Macarthur Grange Planning Proposal - Flora and Fauna Assessment

Toscuz Investments

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Executive Summary

Eco Logical Australia Pty Ltd (ELA) was engaged by Toscuz Investments to prepare this biodiversity assessment for the proposed rezoning for a residential subdivision at Macarthur Grange Country Club (Lot 3900 DP 1170905 – the study area). The proponent is proposing to rezone portions of the land from C3 – Environmental Management to C4 – Environmental Living, C2 – Environmental Conservation and RE1 – Public Recreation. A planning proposal will be submitted to Campbelltown City Council and will be assessed under Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This report is a flora and fauna assessment report which assessed the potential impacts to threatened ecological values listed under the *Biodiversity Conservation Act 2016* (BC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Field surveys were conducted across the study area and identified a range of ecological values, including Cumberland Plain Woodland in the Sydney Basin Bioregion and, Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest – critically endangered under the BC Act and EPBC Act. The study area also contained numerous first, second and third order streams, farm dams, hollow bearing trees and exotic vegetation. A large portion of the study area is currently operating as a golf course. Field survey included a threatened species habitat assessment. Based on previous records (DPIE 2024) and the habitat features present in the study area, 12 threatened fauna species and four threatened flora species are considered likely to occur. *Pimelea spicata* (Spiked Rice-flower) has been previously identified in the study area by Anne Clements and Associates in 2007. Further surveys for *Pimelea spicata* will be required in these areas.

The development footprint presented in this proposal has used the avoid, minimise, and mitigate principles to retain areas of higher ecological constraint and value and concentrated development in cleared areas. The proposed master plan for the site has undergone numerous iterations which have responded to issues raised by Council and responded to the ecological constraints on this site. This has seen a reduction from 69 rural residential lots to 52 rural residential lots and expansion of the areas reserved for conservation and open space.

All land proposed to be zoned C2 Environmental Conservation and RE1 Public Recreation is proposed be dedicated to Council and a Voluntary Planning Agreement (VPA) is currently being negotiated to make arrangements for this dedication. This includes a 33 ha conservation reserve which will allow for rehabilitation and on ongoing protection of the most significant areas of vegetation on the site. In total around 50% of the site area would be dedicated to Council.

While the proposed conservation area would protect most of the good quality vegetation within the study area, much of vegetation within this area is also in a degraded condition (PCT 3319, DNG, DNS or moderate). Therefore, the proposed rehabilitation of this 33 ha of land in perpetuity under a VPA with Council would be a positive impact to the existing biodiversity values in the proposed C2 rezoning area. By contrast, the current C3 Environmental Management zoning allows a range of practices that could be harmful to the biodiversity values on the land.

This report also discusses the future potential approvals pathways for a Part 4 EP&A Act local development application.

1. Introduction

1.1 Description of the project

This Flora and Fauna Assessment was prepared on behalf of Toscuz Investments to accompany a Planning Proposal to rezone the 129.5 ha Macarthur Grange Country Club site in the Campbelltown local government area (LGA).

The planning proposal seeks to provide for a rural residential community subdivision by amending the provisions of the *Campbelltown Local Environmental Plan (LEP) 2015* while protecting the environmentally significant areas of the Scenic Hills Landscape. To achieve this, the proposal will:

- establish a long-term management arrangement for the ongoing protection and future use of this part of the Scenic Hills maintaining the landscape character and scenic qualities
- ensure that future development within the site responds to the topography and the location of significant vegetation
- provide a mix of lot sizes, including 52 rural residential lots, ranging from 0.5 ha to 2.75 ha to facilitate environmental conservation and a rural residential community
- provide for a range of uses on the land surrounding the golf club building including a function centre, restaurant, and café
- provide for a north-south walking and cycle link through the site connecting to existing cycle paths, potential future trails through the Scenic Hills and wider planned Sydney Green Grid projects
- provide a series of 'lookout parks' at key high points connected by the walking and cycle path.

The planning proposal aims to rezone the study area from C3 Environmental Management to a mix of the following zones: C2 Environmental Conservation, C3 Environmental Management, C4 Environmental Living and RE1 Public Recreation.

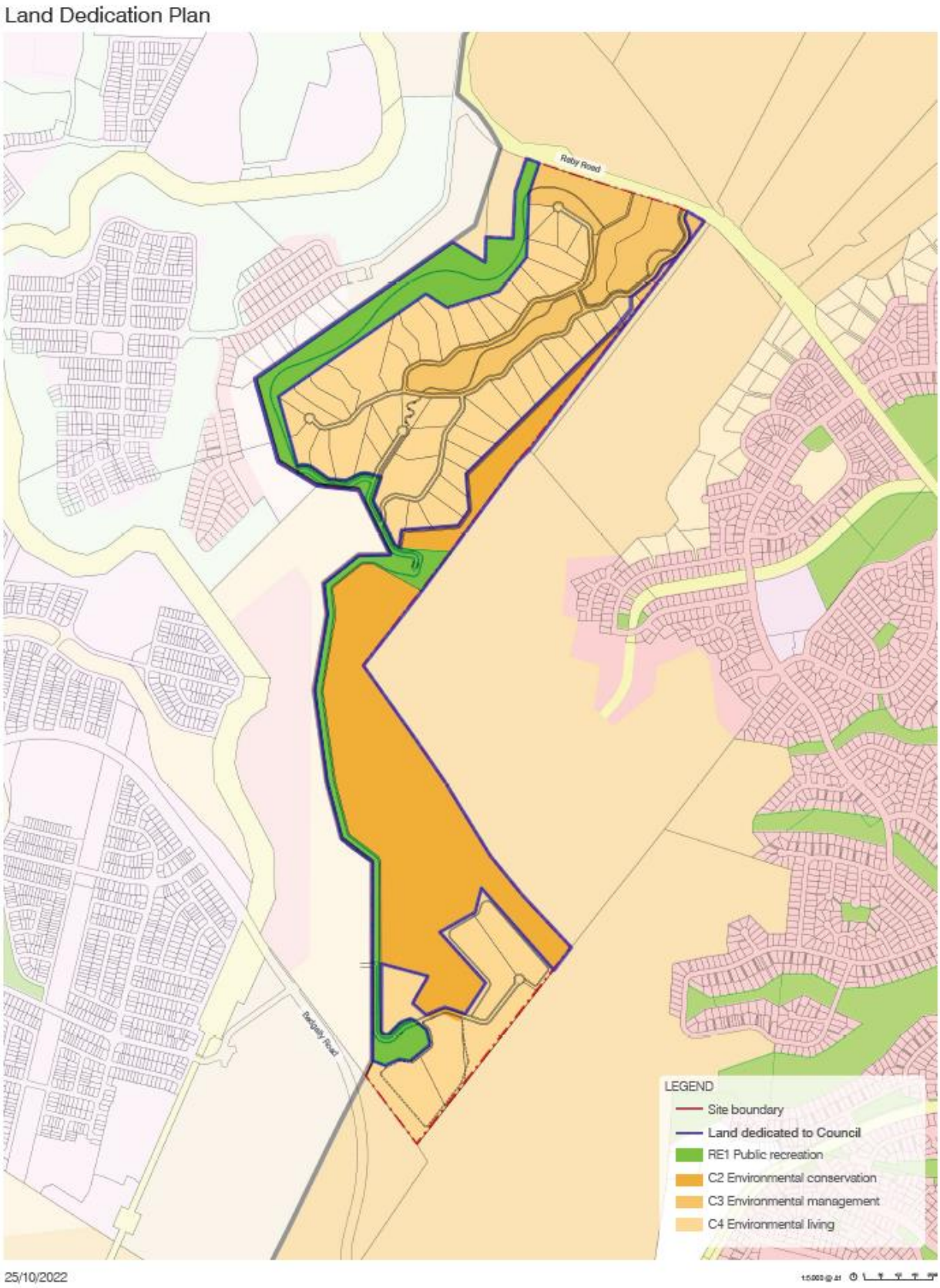

Figure 1: Proposed rezoning and land dedication plan (source: Gateway Determination Report December 2023, NSW DPE)

1.2 Subject site

The subject site is referred to as Macarthur Grange, Varroville being Lot 3900, DP 1170905 and has an area of 129.5 ha. The land is located approximately eight kilometres west of the Campbelltown CBD and is bounded by Raby Road to the north and Gregory Hills Drive to the South (Figure 2). The land borders the Camden-Campbelltown Local Government Area boundary to the west and is situated within the Scenic Hills Protection Area.

The site is occupied by an operational golf course known as Macarthur Grange Golf Club which utilises approximately 71.9 ha of the northern most land. The balance of the land comprises largely degraded Cumberland Plain vegetation and cleared low density grazing patches. The bushland section of the study area also consists of a series of undulating hills. This area is characterised by large patches of interconnecting woodland with several open grasslands and shrublands. Several artificial wetlands also exist toward the southern end of this area. Cattle grazing has occurred within this area.

1.3 Planning proposal

The site is subject to a Planning Proposal which seeks to rezone the site from C3 Environmental Management to a range of zones including C2 Environmental Conservation, C4 Environmental Living and RE1 Public Recreation and to allow additional permitted uses on part of the site fronting Raby Road to support a future function centre, restaurant and café use.

The Planning Proposal would facilitate development of the site for:

- 52 rural residential / environmental living lots with lots sizes ranging from 0.5ha to 3.2ha
- A large lot fronting Raby Road of around 6h to support a function centre / restaurant / cafe use in the location of the existing club house
- A conservation reserve and open space to be dedicated to Council comprising around 50% of the site.

The Planning Proposal seeks to deliver a long-term sustainable land use strategy for an important component of Campbelltown local government area's long established and highly valued Scenic Hills landscape unit.

On 12 July 2022 Campbelltown Council determined to support and forward the Planning Proposal to the Department of Planning, Housing and Infrastructure for Gateway Determination. A Gateway Determination was subsequently issued by Department of Planning, Housing and Infrastructure on the 6 December 2023 endorsing the Planning Proposal to proceed to public exhibition subject to conditions.

1.4 Scope of works

This report will accompany a planning proposal for the rezoning of the study area. The purpose of this report is to:

- document the existing environment, based on the methodology and results of field survey

- outline the legislative context for the proposal
- discuss potential impacts associated with the proposal
- determine what further assessment would be required at the DA stage
- identify and describe any ecological constraints.

Figure 2: Location of the study area

2. Legislative Context

Table 1: Legislative context table

Name	Relevance to the project
Commonwealth	
Environment Protection and Biodiversity Conservation Act 1999	The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) aims to protect Matters of National Environmental Significance (MNES), including vegetation communities and species listed under the EPBC Act. If a development is likely to have a significant impact on MNES, it is likely to be considered a 'Controlled Action' by the Commonwealth and requires assessment and approval by the Commonwealth to proceed. While a Planning Proposal is not an 'action' under the EPBC Act, this report describes the presence of potential MNES within the study area.
State	
Environmental Planning and Assessment Act 1979	The EP&A Act is the principal planning legislation for NSW. It provides a framework for the overall environmental planning and assessment of development proposals. The proposed rezoning is to be assessed under Part 3 of the EP&A Act. The Act provides for the creation of the SEPPs, LEPs and Development Control Plans described below.
Biodiversity Conservation Act 2016	The *Biodiversity Conservation Act 2016* (BC Act) outlines the assessment requirements to determine whether a proposed development (Part 4 of the EP&A Act) is likely to significantly affect threatened species or ecological communities, or their habitats under section 7.3, and whether the Biodiversity Offsets Scheme (BOS) will be triggered. While Planning Proposals do not trigger the BOS, this report lists the potential impacts that may trigger the BOS at the Development Application (DA) stage. The BOS triggers include: • removal of native vegetation greater than the minimum lot size threshold • impacts to land that is mapped as having high biodiversity value on the Biodiversity Values Map or is considered to have Outstanding Biodiversity Value • if the development is determined to have a significant impact on any threatened flora, fauna or ecological communities listed under the BC Act (through the application of s7.3).
Environmental Planning Instruments	
State Environmental Planning Policy (Koala Habitat Protection) 2021	The aim of the State Environmental Planning Policy (Koala Habitat Protection) 2021 is to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline. The City of Campbelltown Local Government Area (LGA) is a listed LGA for which the State Environmental Planning Policy (Koala Habitat Protection) 2021 applies. Under the State Environmental Planning Policy (Koala Habitat Protection) 2021 any land that is mapped on the Koala Development Application map required a Koala Plan of Management. Campbelltown City Council's Comprehensive Koala Plan of Management 2018 approved under the current SEPP in 2020. The Comprehensive Koala Plan of Management applies to this project; however, the SEPP does not apply to Part 3 EP&A Act proposals, and future implications of the rezoning should be considered. If the proponent chooses to proceed under a Part 4 development application (DA) then Part 2, clause 10 of the Koala SEPP applies to development which is proposed to occur on land in which there is an approved koala plan of management (KPM). The Campbelltown Comprehensive Koala Plan of Management (CCKPoM) was approved in 2018 and applies to the study area. Council's determination of a development application for the study area must be consistent with the CKPoM. More information relating to this SEPP can be found in Section 5.5.1 of this report.

Name	Relevance to the project
State Environmental Planning Policy (Sydney Region Growth Centres) 2006 (Sydney Region Growth Centres SEPP)	Two sections of the study area are biodiversity certified (subject land) according to Part 7 (*Bio certification of the Sydney Region Growth Centres SEPP and related EPIs)* of Schedule 7 of the *Threatened Species Conservation Act 1995* (TSC Act). In August 2017 the BC Act was gazetted and the TSC Act was repealed. Under Section 43 of the *Biodiversity Conservation (Savings and Transitional) Regulation 2017*. Land that was biodiversity certified under the now repealed TSC Act is still considered biodiversity certified under the BC Act.
Campbelltown Local Environmental Plan 2015	The subject site is zones as C3: Environmental Management. No areas of within the study area have been mapped as Terrestrial Biodiversity, riparian lands, wetlands, or the environmentally sensitive lands layers under the Campbelltown Local Environmental Plan 2015.

3. Methodology

3.1 Literature review and database search

A review of the available databases pertaining to the ecology and environmental features of the subject site and surrounding area, and existing vegetation mapping was conducted to identify records of threatened species, populations and communities and their potential habitat. Databases and vegetation mapping that were reviewed included:

- BioNet (Atlas of NSW Wildlife) database search (DPE 2024a) (5 km) threatened species, populations and ecological communities listed under the BC Act and EPBC Act
- Biodiversity Values Map (DPE 2023)
- NSW Planning Portal (DPE 2023)
- EPBC Act Protected Matters Search Tool (DCCEEW 2024a) (5 km) for threatened and migratory species, populations and ecological communities listed under the EPBC Act
- Aerial photography and vegetation mapping (OEH 2016) to assess the extent of vegetation including mapped threatened ecological communities (TECs) listed under the BC Act and / or the EPBC Act.

Aerial photography (Nearmap and Google Earth) of the study area and the surrounds were also used to investigate the extent of vegetation cover and landscape features. In addition, relevant Geographic Information System (GIS) databases (soil, geology, drainage) were reviewed. Threatened species and communities identified from both the BioNet and Protected Matters Search tool were combined to produce a Likelihood of occurrence table. This can be found in Appendix A.

3.2 Field Surveys

Field surveys were conducted on 24, 25, 27 and 30 March 2020 by ELA ecologists Griffin Taylor-Dalton, Alex Gorey, and Mike Lawrie. The field survey aimed to:

- validate the existing vegetation mapping, assign a best-fit Plant Community Type (PCT), and determine the condition and extent
- assess threatened flora and fauna habitat
- map any hollow bearing trees or other habitat features such as waterbodies, rocky outcrops, or woody debris
- opportunistically record threatened flora and fauna sightings.

3.2.1 Vegetation Communities

The study area was traversed to validate the vegetation communities, confirm their extent, and provide a condition. To further assist and quantify the vegetation condition, 13 vegetation integrity plots were conducted using the Biodiversity Assessment Method (BAM) (DPE 2020). These plots were conducted across the whole study area.

In June 2022 DPE revised the classification of Plant Community Types (PCT) in eastern NSW. At the time of the original vegetation survey the old PCT names were in use.

In February 2024, data from the 13 BAM plots were entered into the DPE Plot to PCT Assignment Tool-Eastern NSW PCT Classification Version 1.1 (DPE 2022). Results from the tool were then used to assign the new PCT names to the vegetation zones within the subject site.

If data collected from the BAM plots is less than five years old, this information can be used for future impact assessments at the DA stage. Data used in BAM has a five-year currency. Once the data are no longer current, they can inform an assessment, but new survey must be carried out.

3.2.2 Threatened Fauna and Flora

Any opportunistic sightings of threatened species were noted, and GPS waypoints were taken at their location. Any habitat trees that were identified during the field surveys were also marked spatially using a handheld GPS unit.

3.2.3 Ecological constraints

ELA conducted four technical revisions of proposed masterplan layouts to assist the proponent in achieving the most viable development footprint whilst considering the avoid, minimise, and mitigate principles. These iterations are shown in section 5.1 (Figures 18-21). Each masterplan revision was based on assessing the footprint against the type and quantity of impacts that would have been likely to occur. Approvals pathways were also considered. Under the *Biodiversity Conservation Act 2016* (BC Act), the key consideration for the Masterplan was to assess the ecological risks and the environmental impact approvals (EIA) process for future development. The advice concentrated on how the masterplan would:

- Trigger the biodiversity offsets scheme (BOS) by
  - affecting land mapped on the Biodiversity Values Map
  - clearing more than the minimum lot size threshold (for this site that is 1 ha)
  - significantly affecting any threatened flora, fauna, or ecological community.
- Once triggered, the BOS requires that impact is assessed through a Biodiversity Development Assessment Report (BDAR). The requirements of the BDAR are specified in the BC Act and *Biodiversity Conservation Regulation 2017* (BC Regulations). Critical issues for this site are the potential for proposed impacts to be considered serious and irreversible impacts (SAII) by the approval authority (Council) and the cost of offsetting residual unavoidable impacts.

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) aims to protect Matters of National Environmental Significance (MNES) (DCCEEW 2024b), including vegetation communities and species listed under the EPBC Act. If a development is likely to have a significant impact on MNES, it is likely to be considered a 'Controlled Action' by the Commonwealth and requires assessment and approval by the Commonwealth to proceed. The planning proposal is not an 'action' under the EPBC Act, the constraint categories in Table 2 consider how viable the future development as proposed in the masterplan iterations would be.

Table 2: Constraint ratings and reasoning

Constraint rating	Reason
Very high	• listed as a threatened ecological community under the BC Act or EPBC Act and in good condition • is listed as a threatened species or migratory species under the BC Act or EPBC Act

Constraint rating	Reason
	• areas mapped under the biodiversity values map • is listed as a serious and irreversible impact under the BC Act
High	• listed as a threatened ecological community under the BC Act and in moderate condition • areas mapped under the biodiversity values map
Moderate	• vegetation communities in poor condition or a derived form (derived native shrubland or derived native grassland) • vegetation that could provide threatened species habitat
Low	• areas that do not contain any native vegetation or threatened species • areas that are biodiversity certified

3.3 Survey Limitations

Targeted surveys for threatened flora and fauna were not conducted as a part of this assessment. Instead, a habitat assessment was made to inform the likelihood of any threatened species occurring, or having the potential to occur, within the study area.

4. Results

4.1 Literature review and database search

4.1.1 Vegetation communities

A review of the available vegetation mapping (DPE 2023) identified five vegetation communities that have been regionally mapped within the study area (Figure 3):

- PCT 3318 Cumberland Moist Shale Woodland
- PCT 3319 Cumberland Shale Hills Woodland
- PCT 3320 Cumberland Shale Plains Woodland
- PCT 4023 Coastal Valleys Riparian Forest
- PCT 4025 Cumberland Red Gum Riverflat Forest.

Areas that have not been mapped as PCTs consist of exotic species, urban exotic and native shrubs and undifferentiated regenerating shrubs.

The BioNet Atlas 5 km search returned a total of 11 threatened ecological communities which are known, likely or have potential to occur within the subject site.

4.1.2 Threatened flora and fauna

The BioNet Atlas 5km search returned 32 threatened Flora and 65 threatened Fauna species known, likely or with potential to occur within the subject site.

No threatened fauna or flora have been previously recorded with BioNet within the study area (Figure 4), however *Pimelea spicata* (Spiked Rice-flower) has been previously recorded by Anne Clements and Associates in 2007, in the study area (Figure 5). Further surveys will be required for *Pimelea spicata* in the areas that are highlighted in Figure 5.Figure 5. Previous *Pimelea spicata* records (Anne Clements 2007)

4.1.3 Biodiversity Values Map

A large proportion (23.14 ha) of the study area is mapped on the Biodiversity Values Map (DPE 2024 - Figure 6).

4.1.4 Biodiversity certified land

Two sections of the study area are mapped as being biodiversity certified under the State Environmental Planning Policy (Sydney Region Growth Centres) 2006 (Figure 7). Under this SEPP an assessment of the likely impact on biodiversity of development on biodiversity certified land is not required for the purposes of Part 4 of the EP&A Act. However, assessment of the proposed development consistent with the *Water Management Act 2000* and the *Fisheries Management Act 1994* will still be required.

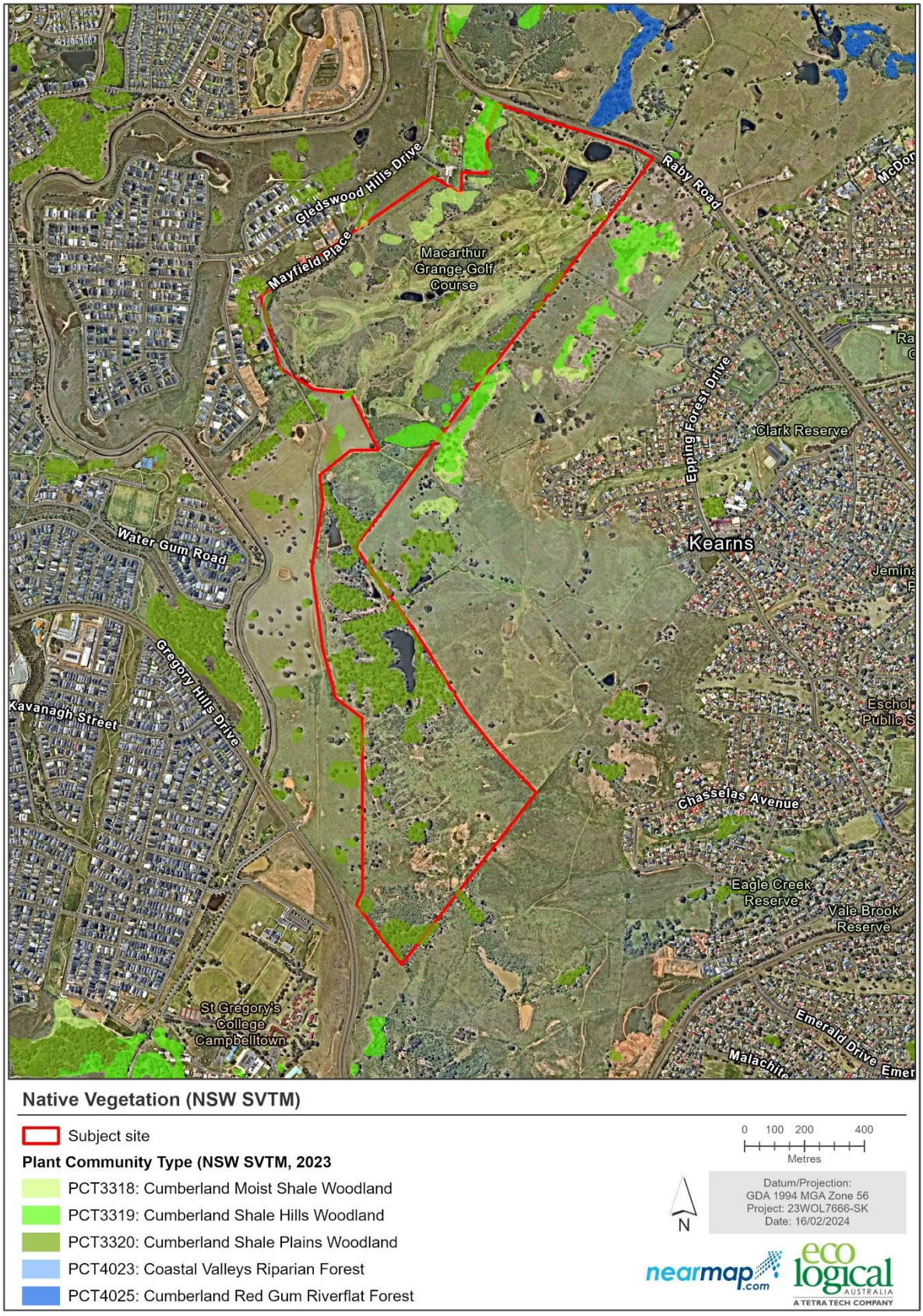

Figure 3: Vegetation mapping across the study area (DPE 2023)

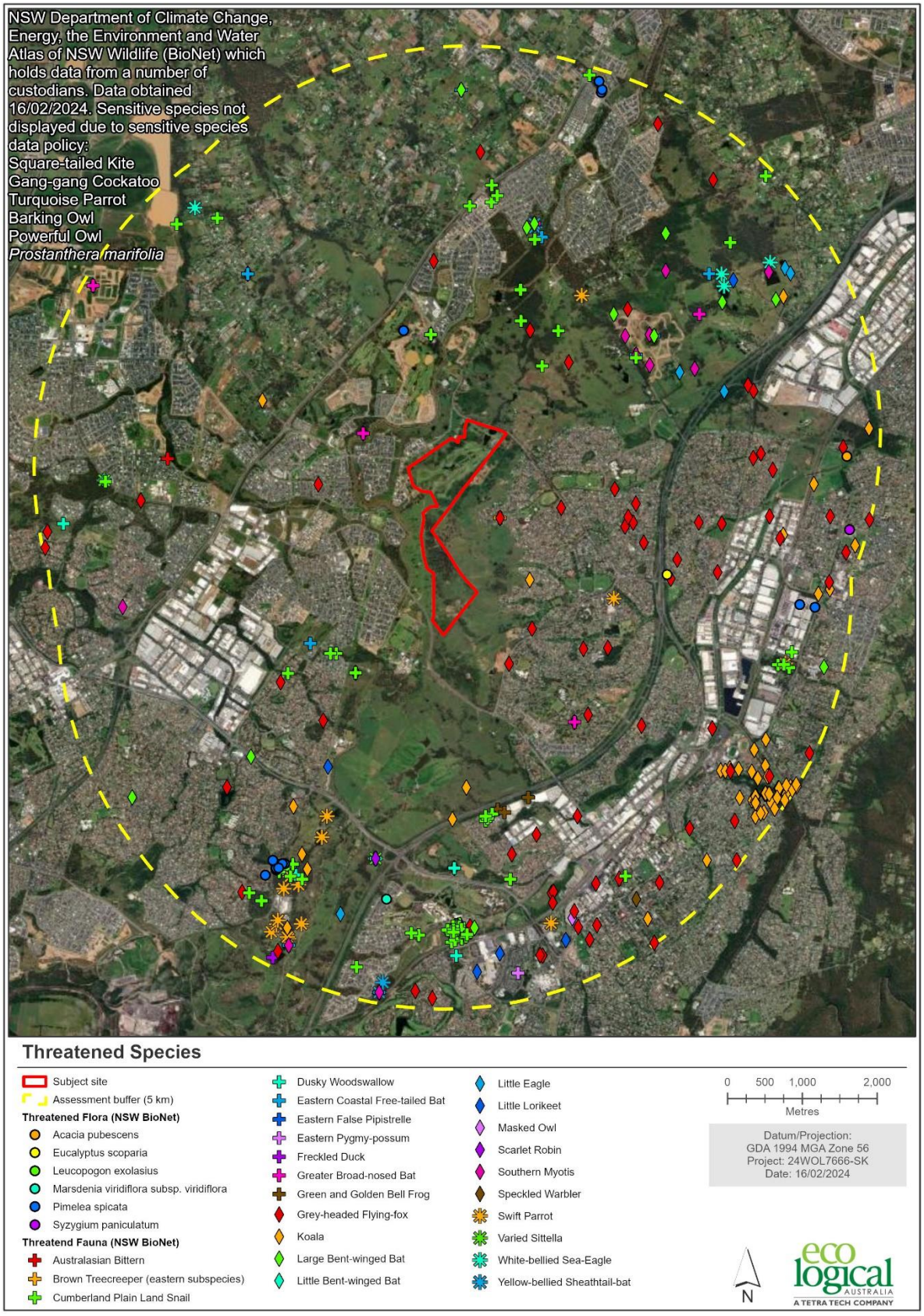

Figure 4: BioNet Atlas search results for 5 km from the study area

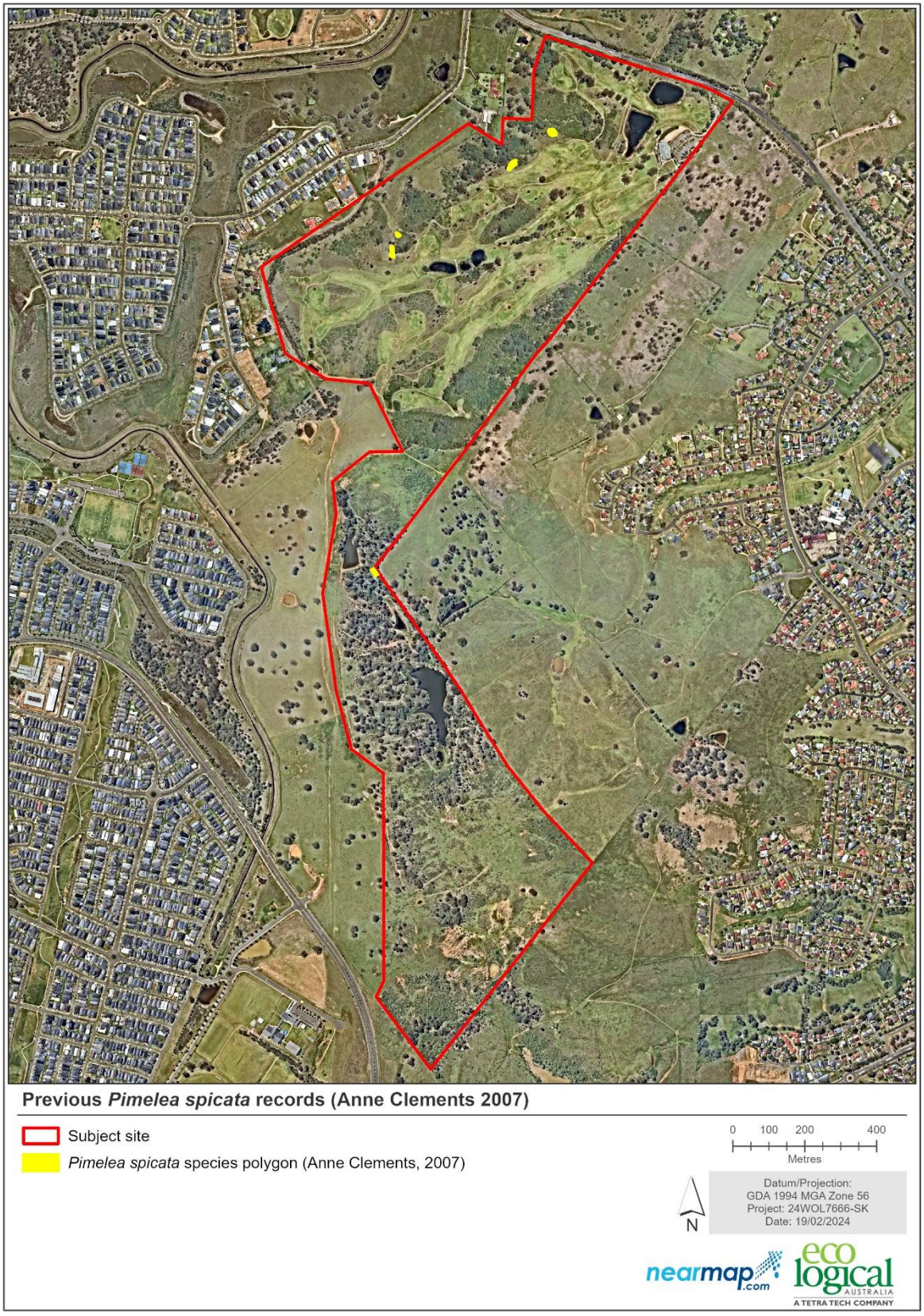

Figure 5. Previous *Pimelea spicata* records (Anne Clements 2007)

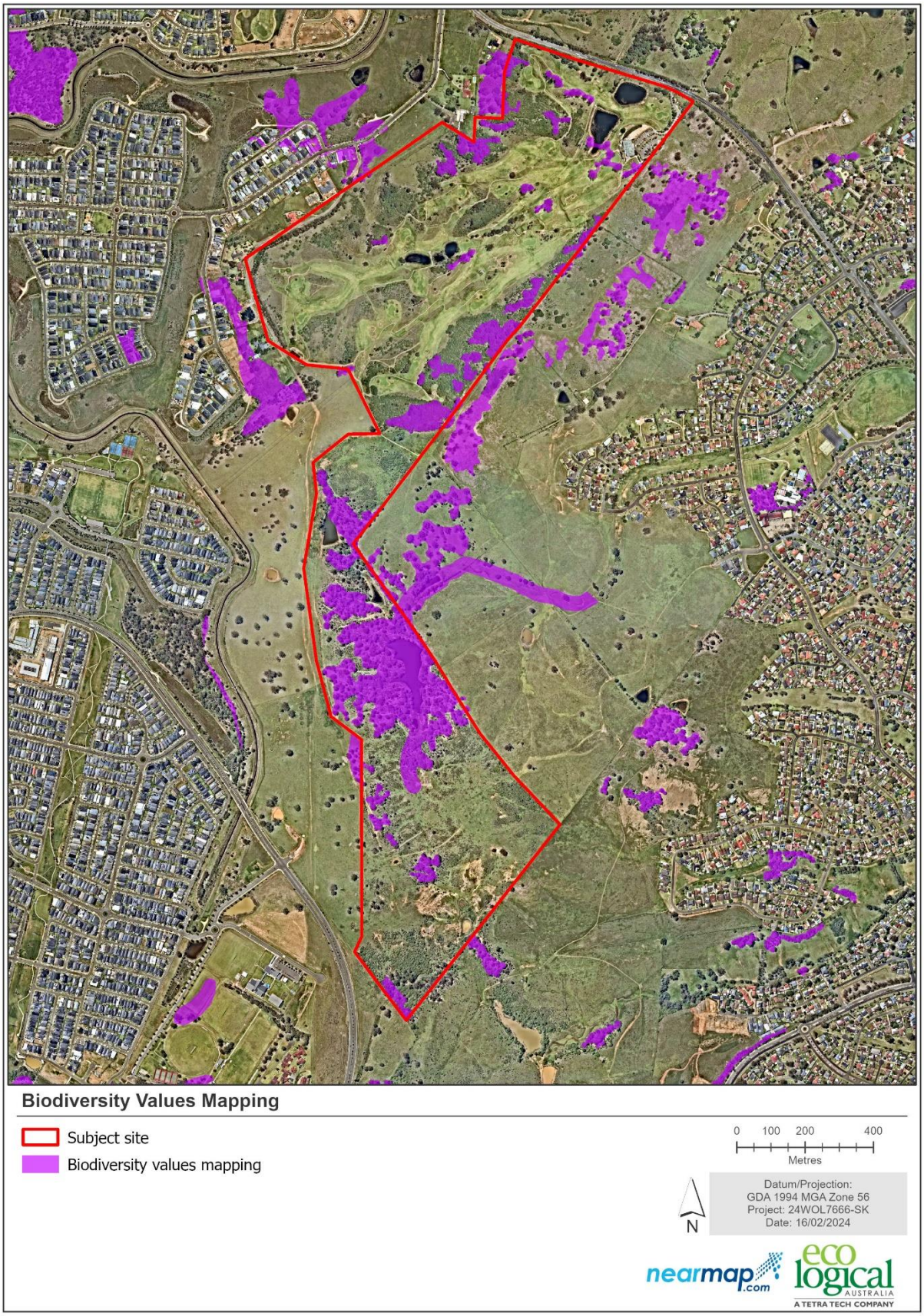

Figure 6: Biodiversity Values mapping across the study area (February 2024)

Figure 7: Biodiversity Certified land across the study area

4.2 Field Survey Results

4.2.1 Vegetation communities

The field survey conducted in March 2020 identified three plant community types (PCTs) and one vegetation community that did not meet a PCT, in the study area. PCTs were revised and assigned to an equivalent PCT under their equivalent under the new Eastern NSW PCT Classification Version 1.1 (DPE 2022). The Plot to PCT tool (NSW DPE 2022) was used to assist in determining the equivalent new PCT. PCT's within the study area are as follows:

- PCT 4025 Cumberland Red Gum Riverflat Forest
- PCT 3319 Cumberland Shale Hills Woodland
- PCT 3975 Southern Lower Floodplain Freshwater Wetland.

The PCTs were refined into vegetation zones based on structural complexity and condition. Two threatened ecological communities were identified within the study area:

- Cumberland Plain Woodland in the Sydney Basin Bioregion (BC Act) – corresponds to PCT 3319
- Cumberland Plain Shale Woodlands and Shale Gravel Transition Forest (BC Act and EPBC Act) – corresponds to PCT 3319

The condition thresholds for Cumberland Plain Woodland were applied all zones of PCT 3319 Cumberland Shale Hills Woodland to determine whether they met the EPBC Act definition of the community. Each zone was assessed against the criteria outlined in Table 3. Where a zone met EPBC Act definition it is discussed in sections 4.2.2.2 to 4.2.2.6.

4.2.2 Justification for selection of PCTs

PCT 4025 Cumberland Red Gum Riverflat Forest was assigned patches because:

- the study area is located in the Sydney Basin Bioregion and the Cumberland subregion, in which this PCT is known to occur
- the patches were located along previously mapped streams or watercourses along flats / depressions at the base of hills
- the canopy species were comprised of species typical to the community, including *Casuarina glauca* and *Melaleuca styphelioides*.

PCT 3319 Cumberland Shale Hills Woodland was assigned because:

- the study area is located in the Sydney Basin Bioregion and the Cumberland subregion, in which this PCT is known to occur
- the patches occurred on hills or at higher elevations
- the canopy species were comprised of species typical to the community, including *Eucalyptus moluccana* (Grey Box), *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus crebra* (Narrow-leaved Ironbark) and *Bursaria spinosa* (Native Blackthorn).

Where the community occurred in derived forms of shrubland and grassland, the community occurred at the same landscape position as intact patches of the community and were comprised of midstorey and groundcover species typical to the community.

PCT 3975 Southern Lower Floodplain Freshwater Wetland was assigned because:

- the study area is located in the Sydney Basin Bioregion and the Cumberland subregion, in which this PCT is known to occur
- the PCT includes artificial waterbodies
- the vegetation was comprised of sedges and rushes typical to the community.
- This PCT corresponds with the Endangered Ecological community (EEC) Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions listed under the BC Act. However, PCT 3975 within the study area does not form part of the EEC under the Scientific Determination (NSW DPE, 2010) because it is present as an artificial wetland created on previously dry land for farm production purposes.

Table 3: EPBC Act condition thresholds for patches that meet the description of Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest

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

Category and rational	Threshold
	upper tree layer species outlined in the Description and Appendix A.

Table 4: PCTs, their condition and extent validated in the study area during survey

PCT	Scientific name	Condition	BC Act listing	EPBC Act listing	Area (ha)
4025	Cumberland Red Gum Riverflat Forest	Poor	E - River-flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions	CE - River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	0.80
3319	Cumberland Shale Hills Woodland	Good	CE - Cumberland Plain Woodland in the Sydney Basin Bioregion	CE - Cumberland Plain Shale Woodlands and Shale Gravel Transition Forest	16.90
3319	Cumberland Shale Hills Woodland	Moderate	CE - Cumberland Plain Woodland in the Sydney Basin Bioregion	CE - Cumberland Plain Shale Woodlands and Shale Gravel Transition Forest	3.19
3319	Cumberland Shale Hills Woodland	Poor	CE - Cumberland Plain Woodland in the Sydney Basin Bioregion	N/A	4.36
3319	Cumberland Shale Hills Woodland	Derived native shrubland	CE - Cumberland Plain Woodland in the Sydney Basin Bioregion	N/A	17.45
3319	Cumberland Shale Hills Woodland	Derived native grassland	CE - Cumberland Plain Woodland in the Sydney Basin Bioregion	N/A	10.28
3975	*Southern Lower Floodplain Freshwater Wetland*	Artificial wetland - Moderate	E - Freshwater Wetlands on Coastal Floodplains of the New South Wales North Coast, Sydney Basin, and South East Corner Bioregions (not considered EEC due to it being artificial wetlands in farm dams)	N/A	0.05
N/A	Exotic / cleared land	Low	N/A	N/A	74.58
				Total	**127.61**

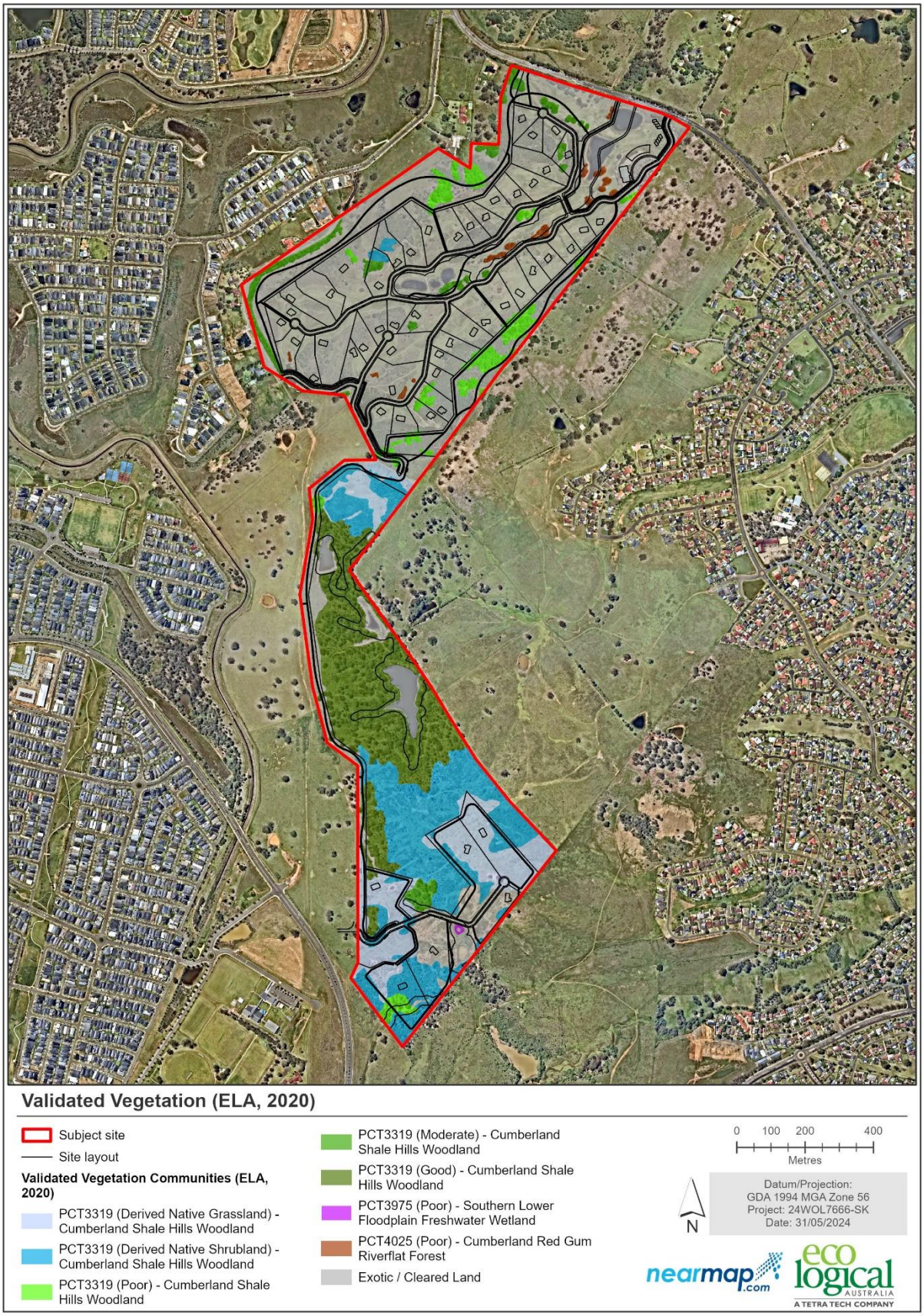

Figure 8: Validated vegetation communities

4.2.2.1 PCT 4025: Cumberland Red Gum Riverflat Forest (poor)

Several small patches of PCT 4025 were identified within the study area, equating to 0.8 ha. These patches were highly modified, often lacking structural complexity and species diversity. Diagnostic canopy species that were identified within this vegetation zone included *Eucalyptus tereticornis* (Forest Red Gum), *Casuarina glauca* (Swamp Oak) and *Angophora floribunda* (Rough-barked Apple). The midstorey was mostly absent within this vegetation zone with only *Melaleuca styphelioides* (Prickly-leaved Tea Tree) and the exotic species *Olea europaea* subsp. *cuspidata* (African Olive). The ground cover was dominated by exotic species. The most abundant exotic species included *Paspalum dilatatum* (Paspalum), *Cenchrus clandestinus* (Kikuyu), *Eleusine tristachya* (Goose Grass) and *Alternanthera pungens* (Khaki Weed). Native species including *Galium binifolium* subsp*. binifolium* and *Dichondra repens* (Kidney Weed) were present though uncommon. While the areas mapped as PCT 4025 consisted of more than 0.5 ha, the patches contained less than 50% native species in the understorey. Therefore the patches of PCT 4025 did not met the definition of River-flat Eucalypt Forest (*River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin, and South East Corner Bioregions)* under the EPBC Act.

Figure 9: PCT 4025 (poor) within the study area

4.2.2.2 PCT 3319: Cumberland Shale Hills Woodland (good)

A large proportion of the vegetation within the southern area of study area was identified as being good condition PCT 3319. These patches were mapped as good condition due to the cover and diversity of native species within this vegetation zone. Diagnostic canopy species that were identified included *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus moluccana* (Grey Box) and *Eucalyptus crebra* (Thin-leaved Ironbark). The midstorey was dominated by large patches of *Bursaria spinosa* (Native Blackthorn) with the occasional *Acacia floribunda* (White Sally Wattle) and the exotic species *Olea europaea* subsp*. cuspidata* (African Olive). The ground cover was dominated by native species. Native grasses included *Aristida ramosa* (Purple Wiregrass), *Bothriochloa macra* (Red Grass), *Microlaena stipoides* var. *stipoides* (Weeping Grass) were common and often the dominant species within the ground cover layer. Native forbs and sedges such as *Brunoniella australis* (Blue Trumpet), *Dichondra repens* (Kidney Weed) and *Cyperus gracilis* (Slender Flat-sedge) were also common.

All patches of good condition PCT 3319 met **condition A** EPBC Act definition of the community because:

- the patch size was >0.5 ha
- the perennial understorey comprised >50% native species.

Figure 10: PCT 3319 (good) within the study area

4.2.2.3 PCT 3319: Cumberland Shale Hills Woodland (moderate)

Moderate condition patches of PCT 3319 were scattered throughout the study area. Similar to the good condition patches, *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus moluccana* (Grey Box) were the dominate species within the canopy. Native cover within the midstorey was minimal. Exotic species including *Olea europaea* subsp*. cuspidata* (African Olive) and *Lantana camara* (Lantana) were the most dominant. Native grasses were prominent within the ground cover layer. These species included *Aristida ramosa* (Purple Wiregrass), *Cymbopogon refractus* (Barbed Wire Grass) and *Themeda triandra* (Kangaroo Grass). Exotic species such as *Cyperus brevifolius* (Mullumbimby Couch), *Chloris gayana* (Rhodes Grass) and *Paspalum dilatatum* (Paspalum) were also common. In areas where >30% native ground cover occurred, the patch did not contain any trees with a DBH >80 cm or trees with hollows. In most patches there was less than 30% native ground cover. As a majority of the patches contained less than 30% native perennial understorey vegetative cover, this zone does not meet the EPBC Act definition of the community.

Figure 11: PCT 3319 (moderate) within the study area

4.2.2.4 PCT 3319: Cumberland Shale Hills Woodland (poor)

Poor condition PCT 3319 distinctly lacked complexity and was often dominated by exotic species. The canopy contained a sparse cover of *Eucalyptus moluccana* (Grey Box). The midstorey within this vegetation zone was heavily infested with *Olea europaea* subsp*. cuspidata* (African Olive) and *Lycium ferocissimum* (African Boxthorn) and *Lantana camara* (Lantana) present, but less common. There was very little species diversity within the ground cover layer. Most native species were recorded in low abundance. This is likely due to the shading effect created by the *Olea europaea* subsp. *cuspidata* (African Olive). Where native ground cover was present, species included *Dichondra repens* (Kidney Weed), *Cymbopogon refractus* (Barbed Wire Grass) and *Glycine tabacina.*

This zone was considered unlikely meet the EPBC Act definition of the community due to the absence of >30% native groundcover.

Figure 12: PCT 3319 (poor) within the study area

4.2.2.5 PCT 3319: Cumberland Shale Hills Woodland – (derived native shrubland)

Several patches of derived native shrubland were identified across the study area. These shrublands were attributed to the PCT 3319 Cumberland Shale Hills Woodland: Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion. No canopy species were present. The zone was defined by having a high abundance of *Bursaria spinosa* (Native Blackthorn), these patches were generally dominated by native species in both the mid and ground strata. There were few individuals of *Lantana camara* (Lantana) or *Olea europaea* subsp*. cuspidata* (African Olive). *Aristida ramosa* (Purple Wiregrass) was the most abundant species within the groundcover, followed by other native species including *Bothriochloa macra* (Red Grass) and *Themeda triandra* (Kangaroo Grass). Notably, the exotic grasses *Paspalum dilatatum* (Paspalum) and *Setaria parviflora* (Pigeon Grass) were also common throughout all patches of derived native shrubland.

Figure 13: PCT 3319 (derived native shrubland) within the study area

4.2.2.6 PCT 3319: Grey Box – Cumberland Shale Hills Woodland – (derived native grassland)

For the purposes of our assessment, ELA used >30% cover of native ground cover species as a benchmark for determining whether a grassland was either derived native grassland (DNG) or exotic. The BAM currently states that grasslands with greater than 15% native vegetation cover are to be considered when determining extent of impacts to native vegetation. Therefore, a benchmark of >15% should be used to determine whether a grassland is considered derived native grassland or exotic. ELA would need to revisit the study area to confirm the extent of (DNG). ELA has also taken into consideration the definition of 'derived vegetation' under the BAM (DPE 2020).

Numerous patches of derived native grasslands were identified within the southern section of the study area. Like the derived native shrublands, these grasslands were attributed to the PCT 3319 Cumberland Shale Hills Woodland: Grey Box – Forest Red Gum grassy woodland on shale of the southern Cumberland Plain, Sydney Basin Bioregion. These grasslands were characterised by absent canopy and midstorey strata. Across the ground cover, *Aristida ramosa* (Purple Wiregrass) and *Setaria parviflora* (Pigeon Grass) were most dominant with *Bothriochloa macra* (Wallaby Grass), *Paspalidium distans*, *Themeda triandra* (Kangaroo Grass) and *Microlaena stipoides* var. *stipoides* (Weeping Grass) also present.

Figure 14: PCT 3319 (derived native grassland) within the study area

4.2.2.7 PCT 3975: Southern Lower Floodplain Freshwater Wetland - Artificial wetland

Several artificial wetlands were identified across the study area. Plots consistent with BAM were not conducted within this PCT. Instead, a rapid vegetation assessment was conducted. Typically, these wetlands had aquatic vegetation within and surrounding them. Species such as *Typha orientalis* (Broadleaf Cumbungi) and *Juncus usitatus* were common in this PCT. Native grasses included *Cynodon dactylon* (Couch), *Rytidosperma* spp. (Wallaby Grass) and *Bothriochloa macra* (Red Grass).

Figure 15: PCT 3975 (artificial wetland) within the study area

4.2.2.8 Exotic / cleared: A combination of woody, herbaceous and grass exotic species

A large proportion of the vegetation in the study area was classified as being exotic. *Olea europaea* subsp*. cuspidata* (African Olive) occurred across the whole study area in large patches often smothering most other flora species. Grassed areas that ran parallel to the landscaped plains of the golf course were commonly dominated by both *Setaria parviflora* (Pigeon Grass) and *Paspalum dilatatum* (Paspalum). Perennial weeds such as *Gomphocarpus fruticosus* (Narrow-leaved Cotton Bush) and *Cirsium vulgare* (Spear Thistle) were also commonly identified throughout these patches.

Figure 16: Exotic/cleared vegetation within the study area

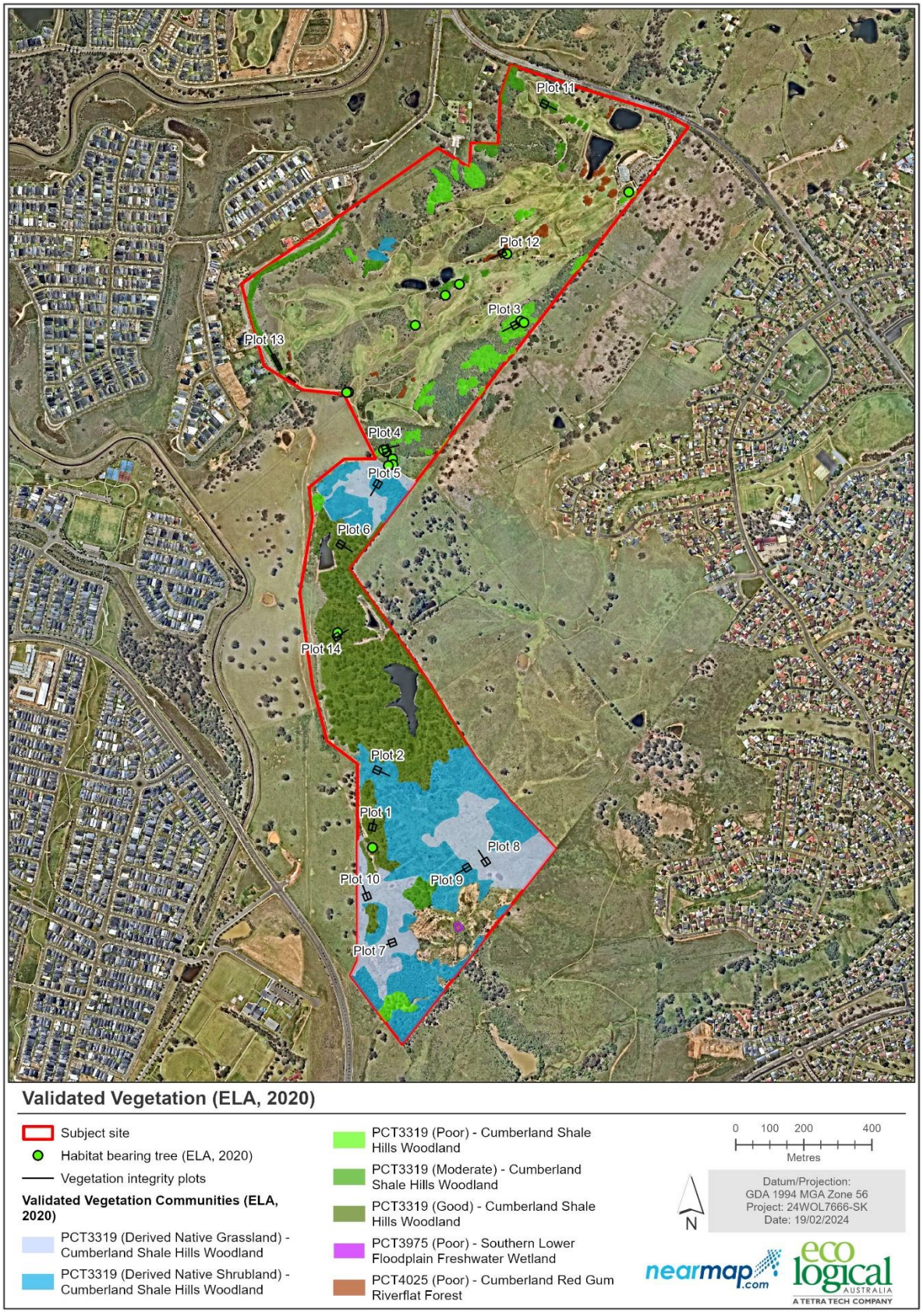

Figure 17: Validated vegetation (ELA 2024) and location of BAM plots and habitat bearing trees

4.2.3 Fauna Species and Habitat

No threatened fauna were observed during the field surveys however there is threatened fauna habitat within the study area. Table 5 outlines the potential forms of habitat across the study area. A total of 12 threatened fauna species and four threatened flora species are either known (for *Pimelea spicata* only) or likely to occur in the study area (Table 6).

Table 5: Fauna habitat breakdown across the study area

Habitat Features	Fauna likely to utilise features	Occurrence
Remnant native vegetation	Birds, megachiropteran bats (fruit bats), arboreal mammals, reptiles	The study area is comprised of large patches of native forest. Most of these patches are intact or have a limited mid-story coverage. Numerous large remnant trees are present.
Hollow-bearing trees	Birds, microchiropteran bats (microbats) and arboreal mammals (gliders and possums)	The study area contains at least 16 hollow-bearing trees (HBT). It is highly likely that there are more that were not identified during the field survey.
Stags	Birds, particularly birds of prey, reptiles, amphibians, micro bats	Several stags were observed across the study area. Similarly, to the hollow-bearing trees, it is highly likely that there are more stags that were not identified during the field survey.
Leaf litter	Reptiles, amphibians, invertebrates	Leaf litter was present in many of the small patches of native vegetation.
Coarse woody debris	Terrestrial mammals, reptiles, invertebrates	There was coarse woody debris located within the patches of Cumberland Plain Woodland.
Watercourse	Amphibians, water birds, aquatic fauna	There were several artificial wetlands located across the study area.
Vegetative corridor	Birds, reptiles, arboreal and small mammals	The study area provides some linkage to other vegetation and aquatic habitats within the locality. Bunburry Curran Creek runs through the study area and to the south and east. This corridor is partially vegetated and may act as a dispersal corridor for highly mobile fauna such as microbats and birds.

Table 6: Threatened flora and fauna species considered likely to occur in the study area

Scientific name	Common name	BC Act listing	EPBC Act listing
Fauna			
Anthochaera phrygia	Regent Honeyeater	CE	CE
Callocephalon fimbriatum	Gang-gang Cockatoo	V	-
Chalinolobus dwyeri	Large-eared Pied Bat	V	V
Lathamus discolor	Swift Parrot	CE	CE
Litoria aurea	Green and Golden Bell Frog	E	E

Scientific name	Common name	BC Act listing	EPBC Act listing
Lophoictinia isura	Square-tailed Kite	V	-
Meridolum corneovirens	Cumberland Plain Land Snail	E	-
Miniopterus australis	Little Bent-winged Bat	V	-
Miniopterus orianae oceanensis	Large Bent-winged Bat	V	-
Myotis macropus	Southern Myotis	V	-
Phascolarctos cinereus	Koala	E	E
Pommerhelix duralensis	Dural Land Snail	E	E
Flora			
Grevillea juniperina subsp. *juniperina*	Juniper-leaved Grevillea	E	-
Marsdenia viridiflora subsp. subsp. *viridiflora - endangered population*	Population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith LGAs	E2	-
Pimelea spicata	Spiked Rice-flower	E	E
Pultenaea pedunculata	Matted Bush-pea	E	-

4.3 Site Constraints

For the purposes of assisting FDP Pty Ltd in determining a final design footprint, the ecological values in the study area have been consolidated into areas of highest constraint to least constraint. Table 7 details the level of constraint that have been used and the rationale behind each.

Upon request from FDP Planning, Serious and Irreversible Impact (SAII) entities have been categorised consistent with the original constraints report submitted in 2020 (ELA 2020). However, it is important to note that a consent authority's assessment of impacts to SAII candidate entities has developed considerably since 2020. Therefore, impacts to all SAII candidate entities presents an approvals risk despite condition classes.

Table 7: Ecological constraints across the study area

Constraint	Areas included	Rationale
Very High	PCT 3319 – Good condition	**PCT 3319 in good condition** • State Approval: o PCT 3319 is a CEEC and listed as a matter subject to Serious and Irreversible Impacts (SAII) under the BC Act, the consent authority must decide whether a serious and irreversible impact will occur. These decisions can be based on any impacts to SAII regardless of the condition. o Majority of PCT 3319 on site is mapped on the Biodiversity Values map. Under the BC Act any impact on these areas would trigger the BOS. o Good condition PCT 3319 requires a higher number of credits to offset impacts once efforts to avoid and minimise impacts have been exhausted. • Federal Approval: o PCT 3319 in good condition met the EPBC Act definition of *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest*. Impact likely requires a referral to the Department of Agriculture, Water and the Environment and likely that any impact of 0.5ha or more to be determined as a controlled action.
High	PCT 3319 – Moderate condition	**PCT 3319 in moderate condition** • State Approval: o PCT 3319 is a CEEC and listed as a matter subject to Serious and Irreversible Impacts (SAII) under the BC Act, the consent authority must decide whether a serious and irreversible impact will occur. These decisions can be based on any impacts to SAII regardless of the condition. o Majority of PCT 3319 on site is mapped on the Biodiversity Values map. Under the BC Act any impact on these areas would trigger the BOS. o Moderate condition PCT 3319 require a slightly lower number of credits to offset impacts once efforts to avoid and minimise impacts have been exhausted. • Federal Approval: o PCT 3319 in moderate condition met the EPBC Act definition of *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest*. Impact requires a referral to the Department of Agriculture, Water and the Environment. Likely that any impact of 0.5ha or more to be determined as a controlled action.
Moderate	PCT 3319 – Poor condition	**PCT 3319 in poor condition, DNS and DNG, as well as PCT 4025.**

Constraint	Areas included	Rationale
	PCT 3319 – DNS PCT 3319 – DNG PCT 4025	• State Approval: o PCT 3319 (poor condition, DNS and DNG) fits the definition of the CEEC and therefore is also listed as a matter subject to Serious and Irreversible Impacts (SAII) under the BC Act, the consent authority must decide whether a serious and irreversible impact will occur. These decisions can be based on any impacts to SAII regardless of the condition. o Majority of PCT 3319 (poor and DNS) on site are mapped on the Biodiversity Values map. Under the BC Act any impact on these areas would trigger the BOS. o Poor condition and DNS PCT 3319 and PCT 4025 require fewer credits to offset impacts once efforts to avoid and minimise impacts have been exhausted. o PCT 4025 fits the definition of the EEC River-Flat Eucalypt Forest on Coastal Floodplains of the New South Wales North Coast, Sydney Basin and South East Corner Bioregions listed under the BC Act. • Federal Approval: o PCT 3319 poor condition, DNS and DNG do not meet the EPBC Act definition of *Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest*. Impacts to these areas are not likely to require a referral to the Department of Climate Change, Energy, the Environment and Water. o EPBC Act definition and condition for borderline condition communities such as these (PCT3319 DNS, DNG and PCT 4025) can be complicated. At this stage that it is unlikely for these areas to meet the EPBC Act definition
Low	• PCT 3975 • Exotic and cleared vegetation • Areas that are Biodiversity Certified	• Exotic and cleared land and areas that are Biodiversity Certified. • State Approval o Exotic vegetation does not need to be offset under the BOS o Further threatened species survey required and would be included in the BDAR at DA stage. Considered to have a low potential habitat for threatened species, impact assessment would be required. Impact not considered likely to be significant for threatened species. o Biodiversity Certified land does not require further threatened matter environmental impact assessment. • Federal Approval o Referral not likely to be required. Considered to have a low potential habitat for threatened species, impact assessment would be required. Impact not considered likely to be significant for threatened species. o Biodiversity Certified land does not require further threatened matter environmental impact assessment.

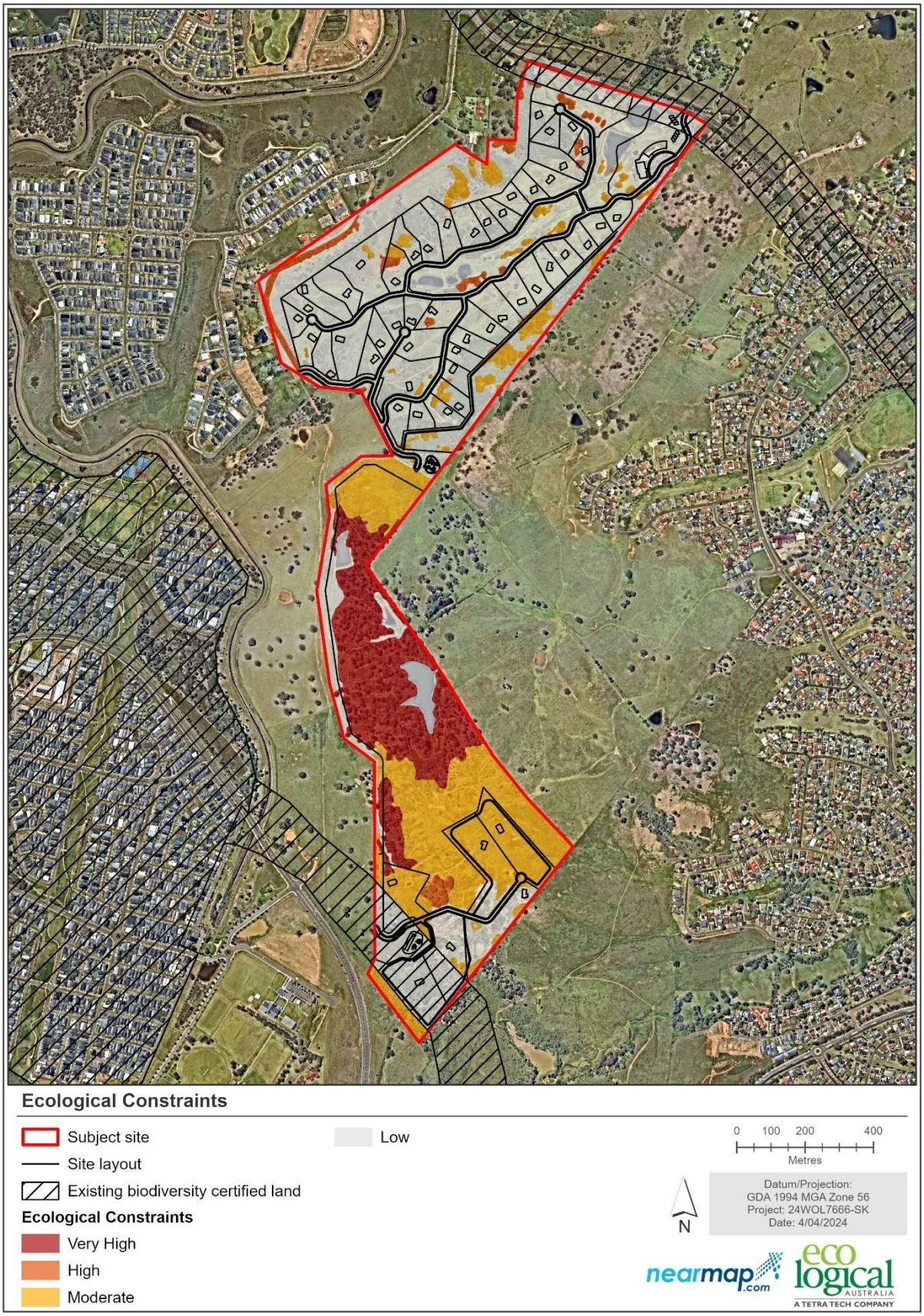

Figure 18: Areas of constraint across the study area

5. Potential impacts and approvals pathways

5.1 Avoid, minimise and mitigate

The proposed master plan for the site has undergone numerous iterations which have responded to issues raised by Council and responded to the ecological constraints on this site. This has seen a reduction from 69 rural residential lots to 52 rural residential lots and expansion of the areas reserved for conservation and open space. During this process, ELA conducted four technical revisions of proposed masterplan layouts to assist the proponent in achieving the most viable development footprint whilst considering the avoid, minimise, and mitigate principles. Each masterplan revision was based on assessing the footprint against the type and quantity of impacts that would have been likely to occur, avoiding, where possible, impacts to threatened ecological values and other constraints described in sections 3.2.3 and 4.3. The design iterations are as follows:

- July 12, 2019 initial scheme included 69 residential lots (Figure 19)
- 8 November 2019 - 60 residential lots (Figure 20)
- 27 May 2020 – 63 residential lots (Figure 21)
- Current design – 52 residential lots (Figure 22).

The final design shows a reduced lot yield with impacts concentrated in areas previously cleared or within poorer quality vegetation in an attempt to avoid areas of higher biodiversity constraints. The majority of good quality vegetation comprising higher biodiversity values are proposed to be retained and managed to ensure its protection under the C2 Environmental Conservation development controls (Campbelltown LEP 2015) as shown in proposed land zoning plan (Figure 1).

All land proposed to be zoned C2 Environmental Conservation and RE1 Public Recreation is proposed be dedicated to Council and a VPA is currently being negotiated to make arrangements for this dedication. This includes a 33 ha conservation reserve which will allow for rehabilitation and on ongoing protection of the most significant areas of vegetation on the site, being a large patch of good quality Cumberland Plain Woodland listed as critically endangered. In total around 50% of the site area would be dedicated to Council. While the proposed conservation area would protect most of the good quality vegetation within the study area, much of vegetation within the proposed conservation area is also in a degraded condition (PCT 3319, DNG, DNS or moderate). Therefore, the proposed rehabilitation of this 33 ha of land in perpetuity under a VPA with Council would be a positive impact to the existing biodiversity values in the proposed C2 rezoning area. By contrast, the current zoning C3 Environmental Management, allows a range of practices that could be harmful to the biodiversity values on the land.

At the Development Application (DA) stage all applications must be cognisant of the BC Act and the application of the mitigation hierarchy.

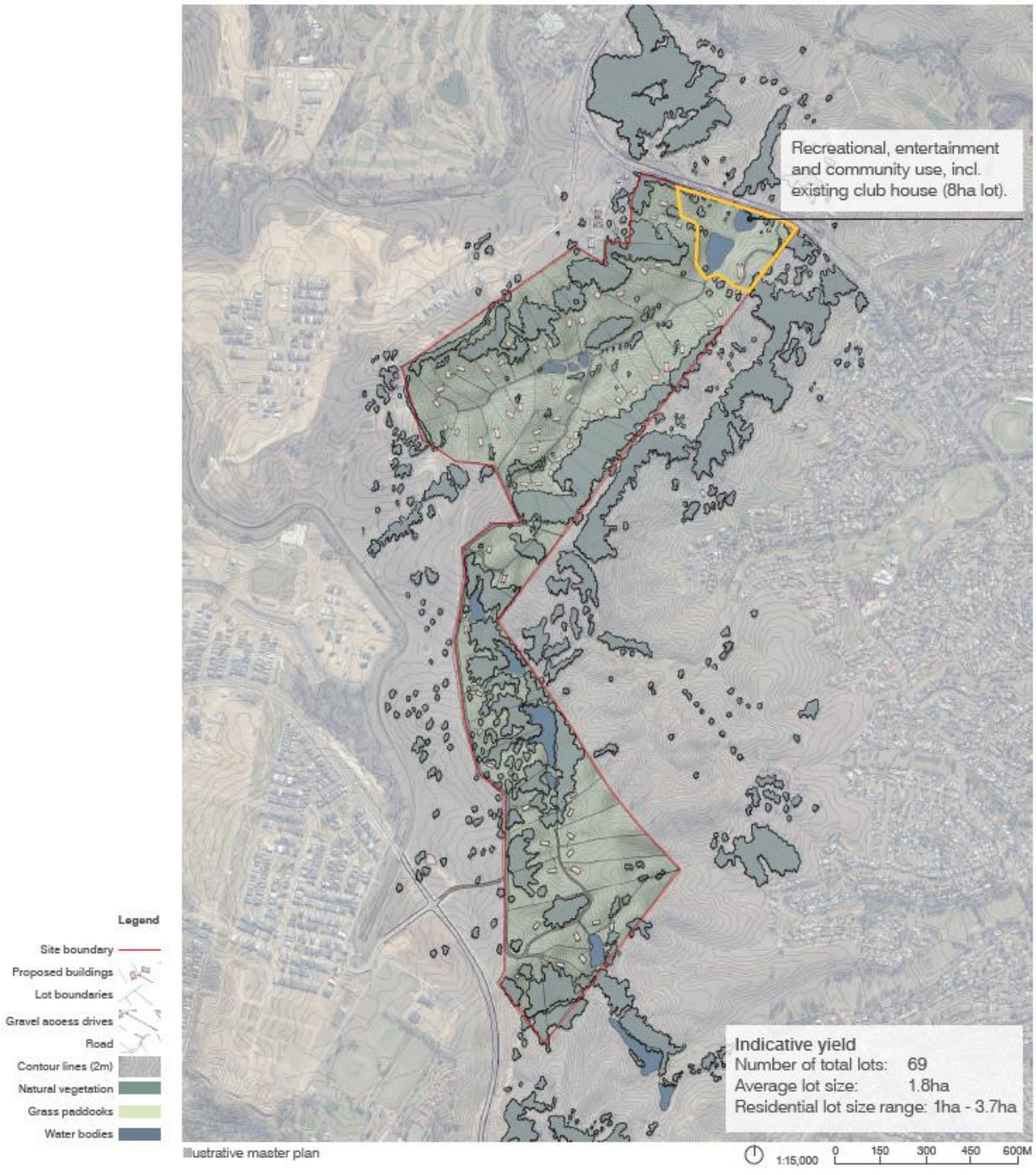

Figure 19: Original scheme Masterplan – 17 July 2019 (Source: Architectus)

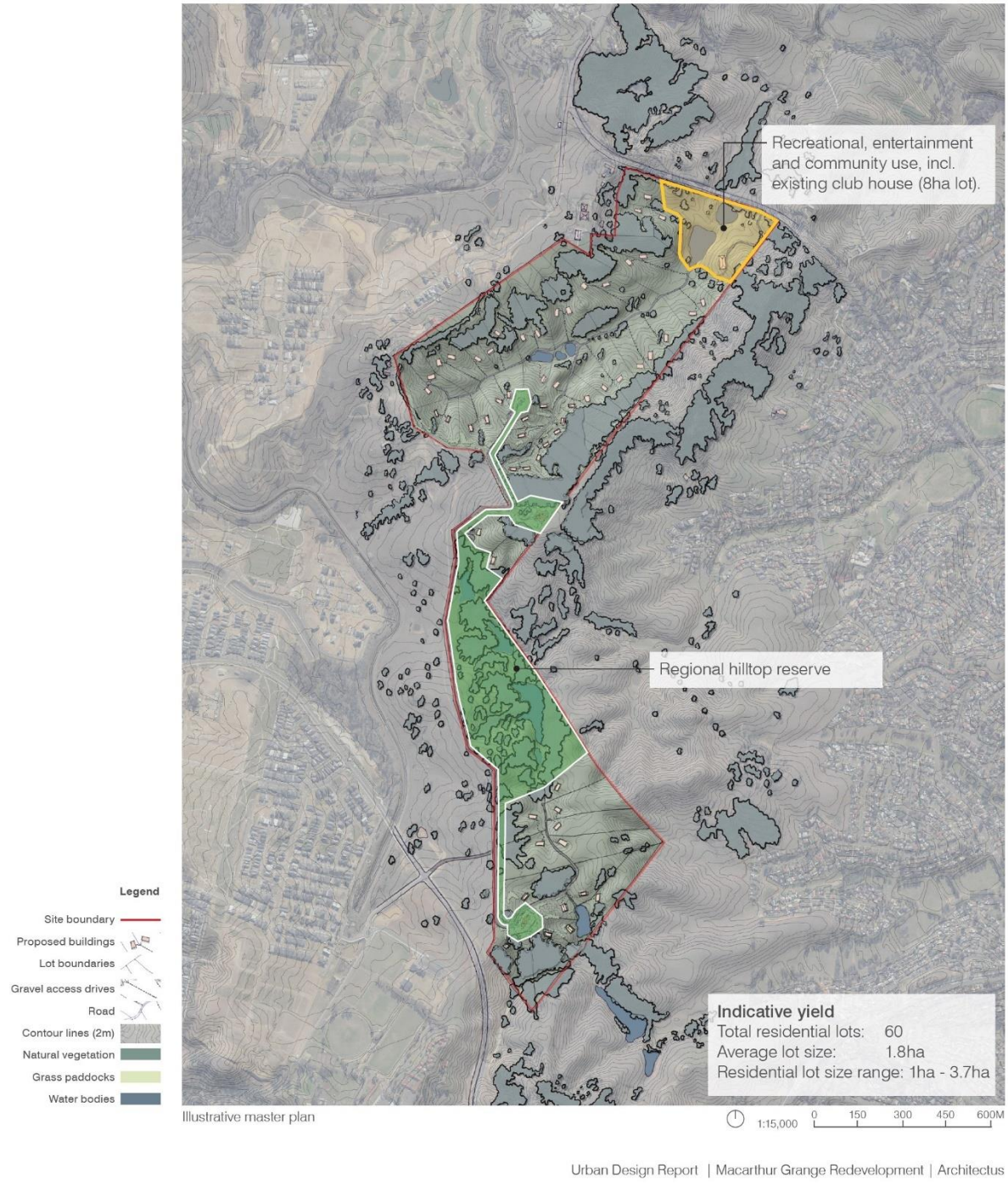

Figure 20: Illustrative masterplan - 8 November 2019 (Source: Architectus)

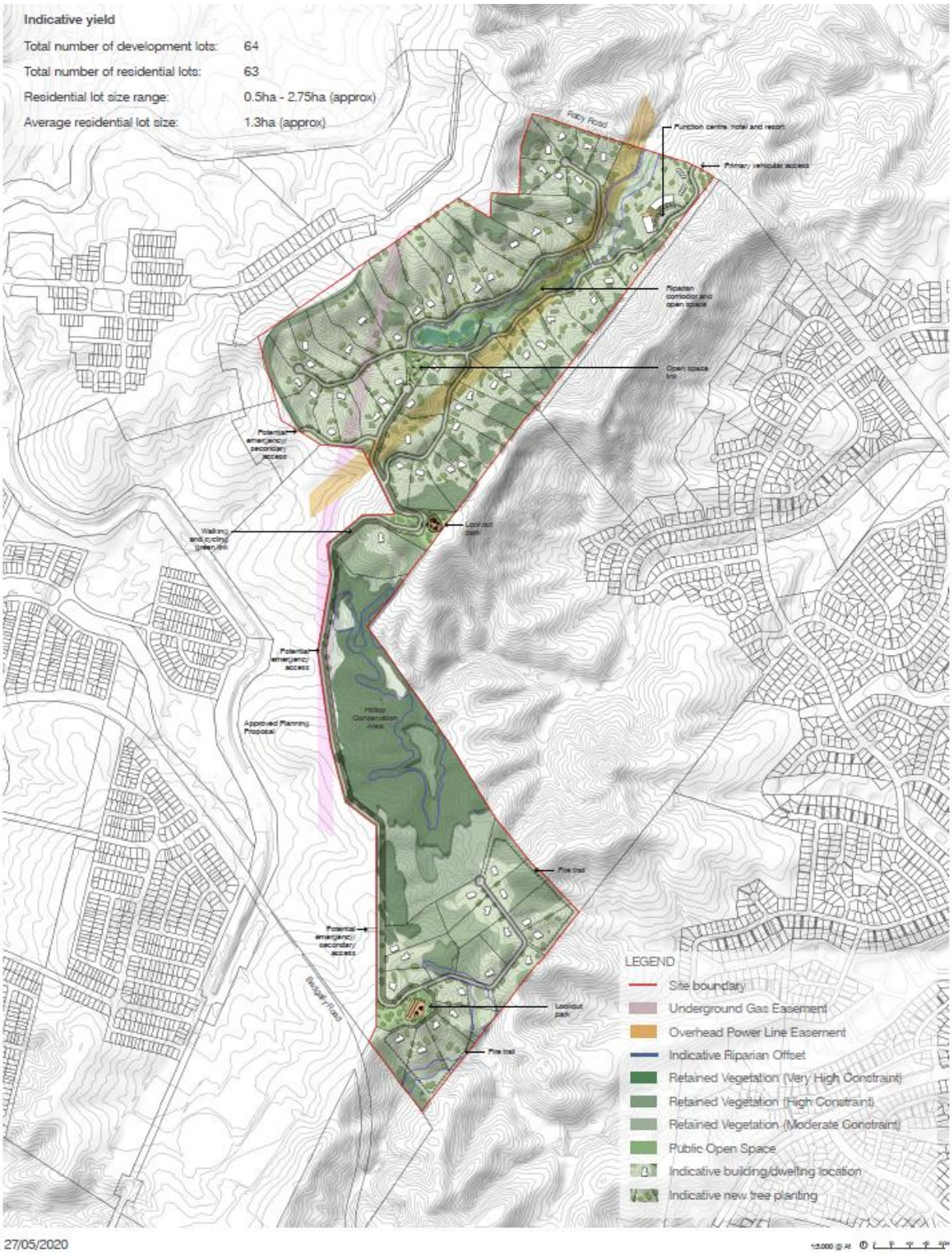

Figure 21: Illustrative Master Plan with larger lot yield (Architectus 2020)

Figure 22: Masterplan following design changes to reduce lot yield (Source Architectus 2024)

5.2 Potential direct impacts

The proposed rezoning and subsequent development would result in direct impacts on site from construction of the road and shared path network, the building footprints, open space facilities, bushfire asset protection zones (APZs) and fire-trails. These impact areas also included areas within the proposed residential lots due to the expected impacts from the proposed land use change. Specifically, impacts include areas mapped as 'managed land' and 'vegetation to be removed' in the *Bushfire Opportunities Constraints Assessment* prepared by ELA on 11 April 2024 (ELA 2024). Impact areas are shown in Figure 23 Areas of Cumberland Plain Woodland within the residential lots located outside of the APZ are proposed to be retained and would be protected under title agreements on the individual lots. Future development as a result of the proposal would have the following direct impacts (Table 8):

- removal of PCT 3319 Cumberland Shale Hills Woodland
- removal of PCT 4025 Cumberland Red Gum Riverflat Forest
- removal of habitat bearing trees
- removal of potential threatened species habitat.

Table 8: Direct impacts to vegetation within the study area

Community	Condition	Area in ha not including biocertified land	Area within biocertified land (ha)
PCT 3319 – Cumberland Plain Woodland	DNG	5.02	1.95
	DNS	1.82	1.80
	Good	0.15	0
	Moderate	0.27	0
	Poor	0.76	0.22
PCT 3975 - Fresh Water Wetlands	Moderate	0	0
PCT 4025 - River-Flat Eucalypt Forest	Poor	0.38	0
	Grand Total	55.72	5.09

There is opportunity for impact areas to be reduced during the development application process through refined bushfire APZ locations and careful design of driveways, among others, which can be considered following detailed subdivision designs.

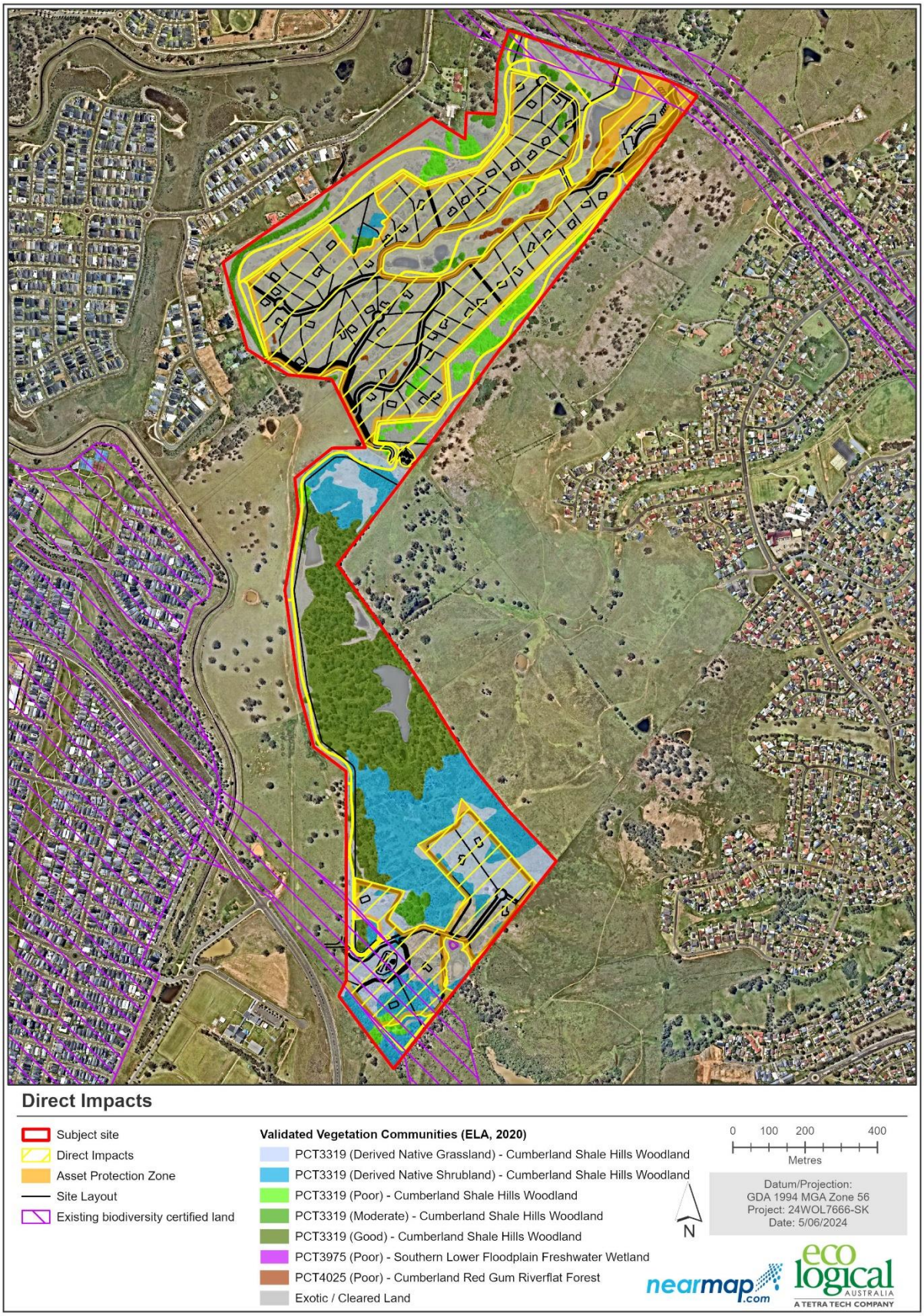

Figure 23: Impact areas

5.3 Potential indirect impacts

The rezoning and subsequent development is also likely to result in the following indirect impacts:

- increased sediment, erosion and nutrient flow
- edge effects, such as possible increase in weeds around the proposed footprint
- soil and vegetation disturbance
- changes to hydrology.

5.4 Potential approvals pathways

ELA understands that the proponent is investigating the options for environmental approval pathways for the site. The primary options are currently a Biodiversity Development Assessment Report (BDAR) or Biodiversity Certification for the study area, with a Part 4 development application with Council as the determining authority. FDP have advised that the proponent intends to undertake a BDAR for future development applications.

5.4.1 State approvals

BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

If the proponent chooses to proceed under a local Part 4 development application (DA) then a Biodiversity Development Assessment Report (BDAR) would be required. If this option is pursued, the rezoning of the study area under Part 3 of the EP&A Act would be completed prior to the commencement of a (DA). The impact assessment would be completed as part of the BDAR. The BDAR would be assessed consistent with the BC Act and biodiversity offsets would be calculated. The BDAR would assess impacts to the following:

- threatened ecological communities
- threatened flora and fauna in the form of ecosystem and species credit species
- Serious and Irreversible Impact entities
- areas mapped by the Biodiversity Values Map
- prescribed biodiversity matters such as non-native habitat bearing vegetation
- ability to avoid, minimise and mitigate impacts to threatened ecological values.

Offset obligations would be discharged as per the BC Regulations.

There are options for credit offsets to be made onsite or offsite which can be further investigated.

STATE ENVIRONMENTAL PLANNING POLICY (KOALA HABITAT PROTECTION) 2021

If the proponent chooses to proceed under a local Part 4 development application (DA), then a Koala Activity Assessment Report (KAAR) is required under Campbeltown Koala Management Plan (CKMP).

The Campbelltown LGA is a listed LGA for which the Koala SEPP applies. The aim of this SEPP is to protect and provide habitat for koalas. As the Campbelltown LGA has an approved Koala Plan of Management (KPM), development consent must not be granted unless Council is satisfied that the measures outlined in their KPM are adhered to and adequately addressed. Within the KPM (Phillips 2018), the development assessment framework flowchart (Figure 24) outlines what must be addressed

for a proponent's DA to be approved by Council. Mapped 'potential koala habitat' is present within the study area, therefore a KAAR is required.

A KAAR must be prepared using the methodology outlined in Appendix B of the approved KPM (Phillips 2018). This methodology involves grid-based assessment within sampling intensity varying dependent on the land zoning. The aim of these assessments is to measure koala activity within the subject site. Only a suitably qualified person can undertake a KAAR. The KPM describes a suitably qualified person as the following:

- being an individual with post-graduate qualifications in koala ecology, and/or
- demonstrable work experience that includes publication of works on koala ecology in peer-reviewed scientific literature
- and/or supported by membership with a professional body such as the EIANZ or ECA.

Depending on the findings of the KAAR, the proponent will then need to adhere to a specific set of planning controls. If koala activity levels are > 10%, then the DA is required to conform with planning controls for core koala habitat. Should the koala activity levels be < 10%, then the DA is required to conform with planning controls for potential koala habitat. Control measures for both options are listed in Appendix B and Appendix C.

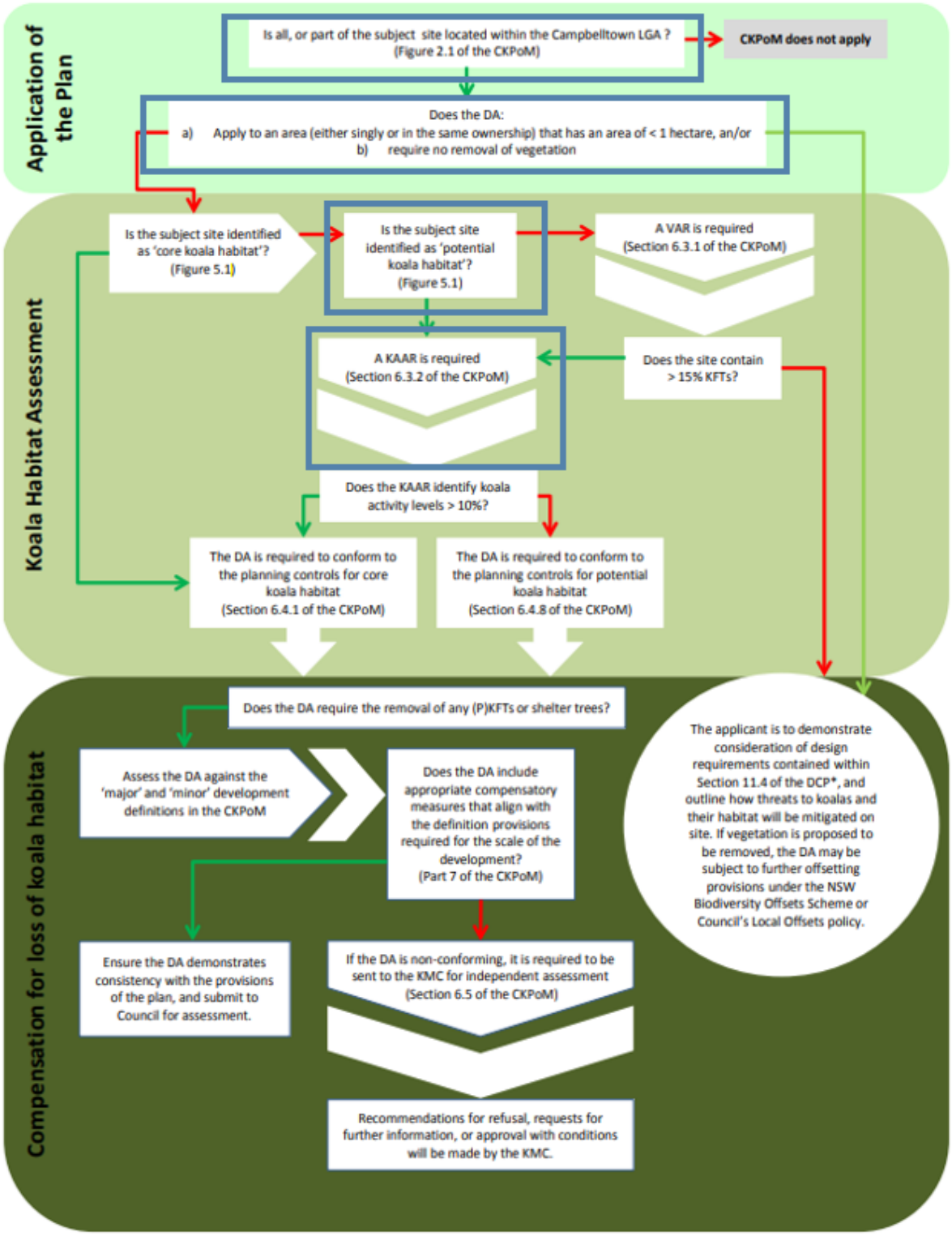

Figure 24: Development assessment framework flowchart (Phillips 2018)

5.4.2 Australian Government approvals

EPBC ACT REFERRAL

The EPBC Act establishes a process for assessing the environmental impact of activities and developments where 'Matters of National Environmental Significance' may be affected. Under the Act any action which "has, will have, or is likely to have a significant impact on a Matter of National Environmental Significance" is defined as a "controlled action", and requires approval from the Minister for the (or her delegate) Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) which is responsible for administering the EPBC Act. The proposed action is likely to operate on the following Matter of NES:

- Cumberland Plain Shale Woodlands and Shale Gravel Transition Forest
- *Artamus cyanopterus cyanopterus* (Dusky Woodswallow)
- *Grevillea parviflora* subsp*. parviflora*
- *Marsdenia viridiflora* subsp*. viridiflora*
- *Phascolarctos cinereus* (Koala)
- *Pimelea spicata*
- *Pteropus poliocephalus* (Grey-headed Flying Fox).

A referral to the Commonwealth DCCEEW is recommended and required.

Pending the results of targeted survey, DCCEEW will determine whether the proposed activity is considered a controlled action.

On 24 March 2020 DCCEEW gazetted Amending Agreement No. 1 to the Bilateral Agreement between NSW and the Commonwealth. Concurrently, the Commonwealth endorsed the NSW BOS, which means where actions are proposed that are controlled in nature, the BOS can be used to discharge Commonwealth offset obligations.

5.5 Gateway determination – Condition 1(b)

The proposal has received conditional support from the NSW DPE as part of a gateway determination process. Clause 1 (b) of this determination states that prior to exhibition, the planning proposal is to be amended.

to include additional information to clarify the intended management of the biodiversity on the site, particularly in relation to the potential public access and walking trails through conservation areas.

All land proposed to be zoned C2 Environmental conservation and RE1 Public Recreation would be retained and is proposed to be transferred to public ownership for ongoing management. ELA have been advised that a Voluntary Planning Agreement (VPA) is being prepared to dedicate all proposed C2 land and to embellish and dedicate all RE1 land to Campbelltown City Council to be managed by council. The proposed north south walking trails would be constructed along the western boundary of the site within the proposed RE1 zone avoiding most of the mapped very high constraint areas. The footpaths can also be microsited to avoid tree removal in areas of high biodiversity and employ construction methods that minimise indirect impacts to surrounding vegetation. This would be subject to further assessment at the DA stage.

Any additional pathways through the C2 zoned land would be progressed by Council and would also be subject to further assessment.

All proposed future development within 'waterfront land' under the Water Management Act (WM Act) would be subject to a Vegetation Management Plan (VMP). More details on impacts to waterfront land are presented in the *Macarthur Grange Riparian Constraints Assessment* (ELA 2024).

The proposed building envelopes in the concept plan have been located to avoid areas of high biodiversity value within proposed C4 Environmental Living areas. Proposed impacts in these areas are dependent on outcomes of complying with PBP 2019. Vegetation in C4 land outside of the proposed development footprint would be managed in accordance with the proposed site-specific Development Control Plan (DCP).

5.6 Recommendations

Notwithstanding the planning approval path selected, there will be a requirement to carry out further surveys for threatened species. Many species have the potential to occur on the site or use habitat present (Appendix A). Some species require targeted survey for both State and Australian government approvals.

It is recommended that future development and approvals for the study area consider conservation measures to secure the retained vegetation. This could include:

- Zoning, such as C2 – Environmental Conservation and C3 Environmental Management. The proposal includes a large area to be rezoned as C2 including 33 ha of good quality vegetation to be protected for the proposed 'Hilltop Conservation Area'.
- Controlling provisions in a Development Control Plan for the site
- Preparation and implementation of a Vegetation Management Plan
- Biodiversity Stewardship Agreement Site administered under the BC Act
- Voluntary Planning Agreement between the proponent and a government agency.

A draft Voluntary Planning Agreement in its most recent (Council informed) iteration proposes the dedication of approximately 59 ha of the site to Council, including the areas of the site with the greatest biodiversity significance located within the proposed 33 ha Hilltop Conservation Area.

It is recommended that a Construction Environment Management Plan and a Koala Activity Assessment Report (KAAR) is also prepared with the future subdivision DA.

6. Conclusion

Eco Logical Australia Pty Ltd (ELA) was engaged by FDP Pty Ltd to prepare this planning proposal for the proposed residential subdivision at Macarthur Grange Country Club (Lot 3900 DP 1170905 – the study area). ELA understands that the proponent is proposing to rezone portions of the land from C3 – Environmental Management to C4 – Environmental Living, C2 – Environmental Conservation and RE1 – Public Recreation. An updated planning proposal will be submitted to Campbelltown City Council and will be assessed under Part 3 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This report is a flora and fauna assessment report which assessed the potential impacts to threatened ecological values listed under the *Biodiversity Conservation Act 2016* (BC Act) and the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Field survey was conducted across the study area and identified a range of ecological values, including Cumberland Plain Woodland in the Sydney Basin Bioregion and Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest – critically endangered under the BC Act and EPBC Act. The study area also contained numerous first, second and third order streams, farm dams, hollow bearing trees, exotic vegetation and a large portion of the site currently functioning as a golf course. Field survey included a threatened species habitat assessment. Based on previous records (DPIE 2024) and the habitat features present in the study area, 12 threatened fauna species and four threatened flora species are considered likely to occur. *Pimelea spicata* (Spiked Rice-flower) has been previously identified in the study area by Anne Clements and Associates in 2007. Further surveys for *Pimelea spicata* will be required in these areas.

The development footprint presented in this proposal has used the avoid, minimise, and mitigate principles to retain areas of higher ecological constraint and value and concentrated development in cleared areas. The proposed master plan for the site has undergone numerous iterations which have responded to issues raised by Council and responded to the ecological constraints on this site. This has seen a reduction from 69 rural residential lots to 52 rural residential lots and expansion of the areas reserved for conservation and open space.

All land proposed to be zoned C2 Environmental Conservation and RE1 Public Recreation is proposed be dedicated to Council and a VPA is currently being negotiated to make arrangements for this dedication. This includes a 33 ha conservation reserve which will allow for rehabilitation and on ongoing protection of the most significant areas of vegetation on the site. In total around 50% of the site area would be dedicated to Council.

While the proposed conservation area would protect most of the good quality vegetation within the study area, much of vegetation within this area is also in a degraded condition (PCT 3319, DNG, DNS or moderate). Therefore, the proposed rehabilitation of this 33 ha of land in perpetuity under a VPA with Council would be a positive impact to the existing biodiversity values in the proposed C2 rezoning area. By contrast, the current C3 Environmental Management zoning allows a range of practices that could be harmful to the biodiversity values on the land.

7. References

Anne Clements & Associates Pty Limited 2007. Macarthur Grange, Raby Road Campbelltown LGA. Report for KWC Capital Partners Pty Ltd.

Campbelltown City Council. 2015. Campbelltown Local Environmental Plan 2015.

Campbelltown (Sustainable City) Development Control Plan 2015

Department of Climate Change, Energy, the Environment and Water (DCCEEW) 2024a. Protected Matters Search Tool. Available: https://www.dcceew.gov.au/environment/epbc/protected-matters-search-tool (Accessed February 2024).

Department of Climate Change, Energy, the Environment and Water (DCCEEW) 2024b. 'Matters of National Environmental Significance: Significant impact guidelines 1.1: *Environment Protection and Biodiversity Conservation Act 1999'*. Canberra, ACT. (Accessed February 2024).

Department of Planning and Environment (DPE) 2024a. NSW BioNet: Atlas of NSW Wildlife online search tool. Available: http://www.bionet.nsw.gov.au/ (Accessed February 2024).

Department of Planning and Environment (DPE) 2024b. BioNet Threatened Biodiversity profiles. Available: https://www.environment.nsw.gov.au/NSWVCA20PRapp/default.aspx (Accessed: February 2024).

Department of Planning and Environment (DPE) 2024c. SEED – The central Resource for Sharing and Enabling Environmental Data in NSW – State Vegetation Type Mapping, 2023. (Accessed February 2024).

Department of Planning and Environment (DPE) 2022. Plot to PCT Assignment Tool Users Guide – Eastern NSW PCT Classification Version 1.1. (Accessed February 2024).

Eco Logical Australia (ELA), 2020. *Macarthur Grange Planning Proposal – Flora and Fauna Assessment. Prepared for Toscuz Investments* Pty Ltd.

Phillips, S. 2018. *Campbelltown Comprehensive Koala Plan of Management*. Prepared by Biolink for Campbelltown City Council (final).

Appendix A - Likelihood of occurrence table

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

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

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

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

Table 9: Likelihood of occurrence for TECs

Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence
ECOLOGICAL COMMUNITIES				
Castlereagh Scribbly Gum and Agnes Banks Woodlands of the Sydney Basin Bioregion		E	Found in the Sydney Basin Bioregion, mostly in the Cumberland IBRA sub-region, with small occurrences in the Sydney Cataract, Wollemi and Burragorang sub-regions. It occurs primarily in the Castlereagh area in the north-west of the Cumberland Plain with other known occurrences near Holsworthy, Kemps Creek and Longneck Lagoon. Occurs primarily on Tertiary sands and gravels of the Hawkesbury-Nepean river system. At Agnes Banks it primarily occurs on aeolian (wind-blown) sands overlying Tertiary alluvium. Found on flat or gently undulating terrain in rain shadow areas typically receiving 700–900 mm annual rainfall. The ecological community occurs primarily at low elevations up to 80 m above sea level (ASL), including old ridges, dunes and terraces.	No. Ecological community not identified within study area.
Coastal Swamp Oak (Casuarina glauca) Forest of New South Wales and South East Queensland ecological community		E	This ecological community is found within the South Eastern Queensland (SEQ), NSW North Coast (NNC), Sydney Basin (SYB) and South East Corner (SEC) IBRA7 bioregions and is found in coastal catchments, mostly at elevations of less than 20 m above sea-level (ASL) that are typically found within 30 km of the coast. Coastal Swamp Oak Forest is often found in association with other vegetation types such as coastal saltmarsh, mangroves, freshwater wetlands, littoral rainforests or swamp sclerophyll forests in a 'mosaic' of coastal floodplain communities. The structure of Coastal Swamp Oak Forest can vary from forest to woodland depending on its location in the landscape and disturbance history (OEH 2022).	No. Ecological community not identified within study area.
Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland		E	The ecological community occurs between the Great Dividing Range and the coastline from near Gladstone in Queensland, through to the south coast of New South Wales, and can be found within the following IBRA2 Bioregions: South East Queensland (SEQ); NSW North Coast (NNC); Sydney Basin (SYB); and the Bateman subregion of the South East Corner (SEC2). This TEC typically occurs in low-lying coastal alluvial areas with minimal relief, such as swamps, floodplain pockets, depressions, alluvial flats, back-barrier flats, fans, terraces, and behind fore-dunes. The Coastal Sclerophyll Swamp Forest often has a layered canopy, dominated by melaleucas and/or *Eucalyptus robusta*.	No. Ecological community not identified within study area.
Coastal Upland Swamps in the	E	E	Endemic to NSW and confined to the Sydney Basin Bioregion. It occurs in the	No. Ecological

Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence
Sydney Basin Bioregion			eastern Sydney Basin from the Somersby district in the north (Somersby-Hornsby plateaux) to the Robertson district in the south (n the Woronora plateau). Occur primarily on impermeable sandstone plateaux with shallow groundwater aquifers in the headwaters and impeded drainage lines of streams, and on sandstone benches with abundant seepage moisture. Generally associated with acidic soils.	community not identified within study area.
Cooks River/Castlereagh Ironbark Forest of the Sydney Basin Bioregion	E	CE	Occurs in western Sydney, with the most extensive stands occurring in the Castlereagh and Holsworthy areas. Smaller remnants occur in the Kemps Creek area and in the eastern section of the Cumberland Plain. Mainly occurs on clay soils derived from the deposits of ancient river systems (alluvium), or on shale soils of the Wianamatta Shales.	No. Ecological community not identified within study area.
Cumberland Plain Shale Woodlands and Shale-Gravel Transition Forest	**CE**	**CE**	**Endemic to the shale hills and plains of the Sydney Basin Bioregion in NSW, occurring primarily in, but not limited to, the Cumberland Sub-region. Flat to undulating or hilly terrain, at elevations up to approximately 350 metres above sea level. Predominantly associated with clay soils, that are derived from Wianamatta Shale geology. Minor occurrences may be present on other soil groups, notably Holocene Alluvium and soils derived from the Mittagong Formation.**	**Yes. Ecological community identified within the study area.**
Elderslie Banksia Scrub Forest in the Sydney Basin Bioregion		CE	A type of scrubby forest or woodland limited to sandy substrates associated with deep Tertiary sand deposits above the present-day Nepean River floodplain, primarily in the Camden area within the Macarthur District of south-western Sydney, New South Wales (NSW). Key elements of the canopy include *Banksia integrifolia* subsp. integrifolia (Coast Banksia), *Angophora subvelutina* (Broad-leaved Apple), *Eucalyptus botryoides* x *E. saligna* (a natural hybrid of Bangalay and Sydney Blue Gum) and various other species of *Eucalyptus* over a mostly shrubby understorey.	No. Ecological community not identified within study area.
River-flat eucalypt forest on coastal floodplains of southern New South Wales and eastern Victoria	**E**	**CE**	**Found on the river flats of the coastal floodplains. Known from parts of the Local Government Areas of Port Stephens, Maitland, Singleton, Cessnock, Lake Macquarie, Wyong, Gosford, Hawkesbury, Baulkham Hills, Blacktown, Parramatta, Penrith, Blue Mountains, Fairfield, Holroyd, Liverpool, Bankstown, Wollondilly, Camden, Campbelltown, Sutherland, Wollongong, Shellharbour, Kiama, Shoalhaven, Palerang, Eurobodalla and Bega Valley. Associated with silts,**	**Yes. Ecological community identified within the study area. This EEC did not meet the EPBC definition of the community.**

Name	BC Act Status	EPBC Act Status	Distribution and Habitat	Likelihood of occurrence
			clay-loams and sandy loams, on periodically inundated alluvial flats, drainage lines and river terraces associated with coastal floodplains.	
Shale Sandstone Transition Forest of the Sydney Basin Bioregion	CE	CE	Occurs at the edges of the Cumberland Plain in western Sydney, most now occurs in the Hawkesbury, Baulkham Hills, Liverpool, Parramatta, Penrith, Campbelltown and Wollondilly local government areas. Intergrade between clay soils from the shale rock and earthy and sandy soils from sandstone, or where shale caps overlay sandstone.	No. Ecological community not identified within study area.
Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion		E	The Upland Basalt Eucalypt Forests of the Sydney Basin Bioregion is typically tall open eucalypt forests found on basalt and basalt-like substrates in, or adjacent to, the Sydney Basin Bioregion. The ecological community usually occurs at elevations between 650 m and 1050 m above sea level. The structure of the ecological community varies from tall open forest to woodland depending on aspect, slope, soil conditions, soil depth, and previous disturbance. Typically, the ecological community has a sparse to dense layer of shrubs and vines, and a diverse understorey of native grasses, forbs, twiners and ferns.	No. Ecological community not identified within study area.
Western Sydney Dry Rainforest and Moist Woodland on Shale	E	CE	Very restricted; occurs most commonly in the far southern section of the Cumberland Plain, in the Razorback Range near Picton. Outlying occurrences have been recorded at Grose Vale and Cattai. Restricted to hilly country where it occurs on the sheltered lower slopes and in gullies. Occurs on clay soils derived from Wianamatta shale.	No. Ecological community not identified within study area.

Key: V = vulnerable, E = endangered, CE = critically endangered, - = Not listed

Scientific name	Common name	BC Act Status	EPBC Act Status	Distribution and Habitat	Records within 5 km	Likelihood of occurrence	Impact assessment required
FLORA							
Acacia baueri subsp. *aspera*		V	E	Restricted to the Sydney region, occurring on the Kings Tableland in the central Blue Mountains and with sporadic occurrences on the Woronora Plateau in the Royal National Park, Mt. Keira district and at Wedderburn. May also occur on the escarpment/Woronora Plateau in the Flat Rock Junction and Stanwell Tops area of the Illawarra. Occurs in low, damp heathlands, often on exposed rocky outcrops over a wide range of climatic and topographical conditions.	0	No – lack of suitable habitat.	No
Acacia bynoeana	Bynoe's Wattle, Tiny Wattle	E	V	Found in central eastern NSW, from the Hunter District (Morisset) south to the Southern Highlands and west to the Blue Mountains. Heath or dry sclerophyll forest on sandy soils.	0	No – lack of suitable habitat.	No
Acacia pubescens	Downy Wattle	V	V	Restricted to the Sydney region around the Bankstown-Fairfield-Rookwood and Pitt Town area, with outliers occurring at Barden Ridge, Oakdale and Mountain Lagoon. Open woodland and forest, including Cooks River/Castlereagh Ironbark Forest, Shale/Gravel Transition Forest and Cumberland Plain Woodland. Occurs on alluviums, shales and at the intergrade between shales and sandstones.	0	No – lack of suitable habitat.	No
Allocasuarina glareicola	null	E	E	Primarily restricted to the Richmond (NW Cumberland Plain) district, but with an outlier population found at Voyager Point, Liverpool. Castlereagh woodland on lateritic soil. Found in open woodland with *Eucalyptus parramattensis*, *Eucalyptus fibrosa*, *Angophora bakeri*, *Eucalyptus sclerophylla* and *Melaleuca decora*.	0	No – lack of suitable habitat.	No
Caladenia tessellata	Thick-lipped Spider-orchid, Daddy Long-legs		V	The Thick Lip Spider Orchid is known from the Sydney area (old records), Wyong, Ulladulla and Braidwood in NSW. Populations in Kiama and Queanbeyan are presumed extinct. Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though	0	No – lack of suitable habitat.	No

Scientific name	Common name	BC Act Status	EPBC Act Status	Distribution and Habitat	Records within 5 km	Likelihood of occurrence	Impact assessment required
				the population near Braidwood is in low woodland with stony soil.			
Cryptostylis hunteriana	Leafless Tongue-orchid	V	V	Known from a range of communities, including swamp-heath and woodland. 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*).	0	No - lack of suitable habitat	No
Cynanchum elegans	White-flowered Wax Plant	E1	E	Restricted to eastern NSW, from Brunswick Heads on the north coast to Gerroa in the Illawarra region, and as far west as Merriwa in the upper Hunter River valley. Dry rainforest; littoral rainforest; *Leptospermum laevigatum-Banksia integrifolia* subsp. *integrifolia* (Coastal Tea-tree– Coastal Banksia) coastal scrub; *Eucalyptus tereticornis* (Forest Red Gum) or *Corymbia maculata* (Spotted Gum) open forest and woodland; and *Melaleuca armillaris* (Bracelet Honey myrtle) scrub.	0	No – lack of suitable habitat.	No
Eucalyptus benthamii	Camden White Gum	CE	V	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, with a further stand at Werriberri (Monkey) Creek in The Oaks. At least five trees occur on the Nattai River in Nattai National Park. Large areas of habitat were inundated by the formation of Warragamba Dam in 1933. Requires a combination of deep alluvial sands and a flooding regime that permits seedling establishment. Recruitment of juveniles appears to be most successful on bare silt deposits in rivers and streams.	0	No – lack of suitable habitat.	No
Eucalyptus	Wallangarra	E	V	In NSW it is known from only three locations near Tenterfield,	1	Unlikely – wrong	No

Scientific name	Common name	BC Act Status	EPBC Act Status	Distribution and Habitat	Records within 5 km	Likelihood of occurrence	Impact assessment required
scoparia	White Gum			including Bald Rock National Park. Found in open eucalypt forest, woodland and heaths on well-drained granite/rhyolite hilltops, slopes and rocky outcrops, typically at high altitudes. At lower elevations can occur in less rocky soils in damp situations.		geographic distribution.	
Genoplesium baueri	Bauer's Midge Orchid	E	E	Has been recorded from locations between Nowra and Pittwater and may occur as far north as Port Stephens. Dry sclerophyll forest and moss gardens over sandstone. Currently the species is known from just over 200 plants across 13 sites. The species has been recorded at locations now likely to be within the following conservation reserves: Berowra Valley Regional Park, Royal National Park and Lane Cove National Park. May occur in the Woronora, O'Hares, Metropolitan and Warragamba Catchments.	0	No – lack of suitable habitat.	No
Grevillea parviflora* subsp. *parviflora	**Small-flower Grevillea**	**V**	**V**	**Sporadically distributed throughout the Sydney Basin with sizeable populations around Picton, Appin and Bargo (and possibly further south to the Moss Vale area) and in the Hunter at in the Cessnock - Kurri Kurri area (particularly Werakata NP). Separate populations are also known from Putty to Wyong and Lake Macquarie on the Central Coast. Grows in sandy or light clay soils usually over thin shales, often with lateritic ironstone gravels and nodules. Sydney region occurrences are usually on Tertiary sands and alluvium, and soils derived from the Mittagong Formation. Soil landscapes include Lucas Heights or Berkshire Park. Occurs in a range of vegetation types from heath and shrubby woodland to open forest. In Sydney it has been recorded from Shale Sandstone Transition Forest and in the Hunter in Kurri Sand Swamp Woodland. however, other communities occupied include *Corymbia maculata* - *Angophora costata* open forest in the Dooralong area, in Sydney Sandstone Ridgetop Woodland at Wedderburn and in Cooks River / Castlereagh Ironbark Forest at Kemps Creek.**	**0**	**Potential – Shale Gravel Transition Forest present.**	**Yes**

Scientific name	Common name	BC Act Status	EPBC Act Status	Distribution and Habitat	Records within 5 km	Likelihood of occurrence	Impact assessment required
Haloragis exalata subsp. *exalata*	Square Raspwort	V	V	Disjunct distribution in the Central Coast, South Coast and North-Western Slopes botanical subdivisions of NSW. Protected and shaded damp situations in riparian habitats.	0	No – lack of suitable habitat.	No
Hibbertia puberula		E1		It extends from Wollemi National Park south to Morton National Park and the south coast near Nowra. Early records of this species are from the Hawkesbury River area and Frenchs Forest in northern Sydney, South Coogee in eastern Sydney, the Hacking River area in southern Sydney, and the Blue Mountains. It favours low heath on sandy soils or rarely in clay, with or without rocks underneath. Habitats are typically dry sclerophyll woodland communities, although heaths are also occupied.	3	No – lack of suitable habitat.	No
Leucopogon exolasius	Woronora Beard-heath	V	V	Woronora Beard-heath is found along the upper Georges River area and in Heathcote National Park. Occurs in woodland on sandstone.	0	No – lack of suitable habitat.	No
Marsdenia viridiflora* subsp. *viridiflora	***Marsdenia viridiflora* R. Br. subsp. *viridiflora* population in the Bankstown, Blacktown, Camden, Campbelltown, Fairfield, Holroyd, Liverpool and Penrith local government areas**	**E**		**Recent records are from Prospect, Bankstown, Smithfield, Cabramatta Creek and St Marys. Previously known north from Razorback Range. Grows in vine thickets and open shale woodland.**	**1**	**Potential – suitable habitat present.**	**Yes**

Scientific name	Common name	BC Act Status	EPBC Act Status	Distribution and Habitat	Records within 5 km	Likelihood of occurrence	Impact assessment required
Melaleuca deanei	Deane's Melaleuca	V	V	Ku-ring-gai/Berowra area, Holsworthy/Wedderburn area, Springwood (in the Blue Mountains), Wollemi National Park, Yalwal (west of Nowra) and Central Coast (Hawkesbury River) areas. Heath on sandstone.	0	No – lack of suitable habitat.	No
Persicaria elatior	Tall Knotweed	V	V	In south-eastern NSW recorded from Mt Dromedary, Moruya State Forest near Turlinjah, the Upper Avon River catchment north of Robertson, Bermagui, and Picton Lakes. In northern NSW known from Raymond Terrace (near Newcastle) and the Grafton area (Cherry Tree and Gibberagee State Forests). Occurs beside streams and lakes, swamp forest or disturbed areas.	0	No – lack of suitable habitat.	No
Persoonia hirsuta	Hairy Geebung			Occurs in woodlands and dry sclerophyll forest on sandstone or very rarely on shale. Known from a number of locations from the Royal National Park to Gosford on the coast and Hill Top to Glen Davis and Putty inland, with records from a number of national parks (Blue Mountains, Wollemi, Dharug, Ku-ring-gai Chase, Marramarra, Royal and Sydney Harbour).	0	No – lack of suitable habitat.	No
Persoonia nutans	Nodding Geebung	E	E	Restricted to the Cumberland Plain in western Sydney, between Richmond in the north and Macquarie Fields in the south. Northern populations: sclerophyll forest and woodland (Agnes Banks Woodland, Castlereagh Scribbly Gum Woodland and Cooks River / Castlereagh Ironbark Forest) on aeolian and alluvial sediments. Southern populations: tertiary alluvium, shale sandstone transition communities and Cooks River / Castlereagh Ironbark Forest.	0	No – lack of suitable habitat.	No
Pimelea curviflora var. *curviflora*			V	Confined to the coastal area of the Sydney and Illawarra regions. Populations are known between northern Sydney and Maroota in the north-west. New population discovered at Croom Reserve near Albion Park in Shellharbour LGA in August 2011. Formerly recorded around the Parramatta River and Port Jackson region including Five	0	No – lack of suitable habitat.	No

Scientific name	Common name	BC Act Status	EPBC Act Status	Distribution and Habitat	Records within 5 km	Likelihood of occurrence	Impact assessment required
				Dock, Bellevue Hill and Manly. Occurs on shaley/lateritic soils over sandstone and shale/sandstone transition soils on ridgetops and upper slopes amongst woodlands. Also recorded in Illawarra Lowalnd Grassy Woodland habitat at Albion Park on the Illawarra coastal plain.			
Pimelea spicata	**Spiked Rice-flower**	**E1**	**E**	**Two disjunct areas; the Cumberland Plain (Marayong and Prospect Reservoir south to Narellan and Douglas Park) and the Illawarra (Landsdowne to Shellharbour to northern Kiama). Well-structured clay soils. *Eucalyptus moluccana* (Grey Box) communities and in areas of ironbark on the Cumberland Plain. Coastal *Banksia* open woodland or coastal grassland in the Illawarra.**	**25**	**Yes – Five areas within the subject site where individuals have previously been identified and recorded.**	**Yes**
Pomaderris brunnea	Brown Pomaderris	E	V	Brown Pomaderris is found in a very limited area around the Colo, Nepean and Hawkesbury Rivers, including the Bargo area and near Camden. It also occurs near Walcha on the New England tablelands and in far eastern Gippsland in Victoria. Brown Pomaderris grows in moist woodland or forest on clay and alluvial soils of flood plains and creek lines. Flowers appear in September and October.	0	No – lack of suitable habitat.	No
Pomaderris cotoneaster	Cotoneaster Pomaderris		E	Cotoneaster Pomaderris has a very disjunct distribution, being known from the Nungatta area, northern Kosciuszko National Park (near Tumut), the Tantawangalo area in South-East Forests National Park and adjoining freehold land, Badgery's Lookout near Tallong, Bungonia State Conservation Area, the Yerranderie area, Kanangra-Boyd National Park, the Canyonleigh area and Ettrema Gorge in Morton National Park. 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.	0	No – lack of suitable habitat.	No
Prostanthera	Seaforth	E4A,3	CE	*Prostanthera marifolia* is currently only known from the northern	1	No – lack of suitable	No

Scientific name	Common name	BC Act Status	EPBC Act Status	Distribution and Habitat	Records within 5 km	Likelihood of occurrence	Impact assessment required
marifolia	Mintbush			Sydney suburb of Seaforth and has a very highly restricted distribution within the Sydney Basin Bioregion. The single population is fragmented by urbanisation into three small sites. All known sites are within an area of 2x2 km. The sites are within the local government area of Northern Beaches Council. Occurs in localised patches in or in close proximity to the endangered Duffys Forest ecological community. Located on deeply weathered clay-loam soils associated with ironstone and scattered shale lenses, a soil type which only occurs on ridge tops and has been extensively urbanised.		habitat.	
Pterostylis gibbosa	Illawarra Greenhood	E1	E	Known from a small number of populations in the Hunter region (Milbrodale), the Illawarra region (Albion Park and Yallah) and the Shoalhaven region (near Nowra). Open forest or woodland, on flat or gently sloping land with poor drainage.	0	No – lack of suitable habitat.	No
Pterostylis saxicola	Sydney Plains Greenhood	E	E	Restricted to western Sydney between Freemans Reach in the north and Picton in the south. Small pockets of shallow soil in depressions on sandstone rock shelves above cliff lines, adjacent to sclerophyll forest or woodland on shale/sandstone transition soils or shale soils.	0	No – lack of suitable habitat.	No
Pultenaea aristata			V	Prickly Bush-pea is restricted to the Woronora Plateau, a small area between Helensburgh, south of Sydney, and Mt Kiera above Wollongong. The species occurs in either dry sclerophyll woodland or wet heath on sandstone.	0	No – lack of suitable habitat.	No
Rhizanthella slateri	Eastern Australian Underground Orchid	V	E	In NSW, currently known from fewer than 10 locations, including near Bulahdelah, the Watagan Mountains, the Blue Mountains, Wiseman's Ferry area, Agnes Banks and near Nowra. Sclerophyll forest in shallow to deep loams.	0	No – lack of suitable habitat.	No
Rhodamnia	Scrub	CE	CE	Occurs in coastal districts north from Batemans Bay in New South Wales, approximately 280 km south of Sydney, to areas inland of	0	No – lack of suitable	No

Scientific name	Common name	BC Act Status	EPBC Act Status	Distribution and Habitat	Records within 5 km	Likelihood of occurrence	Impact assessment required
rubescens	Turpentine			Bundaberg in Queensland. Populations of *R. rubescens* typically occur in coastal regions and occasionally extend inland onto escarpments up to 600 m a.s.l. in areas with rainfall of 1,000-1,600 mm. Found in littoral, warm temperate, subtropical rainforests, and wet sclerophyll forests.		habitat.	
Syzygium paniculatum	Magenta Lilly Pilly	E1	V	Only in NSW, in a narrow, linear coastal strip from Upper Lansdowne to Conjola State Forest. On the south coast the Magenta Lilly Pilly occurs on grey soils over sandstone, restricted mainly to remnant stands of littoral (coastal) rainforest.	0	No – lack of suitable habitat.	No
Thelymitra kangaloonica	Kangaloon Sun Orchid		CE	*Thelymitra kangaloonica* (*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. These swamps are a part of the ecological community "Coastal Upland Swamp" which is listed under the NSW Threatened Species Conservation Act 1995 as an Endangered Ecological Community, also known as “Temperate Highland Peat Swamps on Sandstone” which is listed under the Environment Protection and Biodiversity Conservation Act 1999. One small population is located in Budderoo National Park. This species is found in swamps in sedgelands over grey silty grey loam soils	0	No – lack of suitable habitat.	No
Thesium australe	Austral Toadflax	V	V	In eastern NSW it is found in very small populations scattered along the coast, and from the Northern to Southern Tablelands. Grassland on coastal headlands or grassland and grassy woodland away from the coast. Often found in association with Kangaroo Grass (*Themeda australis).*	0	No – lack of suitable habitat.	No

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Scientific name	Common name	BC Act Status	EPBC Act Status	Distribution and Habitat	Records within 5 km	Likelihood of occurrence	Impact assessment required
Actitis hypoleucos	Common Sandpiper		M	Summer migrant. In NSW, widespread along coastline and also occurs in many areas inland. Coastal wetlands and some inland wetlands, especially muddy margins or rocky shores. Also estuaries and deltas, lakes, pools, billabongs, reservoirs, dams and claypans, mangroves.	0	Unlikely – lack of suitable habitat.	No
Anthochaera phrygia	Regent Honeyeater	CE	CE	Inland slopes of south-east Australia, and less frequently in coastal areas. In NSW, most records are from the North-West Plains, North-West and South-West Slopes, Northern Tablelands, Central Tablelands and Southern Tablelands regions; also recorded in the Central Coast and Hunter Valley regions. Eucalypt woodland and open forest, wooded farmland and urban areas with mature eucalypts, and riparian forests of *Casuarina cunninghamiana* (River Oak). This species prefers woodlands that have significantly large numbers of mature trees, high canopy cover and abundance of mistletoes.	0	Unlikely – preferred habitat, including with high canopy cover and an abundance of mistletoes, not present.	No
Aphelocephala leucopsis	Southern Whiteface		V	Occurs across most of mainland Australia south of the tropics, from the north-eastern edge of the Western Australian wheatbelt, east to the Great Dividing Range. Lives in a wide range of open woodlands and shrublands where an understorey of grasses and or shrubs occur. Known to occur in areas dominated by A*cacia*, or *Eucalypts* on ranges, foothills, lowlands and plains. Preferred habitat includes areas with low tree densities and an understorey which is herbaceous in nature.	0	Unlikely – lack of suitable habitat.	No
Aprasia parapulchella	Pink-tailed Worm-lizard	V	V	The Pink-tailed Legless Lizard is primarily known from the Central and Southern Tablelands and the Southwestern Slopes, with a confirmed outlier record on the Hay Plains north of Hay. There is a concentration of	0	No – lack of suitable habitat.	No

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				populations in the Canberra/Queanbeyan Region. Other populations have been recorded near Cooma, Yass, Bathurst, Albury and West Wyalong. Inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass (*Themeda australis*).			
Apus pacificus	Fork-tailed Swift		M	This migratory species has been recorded in all regions of NSW. Riparian woodland, swamps, low scrub, heathland, saltmarsh, grassland, *Spinifex* sandplains, open farmland and inland and coastal sand-dunes.	0	No – lack of suitable habitat.	No
Artamus cyanopterus cyanopterus	**Dusky Woodswallow**	**V**		**Widespread in NSW from coast to inland including the western slopes of the Great Dividing Range and farther west. Species have also been recorded in southern and southwestern Australia. Woodlands and dry open sclerophyll forest, usually eucalypts and mallee associations. Also have recordings in shrub and heathlands and various modified habitats, including regenerating forests. In western NSW, this species is primarily associated with River Red Gum/Black Box/Coolabah open forest/woodland and associated with larger river/creek systems.**	**72**	**Potential –suitable habitat present.**	**Yes**
Austrocordulia leonardi	Sydney Hawk Dragonfly		E	The Sydney Hawk Dragonfly has specific habitat requirements and has only ever been collected from deep river pools with cooler water and permanent flow. It is strictly a diurnal dragonfly that requires open, sunlit space. Larvae are found under rocks where they coexist with the Eastern Hawk Dragonfly.	0	No – lack of suitable habitat.	No
Botaurus poiciloptilus	Australasian Bittern	E1	E	Found over most of NSW except for the far north-west. Permanent freshwater wetlands with tall, dense	1	Unlikely – the artificial wetlands	No

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				vegetation, particularly *Typha* spp. (bullrushes) and *Eleocharis* spp. (spike rushes).		present within the subject site are of moderate quality and do not have vegetation that is tall and dense in nature.	
Calidris acuminata	Sharp-tailed Sandpiper		M	Occurs along the entire coast of NSW, and sometimes in freshwater wetlands in the Murray-Darling Basin. Littoral and estuarine habitats, including intertidal mudflats, non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	0	No – lack of suitable habitat	No
Calidris ferruginea	Curlew Sandpiper	E1	CE, M	Occurs along the entire coast of NSW, and sometimes in freshwater wetlands in the Murray-Darling Basin. Littoral and estuarine habitats, including intertidal mudflats, non-tidal swamps, lakes and lagoons on the coast and sometimes inland.	0	No – lack of suitable habitat	No
Calidris melanotos	Pectoral Sandpiper		M	Summer migrant to Australia. Widespread but scattered in NSW. East of the Great Divide, recorded from Casino and Ballina, south to Ulladulla. West of the Great Divide, widespread in the Riverina and Lower Western regions. Shallow fresh to saline wetlands, including coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	0	Unlikely – the artificial wetlands present within the subject site are of moderate quality and do not have vegetation that is tall and dense in nature.	No
Callocephalon fimbriatum	Gang-gang Cockatoo	V	E	In NSW, distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. Isolated records known from as far north as Coffs Harbour and as far west as Mudgee. Tall mountain forests and woodlands in summer; in winter,	10	No – lack of suitable habitat.	No

Scientific name	Common name	BC Act Status	EPBC Act Status	Distribution and Habitat	Records within 5 km	Likelihood of occurrence	Impact assessment required
				may occur at lower altitudes in open eucalypt forests and woodlands, and urban areas.			
Calyptorhynchus lathami lathami	South-eastern Glossy Black-Cockatoo	V	V	This species is uncommon but widespread. They can be found from Mitchell, Queensland, through eastern New South Wales to East Gippsland, Victoria. Their distribution is continuous through the forested parts of the Great Dividing Range but becomes more scattered inland, to as far west as the Riverina in New South Wales. Inhabits open forest and woodlands of the coast and the Great Dividing Range where stands of sheoak occur. Black Sheoak (*Allocasuarina littoralis*) and Forest Sheoak (A. *torulosa*) are important foods. Dependent on large hollow-bearing eucalypts for nest sites.	1	Unlikely – *Allocasuarina* sp. are not present.	No
Chalinolobus dwyeri	Large-eared Pied Bat	V	V	Recorded from Rockhampton in Qld south to Ulladulla in NSW. Largest concentrations of populations occur in the sandstone escarpments of the Sydney basin and the NSW north-west slopes. Wet and dry sclerophyll forests, Cyprus Pine dominated forest, woodland, sub-alpine woodland, edges of rainforests and sandstone outcrop country.	0	No – lack of suitable habitat.	No
Climacteris picumnus victoriae	Brown Treecreeper (eastern subspecies)	V		From eastern through central NSW, west to Corowa, Wagga Wagga, Temora, Forbes, Dubbo and Inverell. 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 (*Eucalyptus camaldulensis*) Forest bordering wetlands with an open	1	Unlikely – habitat is highly disturbed.	No

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				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.			
Cuculus optatus	Oriental Cuckoo, Horsfield's Cuckoo		M	This is a migratory species which has potential to visit northern and eastern Australia during the winter. On passage and in winter, occurs in all manner of habitats included open woodland, plantations, forest edge and clearings, and gardens; typically at lower elevations.	0	Unlikely – lack of suitable habitat.	No
Daphoenositta chrysoptera	Varied Sittella	V		The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. Distribution in NSW is nearly continuous from the coast to the far west. Inhabits eucalypt forests and woodlands, especially those containing rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland.	23	No – lack of suitable habitat.	No
Dasyurus maculatus maculatus (SE mainland population)	Spotted-tailed Quoll	V	E	Found on the east coast of NSW, Tasmania, eastern Victoria and north-eastern Qld. Rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	0	No – lack of suitable habitat.	No
Delma impar	Striped Legless Lizard	V	V	In NSW, occurs in the Southern Tablelands, the Southwest Slopes and possibly on the Riverina. Natural Temperate Grassland, secondary and modified grassland, open Box-Gum Woodland. Shelter in tussock-forming grasses or under surface rocks. Actively hunts for spiders, crickets, moth larvae and cockroaches. Goes below ground or under rocks or logs over winter.	0	No – lack of suitable habitat.	No

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Erythrotriorchis radiatus	Red Goshawk	E	V	In NSW, extends to ~30°S. Recent records confined to the Northern Rivers region north of the Clarence River. Open woodland and forest, often along or near watercourses or wetlands. In NSW, preferred habitats include mixed subtropical rainforest, Melaleuca swamp forest and coastal riparian *Eucalyptus* forest. Breeding is likely to be in spring and summer in southern Qld and NSW (if they breed in the state at all). The birds lay clutches of 1-2 eggs, in a stick nest in a tall tree (>20 m tall) within 1 km of a watercourse or wetland. In winter in eastern Australia, the birds appear to move from nesting sites in the ranges to coastal plains, where they are associated with permanent wetlands.	0	No – lack of preferred habitat.	No
Falco hypoleucos	Grey Falcon	E	V	Arid and semi-arid zones. In NSW, found chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. Shrubland, grassland and wooded watercourses, occasionally in open woodlands near the coast, and near wetlands.	0	No – lack of suitable habitat.	No
Falsistrellus tasmaniensis	Eastern False Pipistrelle	V		South-east coast and ranges of Australia, from southern Qld to Victoria and Tasmania. In NSW, records extend to the western slopes of the Great Dividing Range. Tall (greater than 20m) moist habitats.	4	No – lack of suitable habitat.	No
Gallinago hardwickii	Latham's Snipe		M	Migrant to east coast of Australia, extending inland west of the Great Dividing Range in NSW. Freshwater, saline or brackish wetlands up to 2000 m above sea-level; usually freshwater swamps, flooded grasslands or heathlands.	8	Unlikely – the artificial wetlands present within the subject site are of moderate quality and do not have vegetation that is tall	No

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						and dense in nature.	
Glossopsitta pusilla	Little Lorikeet	V		In NSW, found from the coast westward as far as Dubbo and Albury. Dry, open eucalypt forests and woodlands, including remnant woodland patches and roadside vegetation.	8	No – lack of suitable habitat.	No
Grantiella picta	Painted Honeyeater	V	V	Widely distributed in NSW, predominantly on the inland side of the Great Dividing Range but avoiding arid areas. Boree, Brigalow and Box-Gum Woodlands and Box-Ironbark Forests.	0	No – lack of suitable habitat.	No
Haliaeetus leucogaster	White-bellied Sea-Eagle	V		Distributed along the coastline of mainland Australia and Tasmania, extending inland along some of the larger waterways, especially in eastern Australia. Freshwater swamps, rivers, lakes, reservoirs, billabongs, saltmarsh and sewage ponds and coastal waters. Terrestrial habitats include coastal dunes, tidal flats, grassland, heathland, woodland, forest and urban areas.	3	No – lack of suitable habitat.	No
Heleioporus australiacus	Giant Burrowing Frog	V	V	Southeastern NSW and Victoria, in two distinct populations: a northern population in the sandstone geology of the Sydney Basin as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. Heath, woodland and open dry sclerophyll forest on a variety of soil types except those that are clay based. During the non-breeding season this species burrows below the soil surface or in leaf litter. Egg masses are laid in burrows or under vegetation in small pools. Breeding habitat of this species is generally soaks or pools within first or second order streams.	0	No – lack of suitable habitat.	No

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Hieraaetus morphnoides	Little Eagle	V		Distributed throughout the Australian mainland except the most densely forested parts of the Dividing Range escarpment. Occupies habitats rich in prey within open eucalypt forest, woodland or open woodland. Sheoak or acacia woodlands and riparian woodlands of interior NSW are also used. For nest sites it requires a tall living tree within a remnant patch, where pairs build a large stick nest in winter and lay in early spring.	10	No – lack of suitable habitat.	No
Hirundapus caudacutus	White-throated Needletail		V, M	Migratory and usually seen in eastern Australia from October to April. Breeds in forests in south-eastern Siberia, Mongolia, the Korean Peninsula and northern Japan June-August. More common in coastal areas, less so inland.	0	No – lack of suitable habitat.	No
Hoplocephalus bungaroides	Broad-headed Snake	E	V	The Broad-headed Snake is largely confined to Triassic and Permian sandstones, including the Hawkesbury, Narrabeen and Shoalhaven groups, within the coast and ranges in an area within approximately 250 km of Sydney. Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in crevices or hollows in large trees within 500 m of escarpments in summer.	0	No – lack of suitable habitat.	No
Lathamus discolor	Swift Parrot	E1	CE	Migrates from Tasmania to mainland in Autumn-Winter. In NSW, the species mostly occurs on the coast and southwest slopes. Box-ironbark forests and woodlands.	139	Unlikely – lack of suitable habitat.	No
Litoria aurea	Green and Golden Bell Frog	E1	V	Since 1990, recorded from ~50 scattered sites within its former range in NSW, from the north coast near Brunswick Heads, south along the coast to Victoria. Records exist west to Bathurst, Tumut and the ACT	3	Unlikely – the artificial wetlands present within the subject site are of	No

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				region. Marshes, dams and stream-sides, particularly those containing *Typha* spp. (bullrushes) or *Eleocharis* spp. (spike rushes). Some populations occur in highly disturbed areas.		moderate quality and do not have vegetation that is dense in nature.	
Lophoictinia isura	Square-tailed Kite	V		In NSW, it is a regular resident in the north, north-east and along the major west-flowing river systems. It is a summer breeding migrant to the south-east, including the NSW south coast. Timbered habitats including dry woodlands and open forests, particularly timbered watercourses.	3	No – lack of suitable habitat.	No
Melanodryas cucullata cucullata	Hooded Robin (south-eastern)	V		Found throughout much of inland NSW, with the exception of the extreme north-west, where it is replaced by subspecies *picata*. Open eucalypt woodland, acacia scrub and mallee, often in or near clearings or open areas. Requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses.	0	No – lack of suitable habitat.	No
Meridolum corneovirens	**Cumberland Plain Land Snail**	**E**		**Lives in small areas on the Cumberland Plain west of Sydney, from Richmond and Windsor south to Picton and from Liverpool west to the Hawkesbury and Nepean Rivers at the base of the Blue Mountain. Primarily inhabits Cumberland Plain Woodland (a critically endangered ecological community). This community is a grassy, open woodland with occasional dense patches of shrubs. It is also known from Shale Gravel Transition Forests, Castlereagh Swamp Woodlands and the margins of River-flat Eucalypt Forest, which are also listed communities. Lives under litter of bark, leaves and logs, or shelters in loose soil**	**49**	**Potential – Cumberland Plan Woodland habitat present.**	**Yes**

Scientific name	Common name	BC Act Status	EPBC Act Status	Distribution and Habitat	Records within 5 km	Likelihood of occurrence	Impact assessment required
				around grass clumps.			
Micronomus norfolkensis	Eastern Coastal Free-tailed Bat	V		Found along the east coast from south Queensland to southern NSW. Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range. Roost mainly in tree hollows but will also roost under bark or in man-made structures.	30	Unlikely – lack of suitable habitat	No
Miniopterus australis	Little Bent-winged Bat	V		East coast and ranges of Australia from Cape York in Queensland to Wollongong in NSW. Moist eucalypt forest, rainforest, vine thicket, wet and dry sclerophyll forest, Melaleuca swamps, dense coastal forests and banksia scrub. Generally found in well-timbered areas. Roosts in caves, tunnels, tree hollows, abandoned mines, stormwater drains, culverts, bridges and sometimes buildings during the day, and at night forage for small insects beneath the canopy of densely vegetated habitats.	2	No – lack of suitable habitat	No
Miniopterus orianae oceanensis	Large Bent-winged Bat	V		Occurs along the east and north-west coasts of Australia. Roosting habitat includes caves, derelict mines, storm-water tunnels, buildings and other man-made structures. This species hunts in forested areas, catching moths and flying insects above the treetops.	22	No – lack of suitable forested habitat.	No
Monarcha melanopsis	Black-faced Monarch		M	In NSW, occurs around the eastern slopes and tablelands of the Great Divide, inland to Coutts Crossing, Armidale, Widden Valley, Wollemi National Park and Wombeyan Caves. It is rarely recorded farther inland. Rainforest, open eucalypt forests, dry sclerophyll forests and woodlands, gullies in mountain areas or coastal foothills, Brigalow scrub, coastal scrub, mangroves, parks and	0	No – lack of suitable habitat.	No

Scientific name	Common name	BC Act Status	EPBC Act Status	Distribution and Habitat	Records within 5 km	Likelihood of occurrence	Impact assessment required
				gardens.			
Motacilla flava	Yellow Wagtail		M	Regular summer migrant to mostly coastal Australia. In NSW recorded Sydney to Newcastle, the Hawkesbury and inland in the Bogan LGA. Swamp margins, sewage ponds, saltmarshes, playing fields, airfields, ploughed land, lawns.	0	No – lack of suitable habitat.	No
Myiagra cyanoleuca	Satin Flycatcher		M	In NSW, widespread on and east of the Great Divide and sparsely scattered on the western slopes, with very occasional records on the western plains. Eucalypt-dominated forests, especially near wetlands, watercourses, and heavily vegetated gullies.	0	No – lack of suitable habitat.	No
Myotis macropus	**Southern Myotis**	**V**		**The Southern Myotis is found in the coastal band from the north-west of Australia, across the top-end and south to western Victoria. It is rarely found more than 100 km inland, except along major rivers. Forage over streams and pools catching insects and small fish by raking their feet across the water surface. 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.**	**24**	**Potential – foraging habitat present.**	**Yes**
Neophema chrysostoma	Blue-winged Parrot		V	Blue-winged parrots breed in Tasmania, coastal south-eastern South Australia and southern Victoria. They inhabit a range of habitats from coastal, sub-coastal and inland areas, through to semi-arid zones. They tend to favour grasslands and grassy woodlands and are often found near wetlands both near the coast and in semi-arid zones.	1	Unlikely – lack of suitable habitat.	No
Neophema pulchella	Turquoise Parrot	V		The Turquoise Parrot's range extends from southern	0	No – lack of suitable	No

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				Queensland through to northern Victoria, from the coastal plains to the western slopes of the Great Dividing Range. Lives on the edges of eucalypt woodland adjoining clearings, timbered ridges and creeks in farmland. Nests in tree hollows, logs or posts, from August to December.		habitat.	
Ninox connivens	Barking Owl	V		Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g., western NSW) due to the higher density of prey found on these fertile riparian soils.	1	Unlikely – lack of suitable habitat.	No
Notamacropus parma	Parma Wallaby	V	V	The species once occurred in north-eastern NSW from the Queensland boarder to the Bega area in the southeast. Their range is now confined to the coast and ranges of central and northern NSW from the Gosford district to south of the Bruxner Highway between Tenterfield and Casino. Preferred habitat is moist eucalypt forest with thick, shrubby understorey, often with nearby grassy areas, rainforest margins and occasionally drier eucalypt forest. Typically feed at night on grasses and herbs in more open eucalypt forest and the edges of nearby grassy areas. During the day they shelter in dense cover.	0	No – lack of suitable habitat	No
Numenius madagascariensis	Eastern Curlew		CE, M	Summer migrant to Australia. Primarily coastal distribution in NSW, with some scattered inland records. Estuaries, bays, harbours, inlets and coastal lagoons, intertidal mudflats or sandflats, ocean beaches, coral	0	No – lack of suitable habitat.	No

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				reefs, rock platforms, saltmarsh, mangroves, freshwater/brackish lakes, saltworks and sewage farms.			
Pandion haliaetus	Osprey		M	This migratory species has a wide distribution and prefers areas with safe nest sites and shallow water with abundant fish. Nests are generally found within 3 to 5 km of a water body such as a salt marsh, mangrove (*Rhizophora*) swamp, cypress (*Taxodium*) swamp, lake, bog, reservoir or river. Nest sites can be safe from predators either by being difficult for a predator to climb (e.g. on a cliff) or by being over water or on a small island.	0	No – lack of suitable habitat.	No
Petauroides volans	Greater Glider (southern and central)	E	E	The Southern Greater Glider occurs in eastern Australia, in eucalypt forests and woodlands, where it has a broad distribution from around Proserpine in Queensland, south through NSW and the Australian Capital Territory into Victoria. Eucalypt forests and woodlands. Feeds exclusively on eucalypt leaves, buds, flowers and mistletoe. Shelter during the day in tree hollows and will use up to 18 hollows in their home range.	0	No – lack of suitable habitat.	No
Petaurus australis australis	Yellow-bellied Glider (south-eastern)		V	In NSW, it predominantly occurs in forests along the eastern coast, from the NSW-Qld border to the NSW-Vic border. This species can be found 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.	0	No – lack of suitable habitat.	No

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Petrogale penicillata	Brush-tailed Rock-wallaby	E1	V	In NSW they occur from the Qld border in the north to the Shoalhaven in the south, with the population in the Warrumbungle Ranges being the western limit. Rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges.	0	No – lack of suitable habitat.	No
Petroica boodang	Scarlet Robin	V		In NSW, it occurs from the coast to the inland slopes. Dry eucalypt forests and woodlands, and occasionally in mallee, wet forest, wetlands and tea-tree swamps.	9	No – lack of suitable habitat.	No
***Phascolarctos cinereus* (combined populations of Qld, NSW and the ACT)**	**Koala**	**E**	**E**	**The Koala has a fragmented distribution throughout eastern Australia from north-east Queensland to the Eyre Peninsula in South Australia. In New South Wales, koala populations are found on the central and north coasts, southern highlands, southern and northern tablelands, Blue Mountains, southern coastal forests, with some smaller populations on the plains west of the Great Dividing Range.**	**355**	**Potential**	**Yes**
Pluvialis squatarola	Grey Plover		M	Migrates to Australia in the summer, mostly to the west and south coasts. Almost entirely coastal, being found mainly on marine shores, inlets, estuaries and lagoons with large tidal mudflats or sandflats for feeding, sandy beaches for roosting, and also on rocky coasts.	2	No – lack of suitable habitat.	No
Pseudomys novaehollandiae	New Holland Mouse, Pookila		V	Fragmented distribution across eastern NSW. Open heathlands, woodlands and forests with a heathland understorey, vegetated sand dunes.	0	No – lack of suitable habitat.	No
Pteropus poliocephalus	**Grey-headed Flying-fox**	**V**	**V**	**Along the eastern coast of Australia, from Bundaberg in Qld to Melbourne in Victoria. Subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban**	**161**	**Potential – foraging habitat present, including nectar-**	**Yes**

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				gardens and cultivated fruit crops.		**bearing trees.**	
Pycnoptilus floccosus	Pilotbird		V	Pilotbirds are endemic to south-east Australia. Lowland Pilotbirds occur in forests from the Blue Mountains west of Newcastle, around the wetter forests of eastern Australia, to Dandenong near Melbourne Pilotbirds are strictly terrestrial, living on the ground in dense forests with heavy undergrowth. Largely sedentary, they are typically seen hopping briskly over the forest floor and foraging on damp ground or among leaf-litter. Breeding takes places between August and January where a domed nest is built on or near the ground.	0	No – lack of suitable habitat.	No
Rhipidura rufifrons	Rufous Fantail		M	Coastal and near coastal districts of northern and eastern Australia, including on and east of the Great Divide in NSW. Wet sclerophyll forests, subtropical and temperate rainforests. Sometimes drier sclerophyll forests and woodlands.	0	No – lack of suitable habitat.	No
Rostratula australis	Australian Painted Snipe	E1	E	In NSW most records are from the Murray-Darling Basin. Other recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. 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.	0	No – lack of suitable habitat.	No
Saccolaimus flaviventris	Yellow-bellied Sheathtail-bat	V		Forages in most habitats across its very wide range, with and without trees. When foraging for insects, flies high and fast over the forest canopy, but lower in more open country. Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.	2	No - lack of suitable habitat	No

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Scoteanax rueppellii	Greater Broad-nosed Bat	V		The Greater Broad-nosed Bat is found mainly in the gullies and river systems that drain the Great Dividing Range, from north-eastern Victoria to the Atherton Tableland. It extends to the coast over much of its range. In NSW it is widespread on the New England Tablelands, however does not occur at altitudes above 500 m. Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest. Roosting habitat includes tree hollows.	11	Unlikely – lack of suitable habitat.	No
Stagonopleura guttata	Diamond Firetail	V		Widely distributed in NSW, mainly recorded in the Northern, Central and Southern Tablelands, the Northern, Central and Southwestern Slopes and the North West Plains and Riverina, and less commonly found in coastal areas and further inland. Grassy eucalypt woodlands, open forest, mallee, Natural Temperate Grassland, secondary derived grassland, riparian areas and lightly wooded farmland.	0	Unlikely – lack of suitable habitat.	No
Symposiachrus trivirgatus	Spectacled Monarch		M	The Spectacled Monarch is found in coastal north-eastern and eastern Australia, including coastal islands, from Cape York, Queensland to Port Stephens, New South Wales. It is much less common in the south. The Spectacled Monarch prefers thick understorey in rainforests, wet gullies and waterside vegetation, as well as mangroves.	0	No – lack of suitable habitat.	No
Tringa nebularia	Common Greenshank		M	Summer migrant to Australia. Recorded in most coastal regions of NSW; also widespread west of the Great Dividing Range, especially between the Lachlan and Murray Rivers and the Darling River drainage basin, including the Macquarie Marshes, and north-west	0	No – lack of suitable habitat.	No

Scientific name	Common name	BC Act Status	EPBC Act Status	Distribution and Habitat	Records within 5 km	Likelihood of occurrence	Impact assessment required
				regions. Terrestrial wetlands (swamps, lakes, dams, rivers, creeks, billabongs, waterholes and inundated floodplains, claypans, salt flats, sewage farms and saltworks dams, inundated rice crops and bores) and sheltered coastal habitats (mudflats, saltmarsh, mangroves, embayments, harbours, river estuaries, deltas, lagoons, tidal pools, rock-flats and rock platforms).			
Tyto novaehollandiae	Masked Owl	V		Recorded over approximately 90% of NSW, excluding the most arid north-western corner. Most abundant on the coast but extends to the western plains. Dry eucalypt forests and woodlands from sea level to 1100 m.	1	No – lack of suitable habitat.	No

Appendix B – Planning controls for 'core' and 'potential' koala habitat

'Core' koala habitat controls	'Potential' koala habitat control
6.4.2 Retention of (P)KFTs and shelter trees For the purposes of this Plan, development has been classified into 'minor' and 'major' development (see caption below) i. There shall be no removal of (P)KFTs or shelter trees as a consequence of any new DA, beyond what is permissible under the definitions for minor and major development. ii. The applicant must demonstrate to the satisfaction of Council that the protection of all (P)KFTs and shelter trees are consistent with the requirements of AS 4970-2009 (Protection of Trees on Development Sites). iii. Retained (P)KFTs and shelter trees that occur within residential allotments arising from the subdivision of land must be protected by a covenant or other effective restriction on the user on title of the land where appropriate.	**6.4.8 Planning controls in 'potential' koala habitat** i. This section applies to all planning proposals, rezonings, and DAs that relate to areas of potential koala habitat. ii. for the purposes of Section 6.4.2 of the Plan, Council may exercise discretion subject to the application demonstrating to the satisfaction of Council that that retention of (P)KFTs > 200mm DBH has been maximised and that the proposed tree removal will not prejudice the overall vision, aims and objectives of the Plan. iii. for the purposes of Sections 6.4.3 – 6.4.6 of the Plan, Council may exercise discretion in terms of requiring the development to conform. iv. Part 7 of the Plan applies to any DA being considered for the purposes of this section.
6.4.3 Swimming pools i. All new swimming pools must incorporate a design component such as a shallow ramp or other feature that will enable egress by koalas; and/or a stout rope (> 50 mm diameter), one end of which must be secured to a stable poolside fixture, the other end of which must trail in the pool. ii. Without contravening provisions of the Swimming Pools Act 1992, fencing must also be of a type that prevents access to the pool area by koalas (eg not be of timber or have timber posts or have shrubs and trees within 1m of either side of the fence that would allow koalas to climb over).	
6.4.4 Domestic dogs i. On any new residential lots arising from the subdivision of land, the keeping of domestic dogs will be either: A. prohibited by an effective restriction as to user on the title of the land, or other suitable planning measure. B. subject to a covenant; imposing a legal requirement to install a dog-proof yard, whether the prospective owner has the immediate intention of owning a dog or	

'Core' koala habitat controls	'Potential' koala habitat control
not. The yard must not contain (P)KFTs or shelter trees, with a minimum area of approximately 300m2 around a residential dwelling or part thereof. Yard-fencing must be a minimum of 1.8 m high and either be partially buried or have an associated buried component to a minimum depth of 0.3m. All gates into the enclosed area must be of the same height and general structure as the yard-fence and must have minimum clearance above ground to allow for swinging of the gate, below which must be a solid barrier (eg concrete) to deter digging. ii. The options referred to in 6.4.4(i) above must be either registered and/or in place prior to the issuing of a CC.	
6.4.5 Fencing i. Fencing of residential lots must not impede the movement of koalas. Fences that are not supported by this Plan, include (but are not limited to): - colourbond panel fencing - barbed wire fencing - solid brick fencing (>1m high) - steel fencing (>30cm gaps between rails)	
6.4.6 Road design i. Road design standards and/or approved vehicle calming devices (eg speed humps, roundabouts, chicanes and wildlife activated signage) must be incorporated on any new roads created through residential subdivision with a maximum speed of 40km/hr. A. Outside of residential subdivisions, where new roads or road upgrades are proposed that traverse areas of koala habitat and are predicted to accommodate in excess of 1,500 vehicle movements/day, the following standards apply: B. approved wildlife exclusion fencing must be installed along both sides of the road, the lower half of which must be clad with galvansied tin sheeting on the outside face. C. round pipe koala-grids or other approved devices must be installed at	

'Core' koala habitat controls	'Potential' koala habitat control
fence-ends and driveways and other access points to prevent koala access to the road corridor. D. connectivity structures such as overpasses or underpasses (comprising a minimum of 1.2m X 1.2m reinforced concrete box culverts) must be installed at regular intervals that approximate one structure per 250m of exclusion fencing. E. in areas where significant topographical or engineering constraints exist, solutions are to be sought that do not compromise the long-term viability of the koala population. **F.** detailed design in accordance with (i) and (ii) above must be prepared in consultation with a suitably qualified person.	
6.4.7 Protection of koalas from disturbance i. Clearing of native vegetation and/or earthworks as part of any consent from Council must be temporarily suspended within a range of 25m from any tree which is concurrently occupied by a koala and must not resume until the koala has moved from the tree of its own volition. ii. Any clearing of land must not commence until the area proposed for clearing has been inspected for the presence of koalas by a suitably qualified person, and approval given in writing. iii. Approval to proceed with the clearing of vegetation in accordance with this section is only valid for the day on which the inspection has been undertaken. iv. The individual referred to in (ii) above, or a nominated representative, must remain on site during any approved clearing of vegetation. If clearing operations are being undertaken concurrently in different sections of a property, a suitably qualified person must be present in each section.	

Appendix C – Compensatory measures for major and minor development

MAJOR DEVELOPMENT

i This section applies to any DA that relates to the subdivision of land into ≥ three lots, and/or requires the removal of three or more (P)KFTs for each hectare of assessable land.

ii Where a proponent chooses to seek the removal of (P)KFTs or shelter trees in accordance with a DA, provision must be made to compensate for the loss of the associated habitat.

iii To ensure that the provision of compensation is:

- equivalent to the importance of habitat being removed
- geographically appropriate so as to contribute to the long

the proponent shall agree to either, at the applicants expense:

- to enter into a legally binding agreement with Council to make a monetary contribution towards the Koala Habitat Rehabilitation Program detailed in Part 8 of the Plan, or
- to enter into a legally binding agreement with Council to undertake rehabilitation works in areas identified by the Koala Rehabilitation Program detailed in Part 8 of the Plan. This will include payment of a Compensation Guarantee in the form of a Bank Bond which will be released once the required works have been implemented in accord with the agreement. The purpose of a Compensatory Guarantee is to allow Council to implement the required works in the event that the proponent is unable or unwilling to comply.

iv The amount of the monies referred to in 7.1(iii)(a-b) above will be based on the value of the required 'compensation units' (CU) (for every cm of DBH or part thereof) arising from the total number and size of (P)KFTs and shelter trees that will be removed, as follows:

- Small (DBH < 100mm) = 8 CU/mm of DBH
- Medium (DBH >100<300mm) = 15 CU/mm of DBH
- Large (DBH > 300mm) 25 CU/mm of DBH

The value of a CU as at the date of commencement of the Plan is $1.00, this value to be adjusted annually using the CPI increase for the 12 months prior to the review date.

Council must establish a special trust fund into which the monetary amount determined as compensation for the purposes of 7.1(iii)(a) above can be placed, and from which only habitat rehabilitation or regeneration works identified through the provisions of Part 8 of the Plan can be funded.

Appendix D Vegetation Floristic Plot Data

Appendix D Vegetation Floristic Plot Data

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 1			Plot 2			Plot 3			Plot 4		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Araujia sericifera			*	1		g	0.1	2									
Aristida spp.					Grass & grasslike (GG)	g	15	1000	g	20	1000	g	25	1000	g	1	50
Arthropodium milleflorum					Forb (FG)	g	0.1	3									
Bothriochloa macra					Grass & grasslike (GG)	g	1	100	g	2	500	g	0.2	50			
Brunoniella australis					Forb (FG)	g	0.2	50				g	0.2	50			
Bursaria spinosa subsp. *spinosa*					Shrub (SG)	m	60	500	m	30	100				g	0.1	1
Chloris gayana			*	1					g	0.1	1						
Chloris truncata					Grass & grasslike (GG)	g	1	20	g	0.1	10	g	0.1	100	g	0.1	1
Chloris ventricosa					Grass & grasslike (GG)	g	2	100	g	0.2	50	g	0.3	100			
Cotula australis					Forb (FG)	g	0.1	5	g	0.1	10						
Cymbonotus lawsonianus					Forb (FG)				g	0.1	5						

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 1			Plot 2			Plot 3			Plot 4		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Cymbopogon refractus					Grass & grasslike (GG)	g	0.1	10	g	2	500	g	5	100 0	g	0.2	20
Cynodon incompletus			*			g	0.1	10	g	0.1	10						
Cyperus brevifolius			*												g	0.1	1
Cyperus gracilis					Grass & grasslike (GG)	g	0.1	50	g	0.2	50				g	0.1	3
Cyperus spp.					Grass & grasslike (GG)							g	0.1	5			
Desmodium rhytidophyllum					Forb (FG)							g	0.1	1			
Desmodium spp.					Other (OG)	g	0.1	5	g	0.1	50				g	0.1	10
Desmodium varians					Other (OG)	g	0.1	20	g	0.1	50	g	0.1	50			
Desmodium varians					Other (OG)										g	0.1	10
Dichelachne micrantha					Grass & grasslike (GG)	g	0.1	1									
Dichondra repens					Forb (FG)	g	1	100	g	0.1	100	g	0.1	2	g	0.1	20
Einadia hastata					Forb (FG)	g	0.1	1									
Einadia polygonoides					Forb (FG)	g	0.1	5				g	0.1	2	g	0.1	2

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 1			Plot 2			Plot 3			Plot 4		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Einadia trigonos subsp. *stellulata*					Forb (FG)	g	0.1	3							g	0.1	10
Eleusine tristachya					Forb (FG)												
Eragrostis brownii					Grass & grasslike (GG)				g	0.1	5						
Eremophila debilis					Shrub (SG)	g	0.1	1									
Eriochloa pseudoacrotricha					Grass & grasslike (GG)							g	0.1	1			
Eucalyptus moluccana					Tree (TG)	u	25	5				u	20	20	u	15	2
Eucalyptus tereticornis					Tree (TG)												
Euphorbia spp.					Forb (FG)							g	0.1	2			
Ficus spp.					Tree (TG)										u	0.2	1
Fimbristylis dichotoma					Grass & grasslike (GG)				g	0.1	10	g	0.1	1			
Foeniculum vulgare			*														
Galium binifolium subsp. binifolium					Forb (FG)												
Galium spp.					Forb (FG)				g	0.1	20	g	0.1	1			
Galium spp.					Forb (FG)												

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 1			Plot 2			Plot 3			Plot 4		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Geranium homeanum					Forb (FG)				g	0.1	1						
Geranium solanderi var. *solanderi*					Forb (FG)				g	0.1	1						
Glycine clandestina					Other (OG)	g	0.2	50	g	0.2	50						
Glycine tabacina					Other (OG)	g	0.1	20	g	0.1	20	g	0.5	100	g	0.1	20
Gomphocarpus fruticosus			*			g	0.1	2	g	0.1	5	g	0.1	2			
Goodenia hederacea subsp. *hederacea*					Forb (FG)												
Hypericum gramineum					Forb (FG)				g	0.1	20						
Hypochaeris radicata			*						g	0.1	5						
Lagenophora stipitata					Forb (FG)	g	0.1	5	g	0.1	20						
Lantana camara			*	1								m	0.6	5	g	0.5	10
Lepidium africanum			*			g	0.1	1									
Lepidium bonariense			*														
Lycium ferocissimum			*	1		m	0.3	10				m	0.3	5	g	0.2	5
Lysimachia arvensis			*						g	0.2	50						
Medicago sativa			*						g	0.1	10						
Melaleuca styphelioides					Shrub (SG)												

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 1			Plot 2			Plot 3			Plot 4		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Microlaena stipoides var. *stipoides*					Grass & grasslike (GG)	g	0.5	100	g	0.1	50						
Notelaea longifolia f. longifolia					Tree (TG)							m	0.1	2	g	0.1	5
Nothoscordum borbonicum			*						g	0.1	10						
Olea europaea subsp. *cuspidata*			*			m	2	5	g	2	10	m	50	100	u	95	1000
Oxalis perennans					Forb (FG)				g	0.2	50				g	0.1	10
Oxalis perennans					Forb (FG)	g	0.1	10									
Panicum effusum					Grass & grasslike (GG)							g	0.1	3			
Paronychia brasiliana			*			g	0.1	5									
Paspalidium distans					Grass & grasslike (GG)	g	0.2	50				g	0.1	1			
Paspalum dilatatum			*	1		g	0.1	10	g	5	100						
Phyllanthus virgatus					Forb (FG)	g	0.1	2	g	0.1	2	g	0.1	2	g	0.1	1
Plantago lanceolata			*						g	0.1	50						
Portulaca oleracea					Forb (FG)	g	0.1	5	g	0.1	1				g	0.1	1
Richardia humistrata			*			g	0.1	1	g	0.1	1						

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 1			Plot 2			Plot 3			Plot 4		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Rytidosperma spp.					Grass & grasslike (GG)	g	0.2	50				g	0.1	2			
Senecio madagascariensis			*	1		g	0.1	5	g	0.1	10				g	0.1	3
Setaria parviflora			*			g	3	100	g	40	1000	g	0.1	5			
Setaria parviflora			*														
Sida corrugata					Forb (FG)	g	0.1	10	g	0.1	10	g	0.5	100	g	0.2	20
Sida rhombifolia			*			g	0.1	20	g	0.1	20						
Sida spp.					Forb (FG)	g	0.1	2				g	0.2	50			
Solanum prinophyllum					Forb (FG)	g	0.1	1	g	0.1	5						
Solenogyne bellioides					Forb (FG)	g	0.1	10	g	0.1	50						
Sonchus oleraceus			*			g	0.1	1	g	0.1	20						
Sporobolus creber					Grass & grasslike (GG)	g	0.1	5	g	0.2	50	g	0.1	2			
Stackhousia viminea					Forb (FG)				g	0.1	2						
Themeda triandra					Grass & grasslike (GG)	g	5	100	g	5	1000	g	0.2	50	g	0.1	10
Tricoryne elatior					Forb (FG)	g	0.1	5	g	0.1	50						

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 1			Plot 2			Plot 3			Plot 4		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Verbena rigida var. rigida			*						g	0.2	20						
Vittadinia cuneata var. cuneata			*		Forb (FG)							g	0.1	1			
Zornia dyctiocarpa var. dyctiocarpa					Forb (FG)				g	0.2	50						

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 5			Plot 6			Plot 7			Plot 8		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Acacia floribunda					Shrub (SG)				m	0.1	3						
Ajuga australis					Forb (FG)				g	0.1	2						
Alternanthera pungens		*	1														
Angophora floribunda					Tree (TG)												
Araujia sericifera		*	1						g	0.1	1						

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 5			Plot 6			Plot 7			Plot 8		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Aristida spp.					Grass & grasslike (GG)	g	45	1000	g	3	100	g	45	1500	g	10	500
Aristida vagans					Grass & grasslike (GG)				g	0.2	50						
Arthropodium milleflorum					Forb (FG)				g	0.1	3						
Asteraceae spp.															g	0.1	10
Atriplex semibaccata					Shrub (SG)												
Bidens pilosa var. pilosa			*														
Bidens subalternans			*	1		g	0.1	1									
Bothriochloa macra					Grass & grasslike (GG)	g	0.1	10	g	0.1	5	g	0.1	100	g	10	500
Brassica oleracea			*														
Briza minor			*														

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 5			Plot 6			Plot 7			Plot 8		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Bromus catharticus			*														
Brunoniella australis					Forb (FG)				g	0.2	50						
Bursaria spinosa subsp. *spinosa*					Shrub (SG)	m	35	100	m	50	100						
Callistemon spp.					Shrub (SG)												
Casuarina glauca					Tree (TG)												
Cenchrus clandestinus			*	1													
Cheilanthes sieberi subsp. *sieberi*					Fern (EG)				m	0.1	5						
Chenopodium album			*												g	0.1	1
Chloris gayana			*	1													
Chloris truncata					Grass & grasslike (GG)				g	0.1	1	g	0.1	10	g	0.5	50

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 5			Plot 6			Plot 7			Plot 8		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Chloris ventricosa					Grass & grasslike (GG)	g	0.1	5	g	0.1	20				g	0.1	50
Chlorophytum comosum			*	1													
Cirsium vulgare			*												g	0.1	1
Clematis aristata					Other (OG)				g	0.1	5						
Clematis glycinoides var. *glycinoides*					Other (OG)												
Convolvulus erubescens					Other (OG)	g	0.1	1									
Conyza bonariensis			*														
Conyza spp.			*												g	0.1	10
Cotula australis					Forb (FG)	g	0.1	1	g	0.1	1				g	0.1	10
Cymbonotus lawsonianus					Forb (FG)												

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 5			Plot 6			Plot 7			Plot 8		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Cymbopogon refractus					Grass & grasslike (GG)				g	0.1	20						
Cynodon incompletus			*												g	5	50
Cyperus brevifolius			*												g	0.1	100
Cyperus eragrostis			*	1													
Cyperus gracilis					Grass & grasslike (GG)				g	0.2	50	g	0.1	10	g	0.1	100
Desmodium spp.					Other (OG)	g	0.1	5	g	0.1	5						
Desmodium varians					Other (OG)	g	0.8	100	g	0.1	20	g	0.1	10			
Desmodium varians					Other (OG)												
Dianella longifolia var. *longifolia*					Other (OG)												

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 5			Plot 6			Plot 7			Plot 8		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Dichelachne micrantha					Grass & grasslike (GG)										g	0.1	50
Dichondra repens					Forb (FG)	g	2	500	g	0.1	50				g	0.1	10
Dodonaea viscosa subsp. *viscosa*					Shrub (SG)												
Echinopogon caespitosus var. *caespitosus*					Grass & grasslike (GG)	g	0.1	1									
Einadia hastata					Forb (FG)	g	0.1	1	g	1	1						
Einadia nutans subsp. *nutans*					Forb (FG)												
Einadia polygonoides					Forb (FG)	g	0.1	5	g	0.1	5						
Einadia trigonos subsp. *stellulata*					Forb (FG)				g	0.1	5				g	0.2	100
Eleusine tristachya					Forb (FG)										g	0.2	50

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 5			Plot 6			Plot 7			Plot 8		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Eragrostis brownii					Grass & grasslike (GG)	g	0.2	50									
Eragrostis leptostachya					Grass & grasslike (GG)										g	0.2	50
Eremophila debilis					Shrub (SG)				g	0.1	3						
Eriochloa pseudoacrotricha					Grass & grasslike (GG)				g	0.2	20						
Eucalyptus crebra					Tree (TG)												
Eucalyptus eugenioides					Tree (TG)				m	0.2	1						
Eucalyptus moluccana					Tree (TG)				u	5	5						
Eucalyptus tereticornis					Tree (TG)				u	20	4						
Euphorbia spp.					Forb (FG)												

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 5			Plot 6			Plot 7			Plot 8		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Ficus spp.					Tree (TG)												
Fimbristylis dichotoma					Grass & grasslike (GG)	g	0.1	1									
Foeniculum vulgare			*														
Galium binifolium subsp. *binifolium*					Forb (FG)												
Galium spp.					Forb (FG)	g	0.1	5				g	0.1	2	g	0.1	50
Geranium homeanum					Forb (FG)	g	0.1	1							g	0.1	50
Geranium solanderi var. *solanderi*					Forb (FG)	g	0.1	1							g	0.1	50
Glycine clandestina					Other (OG)				g	0.1	10						
Glycine microphylla					Other (OG)												
Glycine tabacina					Other (OG)				g	0.2	50				g	0.2	100

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 5			Plot 6			Plot 7			Plot 8		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Gomphocarpus fruticosus			*			g	0.1	5							g	0.1	1
Goodenia hederacea subsp. *hederacea*					Forb (FG)				g	0.1	2						
Hypericum perforatum			*	1		g	2	100									
Kennedia spp.					Other (OG)				g	0.1	1						
Lagenophora stipitata					Forb (FG)												
Lantana camara			*	1		m	5	20	m	0.5	5						
Lepidium africanum			*														
Lepidium bonariense			*												g	0.1	5
Lepidium didymum			*												g	0.1	5
Linum marginale					Forb (FG)												

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 5			Plot 6			Plot 7			Plot 8		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Lomandra glauca					Grass & grasslike (GG)												
Lycium ferocissimum			*	1					m	0.1	1				m	1	1
Lysimachia arvensis			*			g	0.1	5				g	0.1	5	g	0.1	20
Malva parviflora			*														
Medicago sativa			*														
Melaleuca styphelioides					Shrub (SG)												
Microlaena stipoides var. *stipoides*					Grass & grasslike (GG)	g	0.1	5	g	1	50	g	0.2	50	G	9	500
Modiola caroliniana			*												g	0.1	50
Nassella spp.			*														
Notelaea longifolia f. longifolia					Tree (TG)												

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 5			Plot 6			Plot 7			Plot 8		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Nothoscordum borbonicum			*														
Olea europaea subsp. *cuspidata*			*			g	2	10	m	0.5	5						
Opercularia diphylla					Forb (FG)												
Opuntia stricta var. *stricta*			*	1					g	0.1	3						
Oxalis corniculata			*												g	0.1	50
Oxalis perennans					Forb (FG)	g	0.1	20				g	25	1000	g	0.1	10
Ozothamnus diosmifolius					Shrub (SG)				g	0.1	2						
Paspalidium distans					Grass & grasslike (GG)				g	0.2	2	g	0.1	5	g	0.1	10
Paspalum dilatatum			*	1								g	1	50	g	25	500
Phyllanthus virgatus					Forb (FG)	g	0.1	2							g	0.1	5
Pinus spp.			*														

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 5			Plot 6			Plot 7			Plot 8		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Plantago lanceolata			*			g	0.1	5							g	0.1	10
Plectranthus parviflorus					Forb (FG)				g	0.1	5						
Poa annua			*														
Poaceae						g	0.1	1									
Portulaca oleracea					Forb (FG)	g	0.1	5	g	0.1	5	g	0.1	1	g	0.1	10
Richardia humistrata			*			g	0.1	1									
Rumex brownii					Forb (FG)										g	0.1	1
Rytidosperma spp.					Grass & grasslike (GG)	g	0.1	5	g	0.1	10				g	0.1	10
Scleria mackaviensis					Grass & grasslike (GG)												
Senecio madagascariensis			*	1		g	0.1	5	g	0.1	1	g	0.1	10	g	0.2	10
Setaria parviflora			*			g	15	500	g	0.1	1	g	60	1500	g	5	500

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 5			Plot 6			Plot 7			Plot 8		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Sida corrugata					Forb (FG)				g	0.1	5	g	0.1	10	g	0.1	10
Sida rhombifolia			*			g	0.1	10	g	0.1	10	g	0.1	10	G	0.2	50
Sida spp.					Forb (FG)	g	0.1	1	g	0.1	1				g	0.1	10
Solanum cinereum					Shrub (SG)										g	1	2
Solanum linnaeanum			*						g	0.1	1	g	0.2	5			
Solanum nigrum			*			g	0.1	5	g	0.1	1						
Solanum prinophyllum					Forb (FG)												
Solenogyne bellioides					Forb (FG)												
Sonchus oleraceus			*			g	0.1	5				g	0.1	10	g	0.1	10
Sporobolus creber					Grass & grasslike (GG)							g	0.1	20	g	1	500
Stackhousia viminea					Forb (FG)				g	0.1	2						

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 5			Plot 6			Plot 7			Plot 8		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Taraxacum officinale			*												g	0.1	1
Themeda triandra					Grass & grasslike (GG)	g	1	50	g	0.5	50				g	0.1	50
Tricoryne elatior					Forb (FG)	g	0.1	5									
Tricoryne simplex					Forb (FG)												
Trifolium repens			*												g	0.1	10
Trifolium spp.			*														
Verbena bonariensis			*												g	0.1	10
Verbena rigida var. *rigida*			*			g	0.1	5				g	1	3	g	0.1	10
Vicia sativa subsp. *nigra*			*														
Vigna vexillata var. *angustifolia*			*		Other (OG)												

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 5			Plot 6			Plot 7			Plot 8		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Vittadinia cuneata var. *cuneata*			*		Forb (FG)				g	0.1	5						
Wahlenbergia communis					Forb (FG)	g	0.1	5	g	0.1	2						
Wahlenbergia gracilis					Forb (FG)										g	0.1	10
Zornia dyctiocarpa var. *dyctiocarpa*					Forb (FG)	g	0.3	100							g	0.1	10

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 9			Plot 10			Plot 11			Plot 12		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Acacia decurrens					Tree (TG)												
Acacia floribunda					Shrub (SG)												
Acacia implexa					Shrub (SG)							m	2	5			
Acacia longifolia subsp. *longifolia*					Shrub (SG)							g	1	20			
Alternanthera pungens			*	1											g	0.5	100
Angophora floribunda					Tree (TG)												
Araujia sericifera			*	1													
Aristida spp.					Grass & grasslike (GG)	g	40	1000	g	5	100	g	5	100			
Aristida vagans					Grass & grasslike (GG)												
Arthropodium milleflorum					Forb (FG)							g	0.1	10			
Asparagus aethiopicus			*	1													

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 9			Plot 10			Plot 11			Plot 12		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Asperula conferta					Forb (FG)	g	0.1	10									
Asphodelus fistulosus			*									g	0.1	5			
Aster subulatus			*												g	0.1	10
Asteraceae spp.																	
Atriplex semibaccata					Shrub (SG)												
Bidens pilosa var. pilosa			*			g	0.1	50				g	0.1	20			
Bidens subalternans			*	1													
Bothriochloa macra					Grass & grasslike (GG)	g	1	100	g	10	500	g	0.1	10			
Brassica oleracea			*														
Briza minor			*			g	0.1	1									
Bromus catharticus			*												g	0.1	50
Brunoniella australis					Forb (FG)							g	1	50			
Bursaria spinosa subsp. *spinosa*					Shrub (SG)	m	45	50	m	0.1	1	m	2	2			

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 9			Plot 10			Plot 11			Plot 12		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Callistemon spp.					Shrub (SG)												
Casuarina glauca					Tree (TG)										u	10	4
Cenchrus clandestinus			*	1								g	0.2	50	g	25	1000
Cheilanthes sieberi subsp. *sieberi*					Fern (EG)												
Chenopodium album			*														
Chloris gayana			*	1								g	5	100			
Chloris truncata					Grass & grasslike (GG)				g	0.1	1						
Chloris ventricosa					Grass & grasslike (GG)												
Chlorophytum comosum			*	1								g	0.1	1			
Cirsium vulgare			*						g	0.1	1	g	0.1	10	g	0.1	5
Clematis aristata					Other (OG)												

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 9			Plot 10			Plot 11			Plot 12		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Conyza bonariensis			*			g	0.1	50							g	0.1	1
Conyza spp.			*														
Cotula australis					Forb (FG)	g	0.1	10	g	0.1	20				g	0.1	10
Cymbonotus lawsonianus					Forb (FG)												
Cymbopogon refractus					Grass & grasslike (GG)	g	3	50									
Cynodon incompletus			*			g	2	100	g	8	500				g	25	1000
Cyperus brevifolius			*						g	0.1	20	g	0.5	50			
Cyperus eragrostis			*	1											g	0.1	10
Cyperus gracilis					Grass & grasslike (GG)	g	0.1	50	g	0.1	20	g	0.5	50	g	0.1	50
Cyperus spp.					Grass & grasslike (GG)	g	0.1	1000									

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 9			Plot 10			Plot 11			Plot 12		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Dianella longifolia var. *longifolia*					Other (OG)							g	0.1	20			
Dichelachne micrantha					Grass & grasslike (GG)												
Dichondra repens					Forb (FG)	g	0.1	50				g	0.1	20	g	0.5	50
Dodonaea viscosa subsp. *viscosa*					Shrub (SG)												
Echinopogon caespitosus var. *caespitosus*					Grass & grasslike (GG)												
Einadia hastata					Forb (FG)												
Einadia nutans subsp. *nutans*					Forb (FG)												
Einadia polygonoides					Forb (FG)				g	0.1	20						
Einadia trigonos subsp. *stellulata*					Forb (FG)										g	0.1	1
Eleusine tristachya					Forb (FG)				g	0.1	20				g	0.5	100

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 9			Plot 10			Plot 11			Plot 12		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Eragrostis brownii					Grass & grasslike (GG)	g	0.5	100	g	0.1	20						
Eragrostis leptostachya					Grass & grasslike (GG)				g	0.1	20						
Eremophila debilis					Shrub (SG)												
Eriochloa pseudoacrotricha					Grass & grasslike (GG)												
Eucalyptus crebra					Tree (TG)												
Eucalyptus eugenioides					Tree (TG)												
Eucalyptus moluccana					Tree (TG)							u	5	20			
Eucalyptus tereticornis					Tree (TG)							u	15	1	u	10	1
Euphorbia spp.					Forb (FG)												
Ficus spp.					Tree (TG)												

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 9			Plot 10			Plot 11			Plot 12		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Fimbristylis dichotoma					Grass & grasslike (GG)												
Foeniculum vulgare			*									g	0.1	5			
Galium binifolium subsp. *binifolium*					Forb (FG)										g	5	1000
Galium spp.					Forb (FG)										g	0.1	50
Geranium homeanum					Forb (FG)	g	0.1	50				g	0.1	10			
Geranium solanderi var. *solanderi*					Forb (FG)				g	0.2	50	g	0.1	10			
Glycine clandestina					Other (OG)												
Glycine microphylla					Other (OG)							g	0.1	20			
Glycine tabacina					Other (OG)	g	0.1	50				g	0.2	100			
Gomphocarpus fruticosus			*									g	0.1	1			
Goodenia hederacea subsp. *hederacea*					Forb (FG)												

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 9			Plot 10			Plot 11			Plot 12		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Hypericum gramineum					Forb (FG)	g	0.1	50				g	0.1	10			
Hypericum perforatum			*	1								g	0.1	20			
Hypochaeris glabra			*									g	0.1	1			
Hypochaeris radicata			*			g	0.1	10				g	0.1	10	g	0.1	50
Hypoxis hygrometrica var. *hygrometrica*					Forb (FG)	g	0.1	50	g	0.1	1						
Indigofera australis					Shrub (SG)												
Juncus usitatus					Grass & grasslike (GG)										g	0.1	10
Kennedia spp.					Other (OG)												
Lagenophora stipitata					Forb (FG)												
Lantana camara			*	1													
Lepidium africanum			*												g	0.1	1

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 9			Plot 10			Plot 11			Plot 12		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Lepidium bonariense			*														
Lepidium didymum			*														
Linum marginale					Forb (FG)												
Lomandra glauca					Grass & grasslike (GG)												
Lycium ferocissimum			*	1													
Lysimachia arvensis			*			g	0.2	500	g	0.1	20						
Malva parviflora			*												g	0.1	10
Medicago sativa			*														
Melaleuca styphelioides					Shrub (SG)										m	8	1
Microlaena stipoides var. *stipoides*					Grass & grasslike (GG)	g	5	100	g	0.5	50	g	15	1000			
Modiola caroliniana			*						g	0.1	1				g	0.1	100
Nassella spp.			*									g	0.2	50	g	0.5	5

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 9			Plot 10			Plot 11			Plot 12		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Notelaea longifolia f. longifolia					Tree (TG)												
Nothoscordum borbonicum			*														
Olea europaea subsp. *cuspidata*			*			g	0.5	1				g	3	10	m	1	3
Opercularia diphylla					Forb (FG)												
Opuntia stricta var. *stricta*			*	1													
Oxalis corniculata			*														
Oxalis perennans					Forb (FG)	g	0.1	50	g	0.1	50	g	0.5	100	g	0.1	10
Paspalidium distans					Grass & grasslike (GG)				g	0.1	20	g	0.1	10			
Paspalum dilatatum			*	1		g	5	1000	g	20	500	g	15	500	g	0.2	10
Phyllanthus virgatus					Forb (FG)				g	0.1	20						
Pinus spp.			*														
Plantago lanceolata			*			g	0.1	50	g	0.1	20	g	0.1	20	g	0.1	10

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 9			Plot 10			Plot 11			Plot 12		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Plectranthus parviflorus					Forb (FG)												
Poa annua			*												g	0.1	50
Poaceae																	
Portulaca oleracea					Forb (FG)				g	0.1	20						
Richardia humistrata			*														
Rumex brownii					Forb (FG)										g	0.1	10
Rytidosperma spp.					Grass & grasslike (GG)							g	0.1	20			
Scleria mackaviensis					Grass & grasslike (GG)												
Senecio madagascariensis			*	1		g	0.1	100	g	0.2	50	g	0.2	50			
Setaria parviflora			*			g	2	100	g	40	1000	g	1	50	g	0.1	10
Sida rhombifolia			*			g	0.1	10	g	0.1	10	g	0.1	20			
Sida spp.					Forb (FG)												

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 9			Plot 10			Plot 11			Plot 12		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Solanum cinereum					Shrub (SG)				g	0.1	3						
Sonchus oleraceus			*			g	0.1	10	g	0.1	20				g	0.1	10
Sporobolus creber					Grass & grasslike (GG)	g	2	500	g	2	100						
Stackhousia viminea					Forb (FG)	g	0.1	50									
Taraxacum officinale			*														
Themeda triandra					Grass & grasslike (GG)	g	2	500	g	0.1	5	g	1	100			
Tricoryne elatior					Forb (FG)	g	0.1	100									
Tricoryne simplex					Forb (FG)												
Trifolium repens			*						g	0.1	5	g	0.1	20	g	0.1	10
Trifolium spp.			*			g	0.1	100									
Verbena bonariensis			*			g	0.1	10	g	0.1	5				g	0.1	10
Verbena rigida var. *rigida*			*			g	0.1	10	g	0.1	10						

Species	Listing Status	ROTAP	Exotic	High Threat Weed	Growth Form Group	Plot 9			Plot 10			Plot 11			Plot 12		
						Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Vicia sativa subsp. *nigra*			*														
Vigna vexillata var. *angustifolia*			*		Other (OG)	g	0.1	100									
Vittadinia cuneata var. *cuneata*			*		Forb (FG)												
Wahlenbergia communis					Forb (FG)							g	0.1	20			
Wahlenbergia gracilis					Forb (FG)	g	0.1	50									
Zornia dyctiocarpa var. *dyctiocarpa*					Forb (FG)	g	0.1	50	g	0.1	1						

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