Ecological Constraints Assessment

Pymble Golf Club

Report prepared by Narla Environmental Pty Ltd

for Pymble Golf Club

June 2022

Report:	Ecological Constraints Assessment
Prepared for:	Pymble Golf Club
Prepared by:	Narla Environmental Pty Ltd
Project no:	DMPS6
Date:	June 2022
Version:	Final v2.0

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1. Introduction

1.1 Project Proposal

Narla Environmental Pty Ltd (Narla) was engaged by Pymble Golf Club to prepare an Ecological Constraints Assessment (ECA) for the eastern extent of the Pymble Golf Club on Cowan Road, St Ives NSW 2075 (Lot 1/-/DP511821, Lots 1, 2, 3/-/DP531533, Lot B/DP368565 and Lot 884/DP729629), hereafter referred to as the Survey Area (**Figure 1**).

The proponent intends to re-zone the Survey Area to support the urban planning objectives of the community and Ku-ring-gai Local Government Area (LGA). The scope of the works will be restricted to the proposed development area (**Figure 1**).

Narla have produced this report in order to identify any potential ecological impacts associated with the proposed development, and recommend appropriate measures to mitigate any potential ecological impacts in line with the requirements of the consent authority, Ku-ring-gai Council.

The main purpose of this Ecological Constraints Assessment was to determine the presence of any threatened fauna, flora or ecological community within the Survey Area that are listed under the *Biodiversity Conservation Act 2016* (BC Act) or the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

1.2 Site Description and Location

The Survey Area comprises an area of approximately 2.14ha and is situated in the suburb of St Ives within the Ku-ring-gai LGA. Cowan Road intersects the eastern boundary of the Survey Area.

1.3 Topography, geology and soils

The Survey Area is situated on the Glenorie Soil Landscape, which is characterised by Gently undulating to rolling low hills on Wianamatta Group shales. Local relief 50-80m, slopes 5-20%. Narrow ridges, hillcrests and valleys. Extensively cleared tall open-forest (Wet sclerophyll forest).

The Glenorie soil landscape is underlain by Wianamatta Group Ashfield Shale and Bringelly Shale formations. The Ashfield Shale is comprised of laminite and dark grey shale.

Soils are shallow to moderately deep (<100 cm) Red Podzolic Soils on crests; moderately deep (70-150 cm) Red and Brown Podzolic soils on upper slopes; deep (>200cm) Yellow Podzolic Soils on lower slopes and Humic Gleys, Yellow Podzolic Soils and Greyed Podzolic Soils along drainage lines (Chapman and Murphy 1989).

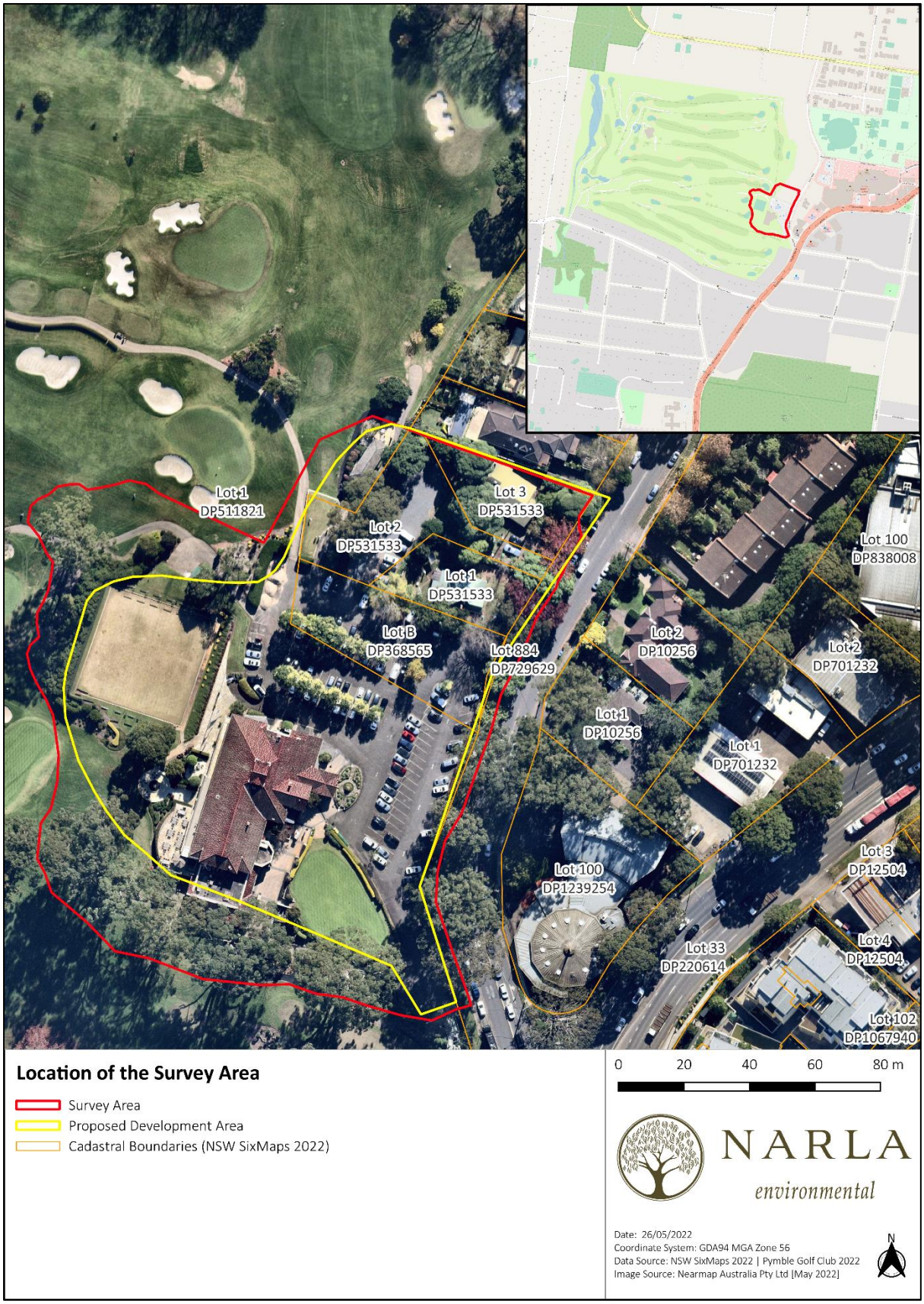

Figure 1. Location of the Survey Area.

1.4 Scope of Assessment

The objectives of this report were to assess all possible ecological constraints within the Survey Area that may arise pursuant to Part 4 of the *Environmental Planning and Assessment Act* 1979 (EP&A Act) and the local planning provisions of Ku-ring-gai Council, including to:

- Conduct an assessment of the ecological constraints within the Survey Area;
- Establish the likelihood of occurrence of migratory species, threatened species, endangered populations and threatened ecological communities as listed under the New South Wales *Biodiversity Conservation Act 2016* (BC Act) and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) within the Survey Area.
- Identify and map the distribution of vegetation communities in the Survey Area;
- Determine ecological impacts or risks that may result due to the proposed development(s).
- Recommend any controls or additional actions for the usage of the property (e.g. development) while protecting or improving ecological / biodiversity values of the Survey Area.

1.5 Study Limitations

This study was undertaken to provide a broad identification of all relevant constraints to any future development within the Survey Area. This study was not meant to provide a complete inventory of all species with potential to occur on the Survey Area; rather it was to provide an assessment into the likelihood of the presence of any significant ecological features (migratory species, threatened species, communities and populations) with potential to utilise the Survey Area, and the potential for impact of the proposed works on those ecological features.

The species inventory provided for the site was restricted to what was observed on the day of the site assessment on the 24th August 2018. The timing of the survey may not have coincided with emergence times of some species of flora and fauna, such as seasonally flowering herbs, seasonal migratory fauna or nocturnal fauna.

This study is not an Ecological Impact Assessment and therefore does not assess impacts of the proposed rezoning or future development of the Survey Area pursuant to section 7.3 of the BC Act; however, it may form the basis for an Ecological Impact Assessment to be compiled.

1.6 Relevant Legislation and Policy

The following summary of relevant legislation and policy (**Table 1**) will likely need to be addressed as part of the future DA.

Table 1. Relevant legislation and policy addressed in this report

Legislation/ Policy	Relevant Ecological Feature on Site	Triggered	Action Required
Environmental Planning and Assessment Act 1979 (EP&A Act)	All threatened species, populations, and ecological communities and their habitat that occur or are likely to occur in the Survey Area during a part of their lifecycle.	Yes	A Flora & Fauna / Ecological Impact Assessment Report and all subsequent recommendations relevant to the Planning proposal and future DA (The planning process).
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	EPBC Listed Critically Endangered Blue Gum High Forest of the Sydney Basin Bioregion was confirmed present with the Survey Area. No other EPBC listed species were observed by Narla Ecologists within the Survey Area. Suitable habitat for several EPBC Act (Commonwealth) threatened fauna and flora species is present.	Yes	An assessment of significance of impact from the proposed DA on Matters of National Environmental Significance (MNES) EPBC Act Assessment of Significant Impact Criteria.
Biodiversity Conservation Act 2016 (BC Act)	Two (2) BC Act listed Critically Endangered Ecological Communities were mapped by Narla Ecologists within the Survey Area, including: ▪ Blue Gum High Forest in the Sydney Basin Bioregion ▪ Sydney Turpentine-Ironbark Forest in the Sydney Basin Bioregion Suitable habitat for a number of BC Act (NSW) listed threatened fauna and flora species is present.	Yes	Assess any future removal of native vegetation or habitat for threatened species, ecological communities or populations pursuant to section 7.3 of the BC Act. This may take place through preparation of a Flora & Fauna or a Biodiversity Development Assessment Report (BDAR).
Biosecurity Act 2015 (Bio Act)	No priority weeds listed under the Biosecurity Act were recorded within the Survey Area.	No	None
State Environmental Planning Policy (Resilience and Hazards) 2021 – Chapter 2 Coastal Management	The Survey Area does not contain areas mapped as 'Coastal Wetlands', 'Littoral Rainforest', proximity to either, 'Coastal Environment Area' or 'Coastal Use Area'; therefore, this chapter of the SEPP does not apply.	No	None
State Environmental Planning Policy (Biodiversity and Conservation) 2021 – Chapter 4 Koala Habitat Protection 2021	This chapter of the SEPP applies to land within the Ku-ring-gai LGA, and the Survey Area and adjoining land comprises an area >1ha, therefore this chapter of the SEPP applies.	Yes	An assessment identifying whether the Survey Area classifies as 'Core Koala Habitat' will be required.
State Environmental Planning Policy (Biodiversity and Conservation) 2021 – Chapter 6 Bushland in Urban Areas	The Subject Site does not contain, nor is adjoining, any land zoned or reserved for public open spaces; therefore, this chapter of the SEPP does not apply.	No	None
Water Management Act 2000	The Survey Area does not occur on waterfront land, therefore this Act does not apply.	No	None

1.7 Ku-ring-gai Local Environmental Plan 2015 (KLEP)

1.7.1 Land Zoning

The Survey Area is currently within the following Land Zoning areas:

- RE2: Private Recreation
- R3: Medium Density Residential

The Ku-ring-gai Local Environmental Plan 2015 (KLEP) requires that development satisfies the objectives of the KLEP in relation to the designated zoning. These include:

RE2: Private Recreation

- To enable land to be used for private open space or recreational purposes.
- To provide a range of recreational settings and activities and compatible land uses.
- To protect and enhance the natural environment for recreational purposes.

R3: Medium Density Residential

- To provide for the housing needs of the community within a medium density residential environment.
- To provide a variety of housing types within a medium density residential environment.
- To enable other land uses that provide facilities or services to meet the day to day needs of residents.
- To provide a transition between low density residential housing and higher density forms of development.

1.7.2 Desired Future Zoning

R4: High Density Residential

- To provide for the housing needs of the community within a high-density residential environment.
- To provide a variety of housing types within a high-density residential environment.
- To enable other land uses that provide facilities or services to meet the day to day needs of residents.
- To provide for high density residential housing close to public transport, services and employment opportunities.

1.7.3 Biodiversity Protection

The objective of Clause 6.3 'Terrestrial Biodiversity' of the KLEP is to protect, maintain and improve the diversity and condition of native vegetation and habitat including:

- Protecting biological diversity of native fauna and flora, and
- Protecting the ecological processes necessary for their continued existence, and
- Encouraging the recovery of threatened species, communities, populations and their habitats, and
- Protecting, restoring and enhancing biodiversity corridors.

This clause applies to land identified as "Biodiversity" on the Terrestrial Biodiversity Map (**Figure 2**).

Before determining a development application for development on land to which this clause applies, the consent authority must consider:

- The impact of the proposed development on the following:
    - Any native vegetation community,
    - The habitat of any threatened species, population or ecological community,
    - Any regionally significant species of plant, animal or habitat,
    - Any biodiversity corridor,
    - Any wetland,
    - The biodiversity values within any reserve,
    - The stability of the land
- Any proposed measure to be undertaken to ameliorate any potential adverse environmental impact,
- Any opportunity to restore or enhance remnant vegetation, habitat and biodiversity corridors.

Development consent must not be granted to development on land to which this clause applies unless the consent authority is satisfied that the development:

- Is consistent with the objectives of this clause,
- Is designed, and will be sited and managed, to avoid any potentially adverse environmental impact or, if a potentially adverse environmental impact cannot be avoided:
    - The development minimises disturbance and adverse impacts on remnant vegetation communities, habitat and threatened species and populations, and
    - Measures have been considered to maintain native vegetation and habitat in parcels of a size, condition and configuration that will facilitate biodiversity protection and native flora and fauna movement through biodiversity corridors, and
    - The development avoids clearing steep slopes and facilitates the stability of the land, and
    - Measures have been considered to achieve no net loss of significant vegetation or habitat.

1.7.4 Riparian Land and Adjoining Watercourses

The Survey Area is not located within any riparian lands as mapped in the KLEP.

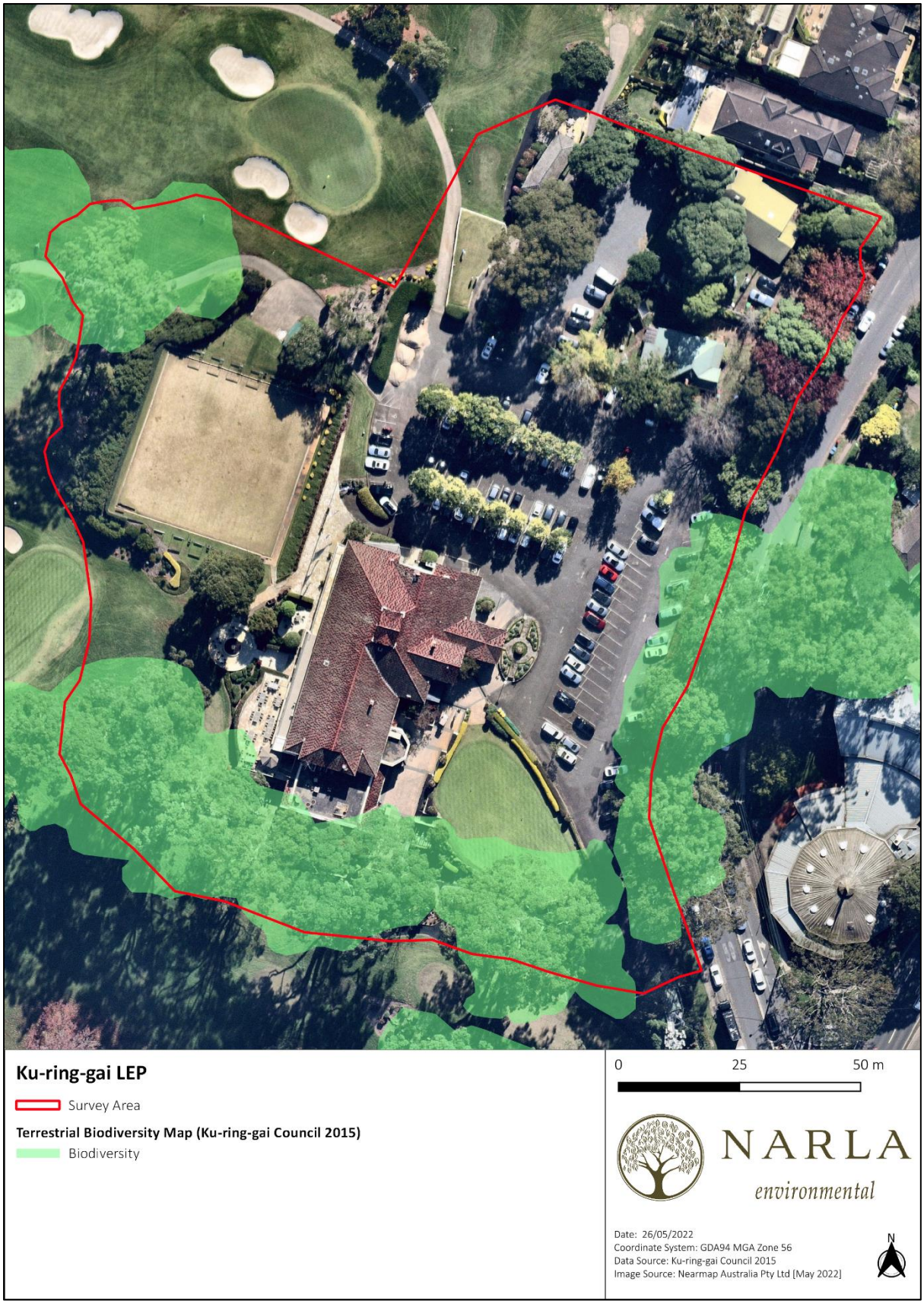

Figure 2. KLEP Terrestrial Biodiversity Mapping.

1.8 Ku-ring-gai Development Control Plan 2021 (KDCP)

1.8.1 Biodiversity

Part 18 (Biodiversity) of the Ku-ring-gai Development Control Plan 2021 (KDCP) outlines a number of objectives in which development should consider and adhere to, including:

- To preserve the natural environment of Ku-ring-gai in the social, economic and environmental interest of the community.
- To retain, consolidate and improve existing bushland, significant vegetation and habitat for flora and fauna.
- To support the protection and recovery of critical habitat, regionally significant and threatened ecological communities, species and populations.
- To capture carbon, contributing to climate control.
- To allow for adaptation of native flora, fauna and ecological communities to climate change.

1.8.2 Controls for all Greenweb Categories

The following controls apply to all Greenweb Categories:

- Development must be designed and sited to minimise impact on any distinctive environmental features and to conserve the areas of vegetation and/or habitat of the highest ecological value on and adjacent to the site, and to minimise fragmentation and edge effects;
- The development design should also integrate consideration of bushfire, ecological impacts and management and include:
  - Consideration of buildings, access, stormwater and utilities;
  - Choosing parts of the site to develop where features are not present;
  - Modifying the size, layout or construction methods to minimise on and off-site disturbance and impacts;
  - Locating built structures to reduce fragmentation of open space areas and vegetation (including canopy);
  - Locating buildings to take advantage of environmental features;
  - Implementing a soil and water management plan to limit impact;
  - Avoiding importing soil from outside the site;
  - Selecting native plant species that are present on site, preferably seeded from species on the site; and
  - Selecting plant species that enhance local fauna habitat.
  - **Note:** Habitat and distinctive environmental features may include: - cliffs and rock outcrops; - remnant bushland and trees; - tree hollows; and - natural watercourses.
- Subdivision must not be permitted unless each proposed site contains a building envelope that allows compliance with this Part;
- Trees adjacent to threatened ecological communities are to be retained as a buffer. This does not apply to trees listed in Council's "Weed Management Policy";
- The development must retain existing site drainage patterns and minimise excavation and fill within 3m of Greenweb lands;
- Where the slope over the building footprint area is greater than 12.5%, site responsive methods such as stepping the building down the site, split level construction or pier and beam construction must be used;
- The planting of species listed in Council's Weed Management Policy will not be permitted;

- Species used for planting in or directly adjacent to Greenweb areas should be of local provenance; and
- A Flora and Fauna Assessment will be required where development within Greenweb lands impacts on connectivity, existing indigenous vegetation, fauna or habitat.
- **Note:** Flora and fauna assessments must be undertaken by an appropriately qualified and experienced person.

1.8.3 Category – Landscape Remnant

Part of the Survey Area is mapped as containing 'Landscape Remnant' on the KDCP Greenweb Mapping (**Figure 3**). The objectives of this category include:

- To maintain smaller Key Vegetation Communities remnants as 'stepping stones', providing habitat, seedbank and pollination resources (facilitating gene flow) and supporting flora and fauna resilience;
- To maintain and restore smaller remnants of Key Vegetation Communities across a range of topographies;
- To protect trees within Key Vegetation Communities that provide food, shelter or nesting resources for native fauna, or that are of exceptional aesthetic value.

The following controls apply to lands mapped as 'Landscape Remnant':

- Avoid locating development on land identified as - Landscape Remnant; on the Greenweb map. (Refer to maps in 18R.1 of the DCP);
- Vegetation retention and rehabilitation on sites that include land identified as Landscape Remnant must be designed to improve connectivity with existing vegetation and habitat;
- Planting within land identified as Landscape Remnant on the Greenweb map is to consist of:
  - not less than 50% locally native species;
  - species that reflect the relevant vegetation communities within the area; and
  - a mix of groundcover, shrubs and trees, and is to exclude monocultures.
- Where the site contains high species diversity or is dominated by weeds within any stratum, preparation of a Vegetation Management Plan by a suitably qualified person may be required. This plan must identify ongoing initiatives to preserve, protect and promote the environmental values of the land.

1.8.4 Category – Canopy Remnant

Part of the Survey Area is mapped as containing 'Canopy Remnant' on the KDCP Greenweb Mapping (**Figure 3**). The objectives of this category include:

- To protect smaller canopy remnant for habitat, species diversity and ecosystem services across a range of topographies.
- To maintain trees for the services they provide to human well-being.
- To improve air quality, prevent soil erosion, assist in improving water quality, carbon sequestration, storm water retention, energy conservation and noise reduction

The following controls apply to lands mapped as 'Canopy Remnant':

- Retain trees identified as Canopy Remnant.
- Planting within land identified as Canopy Remnant is to consist of:
  - not less than 30% locally native species;
  - species that reflect the relevant vegetation communities within the area; and
  - a mix of groundcover, shrubs and trees and is to exclude monocultures.

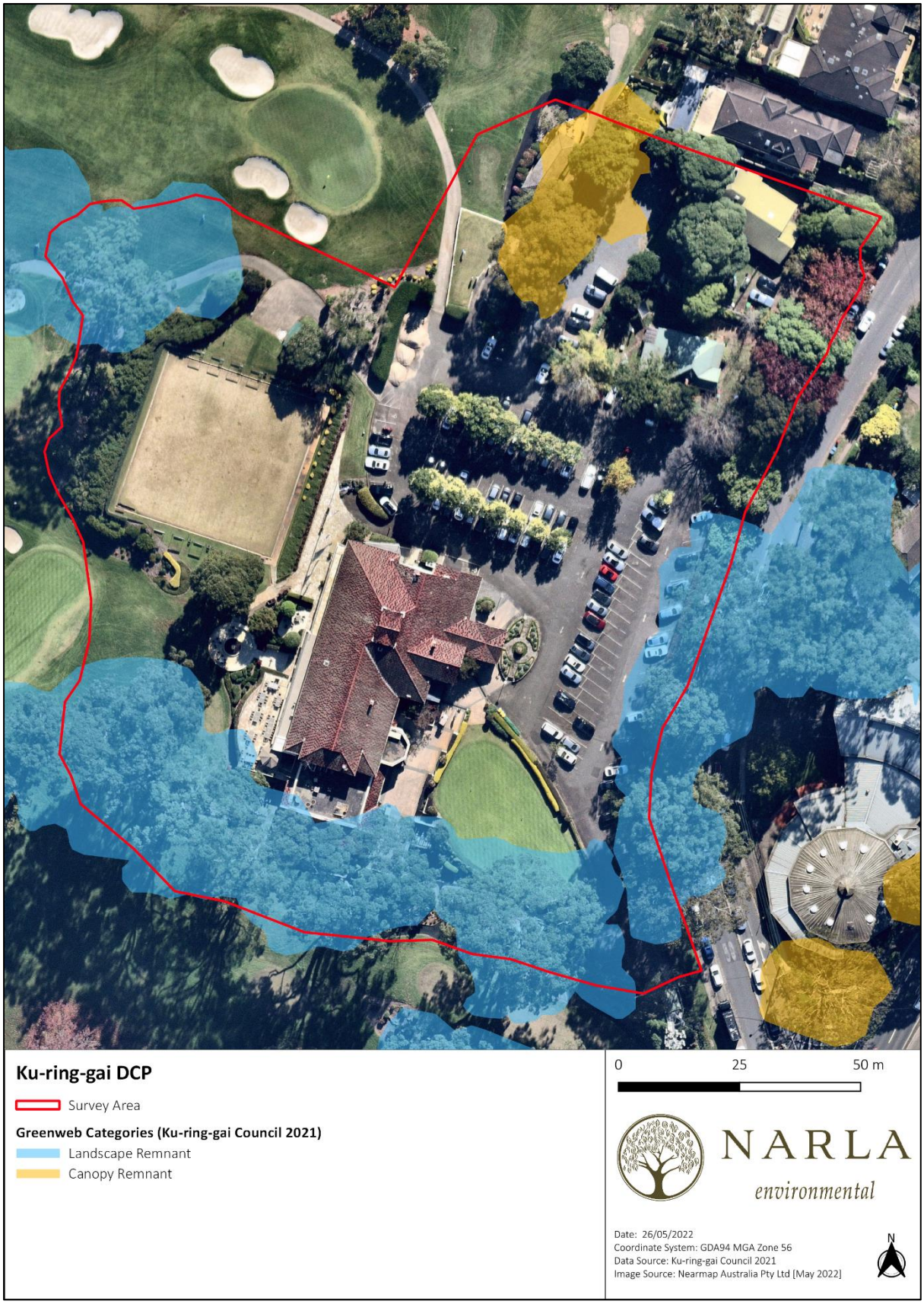

Figure 3. KDCP Greenweb Mapping.

1.9 State Environment Planning Policy (Biodiversity and Conservation) 2021 – Chapter 4: Koala Habitat Protection 2021

This Chapter aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range, and reverse the current trend of koala population decline.

This SEPP applies to LGAs listed in Schedule 2 'Local government areas' of the SEPP. As the Survey Area is in the Ku-ring-gai LGA, which is included in Schedule 2, this Chapter applies to any future development. The development control provisions of the Chapter apply to the Survey Area, as the land:

- Has an area of at least 1 hectare (including adjoining land within the same ownership); and
- Is land in relation to which a development application has been made (or will be made).

Before a council may grant consent to a development application for consent to carry out development on land to which this Part applies, the council must be satisfied as to whether or not the land is a potential koala habitat. A site assessment will be required to determine whether the land contains potential koala habitat, which is defined by the SEPP as:

- Areas of native vegetation where trees of the types listed in Schedule 3 constitute at least 15% of the total number of trees in the upper or lower strata of the tree component.

1.10 Biodiversity Assessment Pathway

The requirements of the BC Act 2016 and Biodiversity Conservation Regulation 2017 are mandatory for all Development Applications (DA) assessed pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) submitted in the Ku-ring-gai LGA.

The BC Act and its regulations stipulate clearing 'area threshold' values (**Table 2**) that determine whether a development is required to be assessed in accordance with the 'Biodiversity Offset Scheme' (BOS). Minimum entry thresholds for vegetation clearing depend on the minimum lot size (shown in the Lot Size Maps made under the relevant Local Environmental Plan [LEP]) or actual lot size (where there is no minimum lot size provided for the relevant land under the LEP). If the land on which the proposed development is located has different minimum lot sizes (or actual lot sizes), the smaller or smallest of those minimum lot sizes is used to determine the area clearing threshold.

The minimum lot size prescribed by KLEP for the Survey Area is 1,200m^2. As the smallest lot is less than 1ha, to avoid triggered the Biodiversity Offset Scheme the future development should avoid the clearing/management of 0.25ha of native vegetation.

Table 2. Biodiversity Offset Scheme entry thresholds.

Minimum lot size associated with the property	Threshold for clearing, above which the BAM and offsets scheme apply
Less than 1 ha	**0.25 ha or more**
1 ha to less than 40 ha	0.50 ha or more
40 ha to less than 1000 ha	1 ha or more
1000 ha or more	2 ha or more

The Biodiversity Values (BV) Map (DPIE 2022a) identifies land with high biodiversity values that are particularly sensitive to impacts from development and clearing. The map is another of the Biodiversity Offsets Scheme Entry Thresholds which is a trigger for determining whether the Biodiversity Offset Scheme

(BOS) applies to a clearing or development proposal. The map has been prepared by the Department of Planning and Environment (DPE) under Part 7 of the Biodiversity Conservation Act 2016 (BC Act).

Areas mapped as containing 'Biodiversity Values' on the Biodiversity Values (BV) Map are present within the Survey Area (**Figure 4**). Any future DA's that require the clearing of native vegetation within areas mapped as 'Biodiversity Values' on the BV Map will trigger the BOS.

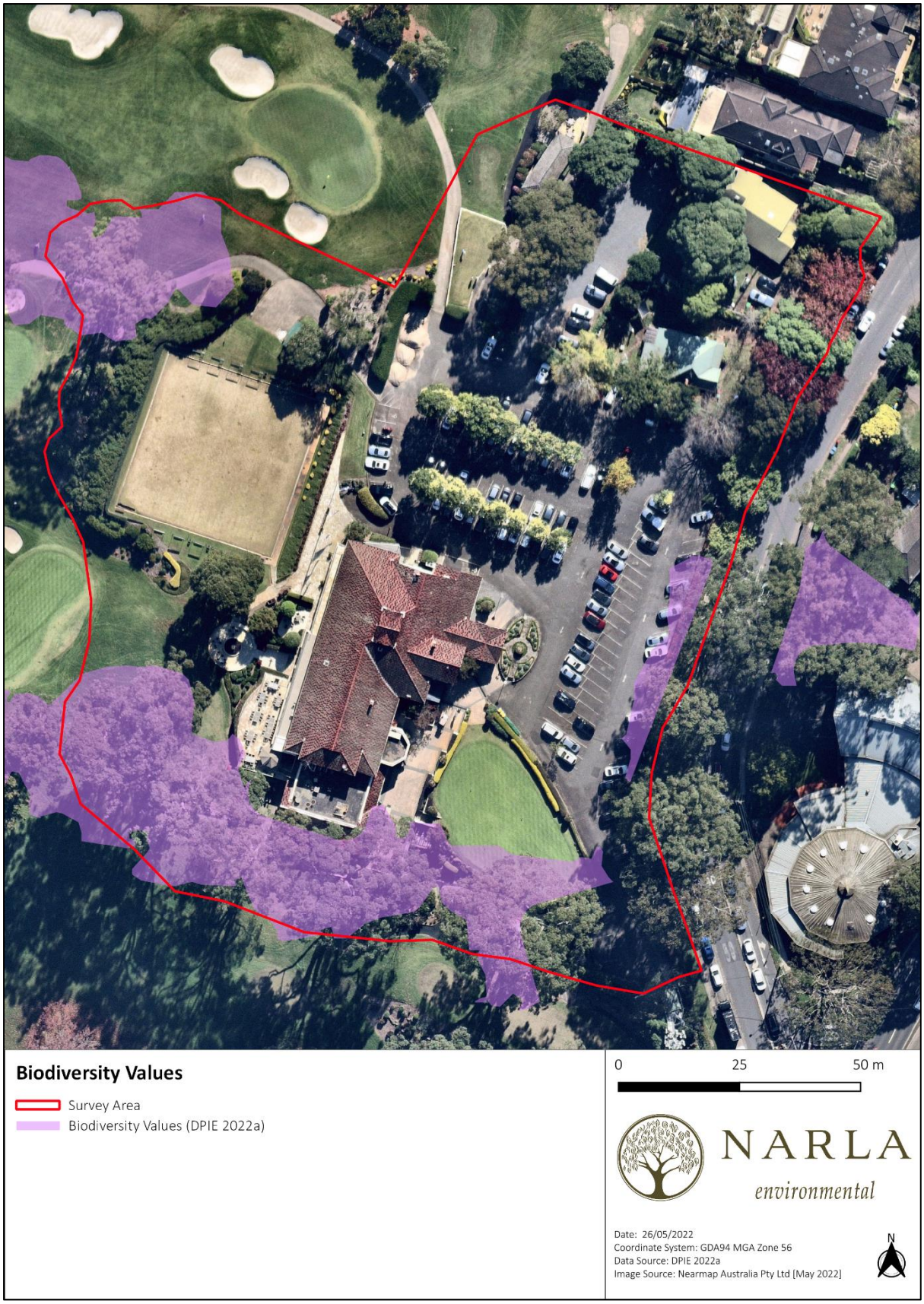

Figure 4. Biodiversity Values.

2. Methodology

2.1 Desktop Assessment and Literature Review

A thorough literature review of local information relevant to the Ku-ring-gai LGA was undertaken. Online databases were utilised to gain an understanding of the site and its surrounds to an area of approximately 10km². Searches utilising NSW Wildlife Atlas (BioNet; DPE 2022b) were conducted to identify any confirmed, historical local occurrences or modelled occurrence of threatened species, populations and communities as well as any migratory fauna within a 10km² search area centred on the Survey Area. This data was used to assist in establishing the presence or likelihood of any such ecological values as occurring on or adjacent to the Survey Area, and helped inform our Ecologist on what to look for during the site assessment.

Soil landscape and geological mapping was examined to gain an understanding of the environment within the Survey Area and assist in determining whether any threatened flora or ecological communities may occur there.

Historical Vegetation Mapping was conducted using The Native Vegetation of the Sydney Metropolitan Area. (OEH 2016a; 2016b) during desktop assessment to gain an understanding of vegetation communities located on the property which was then compared against Narla Ecologists observations during the on-site assessment.

2.2 Ecological Site Assessment

A site assessment was performed by Narla Environmental Ecologist Chris Moore on Friday the 24th August 2018. During the site assessment, the following activities were undertaken:

- Identifying and recording the vegetation communities present within the Survey Area, with focus on identifying any threatened ecological communities (TEC);
- Recording a list of flora species encountered within the Survey Area, with a focus on threatened species, species diagnostic of threatened ecological communities and priority weeds;
- Recording opportunistic sightings of any fauna species seen or heard on or within the immediate surrounds of the Survey Area;
- Identifying and recording the locations of notable fauna habitat such as important nesting, roosting or foraging microhabitats;
- Targeting the habitat of any threatened and regionally significant fauna including:
- Tree hollows (habitat for threatened large forest owls, parrots, cockatoos and arboreal mammals);
- Caves and crevices (habitat for threatened reptiles, small mammals and microbats);
- Termite mounds (habitat for threatened reptiles and the echidna);
- Soaks (habitat for threatened frogs and dragonflies);
- Fruiting trees (food for threatened frugivorous birds and mammals);
- Flowering trees (food for threatened nectivorous mammals and birds);
- Trees and shrubs supporting nest structures (habitat for threatened birds and arboreal mammals); and
- Any other habitat features that may support fauna (particularly threatened) species.

3. Results and Discussion

3.1 Flora

3.1.1 Threatened Flora Species

No BC Act listed threatened flora species were recorded within the Survey Area during the site assessment.

No BC Act or EPBC Act listed flora were confirmed on or immediately adjacent the Survey Area. This does not rule out the potential for some threatened species to still exist within the Survey Area in a state of dormancy (e.g. terrestrial orchids which only emerge after suitable rainfall and warmer temperatures).

3.2 Vegetation Communities

3.2.1 Historically Mapped Vegetation Communities

Historical mapping conducted for the Office of Environment and Heritage NSW (OEH 2016a;2016b) Native Vegetation of the Sydney Metropolitan Area mapping indicated the presence of one (1) Native Vegetation Community within the Survey Area (**Figure 5**). Occurrences of this vegetation community were isolated patches which have been subject to historical clearing:

- SW_F01: Blue Gum High Forest; and,
- Urban_E/N: Urban Native and Exotic Vegetation

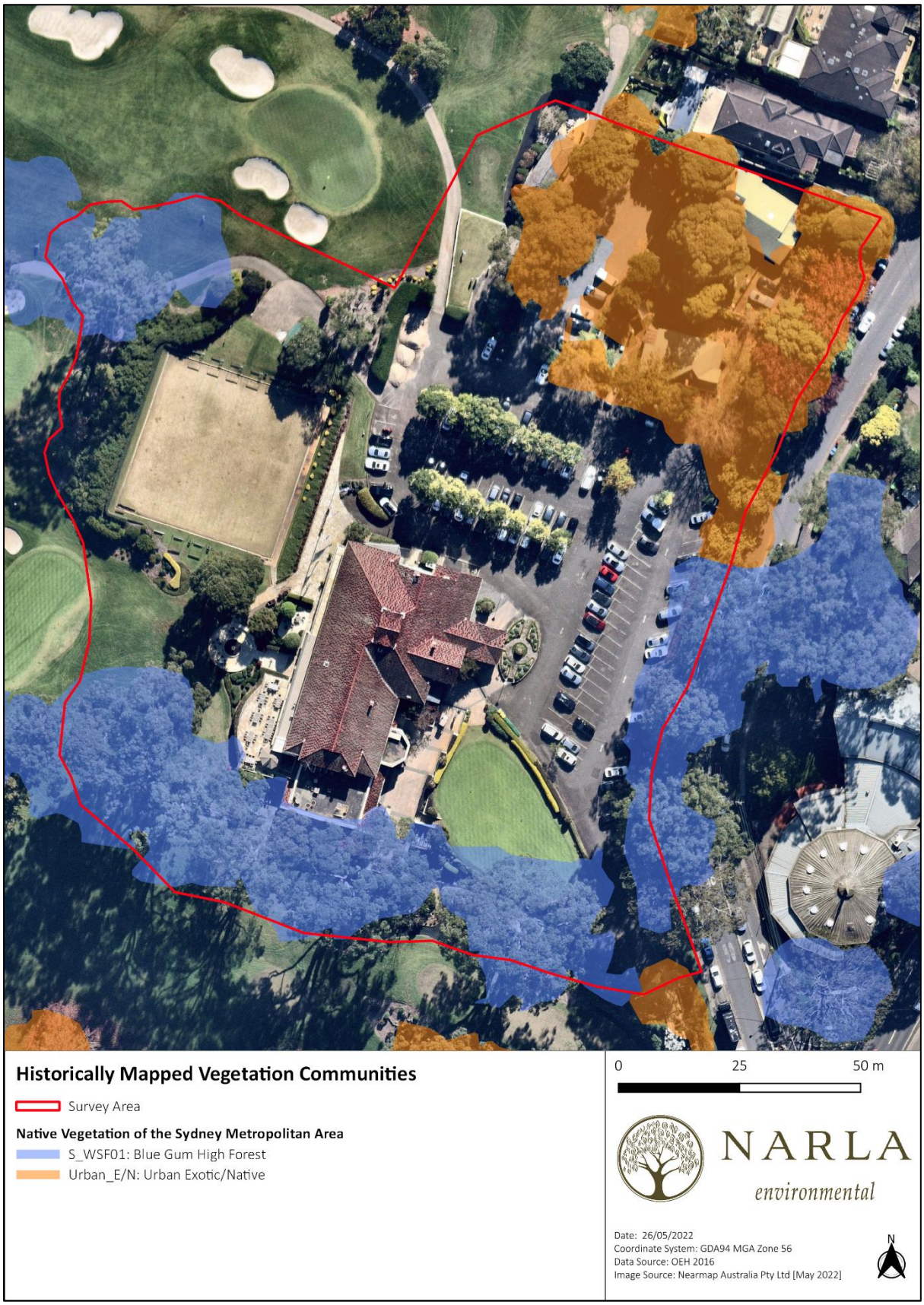

Figure 5. Historical vegetation mapping.

3.2.2 Field validated Vegetation Communities

Ground truthing and subsequent vegetation mapping conducted by Narla Environmental has mapped three vegetation communities within the Survey Area (**Figure 6**). These are:

- S_WSF01 Blue Gum High Forest;
- S_WSF09 Sydney Turpentine Ironbark Forest;
- Urban_E/N Urban Exotic/Native

3.2.3 Threatened Vegetation Communities

For information regarding the native vegetation communities mapped within the Survey Area, refer to **Table 3** and **sections 3.2.4** and **3.2.5** below.

3.2.4 Blue Gum High Forest

BC Act Status: Critically Endangered Ecological Community (CEEC)

EPBC Act Status: Critically Endangered Ecological Community (CEEC)

Blue Gum High Forest (BGHF) is listed as a CEEC under both the BC Act and the EPBC Act.

Eligibility Criteria for BGHF under the EPBC Act is as follows:

Occurrences of the Blue Gum High Forest of the Sydney Basin Bioregion ecological community are considered to be part of the nationally listed ecological community if they are greater than one hectare in size and:

- *Have a canopy cover greater than 10%; or*
- *Have a canopy cover less than 10% and occur in areas of native vegetation in excess of five hectares* (TSSC, 2005).

How BGHF within the Survey Area DOES meet the eligibility criteria under the EPBC Act:

- The section of BGHF that is connected to the community located within the Survey Area is approximately 1.37ha (>1ha)
- Canopy cover recorded was greater than 10%

3.2.5 Sydney Turpentine Ironbark Forest

BC Act Status: Critically Endangered Ecological Community (CEEC)

EPBC Act Status: Critically Endangered Ecological Community (CEEC) (Not eligible – vegetation does not meet diagnostic criteria)

Sydney Turpentine Ironbark Forest (STIF) within the Survey Area is listed as a CEEC under the BC Act.

STIF within the Survey Area does not meet the eligibility criteria for STIF under the EPBC Act.

The criteria to be listed as STIF under the EPBC Act is as follows:

Occurrences of the Turpentine–Ironbark Forest in the Sydney Basin Bioregion ecological community are considered to be part of the nationally listed ecological community if patches are in good condition.

- *Good condition is generally determined as:*
  - *The vegetation has some characteristic components from all structural layers (tree canopy, small tree/shrub mid-storey, and understorey); and*
  - *The tree canopy cover is greater than 10%; and*
  - *The patch size is greater than one hectare.*
- *However, patches with a tree canopy cover of less than 10% are also included in the ecological community, if:*
  - *The patch of the ecological community is greater than one hectare in size; and*
  - *It is part of a remnant of native vegetation that is 5 hectares or more in area*

How STIF within the Survey Area DOES NOT meet the eligibility criteria under the EPBC Act:

- Vegetation on site is not deemed to be of 'good condition' as no mid-story or ground-layer is present
- The patch is less than 1ha

Table 3. Vegetation communities mapped within the Survey Area.

Vegetation Mapping Unit	Area of Coverage on Survey Area (ha)	OEH Description of Community	Narla Observed Community	BC Act	EPBC Act
S_WSF01: Blue Gum High Forest	0.53	Blue Gum High Forest is a tall wet sclerophyll forest found on fertile shale soils in the high rainfall districts of Sydney's North Shore. It is dominated by *Eucalyptus saligna* (Sydney Blue Gum), *Eucalyptus pilularis* (Blackbutt) with a number of other eucalypts occurring patchily. The ground layer is variable in both composition and cover. It may be ferny, grassy or herbaceous depending on topographic situation and disturbance history.	Fragmented, large *Eucalyptus saligna (Sydney Blue Gum)*, *Eucalyptus pilularis* (Blackbutt) and *Angophora costata (Sydney Red Gum)* present with all mid-story absent and only exotic, turfed grassland groundcovers present.	Blue Gum High Forest	Blue Gum High Forest
S_WSF09: Sydney Turpentine Ironbark Forest	0.10	Sydney Turpentine Ironbark Forest is a tall open forest found on shale and shale-enriched sandstone soils on the coast and hinterland of Sydney. The forest is characterised by open midstrata of mesic and sclerophyllous shrubs and small trees with a grassy ground cover. Typically, it is recognised by a canopy dominated by *Syncarpia glomulifera* (Turpentine) and *Eucalyptus paniculata* (Grey Ironbark)	Three remnant trees comprising of *Syncarpia glomulifera* (Turperntine) and *Eucalyptus paniculata* (Grey Ironbark). No mid-story or groundcovers were present.	Sydney Turpentine Ironbark Forest	Listed but observed community does not meet EPBC criteria.

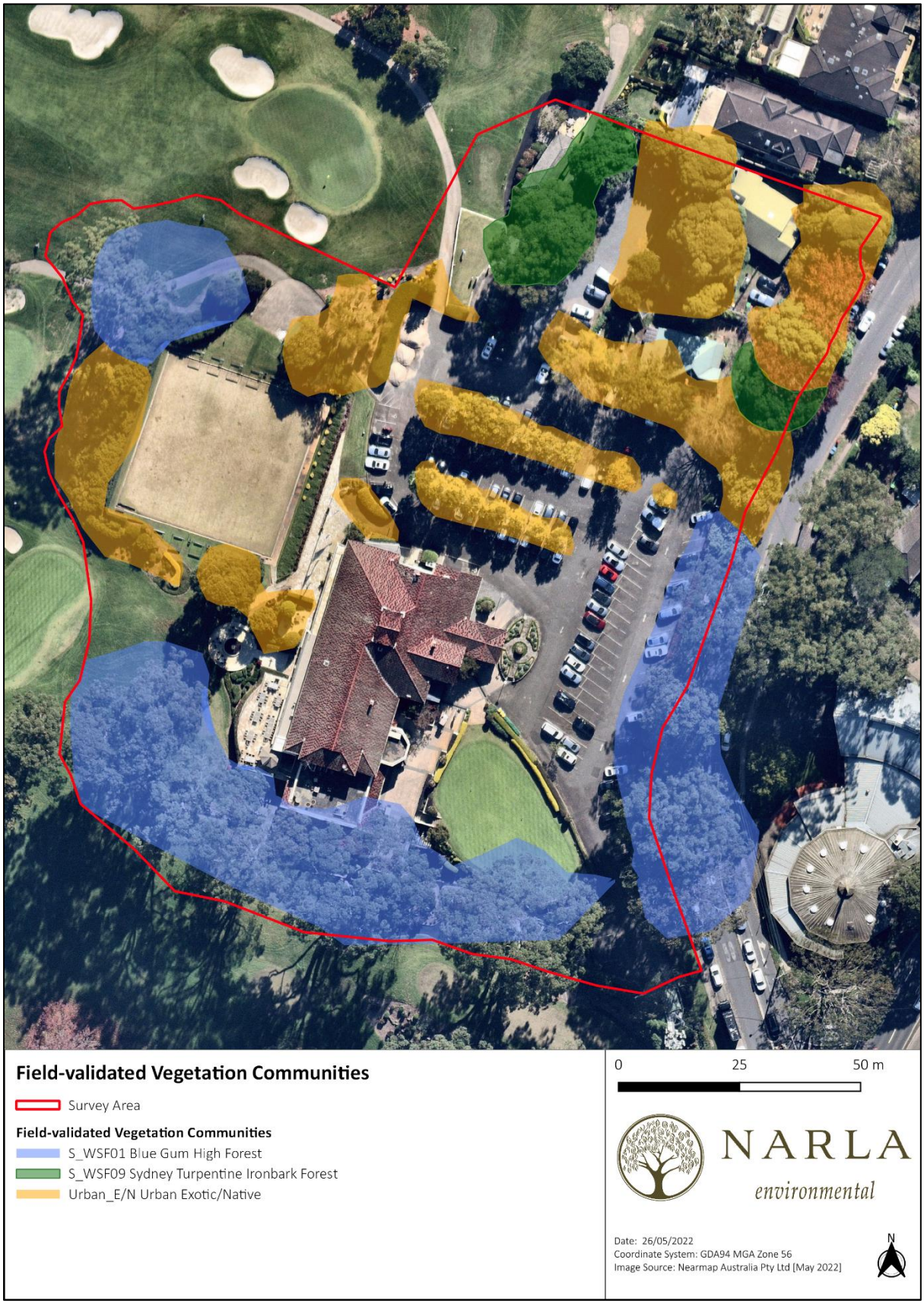

Figure 6. Field Validated Vegetation Mapping within the Survey Area (Narla 2018)

3.3 Fauna

3.3.1 Threatened Fauna

No threatened Fauna were observed during the time of the site assessment. However, following Desktop Assessment, a suite of threatened fauna species were identified as having the potential to utilise habitat on and around the Survey Area for foraging or sheltering purposes. The total list of threatened species deemed as having potential to occur in the Survey Area is presented in **Table 4.**

Table 4. Threatened fauna deemed as having potential to occur on the Survey Area during part of their lifecycles.

Scientific Name	Common Name	TSC Act	EPBC Act	Likelihood
Anthochaera phrygia	Regent Honeyeater	Critically Endangered	Critically Endangered	Low
Artamus cyanopterus cyanopterus	Dusky Woodswallow	Vulnerable	-	Low
Callocephalon fimbriatum	Gang-gang Cockatoo	Vulnerable	-	Low
Calyptorhynchus lathami	Glossy Black-Cockatoo	Vulnerable	-	Low
Chalinolobus dwyeri	Large-eared Pied Bat	Vulnerable	Vulnerable	Low
Daphoenositta chrysoptera	Varied Sittella	Vulnerable	-	Low
Dasyurus maculatus	Spotted-tailed Quoll	Vulnerable	Endangered	Low
Falsistrellus tasmaniensis	Eastern False Pipistrelle	Vulnerable	-	Moderate
Glossopsitta pusilla	Little Lorikeet	Vulnerable	-	High
Isoodon obesulus obesulus	Southern Brown Bandicoot (eastern)	Endangered	Endangered	Low
Lathamus discolor	Swift Parrot	Endangered	Critically Endangered	Moderate
Lophoictinia isura	Square-tailed Kite	Vulnerable	-	High
Miniopterus australis	Little Bentwing-bat	Vulnerable	-	Moderate
Miniopterus schreibersii oceanensis	Eastern Bentwing-bat	Vulnerable	-	High
Mormopterus norfolkensis	Eastern Freetail-bat	Vulnerable	-	Moderate
Ninox connivens	Barking Owl	Vulnerable	-	Moderate
Ninox strenua	Powerful Owl	Vulnerable	-	High
Petauroides volans	Greater Glider	-	Vulnerable	Low
Pseudomys novaehollandiae	New Holland Mouse	-	Vulnerable	Low
Pteropus poliocephalus	Grey-headed Flying-fox	Vulnerable	Vulnerable	High
Scoteanax rueppellii	Greater Broad-nosed Bat	Vulnerable	-	Moderate
Tyto novaehollandiae	Masked Owl	Vulnerable	-	Low
Varanus rosenbergi	Rosenberg's Goanna	Vulnerable	-	Low

3.5 Potential for Development

An ecological constraints map was produced by Narla (**Figure 7**). This map illustrates the areas of the property considered most suitable for development (low ecological constraints) through to the areas least suitable (high ecological constraint). The interpretation of each zone is detailed below (**Table 5**). This map was produced based on site and desktop assessment of existing/historical mapping. It is to be used as a guide only and a strong degree of caution must be expressed when interpreting it. No one should rely or make financial decisions based on this mapping.

Table 5. Key to Ecological Constraints Map

Zone		Description
Low Ecological Constraints - Green	This zone encompasses: ▪ Historically cleared land ▪ Developed areas ▪ Urban Native/Exotic vegetation	This zone is deemed to have high potential for future development with accompaniment of the appropriate environmental assessments and implementation of appropriate restrictions and guidelines.
Moderate Ecological Constraints - Yellow	This zone encompasses: ▪ Native vegetation that may have the potential to provide foraging and sheltering habitat for threatened fauna species	This zone is deemed to have a moderate potential for future development with accompaniment of the appropriate environmental assessments (BDAR or FFA), as well as potential impact mitigation strategies (such as project ecologist services).
High Ecological Constraints - Red	This zone encompasses: ▪ Areas mapped as 'Biodiversity Values' ▪ Critically Endangered Ecological Communities ▪ Landscape remnants on the KDCP Greenweb mapping	Any works proposed in these areas will yield the highest potential ecological impact. All proposed works should aim to avoid these areas if possible. The KDCP states that development is to be avoided on lands identified as Landscape Remnant on the Greenweb map. Future development applications will require the accompaniment of the appropriate environmental assessments (BDAR), as well as potential impact mitigation strategies (such as project ecologist services). Biodiversity offsets may be required to offset the biodiversity impacts of any proposed development within this area.

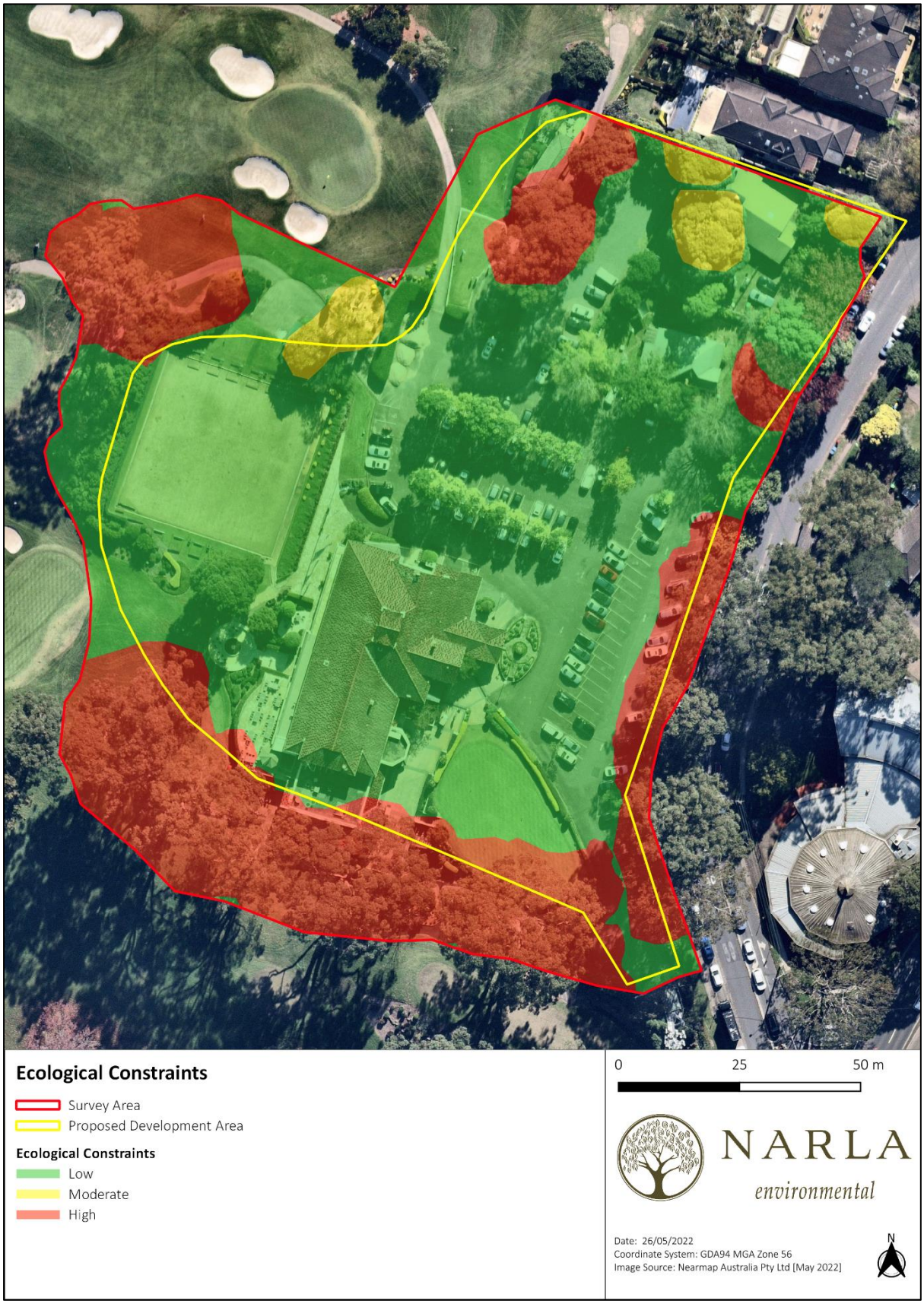

Figure 7. Ecological constraints map indicating the zones most suitable for potential development (green) through to least suitable (red).

4.Recommendations

4.1 Planning Proposal Phase

The planning proposal to rezone the Survey Area to R4 to enable development up to 5 storeys is considered suitable subject to:

- Future development proposals being entirely outside any areas of mapped 'Blue Gum High Forest' and 'Sydney Turpentine Ironbark Forest';
  - Any removal that is deemed as unavoidable of any of the above communities must be offset with the replacement of mature, locally sourced, indigenous species representative of that community at a minimum ratio of 1:1. Plantings must be done in accordance with the species list provided in **Appendix 7.1/7.2**
  - Any loss of Hollows as a result of vegetation clearing must be replaced at a ratio of 3:1 with augmented hollows/nest boxes of equal size.

4.1.1 Pymble Golf Course Development Control Plan

Potential controls for a 'Site Specific Development Control Plan' focusing around the Pymble Golf Course would be:

- All development must be designed and sited to minimise impact on any distinctive environmental features and to conserve the areas of vegetation and/or habitat of the highest ecological value on and adjacent to the Pymble Golf Course.
- The development design should also integrate consideration of bushfire, ecological impacts and management and include:
  - Consideration of buildings, access, stormwater and utilities;
  - Choosing parts of the site to develop where features are not present;
  - Modifying the size, layout or construction methods to minimise on and off-site disturbance and impacts;
  - Locating built structures to reduce fragmentation of open space areas and vegetation (including canopy);
  - Locating buildings to take advantage of environmental features; vi) implementing a soil and water management plan to limit impact;
  - Avoiding importing soil from outside the site;
  - Selecting native plant species that are present on site, preferably seeded from species on the site;
  - Selecting plant species that enhance local fauna habitat.
- Trees adjacent to threatened ecological communities are to be retained as a buffer. This does not apply to trees listed in Council's "Exempt Tree Species"
- No planting of species listed in Council's Exempt Tree Species will be permitted.
- All landscaping conducted within the grounds of the Pymble Golf Course should be representative of the associated threatened ecological communities.

4.2 Future Development Application Phase

Narla proposes the following recommendations regarding the management of biodiversity on the property. Implementation of these recommendations will help see a potential DA approved by Council in the future.

4.2.1 Avoidance of Impacts

Minimising the removal of native vegetation will reduce the overall impact of the proposed development and improve likelihood of obtaining DA approval. Where possible, mature native trees should be retained and protected. Narla recommends that if the proposed development occurs within the areas mapped as low ecological constraints (**Figure 7**), minimal ecological impact will occur.

4.2.2 Clearing of Trees and Vegetation

Should the proponent desire to remove any native vegetation, or undertake clearing within the areas mapped as containing remnant canopy trees belonging to Blue Gum High Forest or Sydney Turpentine Ironbark Forest, it is considered likely that Ku-ring-gai Council will require the proponent to submit a Flora and Fauna Assessment (FFA) including Assessments of Significance on all potentially occurring threatened species under the *Biodiversity Conservation Act 2016*. This report should be delivered by a suitably qualified Ecologist.

Should the proponent desire to remove any native vegetation within the Biodiversity Values mapped in the Survey Area (Figure 4), or if the total impacts to native vegetation exceed the clearing threshold of 0.25ha, the Biodiversity Offset Scheme (BOS) will be triggered and the development will require a Biodiversity Development Assessment Report (BDAR). If the BOS is triggered, biodiversity offsets may be required to offset the biodiversity impacts of any proposed development within this area.

4.2.3 Tree Removal and Replacement Plantings

Ku-ring-gai Council require the submission of a Flora and Fauna Assessment where the proposed development is likely to have either a direct or indirect impact on native vegetation, EEC's, or Endangered species. It is likely that in the event of any vegetation removal, Ku-ring-gai Council will require native-indigenous vegetation to be replaced at a ratio of 1:1 or greater, within the Survey Area.

4.3 Post Development Application Approval

Once the future development application has been approved, Ku-ring-gai council will issue the proponent a set of 'Conditions' of approval of the DA. All Conditions of Approval will be required to be implemented prior to obtaining your construction certificate.

Conditions are likely to include the requirement to implement the recommendations put forward in the FFA or BDAR.

4.3.1 Pre-Clearing Assessment

Owing to the possibility of trees supporting nesting birds, and hollow bearing trees potentially supporting threatened arboreal mammals, birds and microbats, Ku-ring-gai Council may request a Pre-Clearing Assessment of the property undertaken by a qualified ecologist within the proposed area of impact. The assessment will involve checking of all:

- trees, shrubbery and tussocks for nesting native birds
- all logs and other debris thoroughly checked for sheltering reptiles or small mammals
- all other habitat features

4.3.2 Vegetation Clearing

Ku-ring-gai Council may require that a qualified ecologist is present on-site during vegetation clearing to supervise felling of all trees. Each tree should be felled using the 'slow drop technique' which involves the use of ropes and pulleys, or an excavator fitted with a 'grab' attachment which can slowly push the trees to the ground.

Once trees have been felled an ecologist should be on site to inspect the tree for any potential hollows and fauna. Any fauna captured must be relocated offsite into suitable habitat, or taken by the ecologist to a registered wildlife carer.

All proposed construction, machinery operation, excavation, vehicle movement and other works that occur within the Survey Area must be prevented from impact on any hollow-bearing trees, logs/woody debris, and other native vegetation that are to be retained outside the activity footprint.

4.3.3 Demolition of Existing Structure

Microbats often utilise man-made structures including sheds and houses for roosting habitat. Small cavities that provide similar protection to tree hollows will be utilised by microbats where shortages of natural roosting habitat exists, or may even be used in preference (ABS 2017). Owing to the potential roosting habitat within any existing unoccupied dwellings, Ku-ring-gai Council may request that certain crevices and cavities of the building are inspected by an Ecologist for roosting microbats, prior to demolition taking place. If microbats are found, they will be captured and relocated to suitable nearby habitat by the Ecologist.

4.3.4 Tree Protection

The protection of existing trees desired to be retained on site or immediately surrounding the site should be undertaken prior to clearing, ancillary works, excavation or machinery works. Protection must remain around trees for the entire duration of construction, ancillary works, excavation or machinery works. Tree protections must be guided by a consulting Arboriculturalist.

A minor encroachment is less than 10% of the TPZ, outside of the Structural Root one (SRZ) and is considered acceptable by AS-4970 when it is compensated for elsewhere and contiguous with the TPZ

4.3.5 Erosion Management

Ensure that adequate erosion and sediment mitigation measures are in place at all times during construction activity. Refer to the 'Blue Book' (Landcom 2004) for best practice erosion and sedimentation control methods.

4.3.6 Storage, Stockpiling and Laydown Areas

Position all storage, stockpiling and laydown areas away from any areas of native vegetation and never placed against a tree, or under a tree drip zone.

Native vegetation topsoil stockpiles should never be more than 1m high and should be turned regularly to prevent damage to the vegetation propagules and microbiological within.

5.Conclusion

Narla Environmental believe that the proposed rezoning (planning proposal) application can be approved and implemented with minimal ecological impact if the appropriate impact assessment process is implemented prior to any developments being undertaken.

Best utilisation of this property is likely to come from development of the most disturbed/least ecologically constrained portions of the site in addition to protecting and managing the most constrained.

Narla believe that the planning proposal will result in an optimal biodiversity outcome if the recommendations and mitigation measures outlined within this report are addressed and adhered to.

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7.Appendix

7.1 Blue Gum High Forest species list

7.2 Sydney Turpentine Ironbark Forest species list

Blue Gum High Forest Species List

Acmena smithii	*Adiantum aethiopicum*
Allocasuarina torulosa	*Alphitonia excelsa*
Angophora costata	*Angophora floribunda*
Asplenium flabellifolium	*Backhousia myrtifolia*
Blechnum cartilagineum	*Breynia oblongifolia*
Calochlaena dubia	*Carex maculata*
Cissus hypoglauca	*Clematis aristata*
Clerodendrum tomentosum	*Dianella caerulea*
Doodia aspera	*Elaeocarpus reticulatus*
Entolasia marginata	*Entolasia stricta*
Eucalyptus globoidea	*Eucalyptus paniculata*
Eucalyptus pilularis	*Eucalyptus saligna*
Eustrephus latifolius	*Ficus coronata*
Glochidion ferdinandi var. *ferdinandi*	*Glycine clandestina*
Hydrocotyle laxiflora	*Leucopogon juniperinus*
Lomandra longifolia	*Marsdenia rostrata*
Maytenus silvestris	*Morinda jasminoides*
Notelaea longifolia forma *longifolia*	*Oplismenus aemulus*
Oplismenus imbecillis	*Oxalis perennans*
Pandorea pandorana	*Persoonia linearis*

Pittosporum revolutum	*Pittosporum undulatum*
Platylobium formosum	*Poa affinis*
Polyscias sambucifolia subsp. A	*Pratia purpurascens*
Pseuderanthemum variabile	*Pteridium esculentum*
Rapanea variabilis	*Smilax australis*
Smilax glyciphylla	*Tylophora barbata*
Viola hederacea	

Sydney Turpentine Ironbark Forest Species List

Acacia decurrens	*Acacia falcata*	*Acacia implexa*
Acacia longifolia	*Acacia myrtifolia*	*Acacia parramattensis*
Allocasuarina torulosa	*Angophora costata*	*Angophora floribunda*
Aristida vagans	*Billardiera scandens*	*Breynia oblongifolia*
Bursaria spinosa	*Centella asiatica*	*Cheilanthes sieberi*
Clematis aristata	*Clematis glycinoides*	*Clerodendrum tomentosum*
Commelina cyanea	*Corymbia gummifera*	*Daviesia ulicifolia*
Dianella caerulea	*Dichelachne rara*	*Dichondra repens*
Dodonaea triquetra	*Echinopogon caespitosus*	*Elaeocarpus reticulatus*
Entolasia marginata	*Entolasia stricta*	*Eucalyptus acmenoides*
Eucalyptus globoidea	*Eucalyptus paniculata*	*Eucalyptus resinifera*
Exocarpos cupressiformis	*Glycine clandestina*	*Goodenea hederacea*
Goodenia heterophylla	*Hardenbergia violacea*	*Imperata cylindrica*
Indigofera australis	*Kennedia rubicunda*	*Kunzea ambigua*
Lepidosperma laterale	*Leucopogon juniperinus*	*Lomandra longifolia*
Melaleuca decora	*Microlaena stipoides*	*Notelaea longifolia*
Oplismenus aemulus	*Oxalis exilis*	*Ozothamnus diosmifolius*

Pandorea pandorana	*Panicum simile*	*Pittosporum revolutum*
Pittosporum undulatum	*Poa affinis*	*Polyscias sambucifolius*
Pomax umbellata	*Poranthera microphylla*	*Pratia purpurascens*
Pseuderanthemum variabile	*Rapanea variabilis*	*Rubus parvifolius*
Smilax glyciphylla	*Stipa pubescens*	*Syncarpia glomulifera*
Themeda australis	*Tylophora barbata*	*Veronica plebeia*

Zieria smithii

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