacts.*

https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/biodiversity-assessment-method-2020-200438.pdf "

Based on the advice from DPE, it was further agreed[4] that the Biodiversity Assessment is to identify areas of biodiversity value and determine the potential impacts to biodiversity as a result of the proposed Urban

[2] Note that small difference in areas have occurred due to the CPCP shapefiles not neatly following cadastre boundary.
[3] Correspondence dated 24th September 2021 From: Naomi Moss <naomi.moss@planning.nsw.gov.au>
To: Nicole Topple <Nicole.Topple@walkercorp.com.au>; Adrian Hohenzollern
Subject: RE: Appin - Flora and Fauna Assessments
[4] From: Adrian Hohenzollern <Adrian.Hohenzollern@planning.nsw.gov.au>
Sent: Tuesday, 19 October 2021 9:57 AM
To: Nicole Topple <Nicole.Topple@walkercorp.com.au>; Naomi Moss <naomi.moss@planning.nsw.gov.au>
Cc: Neala Gautam <Neala.Gautam@planning.nsw.gov.au>; Bruce Colman (Urbis) <bcolman@urbis.com.au>

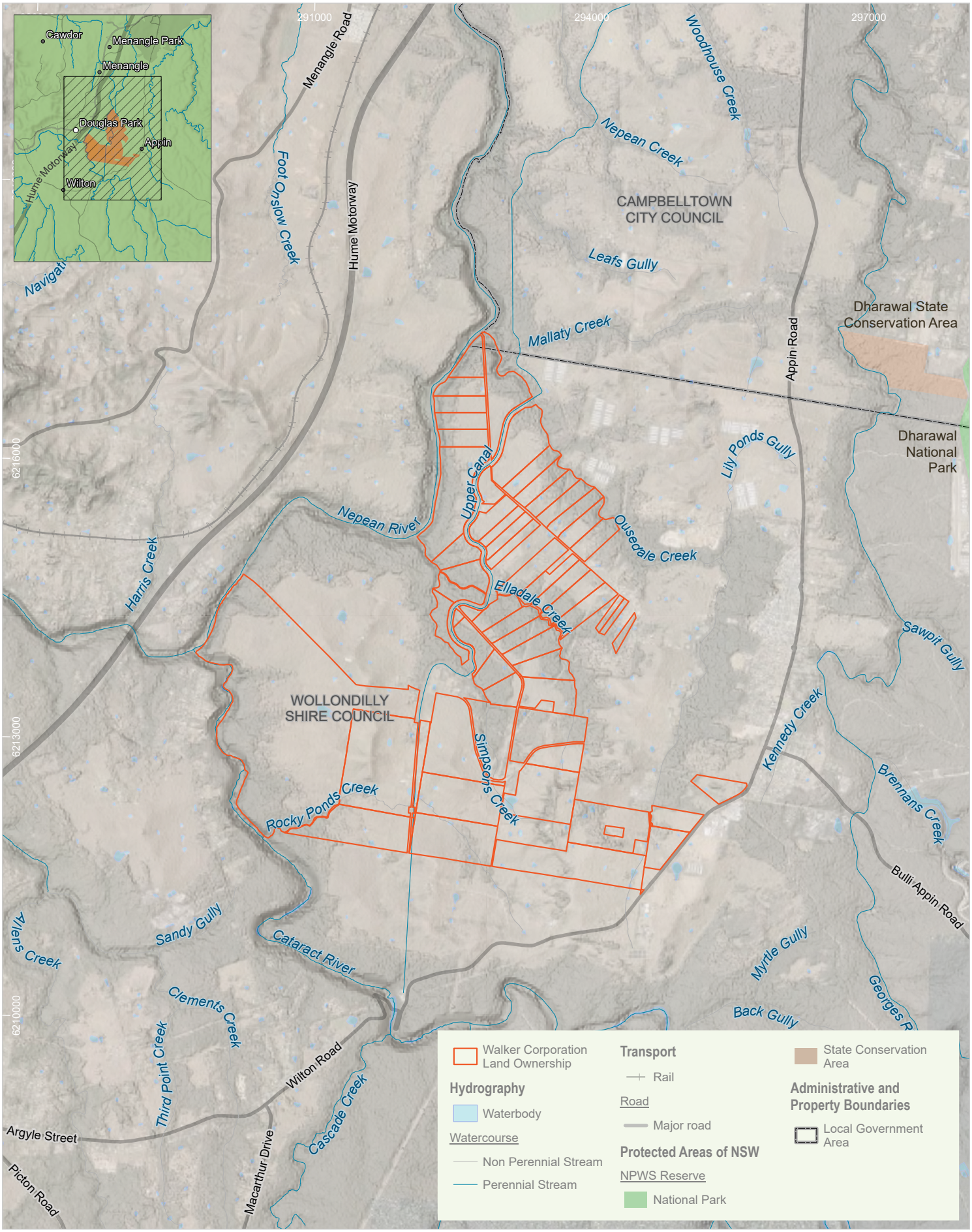
Development Zone. Impacts associated with the zoning that occurs within the CPCP 'Excluded land' category would be subject to further assessment at the development application stage:

"*the Appin Re-zoning Biodiversity Assessment Report undertake an assessment of the proposed Certified-urban capable Land only….. Land identified as Avoided for Biodiversity will be zoned C2 Environmental Conservation by the SEPP accompanying the CPCP and assessment of this land has already been undertaken by the CPCP team. Therefore the Appin Re-zoning Biodiversity Assessment Report will not undertake an assessment on this land.*"

As per the advice and agreement from DPE, this Biodiversity Assessment provides an overview of the vegetation and biodiversity values recorded within the Subject Land, and an assessment of those impacts within the proposed UD Urban Development Zone and SP2 Infrastructure corridor.

A formal biodiversity impact assessment, including targeted field surveys would need to be completed for all areas of impact that extend outside of the certified land. It is our understanding that the Proponent are consulting with DPE regarding this process in relation to the proposed structure plan.

This Biodiversity Assessment also provides a list of the mitigation measures that would be applied to the future development of the Subject Land.



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WGS 1984 Web Mercator

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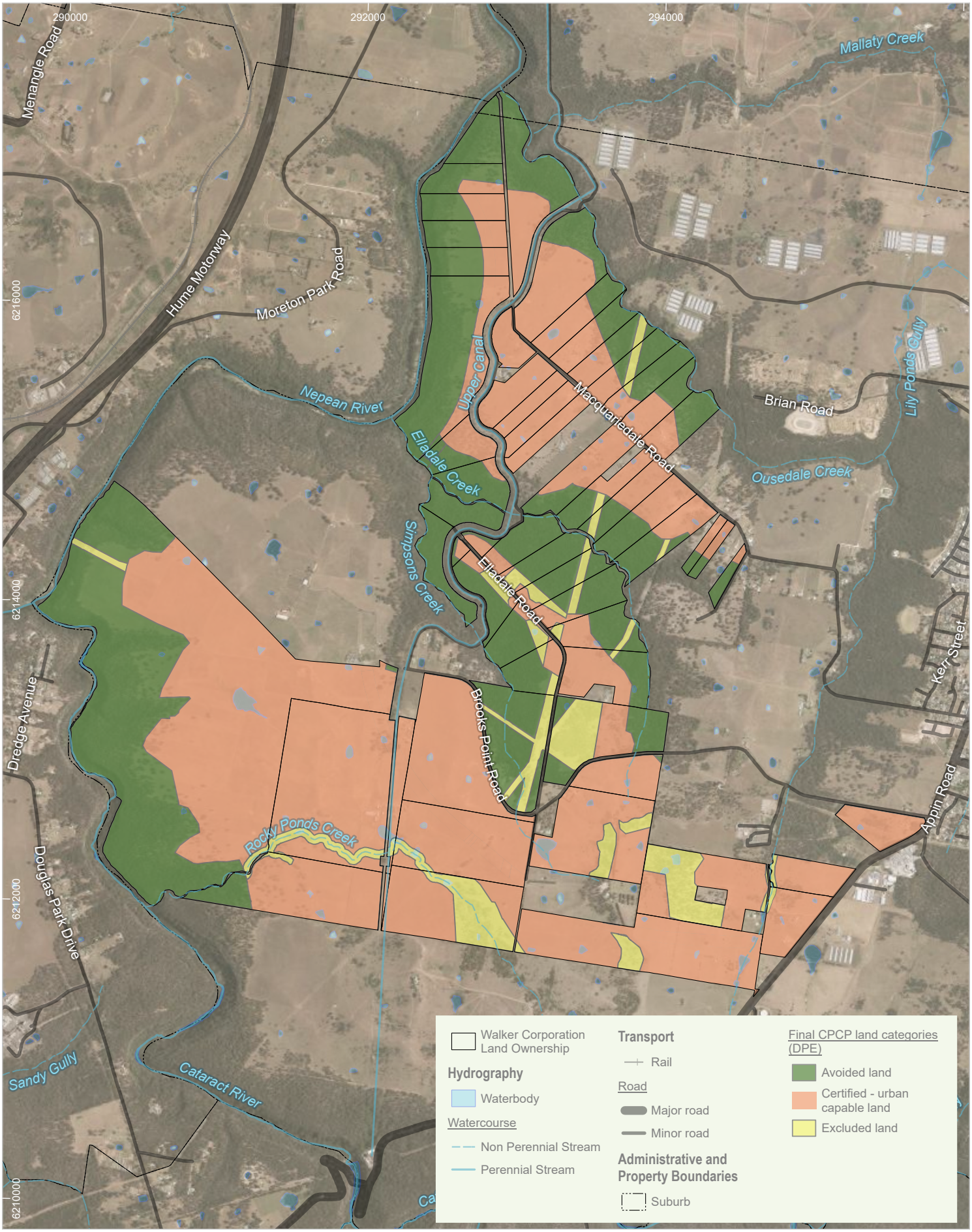
Client: Walker Corporation

Locality

Figure 1



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Cumberland Conservation Plan and Walker Corporation Landholdings

Appin (Part) Precinct - Version 1 Plan

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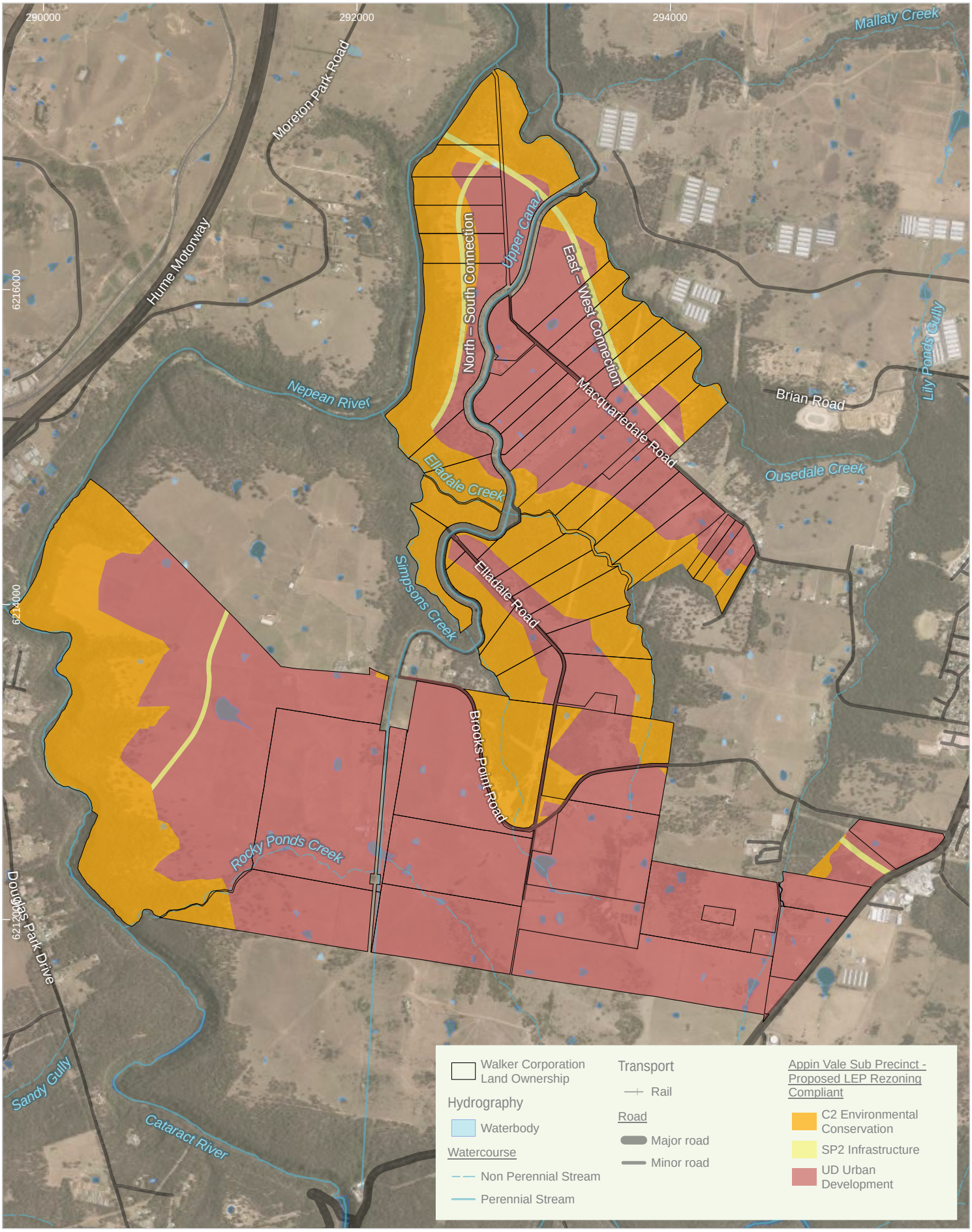
Client: Walker Corporation

Figure 2



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Proposed rezoning

Appin (**Part**) **Precinct** - **Version 1 Plan**

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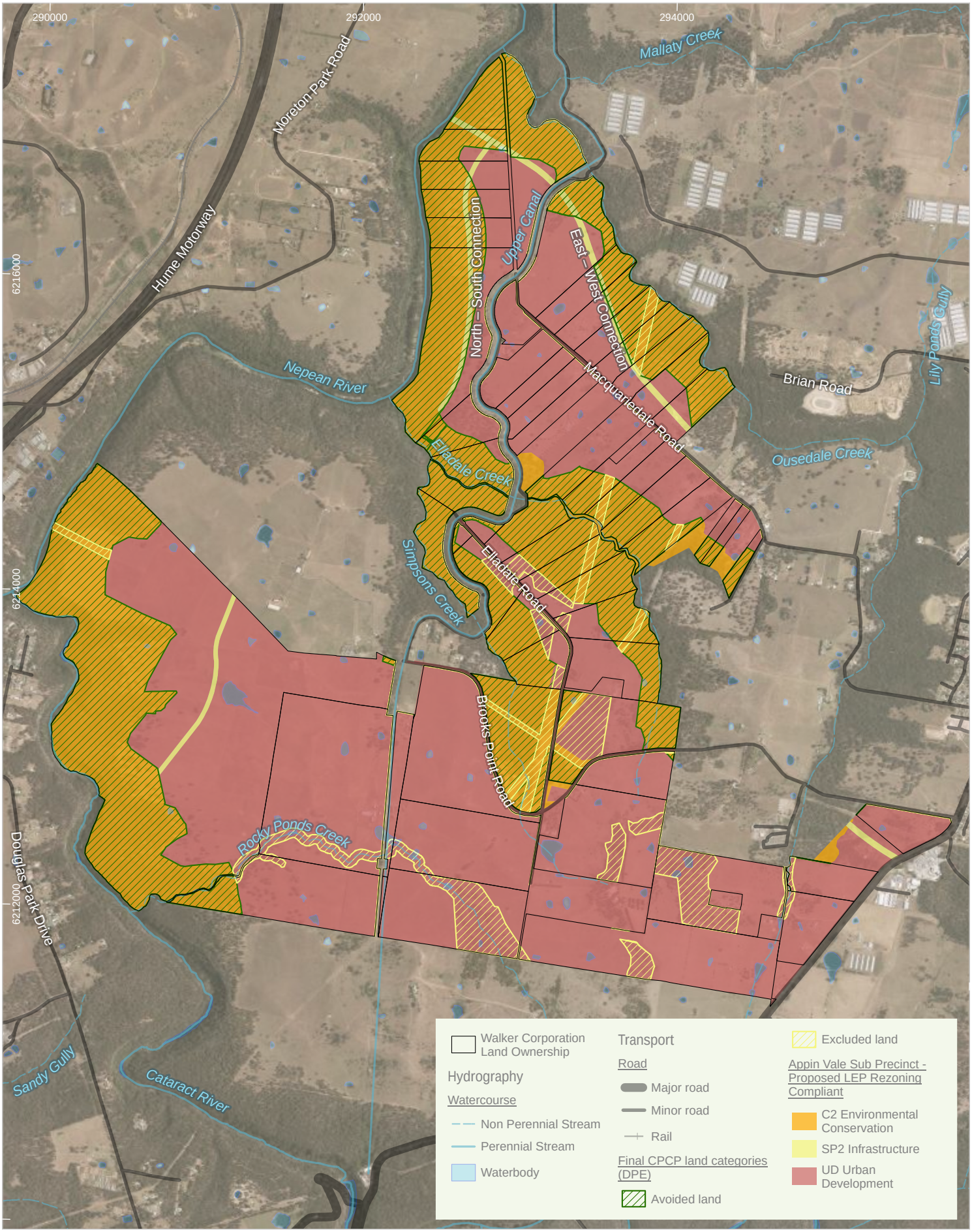
Figure 3



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WGS 1984 Web Mercator

Proposed rezoning in relation to CPCP

Appin **(Part) Precinct** - **Version 1 Plan**

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Figure 4

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2. Biodiversity Assessment

2.1 Landscape context

As requested by DPE (section 1.4) we have applied Stage 1 of the BAM (DPIE 2020b) which refers to an assessment of Landscape features that are applicable to a development, including:

- Native vegetation cover
- Rivers, streams and estuaries
- Areas of geological significance
- Habitat connectivity.

For each factor the current state of the landscape was assessed then compared with the state of the landscape if the future development were to proceed. The results were entered into the BAM-C where relevant.

Each of the associated factors above have been described in Table 3 below in relation to the Subject Land.

Table 3. Landscape features of the Subject Land

Landscape features	Description
Interim Biogeographic Regionalisation for Australia (IBRA) bioregion/subregion	The Subject Land is located within the Sydney Basin IBRA bioregion and Cumberland Subregion. This IBRA region was selected in the Biodiversity Credit Calculator (BAM-C) to generate the list of predicted species and candidate species that are applicable this biodiversity assessment (section 2.4).
NSW (Mitchell) Landscapes	The Subject Land occurs across both the Picton-Razorback Hills, and Upper Nepean Gorges NSW (Mitchell) Landscape. The majority of the Subject Land is located within the Picton-Razorback Hills NSW (Mitchell) Landscape, and thus has been selected in the BAM-C for the purposes of determining the predicted species and candidate species that are applicable this biodiversity assessment (section 2.4).
Rivers, streams and estuaries and Strahler stream order	Watercourses that occur within the Subject Land are shown on Figure 2 . Of particular note, the Nepean River borders the west of the Subject Land. Other notable watercourses in the Subject Land include Ousedale Creek, Elladale Creek and Simpson Creek.
Wetlands within and adjacent to development/Subject Land	There are no Coastal Wetlands in the Subject Land according to the State Environmental Planning Policy (SEPP) (Coastal Management) 2018. There are no Coastal Upland Swamps or Ramsar wetlands within the Subject Land.
Connectivity features	The western portion of the Subject Land supports contiguous habitat that connects along the Nepean River, which eventually adjoins the WaterNSW Special Areas located approximately three kilometres to the south-west. The western portion of the Subject Land has also been identified as an important Koala corridor within the CPCP (section 2.9).
Karst, caves, crevices, cliffs, rocks and other geological features of significance	The geology of the Subject Land mainly comprises sedimentary sandstones, shales and claystones of the Permian and Triassic Periods which have been intruded by igneous sills. Minor cliffs and surface rock are likely to occur to the west of the Subject Land within steep gullies of the Nepean River.
Areas of Outstanding Biodiversity Value (AOBVs)	The Register of Declared Areas of Outstanding Biodiversity Value has information about declared AOBV in NSW. Areas of Outstanding Biodiversity Value declarations in NSW include the following: • Gould's Petrel – critical habitat declaration • Little penguin population in Sydney's North Harbour – critical habitat declaration

Landscape features	Description
	• Mitchell's Rainforest Snail in Stotts Island Nature Reserve – critical habitat declaration • Wollemi Pine – critical habitat declaration. AOBVs are declared under the BC Act for to identify, highlight and effectively manage sites that make significant contributions to the persistence of biodiversity in New South Wales, Australia and globally. No registered AOBVs occur within the Subject Land or surrounds. None of the AOBVs that are listed above would be impacted by the proposal, given none are located within the Subject land.

2.2 Native vegetation

The BAM stage 1 requires all native vegetation within the Subject Land be described and assessed using applicable survey guidelines.

Native vegetation within the Subject Land has been mapped by DPE during the CPCP vegetation mapping process.

The extent of native vegetation and associated Plant Community Type (PCT), as well as the determination of vegetation integrity scores within the nominated areas, is detailed in the DPE (DPIE 2020e) *Cumberland Plain Assessment Report: Part 3: Assessment Approach and Methods*.

In summary, the vegetation validation processes undertaken by DPE (DPIE 2020e) included:

- Aerial Photographic Interpretation
- Interrogation of LiDAR data
- Existing desktop mapping
- Previous surveys and studies
- Rapid assessment ground-truthing
- Field surveys.

Within the Subject Land 28 BAM plots and traverses were completed by Biosis (2019). The DPE vegetation mapping undertaken as part of the CPCP, including the BAM plots and survey tracks completed within the Subject land, are shown on Figure 5.

Biosis (2019) mapped the location of the following PCTs within the Subject Land, including:

- PCT 835 *Forest Red Gum - Rough-barked Apple grassy woodland*
- PCT 849 *Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion*.
- PCT 850 *Grey Box - Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion*.
- PCT 1395 *Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest of the edges of the Cumberland Plain, Sydney Basin Bioregion*.
- PCT 1292 *Water Gum - Coachwood riparian scrub along sandstone streams*
- PCT 1181 *Smooth-barked Apple - Red Bloodwood - Sydney Peppermint heathy open forest on slopes of dry sandstone gullies of western and southern Sydney, Sydney Basin Bioregion*.

The area of native vegetation as mapped is shown in Table 4 below and on Figure 5.

Table 4. Area of each PCT within the Subject Land in relation to the proposed zoning application

PCT	PCT Name	Threatened Ecological Community	Condition	Vegetation Integrity[5]	Non-certified land in CPCP (Area (ha))			Certified Land in CPCP (Area (ha))			Excluded land in CPCP (Area (ha))		Grand Total (Ha)
					C2 Environmental Conservation	SP2 Infrastructure East-West Connection Road	SP2 Infrastructure North – South Connection	UD Urban Development Zone	SP2 Infrastructure East-West Connection Road	SP2 Infrastructure North – South Connection	C2 Environmental Conservation	UD Urban Development Zone	
835	Forest Red Gum - Rough-barked Apple grassy woodland	River-Flat Eucalypt Forest listed as a TEC on the BC Act	Intact	-	0.01	0	0	0	0	0	0	0	0.01
849	Grey Box - Forest Red Gum grassy woodland on flats	Cumberland Plain Woodland listed as a TEC under both State and Commonwealth	DNG	24.1	5.80	0	0.72	9.78	0	0	0	0.02	16.32
			Intact	53.9	2.62	0	0.42	0.96	0	0.03	0	0	4.03
			Scattered Trees	18.3	1.22	0	0	8.49	0	0.01	0	0.41	10.13
			Thinned	42.3	0	0	0	2.11	0	0	0.08	5.58	7.77
850	Grey Box - Forest Red Gum grassy woodland on shale	Cumberland Plain Woodland listed as a TEC under both State and Commonwealth	DNG	25.7	0	0	0	2.65	0	0.09	0	0.08	2.82
			Intact	58.1	0	0	0	1.30	0	0	0	14.40	15.7
			Scattered Trees	38.1	0	0	0	0.07	0	0	0	0.09	0.16
			Thinned	41.9	0	0	0	1.39	0	0	0	5.39	6.78
1181	Smooth-barked Apple - Red Bloodwood - Sydney Peppermint heathy open forest	-	Intact	-	82.42	0.21	0	0	0	0	0.46	0	83.09
1292	Water Gum - Coachwood riparian scrub along sandstone streams	-	Thinned	-	0.03	0	0	0	0	0	0	0	0.03
1395	Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest	Shale Sandstone Transition Forest listed as a TEC under both State and Commonwealth legislation	Other	-	0	0	0	0	0	0	0	0	0
			DNG	28.4	2.41	0	0	4.84	0	0	1.96	0.31	9.52
			Intact	72.9	249.01	1.07	0	7.90	0.21	0	4.27	9.01	271.47
			Scattered Trees	30.0	1.73	0	0	4.69	0.15	0	0.10	0.18	6.85
			Thinned	63.9	44.59	2.08	0	23.61	1.45	0	3.13	10.66	85.52
Total					**389.84**	**3.36**	**1.14**	**67.79**	**1.81**	**0.13**	**10**	**46.13**	**520.2**

[5] [5] Quantified in Table 23-3 of the CPCP Assessment Report. We note that this data obtained by using all the DPE BAM plots undertaken within the Greater Macarthur Area. Vegetation integrity scores were not provided in the CPCP for PCT 1181 and PCT 1292

2.3 Threatened ecological communities

Threatened ecological communities (TECs) that are known to occur in the Subject Land as mapped by DPE (Biosis & OLEC 2020) include:

- Cumberland Plain Woodland in the Sydney Basin Bioregion, which is listed as a Critically Endangered Ecological Community (CEEC) under both State and Commonwealth legislation;
- Shale Sandstone Transition Forest in the Sydney Basin Bioregion, which is listed as a CEEC under both State and Commonwealth legislation
- River-Flat Eucalypt Forest on Coastal Floodplains, which is listed as an Endangered Ecological Community (EEC) under the BC Act .

The extent of the TECs has been mapped on Figure 6 and the associated area provided in Table 5.

Table 5. Threatened Ecological Communities within Subject Land

TEC	Non-certified CPCP			Certified CPCP			Excluded CPCP		Total (ha)
	C2 Environmental Conservation	SP2 East-West Connection Road	SP2 North – South Connection	UD Urban Development	SP2 East-West Connection Road	SP2 North – South Connection	C2 Environmental Conservation	UD Urban Development	
River-Flat Eucalypt Forest	0.01	0	0	0	0	0	0	0	0.01
Cumberland Plain Woodland	9.64	0	1.14	26.75	0	0.13	0.08	25.97	63.71
Shale Sandstone Transition Forest	297.74	3.15	0	41.04	1.81	0	9.46	20.16	373.36
Total	**307.39**	**3.15**	**1.14**	**67.79**	**1.81**	**0.13**	**9.54**	**46.13**	**437.08**

2.4 Threatened species

2.4.1 Assessing the habitat suitability for threatened species – predicted species

The BAM defines two types of biodiversity credits that are used to measure impacts on development sites. The two types of credits are:

- ecosystem credits – measure the value of TECs, threatened species habitat for species that can be reliably predicted to occur within a PCT;
- species credits – apply to all other threatened species which are found to occur at that location and cannot be reliably predicted to occur within the identified PCTs at the development site. All threatened flora are regarded as species credits, and some threatened fauna are regarded as species credits.

The BAM-C determines those species that are ecosystem credits species that are likely to occur within the Subject Land (referred to as 'predicted species'). The list of 'predicted species' (ecosystem credit species) generated via the BAM-C for the Subject Land are displayed in Table 6 below. The 'predicted species' do not need to be surveyed to confirm the presence/absence as they are assumed to be present across the Subject Land within both the certified and non-certified land.

Table 6. Predicted threatened species

Species	Common name	BC Act listing status	EPBC Act listing status.
Anthochaera Phrygia	Regent Honeyeater	Critically Endangered	Critically Endangered
Artamus cyanopterus cyanopterus	Dusky Woodswallow	Vulnerable	Not Listed
Botaurus poiciloptilus	Australasian Bittern	Endangered	Endangered
Callocephalon fimbriatum	Gang-gang Cockatoo	Vulnerable	Not Listed
Calyptorhynchus lathami	Glossy Black-Cockatoo	Vulnerable	Not Listed
Chthonicola sagittate	Speckled Warbler	Vulnerable	Not Listed
Circus assimilis	Spotted Harrier	Vulnerable	Not Listed
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	Vulnerable	Not Listed
Daphoenositta chrysoptera	Varied Sittella	Vulnerable	Not Listed
Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable	Endangered
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Vulnerable	Not Listed
Glossopsitta pusilla	Little Lorikeet	Vulnerable	Not Listed
Grantiella picta	Painted Honeyeater	Vulnerable	Vulnerable
Haliaeetus leucogaster	White-bellied Sea-Eagle	Vulnerable	Not Listed
Hieraaetus morphnoides	Little Eagle	Vulnerable	Not Listed
Hirundapus caudacutus	White-throated Needletail	Not Listed	Vulnerable
Hoplocephalus bungaroides	Broad-headed Snake	Endangered	Vulnerable
Ixobrychus flavicollis	Black Bittern	Vulnerable	Not Listed
Lathamus discolor	Swift Parrot	Endangered	Critically Endangered
Lophoictinia isura	Square-tailed Kite	Vulnerable	Not Listed

Species	Common name	BC Act listing status	EPBC Act listing status.
Melanodryas cucullata cucullata	Hooded Robin (south-eastern form)	Vulnerable	Not Listed
Melithreptus gularis gularis	Black-chinned Honeyeater (eastern subspecies)	Vulnerable	Not Listed
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	Vulnerable	Not Listed
Miniopterus australis	Little Bent-winged Bat	Vulnerable	Not Listed
Miniopterus orianae oceanensis	Large Bent-winged Bat	Vulnerable	Not Listed
Neophema pulchella	Turquoise Parrot	Vulnerable	Not Listed
Ninox connivens	Barking Owl	Vulnerable	Not Listed
Ninox strenua	Powerful Owl	Vulnerable	Not Listed
Pandion cristatus	Eastern Osprey	Vulnerable	Not Listed
Petaurus australis	Yellow-bellied Glider	Vulnerable	Not Listed
Petroica boodang	Scarlet Robin	Vulnerable	Not Listed
Petroica phoenicea	Flame Robin	Vulnerable	Not Listed
Phascolarctos cinereus	Koala	Vulnerable	Vulnerable
Pseudomys novaehollandiae	New Holland Mouse	Not Listed	Vulnerable
Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Vulnerable
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	Vulnerable	Not Listed
Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable	Not Listed
Stagonopleura guttata	Diamond Firetail	Vulnerable	Not Listed
Tyto novaehollandiae	Masked Owl	Vulnerable	Not Listed
Tyto tenebricosa	Sooty Owl	Vulnerable	Not Listed
Varanus rosenbergi	Rosenberg's Goanna	Vulnerable	Not Listed

2.4.2 Assessing the habitat suitability for threatened species – candidate species

Threatened flora and fauna species have been assessed within certified land during the CPCP process.

It is our understanding that targeted surveys/assessment have not been completed by DPE (DPIE 2020e) for non-certified land and excluded land.

A biodiversity impact assessment would therefore need to be completed for the proposed SP2 Infrastructure that do not occur within the certified land.

The BAM-C determines 'candidate species' which are based on the inputs provided in Table 3 and Table 4. The 'candidate species' require targeted survey, and/or an expert report to determine the presence/absence from the Subject Land. It is anticipated that a targeted survey or expert report for threatened species would be required to address the 'candidate species' and applicable threatened species listed on the EPBC Act to support a Biodiversity Impact Assessment for the proposed SP2 Infrastructure that do not occur within the certified land.

The list of candidate species (species credit species) generated via the BAM-C is provided in Table 7 (flora) and Table 8 (fauna), and an assessment as to the threatened species likelihood to occur within the Subject Land is provided in the following sections.

2.5 Threatened flora (species credits)

The BAM regards all threatened flora species as 'species credit' species. Targeted surveys or an expert report are required for those species identified by BAM-C. These species are referred to as 'candidate species'. A total of 50 threatened flora species have been considered as candidate species for this assessment (Table 7).

Threatened flora field survey has been completed in 2019 by ecologists engaged by DPE as part of the CPCP within certified land (Biosis & OLEC 2020). One threatened flora – *Pomaderris brunnea* was recorded by DPE as shown on Figure 7 of which all records of the *Pomaderris brunnea* are located within C2 Environmental Conservation.

Based on a search of Bionet, an additional threatened flora *Leucopogon exolasius* has been recorded within the C2 Environmental Conservation as shown on Figure 7.

To assist in the preparation of this Biodiversity Assessment, a likelihood of occurrence for each of the candidate listed threatened flora has been attributed to both the UD Urban Development Zone that is certified; and the SP2 Infrastructure that occurs within the non-certified lands (Table 7). Based on an assessment of likelihood of occurrence in Table 7, 16 threatened flora have been attributed a moderate likelihood to occur within the SP2 Infrastructure that occurs within the non-certified land.

Table 7. Candidate threatened flora

Species name	Common name	BC Act listing status	EPBC Act listing status.	Survey months	Serious and Irreversible impact (SAII) candidate species	Habitat	Likelihood to occur	
							UD Urban Development Zone (certified)	SP2 Infrastructure zone within non-certified land
Acacia bynoeana	Bynoe's Wattle	Endangered	Vulnerable	All Year Round	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Moderate - Occurs in heath or dry sclerophyll forest on sandy soils.
Acacia gordonii	-	Endangered	Endangered	All Year Round	Not listed	Sandstone outcrops, ridgetops, or within 200 m North of the Great Western Highway	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low - Restricted to the north-west of Sydney, it has a disjunct distribution occurring in the lower Blue Mountains in the west, and in the Maroota/Glenorie area in the east.
Acacia prominens - endangered population	Gosford Wattle, Hurstville and Kogarah Local Government Areas	Endangered Population	Not Listed	-	Not listed	LGAs listed in the Determination (inclusive of Georges River LGA))	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	None – Subject Land is not within listed LGA.
Acacia pubescens	Downy Wattle	Vulnerable	Vulnerable	All Year Round	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Moderate
Caladenia tessellata	Thick Lip Spider Orchid	Endangered	Vulnerable	September to October	Yes listed as a SAII candidate	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low – no historic records near the Subject Land. If present, would likely occur towards the steeper gullies to the west of the Subject Land in grassy sclerophyll woodland. Targeted survey would be required during correct survey season.
Callistemon linearifolius	Netted Bottle Brush	Vulnerable	Not Listed	October to January	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low
Cynanchum elegans	White-flowered Wax Plant	Endangered	Endangered	All Year Round	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low
Darwinia biflora	-	Vulnerable	Vulnerable	All Year Round	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low – Not recorded historically within Appin.
Darwinia peduncularis	-	Vulnerable	Not Listed	All Year Round	Yes listed as a SAII candidate	Rocky areas - or within 50 m of rocky areas	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low – Not recorded historically within Appin.
Deyeuxia appressa	-	Endangered	Endangered	December	Yes listed as a SAII candidate	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low - A highly restricted NSW endemic known only from two pre-1942 records in the Sydney area. Was first collected in 1930 at Herne Bay, Saltpan Creek, off the Georges River, south of Bankstown. The species has not been recorded in over 60 years.
Dillwynia tenuifolia	-	Vulnerable	Not Listed	August to October	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low – not known to occur within the Appin region historically.

Species name	Common name	BC Act listing status	EPBC Act listing status.	Survey months	Serious and Irreversible impact (SAII) candidate species	Habitat	Likelihood to occur	
							UD Urban Development Zone (certified)	SP2 Infrastructure zone within non-certified land
Dillwynia tenuifolia - endangered population	Dillwynia tenuifolia, Kemps Creek	Endangered Population	Not Listed	August to October	Not listed	Bounded by Western Road, Elizabeth Drive, Devonshire Road and Cross Street, Kemps Creek in the Liverpool LGA	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	The Subject Land does not occur within the listed LGAs.
Epacris purpurascens var. *purpurascens*	-	Vulnerable	Not Listed	September to October	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Moderate – potential to occur at the Subject Land.
Eucalyptus benthamii	Camden White Gum	Vulnerable	Vulnerable	All Year Round	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low
Eucalyptus camfieldii	Camfield's Stringybark	Vulnerable	Vulnerable	All Year Round	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low
Grammitis stenophylla	Narrow-leaf Finger Fern	Endangered	Not Listed	All Year Round	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low – the species occurs in moist places, usually near streams, on rocks or in trees, in rainforest and moist eucalypt forest. Such habitat features are not located within the developable areas.
Grevillea juniperina subsp. *juniperina*	Juniper-leaved Grevillea	Vulnerable	Not Listed	All Year Round	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low
Grevillea parviflora subsp. *parviflora*	Small-flower Grevillea	Vulnerable	Vulnerable	August to November	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Moderate/High
Grevillea parviflora subsp. *supplicans*	-	Endangered	Not Listed	August to November	Not listed	North of the Great Western Highway	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low
Gyrostemon thesioides	-	Endangered	Not Listed	All Year Round	Yes listed as a SAII candidate	Sandy, alluvial or colluvial soil within 50 m of a water course	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low – the species has not been recorded for over 90 years in the Nepean River. Habitat for the species may be within the Nepean River, which is not located within the proposed development areas.
Haloragis exalata subsp. *exalata*	Square Raspwort	Vulnerable	Vulnerable	All Year Round	Not listed	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	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low – not known from the locality. The Subject Land does not contain coastal lakes. The Subject Land does contain creek banks and areas of human disturbance. A survey would need to rule out its presence despite low likelihood to occur.

Species name	Common name	BC Act listing status	EPBC Act listing status.	Survey months	Serious and Irreversible impact (SAII) candidate species	Habitat	Likelihood to occur	
							UD Urban Development Zone (certified)	SP2 Infrastructure zone within non-certified land
						Seepage zone or within 100 m within 100m		
Haloragodendron lucasii	-	Endangered	Endangered	All Year Round	Yes listed as a SAII candidate	Hornsby and Ku-Ring-gai LGAs	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	The Subject Land does not occur within the listed LGA.
Hibbertia puberula	-	Endangered	Not Listed	October to December	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low/Moderate
Hibbertia sp. Bankstown	-	Critically Endangered	Critically Endangered	September to December	Yes listed as a SAII candidate	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low – the species is currently known to occur in only one population at Bankstown Airport in Sydney's southern suburbs, in the Bankstown local government area.
Hibbertia spanantha	Julian's Hibbertia	Critically Endangered	Critically Endangered	October to November	Yes listed as a SAII candidate	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low – the species is only known from three small populations near the suburbs of Turramurra, Macquarie Park and Beecroft in Sydney's Northern Suburbs, and from a disjunct occurrence near Maroota in Sydney's north west. A survey would need to be completed during recommended survey month to confirm presence/absence.
Hibbertia superans	-	Endangered	Not Listed	July to December	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low - Occurs from Baulkham Hills to South Maroota in the northern outskirts of Sydney, where there are currently 16 known sites, and at one locality at Mount Boss, inland from Kempsey. A survey would need to be completed during recommended survey month to confirm presence/absence.
Hygrocybe anomala var. *ianthinomarginata*	-	Vulnerable	Not Listed	May to June	Yes listed as a SAII candidate	Creeks or drainage lines or within 500 m Semi-permanent /ephemeral wet areas; or within 500 m Swamps; or within 500 m Waterbodies; or within 500 m	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low - Known from the type locality, Lane Cove Bushland Park, Lane Cove and from other locations in the Sydney regional including Royal National Park, Chatswood, Castle Hill and the Blue Mountains (Springwood). Occurs in gallery warm temperate forests dominated by Lilly Pilly (*Acmena smithii*), Grey Myrtle (*Backhousia myrtifolia*), Cheese Tree (*Glochidion ferdinandi*) and Sweet Pittosporum (*Pittosporum undulatum*). Such species association is not located within the developable areas of the Subject Land.
Lasiopetalum joyceae	-	Vulnerable	Vulnerable	September to November	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low - Has a restricted range occurring on lateritic to shaley ridgetops on the Hornsby Plateau south of the Hawkesbury River. It is currently known from 34 sites between Berrilee and Duffys Forest.

Species name	Common name	BC Act listing status	EPBC Act listing status.	Survey months	Serious and Irreversible impact (SAII) candidate species	Habitat	Likelihood to occur	
							UD Urban Development Zone (certified)	SP2 Infrastructure zone within non-certified land
Leucopogon exolasius	Woronora Beard-heath	Vulnerable	Vulnerable	August to September	Not listed	--	Known to occur in C2 zone as shown on Figure 7. High potential to occur. Assessed as part of the CPCP.	Known to occur in C2 zone as shown on Figure 7. High potential to occur.
Leucopogon fletcheri subsp. *fletcheri*	-	Endangered	Not Listed	August to September	Not listed	Slopes nearby rocky areas or within 50 m Rocky areas; Weathered laterite over sandstone on sandstone ridges, outcrops	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low/Moderate
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	Endangered Population	Not Listed	-	Not listed	Blacktown, Camden, Campbelltown, Canterbury-Bankstown, Cumberland, Fairfield, Liverpool and Penrith LGAs (as amended from the Determination))	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Subject Land is not a listed LGA.
Melaleuca deanei	Deane's Paperbark	Vulnerable	Vulnerable	All Year Round	Yes listed as a SAII candidate	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low/Moderate
Persicaria elatior	Tall Knotweed	Vulnerable	Vulnerable	December to May	Not listed	Semi-permanent/ephemeral wet areas; or within 50 m Swamps; or within 50 m Waterbodies; including Wetlands, or within 50 m	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Unlikely to occur within the development land. May have habitat along the Nepean River.
Persoonia bargoensis	Bargo Geebung	Endangered	Vulnerable	All Year Round	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Unlikely. The species is not known to occur outside of the Bargo / Tahmoor. Is likely to have been detected during DPE surveys given the species is relatively conspicuous.
Persoonia glaucescens	Mittagong Geebung	Endangered	Vulnerable	January to March	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Moderate
Persoonia hirsuta	Hairy Geebung	Endangered	Endangered	All Year Round	Yes listed as a SAII candidate	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low /moderate
Persoonia mollis subsp. *maxima*	-	Endangered	Endangered	All Year Round	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low

Species name	Common name	BC Act listing status	EPBC Act listing status.	Survey months	Serious and Irreversible impact (SAII) candidate species	Habitat	Likelihood to occur	
							UD Urban Development Zone (certified)	SP2 Infrastructure zone within non-certified land
Persoonia nutans	Nodding Geebung	Endangered	Endangered	All Year Round	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Moderate
Pilularia novae-hollandiae	Austral Pillwort	Endangered	Not Listed	October to December	Yes listed as a SAII candidate	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low - In NSW, Austral Pillwort has been recorded from suburban Sydney, Khancoban, the Riverina between Albury and Urana (including Henty, Walbundrie, Balldale and Howlong), Oolambeyan National Park near Carrathool and at Lake Cowal near West Wyalong. Austral Pillwort grows in shallow swamps and waterways, often among grasses and sedges. It is most often recorded in drying mud as this is when it is most conspicuous.
Pimelea curviflora var. *curviflora*	-	Vulnerable	Vulnerable	October to March	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low/Moderate – the species is associated with shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands.
Pimelea spicata	Spiked Rice-flower	Endangered	Endangered	All Year Round	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Moderate – the species is associated with Grey Box communities (particularly Cumberland Plain Woodland variants and Moist Shale Woodland) and in areas of ironbark.
Pomaderris brunnea	Brown Pomaderris	Endangered	Vulnerable	August to October	Not listed	--	Recorded by DPE during the CPCP process as shown on Figure 7.	High
Pomaderris prunifolia - endangered population	P. prunifolia in the Parramatta, Auburn, Strathfield and Bankstown Local Government Areas	Endangered Population	Not Listed		Not listed	LGAs in the Determination listing	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	None – Subject Land does not occur within listed LGA.
Pterostylis saxicola	Sydney Plains Greenhood	Endangered	Endangered	October	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low / Moderate - Most commonly found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The vegetation communities above the shelves where *Pterostylis saxicola* occurs are sclerophyll forest or woodland on shale/sandstone transition soils or shale soils. Targeted survey would be required to confirm presence/absence of the species.
Pultenaea pedunculata	Matted Bush-pea	Endangered	Not Listed	September to November	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low – The species was not detected during DPE field surveys. The species is relatively conspicuous regardless of survey month.
Rhizanthella slateri	Eastern Australian Underground Orchid	Vulnerable	Endangered	September to November	Yes listed as a SAII candidate	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low – Highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur

Species name	Common name	BC Act listing status	EPBC Act listing status.	Survey months	Serious and Irreversible impact (SAII) candidate species	Habitat	Likelihood to occur	
							UD Urban Development Zone (certified)	SP2 Infrastructure zone within non-certified land
								above ground. Therefore usually located only when the soil is disturbed. A targeted survey would need to be completed to confirm presence/absence of the species.
Tetratheca glandulosa	-	Vulnerable	Not Listed	August to November	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low - Restricted to the following Local Government Areas: Baulkham Hills, Gosford, Hawkesbury, Hornsby, Ku-ring-gai, Pittwater, Ryde, Warringah, and Wyong. Regardless targeted survey would be required as per the BAM.
Thesium australe	Austral Toadflax	Vulnerable	Vulnerable	November to February	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low/medium – targeted survey required to confirm presence/absence.
Wahlenbergia multicaulis - endangered population	Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield	Endangered Population	Not Listed	October	Not listed	-	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	None – Subject land does not occur within listed LGA.
Zieria involucrata	-	Endangered	Vulnerable	All year round	Not listed	--	Not recorded by DPE during the CPCP field survey process. No known records on BioNet within the certified land. Assessed as part of the CPCP.	Low

2.6 Matters of National Environmental Significance - flora

A total of 42 threatened flora were generated by the Protected Matters Search Tool (PMST) (DAWE 2022) search for the Subject Land (Appendix 1).

Each of the species from the PMST have been assessed in terms of their likelihood to occur within the Subject Land and incorporated to the candidate species list for assessment where there is a high or known likelihood to occur (Appendix 1).

As identified in Table 7, seven threatened flora listed on the EPBC Act have a moderate likelihood to occur within the SP2 Infrastructure zone located within non-certified land: *Acacia bynoeana* (Bynoe's Wattle), *Acacia pubescens* (Downy Wattle), *Epacris purpurascens* var. *purpurascens, Leucopogon exolasius* (Woronora Beard-heath), *Pimelea curviflora* var. *curviflora, Pimelea spicata* (Spiked Rice-flower) and *Pomaderris brunnea* (Brown Pomaderris).

The potential for these species to occur would need to be assessed in a Biodiversity Impact Assessment, which may be supported by a targeted field survey and/or expert report.

2.7 Fauna habitat

Fauna habitats identified in the Subject Land include:

- Riparian vegetation along Nepean River, which borders the west of the Subject Land. Other notable watercourses in the Subject Land include Ousedale Creek, Elladale Creek and Simpson Creek. These areas are likely to be used by native frogs, reptiles and water birds.
- Open forest, woodland and grassland, supporting canopy, shrub and ground layer vegetation. These areas are likely to be used as foraging and shelter habitat for local fauna, including arboreal mammals and native birds.
- Aquatic habitats associated with watercourses mentioned above. These creeks in the vicinity of the Subject Land support a consistent flow of water and provide habitat for local fauna, including birds, amphibians and reptiles.
- Microhabitats including hollow-bearing trees, leaf litter and fallen timber. These microhabitats occur throughout the native vegetation (PCTs) of the Subject Land with greater concentrations within the C2-Environmental Conservation zone.

2.8 Threatened fauna

Unlike threatened flora, the BAM categorises threatened fauna as either:

- 'ecosystem credit' fauna - the species is assumed to be present based on the PCTs present, and therefore no targeted survey is required.
- 'species credit' fauna – the species is associated with specific habitat requirements, and a survey or expert report is required to confirm the presence/absence of the species.
- Dual credit fauna – the species is regarded as an 'ecosystem credit' if specific habitat features (e.g. Hollow-bearing trees) are not present. This is guided by the Threatened Biodiversity Database Collection (TBDC).

Targeted surveys or an expert report are required for threatened fauna identified by BAM-C, and for species deemed to have a high potential or known occurrence from database searches. These species are referred to as 'candidate species'. A total of 29 threatened fauna species have been considered as candidate species for this assessment (Table 8).

Threatened fauna field survey has been completed by ecologists engaged by DPE in 2019 as part of the CPCP across the certified land (Biosis & OLEC 2020).

The DPE survey effort recorded only one threatened fauna species (Little Lorikeet) as shown on Figure 7. The Little Lorikeet is regarded as an 'ecosystem credit species'.

Threatened fauna records obtained from BioNet include the following within the Subject Land: Cumberland Plain Land Snail, Grey-headed Flying Fox, Dusky Woodswallow, Powerful Owl, Large Bent-winged bat, Koala, Southern Myotis and Varied Sittella. Of these species, the Cumberland Plain Land Snail, Koala and Southern Myotis are regarded as 'species credit fauna'. Both the Grey-headed Flying-fox and Powerful owl are regarded as 'dual credit' fauna and are only regarded as a 'species credit' if important habitat is present within the Subject Land (Table 8). Most of the records are contained with the C2 Environmental Conservation zone.

No targeted threatened fauna survey has been completed within the non-certified lands which encompasses portions of the SP2 Infrastructure (Figure 4).

To assist in the preparation of this Biodiversity Assessment we have attributed a likelihood of occurrence for the candidate listed threatened fauna has been attributed to both the UD Urban Development Zone that is certified; and the SP2 Infrastructure that occurs within the non-certified land (Table 8).

Based on an assessment of likelihood of occurrence in Table 8, 14 candidate threatened fauna have been attributed to a moderate or high likelihood to occur within the SP2 Infrastructure that occurs within the non-certified land. Notwithstanding, targeted surveys/expert reports would need to be completed for all candidate species to accompany a biodiversity impact assessment. Threatened species with a moderate to high likelihood to occur include: Bush Stone-curlew, Gang-gang Cockatoo, Glossy Black-Cockatoo, Large-eared Pied Bat, Cumberland Plain Land Snail, Little Bent-winged Bat, Large Bent-winged Bat, Southern Myotis, Barking Owl, Powerful Owl, Koala, Red-crowned Toadlet, Masked Owl and Sooty Owl.

Table 8: Candidate threatened fauna

Species name	Common name	BC Act listing status	EPBC Act listing status	Habitat requirements as per the TBDC	UD Urban Development Zone (certified)	SP2 Infrastructure within non-certified land
Anthochaera phrygia	Regent Honeyeater	Critically Endangered	Critically Endangered	As per mapped areas	Species assessed during CPCP process.	Not mapped as an important area in the BAM. Therefore not considered further.
Burhinus grallarius	Bush Stone-curlew	Endangered	Not Listed	Fallen/standing dead timber including logs	Species assessed during CPCP process.	Moderate likelihood for the species to occur - to be confirmed with field survey/expert assessment.
Callocephalon fimbriatum	Gang-gang Cockatoo	Vulnerable	Not Listed	Hollow bearing trees - Eucalypt tree species with hollows greater than 9 cm diameter	Species assessed during CPCP process.	Moderate likelihood for the species to occur - to be confirmed with field survey/expert assessment. Previously recorded in locality.
Callocephalon fimbriatum - endangered population	Gang-gang Cockatoo population in the Hornsby and Ku-ring-gai Local Government Areas	Endangered Population	Not Listed	Hornsby and Ku-ring-gai LGAs	Species assessed during CPCP process.	Not applicable as not located in LGA.
Calyptorhynchus lathami	Glossy Black-Cockatoo	Vulnerable	Not Listed	Hollow bearing trees - Living or dead tree with hollows greater than 15cm diameter and greater than 8m above ground	Species assessed during CPCP process.	Moderate likelihood for the species to occur - to be confirmed with field survey/expert assessment.

Species name	Common name	BC Act listing status	EPBC Act listing status	Habitat requirements as per the TBDC	UD Urban Development Zone (certified)	SP2 Infrastructure within non-certified land
Cercartetus nanus	Eastern Pygmy-possum	Vulnerable	Not Listed	--	Species assessed during CPCP process.	Low likelihood to occur which would need to be confirmed with field survey/expert assessment.
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	Vulnerable	Cliffs -Within two kilometres of rocky areas containing caves, overhangs, escarpments, outcrops, or crevices, or within two kilometres of old mines or tunnels	Species assessed during CPCP process.	High likelihood to forage within the area.
Haliaeetus leucogaster	White-bellied Sea-Eagle	Vulnerable	Not Listed	Living or dead mature trees within suitable vegetation within 1km of a rivers, lakes, large dams or creeks, wetlands and coastlines	Species assessed during CPCP process.	Low likelihood to occur which would need to be confirmed with field survey/expert assessment.
Heleioporus australiacus	Giant Burrowing Frog	Vulnerable	Vulnerable	--	Species assessed during CPCP process.	Low likelihood to occur given the lack of records and riparian habitat.
Hieraaetus morphnoides	Little Eagle	Vulnerable	Not Listed	Nest trees - live (occasionally dead) large old trees within vegetation)	Species assessed during CPCP process.	High likelihood to occur, however low likelihood for a nest to be within the proposed area and within relative close proximity – however would need to be

Species name	Common name	BC Act listing status	EPBC Act listing status	Habitat requirements as per the TBDC	UD Urban Development Zone (certified)	SP2 Infrastructure within non-certified land
						confirmed by a field survey.
Hoplocephalus bungaroides	Broad-headed Snake	Endangered	Vulnerable	The south west margins of the sub-region Rocky areas Including escarpments, outcrops and pogodas within the Sydney Sandstone geologies	Species assessed during CPCP process.	Low likelihood based on previous records, and lack of suitable habitat.
Lathamus discolor	Swift Parrot	Endangered	Critically Endangered	As per mapped areas	Species assessed during CPCP process.	Not mapped as an important area in the BAM. Therefore not considered further.
Litoria aurea	Green and Golden Bell Frog	Endangered	Vulnerable	Semi-permanent/ephemeral wet areas; Within 1km of wet areas Swamps; Within 1km of swamp Waterbodies; Within 1km of waterbody	Species assessed during CPCP process.	Low likelihood based on the lack of records and associated water habitat.
Lophoictinia isura	Square-tailed Kite	Vulnerable	Not Listed	Nest trees	Species assessed during CPCP process.	Low likelihood for a nest to be within the proposed area and within relative close proximity – however would need to be confirmed by a field survey.
Meridolum corneovirens	Cumberland Plain Land Snail	Endangered	Not Listed	--	Species assessed in CPCP. Known to occur in the Subject Land based on previous records. Likely to be associated with	High likelihood to have habitat within Shale Sandstone Transition Forest and Cumberland Plain Woodland.

Species name	Common name	BC Act listing status	EPBC Act listing status	Habitat requirements as per the TBDC	UD Urban Development Zone (certified)	SP2 Infrastructure within non-certified land
					Cumberland Plain Woodland and Shale Sandstone Transition Forest.	
Miniopterus australis	Little Bent-winged Bat	Vulnerable	Not Listed	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	Species assessed during CPCP process.	High likelihood to forage. Breeding habitat is unlikely.
Miniopterus orianae oceanensis	Large Bent-winged Bat	Vulnerable	Not Listed	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	Species assessed during CPCP process.	High likelihood to forage in the area. Breeding habitat is unlikely.
Myotis macropus	Southern Myotis	Vulnerable	Not Listed	Hollow bearing trees; Within 200 m of riparian zone Other; Bridges, caves or artificial structures within 200 m of riparian zone Waterbodies; This include rivers, creeks, billabongs, lagoons, dams and other waterbodies on or within 200m of the site	Species assessed in CPCP. Known to occur within the Subject Land based on BioNet records.	High likelihood to forage in the area. The species has been previously recorded in the Subject Land (BioNet).
Ninox connivens	Barking Owl	Vulnerable	Not Listed	Hollow bearing trees; Living or dead trees with hollows greater than 20 cm	Species assessed during CPCP process.	Moderate likelihood for the species to

Species name	Common name	BC Act listing status	EPBC Act listing status	Habitat requirements as per the TBDC	UD Urban Development Zone (certified)	SP2 Infrastructure within non-certified land
				diameter and greater than 4m above the ground		occur - to be confirmed with field survey/expert assessment.
Ninox strenua	Powerful Owl	Vulnerable	Not Listed	Hollow bearing trees; Living or dead trees with hollow greater than 20cm diameter;	Species assessed in CPCP. Known to occur within the Subject Land based on BioNet records	High likelihood for the species to occur, however a moderate likelihood for the suitable tree hollow requirements to be present. To be confirmed with field survey/expert assessment.
Pandion cristatus	Eastern Osprey	Vulnerable	Not Listed	Presence of stick-nests in living and dead trees (>15m) or artificial structures within 100m of a floodplain for nesting)	Species assessed during CPCP process.	Low likelihood to occur however would need to be confirmed via survey / expert report.
Petauroides volans	Greater Glider	Not Listed	Vulnerable	Hollow bearing trees	Species assessed during CPCP process.	Low likelihood to occur however would need to be confirmed via survey / expert report.
Petaurus norfolcensis	Squirrel Glider	Vulnerable	Not Listed	--	Species assessed during CPCP process.	Low likelihood to occur however would need to be confirmed via survey / expert report.

Species name	Common name	BC Act listing status	EPBC Act listing status	Habitat requirements as per the TBDC	UD Urban Development Zone (certified)	SP2 Infrastructure within non-certified land
Phascolarctos cinereus	Koala	Vulnerable	Vulnerable	Areas identified via survey as important habitat (see comments))	Species assessed in CPCP. Known to occur in Subject Land.	High – protected Koala corridor.
Pommerhelix duralensis	Dural Land Snail	Endangered	Endangered	--	Species assessed during CPCP process.	Low likelihood to occur based on geographic location.
Pseudophryne australis	Red-crowned Toadlet	Vulnerable	Not Listed	--	Species assessed during CPCP process.	High likelihood to occur within drainage depressions.
Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Vulnerable	Breeding camps	Species assessed in CPCP. Known to occur within the Subject Land based on BioNet records	High likelihood to foraging, however camp sites are unlikely to occur.
Tyto novaehollandiae	Masked Owl	Vulnerable	Not Listed	Hollow bearing trees -Living or dead trees with hollows greater than 20cm diameter	Species assessed during CPCP process.	Moderate likelihood for the species to occur - to be confirmed with field survey/expert assessment.
Tyto tenebricosa	Sooty Owl	Vulnerable	Not Listed	Caves or clifflines/ledges|Hollow bearing trees; Living or dead trees with hollows greater than 20cm diameter	Species assessed during CPCP process.	Moderate likelihood for the species to occur - to be confirmed with field survey/expert assessment.

2.9 Threatened fauna – Koala

The Subject Land occurs within the area mapped as the region of the Southern Sydney koala population, which is a population located near and within the Wilton and Greater Macarthur growth areas.

The DPE mapped the extent of the population in 2018 and has recognised the connectivity importance of the population throughout the region. The Koala corridors mapped as part of the CPCP within the Subject Land, are shown on Figure 7.

As indicted in Table 9, a total of 443.84 ha of Koala habitat is mapped within the Subject Land. Approximately 9.56 ha of the Koala corridor is located within the proposed SP2 Infrastructure zone to support the proposed East-West Connection Road and North-South Connection.

The Proponent proposes bridge locations at the Nepean River crossing and the Ousedale Creek Upper Canal to facilitate the movement of Koalas along the mapped Koala corridors.

Potential impacts to the Koala corridor are discussed in section 4.4.1

Table 9. Area of important Koala corridor within the Subject Land

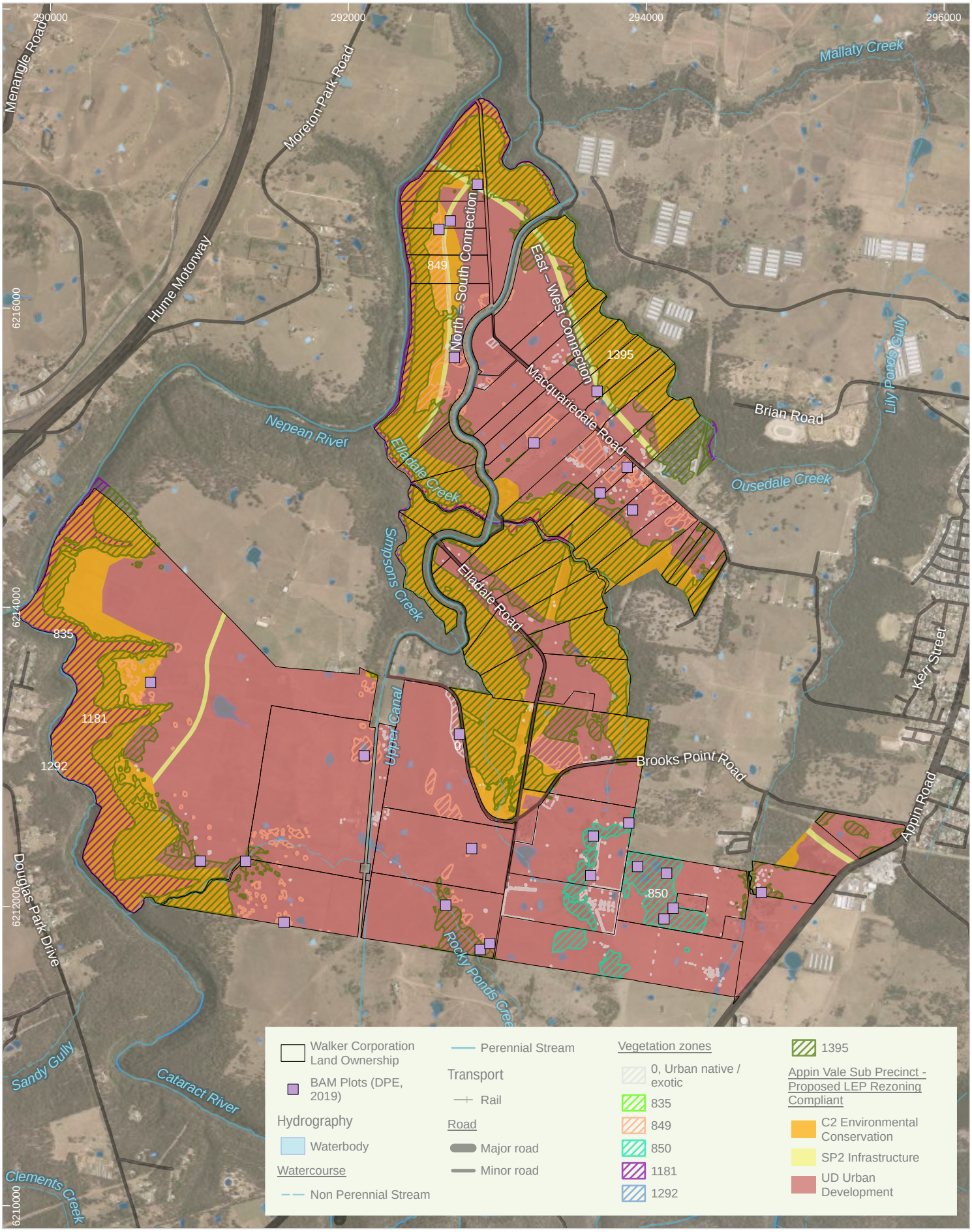
CPCP	Koala mapping	Proposed rezoning			
		C2 Environmental Conservation	SP2 Infrastructure	UD Urban Development	Total
Avoided land	Potential Restoration for Protected Koala Habitat	48.22	4.46	0	52.68
	Protected Koala Habitat	385.45	4.42	0	389.87
Certified - urban capable land	Potential Restoration for Protected Koala Habitat	0	0.28	0.05	0.33
	Protected Koala Habitat	0	0.40	0.00	0.4
Excluded land	Potential Restoration for Protected Koala Habitat	0.08	0.00	0.00	0.08
	Protected Koala Habitat	0.48	0.00	0.00	0.48
Total		**434.23**	**9.56**	**0.05**	**443.84**

2.10 Matters of National Environmental Significance – fauna

A total of 33 threatened fauna were generated by the PMST search for the Subject Land (Appendix 1).

Each of the species from the PMST have been assessed in terms of their likelihood to occur within the Subject Land and incorporated to the candidate species list for assessment where there is a high or known likelihood to occur.

As identified in Table 8 and Appendix 1, the following threatened fauna listed on the EPBC Act have a moderate or higher likelihood to occur within the SP2 Infrastructure zone that occurs within non-certified land: Gang-gang Cockatoo, Glossy Black-Cockatoo, White-throated Needletail, Swift Parrot, Large-eared Pied Bat, Koala, Grey-headed Flying-fox. The potential for these species to occur would be assessed in the Biodiversity Impact Assessment.



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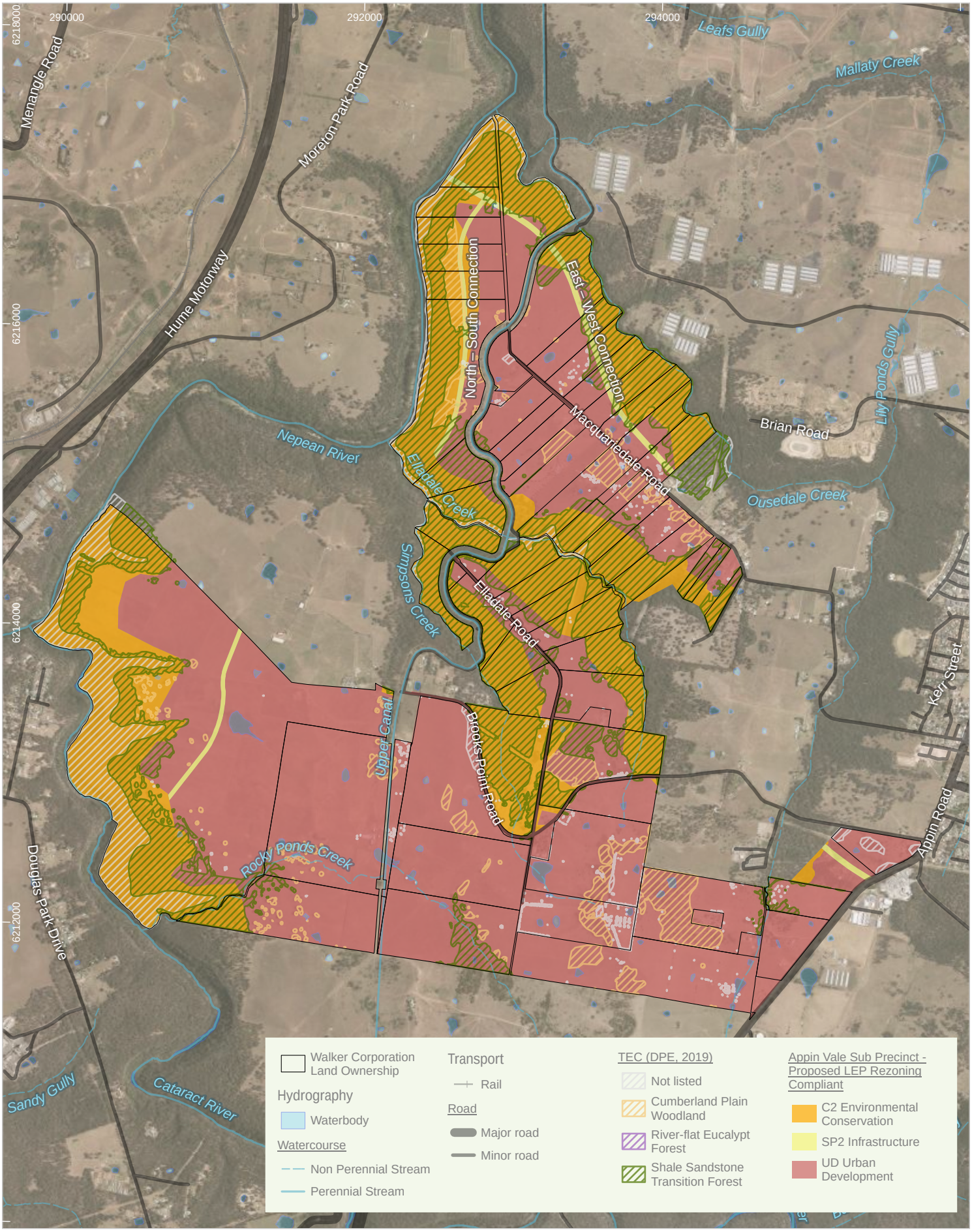
Vegetation

Appin (**Part**) Precinct - **Version 1 Plan**

Niche PM: Luke Baker
Niche Proj. #: 7320
Client: Walker Corporation

Figure 5



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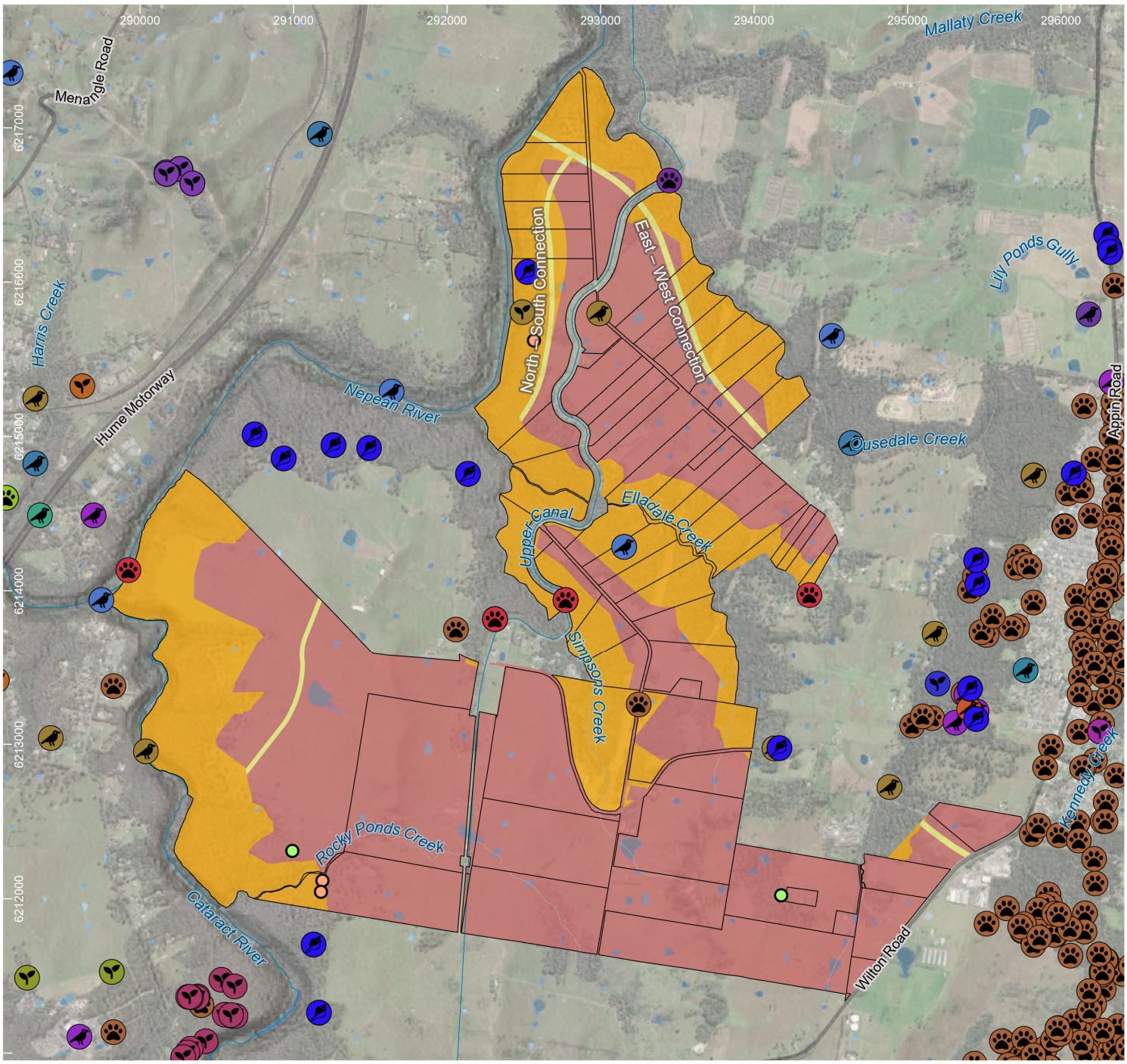
Threatened Ecological Communities

Appin **(Part)** Precinct - **Version 1 Plan**

Niche PM: Luke Baker
Niche Proj. #: 7320
Client: Walker Corporation

Figure 6



Walker Corporation Land Ownership

Threatened Species (DPE, 2019)
- Little Lorikeet
- *Pomaderris brunnea*

Hydrography
- Waterbody

Watercourse
- Non Perennial Stream
- Perennial Stream

Transport
- Rail

Road
- Major road

Gastropoda
- Cumberland Plain Land Snail (18)

Aves
- Black Falcon (1)
- Bush Stone-curlew (1)
- Dusky Woodswallow (9)
- Flame Robin (1)
- Little Eagle (2)
- Little Lorikeet (10)
- Scarlet Robin (1)
- Varied Sittella (7)
- White-bellied Sea-Eagle (3)
- White-throated Needletail (1)

Mammalia
- Eastern Coastal Free-tailed Bat (2)
- Greater Broad-nosed Bat (1)
- Grey-headed Flying-fox (6)
- Koala (218)
- Large Bent-winged Bat (2)
- Southern Myotis (15)
- Spotted-tailed Quoll (1)
- Yellow-bellied Sheathtail-bat (1)

Flora
- *Eucalyptus nicholii (1)*
- *Galium australe (1)*
- *Grevillea parviflora subsp. parviflora (15)*
- *Leucopogon exolasius (1)*
- *Persoonia bargoensis (2)*
- *Pimelea curviflora var. curviflora (2)*
- *Pimelea spicata (15)*
- *Pomaderris brunnea (1)*
- *Syzygium paniculatum (1)*

Appin Vale Sub Precinct - Proposed LEP Rezoning Compliant
- C2 Environmental Conservation
- SP2 Infrastructure
- UD Urban Development

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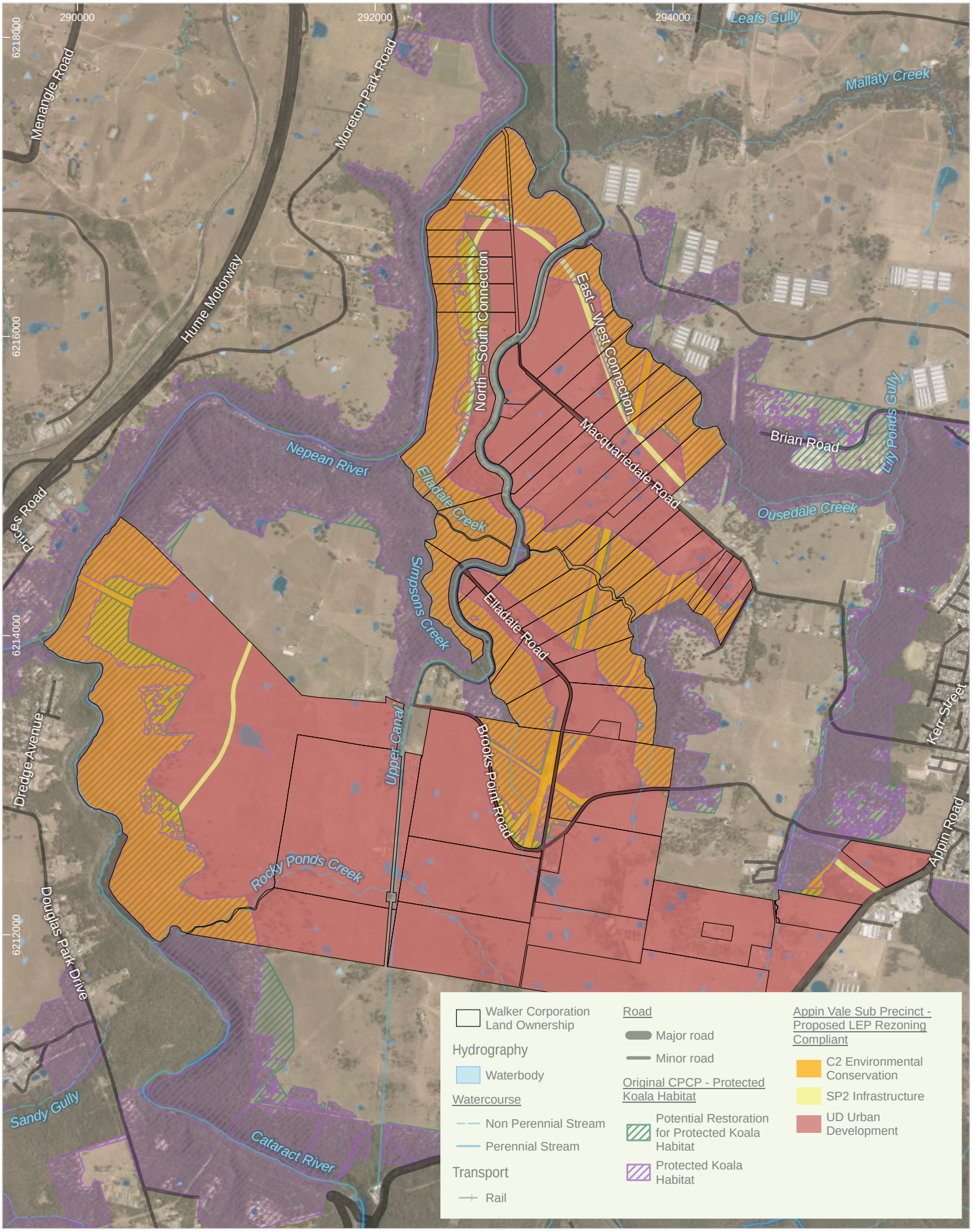
Threatened flora and fauna
Appin Vale Sub Precinct - Compliant Scheme

Niche PM: Luke Baker
Niche Proj. #: 7320
Client: Walker Corporation

Figure 7



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WGS 1984 Web Mercator

Koala corridors

Appin (**Part**) Precinct - **Version 1 Plan**

Niche PM: Luke Baker
Niche Proj. #: 7320
Client: Walker Corporation

Figure 8

3. Avoidance

3.1 Avoidance of biodiversity

The strategic planning process undertaken as part of the CPCP has aimed to locate and design certified-urban capable land in the nominated areas to avoid and minimise impacts on areas of high biodiversity value. The process and the avoidance criteria of biodiversity values is detailed in Appendix B of the CPCP.

The biodiversity impacts associated with the proposed UD Urban Development Zone, including the assessment of biodiversity avoidance, has therefore been assessed by the DPE (DPIE 2020e).

The Proponent proposes the SP2 Infrastructure zone as shown on Figure 3 to support the East-West Connection Road and the North-South Connection. This would result in 8.99 ha of CPCP Avoided land that would be developed for the road infrastructure.

An overview of the biodiversity impacts associated with this proposal are detailed in section 4. The Proponent are consulting with DPE regarding the proposal to align with the GMGA road infrastructure requirements.

The Proponent have stated that they have positioned the proposed SP2 Infrastructure zone on outskirts of the residential subdivision which provides the following benefits for the structure plan:

- APZ buffer between the Bushland and Residential Development;
- Koala Protection Corridor (fencing along the road) minimising human interaction into the C2 Environmental Protection land;
- Residential liveability is far greater having a community together rather than splitting the community by a large road corridor;
- Minimising large intersection treatments along the main road by only requiring connecting the southern side of the residential community to the road;
- Minimising residential crossing a major road to access amenities on the south;
- Noise pollution mitigation which only impacts one side of the road.

The Proponent would work in conjunction with DPE to further justify the proposal in respect to biodiversity impacts. This report has therefore not provided a detailed assessment of avoidance criteria as specified in the BAM given the on-going consultation between DPE and the Proponent in respect to the connecting road networks.

As stated in the CPCP, while the certified-urban capable land has been designated for urban development through the Plan, planning for essential infrastructure is in various stages. Additional, essential infrastructure development may therefore be needed outside certified-urban capable land to support growth over the next four decades and beyond.

As previously discussed in section 1.3, the proposed Orbital and arterial road network may classify as 'essential infrastructure' as defined in the CPCP. As such, the proposal would be assessed by DPE to comply with the CPCP '*Appendix A. Guidelines for essential infrastructure development*' and obtain all required NSW biodiversity approvals. This includes specific requirements to avoid, mitigate or offset impacts to MNES and other relevant EPBC Act matters.

4. Impact Assessment

Stage 2 of the BAM details the requirements for quantifying the direct and indirect impacts to PCTs and candidate threatened species. Residual impacts that cannot be avoided and minimised, are offset.

As discussed throughout this report, the UD Urban Development Zone has already been assessed for biodiversity impacts as part of the CPCP. The CPCP Assessment Report (Biosis & OLEC 2020) has assessed the direct, indirect, prescribed and cumulative impacts within the certified land.

A Biodiversity Impact Assessment associated with the proposed SP2 Infrastructure zone that occurs within non-certified land would need to be completed.

4.1 Direct impact to native vegetation and habitat

The area of direct impact to native vegetation associated with the proposed zoning is provided in Table 10. Approximately 4.29 ha of native vegetation may be directly impacted by the SP2 Infrastructure that occurs in non-certified land. It should be noted however that this may be an overestimate, as there would need to be a bridge constructed at the Nepean River which may avoid vegetation on the bank of the River.

Direct impacts associated with the proposed UD Urban Development zoning that occurs within the CPCP 'Excluded land' category would be subject to further assessment at the development application stage. Approximately 46.13 ha of native vegetation occurs within CPCP 'Excluded Land' (Table 11), most of which would be designated for Greening Open Space.

A biodiversity impact assessment would need to be completed for all direct impacts to native vegetation that occur outside of certified land in accordance with a relevant biodiversity impact assessment process.

Table 10. Potential direct impacts to native vegetation within non-certified land

PCT	Condition	SP2 Infrastructure East-West Connection Road	SP2 Infrastructure North – South Connection	Total impact
850 Grey Box - Forest Red Gum grassy woodland on shale	DNG	0	0.72	1.14
	Intact	0	0.42	
1395 Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest	DNG	0	0	3.15
	Intact	1.07	0	
	Scattered Trees	0	0	
	Thinned	2.08	0	
Total		**3.15**	**1.14**	**4.29**

Table 11. Vegetation that occurs within Excluded CPCP Land proposed as UD Urban Development Zone

PCT code	Condition	Area (ha)
849 Grey Box - Forest Red Gum grassy woodland on flats	DNG	0.02
	Scattered Trees	0.41
	Thinned	5.58
850 Grey Box - Forest Red Gum grassy woodland on shale	DNG	0.08
	Intact	14.40
	Scattered Trees	0.09
	Thinned	5.39
1395 Narrow-leaved Ironbark - Broad-leaved Ironbark - Grey Gum open forest	DNG	0.31
	Intact	9.01
	Scattered Trees	0.18
	Thinned	10.66
Total of native vegetation (ha)		**46.13**

4.2 Direct impact to threatened ecological communities

Approximately 4.29 ha of TEC may be directly impacted by the SP2 Infrastructure that is not certified (Table 12). This comprises of 1.14 ha of Cumberland Plain Woodland and 3.15 ha of Shale Sandstone Transition Forest.

Approximately 3.15 ha of TEC may be impacted by the proposed East-West Connection Road, and approximately 1.14 ha for the North-South Connection as shown in Table 12.

Both Shale Sandstone Transition Forest and Cumberland Plain Woodland are regarded as 'Serious and Irreversible' impact (SAII) candidates under the BC Act. A SAII is one that is likely to contribute significantly

to the risk of a threatened species or ecological community becoming extinct in accordance with the principles set out in clause 6.7(2) of the Biodiversity Conservation Regulation 2017 (BC Regulation). An assessment of the SAII would need to be completed in the biodiversity impact assessment for the proposal.

Table 12. Potential direct impact to threatened ecological communities within non-certified land

Threatened Ecological Community	Condition	SP2 Infrastructure East-West Connection Road	SP2 Infrastructure North – South Connection	Total impact
Cumberland Plain Woodland	DNG	0	0.72	**1.14**
	Intact	0	0.42	
Shale Sandstone Transition Forest	DNG	0	0	**3.15**
	Intact	1.07	0	
	Scattered Trees	0	0	
	Thinned	2.08	0	
Total		**3.15**	**1.14**	**4.29**

4.3 Direct impact to threatened flora

Direct impact to threatened flora within the certified land has already been assessed as part of the CPCP.

Based on an assessment of likelihood of occurrence in Table 7, 16 threatened flora have been attributed to a moderate (or higher) likelihood to occur within the SP2 Infrastructure zone and UD Urban Development Zone that is not certified, including: *Acacia bynoeana, Acacia pubescens, Epacris purpurascens* var. *purpurascens, Grevillea parviflora* subsp. *parviflora, Hibbertia puberula, Leucopogon exolasius, Leucopogon fletcheri* subsp. *fletcheri, Melaleuca deanei, Persoonia glaucescens, Persoonia hirsuta, Persoonia nutans, Pimelea curviflora* var. *curviflora, Pimelea spicata, Pomaderris brunnea, Pterostylis saxicola* and *Thesium australe*.

A threatened flora field survey and/or expert report would need to be completed to inform the biodiversity impact assessment within the SP2 Infrastructure zone which is not certified. The biodiversity impact assessment would also assess the impacts on threatened flora listed on the EPBC Act (Appendix 1).

4.4 Direct impact to threatened fauna

Impact to threatened fauna within the UD Urban Development Zone have already been assessed as part of the CPCP.

A total of 29 candidate threatened fauna would need to be assessed during a biodiversity impact assessment for the SP2 Infrastructure zone which is not certified. Of the candidate species, 14 threatened fauna have been attributed to a moderate (or higher) likelihood to occur (Table 8). Threatened fauna that have potential to occur within this area include: Bush Stone-curlew, Gang-gang Cockatoo, Glossy Black-Cockatoo, Large-eared Pied Bat, Cumberland Plain Land Snail, Little Bent-winged Bat, Large Bent-winged Bat, Southern Myotis, Barking Owl, Powerful Owl, Koala, Red-crowned Toadlet, Masked Owl and Sooty Owl.

A threatened fauna field survey and/or expert report would need to be completed to inform the biodiversity impact assessment within the SP2 Infrastructure zone which is not certified. The biodiversity impact assessment would also assess the impacts on threatened fauna listed on the EPBC Act (Appendix 1).

4.4.1 Direct impact to Koala

As discussed in section 2.9, approximately 9.56 ha of non-certified land associated with the proposed SP2 Infrastructure zone occurs within a mapped Koala corridor.

Factors that are likely to affect Koala usage of corridors include, but are not necessarily limited to:

- Width of the corridors (with wider corridors preferred);
    - The NSW Chief Scientist & Engineer (2021) recommended a minimum average Koala corridor width of 390 – 425 m, with a 30m buffer on either side where fenced, and wider to ~60m where fencing is not feasible.
- Value of vegetation within the corridor as Koala habitat (preferred areas would include vegetation on more fertile shale soils, mature vegetation with larger trees);
- Length of the corridor (with shorter length corridors preferred);
- Breaks or other restrictions to Koala movement within the corridors (with breaks or interruptions to movements minimised);
- Whilst Koalas can move across cleared paddocks, it is preferred that that corridors provide suitable foraging habitat. Thus, revegetation of cleared areas can also facilitate longer term Koala outcomes. To facilitate this revegetation or rehabilitation of cleared or degraded lands set aside for conservation should occur as early as possible, so as to allow trees and vegetation to establish.

In terms of the width of the Koala corridor, the SP2 Infrastructure does reduce the width of the Koala corridor, however it is not shortened to such an extent that the average corridor width is likely to be less than 425 m.

To minimise obstructions of the Koala corridor, the proponent proposed bridge locations at the Nepean River crossing and the Ousedale Creek Upper Canal to facilitate the movement of Koalas. The design of the bridge layout have not yet been developed, however it is envisaged that this would be done so with the input of a Koala specialist to ensure the Koala integrity of the corridor is maintained.

4.5 Indirect impacts

The construction and operation of infrastructure within the SP2 Infrastructure zone may have indirect or prescribed impacts in addition to the direct impacts on biodiversity.

The indirect impacts associated with the SP2 Infrastructure zoning would need to be formally assessed by DPE for the proposed East-West Connection Road and North-South Connection, and suitable mitigation measures documented within the impact assessment.

Indirect impacts are any impact that could adversely affect biodiversity values, such as native vegetation, TECs and threatened species habitat. Indirect impacts may also result from changes to land-use patterns, such as an increase in vehicular access and human activity.

The BAM (DPIE 2020) lists the following indirect impacts that are applicable to all development:

- Inadvertent impacts to adjacent habitat or vegetation
- Reduced viability of adjacent habitat due to edge effects
- Increased risk of starvation or exposure and loss of shade or shelter
- Loss of breeding habitat
- Removal and disturbance of rocks, including bush rock
- Erosion and sedimentation
- Air quality/dust emissions
- Weeds and pathogens and pest species.

The types of development that are proposed for the UD Urban Development Zone that have the potential to cause indirect impacts on biodiversity values are described in the CPCP, and include:

- Urban and industrial development in the nominated areas
- Infrastructure in the nominated areas
- Transport corridors.

The nature, extent and duration of the potential indirect impacts in relation to the UD Urban Development Zone and SP2 Infrastructure zoning are described broadly in Table 13.

Mitigation measures to avoid or minimise the indirect impacts are detailed in section 5.

Table 13. Indirect impacts

Indirect impact	Details
Reduction in surface water quality and changes to surface water flows	The development may lead to changes to hydrology and water quality. This is primarily related to: • Disruption to natural flows and processes • Increase of hard surfaces leading to an increased volume of water entering downstream waterways • Introduction of contaminants into surface water, such as nutrients, chemicals and sediment from urban and other development and land uses, including disturbance of soils/contaminated soils during construction.
Changes to groundwater	The development may affect groundwater quality, including from salinity and contamination. This is primarily related to: • Clearing for construction • Construction works involving large excavations • Diversion of surface water, including installation of buildings and hard surfaces.
Soil disturbance	The development may cause soil erosion and sedimentation and disturbance to contaminated soils, which can lead to changes in water quality. This is primarily related to: • Vegetation clearing • Construction works involving large excavations • The management of spoil during construction. The development may cause soil erosion and sedimentation and disturbance to contaminated soils, which can lead to changes in water quality. This is primarily related to: • Vegetation clearing • Construction works involving large excavations • The management of spoil during construction.
Spread of disease	The development may increase the risk of the spread of infection/disease. This is primarily related to: • Soil transportation on contaminated footwear, vehicles and machinery, and in residential garden establishment • Increased site visitation rates • Earthworks and activities conducted during construction • Increased surface water runoff.
Spread of weeds	The development under the Plan has the potential to increase the spread of invasive species and weeds. This is primarily related to: • New environmental conditions at the edges of developments such as altered light levels, windspeed, and temperature, that may facilitate the spread of weeds • Use of inappropriate species in landscaping and revegetation • Accidental dispersal of weed seeds and plant material • Altered fire regimes.

Indirect impact	Details
Predation/ competition / land degradation by pest/ domestic fauna	The development under the Plan has the potential to increase the spread of pest fauna and/or access to natural areas by domestic fauna, leading to increased predation and competition with native fauna. This is primarily related to: • Clearing that creates new movement pathways that can be used by pest fauna to expand their range • Clearing that changes conditions at the edges of habitat that favour pest fauna • Direct predation of native fauna by pest/domestic fauna • Pest fauna destroying habitat and spreading disease. Domestic animals in this context is primarily related to increased numbers of cats, dogs and rabbits.
Altered fire regimes and increased fire risk	The development has the potential to alter fire regimes and increase fire risk. This is primarily related to: • Arson or the accidental lighting of fires • Increased burns for hazard reduction to protect assets, particularly within Asset Protect Zones • Reduced burns in some areas due to risk to urban areas
Disturbance from increased public access to nature habitat areas	The development may increase human activity in the vicinity which can impact avoided lands, conservation lands. This is primarily related to: • Trampling of threatened flora species/habitat for threatened fauna species • Track creation • Bush rock removal and disturbance • Rubbish dumping and disturbance from associated clean-up activities • Timber collection, removal of dead wood • Illegal collection of threatened species • Dog walking • Recreational activities such as mountain-biking, four-wheel driving and fishing.
Fauna mortality and injury, fauna displacement and the introduction of barriers to fauna movement	The development may increase the likelihood of fauna mortality and fauna displacement, and will introduce barriers to fauna movement. This is primarily related to: • Direct mortality as a result of collisions with vehicles or new structures, shooting, poaching, or secondary poisoning during pest control • Displacement due to clearing for the development • Introduction of linear barriers such as fences, roads and railways, which can affect fauna movement and predation.
Fauna disturbance due to noise, dust or light	The development will increase noise, dust and light. This is primarily related to: • Clearing for the development • Construction activities, including use of heavy vehicles and machinery • Increased noise levels from traffic due to new roads or increased traffic on existing roads

Indirect impact	Details
	• Artificial light from urban and commercial areas, and along transport routes.
Inadvertent impacts on adjacent habitat or vegetation	The development may cause inadvertent impacts on adjacent habitat, vegetation or important habitat features, such as hollow bearing trees. This could occur during construction or operation and is primarily related to: • Impacts adjacent to construction sites • Road, trail and powerline maintenance • High frequency land management such as mowing and slashing or weed control.

4.6 Prescribed biodiversity impacts

Prescribed biodiversity impacts are impacts on biodiversity values in addition to, or instead of, impacts from clearing vegetation and/or loss of habitat. Prescribed additional biodiversity impacts (prescribed impacts) must be assessed as part of the BOS, as per clause 6.1 of the BC Regulation. Such prescribed impacts (including direct and indirect impacts) include(section 6 of the BAM, DPIE 2020):

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

Of the above prescribed impacts, the development with the UD Urban Development Zone and SP2 Infrastructure has the potential to result in prescribed impacts a), b), c), d) and f).

Prescribed impacts for the certified land have been assessed in the CPCP. The process is detailed in the CPCP Assessment Report (Biosis & OLEC 2020; DPIE 2020e).

Prescribed impacts that are likely to be associated with the East-West Connection Road and the North-South Connection are listed in Table 14. The assessment of prescribed impacts on threatened biodiversity within this area would be undertaken as part of a biodiversity impact assessment.

Mitigation measures that are applicable to the UD Urban Development Zone have been discussed in section 5.

Table 14. Prescribed impacts associated with proposal

Prescribed impact type	Associated potential direct impacts	Associated potential indirect impacts
Karst, caves, crevices, cliffs	Removal or destruction (e.g. cracking or collapse) of habitat	• Human disturbance • Noise or light disturbance
Rocks	Removal of habitat (rocks)	• N/A
Human-made structures	Removal of habitat (structures)	• Human disturbance • Noise or light disturbance
Non-native vegetation	Removal of habitat (non-native vegetation)	• Recreational use / disturbance • Weed invasion • Spread of plant/ animal disease • Pest animals/predation/ competition • Soil erosion/ sedimentation • Urban run-off (water quality)
Habitat connectivity/movement	Reduction in connectivity through the loss of stepping stone habitat	• Reduction in habitat connectivity and edge effects
Water bodies/hydrological processes	Removal of habitat (water bodies)	• Change in water flows/ quantity/ Urban run-off (water quality)
Vehicle strikes	Death of species individuals	• N/A

5. Mitigation measures

5.1 Mitigation measures

Indirect impacts associated with the proposed re-zoning are associated with the construction phase of the UD Urban Development Zone, and throughout the on-going usage of the land. The indirect impacts associated with the SP2 Infrastructure zoning would be formally assessed by DPE for the proposed East-West Connection Road and North-South Connection, and suitable mitigation measures documented within the impact assessment.

The types of mitigation measures and the processes to implement these mitigation measures are different for the types of development proposed under the CPCP. For the urban, industrial and agribusiness development, mitigation measures will be implemented through the NSW planning system. For infrastructure and transport corridors, mitigation measures will be implemented through the NSW environmental assessment and approval process current at the time of the development.

Mitigation measures would be implemented within:

- General environmental controls and the specific controls in the nominated areas Development Control Plans (DCPs). For example, State Environmental Planning Policies (SEPPs), Strategic land-use Plans, and Subdivision plans
- Environmental Controls
- Management Plans
- Asset Protection Zones
- Environmental Protection Zoning.

The mitigation measures would address the potential for residual risks to threatened biodiversity, which are listed in *Appendix E. Species and TEC-specific mitigation measures* of the CPCP (DPIE 2020). A summary of the mitigation measures from Appendix E that are applicable to the proposal are provided in Table 15.

Mitigation measures/protocols associated with biodiversity values would be addressed in a Biodiversity Management Plan(s) that would be implemented prior to construction, during construction, and operational phases of a Project. The Biodiversity Management Plan(s) would consist of management procedures to minimise impacts to surrounding biodiversity.

Key components to be incorporated into the management plans include:

Vegetation clearing protocol for construction activities

A vegetation clearing protocol would be incorporated into the Biodiversity Management Plan and would include the following:

- Prior to clearing of native vegetation, ecologists are to survey for ground-dwelling fauna and to remove any fauna/fauna habitat (nests or hollow logs) to adjacent habitat that would not be further disturbed.
- Prior to clearing all hollow-bearing trees are to be marked. Underscrubbing would then take place within the vegetation surrounding the hollow-bearing trees.
- After a 24-hour period, in the presence of an ecologist, the hollow-bearing trees would be gently felled.
- Any fauna displaced during clearing are to be captured if required to protect the animal from harm and relocated to previously identified, safe areas (fauna to be captured and handled only by personnel trained to do so), or otherwise promoted to move into adjoining areas outside the disturbance area.

- In an event that fauna are injured during clearing, the NSW Wildlife Information, Rescue and Education Service (WIRES) will be contacted to handle and collect for appropriate care and rehabilitation.

Employee Education and General Environmental Controls Employees and contractors would be educated on, and required to implement the following controls, to avoid or at least minimise potential environmental impacts associated with construction:

- Participate in a site induction including any site-specific environmental constraints, protocols, and safeguards.
- Minimise dust generation by minimising the extent and time that bare soil is exposed and by appropriate dust suppression.
- Procedures for the management of hydrocarbon and/or chemical spills throughout the Subject Land.
- Ensuring vehicles remain on designated roads and tracks and abide by site speed limits, through use of signposting and driver education during the induction process and in on-going Project discussions.
- Management and removal of all rubbish from the Subject Land.
- Observe no- go areas and limit of works.

Weed management

Weed management activities during the construction and operation will include:

- Management protocols for the identification of noxious or significant environmental weeds within areas to be cleared (to avoid transporting the weeds to C2 Environmental Protection zones or other parts of the Subject Land).
- Regular site inspections by qualified bushland regenerator.
- Regular weed control (weed spraying) on the edge development works during construction.

Fire management

Fire prevention and suppression during construction and operational activities to avoid impacts to biodiversity values.

Table 15. Mitigation measures (Appendix E. Species and TEC-specific mitigation measures)

Mitigation measure	Rationale for measure	Species	Implementation Mechanism (CPCP)	Approach to proposal
Habitat features and connectivity				
Retain large trees (including dead trees) (≥50cm DBH) during precinct planning where possible and avoid impacts to soil within the dripline of these trees during construction	Large trees within urban landscapes are likely to be important for the persistence of several species within the subregion. Microbats benefit directly through roosting opportunities and indirectly through foraging opportunities. Flying-foxes and nectivorous birds benefit directly through foraging opportunities (high volumes of nectar). Owls and raptors benefit indirectly through large trees providing habitat for prey species.	Microbats: Southern Myotis, Little Bent-winged Bat, Eastern Coastal Freetailed Bat, Large Bent-winged Bat, Yellow-bellied Sheathail-bat, Eastern False Pipistrelle, Greater Broad-nosed Bat. Flying-foxes and nectivorous birds: Grey-headed Flying fox, Regent Honeyeater, Swift Parrot, Little Lorikeet, Painted Honeyeater, and Black-chinned Honeyeater. Owls and raptors: Barking Owl, Powerful Owl, Masked Owl, Little Eagle, White-bellied Sea Eagle, Square tailed Kite, Spotted Harrier.	DCP; Guidelines for Infrastructure assessment including state significant development and Part 5 activities under EP&A Act	• Retainment of large trees where possible during precinct planning. • Surrounding C2 Environmental Protection and other retained land would be sufficiently demarcated and secured during construction and operation to prevent impacts to retained native vegetation.
Retain areas of high density Proteaceae shrubs where possible, particularly along riparian corridors.	Proteaceae shrubs such as banksias are a favoured foraging resource for the species and the species is likely to use riparian corridors as habitat or for moving between other areas of suitable habitat.	Eastern Pygmy possum	DCP; Guidelines for infrastructure Assessment including state significant development and Part 5 activities under EP&A Act.	• Retainment of C2 Environmental Protection land as indicated on Figure 3. Retainment includes riparian vegetation. • Proteaceae shrubs used in landscaping design

Mitigation measure	Rationale for measure	Species	Implementation Mechanism (CPCP)	Approach to proposal
				where possible and practical.
Undertake preconstruction surveys prior to removal or disturbance (seasonally dependent, before torpor) to human made structures to ensure any roosting habitat for microbat species including mine shafts, storm water tunnels, old or derelict buildings, bridges and culverts are retained where possible	Minimises the potential impacts of urban development to human-made structures that may be used by microbats for roosting or breeding	Eastern Coastal Freetailed Bat Little Bent-winged Bat Large Bent-winged Bat Southern Myotis Yellow-Bellied Sheathtail-Bat	DCP; Guidelines for infrastructure Assessment including state significant development and Part 5 activities under EP&A Act.	• Pre-clearing assessment completed as specified in Biodiversity Management Plan. • Management protocol to be developed with suitability qualified ecologist.
Pest and domestic animals				
Modify pest control techniques implemented during construction and operation of the development and under the pest control strategy to reduce the risk of secondary poisoning (e.g. from Pindone or second-generation rodenticides)	There is a risk of pest control measures causing secondary poisoning of raptors.	White-bellied Sea Eagle Little Eagle Square-tailed kite Spotted Harrier	Nominated areas: DCP; Guidelines for infrastructure assessment including state Significant development and Part 5 activities under EP&A Act Strategic Conservation area: Pest animal Implementation strategy.	• Implement pest management plan during construction and operation.
Where permitted and appropriate, contain domestic cats and dogs in new residential areas during operation of the development at the	Increased numbers of domestic cats and dogs associated with urban development increases the threat of predation to native animals.	Eastern Pygmy possum Spotted-tailed Quoll	DCP	• Implement pest management plan during construction and operation. • Domestic animals excluded from C2

Mitigation measure	Rationale for measure	Species	Implementation Mechanism (CPCP)	Approach to proposal
urban/bushland interface consistent with relevant Council guidelines.				Environmental Conservation areas as consistent with Council guidelines. • Pest control within C2 Environmental Conservation Area as required.
Human disturbance				
Establish minimum setbacks for urban development around flying fox camps	Minimises disturbance to known populations	Grey-headed Flying-fox	DCP	• Grey-headed Flying-fox camps are not known to occur within the Subject Land.
Disease				
Incorporate best practice site hygiene protocols to manage the potential spread of pathogens, such as Phytophthora and Myrtle Rust within or adjacent to potential habitat for relevant species.	Minimises the risk of the spread of pathogens due to construction activities adjacent to potential habitat for the species.	Greater Glider	DCP Guidelines for infrastructure assessment including state significant development and Part 5 activities under EP&A Act	• Vehicle wash-down procedures to be implemented where possible and practical. Procedures to be included in Biodiversity Management Plan for the construction phase if entering C2 Environmental Conservation Areas. • Exclusions and access protocols within C2 Environmental Conservation land
Other				

Mitigation measure	Rationale for measure	Species	Implementation Mechanism (CPCP)	Approach to proposal
Consult with relevant land managers to implement critical actions for Cumberland Plain Land Snail under the Save our Species program (EES, 2020) on public land adjacent to urban development during construction and operation of the development, taking into account relevant guidance in the Weed Control Implementation Strategy and the Fire Management Strategy.	Minimises indirect impacts to Cumberland Plain Land Snail adjacent to urban capable land	Cumberland Plain Land Snail Key indirect impacts/threats to be managed for this species are: • Weed invasion • Inappropriate fire regimes • Removal of fallen logs for firewood Slashing of habitat	Consultation with local councils and other public agencies Weed Control Implementation Strategy Fire Management Strategy	• Walker Corporation would consult with relevant agencies to implement suitable asset protection zones during precinct planning.
Implement 'open structure design' when designing structures such as roads adjacent to known populations of Cumberland Plain Land Snail where possible, consistent with the critical actions for this species under the Save our Species program (EES, 2020)	Development in the nominated areas may isolate patches of habitat. This action is consistent with a critical action for this species under the Save our Species program (EES, 2020).	Cumberland Plain Land Snail	Consultation with local councils and other public agencies	• Walker Corporation would consult with relevant agencies to implement suitable design during precinct planning.
Mitigation measures to address residual risks to threatened flora				
Weed invasion				
Implement mitigation measures to manage weeds for flora populations and habitat adjacent to major	Minimises indirect impacts to flora populations and habitat adjacent to major infrastructure corridors	*Pultenaea pedunculata*	DCP Guidelines for infrastructure assessment including state	• Walker Corporation would implement weed control measures during construction and

Mitigation measure	Rationale for measure	Species	Implementation Mechanism (CPCP)	Approach to proposal
infrastructure corridors during construction and operation of the development, taking into account relevant guidance in the Weed Control Implementation Strategy.			significant development and Part 5 activities under the EP&A Act Weed Control Implementation Strategy	operation. The Management of weeds during construction would be detailed in the Biodiversity Management Plan. • *Pultenaea pedunculata* was not recorded during the DPE surveys within the certified land.
Altered fire regime				
Consult with land managers of land containing known populations or habitat for relevant species to mitigate indirect impacts from fire during construction and operation of the development, taking into account guidance in the Fire Management Strategy.	Minimises indirect impacts to flora populations and habitat adjacent to urban capable land.	*Pultenaea pedunculata;* *Persoonia bargoensis*	Consultation with local councils and other public agencies Fire Management Strategy	• Walker Corporation would consult with relevant agencies to implement suitable asset protection zones during precinct planning.
Human disturbance				
Consult with land managers of land containing known populations or habitat for relevant species to mitigate indirect impacts from human disturbance during construction and operation of the development, including controlling public	Minimises indirect impacts to flora populations and habitat adjacent to urban capable land.	*Persoonia bargoensis* *Pultenaea pedunculata* *Genoplesium baueri* (important population no. 21) *Persoonia bargoensis* *Melaleuca deanei* *Pterostylis saxicola*	Consultation with local councils and other public agencies	• Walker Corporation would implement weed control measures during construction and operation. The Management of weeds during construction would be detailed in the

Mitigation measure	Rationale for measure	Species	Implementation Mechanism (CPCP)	Approach to proposal
access, managing maintenance activities such as mowing and slashing, and managing rubbish dumping.				Biodiversity Management Plan. • *Pomaderris pedunculata, P. bargoensis, Melaleuca deanei, Ptyerostylis hunteriana* were not recorded by DPE within the certified land. • Demarcation of Environment protection areas. • Fencing, fence repair, and locked gates to secure environmental protection areas. • Limit access to sensitive habitat features within environmental protection area.
Disease				
Incorporate best practice site hygiene protocols to manage the potential spread of pathogens, such as Phytophthora and Myrtle Rust adjacent to potential habitat for relevant species.	Minimises the risk of the spread of pathogens due to construction activities adjacent to potential habitat for the species.	*Persoonia bargoensis*	DCP Guidelines for infrastructure assessment including state significant development and Part 5 activities under EP&A Act.	• Vehicle wash-down procedures to be implemented where possible and practical. Procedures to be included in Biodiversity Management Plan for the construction phase if entering C2 Environmental Conservation Areas. • Exclusions and access protocols within C2

Mitigation measure	Rationale for measure	Species	Implementation Mechanism (CPCP)	Approach to proposal
				Environmental Conservation land • Exclusions and access protocols within environmental protected land.
Mitigation measures to address residual risks to threatened ecological communities				
Incorporate best practice site hygiene protocols to manage the potential spread of pathogens, such as Phytophthora and Myrtle Rust adjacent to potential habitat for relevant TECs.	Minimises the risk of the spread of pathogens due to construction activities for urban development or major infrastructure corridors adjacent to TECs.	Shale Sandstone Transition Forest (NSW and Cth)	DCP Guidelines for infrastructure assessment including state significant development and Part 5 activities under EP&A Act.	• Vehicle wash-down procedures to be implemented where possible and practical. Procedures to be included in Biodiversity Management Plan for the construction phase if entering C2 Environmental Conservation Areas. • Exclusions and access protocols within C2 Environmental Conservation land • Exclusions and access protocols within environmental protected land.

5.2 Mitigation measures for Koala

The CPCP includes a commitment to mitigate indirect impacts from urban, infrastructure and transport development on the Southern Sydney Koala population to best practice standards and in line with the Chief Scientist Koala Report.

A set of actions under the commitment specify how this will be done, including:

- Constructing exclusion fencing between important koala habitat and urban capable land in Wilton and Greater Macarthur Growth Area;
- Applying development controls within 60 m of koala habitat in accordance with the Koala Habitat Protection Guideline (DPIE 2022) (made under State Environmental Planning Policy (Koala Habitat Protection) 2019).

The commitment to mitigate indirect and prescribed impacts from urban, industrial, infrastructure and major infrastructure corridors development on the Southern Sydney koala population is listed as 'commitment 8' in the CPCP.

Mitigation measures that would be applied to the construction and operational phase of the UD Urban Development zone would include those mitigation measures listed in Table 16.

It is envisaged that the Koala specific mitigation measures associated with the East-West Connection Road and North-South Connection would be specified in the biodiversity impact assessment and associated management plan.

Table 16. Urban Development Zone – Koala specific mitigation measures

Koala impact	Proposed mitigation measure
Safeguard of habitat	All relevant project personnel and contractors will undergo environmental induction training before commencing work on site. Information to be addressed during this training will include: • Koala identification and location of habitat areas within the Subject Land (i.e. the C2 Environmental Conservation Area) • Procedures to be followed in the event that Koalas are found injured in the proximity of works areas. **Construction phase** The following mitigation measures will be implemented during construction of the UD Urban Development Zone: • Appointment of a Project Ecologist for the duration of clearing works to ensure conditions relating to biodiversity management of the site are fully implemented and complied with • Prepare and implement a Construction Environmental Management Plan • Demarcations of environmental protection areas prior to clearing activities commencing to minimise any inadvertent damage • Two-stage clearing protocol to be implemented as detailed in section 5.1.
Vehicle collisions	Traffic management measures to be implemented during construction, include: • Construction traffic to utilise clearly defined access and egress points to and from the development site that avoid retained Koala habitat areas • Construction traffic within the development site to keep to designated routes where possible • Parking and equipment and material laydown areas to be positioned away from C2 Environmental Conservation where possible

Koala impact	Proposed mitigation measure
	• Construction traffic is to adhere to construction zone speed limits of 20 km/h across the site • Demarcation of habitat to be installed prior to site works commencing to delineate the limit of areas impacted by the works and accessible by construction traffic. During the construction, it is recommended that the potential for Koala road strike and to increase driver and community awareness be conveyed by: • Tool box talks and site induction • 'Koala Warning Signs' dispersed throughout the road network where reasonable interaction may occur.
Attacks by feral and domestic dogs	Dog attacks are a threat to Koalas that are closely associated with urban expansion, with exposure to the threat increasing as land adjacent to Koala habitat is developed and occupied. Additionally, attacks by dogs are likely to be more common during the koala breeding season as this is when koalas are more active and more likely to be moving through cleared areas. It is recommended that that public education through signage and other education measures be implemented where practical to create community awareness of the impacts to Koala from domestic animals.

6. Recommendations

The UD Urban Development Zone that is proposed to be certified, is relatively unconstrained from a terrestrial ecology perspective as it has already been assessed by DPE during the CPCP process.

Biodiversity values impacted within the SP2 Infrastructure zone that occur within non-certified land would need to be assessed in a formal biodiversity impact assessment which would likely include the cumulative impact of the entire East-West Connection Road network, and North-South Connection network. It is therefore recommended that the Proponent continue to consult with the DPE and other relevant authorities to assist with the road network planning. The assessment process would likely require targeted threatened biodiversity survey and additional biodiversity flora plot data collection.

It is recommended that existing trees within the certified land be incorporated into the urban design where possible. And where possible, restoration and embellishment of open spaces and drainage spaces to include endemic species which will provide improved habitat resources and will assist native fauna to adapt to changes to the environment that result from development.

Prior to the clearing of any native vegetation/habitat, it is recommended that a Biodiversity Management Plan be prepared to ensure the protection of the surrounding C2 Environmental Protection and to ensure the safe felling of habitat within the UD Urban Development Zone and SP2 Infrastructure. The Biodiversity Management Plan should contain the protocols listed in section 5.

7. Conclusion

Biodiversity impacts associated with the certified land have been assessed as part of the CPCP process, and thus the impacts to biodiversity within the certified land has therefore already been assessed.

The biodiversity impacts associated with the proposed SP2 Infrastructure zone have not been formally assessed. A biodiversity impact assessment would need to be completed, and would need to consider the cumulative impact of the proposed East-West Connection Road and North-South Connection and the additional Urban Development zoning with the non-certified land. The biodiversity impact assessment associated with both road networks may need to ensure that the proposal is consistent with '*Appendix A. Guidelines for essential infrastructure development*'.

Mitigation measures to minimise and avoid indirect impacts during the construction and operation of the UD Urban Development Zone have been provided in this report. It is recommended that the protocols, monitoring and responsibilities associated with mitigation measures be detailed in a Biodiversity Management Plan prior to construction of the UD Urban Development Zone and SP2 Infrastructure.

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Appendix 1 - Likelihood of occurrence of threatened biodiversity in the Subject Land

Scientific Name	Common Name (Source)	BC Act	EPBC Act	Biodiversity Credit Class	Habitat	Likelihood of Occurrence
Heleioporus australiacus	Giant Burrowing Frog (PMST/BioNet)	V	V	Species	The Giant Burrowing Frog has been recorded breeding in a range of water bodies associated with more sandy environments of the coast and adjacent ranges from the Sydney Basin south the eastern Victoria. It breeds in hanging swamps, perennial non-flooding creeks and occasionally permanent pools, but permanent water must be present to allow its large tadpoles time to reach metamorphosis.	Low
Litoria aurea	Green and Golden Bell Frog (PMST)		V	Species	Inhabits a very wide range of water bodies including marshes, dams, and streams, particularly those containing emergent vegetation such as bullrushes or spikerushes. It also inhabits numerous types of man-made water bodies including quarries and sand extraction sites. Optimum habitat includes waterbodies that are un-shaded, free of predatory fish such as Plague Minnow, have a grassy area nearby and diurnal sheltering sites available.	Low
Litoria littlejohni	Littlejohn's Tree Frog (PMST)		E	Species	Occurs in wet and dry sclerophyll forests and heathland associated with sandstone outcrops between 280 and 1000 m on the eastern slopes of the Great Dividing Range from the Central Coast down into Victoria. Individuals have been collected from a wide range of water bodies that includes semi-permanent dams, permanent ponds, temporary pools, and permanent streams, with calling occurring from fringing vegetation or on the banks. Individuals have been observed sheltering under rocks on high exposed ridges during summer and within deep leaf litter adjacent to the breeding site. Calling occurs in all months of the year, often in association with heavy rains. The tadpoles are distinctive, being large and very dark in colouration.	Low
Litoria watsoni	Watson's Tree Frog (PMST)	V	E	N/A	Littlejohn's Tree Frog is known to inhabit forest, coastal woodland and heath from 100 to 950 m above sea level (White & Ehmann 1997), but the species is not associated with any specific vegetation types (Lemckert 2004). Breeding habitat has been variously reported as rocky streams and semi-permanent dams (Barker et al. 1995), still water in dams, ditches, isolated pools and flooded hollows (Hero et al.1991), dams, creeks and lagoons (Griffiths 1997), semi-permanent or permanent	Low

Scientific Name	Common Name (Source)	BC Act	EPBC Act	Biodiversity Credit Class	Habitat	Likelihood of Occurrence
					dams, ponds and creeks (Anstis 2002) and temporary pools when sufficient run-off water was available (White et al. 1994). Non-breeding habitat is unknown. (SPRAT)	
Mixophyes balbus	Stuttering Frog (PMST)	E	V	Species	Stuttering Frogs occur along the east coast of Australia from southern Queensland to north-eastern Victoria. It is the only Mixophyes species that occurs in south-east NSW and in recent surveys it has only been recorded at three locations south of Sydney. Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range. Outside the breeding season adults live in deep leaf litter and thick understorey vegetation on the forest floor. (Threatened Sp. Profile)	Low
Pseudophryne australis	Red-crowned Toadlet (BioNet)	V		Species	Occurs on wetter ridge tops and upper slopes of sandstone formations on which the predominant vegetation is dry open forests and heaths. This species typically breeds within small ephemeral creeks that feed into larger semi-perennial streams. After rain these creeks are characterised by a series of shallow pools lined by dense grasses, ferns and low shrubs and usually contain leaf litter for shelter. Eggs are terrestrial and laid under litter, vegetation, or rocks where the tadpoles inside will reach a relatively late stage of development before waiting for flooding waters before hatching will occur.	Low
Anthochaera phrygia	Regent Honeyeater (PMST/BioNet)	E	CE	Species/ Ecosystem	The Regent Honeyeater mainly inhabits temperate woodlands and open forests of the inland slopes of south-east Australia. Birds are also found in drier coastal woodlands and forests in some years. The distribution of the species has contracted dramatically in the last 30 years to between north-eastern Victoria and south-eastern Queensland. There are only three known key breeding regions remaining: north-east Victoria (Chiltern-Albury), and in NSW at Capertee Valley and the Bundarra-Barraba region. In NSW the distribution is very patchy and mainly confined to the two main breeding areas and surrounding fragmented woodlands. In some years flocks converge on flowering coastal woodlands and forests.	Low
Artamus cyanopterus cyanopterus	Dusky Woodswallow (BioNet)	V	-	Ecosystem	Dusky woodswallows are widespread in eastern, southern, and southwestern Australia. The species occurs throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range. Primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations,	High

Scientific Name	Common Name (Source)	BC Act	EPBC Act	Biodiversity Credit Class	Habitat	Likelihood of Occurrence
					with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and groundcover of grasses or sedges and fallen woody debris.	
Botaurus poiciloptilus	Australasian Bittern (PMST)	-	E	Ecosystem	The Australasian Bitterns is widespread but uncommon over south-eastern Australia. In NSW they may be found over most of the state except for the far north-west. Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes and spikerushes.	Low
Burhinus grallarius	Bush Stone-curlew (BioNet)	E		Species	The Bush Stone-curlew is found throughout Australia except for the central southern coast and inland, the far south-east corner, and Tasmania. Only in northern Australia is it still common however and, in the south-east, it is either rare or extinct throughout its former range. Inhabits open forests and woodlands with a sparse grassy ground layer and fallen timber. Largely nocturnal, being especially active on moonlit nights.	Low
Calidris canutus	Red Knot (PMST)	-	E	Species/ Ecosystem	The Red Knot is a non-breeding migratory visitor from Arctic regions of Siberia. In NSW it is recorded in small numbers replenishing fat stores along some of the major river estuaries and sheltered embayment's of the coastline, in particular the Hunter River estuary, after which the birds proceed to Victoria by October.	Low
Calidris ferruginea	Curlew Sandpiper (PMST)	-	CE	Species/ Ecosystem	The Curlew Sandpiper is distributed around most of the coastline of Australia. It occurs along the entire coast of NSW, particularly in the Hunter Estuary, and sometimes in freshwater wetlands in the Murray-Darling Basin. It generally occupies littoral and estuarine habitats, and in New South Wales is mainly found in intertidal mudflats of sheltered coasts. It also occurs in non-tidal swamps, lakes, and lagoons on the coast and sometimes the inland	Low
Callocephalon fimbriatum	Gang-gang Cockatoo (PMST/BioNet)	V	E	Species/ Ecosystem	In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Also occur in subalpine snow gum woodland and occasionally in temperate or regenerating forest. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. It requires tree hollows in which to breed.	Moderate
Calyptorhynchus lathami	Glossy Black-Cockatoo	V		Species/ Ecosystem	In summer, occupies tall montane forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. Also occur in subalpine snow gum	Moderate

Scientific Name	Common Name (Source)	BC Act	EPBC Act	Biodiversity Credit Class	Habitat	Likelihood of Occurrence
	(BioNet)				woodland and occasionally in temperate or regenerating forest. In winter, occurs at lower altitudes in drier, more open eucalypt forests and woodlands, particularly in box-ironbark assemblages, or in dry forest in coastal areas. It requires tree hollows in which to breed.	
Charadrius leschenaultii	Greater Sand Plover (PMST)		V	Species/ Ecosystem	Occur on sheltered sandy, shelly, or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons. Non-breeding in Australia.	Low
Chthonicola sagittata	Speckled Warbler (BioNet)	V		Ecosystem	The Speckled Warbler lives in a wide range of eucalypt dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Typical habitat would include scattered native tussock grasses, a sparse shrub layer, some eucalypt regrowth, and an open canopy.	Low
Circus assimilis	Spotted Harrier (BioNet)	V		Ecosystem	The Spotted Harrier occurs throughout the Australian mainland, except in densely forested or wooded habitats of the coast, escarpment, and ranges, and rarely in Tasmania. Individuals disperse widely in NSW and comprise a single population. Occurs in grassy open woodland including acacia and mallee remnants, inland riparian woodland, grassland, and shrub steppe. It is found most in native grassland, but also occurs in agricultural land, foraging over open habitats including edges of inland wetlands.	Low – may fly over.
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies) (BioNet)	V		Ecosystem	Found in eucalypt woodlands (including box-gum woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and river red gum forest bordering wetlands with an open understorey of acacias, saltbush, lignum, cumbungi and grasses; usually not found in woodlands with a dense shrub layer; fallen timber is an important habitat component for foraging; also recorded, though less commonly, in similar woodland habitats on the coastal ranges and plains.	High
Daphoenositta chrysoptera	Varied Sittella (BioNet)	V	-	Ecosystem	Inhabits wide variety of dry eucalypt forests and woodlands, usually with either shrubby under storey or grassy ground cover or both, in all climatic zones of	High – known

Scientific Name	Common Name (Source)	BC Act	EPBC Act	Biodiversity Credit Class	Habitat	Likelihood of Occurrence
					Australia. Usually in areas with rough-barked trees, such as stringybarks or ironbark's, but also in paperbarks or mature Eucalypts with hollows.	
Dasyornis brachypterus	Eastern Bristlebird (PMST)	-	E	Species	The distribution of the Eastern Bristlebird has contracted to three disjunct areas of south-eastern Australia. There are three main populations: Northern - southern Queensland/northern NSW, Central - Barren Ground NR, Budderoo NR, Woronora Plateau, Jervis Bay NP, Booderee NP and Beecroft Peninsula and Southern - Nadgee NR and Croajingalong NP in the vicinity of the NSW/Victorian border. Habitat for central and southern populations is characterised by dense, low vegetation including heath and open woodland with a heathy understorey. In northern NSW the habitat occurs in open forest with dense tussocky grass understorey and sparse mid-storey near rainforest ecotone; all these vegetation types are fire prone.	Low
Falco hypoleucos	Grey Falcon	-	V	Ecosystem	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. Also occurs near wetlands where surface water attracts prey.	Low
Falco subniger	Black Falcon (BioNet)	-	V	Ecosystem	The Black Falcon is widely, but sparsely, distributed in New South Wales, mostly occurring in inland regions. Some reports of 'Black Falcons' on the tablelands and coast of New South Wales are likely to be referring to the Brown Falcon. In New South Wales there is assumed to be a single population that is continuous with a broader continental population, given that falcons are highly mobile, commonly travelling hundreds of kilometres.	Low
Glossopsitta pusilla	Little Lorikeet (BioNet)	V		Ecosystem	Distributed in forests and woodlands from the coast to the western slopes of the Great Dividing Range in NSW, extending westwards to the vicinity of Albury, Parkes, Dubbo, and Narrabri. Mostly occur in dry, open eucalypt forests and woodlands. They feed primarily on nectar and pollen in the tree canopy. Nest hollows are located at heights of between 2 m and 15 m, mostly in living, smooth-barked eucalypts. Most breeding records come from the western slopes.	Known
Grantiella picta	Painted Honeyeater (PMST)	-	V	Ecosystem	Inhabits Boree/ Weeping Myall (Acacia pendula), Brigalow (A. harpophylla) and Box-Gum Woodlands and Box-Ironbark Forests. A specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias. Prefers mistletoes of the genus Amyema.	Low

Scientific Name	Common Name (Source)	BC Act	EPBC Act	Biodiversity Credit Class	Habitat	Likelihood of Occurrence
Haliaeetus leucogaster	White-bellied Sea-Eagle (BioNet)	V	-	Species/ Ecosystem	Inhabits coastal and near coastal areas, building large stick nests, and feeding mostly on marine and estuarine fish and aquatic fauna.	Low – may fly over
Hieraaetus morphnoides	Little Eagle (BioNet)	V	-	Species/ Ecosystem	Most abundant in lightly timbered areas with open areas nearby. Often recorded foraging in grasslands, crops, treeless dune fields, and recently logged areas. May nest in farmland, woodland, and forest in tall trees.	Low
Hirundapus caudacutus	White-throated Needletail (PMST)	-	V	Ecosystem	An aerial species found in feeding concentrations over cities, hilltops, and timbered ranges	Moderate
Lathamus discolor	Swift Parrot (PMST/BioNet)	E	CE	Species/ Ecosystem	The Swift Parrot occurs in woodlands and forests of NSW from May to August, where it feeds on eucalypt nectar, pollen, and associated insects. The Swift Parrot is dependent on flowering resources across a wide range of habitats in its wintering grounds in NSW. This species is migratory, breeding in Tasmania and nomadic, moving about in response to changing food availability.	Low / moderate
Lophoictinia isura	Square-tailed Kite (BioNet)	V	-	Species/ Ecosystem	Typically inhabits coastal forested and wooded lands of tropical and temperate Australia. In NSW it is often associated with ridge and gully forests dominated by Eucalyptus longifolia, Corymbia maculata, E. elata or E. smithii. Individuals appear to occupy large hunting ranges of more than 100km2. They require large living trees for breeding, particularly near water with surrounding woodland -forest close by for foraging habitat. Nest sites are generally located along or near watercourses, in a tree fork or on large horizontal limbs.	Low – may fly over
Neophema chrysogaster	Orange-bellied Parrot (PMST)	-	CE	Species	The Orange-bellied Parrot breeds in the south-west of Tasmania and migrates in autumn to spend the winter on the mainland coast of south-eastern South Australia and southern Victoria. There are occasional reports from NSW, with the most recent records from Shellharbour and Maroubra in May 2003. It is expected that NSW habitats may be more frequently utilised than observations suggest. Typical winter habitat is saltmarsh and strandline-foredune vegetation communities either on coastlines or coastal lagoons. Spits and islands are favoured but they will turn up anywhere within these coastal regions. The species can be found foraging in weedy	Low

Scientific Name	Common Name (Source)	BC Act	EPBC Act	Biodiversity Credit Class	Habitat	Likelihood of Occurrence
					areas associated with these coastal habitats or even in totally modified landscapes such as pastures, seed crops and golf courses.	
Ninox strenua	Powerful Owl (BioNet)	V	-	Species/ Ecosystem	Occupies wet and dry eucalypt forests and rainforests. Can occupy both un-logged and lightly logged forests as well as undisturbed forests where it usually roosts on the limbs of dense trees in gully areas. It is most recorded within red turpentine in tall open forests and black she-oak within open forests. Large mature trees with hollows at least 0.5 m deep are required for nesting. Tree hollows are particularly important for the Powerful Owl because a large proportion of the diet is made up of hollow-dependent arboreal marsupials. Nest trees for this species are usually emergent with a diameter at breast height of at least 100 cm.	Moderate
Numenius madagascariensis	Eastern Curlew (PMST)	-	CE	Species/ Ecosystem	Occupies wet and dry eucalypt forests and rainforests. Can occupy both un-logged and lightly logged forests as well as undisturbed forests where it usually roosts on the limbs of dense trees in gully areas. It is most recorded within red turpentine in tall open forests and black she-oak within open forests. Large mature trees with hollows at least 0.5 m deep are required for nesting. Tree hollows are particularly important for the Powerful Owl because a large proportion of the diet is made up of hollow-dependent arboreal marsupials. Nest trees for this species are usually emergent with a diameter at breast height of at least 100 cm.	Low
Petroica boodang	Scarlet Robin (BioNet)	V	-	Ecosystem	The Scarlet Robin is found from SE Queensland to SE South Australia and in Tasmania and SW Western Australia. In NSW, it occurs from the coast to the inland slopes. The Scarlet Robin lives in dry eucalypt forests and woodlands. The understorey is usually open and grassy with few scattered shrubs.	High
Petroica phoenicea	Flame Robin (BioNet)	V	-	Ecosystem	Flame Robins are found in a broad coastal band from southern Queensland to just west of the South Australian border. The species is also found in Tasmania. The preferred habitat in summer includes eucalyptus forests and woodland, whilst in winter prefers open woodlands and farmlands. It is considered migratory. The Flame Robin breeds from about August to January.	Low
Pycnoptilus floccosus	Pilotbird (PMST)	-	V	N/A	Pilotbirds are endemic to south-east Australia. Upland Pilotbirds occur above 600 m in the Brindabella Ranges in the Australian Capital Territory, and in the Snowy Mountains in New South Wales and north-east Victoria (Higgins & Peter 2002; Loyn et al. 2021). Lowland Pilotbirds occur in forests from the Blue Mountains west of	Low

Scientific Name	Common Name (Source)	BC Act	EPBC Act	Biodiversity Credit Class	Habitat	Likelihood of Occurrence
					Newcastle, around the wetter forests of eastern Australia, to Dandenong near Melbourne (Higgins & Peter 2002; Loyn et al. 2021). (SPRAT)	
Rostratula australis	Australian Painted Snipe (PMST)	-	E	Ecosystem	In NSW, this species has been recorded at the Paroo wetlands, Lake Cowell, Macquarie Marshes and Hexham Swamp. Most common in the Murray-Darling Basin. Prefers fringes of swamps, dams, and nearby marshy areas where there is a cover of grasses, lignum, low scrub, or open timber. Nests on the ground amongst tall vegetation, such as grasses, tussocks, or reeds.	Low
Stagonopleura guttata	Diamond Firetail (BioNet)	V	-	Ecosystem	Feeds exclusively on the ground, on ripe and partly ripe grass and herb seeds and green leaves, and on insects (especially in the breeding season). Found in grassy eucalypt woodlands, including box-gum woodlands and snow gum woodlands. Also occurs in open forest, mallee, natural temperate grassland, and in secondary grassland derived from other communities.	High
Sternula nereis nereis	Australian Fairy Tern (PMST)	-	V	Species	Distribution includes the southern half of NSW coast. Fairy Terns utilise a variety of habitats including offshore, islands in estuaries or lakes, wetlands, beaches, and spits.	Low
Tyto novaehollandiae	Masked Owl (BioNet)	V	-	Species/ Ecosystem	Inhabits a diverse range of wooded habitat that provide tall or dense mature trees with hollows suitable for nesting and roosting. Mostly recorded in open forest and woodlands adjacent to cleared lands. Nest in hollows, in trunks and in near vertical spouts or large trees, usually living but sometimes dead. Nest hollows are usually located within dense forests or woodlands. Masked owls' prey upon hollow-dependent arboreal marsupials, but terrestrial mammals make up the largest proportion of the diet.	Low
Bidyanus bidyanus	Silver Perch (PMST)	-	CE	N/A	Silver perch, also known as bidyan or black or silver bream, are a moderate to large freshwater fish native to the Murray-Darling River system. They were once widespread and abundant throughout most of this area, except for cooler high-altitude streams. However, they have now declined to low numbers or disappeared from most of their former range. Silver perch seem to prefer fast-flowing, open waters, especially where there are rapids and races.	Low
Maccullochella peelii	Murray Cod (PMST)	-	V	N/A	The Murray Cod is found in a wide range of warm water habitats, from clear, rocky streams to slow-flowing turbid rivers and billabongs. Generally, they are found in	Low

Scientific Name	Common Name (Source)	BC Act	EPBC Act	Biodiversity Credit Class	Habitat	Likelihood of Occurrence
					waters up to 5 m deep and in sheltered areas with cover from rocks, timber, or overhanging banks. The species is highly dependent on wood debris for habitat, using it to shelter from fast-flowing water.	
Macquaria australasica	Macquarie Perch (PMST)	-	E	N/A	Recent research indicates that there may be at least two distinct forms of Macquarie Perch, one from the western rivers (Murray-Darling Basin form) and one from the eastern rivers (the Shoalhaven and Hawkesbury-Nepean systems) (the coastal form). The species has also been stocked or translocated into several reservoirs including Talbingo, Cataract and Khancoban reservoirs and translocated into streams including the Mongarlowe River. Macquarie Perch are found in both river and lake habitats; especially the upper reaches of rivers and their tributaries	Low
Prototroctes maraena	Australian Grayling (PMST)	-	V	N/A	Historically, this species occurred in coastal streams from the Grose River Valley, southwards through NSW, Vic., and Tas. It also occasionally occurred high upstream in the Snowy R. A single juvenile specimen was collected from Lake Macquarie in 1974. This species spends only part of its lifecycle in freshwater. The Tambo River population inhabits a clear, gravel-bottomed stream with alternating pools and riffles, and granite outcrops. It has also been associated with clear, gravel-bottomed habitats in the Mitchell & Wonnangatta Rivers but was present in a muddy-bottomed, heavily silted habitat in the Tarwin R.	Low
Meridolum corneovirens	Cumberland Plain Land Snail (BioNet)	E		Species	Primarily inhabits Cumberland Plain woodland (an EEC). This community is a grassy, open woodland with occasional dense patches of shrubs. Lives under litter of bark, leaves and logs, or shelters in loose soil around grass clumps. Occasionally shelters under rubbish.	Known
Petalura gigantea	Giant Dragonfly (BioNet)	E	-	Species	The Giant Dragonfly is found along the east coast of NSW from the Victorian border to northern NSW. It is not found west of the Great Dividing Range. There are known occurrences in the Blue Mountains and Southern Highlands, in the Clarence River catchment, and on a few coastal swamps from north of Coffs Harbour to Nadgee in the south. Live in permanent swamps and bogs with some free water and open vegetation. Adults emerge from late October and are short-lived, surviving for one summer after emergence.	Low
Cercartetus nanus	Eastern Pygmy-possum	V	-	Species	Inhabits rainforest through to sclerophyll forest and tree heath. Banksias and myrtaceous shrubs and trees are a favoured food source. Will often nest in tree	Low

Scientific Name	Common Name (Source)	BC Act	EPBC Act	Biodiversity Credit Class	Habitat	Likelihood of Occurrence
	(BioNet)				hollows but can also construct its own nest. Because of its small size it can utilise a range of hollow sizes including very small hollows. Individuals will use a few different hollows and an individual has been recorded using up to 9 nest sites within a 0.5ha area over a 5-month period.	
Chalinolobus dwyeri	Large-eared Pied Bat (PMST/BioNet)	V	V	Species	Located in a variety of drier habitats, including the dry sclerophyll forests and woodlands to the east and west of the Great Dividing Range. Can also be found on the edges of rainforests and in wet sclerophyll forests. This species roosts in caves and mines in groups of between 3 and 37 individuals.	High
Dasyurus maculatus maculatus	Spot-tailed Quoll (SE mainland population) (PMST/BioNet)	V	E	Ecosystem	It is now found in eastern NSW, eastern Victoria, south-east and north-eastern Queensland, and Tasmania. Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline. Quolls use hollow-bearing trees, fallen logs, other animal burrows, small caves and rock outcrops as den sites. (Threatened Sp. Profile)	Low
Falsistrellus tasmaniensis	Eastern False Pipistrelle (BioNet)	V	-	Ecosystem	Inhabit sclerophyll forests, preferring wet habitats where trees are more than 20 m high. Two observations have been made of roosts in stem holes of living eucalypts. There is debate about whether this species moves to lower altitudes during winter, or whether they remain sedentary but enter torpor. This species also appears to be highly mobile and records showing movements of up to 12 km between roosting and foraging sites.	High
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern) (PMST/BioNet)	E	E	Species	Prefers sandy soils with scrubby vegetation and-or areas with low ground cover that are burn from time to time. A mosaic of post fire vegetation is important for this species.	Low
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat (BioNet)	V	-	Ecosystem	Most records are from dry eucalypt forests and woodlands to the east of the Great Dividing Range. Appears to roost in trees, but little is known of this species' habits.	Low
Miniopterus australis	Little Bent-winged Bat (BioNet)	V	-	Species/ Ecosystem	Coastal north-eastern NSW and eastern Queensland. Little Bent-winged Bat is an insectivorous bat that roost in caves, in old mines, in tunnels, under bridges, or in similar structures. They breed in large aggregations in a small number of known caves and may travel 100s km from feeding home ranges to breeding sites. Little	Moderate

Scientific Name	Common Name (Source)	BC Act	EPBC Act	Biodiversity Credit Class	Habitat	Likelihood of Occurrence
					Bent-winged Bat prefers moist eucalypt forest, rainforest, or dense coastal banksia scrub where it forages below the canopy for insects.	
Miniopterus orianae oceanensis	Large Bent-winged Bat (BioNet)	V	-	Species/ Ecosystem	Eastern Bent-wing Bats occur along the east and north-west coasts of Australia. Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings, and other man-made structures. Form discrete populations centred on a maternity cave that is used annually in spring and summer for the birth and rearing of young.	Moderate
Myotis macropus	Southern Myotis (BioNet)	V	-	Species	The Large-footed Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. Generally, roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage.	High – previous records
Petauroides volans	Greater Glider (PMST)	-	V	Species	The Greater Glider occurs in eucalypt forests and woodlands. The Greater Glider occurs in eucalypt forests and woodlands. The species nests in hollows and are typically found in older forests. Generally, the home range for the greater glider is between 0.7-3 hectares and tends to have a population density of 0.01-5 individuals per hectare. The home ranges of females can overlap with males and females however for the males the home ranges never overlap.	Low
Petaurus australis australis	Yellow-bellied Glider (south-eastern) (BioNet)	V	-	Ecosystem	The Yellow-bellied Glider is found along the eastern coast to the western slopes of the Great Dividing Range, from southern Queensland to Victoria. Occur in tall mature eucalypt forest generally in areas with high rainfall and nutrient rich soils. Forest type preferences vary with latitude and elevation; mixed coastal forests to dry escarpment forests in the north; moist coastal gullies and creek flats to tall montane forests in the south. Very mobile and occupy large home ranges between 20 to 85 ha to encompass dispersed and seasonally variable food resources. (Threatened Sp. Profile)	Low
Petaurus norfolcensis	Squirrel Glider (BioNet)	V		Species	Generally, occurs in dry sclerophyll forests and woodlands but is absent from dense coastal ranges in the southern part of its range. Requires abundant hollow bearing trees and a mix of eucalypts, banksias, and acacias. There is only limited information available on den tree use by Squirrel gliders, but it has been observed using both living and dead trees as well as hollow stumps. Within a suitable vegetation	Low

Scientific Name	Common Name (Source)	BC Act	EPBC Act	Biodiversity Credit Class	Habitat	Likelihood of Occurrence
					community at least one species should flower heavily in winter and one species of eucalypt should be smooth barked. Endangered population in the Wagga Wagga LGA.	
Petrogale penicillata	Brush-tailed Rock-wallaby (PMST)	-	V	Species	Found in rocky areas in a wide variety of habitats including rainforest gullies, wet and dry sclerophyll forest, open woodland, and rocky outcrops in semi-arid country. Commonly sites have a northerly aspect with numerous ledges, caves, and crevices.	Low
Phascolarctos cinereus	Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) (PMST/BioNet)	V	E	Species/ Ecosystem	Inhabits eucalypt forests and woodlands. The suitability of these forests for habitation depends on the size and species of trees present, soil nutrients, climate, and rainfall.	Known
Phoniscus papuensis	Golden-tipped Bat (BioNet)	V	-	Ecosystem	The Golden-tipped Bat is distributed along the east coast of Australia in scattered locations from Cape York Peninsula in Queensland to south of Eden in southern NSW. It is found in rainforest and adjacent wet and dry sclerophyll forest up to 1000m, and is also recorded in tall open forest, Casuarina-dominated riparian forest, and coastal Melaleuca forests. Bats will fly up to two kilometres from roosts to forage in rainforest and sclerophyll forest on mid and upper-slopes and are specialist feeders on small web-building spiders. They roost mainly in rainforest gullies on small first- and second-order streams in modified abandoned hanging nests of Yellow-throated Scrubwren and Brown Gerygone, and sometimes under thick moss on tree trunks, in tree hollows, dense foliage and epiphytes. Maternity roosts sometimes have been recorded up to 450m away from water sources.	Low
Potorous tridactylus trisulcatus	Long-nosed Potoroo (southern mainland) (PMST)	-	V	Species	In NSW it is generally restricted to coastal heaths and forests east of the Great Dividing Range, with an annual rainfall exceeding 760 mm. Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature. Individuals are mainly solitary, non-territorial and have home range sizes ranging between 2-5 ha. (Threatened Sp Profile)	Low

Scientific Name	Common Name (Source)	BC Act	EPBC Act	Biodiversity Credit Class	Habitat	Likelihood of Occurrence
Pseudomys novaehollandiae	New Holland Mouse (PMST)	-	V	Ecosystem	The New Holland Mouse currently has a disjunct, fragmented distribution across Tasmania, Victoria, New South Wales, and Queensland. Across the species' range the New Holland Mouse is known to inhabit open heathlands, open woodlands with a heathland understorey, and vegetated sand dunes.	Low
Pteropus poliocephalus	Grey-headed Flying-fox (PMST/BioNet)	V	V	Species/ Ecosystem	This species is a canopy-feeding frugivore and nectarivore of rainforests, open forests, woodlands, melaleuca swamps and banksia woodlands. Bats commute daily to foraging areas, usually within 15 km of the day roost although some individuals may travel up to 70 km.	High to forage
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat (BioNet)	V	-	Ecosystem	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Forages in most habitats across its very wide range, with and without trees; appears to defend an aerial territory.	Low
Scoteanax rueppellii	Greater Broad-nosed Bat (BioNet)	V	-	Ecosystem	Prefer moist gullies in mature coastal forests and rainforests, between the Great Dividing Range and the coast. They are only found at low altitudes below 500 m. In dense environments they utilise natural and human-made opening in the forest for flight paths. Creeks and small rivers are favoured foraging habitat. This species roosts in hollow tree trunks and branches	Moderate
Hoplocephalus bungaroides	Broad-headed Snake (PMST/BioNet)	E	V	Species/ Ecosystem	Occurs almost exclusively in association with communities occurring on Triassic sandstone within the Sydney Basin. Typically found among exposed sandstone outcrops with vegetation types ranging from woodland to heath. Within these habitats they spend most of the year sheltering in and under rock crevices and exfoliating rock. However, some individuals will migrate to tree hollows within 500m of escarpment to find shelter during hotter parts of summer.	Low
Varanus rosenbergi	Rosenberg's Goanna (BioNet)	-	V	Ecosystem	This species is a Hawkesbury-Narrabeen sandstone outcrop specialist. Occurs in coastal heaths, humid woodlands and both wet and dry sclerophyll forests.	Low
Acacia bynoeana	Bynoe's Wattle (PMST/BioNet)	E	V	Species	Grows mainly in heath and dry sclerophyll forest in sandy soils. Mainly south of Dora Creek-Morisset area to Berrima and the Illawarra region, west to the Blue	Moderate

Scientific Name	Common Name (Source)	BC Act	EPBC Act	Biodiversity Credit Class	Habitat	Likelihood of Occurrence
					Mountains, also recorded from near Kurri Kurri in the Hunter Valley and from Morton National Park.	
Acacia pubescens	Downy Wattle (PMST)	V	V	Species	Occurs in open woodland and forest, in a variety of plant communities, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland.	Moderate
Allocasuarina glareicola	(PMST)	-	E	Species	Grows in Castlereagh woodland on lateritic soil. Found in open woodland with *Eucalyptus parramattensis, Eucalyptus fibrosa, Angophora bakeri, Eucalyptus sclerophylla* and *Melaleuca decora*. Common associated understorey species include *Melaleuca nodosa, Hakea dactyloides, Hakea sericea, Dillwynia tenuifolia, Micromyrtus minutiflora, Acacia elongata, Acacia brownei, Themeda australis* and *Xanthorrhoea minor*.	Low
Astrotricha crassifolia	Thick-leaf Star-hair (PMST)	-	V	Species	Occurs near Patonga (Gosford LGA), and in Royal NP and on the Woronora Plateau (Sutherland and Campbelltown LGAs). There is also a record from near Glen Davis (Lithgow LGA). Also, in Victoria. Occurs in dry sclerophyll woodland on sandstone.	Low
Caladenia tessellata	Thick-lipped Spider-orchid (PMST)	-	V	Species	The Tessellated Spider Orchid is found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil. Known from the Sydney area (old records), Wyong, Ulladulla, and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct.	Low
Commersonia prostrata	Dwarf Kerrawang (PMST)	-	E	Species	Occurs on sandy, sometimes peaty soils in a wide variety of habitats: snow gum woodland at Rose Lagoon; blue leaved stringybark open forest at Tallong; and in brittle gum low open woodland at Penrose; scribbly gum - swamp mahogany ecotonal forest at Tomago.	Low
Cryptostylis hunteriana	Leafless Tongue-orchid (PMST)	-	V	Species	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black Sheoak (*Allocasuarina littoralis*); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (C. subulata) and the Tartan Tongue Orchid (C. erecta).	Low

Scientific Name	Common Name (Source)	BC Act	EPBC Act	Biodiversity Credit Class	Habitat	Likelihood of Occurrence
Cynanchum elegans	White-flowered Wax Plant (PMST)	E	E	Species	Recorded from rainforest gullies scrub and scree slopes from the Gloucester district to the Wollongong area and inland to Mt Dangar.	Low
Epacris purpurascens var. *purpurascens*	(BioNet)	V		Species	Recorded from Gosford in the north, to Narrabeen in the east, Silverdale in the west and Avon Dam vicinity in the South. Found in a range of habitat types, most of which have a strong shale soil influence.	Moderate
Eucalyptus benthamii	Camden White Gum (PMST)	V	V	Species	Occurs on the alluvial flats of the Nepean River and its tributaries. There are two major subpopulations: in the Kedumba Valley of the Blue Mountains National Park and at Bents Basin State Recreation Area. Several trees are scattered along the Nepean River around Camden and Cobbitty. At least five trees occur on the Nattai River in Nattai National Park. Requires a combination of deep alluvial sands and a flooding regime that permits seedling establishment. Occurs in open forest.	Low
Eucalyptus camfieldii	Camfield's Stringybark (PMST)	V	V	Species	Restricted distribution in a narrow band with the most northerly records in the Raymond Terrace Area south to Waterfall. Localised and scattered distribution includes sites at Norah Head (Tuggerah Lakes), Peats Ridge, Mt Colah, Elvina Bay Trail (West Head), Terrey Hills, Killara, North Head, Menai, Wattamolla, and a few other sites in Royal National Park. Poor coastal country in shallow sandy soils overlying Hawkesbury sandstone. Coastal heath mostly on exposed sandy ridges. Occurs mostly in small, scattered stands near the boundary of tall coastal heaths and low open woodland of the slightly more fertile inland areas.	Low
Eucalyptus nicholii	Narrow-leaved Black Peppermint (BioNet)	V	V	Species	Typically grows in dry grassy woodland, on shallow soils of slopes and ridges. Found primarily on infertile soils derived from granite or metasedimentary rock. Seedling recruitment is common, even in disturbed soils, if protected from grazing and fire.	Low
Galium australe	Tangled Bedstraw (BioNet)	E		Species	Widespread in Victoria and is also found in South Australia and Tasmania. Once regarded as presumed extinct in NSW, this species is now known from the Towamba Valley near Bega, Lake Yarrunga near Kangaroo Valley, Cullendulla Creek Nature Reserve near Batemans Bay, Conjola National Park, Swan Lake near Swanhaven, and the Big Hole in Deua National Park. Grows in moist gullies of tall forest, Eucalyptus tereticornis forest, coastal Banksia shrubland, and Allocasuarina nana heathland. In	Low

Scientific Name	Common Name (Source)	BC Act	EPBC Act	Biodiversity Credit Class	Habitat	Likelihood of Occurrence
					other States the species is found in a range of near-coastal habitats, including sand dunes, sand spits, shrubland and woodland.	
Genoplesium baueri	Bauer's Midge Orchid (PMST/BioNet)	E	E	Species	Grows in dry sclerophyll forest and moss gardens over sandstone. Flowers February to March. Has been recorded between Ulladulla and Port Stephens. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded in Berowra Valley Regional Park, Royal National Park and Lane Cove National Park and may also occur in the Woronora, Metropolitan and Warragamba Catchments.	Low
Grammitis stenophylla	Narrow-leaf Finger Fern (BioNet)	E		Species	Moist places, usually near streams, on rocks or in trees, in rainforest and moist eucalypt forest.	Low
Grevillea parviflora subsp. *parviflora*	Small-flower Grevillea (PMST/BioNet)	V	V	Species	Grows in sandy or light clay soils usually over thin shales. Occurs in a range of vegetation types from heath and shrubby woodland to open forest. Found over a range of altitudes from flat, low-lying areas to upper slopes and ridge crests. Often occurs in open, slightly disturbed sites such as along tracks.	Moderate
Grevillea raybrownii	(PMST)	V	V	Species	All natural remnant sites occur within a habitat that is both characteristic and consistent between sites. Generally, occurs on ridgetops and, less often, slopes and benches of Hawkesbury Sandstone and Mittagong Formation. It occurs in Eucalyptus open forest and woodland with a shrubby understorey on sandy, gravelly loam soils derived from sandstone that are low in nutrients. Killed by fire and relies entirely on seed that is stored in the soil for regeneration. Recruitment appears to be promoted by fire or other disturbances.	Low
Haloragis exalata subsp. exalata	Wingless Raspwort (PMST)	V	V	Species	Occurs in 4 widely scattered localities in eastern NSW. It is disjointly distributed in the central coast, south coast, and north-western slopes botanical subdivisions of NSW. The species appears to require protected and shaded damp situations in riparian habitats.	Low
Leucopogon exolasius	Woronora Beard-heath (PMST/BioNet)	V	V	Species	Grows in woodland on sandstone. Restricted to the Woronora and Grose Rivers and Stokes Creek, Royal National Park.	Moderate

Scientific Name	Common Name (Source)	BC Act	EPBC Act	Biodiversity Credit Class	Habitat	Likelihood of Occurrence
Melaleuca biconvexa	Biconvex Paperbark (PMST)		V	Species	Grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects. Scattered and dispersed populations found in the Jervis Bay area in the south and the Gosford-Wyong area in the north.	Low
Melaleuca deanei	Deane's Melaleuca (PMST/BioNet)	V	V	Species	Grows in wet heath on sandstone in coastal districts from Berowra to Nowra.	Low
Persicaria elatior	Tall Knotweed (PMST)	V	V	Species	This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	Low
Persoonia acerosa	Needle Geebung (PMST)	V	V	Species	Occurs in dry sclerophyll forest, scrubby low-woodland, and heath on low fertility soils. Recorded only on the central coast and in the Blue Mountains, from Mt Tomah in the north to as far south as Hill Top where it is now believed to be extinct. Mainly in the Katoomba, Wentworth Falls, Springwood area.	Low
Persoonia bargoensis	Bargo Geebung (PMST/BioNet)	E	V	Species	The Bargo Geebung occurs in woodland or dry sclerophyll forest on sandstone and on heavier, well drained, loamy, gravely soils.	Low
Persoonia glaucescens	Mittagong Geebung (PMST)	V	V	Species	The Mittagong Geebung grows in woodland to dry sclerophyll forest on clayey and gravely laterite. The preferred topography is ridge-tops, plateaux and upper slopes. Aspect does not appear to be a significant factor.	Low
Persoonia hirsuta	Hairy Geebung (PMST/BioNet)	E	E	Species	Distributed from Singleton in the north, along the east coast to Bargo in the south and the Blue Mountains to the west. A large area of occurrence, but occurs in small populations, increasing the species fragmentation in the landscape. Found in sandy soils in dry sclerophyll open forest, woodland, and heath on sandstone. Usually present as isolated individuals or very small populations. Probably killed by fire (as other Persoonia spp. are) but will regenerate from seed.	Low
Persoonia nutans	Nodding Geebung (PMST)	E	E	Species	Confined to aeolian and alluvial sediments and occurs in a range of sclerophyll forest and woodland vegetation communities, with most individuals occurring within Agnes Banks woodland or Castlereagh Scribbly Gum woodland. Restricted to the Cumberland Plain in western Sydney, between Richmond in the north and Macquarie Fields in the south.	Low

Scientific Name	Common Name (Source)	BC Act	EPBC Act	Biodiversity Credit Class	Habitat	Likelihood of Occurrence
Pimelea curviflora var. *curviflora*	(PMST/BioNet)	V	V	Species	Confined to the coastal area of Sydney between northern Sydney in the south and Maroota in the north-west. Former range extended south to the Parramatta River and Port Jackson region including Five Dock, Bellevue Hill and Manly. Occurs on shaley-lateritic soils over sandstone and shale-sandstone transition soils on ridgetops and upper slopes amongst woodlands.	Low
Pimelea spicata	Spiked Rice-flower (PMST/BioNet)	E	E	Species	In both the Cumberland Plain and Illawarra environments this species is found on well-structured clay soils. On the Cumberland Plain sites, it is associated with Grey Box communities (particularly Cumberland Plain Woodland variants and Moist Shale Woodland) and in areas of ironbark.	Moderate
Pomaderris brunnea	Rufous Pomaderris (PMST/BioNet)	E	V	Species	The species is expected to live for 10 - 20 years, while the minimum time to produce seed is estimated to be 4 - 6 years. Found in a very limited area around the Colo, Nepean, and Hawkesbury Rivers, including the Bargo area. It also occurs at Walcha on the New England Tableland and in far eastern Gippsland in Victoria.	Moderate
Pomaderris cotoneaster	Cotoneaster Pomaderris (PMST)	E	E	Species	Cotoneaster Pomaderris has a very disjunct distribution and has been recorded in a range of habitats in predominantly forested country. The habitats include forest with deep, friable soil, amongst rock beside a creek, on rocky forested slopes and in steep gullies between sandstone cliffs.	Low
Prasophyllum affine	Jervis Bay Leek Orchid (PMST)	-	E	Species	Jervis Bay Leek Orchid is currently known from three areas south-east of Nowra on South Coast. These are Kinghorne Point, Wowly Gully near the town of Callala Bay, and near the township of Vincentia. This species grows on poorly drained grey clay soils that support low heathland and sedgeland communities. Pollination is primarily by specialised wasp species.	Low
Pterostylis saxicola	Sydney Plains Greenhood (PMST/BioNet)	E	E	Species	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. Most found growing in small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines. The vegetation communities above the shelves where Pterostylis saxicola occurs are sclerophyll forest or woodland on shale-sandstone transition soils or shale soils.	Low
Pultenaea aristata	Prickly Bush-pea (PMST/BioNet)	V	V	Species	Grows in moist, dry sclerophyll woodland to heath on sandstone, specifically the drier areas of Upland Swamps. Restricted to the Woronora Plateau, a small area between Helensburgh, south of Sydney, and Mt Keira above Wollongong.	Low

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Pultenaea pedunculata	Matted Bush-pea (BioNet)	E	-	Species	Pultenaea pedunculata occurs in a range of habitats. NSW populations are generally among woodland vegetation, but plants have also been found on road batters and coastal cliffs. It is largely confined to loamy soils in dry gullies in populations in the Windellama area.	Low
Rhizanthella slateri	Eastern Underground Orchid (PMST)	E	E	Species	Habitat requirements are poorly understood, and no vegetation type has been associated with the species, although it is known to occur in sclerophyll forest. Highly cryptic given that it grows almost completely below the soil surface, with flowers being the only part of the plant that can occur above ground. Therefore, usually located only when the soil is disturbed. 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.	Low
Rhodamnia rubescens	Scrub Turpentine (PMST)	CE	CE	Species	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of Bundaberg in Queensland. Populations of *R. rubescens* typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m ASL. in areas with rainfall of 1,000-1,600 mm. Found in littoral, warm temperate and subtropical rainforest, and wet sclerophyll forest usually on volcanic and sedimentary soils.	Low
Rhodomyrtus psidioides	Native Guava (PMST)	CE	CE	Species	Occurs from Broken Bay, approximately 90 km north of Sydney, New South Wales, to Maryborough in Queensland. Populations are typically restricted to coastal and sub-coastal areas of low elevation however the species does occur up to c. 120 km inland in the Hunter and Clarence River catchments and along the Border Ranges in NSW. Pioneer species found in littoral, warm temperate and subtropical rainforest, and wet sclerophyll forest often near creeks and drainage lines. This species is characterised being extremely susceptible to infection by Myrtle Rust. Myrtle Rust affects all plant parts.	Low
Syzygium paniculatum	Magenta Lilly Pilly (PMST/BioNet)	E	V	Species	Found only in NSW, in a narrow, linear coastal strip from Bulahdelah to Conjola State Forest. On the south coast the species occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral rainforest. On the central coast it occurs on gravels, sands, silts and clays in riverside gallery rainforests and remnant littoral rainforest communities	Low

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Thelymitra kangaloonica	Kangaloon Sun Orchid (PMST)	-	CE	Species	Thelymitra sp. Kangaloon is only known to occur on the southern tablelands of NSW in the Moss Vale - Kangaloon - Fitzroy Falls area at 550-700 m above sea level. It is known to occur at three swamps that are above the Kangaloon Aquifer. It is found in swamps in sedgelands over grey silty grey loam soils	Low
Thesium australe	Austral Toadflax (PMST)	V	V	Species	Grows in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. Occurs in grassland or grassy woodland. Grows on kangaroo grass tussocks but has also been recorded within the exotic coolatai grass.	Low
Xerochrysum palustre	Swamp Paper Daisy (PMST)	V	V	Species	Found in Kosciuszko National Park and the eastern escarpment south of Badja. Also found in eastern Victoria. Grows in swamps and bogs which are often dominated by heaths. Also grows at the edges of bog margins on peaty soils with a cover of shrubs or grasses.	Low

Note: Habitat descriptions taken from the relevant profiles on the DPIE Threatened Species website or DAWE SPRAT database unless otherwise stated.

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Contact Us

Niche Environment and Heritage
02 9630 5658
info@niche-eh.com

NSW Head Office – Sydney
PO Box 2443 North Parramatta
NSW 1750 Australia

QLD Head Office – Brisbane
PO Box 540 Sandgate
QLD 4017 Australia

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