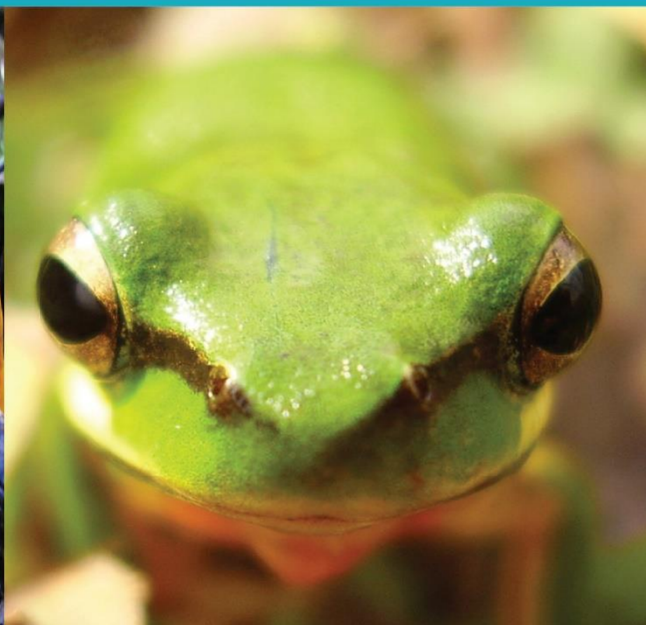




# TRAVERS BUSHFIRE & ECOLOGY

A TBE ENVIRONMENTAL COMPANY



## BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

Proposed Development

Lots 3 and 4, DP 584287

97-115 River Road

Greenwich

14 April 2022

(REF: 18TSA08INT)

# BIODIVERSITY DEVELOPMENT ASSESSMENT REPORT

## Proposed Residential Development

Lots 3 and 4 and 4, DP 584287 , 97-115 River Road, Greenwich

|                        |                                                                                                                                                                                                                                                                                                                  |
|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| <b>Date:</b>           | 14/04/22                                                                                                                                                                                                                                                                                                         |
| <b>File:</b>           | 18TSA08INT                                                                                                                                                                                                                                                                                                       |

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## EXECUTIVE SUMMARY

*Travers bushfire & ecology* has been engaged to prepare a biodiversity development assessment report (BDAR) for the proposed health care facility (hospital, Pallister House, seniors living, and respite) at Lots 3 and 4, DP 584287, 97-115 River Road, Greenwich. The area bounded by Lots 3 and 4, DP 584287 has been subject to survey effort and will hereafter be referred to as the 'study area'.

The area of direct impact from the development will hereafter be referred to as the 'development footprint'.

### Development/Planning proposal

The proposed development is for a health care facility made up of a hospital, Pallister House, seniors living quarters, and a respite with services such as NBN, power, water and sewage.

### Recorded biodiversity

Ecological survey and assessment has been undertaken in accordance with the *Biodiversity Assessment Methodology* (BAM) as well as relevant legislation including the *Environmental Planning and Assessment Act 1979* (EP&A Act), the *Biodiversity Conservation Act 2016* (BC Act), the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the *Fisheries Management Act 1994* (FM Act). Compliant survey and limitations for candidate species are explained in Section 2.5, Section 4.2.1 (flora) and Section 4.3.2 (fauna).

In respect of matters required to be considered under the EP&A Act and relating to the species / provisions of the BC Act, one (1) threatened fauna species Grey-headed Flying-fox (*Pteropus poliocephalus*), no threatened flora species, and no threatened ecological communities (TECs) were recorded within the development footprint.

In respect of matters required to be considered under the EPBC Act, one (1) threatened fauna species Grey-headed Flying-fox (*Pteropus poliocephalus*), no threatened flora species and no threatened ecological communities listed under this Act were recorded within the development footprint.

In respect of matters relative to the FM Act, no suitable habitat for threatened marine or aquatic species was observed within the development footprint.

### Impact assessment

Avoidance actions are outlined in Section 5.2. The resultant direct, indirect, and cumulative ecological impacts of the proposal have been carefully considered in Section 5.3. Further recommended mitigation measures, to minimise/offset these impacts to address threatening processes and to create a more positive ecological outcome for threatened biodiversity, have been outlined within Section 6.2.

The Development Proposal will cause an impact on 0.93 ha of native vegetation, which includes impacts to two different vegetation units including the following (PCT below refers to Plant Community Type):

- 0.64 ha of remnant / unmanaged PCT 1841 – Coastal enriched sandstone forest; including 0.21 ha complete removal and 0.43 ha partial clearing for APZ
- 0.29 ha of planted / managed PCT 1841 – Coastal enriched sandstone forest; including 0.13 ha complete removal and 0.016 ha partial clearing for APZ

The assessment of serious and irreversible impacts are set out under Section 6.7.2 of the BC Reg 2017 to guide the determining authority on this decision. These principles have been reviewed and assessed in Appendix 1.

There will be no significant impact on matters listed under the FM Act.

## Biodiversity Offsets Scheme (BOS) – Threshold Assessment

This project is a State Significant Development, which automatically triggers offsetting under the BOS and therefore threshold criteria does not need consideration.

## BAM Calculator results

The BAM Calculator provides a means of objectively determining the loss of biodiversity as a result of a proposed development. The 'credits' generated (Table A & B) are the amount of credits required to be 'transferred' (purchased) to allow the proposal to proceed.

*Table A – Requirement for ecosystem credits*

| Zone | Veg. zone name | Veg. integrity loss | Area (ha) | Sensitivity to loss | Biodiversity risk weighting | Potential SAI | Ecosystem credits |
|------|----------------|---------------------|-----------|---------------------|-----------------------------|---------------|-------------------|
| 1    | 1841_remnant   | 21.3                | 0.64      | Moderate            | 1.75                        | no            | 6                 |
| 2    | 1841_managed   | 27.1                | 0.29      | Moderate            | 1.75                        | no            | 3                 |
|      |                |                     |           |                     |                             |               | <b>Total: 9</b>   |

*Table B – Requirement for species credits*

| Species                                                       | Area (ha) / count | Credits |
|---------------------------------------------------------------|-------------------|---------|
| <i>Callocephalon fimbriatum</i> / Gang-gang Cockatoo          | 0.62              | 7       |
| <i>Calyptorhynchus lathamii</i> / Glossy Black-Cockatoo       | 0.62              | 7       |
| <i>Cercartetus nanus</i> / Eastern Pygmy-possum               | 0.93              | 11      |
| <i>Chalinolobus dwyeri</i> / Large-eared Pied Bat             | 0.93              | 16      |
| <i>Deyeuxia appressa</i> / Deyeuxia appressa                  | 5 individuals     | 15      |
| <i>Hieraaetus morphnoides</i> / Little Eagle                  | 0.93              | 8       |
| <i>Litoria aurea</i> / Green and Golden Bell Frog             | 0.93              | 11      |
| <i>Miniopterus australis</i> / Little Bent-winged Bat         | 0.1               | 2       |
| <i>Miniopterus orianae oceanensis</i> / Large Bent-winged Bat | 0.1               | 2       |
| <i>Myotis macropus</i> / Southern Myotis                      | 0.47              | 6       |
| <i>Ninox connivens</i> / Barking Owl                          | 0.84              | 9       |
| <i>Ninox strenua</i> / Powerful Owl                           | 0.84              | 9       |
| <i>Petaurus norfolcensis</i> / Squirrel Glider                | 0.93              | 11      |

# LIST OF ABBREVIATIONS

|                     |                                                                                                         |
|---------------------|---------------------------------------------------------------------------------------------------------|
| APZ                 | asset protection zone                                                                                   |
| BAM                 | Biodiversity Assessment Method (2020)                                                                   |
| BAR                 | Biodiversity Assessment Report                                                                          |
| <i>BC Act</i>       | Biodiversity Conservation Act (2016)                                                                    |
| <i>BC Reg</i>       | Biodiversity Conservation Regulation (2017)                                                             |
| BCAR                | Biodiversity Certification Assessment Report                                                            |
| BDAR                | Biodiversity Development Assessment Report                                                              |
| BOS                 | Biodiversity Offset Scheme                                                                              |
| BPA                 | bushfire protection assessment                                                                          |
| BSSAR               | Biodiversity Stewardship Site Assessment Report                                                         |
| CEEC                | Critically endangered ecological community                                                              |
| <i>CM Act</i>       | Coastal Management Act 2016                                                                             |
| DAWE                | Department of Agriculture, Water and the Environment.                                                   |
| DCP                 | development control plan                                                                                |
| DEC                 | NSW Department of Environment and Conservation (superseded by DECC from April 2007)                     |
| DECC                | NSW Department of Environment and Climate Change (superseded by DECCW from October 2009)                |
| DECCW               | NSW Department of Environment, Climate Change and Water (superseded by OEH from April 2011)             |
| DEWHA               | Commonwealth Department of Environment, Water, Heritage & the Arts (superseded by SEWPAC)               |
| DOEE                | Commonwealth Department of Environment & Energy (superseded by DAWE)                                    |
| DPIE                | NSW Department of Planning, Industry and Environment                                                    |
| EEC                 | endangered ecological community                                                                         |
| EPA                 | Environment Protection Authority                                                                        |
| <i>EP&amp;A Act</i> | Environmental Planning and Assessment Act (1979)                                                        |
| <i>EPBC Act</i>     | Environment Protection and Biodiversity Conservation Act (1999)                                         |
| <i>FM Act</i>       | Fisheries Management Act                                                                                |
| IBRA                | Interim Biogeographic Regionalisation for Australia                                                     |
| LEP                 | local environmental plan                                                                                |
| LGA                 | local government area                                                                                   |
| <i>LLS Act</i>      | Local Land Services Act (2013)                                                                          |
| NES                 | national environmental significance                                                                     |
| <i>NPW Act</i>      | National Parks and Wildlife Act (1974)                                                                  |
| NRAR                | Natural Resources Access Regulator (NSW)                                                                |
| NSW DPI             | NSW Department of Industry and Investment                                                               |
| OEH                 | Office of Environment and Heritage (superseded by DPIE from August 2019)                                |
| PCT                 | plant community type                                                                                    |
| PFC                 | projected foliage cover                                                                                 |
| RFS                 | NSW Rural Fire Service                                                                                  |
| ROTAP               | rare or threatened Australian plants                                                                    |
| SAII                | Serious And Irreversible Impacts                                                                        |
| SEPP                | State Environmental Planning Policy                                                                     |
| SEWPAC              | Commonwealth Dept. of Sustainability, Environment, Water, Population & Communities (superseded by DOEE) |
| SIS                 | species impact statement                                                                                |
| SULE                | safe useful life expectancy                                                                             |
| TEC                 | threatened ecological community                                                                         |
| TPZ                 | tree preservation zone                                                                                  |
| TSC Act             | Threatened Species Conservation Act (1995) – Superseded by the Biodiversity Conservation Act (2016)     |
| VMP                 | vegetation management plan                                                                              |

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# 1. INTRODUCTION

Travers bushfire & ecology has been engaged to undertake a biodiversity development assessment report for Lots 3 and 4, DP 584287 within the Lane Cove local government area (LGA) (Figure 1.1). This lot is subject to a proposed development application and will hereafter be referred to as the 'study area'.

The area containing the proposed development, APZs, and all associated impact on habitat features is hereafter referred to as the 'development footprint'.

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



Figure 1.1 – Study area (red)

## 1.1 Purpose

The purposes of this Biodiversity Development Assessment Report (BDAR) are to:

- Carry out a botanical survey to describe the vegetation communities and their conditions
- Carry out a fauna habitat survey for the detection and assessment of fauna and their potential habitats
- Complete targeted surveys for threatened species, populations, and ecological communities
- Prepare a BDAR in accordance with the requirements of the:
  - a) Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act),
  - b) Biodiversity Conservation Act 2016 (BC Act),
  - c) Biodiversity Conservation Regulation 2017 (BC Reg.),
  - d) Fisheries Management Act 1994 (FM Act), and
- Prepare a BDAR in accordance with the Biodiversity Assessment Methodology (BAM) 2020

### 1.1.1 Certification of BAM compliance

Section 6.15 of the *BC Act* regarding the currency of a BDAR requires:

- (1) A biodiversity assessment report cannot be submitted in connection with a relevant application unless the accredited person certifies in the report that the report has been prepared on the basis of the requirements of (and information provided under) the biodiversity assessment method as at a specified date and that date is within 14 days of the date the report is so submitted.
- (2) A relevant application is an application for planning approval, for vegetation clearing approval, for biodiversity certification or in respect of a biodiversity stewardship agreement.

George Plunkett (BAAS 19010) is an accredited person under the *BC Act*. I, George Plunkett, certify here that the report has been prepared on the basis of the requirements of (and information provided under) the BAM as 14 April 2022, and that date is within 14 days of the date the report is so submitted.

### 1.1.2 Terminology

Throughout this report the terms development footprint and study area are used. It is important to have a thorough understanding of these terms as they apply to the assessment.

**Development footprint** means the area directly affected by the proposal. It has the same meaning as “subject land” defined below.

**Study area** is the portion of land that encompasses all surveys undertaken and is usually all land contained within the designated property boundary. The study area extends as far as is necessary to assess all important biodiversity values known and likely to occur within the subject land and includes the development footprint and any additional areas which are likely to be affected by the proposal, either directly or indirectly.

**Subject land** is land to which the BAM is applied in Stage 1 to assess the biodiversity values. It includes land that may be a development site, clearing site, proposed for biodiversity certification or land that is proposed for a biodiversity stewardship agreement. In this case, it refers to the area designated as the development footprint, and has the same meaning for the

purposes of this report. The terms “subject land” and “development footprint” are interchangeable in this regard.

**Direct impacts** are those that directly affect the habitat and individuals. They include, but are not limited to, death through clearing, predation, trampling, poisoning of the animal/plant itself and the removal of suitable habitat. When applying each factor, consideration must be given to all of the likely direct impacts of the proposed activity or development.

**Indirect impacts** occur when project-related activities affect species, populations or ecological communities in a manner other than direct loss. Indirect impacts can include loss of individuals through starvation, exposure, predation by domestic and/or feral animals, loss of breeding opportunities, loss of shade/shelter, deleterious hydrological changes, increased soil salinity, erosion, inhibition of nitrogen fixation, weed invasion, fertiliser drift, or increased human activity within or directly adjacent to sensitive habitat areas. As with direct impacts, consideration must be given, when applying each factor, to all of the likely indirect impacts of the proposed activity or development.

## 1.2 Site description

### 1.2.1 Site overview

Table 1.1 provides an overview the planning, cadastral, and topographical details of the study area and an overview of the site and surrounds is shown on Figure 1.4 and Figure 1.5 (site and location maps).

*Table 1.1 – Site features*

|                               |                                                                                                                                                                                                                                                                                                  |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Location</b>               | 97-115 River Road, Greenwich, NSW 2250                                                                                                                                                                                                                                                           |
| <b>Location description</b>   | The site is surrounded by predominately existing urban development with scattered vegetation to the east. The northern boundary runs parallel to River Rd. The southern and eastern boundary are connected to Gore Creek Reserve/Lane Cove Bushland Park.                                        |
| <b>Area</b>                   | 2.22 ha                                                                                                                                                                                                                                                                                          |
| <b>Local government area</b>  | Lane Cove Council                                                                                                                                                                                                                                                                                |
| <b>Zoning</b>                 | SP2 – Special Purpose                                                                                                                                                                                                                                                                            |
| <b>Grid reference MGA-56</b>  | 331905E 6255520N MGA 2020-56                                                                                                                                                                                                                                                                     |
| <b>Elevation</b>              | Approximately 40-50 m AHD                                                                                                                                                                                                                                                                        |
| <b>Topography</b>             | Situated on a sloping topography towards the south-west portion of the site where there is a approx.. 40 m high drop-off/escarpment.                                                                                                                                                             |
| <b>Catchment and drainage</b> | There are no creek lines within the study area. However, there is Gore Creek to the south-west within approx. 100 m of site and it is expected that any drainage filters down to the Creek, which in turn drains into Lane Cove River. Refer to Figure 1.5 for local drainages and stream order. |
| <b>Existing land use</b>      | The site is currently in operation as Hammond Care Greenwich Hospital.                                                                                                                                                                                                                           |

## 1.2.2 Landscape features

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

**Table 1.2 – Landscape features**

|                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Patch size</b>                                                                            | >100 ha                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>IBRA bioregions and subregions</b>                                                        | Sydney Basin bioregion – Pittwater subregion (Figure 1.4 and Figure 1.5)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>NSW landscape region and area (ha)</b>                                                    | Port Jackson Basin                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Native vegetation extent in the buffer area (1500 m)</b>                                  | 203.13 ha approx. and 26.79%<br>Cover class: 10–30%                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Cleared areas</b>                                                                         | Approximately 0.9 ha of land within the study area is cleared                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Evidence to support differences between mapped vegetation extent and aerial imagery</b>   | Mapped vegetation closely matches aerial imagery.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <b>Rivers and streams classified according to stream order</b>                               | The site map (Figure 1.4) shows the study area with first, second and third order streams                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Wetlands within, adjacent to and downstream of the site, including important wetlands</b> | There are several dams across the site, shown on the site map (Figure 1.4)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Connectivity features</b>                                                                 | There is some connectivity to the development footprint. There is connection to Lane Cove Bushland Park and Gore Creek to the west and also to Gore Creek Reserve to the south. The north of the site runs parallel to River Rd and to the east is mainly existing residential properties (i.e., poor connectivity in those directions). The location map (Figure 1.5) shows an overview of the extent of native vegetation and connective features in the locality.                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Geology and soils</b>                                                                     | Geology: Hawkesbury Sandstone (Rh) – Sandstone, quartz, with some shale. Soils: The majority of the study area is located on the GyMEA soil landscape. gy—shallow to moderately deep (30-100 cm) Yellow Earths and Earthy Sands on crests and inside of benches; shallow (<20 cm) Siliceous Sands on leading edges of benches; localised Gleyed Podzolic Soils and Yellow Podzolic Soils on shale lenses; shallow to moderately deep (<100 cm) Siliceous Sands and Leached Sands along drainage lines. The eastern and western extremities of the site lie on the Hawkesbury soil landscape. ha—shallow (>50 cm), discontinuous Lithosols/Siliceous Sands associated with rock outcrop; Earthy Sands, Yellow Earths and some Yellow Podzolic Soils on inside of benches and along joints and fractures; localised Yellow and Red Podzolic Soils associated with shale lenses; Siliceous Sands and secondary Yellow Earths along drainage lines |
| <b>Identification of method applied (i.e. linear or site-based)</b>                          | Site based assessment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

### 1.2.3 Zoning

The site is currently zoned SP2 under the Lane Cove LEP of 2010 (Figure 1.2) which is for Special Purposes (health services facilities).

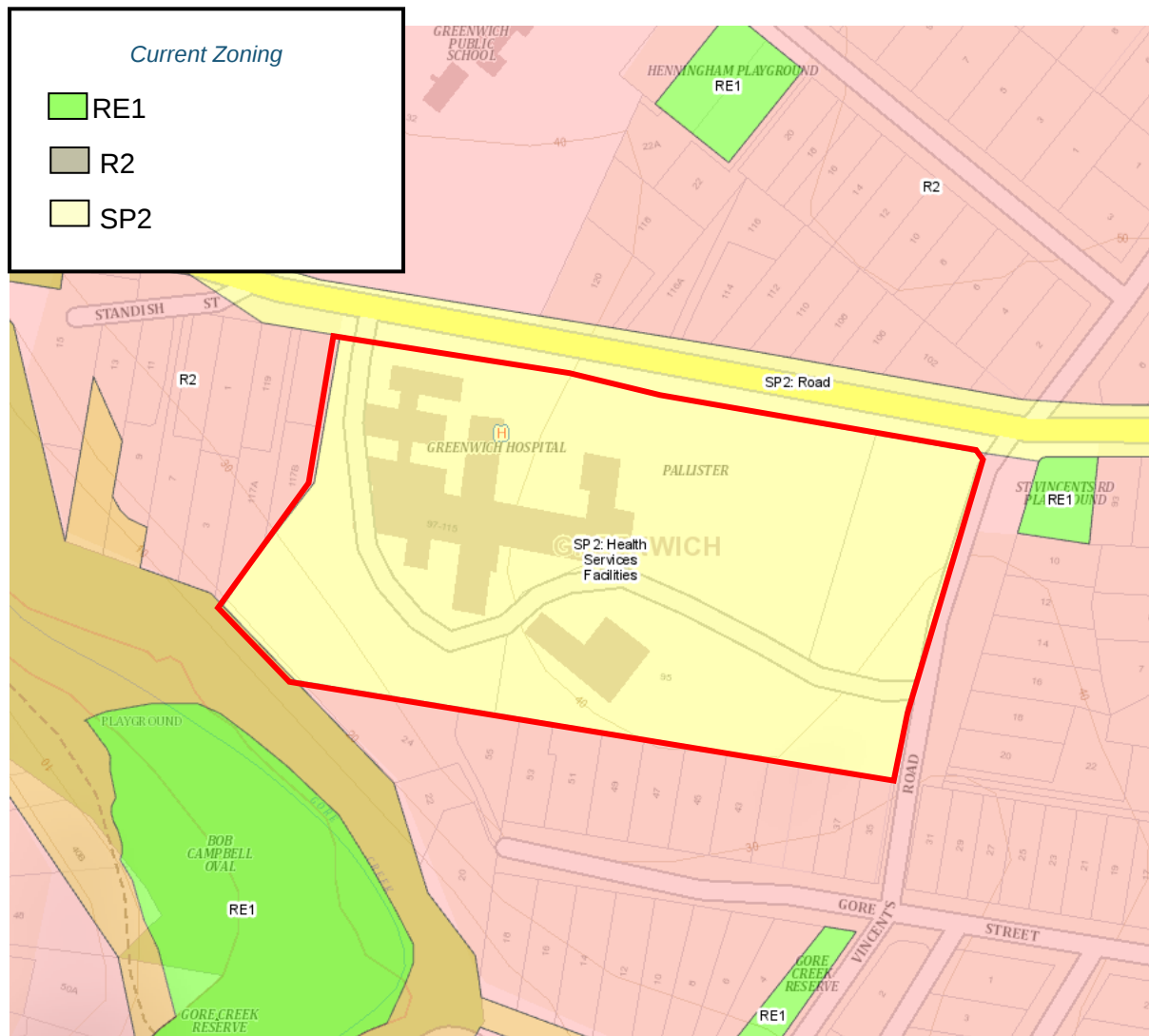


Figure 1.2 – Zoning

(Source: Planning Portal, 2022)

## 1.3 Proposed development

The subject proposal is for the detailed design and construction of the facility following its concept approval under SSD-8699. Specifically, SSD-13619238 seeks approval for the following:

- Demolition of the existing hospital building and associated facilities at the site;
- Construction of a new hospital facility and integrated healthcare uses and services, including:
  - a new 7 storey main hospital building;
  - two new 5-6 storey serviced self-care housing buildings (serviced seniors living);
  - a new 2-3 storey respite care building;



## 1.4 Statutory assessment requirements

### 1.4.1 *Environmental Planning and Assessment Act 1979 (EP&A Act)*

Prior to any development taking place in New South Wales a formal assessment needs to be made of the proposed work to ensure it complies with relevant planning controls and, according to its nature and scale, confirm that it is environmentally and socially sustainable. State, regional, and local planning legislation indicates the level of assessment required, and outlines who is responsible for assessing the development. The development assessment and consent system is outlined in Part 4 of the *EP&A Act* and the infrastructure and environmental impact assessment system is outlined in Part 5 of the *EP&A Act*.

#### **Section 7.14 State significant development or infrastructure**

- (1) This section applies to an application for development consent for State significant development under Part 4, or an application for approval for State significant infrastructure under Part 5.1, that is required under Division 2 to be accompanied by a biodiversity development assessment report.
- (2) The Minister for Planning, when determining in accordance with the *EP&A Act* any such application, is to take into consideration under that Act the likely impact of the proposed development on biodiversity values as assessed in the biodiversity development assessment report. The Minister for Planning may (but is not required to) further consider under that Act the likely impact of the proposed development on biodiversity values.
- (3) If the Minister for Planning decides to grant consent or approval and the biodiversity offsets scheme applies to the proposed development, the conditions of the consent or approval may require the applicant to retire biodiversity credits to offset the residual impact on biodiversity values (whether of the number and class specified in the report or other number and class). The residual impact is the impact after the measures that are required to be carried out by the terms or conditions of the consent or approval to avoid or minimise the impact on biodiversity values of the proposed development.
- (4) A condition to retire biodiversity credits is required to be complied with before any development is carried out that would impact on biodiversity values. If the retirement of particular biodiversity credits applies to a stage of the development, compliance with the condition for their retirement is postponed until it is proposed to carry out that stage of the development.
- (5) This section does not operate to limit the matters that the Minister for Planning may take into consideration in relation to the impact of proposed development on biodiversity values, the measures that the Minister may require to avoid or minimise those impacts or the power of the Minister to refuse to grant consent or approval because of those impacts.

### 1.4.2 *Biodiversity Conservation Act 2016 (BC Act)*

The BC Act repeals the Threatened Species Conservation Act 1995, the Nature Conservation Trust Act 2001 and the animal and plant provisions of the National Parks and Wildlife Act 1974.

The *BC Act* and the *BC Reg* establishes a regulatory framework for assessing and offsetting impacts on biodiversity values due to proposed developments and clearing. It establishes a framework to avoid, minimise, and offset impacts on biodiversity from development through the Biodiversity Offsets Scheme. Where development consent is granted, the authority may

impose as a condition of consent an obligation to retire a number and type of biodiversity credits determined under the new Biodiversity Assessment Method (BAM).

The BOS applies to:

- local development (assessed under Part 4 of the *Environmental Planning and Assessment Act 1979*) that triggers a BOS threshold or is likely to significantly affect threatened species based on the test of significance in section 7.3 of the *Biodiversity Conservation Act 2016*
- state significant development and state significant infrastructure projects, unless the Secretary of the Department of Planning, Industry and Environment and the environment agency head determine that the project is not likely to have a significant impact
- biodiversity certification proposals
- clearing of native vegetation in urban areas and areas zoned for environmental conservation that exceeds a BOS threshold and does not require development consent
- clearing of native vegetation that requires approval by the Native Vegetation Panel under the Local Land Services Act 2013
- activities assessed and determined under Part 5 of the *Environmental Planning and Assessment Act 1979* (generally, proposals by government entities) if proponents choose to 'opt in' to the Scheme.

Proponents will need to supply evidence relating to the triggers for the BOS thresholds and the test of significance (where relevant) when submitting their application to the consent authority.

Development consent cannot be granted for non-State significant development under Part 4 of the *EP&A Act* if the consent authority is of the opinion it is likely to have serious and irreversible impacts (SAIL) on biodiversity values. The determination of SAIL is to be made in accordance with principles prescribed section 6.7 of the *BC Regulation 2017*. The principles have been designed to capture those impacts which are likely to contribute significantly to the risk of extinction of a threatened species or ecological community in New South Wales.

The threatened species test of significance is used to determine if a development or activity is likely to significantly affect threatened species or ecological communities, or their habitats. It is applied as part of the Biodiversity Offsets Scheme entry requirements and for Part 5 activities under the *Environmental Planning and Assessment Act (EP&A Act)*, 1979.

The test of significance is set out in s.7.3 of the *BC Act*. If the activity is likely to have a significant impact, or will be carried out in a declared area of outstanding biodiversity value, the proponent must either apply the Biodiversity Offsets Scheme or prepare a species impact statement (SIS).

The environmental impact of activities that will not have a significant impact on threatened species will continue to be assessed under s.111 of the *EP&A Act*

### **1.4.3 Fisheries Management Act 1994 (FM Act)**

The *FM Act* provides a list of threatened aquatic species that require consideration when addressing the potential impacts of a proposed development. Where a proposed activity is located in an area identified as critical habitat, or such that it is likely to significantly affect threatened species, populations, ecological communities, or their habitats, an SIS is required to be prepared.

### **1.4.4 Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)**

The *EPBC Act* requires that Commonwealth approval be obtained for certain actions. It provides an assessment and approvals system for actions that have a significant impact on matters of *national environmental significance* (NES). These may include:

- World Heritage Properties and National Heritage Places
- Wetlands of International Importance protected by international treaty
- Nationally listed threatened species and ecological communities
- Nationally listed migratory species
- Commonwealth marine environment

Actions are projects, developments, undertakings, activities, and series of activities or alteration of any of these. An action that needs Commonwealth approval is known as a controlled action. A controlled action needs approval where the Commonwealth decides the action would have a significant effect on an NES matter.

Where a proposed activity is located in an area identified to be of NES, or such that it is likely to significantly affect threatened species, ecological communities, migratory species or their habitats, then the matter needs to be referred to the Commonwealth Department of Agriculture, Water and the Environment (DAWE) for assessment. In the case where no listed federal species are located on site then no referral is required. The onus is on the proponent to make the application and not the Council to make any referral.

A threshold criterion apply to specific NES matters which may determine whether a referral is or is not required, such as for the *EPBC*-listed ecological communities Cumberland Plain Woodland and Shale-Gravel transition Forest. Consultation with DOEE may be required to determine whether a referral is or is not required. If there is any doubt as to the significance of impact or whether a referral is required, a referral is generally recommended to provide a definite decision under the *EPBC Act* thereby removing any further obligations in the case of 'not controlled' actions.

A significant impact is regarded as being:

*important, notable, or of consequence, having regard to its context or intensity and depends upon the sensitivity, value, and quality of the environment which is impacted and upon the duration, magnitude, and geographical extent of the impacts. A significant impact is likely when it is a real or not a remote chance or possibility.*

Source: EPBC Policy Statement

Guidelines on the correct interpretation of the actions and assessment of significance are located on the department's web site <http://www.environment.gov.au/epbc/publications>.

### **1.4.5 Coastal Management Act 2016 (CM Act)**

The *Coastal Management Act* (*CM Act*, 2016) establishes the framework and overarching objects for coastal management in New South Wales. The Act commenced on 29 June 2018 and replaces the previous *Coastal Protection Act* (1979).

The purpose of the *CM Act* is to manage the use and development of the coastal environment in an ecologically sustainable way, for the social, cultural and economic well-being of the people of New South Wales.

The *CM Act* also supports the aims of the *Marine Estate Management Act 2014*, as the coastal zone forms part of the marine estate.

The *CM Act* defines the coastal zone, comprising four (4) coastal management areas:

1. coastal wetlands and littoral rainforests area; areas which display the characteristics of coastal wetlands or littoral rainforests that were previously protected by SEPP 14 and SEPP 26
2. coastal vulnerability area; areas subject to coastal hazards such as coastal erosion and tidal inundation
3. coastal environment area; areas that are characterised by natural coastal features such as beaches, rock platforms, coastal lakes and lagoons and undeveloped headlands. Marine and estuarine waters are also included
4. coastal use area; land adjacent to coastal waters, estuaries and coastal lakes and lagoons.

The *CM Act* establishes management objectives specific to each of these management areas, reflecting their different values to coastal communities.

### **1.4.6 Licences**

Individual staff members of *Travers bushfire & ecology* are licensed under Clause 20 of the *National Parks and Wildlife (Land Management) Regulation 1995* and Sections 120 & 131 of the *National Parks and Wildlife Act 1974* to conduct flora and fauna surveys within service and non-service areas. NPWS Scientific Licence Numbers: SL100848.

*Travers bushfire & ecology* staff are licensed under an Animal Research Authority issued by the NSW Department of Primary Industries. This authority allows *Travers bushfire & ecology* staff to conduct various fauna surveys of native and introduced fauna for the purposes of environmental consulting throughout New South Wales.



Figure 1.4 – Site map

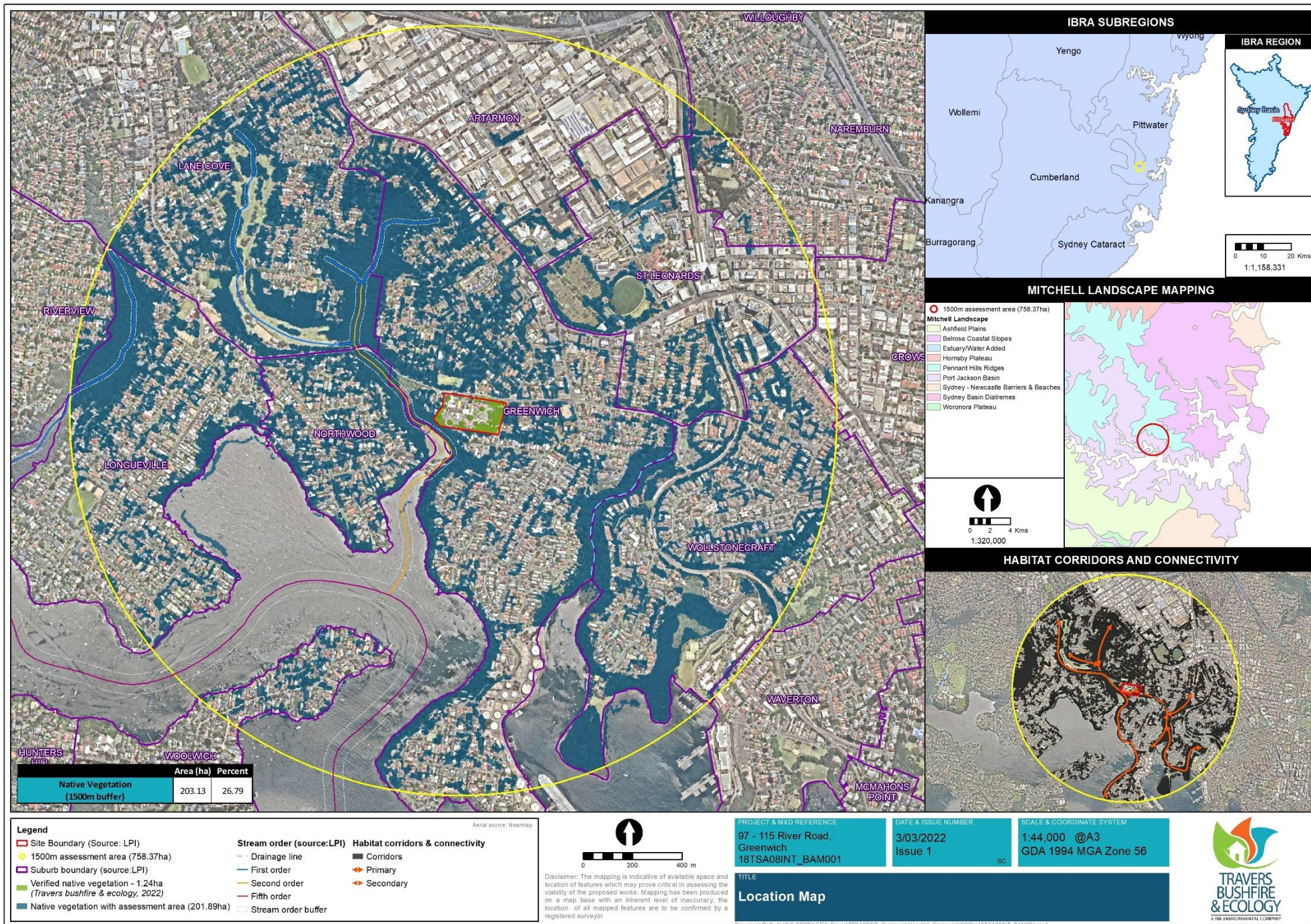


Figure 1.5 – Location map

## 2. SURVEY METHODOLOGY

### 2.1 Presurvey information collation & resources

#### Technical resources utilised:

##### Legislation

- Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)
- Biodiversity Conservation Act 2016 (BC Act)
- Biodiversity Conservation Regulation 2017 (BC Reg.)
- Fisheries Management Act 1994 (FM Act)

##### Survey Guidelines

- Survey guidelines for Australia's threatened birds (DEWHA 2010)
- Survey guidelines for Australia's threatened fish (DEWHA 2011)
- Survey guidelines for Australia's threatened frogs (DEWHA 2010)
- Survey guidelines for Australia's threatened mammals (DEWHA 2011)
- Survey guidelines for Australia's threatened bats (DEWHA. 2010)
- Survey guidelines for Australia's threatened reptiles (DEWHA 2011)
- Matters of National Environmental Significance (Commonwealth of Australia 2013)
- Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities 2004 (working draft), Department of Environment and Conservation (DEC)
- Threatened Species Survey and Assessment Guidelines: Field Survey Methods for Fauna – Amphibians (DECC – April 2009a)
- Hygiene Protocol for the Control of Diseases in Frogs (DECC 2008)
- Region based guide to the echolocation calls of Microchiropteran bats (DEC 2004)
- Species credit threatened bats and their habitats (DPIE 2018)
- Field survey methods: Best practice field survey methods for environmental consultants and surveyors when assessing proposed development sites or other activities on sites containing threatened species, populations or ecological communities (OEH 2004)
- Surveying threatened plants and their habitats: NSW survey guide for the Biodiversity Assessment Method (DPIE 2020)

##### Mapping Resources

- Aerial photographs (Google Earth Pro / Spatial Information Exchange / NearMap)
- Topographical maps (scale 1:25,000)
- LiDAR data for contours (Land and Property Information, est. 2015 estimated)
- ESspade – OEH tool for checking soil types

##### Threatened species records

- BioNet database which holds data from a number of custodians (18/10/2021 to 10 km)
- Atlas of Living Australia (NCRIS/GBIF 2017)
- Birddata (Birdlife Australia 2017)
- NSW Bird Atlas (NSWBA 2017)

### Vegetation mapping/resources:

- BioNet Vegetation Classification System
- The Native Vegetation of the Sydney Metropolitan Area (OEH 2016)
- Australian Virtual Herbarium
- Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method (DPIE 2020).

### **Vegetation Mapping:**

The Native Vegetation of the Sydney Metropolitan Area (OEH 2016) maps the following communities within the study area:

- PCT 1776 - Smooth-barked Apple - Red Bloodwood open forest on enriched sandstone slopes around Sydney and the Central Coast
- PCT 1778 - Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney
- PCT 1828 - Coachwood - Lilly Pilly - Water Gum gallery rainforest in sandstone gullies of the Sydney basin
- Urban exotic / native

## **2.2 Flora survey methodology**

Flora survey was undertaken on 18 October 2021 and 8 Feb 2022 over a combined time of 8 hrs.

Stratified survey using the BAM was undertaken. The following information was collected at each of four (4) BAM plots:

- Native overstorey, mid-storey and ground cover recorded for all observed species and an estimate of stems (20 m x 20 m, 10 m x 40 m).
- Stratum (and layer): stratum and layer in which each species occurs (20 m x 20 m)
- Growth form: growth form for each recorded species (20 m x 20 m)
- Species name: scientific name and common name (20 m x 20 m)
- Percent projected foliage cover of the understorey strata and exotic vegetation (20 m x 20 m)
- Number of trees with hollows visible from the ground (20 m x 50 m)
- The total length of fallen logs >10 cm in diameter (20 m x 50 m)
- The proportion of regenerating overstorey species (20 m x 50 m)
- Number of large trees (20 m x 50 m)
- Estimates of leaf litter cover, bare ground, cryptograms and rocks in 1 m x 1 m subplots at five (5) locations along the central transect (20 m x 50 m)

Targeted survey for threatened flora was undertaken throughout the subject lots (refer to Figure 3.2).

All plot sheets utilised for the BAM calculator are provided in Appendix 2.

## **2.3 Fauna survey methodology**

Site survey effort accounting for techniques deployed, duration, and weather conditions are outlined in Table 2.1 and are depicted on Figure 3.2.

### **Diurnal birds**

Two (2) diurnal bird census points were undertaken within the development footprint and one (1) was undertaken at the driveway off Vincent's Road to the south-east. A minimum of 15 minutes of survey was undertaken at each census point in an area radiating out to between 30–50 m. Bird census points were selected to give an even spread and representation across the site and its communities (Figure 3.2). Census points were also commenced in locations where bird activity was apparent, as often different small bird species are found foraging together. Opportunistic diurnal bird survey was conducted between census points and whilst undertaking other diurnal surveys. Additional opportunistic surveys were conducted on another two days.

A raptor nest search transect was also conducted throughout the study area over two days (Figure 3.2).

### **Nocturnal birds**

Given the suitability of habitat present, Masked Owl (*Tyto novaehollandiae*), Powerful Owl (*Ninox strenua*), Barking Owl (*Ninox connivens*), and Sooty Owl (*Tyto tenebricosa*) were targeted by call-playback techniques.

Given that the hollow-bearing tree SHT 2 provided owl roosting potential, stag-watching of that tree was undertaken on the night of the 18/10/2021.

### **Arboreal and terrestrial mammals**

There is limited habitat onsite considered suitable for threatened arboreal and terrestrial mammal species. Preliminary nocturnal habitat searches and spotlighting were undertaken over one (1) day and night.

### **Bats**

Mega-chiropteran bat species, such as Grey-headed Flying-fox, were surveyed by targeting flowering / fruiting trees during spotlighting activities and by listening to distinctive vocalisations. Suitable roosting habitat is searched for presence of small or large established camps during diurnal survey periods.

Micro-chiropteran bats were passively surveyed for using two ultrasonic recording detectors deployed for nine (9) nights: one (1) preliminary night in October 2020 and then eight (8) consecutive nights in Feb 2020. This provided a total effort of 18 detector nights.

The escarpment to the west of the site was searched for potential bat habitat such as caves and crevices for one hour on 28/02/2022.

### **Amphibians**

No amphibian surveys were conducted.

### **Reptiles**

There is no habitat onsite considered suitable for threatened reptile species. However, opportunistic diurnal habitat searches were undertaken in October 2021.

### **Habitat trees**

Only significant habitat trees were recorded (see below).

### **Significant habitat trees**

Significant habitat trees are defined as trees containing large hollows suitable for use by owls and/or containing a number of good quality hollows typically consisting of more than one medium (10–30

cm) sized hollows. A tree may also be considered significant where evidence of use by select fauna is found such as a glider sap feed tree, raptor nest, or owl roost.

Significant Hollow-bearing trees were identified and recorded within the development footprint on a *Trimble* handheld GPS unit during surveys. All data such as hollow types, hollow size, tree species, diameter at breast height, canopy spread and overall height were collected and a metal tag with the tree number placed on the trunk for field relocation purposes. Other habitat features such as nests and significant sized mistletoes for foraging were also searched for. A summary of significant habitat tree results is provided in Table 3.8.

## 2.4 Field survey effort

Table 2.1 and Table 2.2 below detail the flora and fauna survey effort undertaken for the development footprint.

*Table 2.1 – Fauna survey effort*

| Fauna group                | Date                 | Weather conditions                                                           | Survey technique(s)                                   | Time effort (24hr)  |
|----------------------------|----------------------|------------------------------------------------------------------------------|-------------------------------------------------------|---------------------|
| <b>Diurnal birds</b>       | 18/10/2021           | 6/8 cloud, no wind, no rain, temp 21.9–16oC                                  | Diurnal census x3                                     | 1hr                 |
|                            |                      |                                                                              | Diurnal opportunistic                                 | 3hr 10min 1630–1940 |
|                            | 15/02/2022           | 2/8 cloud, no wind, no rain, temp 24oC                                       | Raptor nest search                                    | 0.5hrs 1430–1500    |
|                            | 15/02/2022           | 2/8 cloud, no wind, no rain, temp 24oC                                       | Diurnal opportunistic                                 | 0.5hrs 1430–1500    |
|                            | 28/02/2022           | 8/8 cloud, no wind, patchy rain, temp 22oC                                   | Diurnal opportunistic                                 | 1.5hrs 1645–1815    |
| <b>Nocturnal birds</b>     | 18/10/2021           | 6/8 cloud, no wind, no rain, temp 16oC                                       | Spotlighting                                          | 1hrs 2000–2100      |
|                            |                      |                                                                              | Call playback (Section 2.5 species)                   | Commenced @ 2130    |
| <b>Arboreal mammals</b>    | 18/10/2021           | 6/8 cloud, no wind, no rain, temp 16oC                                       | Spotlighting                                          | 1hrs 2000–2100      |
|                            |                      |                                                                              | Call playback (Section 2.5 species)                   | Commenced @ 2130    |
| <b>Terrestrial mammals</b> | 18/10/2021           | 6/8 cloud, no wind, no rain, temp 16oC                                       | Spotlighting                                          | 1hrs 2000–2100      |
|                            |                      |                                                                              | Call playback (Section 2.5 species)                   | Commenced @ 2130    |
| <b>Bats</b>                | 18/10/2021           | 6/8 cloud, no wind, no rain, temp 16oC                                       | Ultrasonic microbat recording (Passive monitoring) x2 | 2hrs 2000–2200 (x2) |
|                            | 07/02/2022–15/3/2022 | 70 mm rain, average wind speed approx. 20 km/h, average maximum temp 27.1°C. | Ultrasonic microbat recording (Passive monitoring) x2 | 14 recorder nights  |
|                            | 28/02/2022           | 8/8 cloud, no wind, patchy rain, temp 22oC                                   | Cave/crevice searches                                 | 1.5hrs 1645–1815    |
| <b>Reptiles</b>            | 07/02/2022           | 2/8 cloud, no wind, no rain, temp 24oC                                       | Rocky habitat roots searches                          | 0.5hrs 1400–1430    |
|                            | 18/10/2021           | 6/8 cloud, no wind, no rain, temp 21.9–16oC                                  | Diurnal opportunistic / habitat searches              | 1hr 1500–1600       |
| <b>Amphibians</b>          | 18/10/2021           | 6/8 cloud, no wind, no rain, temp 21.9–16oC                                  | Spotlighting / call identification                    | 1hr 1500–1600       |
|                            | 28/02/2022           | 8/8 cloud, no wind, patchy rain, temp 22oC                                   | Breeding habitat search                               | 1.5hrs 1645–1815    |

*Table 2.2 – Flora survey effort*

| Flora survey                  | Survey technique(s)                                                                                                    | Dates                   |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------|-------------------------|
| <b>Vegetation communities</b> | Survey of the boundaries of all communities – field verification, plotting vegetation boundaries on aerial photographs | 8 Feb 2022              |
| <b>Stratified sampling</b>    | Four (4) 20 m x 20 m / 50 m x 20 m floristic transect plots within native vegetation using BAM                         | 18 Oct 2021, 8 Feb 2022 |
| <b>Targeted searches</b>      | Parallel field traverse across the entire subject land                                                                 | 18 Oct 2021, 8 Feb 2022 |

*Table 2.3 – Plot and transect survey effort – development footprint*

| Veg zone no. | PCT  | Condition           | Area (Ha) | Minimum plots required | Plot sampled | Plot identifier | Plot size   | Easting at 0 m                   | Northing at 0 m                     | Bearing          |
|--------------|------|---------------------|-----------|------------------------|--------------|-----------------|-------------|----------------------------------|-------------------------------------|------------------|
| 1            | 1841 | Remnant / unmanaged | 0.64      | 1                      | 3            | 1<br>2<br>3     | 20 m x 50 m | 332043 E<br>331811 E<br>331996 E | 6255457 N<br>6255471 N<br>6255428 N | 14<br>143<br>104 |
| 2            | 1841 | Planted / managed   | 0.29      | 1                      | 1            | 4               | 20 m x 50 m | 332056 E                         | 6255523 N                           | 250              |

## 2.5 Survey limitations

It is important to note that field survey data collected during the survey period is representative of species occurring within the development footprint for potentially that occasion only. Due to effects of fire, breeding cycles, migratory patterns, camouflage, weather conditions, time of day, visibility, predatory and / or feeding patterns, increased species frequency or richness may be observed within the development footprint outside the nominated survey period. Habitat assessments based on the identification of micro-habitat features for various species of interest, including regionally significant and threatened species, have been used to minimise the implications of this survey limitation.

### Flora survey limitations

The species list does not include all household or exotic garden / landscaping species and those species which could not be identified at the time of the survey past genus level. Cryptic species not flowering at the time of the survey may not be observed during survey outside of peak flowering periods. Likewise cryptic orchid species are generally only recognisable when flowering.

Targeted flora survey is compliant for all candidate species with potential to occur, except for *Deyeuxia appressa*, which requires survey in December to assess presence (current survey was conducted in October and February). For the purposes of this BDAR and credit assessment, it is assumed that *D. appressa* is present in accordance with the BAM. This species is a very rare grass only known from a few records, and is listed as a potential SAI entity. Appendix 1 provides assessment of SAI entities, but targeted survey is required to allow for accurate determination of SAI on this species.

Table 2.4 – Survey adequacy for species credit species (flora)

| Common name                                          | BC Act | Potential SAI entity | Potential to occur (presence status) / Habitat | Survey adequacy              |                  |                              |
|------------------------------------------------------|--------|----------------------|------------------------------------------------|------------------------------|------------------|------------------------------|
|                                                      |        |                      |                                                | Defined survey period (TBDC) | Conducted survey | Survey sufficient to exclude |
| <i>Deyeuxia appressa</i>                             | E1     | yes                  | unlikely                                       | Dec                          | Oct, Feb         | no                           |
| <i>Epacris purpurascens</i> var. <i>purpurascens</i> | V      | no                   | unlikely                                       | Sept–Oct                     | Oct, Feb         | yes                          |
| <i>Grammitis stenophylla</i>                         | E1     | no                   | low                                            | All months                   | Oct, Feb         | yes                          |
| <i>Leptospermum deanei</i>                           | V      | no                   | low                                            | Oct–Nov                      | Oct, Feb         | yes                          |
| <i>Persoonia mollis</i> subsp. <i>maxima</i>         | V      | no                   | unlikely                                       | All months                   | Oct, Feb         | yes                          |
| <i>Rhodamnia rubescens</i>                           | CE     | no                   | unlikely                                       | All months                   | Oct, Feb         | yes                          |
| <i>Rhodomyrtus psidioides</i>                        | CE     | no                   | unlikely                                       | All months                   | Oct, Feb         | yes                          |
| <i>Syzygium paniculatum</i>                          | E      | no                   | low                                            | April–June                   | Oct, Feb         | no - but see comments below  |

## ***Fauna survey limitations***

### *Diurnal birds*

General bird surveys were conducted during three one-hour sessions on different days but all surveys were in the middle of the day, which is not an optimum time for bird surveys. There were no targeted diurnal bird surveys conducted for threatened cockatoos such as the Gang-Gang Cockatoo or Glossy-black Cockatoo, therefore, these species cannot be ruled out.

### *Bats*

Further bat recorder deployment is needed along the escarpment to rule out the presence of cave breeding bats.

### *Nocturnal birds*

All nocturnal bird survey was conducted in a single night, which does not take into consideration the huge number of environmental variables that could have led to certain species being present and/or detected on that night.

### *Arboreal and terrestrial mammals*

All mammal survey was conducted in a single afternoon and night, which does not take into consideration the huge number of environmental variables that could have led to certain species being present and/or detected on that day/night.

### *Habitat trees*

Hollow-dependent threatened species were not recorded during survey. However, not all hollows suitable for roosting/denning/breeding by threatened fauna within the development footprint have been recorded and stag-watched.

### *Candidate species*

The BAM-C has identified a list of threatened fauna species credit species that have potential habitat associated with the recorded PCTs in the development footprint (refer to Table 4.3 for this full list). Species credit species require survey to rule out presence on site otherwise these species must be assumed to be present and will generate subsequent credits for offsetting.

Following a habitat assessment of the site and surrounding study area, as well as the elimination of select species where breeding habitat is absent, the following species require seasonal survey.

Table 2.5 – Survey adequacy for species credit species (fauna)

| Common name                      | BC Act | Potential SAIL entity | Potential to occur (presence status) / Habitat | Survey adequacy              |                  |                              |
|----------------------------------|--------|-----------------------|------------------------------------------------|------------------------------|------------------|------------------------------|
|                                  |        |                       |                                                | Defined survey period (TBDC) | Conducted survey | Survey sufficient to exclude |
| Glossy Black-Cockatoo (breeding) | V      | no                    | yes                                            | Jan-Sept                     | Oct              | No                           |
| Eastern Pygmy Possum             | V      | no                    | yes                                            | Oct-March                    | N/A              | No                           |
| Southern Myotis                  | V      | no                    | yes                                            | Oct-March                    | Oct and Feb      | No                           |
| Green and Golden Bell Frog       | E      | no                    | yes                                            | Nov-March                    | N/A              | No                           |
| Powerful Owl (breeding)          | V      | no                    | yes                                            | May-August                   | Oct              | No                           |
| Barking Owl (breeding)           | V      | no                    | yes                                            | May-Dec                      | Oct              | No                           |
| Masked Owl (breeding)            | V      | no                    | yes                                            | May-Aug                      | Oct              | No                           |
| Gang-gang Cockatoo (breeding)    | V      | no                    | yes                                            | Oct-Jan                      | Oct and Feb      | No                           |
| Squirrel Glider                  | V      | no                    | yes                                            | All year                     | Oct              | No                           |
| Red-crowned Toadlet              | V      | no                    | yes                                            | All year                     | N/A              | No                           |
| Large-eared Pied Bat             | V      | yes                   | yes                                            | Nov-Jan                      | Oct and Feb      | No                           |
| Little Bentwing-bat (breeding)   | V      | yes                   | yes                                            | Dec-Feb                      | Oct and Feb      | No                           |
| Large Bent-winged Bat (breeding) | V      | yes                   | yes                                            | Dec-Feb                      | Oct and Feb      | No                           |
| Little Eagle (breeding)          | V      | no                    | yes                                            | Aug-Oct                      | Oct and Feb      | Yes                          |
| Koala (breeding) – species       | E1     | no                    | yes                                            | All year                     | Oct and Feb      | yes                          |

## 3. SURVEY RESULTS

### 3.1 Flora results

#### 3.1.1 Native vegetation extent

The native vegetation to be impacted measures 1.32 ha. This is a combination of impacts from building footprints, internal driveways, and APZs.

#### 3.1.2 Flora species

The plants observed within the vegetation communities of the study area are listed in the Table 3.1 below.

Table 3.1 – Flora observations within the study area

| Family         | Scientific name                       | Plot 1                 | Plot 2 | Plot 3 | Plot 4 |
|----------------|---------------------------------------|------------------------|--------|--------|--------|
| <b>Trees</b>   |                                       | <b>% foliage cover</b> |        |        |        |
| Myrtaceae      | <i>Angophora costata</i>              |                        |        | 30     |        |
| Sterculiaceae  | <i>Brachychiton acerifolius</i>       |                        | 1      | 0.1    |        |
| Cunoniaceae    | <i>Ceratopetalum apetalum</i>         |                        | 0.5    |        |        |
| Myrtaceae      | <i>Eucalyptus pilularis</i>           | 2                      | 3      |        |        |
| Myrtaceae      | <i>Eucalyptus resinifera</i>          | 21                     |        |        |        |
| Myrtaceae      | <i>Eucalyptus saligna</i>             | 3                      |        |        |        |
| Moraceae       | <i>Ficus rubiginosa</i>               |                        | 5      | 8      | 50     |
| Phyllanthaceae | <i>Glochidion ferdinandi</i>          | 0.5                    | 0.5    | 5      | 3      |
| Proteaceae     | <i>Grevillea robusta</i>              |                        |        | 4      |        |
| Myrtaceae      | <i>Lophostemon confertus</i>          |                        |        |        | 8      |
| Oleaceae       | <i>Notelaea longifolia</i>            |                        | 0.5    |        |        |
| <b>Shrubs</b>  |                                       |                        |        |        |        |
| Rutaceae       | <i>Acronychia oblongifolia</i>        | 5                      |        |        |        |
| Proteaceae     | <i>Banksia spinulosa</i>              |                        |        |        | 1      |
| Elaeocarpaceae | <i>Elaeocarpus reticulatus</i>        |                        | 0.5    |        |        |
| Malvaceae      | <i>Hibiscus heterophyllus</i>         |                        | 0.5    |        |        |
| Pittosporaceae | <i>Pittosporum undulatum</i>          | 2                      | 1      | 20     | 4      |
| Podocarpaceae  | <i>Podocarpus spinulosus</i>          |                        | 0.5    |        |        |
| <b>Palms</b>   |                                       |                        |        |        |        |
| Arecaceae      | <i>Archontophoenix cunninghamiana</i> |                        |        | 0.1    |        |
| Doryanthaceae  | <i>Doryanthes excelsa</i>             |                        |        | 3      | 4      |
| Arecaceae      | <i>Livistona australis</i>            |                        | 0.5    |        |        |
| <b>Vines</b>   |                                       |                        |        |        |        |
| Lauraceae      | <i>Cassytha pubescens</i>             |                        |        | 2      |        |
| Luzuriagaceae  | <i>Eustrephus latifolius</i>          |                        | 0.5    |        |        |
| Dilleniaceae   | <i>Hibbertia dentata</i>              |                        |        | 0.1    |        |
| Rubiaceae      | <i>Morinda jasminoides</i>            |                        | 0.5    |        |        |
| Smilacaceae    | <i>Smilax glycyphylla</i>             |                        | 0.5    |        |        |

| Family                        | Scientific name                 | Plot 1 | Plot 2 | Plot 3 | Plot 4 |
|-------------------------------|---------------------------------|--------|--------|--------|--------|
| <b>Grass &amp; grass-like</b> |                                 |        |        |        |        |
| Poaceae                       | <i>Cynodon dactylon</i>         |        |        | 4      |        |
| Cyperaceae                    | <i>Cyperus gracilis</i>         |        |        |        | 40     |
| Poaceae                       | <i>Entolasia stricta</i>        |        |        | 2      |        |
| Cyperaceae                    | <i>Lepidosperma laterale</i>    |        |        | 0.1    |        |
| Lomandraceae                  | <i>Lomandra longifolia</i>      |        | 0.5    | 3      | 1      |
| Poaceae                       | <i>Microlaena stipoides</i>     |        |        | 2      | 5      |
| Poaceae                       | <i>Oplismenus aemulus</i>       | 0.5    | 0.5    | 3      | 15     |
| Poaceae                       | <i>Poa affinis</i>              |        |        | 0.1    |        |
| <b>Forbs</b>                  |                                 |        |        |        |        |
| Commelinaceae                 | <i>Commelina cyanea</i>         | 0.5    |        | 1      |        |
| Phormiaceae                   | <i>Dianella caerulea</i>        |        |        | 1      |        |
| Convolvulaceae                | <i>Dichondra repens</i>         | 0.5    |        |        | 1      |
| Oxalidaceae                   | <i>Oxalis perennans</i>         |        |        |        | 0.1    |
| Solanaceae                    | <i>Solanum americanum</i>       |        |        |        | 0.5    |
| <b>Ferns</b>                  |                                 |        |        |        |        |
| Adiantaceae                   | <i>Adiantum aethiopicum</i>     |        |        | 4      |        |
| Adiantaceae                   | <i>Adiantum hispidulum</i>      |        | 0.5    |        |        |
| Aspleniaceae                  | <i>Asplenium aethiopicum</i>    |        | 0.5    | 0.1    |        |
| Dicksoniaceae                 | <i>Calochlaena dubia</i>        |        |        | 8      |        |
| Cyatheaceae                   | <i>Cyathea leichhardtiana</i>   |        | 0.5    |        |        |
| Davalliaceae                  | <i>Nephrolepis cordifolia</i>   |        | 0.5    |        |        |
| Dennstaedtiaceae              | <i>Pteridium esculentum</i>     |        |        | 0.1    |        |
| <b>High-threat exotics</b>    |                                 |        |        |        |        |
| Basellaceae                   | <i>Anredera cordifolia</i>      | 0.5    | 0.5    |        |        |
| Apocynaceae                   | <i>Araujia sericifera</i>       |        |        | 2      |        |
| Asparagaceae                  | <i>Asparagus aethiopicus</i>    | 0.5    | 1      | 1      | 0.1    |
| Poaceae                       | <i>Axonopus fissifolius</i>     |        |        |        | 3      |
| Asteraceae                    | <i>Bidens pilosa</i>            |        | 0.5    | 0.1    | 0.1    |
| Asparagaceae                  | <i>Chlorophytum comosum</i>     |        |        | 4      |        |
| Lauraceae                     | <i>Cinnamomum camphora</i>      | 2      | 0.5    | 8      |        |
| Rosaceae                      | <i>Cotoneaster</i> spp.         | 0.5    |        |        |        |
| Poaceae                       | <i>Ehrharta erecta</i>          | 0.5    |        | 3      | 2      |
| Fabaceae                      | <i>Erythrina crista-galli</i>   | 3      |        |        |        |
| Araliaceae                    | <i>Hedera helix</i>             | 0.5    |        |        | 0.1    |
| Convolvulaceae                | <i>Ipomoea cairica</i>          | 0.5    | 0.5    | 0.1    |        |
| Verbenaceae                   | <i>Lantana camara</i>           |        |        | 0.1    |        |
| Oleaceae                      | <i>Ligustrum lucidum</i>        | 2      | 2      | 1      | 3      |
| Oleaceae                      | <i>Ligustrum sinense</i>        | 0.5    | 0.5    |        |        |
| Ochnaceae                     | <i>Ochna serrulata</i>          | 0.5    | 2      | 2      | 1      |
| Oleaceae                      | <i>Olea europaea</i>            | 0.5    |        | 1      |        |
| Arecaceae                     | <i>Phoenix canariensis</i>      |        |        | 2      |        |
| Commelinaceae                 | <i>Tradescantia fluminensis</i> |        | 1      | 5      |        |

### 3.1.3 Plant community types (PCTs)

#### Evidence used to identify a PCT: Zones 1 & 2

Recorded native species within plots 1–3 were entered into the BioNet Vegetation Classification Tool, along with Interim Biogeographic Regionalisation for Australia (IBRA) sub-region (Pittwater). This produced a shortlist of PCTs for each plot, the top 5 of which are reproduced in Table 3.2. For each of these plots, the top ranked PCT is PCT 1841. This PCT is a close match for the remnant vegetation on site, with canopy diagnostic such as *Angophora costata*, *Eucalyptus pilularis* and *Eucalyptus saligna* present. The landscape position and underlying geology is also correct: sandstone gullies and sheltered slopes enriched by clay material. PCT 1841 is the best-fit PCT and has been assigned to Zone 1.

Zone 2 appears to be mostly comprised of planted native vegetation, although there are several plants representative of the indigenous vegetation. Plot 4 within Zone 2 was located within mostly planted vegetation, so was not used to determine PCT. It is reasonable to assume that the original vegetation within Zone 2 would have been similar to that within Zone 1. As such, we have also assigned this zone to PCT 1841.

It is noted that the PCTs mapped by OEH, *Keystone Ecological* and *Eco Logical Australia*, 1776 and 1778, have not been selected for Zones 1 and 2. PCT 1776 (Coastal Enriched Sandstone Dry Forest) does not rank highly among the shortlisted PCTs, ranking equal 22<sup>nd</sup> (Plot 1), equal 11<sup>th</sup> (Plot 2) and equal 9<sup>th</sup> (Plot 3). It is classed as a Sydney Coastal Dry Sclerophyll Forest, whereas the vegetation observed is aligned to a Wet Sclerophyll vegetation class. PCT 1778 (Coastal Sandstone Foreshores Forest) is a better match, ranking 2<sup>nd</sup> in each shortlist for Plots 2 and 3, and equal 6<sup>th</sup> for plot 1. It too is classed as Sydney Coastal Dry Sclerophyll Forest, although it is described as containing many mesic species. Although a potential match, it is considered that PCT 1841 is the correct PCT for Zones 1 and 2 as it consistently ranks highest based on floristic analysis of all plot data through the BVCT. As noted in Section 4.1, our determination of PCT 1841 is based on detailed assessment of plot data using the BioNet Vegetation Classification tool, which is the industry-accepted method and required under the BAM. The determination by *Keystone* and *Eco Logical* does not provide detailed justification, nor a shortlist of potential PCTs for each vegetation zone, and appears to generally follow the mapping by OEH (2016).

Table 3.2 – PCT shortlist

| Zone  | PCT ranking | PCT no. | PCT name                                | No. diag. spp. |
|-------|-------------|---------|-----------------------------------------|----------------|
| 1 & 2 | Plot 1      |         |                                         |                |
|       | 1           | 1841    | Coastal enriched sandstone moist forest | 5              |
|       | 2           | 1237    | Blue Gum high forest                    | 4              |
|       | =3          | 1281    | Sydney Turpentine - Ironbark forest     | 4              |
|       | =3          | 1795    | Coastal flats Swamp Mahogany forest     | 4              |
|       | =3          | 1915    | Coastal flats tall moist forest         | 4              |
|       | Plot 2      |         |                                         |                |
|       | 1           | 1841    | Coastal enriched sandstone moist forest | 8              |

| Zone | PCT ranking   | PCT no. | PCT name                                                                                                                | No. diag. spp. |
|------|---------------|---------|-------------------------------------------------------------------------------------------------------------------------|----------------|
|      | 2             | 1778    | Coastal sandstone foreshores forest                                                                                     | 7              |
|      | =3            | 1237    | Blue Gum high forest                                                                                                    | 6              |
|      | =3            | 1621    | Smooth-barked Apple open forest on coastal lowlands of the Central Coast                                                | 6              |
|      | =3            | 1625    | Red Bloodwood - Sydney Peppermint - Podocarpus spinulosus shrubby open forest of the southern Central Coast             | 6              |
|      | =3            | 1780    | Coastal sandstone riparian forest                                                                                       | 6              |
|      | =3            | 1793    | Coastal Sand Bangalay Forest                                                                                            | 6              |
|      | =3            | 1795    | Coastal flats Swamp Mahogany forest                                                                                     | 6              |
|      | =3            | 1833    | Coastal escarpment littoral rainforest                                                                                  | 6              |
|      | =3            | 1915    | Coastal flats tall moist forest                                                                                         | 6              |
|      | <b>Plot 3</b> |         |                                                                                                                         |                |
|      | 1             | 1841    | Coastal enriched sandstone moist forest                                                                                 | 12             |
|      | =2            | 1183    | Smooth-barked Apple - Sydney Peppermint - Turpentine heathy open forest on plateaux areas of the Sydney Basin Bioregion | 11             |
|      | =2            | 1778    | Coastal sandstone foreshores forest                                                                                     | 11             |
|      | =4            | 1793    | Coastal Sand Bangalay Forest                                                                                            | 9              |
|      | =4            | 1845    | Coastal shale-sandstone forest                                                                                          | 9              |

#### Rainforest vegetation outside of subject land:

A small area of rainforest vegetation occurs in the far south west of Lot 3. As this vegetation is outside of the subject land and will not be impacted, no vegetation zone has been applied to this vegetation in accordance with the BAM. As no detailed flora survey was undertaken in that portion of the site, this vegetation has been assigned to PCT 1828 following the designation by previous mapping by OEH (2016), Keystone Ecological (2019) and EcoLogical Australia (2019). PCT 1828 is associated with the *Hygrocybeae Community of Lane Cove Bushland Park in the Sydney Basin Bioregion* which is listed as Critically Endangered under the *BC Act*, but is geographically constrained to Lane Cove Bushland Park and Osborne Park, which are close by but outside the subject lots. The proposal will not impact on this TEC.

Table 3.3 – PCTs

| PCT code | PCT name                                | Vegetation formation                             | Vegetation class                    | % Cleared | Area within development site (ha) | TEC status            |
|----------|-----------------------------------------|--------------------------------------------------|-------------------------------------|-----------|-----------------------------------|-----------------------|
| 1841     | Coastal enriched sandstone moist forest | Wet Sclerophyll Forests (Shrubby sub-formation); | North Coast Wet Sclerophyll Forests | 67        | 1.21 on site, 0.93 to be impacted | no associated TEC     |
| 1828     | Coastal sandstone gallery rainforest    | Rainforests;                                     | Littoral Rainforests;               | 6         | 0.03 on site, none to be impacted | Hygrocybeae Community |

### 3.1.4 Vegetation descriptions of observed communities

The following vegetation communities were identified within the subject land through on-ground vegetation survey.

#### Zone 1 – PCT 1841 - Coastal enriched sandstone moist forest – remnant / unmanaged

This is the primary vegetation community on the site, occurring in the south eastern and south western portions of the site. It represents the majority of the remnant vegetation present and is in a moderate condition, with good diversity of native understorey species and a moderate abundance of exotics.



Photo 3.1 – Zone 1: PCT 1841 (remnant / unmanaged) in the location of BAM plot 3

Canopy – *Angophora costata*, *Eucalyptus pilularis*, *Eucalyptus resinifera* and *Eucalyptus saligna* providing 20–30% Projected Foliage Cover (PFC).

Mid-storey – *Pittosporum undulatum*, *Glochidion ferdinandi*, *Brachychiton acerifolius*, *Archontophoenix cunninghamiana*, *Doryanthes excelsa*, *Calochlaena dubia*, *Cassytha pubescens* and *Hibbertia dentata* providing 20–40% PFC. Exotic species are abundant in places, and include *Hedera helix*, *Ipomoea cairica*, *Lantana camara*, *Ligustrum lucidum*, *Ligustrum sinense*, *Ochna serrulata*, *Olea europaea* and *Phoenix canariensis*.

Groundcovers – *Adiantum aethiopicum*, *Asplenium aethiopicum*, *Pteridium esculentum*, *Commelina cyanea*, *Dianella caerulea*, *Cynodon dactylon*, *Oplismenus aemulus*, *Lomandra longifolia*, *Lepidosperma laterale*, *Poa affinis*, *Entolasia stricta* and *Microlaena stipoides* providing 1–20% PFC. Exotic ground covers include species such as *Tradescantia fluminensis*.

## **Zone 2 – PCT 1841 - Coastal enriched sandstone moist forest – planted/managed**

This vegetation is comprised mostly of planted native trees and shrubs. It is likely that some of these are remnant or self-established plants from the indigenous, remnant vegetation, but it is not possible to distinguish which are planted or not with great level of certainty. The understorey is highly managed and contains a lot of mown lawn.



**Photo 3.2 – Zone 2: PCT 1841 (managed / planted) in the north east of the site within Plot 4**

Canopy – species include *Ficus rubiginosa*, *Eucalyptus pilularis*, *E. microcorys*, *E. sideroxylon* and *Stenocarpus sinuatus* providing up to 50% PFC.

Mid-storey – *Syzygium smithii*, *Callistemon* spp., *Melia azedarach*, *Leptospermum* sp., *Banksia* spp. and *Cupaniopsis anacardioides* providing up to 5% PFC.

Groundcovers – *Cyperus gracilis*, *Oplismenus aemulus*, *Lomandra longifolia* and *Microlaena stipoides* providing up to 60% PFC.

## **Exotic vegetation**

Exotic and non-native trees and shrubs are scattered through out the managed portions of the subject land. Species include *Cinnamomum camphora*, *Corymbia citriodora*, *Cupressus* spp., *Phoenix canariensis*, *Pinus radiata*, *Jacaranda mimosifolia*, *Camelia japonica*, *Liquidambar styraciflua* and *Jacaranda mimosifolia*. As this vegetation lacks native species, it does not need to be assigned to a vegetation zone or PCT.



*Figure 3.1 – exotic vegetation in the north of the subject land.*

**PCT 1828 Coastal sandstone gallery rainforest (outside subject land)**

This vegetation occurs outside the subject land in the far south west of the subject lot 3. This vegetation is typically dominated by *Ceratopetalum apetalum*, with a scattered cover of small trees in the sub-canopy layer, usually comprising *Callicoma serratifolia*, *Acmena smithii*, *Tristaniopsis laurina* and tree ferns (*Cyathea* spp.).



*Photo 3.3 – vegetation close to PCT 1828 - Coastal sandstone gallery rainforest in the south west of lot 3*

### 3.1.5 Vegetation integrity assessment

A vegetation integrity assessment is an assessment on the site's condition. Vegetation patches are broken into zones of roughly equal quality and then surveyed by transect plots. The number of required transect plots is dependent upon the size of the zone.

| Vegetation zone area (ha) | Minimum number of plots/transects                                                                          |
|---------------------------|------------------------------------------------------------------------------------------------------------|
| <2                        | 1 plot/transect                                                                                            |
| >2–5                      | 2 plots/transects                                                                                          |
| >5–20                     | 3 plots /transects                                                                                         |
| >20–50                    | 4 plots/transects                                                                                          |
| >50–100                   | 5 plots/transects                                                                                          |
| >100–250                  | 6 plots/transects                                                                                          |
| >250–1000                 | 7 plots/transects; more plots may be needed if the condition of the vegetation is variable across the zone |
| >1000                     | 8 plots/transects; more plots may be needed if the condition of the vegetation is variable across the zone |

Once data from the transect plot has been collected, the composition of native plant species per growth form is assessed, along with numbers of stems, percentages of exotic or high threat exotic species present, number and sizes of Eucalypt and non-Eucalypt tree stems, litter cover, rock cover, cryptogram cover, hollows and fallen logs. Therefore the vegetation integrity assessment is a measure of composition, structure and function.

The breakdown of PCTs and zones is shown on Figure 3.2. Impacted areas (the development footprint) are shown cross-hatched. Figure 3.2 shows the location of the plots in relation to the impacted areas.

The vegetation integrity score is obtained using equations and weightings based upon a number of entities to calculate scores for composition, structure and function, for an overall current vegetation integrity score.

*Table 3.4 – Current vegetation integrity score*

| Vegetation zone name | Area (ha) | Composition condition score | Structure condition score | Function condition score | Current vegetation integrity score |
|----------------------|-----------|-----------------------------|---------------------------|--------------------------|------------------------------------|
| 1841_remnant         | 0.64      | 17.4                        | 23.4                      | 74.3                     | 31.2                               |
| 1841_managed         | 0.29      | 19.6                        | 48                        | 52.8                     | 36.7                               |

The future vegetation integrity score is measured assuming there will be no vegetation retained within, and to 2 m from, the building footprint and driveway. These areas will have a future vegetation integrity score of zero.

In the areas within the APZ it is assumed that there will be limited vegetation retained in compliance with Inner Protection Area (IPA) APZ standards. The *Standards for Asset Protection Zones* (RFS, 2005) provides the following vegetation maintenance guidelines for IPAs:

Fuel loads within the IPA are to be maintained so they do not exceed 4t/ha.

Trees are to be maintained to ensure;

- Canopy cover does not exceed 15%
- Trees (at maturity) do not touch or overhang the building
- Tree canopies (at maturity) should be well spread out and not form a continuous canopy
- Lower limbs should be removed up to a height of 2 m above ground
- Preference should be given to smooth barked and evergreen trees.

Shrubs are to be maintained to ensure;

- Large discontinuities or gaps in vegetation
- Shrubs should not be located under trees
- Shrubs should not form more than 10% of ground cover
- Clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of vegetation.

Grass is to be maintained to ensure:

- A height of 10 cm or less
- Leaves and debris are removed.

Based on these guidelines, we have assumed the following is estimating future VI scores for the APZ management zones:

- Trees: richness decrease to 3, cover decrease to 15
- Shrubs: richness decrease to 2, cover decrease to 5 (Zone 1)
- Grasses: richness maintained at 2.3 (Zone 1) or 4 (Zone 2), cover maintained to 5.2 (Zone 1) and 61 (Zone 2)
- Forbs: richness maintained at 1.7 (Zone 1) or 3 (Zone 2), cover maintained at 1 (Zone 1) and 1.6 (Zone 2)

- Ferns: richness maintained at 1 (Zone 1) or 0 (Zone 2), cover decrease to 1 (Zone 1) and 0 (Zone 2)
- Other: richness decreased/maintained at 1, cover decrease to 1.
- Large trees: decrease to 1
- Litter cover: decrease to 40%
- Coarse woody debris: decrease to 0 m
- Hollows: decrease to 1 per plot
- Tree stem classes: decrease to 3 (Zone 1) or maintained at 2 (Zone 2)
- High threat weed cover: decrease to 5%

It is important to note that the BAM-C only allows future integrity scores within a certain range which are dependent on benchmark values and plot data. This is the cause of discrepancies in future richness and cover values between the vegetation zones presented above. Given the above estimates, the future vegetation integrity score will be above zero within the APZ as indicated in Table 3.5.

**Table 3.5 – Future Vegetation Integrity scores**

| Vegetation zone name | Management zone | Area (ha) | Compos. condition score | Struct. condition score | Funct. condition score | Future VI score | Change in VI score | Total change in VI score |
|----------------------|-----------------|-----------|-------------------------|-------------------------|------------------------|-----------------|--------------------|--------------------------|
| 1841_remnant         | Total impact    | 0.21      | 0                       | 0                       | 0                      | 0               | -31.2              | -21.3                    |
|                      | APZ             | 0.43      | 11                      | 8.6                     | 32.5                   | 14.8            | -16.4              |                          |
| 1841_managed         | Total impact    | 0.13      | 0                       | 0                       | 0                      | 0               | -36.7              | -27.1                    |
|                      | APZ             | 0.16      | 19.6                    | 9.9                     | 27.2                   | 17.4            | -19.3              |                          |

## 3.2 Fauna results

Fauna species observed throughout the duration of fauna surveys are listed below.

**Table 3.6 – Fauna recorded within the study area**

| Common name              | Scientific name                 | Method observed |
|--------------------------|---------------------------------|-----------------|
| <b>Birds</b>             |                                 | Oct 2021        |
| Australian Magpie        | <i>Cracticus tibicen</i>        | O               |
| Australian Raven         | <i>Corvus coronoides</i>        | OW              |
| Australian White Ibis    | <i>Threskiornis molucca</i>     | O               |
| Brown Gerygone           | <i>Gerygone mouki</i>           | W               |
| Brush Turkey             | <i>Alectura lathamii</i>        | O               |
| Laughing Kookaburra      | <i>Dacelo novaeguineae</i>      | OW              |
| Magpie-lark              | <i>Grallina cyanoleuca</i>      | OW              |
| Masked Lapwing           | <i>Vanellus miles</i>           | OW              |
| Noisy Miner              | <i>Manorina melanocephala</i>   | OW              |
| Pied Currawong           | <i>Strepera graculina</i>       | OW              |
| Rainbow Lorikeet         | <i>Trichoglossus haematodus</i> | OW              |
| Red Wattlebird           | <i>Anthochaera carunculata</i>  | OW              |
| Rock Dove *              | <i>Columba livia</i>            | OW              |
| Sulphur Crested Cockatoo | <i>Cacatua galerita</i>         | OW              |
| Welcome Swallow          | <i>Hirundo neoxena</i>          | OW              |
| <b>Mammals</b>           |                                 |                 |
| Black Rat *              | <i>Rattus rattus</i>            | O               |

| Common name                                                                                                                                                                                                                                                                                                                                                                                                                       | Scientific name                                                             | Method observed                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Brown Rat *                                                                                                                                                                                                                                                                                                                                                                                                                       | <i>Rattus norvegicus</i>                                                    | O                                                                                 |
| Common Brushtail Possum                                                                                                                                                                                                                                                                                                                                                                                                           | <i>Trichosurus vulpecula</i>                                                | O                                                                                 |
| Common Ringtail Possum                                                                                                                                                                                                                                                                                                                                                                                                            | <i>Pseudocheirus peregrinus</i>                                             | O                                                                                 |
| Domesticated Dog *                                                                                                                                                                                                                                                                                                                                                                                                                | <i>Canis lupus familiaris</i>                                               | O                                                                                 |
| Gould's Long-eared Bat                                                                                                                                                                                                                                                                                                                                                                                                            | <i>Nyctophilus gouldii</i>                                                  | U                                                                                 |
| Grey-headed Flying Fox <sup>TS</sup>                                                                                                                                                                                                                                                                                                                                                                                              | <i>Pteropus poliocephalus</i>                                               | O                                                                                 |
| <b>Reptiles</b>                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                             |                                                                                   |
| Delicate Skink                                                                                                                                                                                                                                                                                                                                                                                                                    | <i>Lampropholis delicata</i>                                                | O                                                                                 |
| Eastern Water Skink                                                                                                                                                                                                                                                                                                                                                                                                               | <i>Eulamprus quoyii</i>                                                     | O                                                                                 |
| <b>Amphibians</b>                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                             |                                                                                   |
| Striped March Frog                                                                                                                                                                                                                                                                                                                                                                                                                | <i>Limnodynastes peronii</i>                                                | O                                                                                 |
| <p>Note: * indicates introduced species<br/> TS indicates threatened species<br/> MS indicates Migratory species</p> <p>All species listed are identified to a high level of certainty unless otherwise noted as:</p> <p>PR indicates species identified to a 'probable' level of certainty – more likely than not<br/> PO indicates species identified to a 'possible' level of certainty – low-moderate level of confidence</p> |                                                                             |                                                                                   |
| E - Nest/roost<br>F - Tracks/scratchings<br>FB - Burrow<br>G - Crushed cones                                                                                                                                                                                                                                                                                                                                                      | H - Hair/feathers/skin<br>K - Dead<br>O - Observed<br>OW - Obs & heard call | P - Scat<br>Q - Camera<br>T - Trapped/netted<br>U - Anabat/ultrasound             |
|                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                             | W - Heard call<br>X - In scat<br>Y - Bone/teeth/shell<br>Z - In raptor/owl pellet |

## 3.3 Habitat results

### 3.3.1 Fauna habitat observations

The fauna habitats present within the site are identified within the following table.

Table 3.7 – Observed fauna habitat

| Topography            |                             |                 |           |                         |              |                              |                        |           |   |              |
|-----------------------|-----------------------------|-----------------|-----------|-------------------------|--------------|------------------------------|------------------------|-----------|---|--------------|
| Flat                  | ✓                           | Gentle          | ✓         | Moderate                | ✓            | Steep                        | ✓                      | Drop-offs | ✓ |              |
| Vegetation structure  |                             |                 |           |                         |              |                              |                        |           |   |              |
| Closed Forest         |                             | Open Forest     | ✓         | Woodland                | ✓            | Heath                        |                        | Grassland | ✓ |              |
| Disturbance history   |                             |                 |           |                         |              |                              |                        |           |   |              |
| Fire                  |                             | Under-scrubbing |           |                         | ✓            | Cut and fill works           |                        |           |   |              |
| Tree clearing         |                             | ✓               | Grazing   |                         |              |                              |                        |           |   |              |
| Soil landscape        |                             |                 |           |                         |              |                              |                        |           |   |              |
| DEPTH:                | Deep                        | ✓               | Moderate  | ✓                       | Shallow      |                              | Skeletal               |           |   |              |
| TYPE:                 | Clay                        | ✓               | Loam      |                         | Sand         | ✓                            | Organic                | ✓         |   |              |
| VALUE:                | Surface foraging            |                 | ✓         | Sub-surface foraging    |              | ✓                            | Denning/burrowing      |           |   |              |
| WATER RETENTION:      | Well Drained                |                 | ✓         | Damp / Moist            |              | ✓                            | Water logged           |           | ✓ | Swamp / Soak |
| Rock habitat          |                             |                 |           |                         |              |                              |                        |           |   |              |
| CAVES:                | Large                       |                 | Small     | ✓                       | Deep         |                              | Shallow                | ✓         |   |              |
| CREVICES:             | Large                       |                 | Small     | ✓                       | Deep         | ✓                            | Shallow                |           |   |              |
| ESCARPMENTS:          | Winter / late sunny aspects |                 |           |                         | ✓            | Shaded winter / late aspects |                        |           |   | ✓            |
| OUTCROPS:             | High Surface Area Hides     |                 |           | Med. Surface Area Hides |              | Low Surface Area Hides       |                        | ✓         |   |              |
| SCATTERED / ISOLATED: | High Surface Area Hides     |                 |           | Med. Surface Area Hides |              | ✓                            | Low Surface Area Hides |           |   | ✓            |
| Feed resources        |                             |                 |           |                         |              |                              |                        |           |   |              |
| FLOWERING TREES:      | Eucalypts                   |                 |           | ✓                       | Corymbias    |                              | Melaleucas             |           |   | ✓            |
|                       | Banksias                    |                 |           | Acacias                 |              | ✓                            |                        |           |   |              |
| SEEDING TREES:        | Allocasuarinas              |                 |           | Conifers                |              |                              |                        |           |   |              |
| WINTER FLOWERING      | C. maculata                 |                 | E. crebra |                         | E. globoidea |                              | E. sideroxylon         |           |   |              |

| Topography           |                    |  |                    |  |                |  |
|----------------------|--------------------|--|--------------------|--|----------------|--|
| EUCALYPTS:           | A. costata ✓       |  | E. grandis         |  | E. multicaulis |  |
|                      | E. robusta         |  | E. tereticornis ✓  |  | E. agglomerata |  |
| FLOWERING PERIODS:   | Autumn             |  | Winter ✓           |  | Spring ✓       |  |
| OTHER:               | Mistletoe          |  | Figs / Fruit ✓     |  | Sap / Manna    |  |
| Foliage protection   |                    |  |                    |  |                |  |
| UPPER STRATA:        | Dense              |  | Moderate ✓         |  | Sparse ✓       |  |
| MID STRATA:          | Dense              |  | Moderate           |  | Sparse ✓       |  |
| PLANT / SHRUB LAYER: | Dense              |  | Moderate ✓         |  | Sparse ✓       |  |
| GROUNDCOVERS:        | Dense              |  | Moderate ✓         |  | Sparse         |  |
| Hollows / logs       |                    |  |                    |  |                |  |
| TREE HOLLOWES:       | Large ✓            |  | Medium ✓           |  | Small ✓        |  |
| TREE HOLLOW TYPES    | Spouts / branch ✓  |  | Trunk ✓            |  | Broken Trunk   |  |
| GROUND HOLLOWES:     | Large              |  | Medium ✓           |  | Small          |  |
| Vegetation debris    |                    |  |                    |  |                |  |
| FALLEN TREES:        | Large              |  | Medium ✓           |  | Small ✓        |  |
| FALLEN BRANCHES:     | Large              |  | Medium ✓           |  | Small ✓        |  |
| LITTER:              | Deep               |  | Moderate ✓         |  | Shallow ✓      |  |
| HUMUS:               | Deep               |  | Moderate           |  | Shallow ✓      |  |
| Drainage catchment   |                    |  |                    |  |                |  |
| WATER BODIES         | Wetland(s)         |  | Soak(s)            |  | Dam(s)         |  |
| RATE OF FLOW:        | Still              |  | Slow ✓             |  | Rapid          |  |
| CONSISTENCY:         | Permanent ✓        |  | Perennial          |  | Ephemeral ✓    |  |
| RUNOFF SOURCE:       | Urban / Industrial |  | Parkland ✓         |  | Grazing        |  |
| RIPARIAN HABITAT:    | High quality ✓     |  | Moderate quality ✓ |  | Low quality    |  |
| Artificial habitat   |                    |  |                    |  |                |  |
| STRUCTURES:          | Sheds              |  | Infrastructure ✓   |  | Equipment      |  |
| SUB-SURFACE          | Pipe / culvert(s)  |  | Tunnel(s)          |  | Shaft(s)       |  |
| FOREIGN MATERIALS:   | Sheet              |  | Pile / refuse      |  |                |  |

### 3.3.2 Habitat tree data

Significant habitat trees observed within the development footprint / study area are tabled below. Significant habitat trees are defined as trees containing large hollows suitable for use by owls and/or containing a number of good quality hollows typically consisting of more than one medium (10–30 cm) sized hollows. A tree may also be considered significant where evidence of use by select fauna is found such as glider sap feed tree, raptor nest, or owl roost.

We note that SHT2 is the only significant habitat tree within the subject land. The other three are outside of the subject land (Figure 3.2), but buffers from these tree contribute to species polygons used to assess credit requirements for assumed candidate species (see Section 4.3.2).

**Table 3.8 – Habitat tree data**

| Tree no. | Scientific name             | Common name | DBH (cm) | Height (m) | Spread (m) | Hollows & other habitat features recorded                                                                                                   |
|----------|-----------------------------|-------------|----------|------------|------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| SHT1     | -                           | Stag        | 70       | 5          | 2.5        | 1x 20cm trunk hollow (2 m from ground)                                                                                                      |
| SHT2     | <i>Eucalyptus pilularis</i> | Black butt  | 60       | 8          | 6          | 2x 10-15cm spout hollow<br>2x 15-20cm branch spout<br>1x 20-30cm trunk hollow<br>1x 30-40cm trunk hollow<br>(all are 3-4m above the ground) |
| SHT3     | <i>Eucalyptus pilularis</i> | Black butt  | 100      | 12         | 8          | 1x 10cm branch spout<br>1x 10cm branch spout<br>(3-4m above ground)                                                                         |
| SHT4     | <i>Eucalyptus pilularis</i> | Black butt  | 100      | 20         | 10         | 1x 25 cm trunk spout<br>(approx. 12 m from ground)                                                                                          |



Figure 3.2 – Flora and fauna survey effort and results



**Figure 3.3 – Vegetation impacts**

## 4. BIODIVERSITY ASSESSMENT

### 4.1 Previous surveys and reports reviewed

The following reports were examined and reviewed as part of this assessment to identify the potential vegetation communities and other threatened biodiversity with potential to occur for assessment.

#### ***Biodiversity Development Assessment Report for the proposed Greenwich Hospital Redevelopment, Keystone Ecological (January 2019)***

Keystone Ecological conducted a Biodiversity Development Assessment Report for the proposed Greenwich Hospital Redevelopment in 2019. Flora surveys were undertaken by random meander and full floristic transects and quadrats in accordance with the Biodiversity Assessment Method 2017 (BAM 2017). Fauna survey employed call identification, habitat assessment, diurnal and nocturnal searches and searches for signs of animal activity. The fauna survey did not however conduct target searches for terrestrial mammals due to the perceived lack of suitable habitat and survey equipment vulnerability.

The flora survey was undertaken between July and December 2017.

Fauna survey was undertaken between November and December 2017.

#### PCTs identified:

- DSF04 = PCT 1776 Smooth-barked Apple – Red Bloodwood Open Forest on enriched sandstone slopes around Sydney and the Central Coast;
- DSF06 = PCT 1778 Smooth-barked Apple – Coast Banksia / Cheese Tree Open Forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney; and
- RF02 = PCT 1828 Coachwood – Lilly Pilly – Water Gum Gallery Rainforest in sandstone gullies of the Sydney Basin

#### Recorded threatened fauna species:

- *Pteropus poliocephalus* Grey-headed Flying-fox
- *Saccolaimus flaviventris* Yellow-bellied Sheath-tail-bat
- *Chalinolobus dwyeri* Large-eared Pied Bat (probable)

#### Recorded threatened flora species:

None recorded.

#### ***Greenwich Hospital Redevelopment Biodiversity Development Assessment Report, Eco Logical Australia (September 2019)***

Eco Logical Australia conducted a Biodiversity Development Assessment Report for the proposed Greenwich Hospital Redevelopment in 2019. Target surveys were not undertaken during this assessment however, habitat assessment, vegetation mapping and assessment was undertaken following the methods described in the Biodiversity Assessment Method 2017.

#### PCTs identified

- PCT 1776 Smooth-barked Apple - Red Bloodwood open forest on enriched sandstone slopes around Sydney and the Central Coast **moderate condition**

- Vegetation Zone 2: PCT 1776 *Smooth-barked Apple - Red Bloodwood open forest on enriched sandstone slopes around Sydney and the Central Coast* **managed understorey**
- Vegetation Zone 3: PCT 1778 *Smooth-barked Apple - Coast Banksia / Cheese Tree open forest on sandstone slopes on the foreshores of the drowned river valleys of Sydney*
- Vegetation Zone 4: PCT 1828

No threatened flora or fauna species were recorded.

#### **Comparison with current BDAR and assessment**

It is noted differences between the current BDAR and the previous reports by *Keystone Ecological* and *Eco Logical Australia* are due to differences in the approach of identifying vegetation, assessing threatened species, and application of the BAM 2017 vs BAM 2020. The current BDAR has been prepared in accordance with the BAM 2020, utilising the BioNet Vegetation Classification Tool, and with consideration of the threatened species survey guidelines.

## **4.2 Flora**

No threatened flora species were observed.

Species recorded within BAM plots are listed in Table 3.1.

### **4.2.1 State legislative flora matters**

#### **(a) Threatened flora species (NSW)**

BC Act – no threatened flora species were recorded within the subject land.

#### **(b) Endangered flora populations (NSW)**

No endangered populations occur within the Lane Cove LGA.

#### **(c) Threatened ecological communities (NSW)**

No threatened ecological communities (TECs) were observed within the subject land.

#### **(d) Ecosystem credit species**

The BAM calculator did not predict any threatened flora species as ecosystem credit species.

#### **(e) Species credit species**

Based upon the BAM calculator and field surveys to date, the following predicted threatened species were considered as confirmed candidate species:

Table 4.1 – Species credit species (flora)

| Scientific name                                        | BC Act | Potential SAIL entity | Associated PCTs | Potential to occur (presence status)                 | Confirmed candidate species | Survey Adequacy              |                      |                            | Presence                      |
|--------------------------------------------------------|--------|-----------------------|-----------------|------------------------------------------------------|-----------------------------|------------------------------|----------------------|----------------------------|-------------------------------|
|                                                        |        |                       |                 |                                                      |                             | Defined survey period (TBDC) | Actual Survey period | Survey Compliant (Yes/ No) |                               |
| <i>Acacia prominens</i> - endangered population        | E2     | no                    | 1841            | no - outside defined LGAs                            | no                          | n/a                          | n/a                  | n/a                        | Absent (outside defined LGAs) |
| <i>Camarophyllopsis kearneyi</i>                       | E1     | no                    | 1841            | no - geographically restricted; microhabitats absent | no                          | n/a                          | n/a                  | n/a                        | Absent (microhabitats absent) |
| <i>Deyeuxia appressa</i>                               | E1     | no                    | 1841            | unlikely                                             | yes                         | Dec                          | Oct, Feb             | no                         | Present (Assumed)             |
| <i>Epacris purpurascens</i> var. <i>purpurascens</i>   | V      | no                    | 1841            | low                                                  | yes                         | Sept–Oct                     | Oct, Feb             | yes                        | Absent (Survey)               |
| <i>Grammitis stenophylla</i>                           | E1     | no                    | 1841            | unlikely                                             | yes                         | All months                   | Oct, Feb             | yes                        | Absent (survey)               |
| <i>Grevillea shiressii</i>                             | V      | no                    | 1841            | no                                                   | no                          | n/a                          | n/a                  | n/a                        | Absent (outside defined LGA)  |
| <i>Hygrocybe anomala</i> var. <i>ianthinomarginata</i> | V      | no                    | 1841            | no - microhabitats absent                            | no                          | n/a                          | n/a                  | n/a                        | Absent (microhabitats absent) |
| <i>Leptospermum deanei</i>                             | V      | no                    | 1841            | low                                                  | yes                         | Oct–Nov                      | Oct, Feb             | yes                        | Absent (survey)               |
| <i>Melaleuca biconvexa</i>                             | V      | no                    | 1841            | no - microhabitats absent                            | no                          | n/a                          | n/a                  | n/a                        | Absent (microhabitats absent) |
| <i>Persoonia mollis</i> subsp. <i>maxima</i>           | V      | no                    | 1841            | unlikely                                             | yes                         | All months                   | Oct, Feb             | yes                        | Absent (survey)               |
| <i>Rhodamnia rubescens</i>                             | CE     | no                    | 1841            | unlikely                                             | yes                         | All months                   | Oct, Feb             | yes                        | Absent (survey)               |
| <i>Rhodomyrtus psidioides</i>                          | CE     | no                    | 1841            | unlikely                                             | yes                         | All months                   | Oct, Feb             | yes                        | Absent (survey)               |

| Scientific name                                         | BC Act | Potential SAll entity | Associated PCTs | Potential to occur (presence status) | Confirmed candidate species | Survey Adequacy              |                      |                             | Presence                      |
|---------------------------------------------------------|--------|-----------------------|-----------------|--------------------------------------|-----------------------------|------------------------------|----------------------|-----------------------------|-------------------------------|
|                                                         |        |                       |                 |                                      |                             | Defined survey period (TBDC) | Actual Survey period | Survey Compliant (Yes/ No)  |                               |
| <i>Syzygium paniculatum</i>                             | E      | no                    | 1841            | low                                  | yes                         | April–June                   | Oct, Feb             | no - but see comments below | Absent (survey)               |
| <i>Wahlenbergia multicaulis</i> - endangered population | E2     | no                    | 1841            | no - outside defined LGAs            | no                          | n/a                          | n/a                  | n/a                         | Absent (outside defined LGAs) |

## Exclusions based on distribution, geographic limitations and habitat features

Exclusion of species from consideration as candidate species follows Section 5.1 of the BAM. Candidate species can be excluded from further consideration if:

- The distribution of the species does not include the IBRA subregion within which the subject land is located
- the subject land is outside any geographic limitations of the species distribution based on information from the threatened biodiversity profile search webpage. If no geographic limitations are listed for the species, then this step is not applicable
- none of the habitat constraints for the species as provided in the TBDC are present in a vegetation zone or subject land.
- the species is a vagrant in the IBRA subregion.

After carrying out a field assessment, a candidate species can also be excluded if:

- the microhabitats required by a species are absent from the subject land (or specific vegetation zone).
- the habitat constraints or microhabitats are degraded to the point that the species is unlikely to use the subject land (or specific vegetation zones).

If a candidate species cannot be excluded based on the above criteria, targeted survey must be undertaken, the species assumed present or an expert report obtained that states that the species is unlikely to be present on the subject land or specific vegetation zones.

### Excluded species are mentioned below:

#### *Acacia prominens* - endangered population

This endangered population is restricted to the LGAs of Hurstville and Kogarah (inclusive of Georges River LGA). The subject land is within the Lane Cove LGA and therefore is outside the distribution of this population.

#### *Camarophyllopsis kearneyi*

The TBDC and species final determination states that *Camarophyllopsis kearneyi* is known only from its type locality in Lane Cove Bushland Park. While the subject land is close to this park, it is outside of the park. Young (1999) states that this species grows along the banks of Gore Creek within gallery warm-temperate rainforest. The subject land contains neither creeks nor rainforest. This species can therefore be excluded as a candidate species due to being geographically restricted and a lack of features providing microhabitats for this species.

#### *Melaleuca biconvexa*

The TBDC and species profile webpage states that this species grows in damp places, often near streams or low-lying areas on alluvial soils of low slopes or sheltered aspects. The subject land is above an escarpment and does not contain damp or low-lying places providing suitable microhabitats for this species.

#### *Hygrocybe anomala* var. *ianthinomarginata*

The TBDC states that this species occurs in gallery warm temperate forests dominated by Lilly Pilly (*Acmena smithii*), Grey Myrtle (*Backhousia myrtifolia*), Cheese Tree (*Glochidion ferdinandi*) and Sweet Pittosporum (*Pittosporum undulatum*). Similar forest occurs in the far south west of the site outside of the subject land and will not be impacted. Vegetation within

Zones 1 and 2 does not match this specific vegetation and as such this species can be excluded as the subject land does not provide suitable microhabitats for this species..

#### *Wahlenbergia multicaulis* - endangered population

This endangered population is restricted to the LGAs of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield. The subject land is within the Lane Cove LGA and therefore is outside the distribution of this population.

#### *Syzygium paniculatum*

The TBDC-defined survey period for this species is April–June. Targeted survey was undertaken in October and February, which is outside this period. Cultivated *Syzygium* plants were recorded within the subject land, but these could all be determined as *S. australe*, or cultivars thereof, due to the leafy twigs possessing 4-wings, with the wings joining above each node to produce a small pocket (as per Harden 1993 and PlantNet: <https://plantnet.rbgsyd.nsw.gov.au/cgi-bin/NSWfl.pl?page=nswfl&lvl=gn&name=Syzygium>). It is therefore considered that sufficient survey has been conducted to demonstrate the absence of *S. paniculatum* within the subject land.

### **Species assumed present due to survey constraints**

#### *Deyeuxia appressa*

This species is very rare grass and has only been recorded in two localities: first in 1930 at Herne Bay, Saltpan Creek, off the Georges River, south of Bankstown, then in 1941 from Killara, near Hornsby. There is very low probability that this species would be present on the subject land, but as virtually nothing is known about the ecology and habitat constraints required for this species, we cannot exclude as a candidate species. As survey has not been undertaken in December, in accordance with the BAM, we must assume presence. This species is assessed by count of individuals, rather than area, although the data deficient status of this species makes an estimate of count difficult. As there are only four specimens ever recorded and the subject site is moderately to highly disturbed we consider that, if present, there would only be a few individuals within the site. Subsequently, we have assumed a conservative five individuals in Zone 1. As Zone 2 is largely derived and highly modified, it is very unlikely to support indigenous, threatened flora and as such we have not assumed any *D. appressa* within Zone 2.

*Deyeuxia appressa* is a potential SAIL species – Appendix 1 provides assessment of SAIL entities, but targeted survey in December is required to allow for accurate determination of SAIL on this species.

## **4.3 Fauna**

All fauna species recorded during surveys, key fauna habitat observations, and habitat tree data are provided in Section 3.

### **4.3.1 Key fauna habitat**

Most notable habitat features for threatened fauna species considered with most potential to occur (see Sections 4.4.4 & 4.4.5) include:

- Large hollows (30+cm)
- Medium hollows (10-30cm)
- Small hollows (<10cm)
- Rock on rock habitat

- Shallow caves and overhangs
- Diverse seasonal flowering opportunities for nectivorous species.
- Winter flowering trees

A complete assessment of the location of habitat trees and the size of hollows was not conducted as part of surveys undertaken. Only the approximate size range and quality of hollows were noted during site visits.

### 4.3.2 State legislative fauna matters

#### (a) Threatened fauna species (NSW)

One (1) state listed threatened fauna species – Grey-headed Flying-fox (*Pteropus poliocephalus*) – was recorded within the development footprint during surveys.

#### (b) Endangered fauna populations (NSW)

There are no endangered fauna populations within the Lane Cove LGA.

#### (c) State Environmental Planning Policy (Biodiversity and Conservation) 2021 – Koala Habitat Protection

Chapter 4 of State Environmental Planning Policy (Biodiversity and Conservation) 2021 (Koala Habitat Protection) applies to land within LGAs listed under Schedule 2 of the Policy. As the study area falls under the Lane Cove LGA, which is not listed under Schedule 2, it is considered that this SEPP does not apply to this development proposal. Therefore, the overarching legislative document relating to Koalas will be the *BC Act*.

#### (d) Ecosystem credit species

Based upon the BAM calculator and field surveys to date, the following predicted threatened fauna species were considered as candidate species:

Table 4.2 – Ecosystem credit species (fauna)

| Common name                       | BC Act | Excluded | Confirmed predicted species | Associated PCT |
|-----------------------------------|--------|----------|-----------------------------|----------------|
| Barking Owl (foraging)            | V      |          | Yes                         | 1841           |
| Dusky Woodswallow                 | V      |          | Yes                         | 1841           |
| Eastern Coastal Free-tailed Bat   | V      |          | Yes                         | 1841           |
| Eastern False Pipistrelle         | V      |          | Yes                         | 1841           |
| Gang-gang Cockatoo (foraging)     | V      |          | Yes                         | 1841           |
| Greater Broad-nosed Bat           | V      |          | Yes                         | 1841           |
| Grey-headed Flying-fox (foraging) | V      |          | Yes                         | 1841           |
| Large Bent-winged Bat (foraging)  | V      |          | Yes                         | 1841           |
| Little Bent-winged Bat (foraging) | V      |          | Yes                         | 1841           |
| Little Eagle (foraging)           | V      |          | Yes                         | 1841           |
| Little Lorikeet                   | V      |          | Yes                         | 1841           |

| Common name                      | BC Act | Excluded | Confirmed predicted species | Associated PCT |
|----------------------------------|--------|----------|-----------------------------|----------------|
| Masked Owl (foraging)            | V      |          | Yes                         | 1841           |
| Osprey (foraging)                | V      |          | Yes                         | 1841           |
| Powerful Owl (foraging)          | V      |          | Yes                         | 1841           |
| Spotted-tailed Quoll             | V      |          | Yes                         | 1841           |
| Varied Sittella                  | V      |          | Yes                         | 1841           |
| Yellow-bellied Sheath-tail-bat   | V      |          | Yes                         | 1841           |
| Rosenberg's Goanna               | V      |          | Yes                         | 1841           |
| Superb Fruit-dove                | V      |          | Yes                         | 1841           |
| Rose-crowned Fruit-dove          | V      |          | Yes                         | 1841           |
| Koala (foraging)                 | E      |          | Yes                         | 1841           |
| Glossy Black-Cockatoo (foraging) | V      | Yes      |                             | 1841           |
| Swift Parrot (foraging)          | E      |          | Yes                         | 1841           |
| Regent Honeyeater (foraging)     | E4A    |          | Yes                         | 1841           |

#### Excluded species justification (ecosystem credit species):

- *Glossy Black-Cockatoo*

The site does not support foraging habitat provided by *Allocasuarina* or *Casuarina* trees, which is the single habitat constraint for this species when assessed for ecosystem credits (TBDC).

#### (e) Species credit species

Based upon the BAM calculator and field surveys to date, the following predicted threatened fauna species were considered as confirmed candidate species:

**Table 4.3 – Species credit species (fauna)**

| Common name                             | BC Act | Associated PCTs | Confirmed candidate species    | Survey adequacy              |                      |                                   | Presence                                |
|-----------------------------------------|--------|-----------------|--------------------------------|------------------------------|----------------------|-----------------------------------|-----------------------------------------|
|                                         |        |                 |                                | Defined survey period (TBDC) | Actual survey period | Survey sufficient to exclude      |                                         |
| Red-crowned Toadlet                     | V      | 1841            | Yes                            | All months                   | N/A                  | No (no frog survey undertaken)    | Present (Assumed)                       |
| Green and Golden Bell Frog              | E1     | 1841            | Yes                            | Nov-March                    | N/A                  | No (no frog survey undertaken)    | Present (Assumed)                       |
| Powerful Owl (breeding)                 | V      | 1841            | Yes                            | May-August                   | Oct                  | No (outside survey period)        | Present (Assumed)                       |
| Barking Owl (breeding)                  | V      | 1841            | Yes                            | May-Dec                      | Oct                  | No (survey effort not sufficient) | Present (Assumed)                       |
| Masked Owl (breeding)                   | V      | 1841            | Yes                            | May-Aug                      | Oct                  | No                                | Present (Assumed)                       |
| Gang-gang Cockatoo (breeding)           | V      | 1841            | Yes                            | Oct-Jan                      | Oct and Feb          | No (survey effort not sufficient) | Present (Assumed)                       |
| Glossy Black-Cockatoo (breeding)        | V      | 1841            | Yes                            | Jan-Sept                     | Oct and Feb          | No (survey effort not sufficient) | Present (Assumed)                       |
| Eastern Pygmy Possum                    | V      | 1841            | Yes                            | Oct-March                    | nil                  | No (no trapping undertaken)       | Present (Assumed)                       |
| Squirrel Glider – species               | V      | 1841            | Yes                            | All year                     | nil                  | No (no trapping undertaken)       | Present (Assumed)                       |
| Squirrel Glider – endangered population | E2     | 1841            | No (outside geographic limits) | N/A                          | N/A                  | N/A                               | Absent (site outside geographic limits) |
| Large-eared Pied Bat                    | V      | 1841            | Yes                            | Nov-Jan                      | Oct and Feb          | No                                | Present (Assumed)                       |
| Southern Myotis                         | V      | 1841            | Yes                            | Oct-Mar                      | Oct and Feb          | No (survey effort not sufficient) | Present (Assumed)                       |
| Little Bent-winged Bat (breeding)       | V      | 1841            | Yes                            | Dec-Feb                      | Oct and Feb          | No (survey effort not sufficient) | Present (Assumed)                       |
| Large Bent-winged Bat (breeding)        | V      | 1841            | Yes                            | Dec-Feb                      | Oct and Feb          | No (survey effort not sufficient) | Present (Assumed)                       |
| Grey-headed Flying-fox (breeding)       | V      | 1841            | No                             | N/A                          | N/A                  | N/A                               | Absent (habitat constraints)            |
| Osprey (breeding)                       | V      | 1841            | No                             | N/A                          | N/A                  | N/A                               | Absent (habitat constraints)            |
| Little Eagle (breeding)                 | V      | 1841            | Yes                            | Aug-Oct                      | Oct and Feb          | Yes                               | Absent (survey)                         |
| Regent Honeyeater (breeding)            | E4A    | 1841            | No                             | N/A                          | N/A                  | N/A                               | Absent (habitat constraints)            |

| Common name                   | BC Act | Associated PCTs | Confirmed candidate species    | Survey adequacy              |                      |                              | Presence                                |
|-------------------------------|--------|-----------------|--------------------------------|------------------------------|----------------------|------------------------------|-----------------------------------------|
|                               |        |                 |                                | Defined survey period (TBDC) | Actual survey period | Survey sufficient to exclude |                                         |
| Swift Parrot (breeding)       | E1     | 1841            | No                             | N/A                          | N/A                  | N/A                          | Absent (habitat constraints)            |
| Koala (breeding) – species    | E1     | 1841            | Yes                            | All year                     | Oct and Feb          | yes                          | Absent (Survey)                         |
| Koala – endangered population | E2     | 1841            | No (outside geographic limits) | N/A                          | N/A                  | N/A                          | Absent (site outside geographic limits) |

### Excluded species justification (species credit species):

- *Grey-headed Flying Fox*

TBDC habitat constraint is presence of breeding camp. No breeding camps were detected on site or nearby.

- *Swift Parrot*

The site is not mapped as containing important habitat for this species on the BAM - Important Areas (DPIE) mapping.

- *Regent Honeyeater*

The site is not mapped as containing important habitat for this species on the BAM - Important Areas (DPIE) mapping.

- *Squirrel Glider on Barrenjoey Peninsula, north of Bushrangers Hill – endangered population*

The site is placed outside of the geographic limits of the population, which are Barrenjoey Peninsula, north of Bushrangers Hill (TBDC).

- *Koala in the Pittwater LGA – endangered population*

The site is not within the Pittwater LGA and is therefore outside the geographic limits of this population (TBDC).

### Species assumed present due to survey constraints

- *Red-crowned Toadlet; Green and Golden Bell Frog*

Insufficient survey has been undertaken for these frogs so they must be assumed present. Keystone Ecological conducted acoustic recording of frog calls over 6 days in November and December 2017, but the use of acoustic recorders is not recommended for the red-crowned toadlet as the calls of this species are relatively soft and difficult to distinguish from species of the same genus (DPIE 2020b). Additionally, while acoustic recording can be used for Green and Golden Bell Frog, recorders must be placed on site for a minimum of 14 days (DPIE 2020b).

- *Powerful Owl (breeding), Barking Owl (breeding), Masked Owl (breeding), Gang-gang Cockatoo (breeding), Glossy Black-Cockatoo (breeding)*

Sufficient survey has not been undertaken to establish presence of breeding within recorded tree hollows for these species. Significant Habitat Tree (SHT) 4 provides suitable breeding hollows for all these species, while SHT 1 and 2 provide suitable breeding hollows for the three owl species only. Stag-watching of these trees is required in the appropriate period over multiple nights (Tables 2.5 and 4.3 provide survey period).

- *Eastern Pygmy Possum, Squirrel Glider – species*

Trapping is needed to assess presence of these species.

## 4.4 Watercourses, GDEs & Wetlands

### 4.4.1 Endangered wetland communities

A number of wetland communities have been listed as TECs under the *BC Act*. We note that 'wetlands' are included in the definition of 'waterfront lands' in accordance with the *Water Management Act 2000 (WM Act)* due to their inclusion in the definition of a 'lake' under the same Act.

No endangered wetland communities were present within the development footprint and therefore a referral to NRAR is not required for impacts on waterfront land.

### 4.4.2 Groundwater dependent ecosystems (GDEs)

Groundwater dependent ecosystems (GDEs) are communities of plants, animals and other organisms whose extent and life processes are dependent on groundwater. Some examples of ecosystems which depend on groundwater are:

- wetlands;
- red gum forests, vegetation on coastal sand dunes and other terrestrial vegetation;
- ecosystems in streams fed by groundwater;
- limestone cave systems;
- springs; and
- hanging valleys and swamps.

GDEs were not observed within the development footprint and therefore the policy does not require any further consideration. A referral to NRAR is not required for impacts on waterfront land.

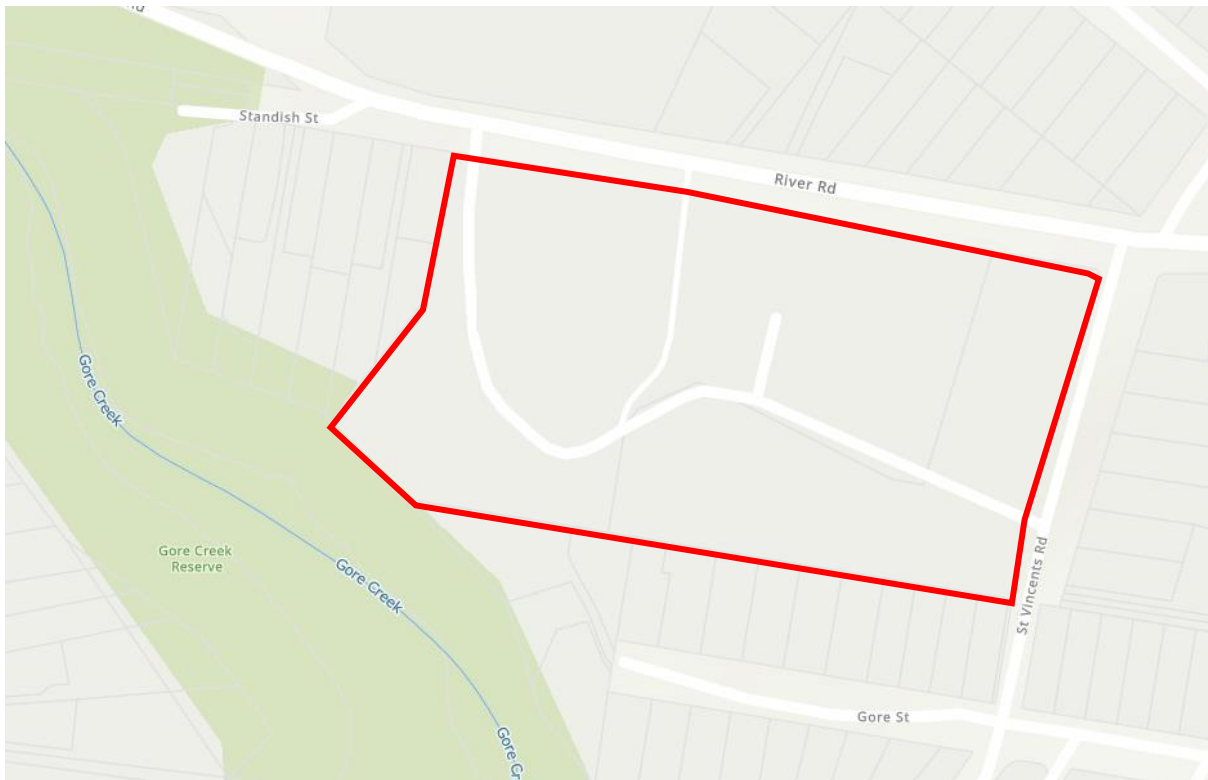
### 4.4.3 Watercourses

*Water Management (General) Regulation 2018* hydroline spatial data maps Gore Creek to the south west of the site, which is a second-order stream at that point (Figure 4.1). The site is outside the required 20 m riparian buffer for second order streams under the *Natural Resources Access Regulator (NRAR) Act 2017* and therefore the proposal does not require controlled activity approval by NRAR (Figure 1.5).

Although not a stream, Lane Cove LEP recognises a riparian zone along the western boundary of the development site (Figure 4.2). This riparian zone surrounds a drainage line containing a stormwater outlet and gully that connects to Gore Creek off site.

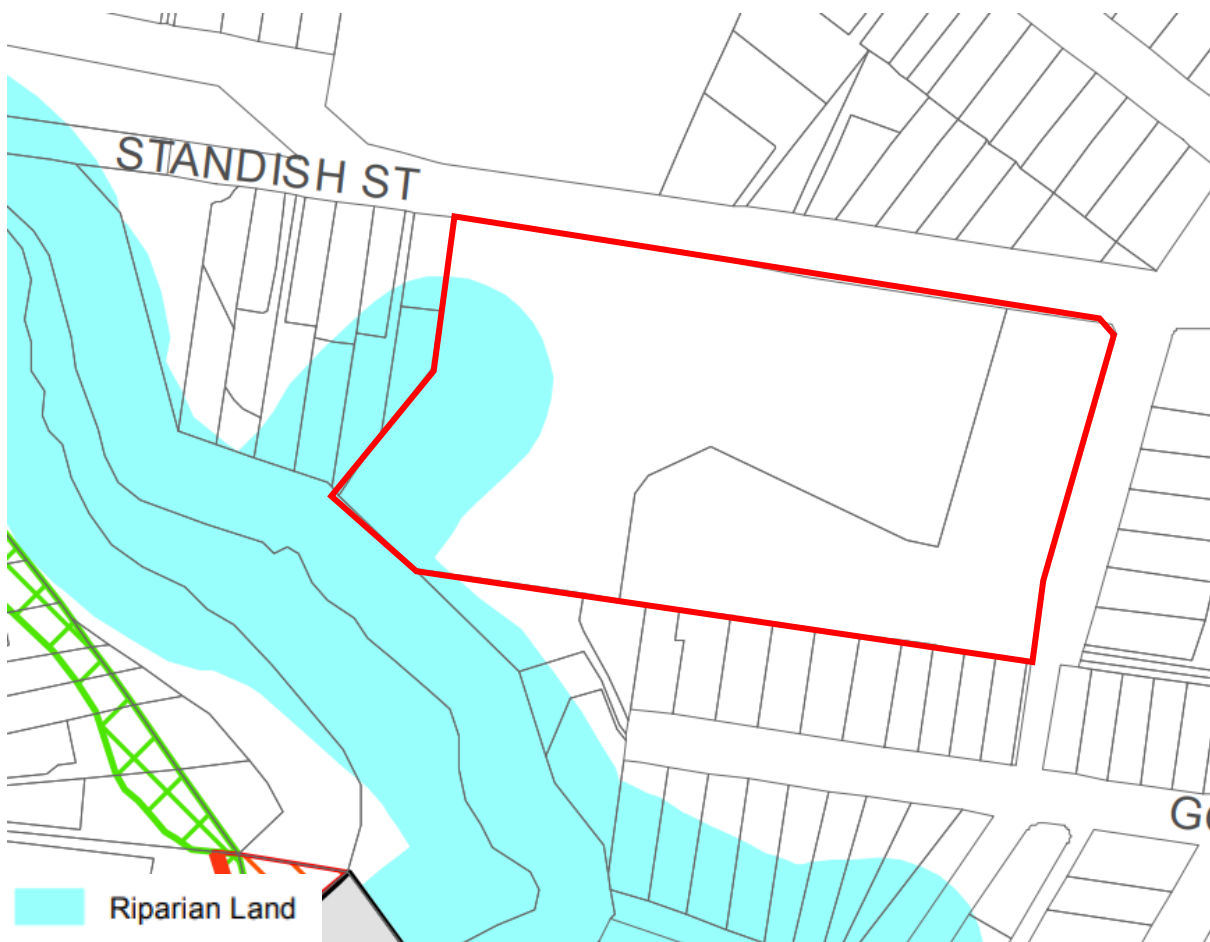
Watercourse assessment has not been undertaken as part of this BDAR, but *Keystone Ecological* (2017) report that this feature comprises two main parts, above and below a low escarpment. Above the escarpment, the upper portion is a shallow and narrow depression at the base of the west facing slope, situated between the development site and neighbouring properties, and was not observed to carry water. The lower portion, is fed by a stormwater pipe that was observed to carry water. Below the escarpment is in a seemingly more natural condition, with a steep and rocky fall into Gore Creek. However, this area has also been highly disturbed and modified by the installation of the stormwater outlet, and disturbances associated with the filling of the estuary and channelizing of Gore Creek.

The Lane Cove LEP (2009) states that development consent must not be granted for development on land to which this clause applies unless the consent authority has considered the impact of the proposed development on the land and any opportunities for rehabilitation of aquatic and riparian vegetation and habitat on that land.



**Figure 4.1 – Nearby mapped watercourses**

(Source: Water Management (General) Regulation 2018 hydroline spatial data 1.0)

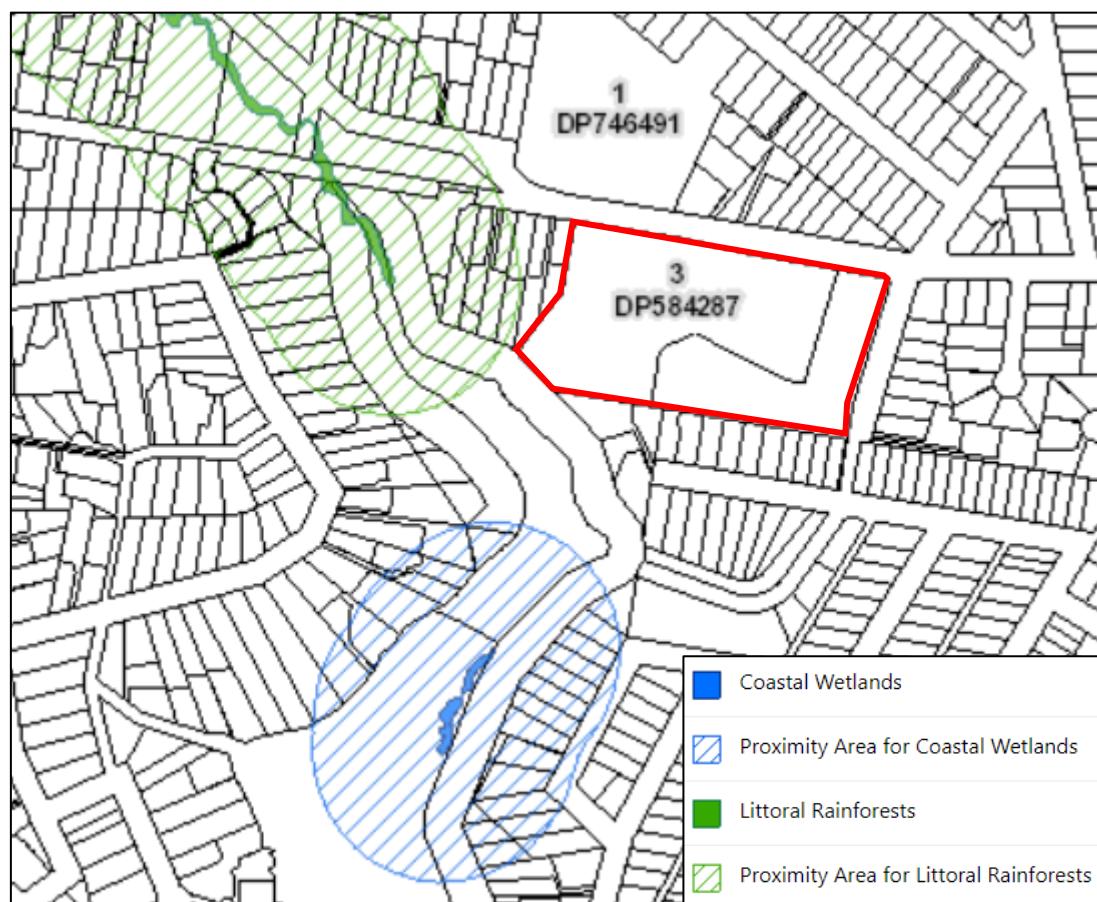


**Figure 4.2 – Lane Cove LEP Riparian Land Map (2009)**

While the proposal will encroach on this mapped 'riparian zone' it will not directly impact on the actual riparian features associated with Gore Creek. Within the area of the drainage line, weed and sediment control and restoration works are to be completed as part of the VMP, which will mitigate any indirect impacts associated with the construction and development phases of the proposal. Appropriate stormwater control is to be implemented to avoid any increases in sediment, nutrient, pollution and runoff into Gore Creek.

#### **4.4.4 State Environmental Planning Policy (Resilience and Hazards) 2021 – Division 1 Coastal wetlands and littoral rainforests area**

The State Environmental Planning Policy (Resilience and Hazards) 2021 maps areas of coastal wetland and littoral rainforest that need consideration under Division 1 of this SEPP. As there are no coastal wetlands, littoral rainforest, or proximity areas to these features within the site, no further consideration of this SEPP is required.



**Figure 4.3 – Coastal wetlands and littoral rainforests area map**

## 5. IMPACT ASSESSMENT

### 5.1 BOS thresholds

This project is a State Significant Development, which automatically triggers offsetting under the BOS, and therefore the BOS threshold criteria do not need consideration.

### 5.2 Avoidance and minimisation actions

The following strategies and actions have been undertaken to either avoid or minimise impacts on biodiversity values:

- Impacts from clearing native vegetation and threatened species habitat has been minimised by locating the proposal in areas:
  - within existing building footprints
  - cleared areas
  - areas of low-condition vegetation
- Minimise clearing particularly on steeply-sloped areas in the far south west of the site
- Avoidance of significant habitat tree SHT2, which provides potential habitat for threatened owls
- Avoidance of direct impacts on PCT 1828 Coastal sandstone gallery rainforest
- Avoidance of rock features providing potential roosting and breeding habitat for threatened microbat species

### 5.3 Potential ecological impacts

The direct, indirect and cumulative ecological impacts have been considered in respect to recorded biodiversity, threatening processes and extent of impact as a result of the proposed works:

#### 5.3.1 Prescribed impacts

*Table 5.1 – Prescribed impacts*

| Feature                                                                            | Present (yes / no) | Description of feature characteristics and location                    | Potential impact                                                                                                                                           | Threatened species or community using or dependent on feature                                                                                                      | Section of the BAR where prescribed impact is addressed                                                                                                        |
|------------------------------------------------------------------------------------|--------------------|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Karst, caves, crevices, cliffs, rocks or other geological features of significance | yes                | Rock overhangs in far SW of site; rock outcropping in S and SE of site | None likely – rock overhangs are outside the subject land; rock outcrops are within the APZ but outside the development footprint so will not be impacted. | Cave-breeding microbats have potential to use the rock overhangs. No direct impact is proposed on these features, but breeding habitat has been assumed for credit | Credit assessment of candidate threatened microbats for is addressed in Section 4.3.2(e). AS there will be no impacts on these features, no further assessment |

| Feature                                               | Present (yes / no) | Description of feature characteristics and location | Potential impact                                                                                                                                                        | Threatened species or community using or dependent on feature | Section of the BAR where prescribed impact is addressed |
|-------------------------------------------------------|--------------------|-----------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------|
|                                                       |                    |                                                     |                                                                                                                                                                         | calculations based on inadequate survey.                      | as a prescribed impact is needed.                       |
| Human-made structures                                 | no                 | n/a                                                 | n/a                                                                                                                                                                     | n/a                                                           | n/a                                                     |
| Non-native vegetation                                 | yes                | Planted non-native trees                            | Removal of minor flowering, fruiting and seeding resources e.g. <i>Corymbia citriodora</i> , <i>Syagrus romanzoffiana</i> (Cocos Palm), <i>Mangifera indica</i> (Mango) | Grey-headed Flying Fox                                        | 5.3.1                                                   |
| Habitat connectivity                                  | no                 | n/a                                                 | n/a                                                                                                                                                                     | n/a                                                           | 5.4                                                     |
| Waterbodies, water quality and hydrological processes | no                 | n/a                                                 | n/a                                                                                                                                                                     | n/a                                                           | n/a                                                     |
| Wind farm development                                 | no                 | n/a                                                 | n/a                                                                                                                                                                     | n/a                                                           | n/a                                                     |
| Vehicle strikes                                       | no                 | n/a                                                 | n/a                                                                                                                                                                     | n/a                                                           | n/a                                                     |

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

Non-native vegetation -

(a) describe the nature, extent and duration of short-term and long-term impacts

**Response:** Flowering and fruiting resources e.g. *Corymbia citriodora*, *Syagrus romanzoffiana* (Cocos Palm), *Mangifera indica* (Mango) are present within the development footprint, as described in Section 3.1.4. Parts of this vegetation will be removed for the development. However, this vegetation only provides minor foraging utility and is well represented within the locality. Its removal is not expected to have any short-term or long-term impacts on any entity being assessed under the BAM.

(b) predict the consequences of impacts on threatened entities identified in Subsection 6.1.2

**Response:** Threatened species recorded or with potential to occur that are known to utilise non-native vegetation include Grey-headed Flying Fox, which is known to forage on flowering a fruiting trees. As this habitat is well represented within the

surrounding locality it is considered that the proposal will not hinder the foraging behaviour and therefore there will be no consequences of these impacts.

*(c) justify predictions of impacts with relevant literature and other published sources of information, or advice from experts.*

**Response:** Foraging behaviour for each species are stated in species profiles (OEH) and the TBDC (BioNet). Based on these profiles, the removal of non-native vegetation from the site is not expected to have a significant impact on any entity being assessed under the BAM.

### 5.3.2 Direct impacts

The other direct impacts of the proposal within the development footprint are considered as:

- Impacts on 0.64 ha of remnant / unmanaged PCT 1841 – Coastal enriched sandstone forest; including 0.21 ha complete removal and 0.43 ha partial clearing for APZ
- Impacts on 0.29 ha of planted / managed PCT 1841 – Coastal enriched sandstone forest; including 0.13 ha complete removal and 0.0.16 ha partial clearing for APZ
- Impacts on 0.39 ha of exotic and non-native vegetation
- Subsequent removal of threatened fauna species foraging habitat including:
  - (a) Very minor seasonal flowering resources for Grey-headed Flying-fox
  - (b) Air space and prey species habitat for threatened microbats

### 5.3.3 Indirect impacts

The potential indirect impacts of the proposal are considered as:

- Very slight reduced cross-site movements by small bird species such as passerines
- Edge effects such as weed incursions caused from soil disturbance, repeated clearing and landscaping species becoming a nuisance in the adjacent remnant bushland
- Increased spill-over from noise, activity, scent and lighting effects into the adjacent quality natural habitat areas
- Increased soil nutrients from changes to runoff that may provide further opportunities for weed plumes
- Concentrated stormwater runoff from solid surfaces and subsequent increased flows

### 5.3.4 Cumulative impacts

The potential cumulative impacts (combined results of past, current and future activities) of the proposal are considered as:

- Increased risk of weed invasion and fungal mobilisation or infections
- Cumulative loss of native vegetation
- Cumulative loss of fauna habitat

### 5.3.5 Serious & Irreversible Impacts (SAILs)

An impact is to be regarded as serious and irreversible if it is likely to contribute significantly to the risk of a threatened species or ecological community most at risk of extinction. Threatened species and communities that are potential for serious and irreversible impacts are identified in the BioNet TBDC, and a list is provided on the DPIE webpage: <https://www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity-offsets-scheme/local-government-and-other-decision-makers/serious-and-irreversible-impacts-of->

[development](#). The principles for determining serious and irreversible impacts are set out under Section 9.1 of the BAM.

Candidate SAI entities recorded or with potential to occur within the study area include:

*Table 5.2 – Candidate SAI species*

| Species / TEC<br>(Scientific Name)                       | Species<br>(Common Name) | BC<br>Act | Potential to<br>occur      |
|----------------------------------------------------------|--------------------------|-----------|----------------------------|
| <i>Miniopterus schreibersii</i> subsp. <i>oceanensis</i> | Large Bent-winged Bat    | V         | Possible – assumed present |
| <i>Miniopterus australis</i>                             | Little Bent-winged Bat   | V         | Possible – assumed present |
| <i>Chalinolobus dwyeri</i>                               | Large-eared pied-bat     | V         | Possible – assumed present |
| <i>Deyeuxia appressa</i>                                 | -                        | E1        | Unlikely – assumed present |

### Species:

The SAI assessment provisions for threatened species are outlined under Section 9.1.2 of the BAM (2021) and have been considered for Large Bent-winged Bat, Little Bent-winged Bat and Large-eared Pied-bat within Appendix 3 of this report as prompted by the BAM calculator. As a result of this assessment it is considered that the proposal does not trigger SAI consideration for Large Bent-winged Bat and Little Bent-winged Bat. Further survey is necessary to assess presence of breeding habitat and breeding individuals of Large-eared Pied-bat, and presence of *Deyeuxia appressa*. These species have been assumed present for the purposes of credit calculation, pending this further survey.

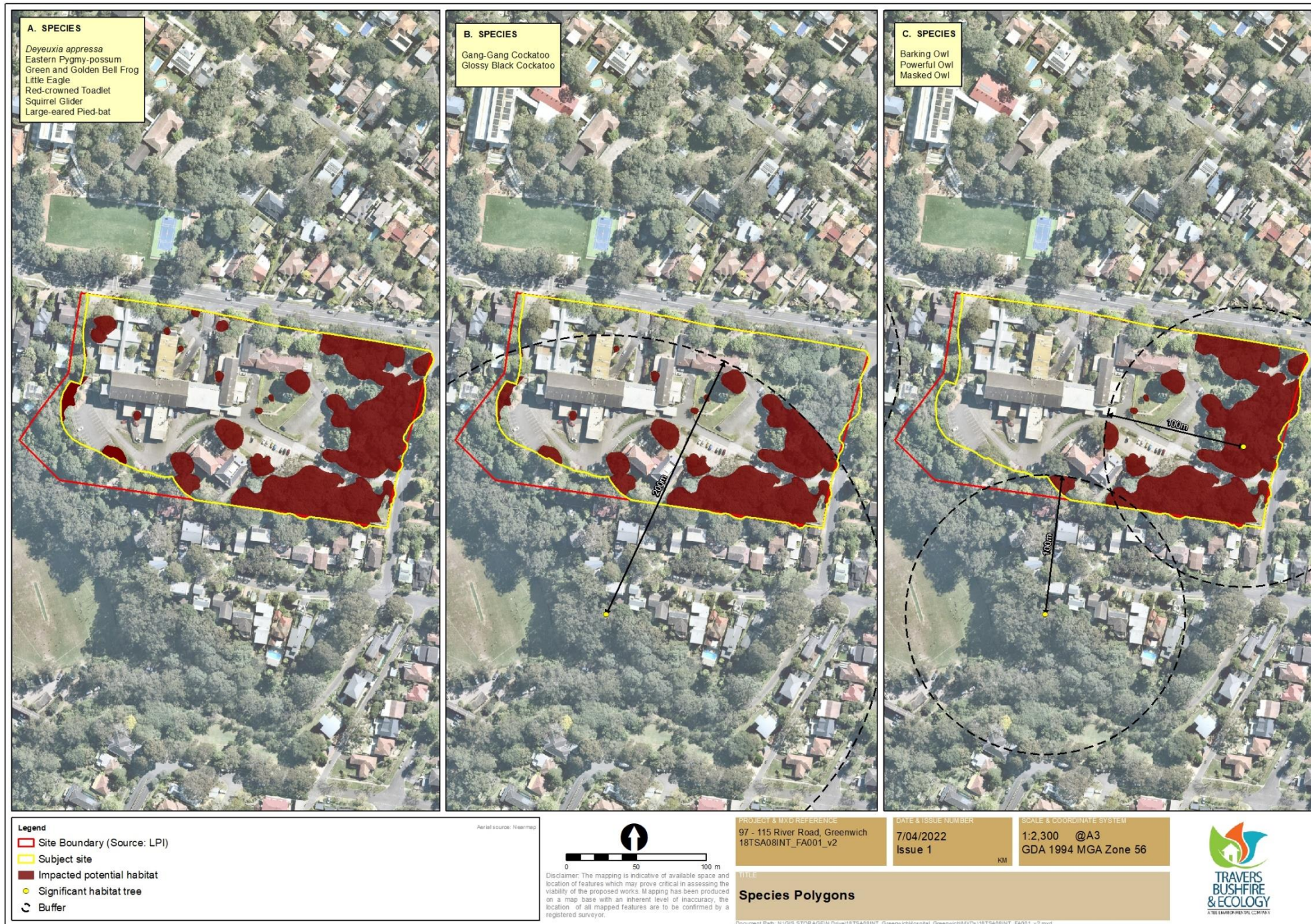
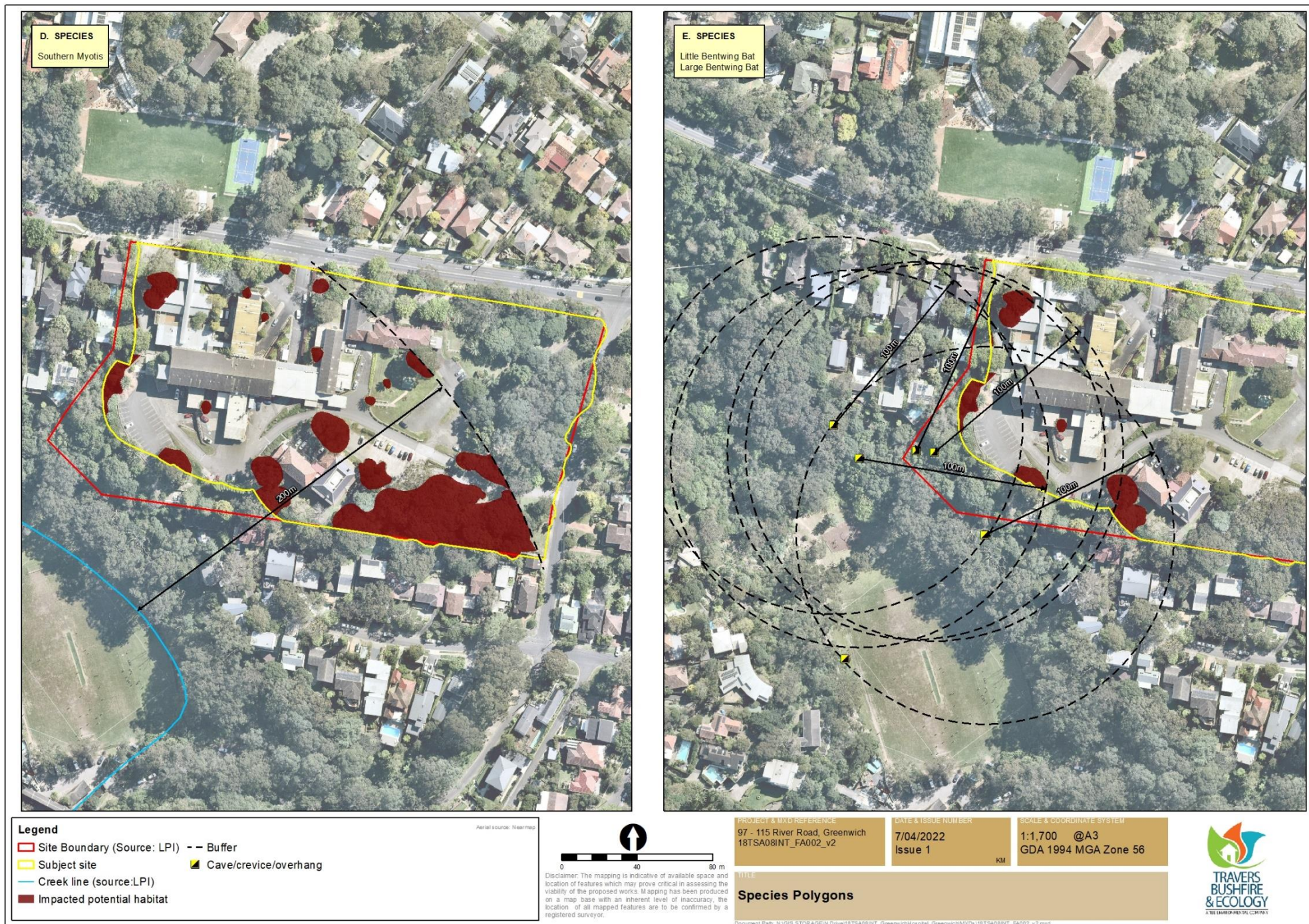


Figure 5.1 – Species credit species polygons



**Figure 5.1 cont. – Species credit species polygons**

## 6. CONCLUSION

Travers bushfire & ecology has been engaged to undertake a biodiversity development assessment report for Lots 3 and 4, DP 584287 within the Lane Cove local government area (LGA).

Ecological survey and assessment have been undertaken in accordance with relevant legislation including the *Environmental Planning and Assessment Act 1979*, the *Biodiversity Conservation Act 2016*, the commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and the *Fisheries Management Act 1994*.

### 6.1 Legislative compliance

In respect of matters required to be considered under the *Environmental Planning and Assessment Act 1979* and relating to the species / provisions of the *Biodiversity Conservation Act 2016*, one threatened fauna species, Grey-headed Flying-fox, no threatened flora species, and no TECs, were recorded within the study area.

Offsetting under the Biodiversity Offsets Scheme (BOS) is required for the proposal as the proposal is classed as a State Significant Development.

## 6.2 Mitigation measures

The following mitigation measures are recommended to avoid, minimise or ameliorate the above potential ecological impacts, address threatening processes and to guide a more positive ecological outcome for threatened species and their associated habitats.

**Table 6.1 – Measures to mitigate & manage impacts**

| Action / Technique                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Outcome                                       | Timing / Frequency                      | Responsibility                         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|-----------------------------------------|----------------------------------------|
| A <b>Vegetation Management Plan (VMP)</b> has been prepared to identify mitigation actions for retained biodiversity values within the site:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                               |                                         |                                        |
| <p>(a) Protection and conservation of retained vegetation (PCTs 1841 and 1828) to the south west of the development footprint.</p> <ul style="list-style-type: none"> <li>• Installation of permanent protection fencing and erosion control fencing;</li> <li>• Engagement of a Project Ecologist to undertake ongoing monitoring, compliance inspections and certifications</li> <li>• Engagement of a suitably qualified bushland regeneration team.</li> <li>• Weed control and maintenance of replanted and managed areas for a period of not less than 5 years in accordance with the Weed Eradication Management Plan (WEMP) produced by Travers bushfire and ecology, Nov 2020);</li> <li>• Restoration of PCT 1841 vegetation within the fully structured revegetation zones to create 0.06ha (600m<sup>2</sup>) of fully structured and diverse vegetation;</li> <li>• Restoration of PCT 1841 disturbed vegetation within the APZ zones to create 0.02 ha (200m<sup>2</sup>) of vegetation to comply with OPA standards; and</li> <li>• Management of the restored vegetation, protective fencing and 14x installed nest boxes for a period of 5 years, with regular inspections by the Project Ecologist and compliance certificates sent to Council.</li> </ul> | Prevent indirect impacts on retained habitats | Prior to any clearing works.<br>Ongoing | Project Ecologist as guided by the VMP |

| Action / Technique                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Outcome                                                                         | Timing / Frequency                                                                                 | Responsibility                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|---------------------------------|
| (b) Sediment and erosion control measures in accordance with Managing Urban Stormwater: Soils and Construction (Landcom 2004) to minimise impact of possible sedimentation to local drainage lines.                                                                                                                                                                                                                                                                                                                  | Maintain integrity of habitat and natural topsoil soil by preventing deposition | Prior to any clearing works. Ongoing during all exposed soil stages until landscaping is completed | Project Ecologist / Contractors |
| (c) Management of hollows and hollow-dependent fauna: <ul style="list-style-type: none"> <li>The felling of hollow-bearing trees is to be conducted under the supervision of a fauna ecologist to ensure appropriate animal welfare procedures are taken, particularly for threatened species. Hollows of high quality or with fauna recorded residing within should be dismantled for relocation and all hollows should be inspected for occupation, signs of previous activity and potential for reuse.</li> </ul> | Protection of hollow-dependent wildlife                                         | At time of removal                                                                                 | Project Ecologist               |
| <ul style="list-style-type: none"> <li>Subsequent hollows of retention value are to be relocated to nearby conservation areas. If these are placed as on ground habitat and are not reattached to a new recipient tree then they are to be replaced with appropriately sized nest boxes affixed to a retained tree. All hollow sections considered suitable for Squirrel Glider should where possible be recovered and prepared for placement into an appropriate retained tree.</li> </ul>                          | Maintain quality denning / hollow shelter opportunities                         | At time of removal                                                                                 | Project Ecologist               |
| <ul style="list-style-type: none"> <li>Constructed nest boxes should as priority target recorded hollow-dependent threatened species (and their prey species). Boxes should be constructed all of weatherproof timber (marine ply), fasteners and external paint and appropriately affixed to a recipient tree under the guidance of a fauna ecologist.</li> </ul>                                                                                                                                                   | Protection of hollow-dependent wildlife                                         | Prior to hollow removal                                                                            | Project Ecologist               |
| <ul style="list-style-type: none"> <li>If a threatened species is found to be occupying the hollow at the time of removal then this hollow section is to be reattached to a recipient tree within the nearby conservation areas as selected and directed by the fauna ecologist. The welfare and temporary holding of the residing animal(s) is at the discretion of the fauna ecologist.</li> </ul>                                                                                                                 | Priority protection of hollow-dependent threatened species                      | At time of removal                                                                                 | Project Ecologist               |

| Action / Technique                                                                                                                                                                                                         | Outcome                                                                | Timing / Frequency                                                 | Responsibility                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------|
| <ul style="list-style-type: none"> <li>The relocated hollow section and nest boxes should be well secured in the recipient tree in a manner that will not compromise the current or future health of that tree.</li> </ul> | Ensure hollow integrity is maintained                                  | Time of installation                                               | Project Ecologist               |
| <ul style="list-style-type: none"> <li>Monitoring of nest boxes and relocated hollows</li> </ul>                                                                                                                           | Ensure hollow integrity is maintained                                  | Each year for 5 years                                              | Project Ecologist               |
| (d) Management of any other displaced fauna                                                                                                                                                                                | Prevent direct impacts on nesting and terrestrial native fauna species | Prior to and during habitat removal / Adaptive management required | Project Ecologist               |
| (e) If any fauna species, a nest or roost is located during development works, then works should cease until safe relocation can be advised by a contact fauna ecologist                                                   | Prevent direct impacts on nesting and terrestrial native fauna species | At time of removal / Adaptive management required                  | Project Ecologist / Contractors |

## 6.3 Biodiversity credit requirements

### 6.3.1 *Impacts requiring offset*

The following impacts will require offsetting:

- Impacts on 0.64 ha PCT 1841 (remnant / unmanaged)
- Impacts on 0.29 ha PCT 1841 (managed / planted)
- loss of habitat for threatened species assumed present, including species credits for Gang-gang Cockatoo, Glossy Black-Cockatoo, Callocephalon fimbriatum / Gang-gang Cockatoo, Eastern Pygmy-possum, Large-eared Pied Bat, *Deyeuxia appressa*, Little Eagle, Green and Golden Bell Frog, Little Bent-winged Bat, Large Bent-winged Bat, Southern Myotis, Barking Owl, Powerful Owl and Squirrel Glider.

### 6.3.2 *Impacts not requiring offset*

The following impacts do not require offset:

- Impacts on non-native vegetation
- Indirect impacts on remaining native vegetation areas as outlined in Section 5.3.3.

All areas of native vegetation impact will require offsetting and have been accounted for in the BAM calculator.

### 6.3.3 *Areas not requiring assessment*

Native vegetation that has not been directly impacted by this proposal, both within the study area and beyond, do not require credit assessment.

## 7. BAM CREDIT RESULTS

### 7.1 Ecosystem credits and species credits

Ecosystem credits and species credits that measure the impact of the development on biodiversity values have been calculated, assuming full removal of vegetation for roads, removal of trees and shrubs for fence lines with retention of some ground layer species, and thinning of vegetation in APZs reducing both cover and abundance. The result of this means that all impacted areas will still have some future biodiversity value, and as such, the future vegetation integrity score will be above 0. There will be a significant drop in the scores, but as they still retain some value, the number of credits required is less. Future vegetation integrity score for each vegetation zone at the development site is shown in Section 3.1.5.

Habitat suitability for threatened species has been considered in Section 4. Some species are considered for species credits, particularly if potential breeding habitat is compromised or impacted.

Ecosystem credits for plant community types (PCTs), ecological communities and threatened species habitat is shown below in Table 7.1. Species credits for threatened species are shown in Table 7.2.

Table 7.1 – Requirement for ecosystem credits

| Zone     | Veg. zone name | Veg. integrity loss | Area (ha) | Sensitivity to loss | Sensitivity to loss justification | Sensitivity to gain | Biodiversity risk weighting | Potential SAIL | Ecosystem credits |
|----------|----------------|---------------------|-----------|---------------------|-----------------------------------|---------------------|-----------------------------|----------------|-------------------|
| 1        | 1841_remnant   | 21.3                | 0.64      | Moderate            | PCT Cleared - 67%                 | High                | 1.75                        | no             | 6                 |
| 2        | 1841_managed   | 27.1                | 0.29      | Moderate            | PCT Cleared - 67%                 | High                | 1.75                        | no             | 3                 |
| Total: 9 |                |                     |           |                     |                                   |                     |                             |                |                   |

Table 7.2 – Requirement for species credits

| Vegetation zone name                                                    | Habitat condition (vegetation integrity) loss | Area / Count | Sensitivity to loss | Sensitivity to loss(Justification) | Sensitivity to gain | Sensitivity to gain(Justification) | Biodiversity risk weighting | Potential SAIL | Species credits |
|-------------------------------------------------------------------------|-----------------------------------------------|--------------|---------------------|------------------------------------|---------------------|------------------------------------|-----------------------------|----------------|-----------------|
| <b><i>Callocephalon fimbriatum</i> / Gang-gang Cockatoo ( Fauna )</b>   |                                               |              |                     |                                    |                     |                                    |                             |                |                 |
| 1841_managed                                                            | 27.1                                          | 0.12 ha      | Moderate            |                                    | High                |                                    | 2                           | FALSE          | 2               |
| 1841_remnant                                                            | 21.3                                          | 0.5 ha       | Moderate            |                                    | High                |                                    | 2                           | FALSE          | 5               |
| Subtotal: 7                                                             |                                               |              |                     |                                    |                     |                                    |                             |                |                 |
| <b><i>Calyptorhynchus lathami</i> / Glossy Black-Cockatoo ( Fauna )</b> |                                               |              |                     |                                    |                     |                                    |                             |                |                 |
| 1841_managed                                                            | 27.1                                          | 0.12 ha      | Moderate            |                                    | High                |                                    | 2                           | FALSE          | 2               |
| 1841_remnant                                                            | 21.3                                          | 0.5 ha       | Moderate            |                                    | High                |                                    | 2                           | FALSE          | 5               |
| Subtotal: 7                                                             |                                               |              |                     |                                    |                     |                                    |                             |                |                 |
| <b><i>Cercartetus nanus</i> / Eastern Pygmy-possum ( Fauna )</b>        |                                               |              |                     |                                    |                     |                                    |                             |                |                 |
| 1841_managed                                                            | 27.1                                          | 0.29 ha      | Moderate            |                                    | High                |                                    | 2                           | FALSE          | 4               |
| 1841_remnant                                                            | 21.3                                          | 0.64 ha      | Moderate            |                                    | High                |                                    | 2                           | FALSE          | 7               |
| Subtotal: 11                                                            |                                               |              |                     |                                    |                     |                                    |                             |                |                 |
| <b><i>Chalinolobus dwyeri</i> / Large-eared Pied Bat ( Fauna )</b>      |                                               |              |                     |                                    |                     |                                    |                             |                |                 |

| Vegetation zone name                                                           | Habitat condition (vegetation integrity) loss | Area / Count  | Sensitivity to loss | Sensitivity to loss(Justification) | Sensitivity to gain | Sensitivity to gain(Justification) | Biodiversity risk weighting | Potential SAIL | Species credits |
|--------------------------------------------------------------------------------|-----------------------------------------------|---------------|---------------------|------------------------------------|---------------------|------------------------------------|-----------------------------|----------------|-----------------|
| 1841_managed                                                                   | 27.1                                          | 0.29 ha       | Moderate            |                                    | Very High           |                                    | 3                           | TRUE           | 6               |
| 1841_remnant                                                                   | 21.3                                          | 0.64 ha       | Moderate            |                                    | Very High           |                                    | 3                           | TRUE           | 10              |
|                                                                                |                                               |               |                     |                                    |                     |                                    |                             |                | Subtotal: 16    |
| <b><i>Deyeuxia appressa</i> / Deyeuxia appressa ( Flora )</b>                  |                                               |               |                     |                                    |                     |                                    |                             |                |                 |
| 1841_remnant                                                                   | N/A                                           | 5 individuals | Very High           |                                    | High                |                                    | 3                           | TRUE           | 15              |
|                                                                                |                                               |               |                     |                                    |                     |                                    |                             |                | Subtotal: 15    |
| <b><i>Hieraaetus morphnoides</i> / Little Eagle ( Fauna )</b>                  |                                               |               |                     |                                    |                     |                                    |                             |                |                 |
| 1841_managed                                                                   | 27.1                                          | 0.29 ha       | Moderate            |                                    | Moderate            |                                    | 1.5                         | FALSE          | 3               |
| 1841_remnant                                                                   | 21.3                                          | 0.64 ha       | Moderate            |                                    | Moderate            |                                    | 1.5                         | FALSE          | 5               |
|                                                                                |                                               |               |                     |                                    |                     |                                    |                             |                | Subtotal: 8     |
| <b><i>Litoria aurea</i> / Green and Golden Bell Frog ( Fauna )</b>             |                                               |               |                     |                                    |                     |                                    |                             |                |                 |
| 1841_managed                                                                   | 27.1                                          | 0.29 ha       | High                |                                    | High                |                                    | 2                           | FALSE          | 4               |
| 1841_remnant                                                                   | 21.3                                          | 0.64 ha       | High                |                                    | High                |                                    | 2                           | FALSE          | 7               |
|                                                                                |                                               |               |                     |                                    |                     |                                    |                             |                | Subtotal: 11    |
| <b><i>Miniopterus australis</i> / Little Bent-winged Bat ( Fauna )</b>         |                                               |               |                     |                                    |                     |                                    |                             |                |                 |
| 1841_managed                                                                   | 27.1                                          | 0.06 ha       | Moderate            |                                    | Very High           |                                    | 3                           | TRUE           | 1               |
| 1841_remnant                                                                   | 21.3                                          | 0.04 ha       | Moderate            |                                    | Very High           |                                    | 3                           | TRUE           | 1               |
|                                                                                |                                               |               |                     |                                    |                     |                                    |                             |                | Subtotal: 2     |
| <b><i>Miniopterus orianae oceanensis</i> / Large Bent-winged Bat ( Fauna )</b> |                                               |               |                     |                                    |                     |                                    |                             |                |                 |
| 1841_managed                                                                   | 27.1                                          | 0.06 ha       | Moderate            |                                    | Very High           |                                    | 3                           | TRUE           | 1               |
| 1841_remnant                                                                   | 21.3                                          | 0.04 ha       | Moderate            |                                    | Very High           |                                    | 3                           | TRUE           | 1               |
|                                                                                |                                               |               |                     |                                    |                     |                                    |                             |                | Subtotal: 2     |
| <b><i>Myotis macropus</i> / Southern Myotis ( Fauna )</b>                      |                                               |               |                     |                                    |                     |                                    |                             |                |                 |

| Vegetation zone name                                                 | Habitat condition (vegetation integrity) loss | Area / Count | Sensitivity to loss | Sensitivity to loss(Justification) | Sensitivity to gain | Sensitivity to gain(Justification) | Biodiversity risk weighting | Potential SAIL | Species credits |
|----------------------------------------------------------------------|-----------------------------------------------|--------------|---------------------|------------------------------------|---------------------|------------------------------------|-----------------------------|----------------|-----------------|
| 1841_managed                                                         | 27.1                                          | 0.14 ha      | Moderate            |                                    | High                |                                    | 2                           | FALSE          | 2               |
| 1841_remnant                                                         | 21.3                                          | 0.33 ha      | Moderate            |                                    | High                |                                    | 2                           | FALSE          | 4               |
|                                                                      |                                               |              |                     |                                    |                     |                                    |                             |                | Subtotal: 6     |
| <b><i>Ninox connivens</i> / Barking Owl ( Fauna )</b>                |                                               |              |                     |                                    |                     |                                    |                             |                |                 |
| 1841_managed                                                         | 27.1                                          | 0.23 ha      | Moderate            |                                    | High                |                                    | 2                           | FALSE          | 3               |
| 1841_remnant                                                         | 21.3                                          | 0.6 ha       | Moderate            |                                    | High                |                                    | 2                           | FALSE          | 6               |
|                                                                      |                                               |              |                     |                                    |                     |                                    |                             |                | Subtotal: 9     |
| <b><i>Ninox strenua</i> / Powerful Owl ( Fauna )</b>                 |                                               |              |                     |                                    |                     |                                    |                             |                |                 |
| 1841_managed                                                         | 27.1                                          | 0.23 ha      | Moderate            |                                    | High                |                                    | 2                           | FALSE          | 3               |
| 1841_remnant                                                         | 21.3                                          | 0.6 ha       | Moderate            |                                    | High                |                                    | 2                           | FALSE          | 6               |
|                                                                      |                                               |              |                     |                                    |                     |                                    |                             |                | Subtotal: 9     |
| <b><i>Petaurus norfolcensis</i> / Squirrel Glider ( Fauna )</b>      |                                               |              |                     |                                    |                     |                                    |                             |                |                 |
| 1841_managed                                                         | 27.1                                          | 0.29 ha      | Moderate            |                                    | High                |                                    | 2                           | FALSE          | 4               |
| 1841_remnant                                                         | 21.3                                          | 0.64 ha      | Moderate            |                                    | High                |                                    | 2                           | FALSE          | 7               |
|                                                                      |                                               |              |                     |                                    |                     |                                    |                             |                | Subtotal: 11    |
| <b><i>Pseudophryne australis</i> / Red-crowned Toadlet ( Fauna )</b> |                                               |              |                     |                                    |                     |                                    |                             |                |                 |
| 1841_managed                                                         | 27.1                                          | 0.29 ha      | Moderate            |                                    | Moderate            |                                    | 1.5                         | FALSE          | 3               |
| 1841_remnant                                                         | 21.3                                          | 0.64 ha      | Moderate            |                                    | Moderate            |                                    | 1.5                         | FALSE          | 5               |
|                                                                      |                                               |              |                     |                                    |                     |                                    |                             |                | Subtotal: 8     |
| <b><i>Tyto novaehollandiae</i> / Masked Owl ( Fauna )</b>            |                                               |              |                     |                                    |                     |                                    |                             |                |                 |
| 1841_managed                                                         | 27.1                                          | 0.23 ha      | Moderate            |                                    | High                |                                    | 2                           | FALSE          | 3               |
| 1841_remnant                                                         | 21.3                                          | 0.6 ha       | Moderate            |                                    | High                |                                    | 2                           | FALSE          | 6               |
|                                                                      |                                               |              |                     |                                    |                     |                                    |                             |                | Subtotal: 9     |

## 7.2 Ecosystem credit classes

Table 7.3 – Ecosystem credit summary

| PCT                                          | TEC       | Area | HBT Cr | No HBT Cr | Credits |
|----------------------------------------------|-----------|------|--------|-----------|---------|
| 1841-Coastal enriched sandstone moist forest | Not a TEC | 0.93 | 6      | 3         | 9       |

Table 7.4 – Credit classes for PCT 877 and 1395 - Like for like options

| PCT  | Class                                                                                                                          | Trading group                                                                                                             | HBT | Credits | IBRA region                                                                                                                                           |
|------|--------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|-----|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1841 | North Coast Wet Sclerophyll Forests<br>This includes PCT's: 661, 686, 694, 827, 1217, 1237, 1244, 1285, 1504, 1841, 1843, 1915 | North Coast Wet Sclerophyll Forests<br>- $\geq 50\%$ - $< 70\%$ cleared group (including Tier 3 or higher threat status). | Yes | 6       | Pittwater , Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| 1841 | North Coast Wet Sclerophyll Forests<br>This includes PCT's: 661, 686, 694, 827, 1217, 1237, 1244, 1285, 1504, 1841, 1843, 1915 | North Coast Wet Sclerophyll Forests<br>- $\geq 50\%$ - $< 70\%$ cleared group (including Tier 3 or higher threat status). | No  | 3       | Pittwater , Cumberland, Sydney Cataract, Wyong and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

## 7.3 Species credit classes

Table 7.5 – Species credit summary

| Species                                                 | Veg. zones                 | Area (ha) / count | Credits |
|---------------------------------------------------------|----------------------------|-------------------|---------|
| <i>Callocephalon fimbriatum</i> / Gang-gang Cockatoo    | 1841_remnant, 1841_managed | 0.62              | 7       |
| <i>Calyptorhynchus lathamii</i> / Glossy Black-Cockatoo | 1841_remnant, 1841_managed | 0.62              | 7       |
| <i>Cercartetus nanus</i> / Eastern Pygmy-possum         | 1841_remnant, 1841_managed | 0.93              | 11      |
| <i>Chalinolobus dwyeri</i> / Large-eared Pied Bat       | 1841_remnant, 1841_managed | 0.93              | 16      |
| <i>Deyeuxia appressa</i> / Deyeuxia appressa            | 1841_remnant               | 5 individuals     | 15      |
| <i>Hieraaetus morphnoides</i> / Little Eagle            | 1841_remnant, 1841_managed | 0.93              | 8       |

| Species                                                       | Veg. zones                    | Area (ha) / count | Credits |
|---------------------------------------------------------------|-------------------------------|-------------------|---------|
| <i>Litoria aurea</i> / Green and Golden Bell Frog             | 1841_remnant,<br>1841_managed | 0.93              | 11      |
| <i>Miniopterus australis</i> / Little Bent-winged Bat         | 1841_remnant,<br>1841_managed | 0.1               | 2       |
| <i>Miniopterus orianae oceanensis</i> / Large Bent-winged Bat | 1841_remnant,<br>1841_managed | 0.1               | 2       |
| <i>Myotis macropus</i> / Southern Myotis                      | 1841_remnant,<br>1841_managed | 0.47              | 6       |
| <i>Ninox connivens</i> / Barking Owl                          | 1841_remnant,<br>1841_managed | 0.84              | 9       |
| <i>Ninox strenua</i> / Powerful Owl                           | 1841_remnant,<br>1841_managed | 0.84              | 9       |
| <i>Petaurus norfolcensis</i> / Squirrel Glider                | 1841_remnant,<br>1841_managed | 0.93              | 11      |

All above-listed species need to be offset with the same species but anywhere in NSW.

The pricing of credits can vary greatly over time and it is advised that the proponent use the online Biodiversity Offset Payment Calculator tool to determine the current pricing of credits (<https://www.lmbc.nsw.gov.au/offsetpaycalc>).

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## Appendix 1. SAI impact assessment - species

The additional impact assessment provisions for threatened species to determine a Serious and Irreversible Impact (SAI) are outlined under Section 9.2 of the BAM (2020) and have been applied to the Large Bent-winged Bat, Little Bent-winged Bat, Large-eared Pied Bat and *Deyeuxia appressa* as follows below. These species have been assumed present for credit calculation as required by the BAM.

Measures taken to avoid the direct and indirect impact on species at risk of SAI are outlined in Section 5.2. We have consulted the Threatened Biodiversity Data Collection (TBDC) and other sources to enable the application of the four principles set out in clause 6.7 of the BC Reg. For the species considered this is summarized as follows:

| Common Name              | Principle |   |   |   | Justification                                                                | Reference |
|--------------------------|-----------|---|---|---|------------------------------------------------------------------------------|-----------|
|                          | 1         | 2 | 3 | 4 |                                                                              |           |
| Large Bent-winged Bat    |           |   |   | ✓ | The species is dependent on non-responding attribute (breeding habitat only) | TBDC      |
| Little Bent-winged Bat   |           |   |   | ✓ | The species is dependent on non-responding attribute (breeding habitat only) | TBDC      |
| Large-eared Pied Bat     |           |   |   | ✓ | The species is dependent on non-responding attribute (breeding habitat only) | TBDC      |
| <i>Deyeuxia appressa</i> |           | ✓ | ✓ |   | Very small population size; restricted distribution                          | TBDC      |

The criteria as specified in Section 9.1.2.4 of the BAM required to be considered for candidate SAI species nominated is with respect to Principles 1–3 only. As these do not apply to the microbat species considered, a summary is provided below:

**Large Bent-winged Bat & Little Bent-winged Bat** – These species are allocated to species credit class for breeding habitat only. Species sensitivity to loss is indicated by the TBDC as ‘moderate’. Species sensitivity to potential gain for breeding is ‘very high’. Species sensitivity to potential gain for foraging is ‘high’.

The Large Bent-winged Bat and Little Bent-winged Bat have not been recorded onsite but have been assumed present for credit calculation purposes (see Section 4.3.2(e)).

Any impacts on breeding habitat could be considered potentially serious and irreversible. ‘Potential breeding habitat’ as defined by *The BAM Bat Guide* for these species includes “caves, tunnels, mines or other structures known or suspected to be used”. No such habitat exists within the subject land, although there are rock features outside the subject land to the south-west that may provide potential breeding habitat (Figure 3.2). As these habitat features will not be impacted by the proposal, and are outside the subject land, there will be no likely SAI on Large Bent-winged Bat or Little Bent-winged Bat. Further targeted survey of these features for presence of bat breeding habitat is recommended for the Large-eared Pied Bat (see below), and this will advise on these other two species.

**Large-eared Pied Bat** – Insufficient information is available on the species’ distribution and ecology to guide effective management (DPIE – Saving Our Species Strategies). This is a species credit species. Species sensitivity to loss is indicated by the TBDC as ‘moderate’. Species sensitivity to potential gain is ‘very high’.

The Large-eared Pied Bat has been recorded by Keystone Ecological in 2017 with probable level of certainty. No surveys have been undertaken to determine presence of potential breeding habitat and breeding individuals in accordance with the BAM. Subsequently, the species is assumed present for the purposes of this BDAR and species credit assessment.

The '*Species credit threatened bats and their habitats – NSW survey guide for the Biodiversity Assessment Method (The BAM Bat Guide)*' outline how to define presence of important 'breeding habitat'. Species polygons for offsetting calculations have also been generated in accordance with Table 1 of this guide.

The SAI threshold for this species is potential breeding habitat and presence of breeding individuals. Potential breeding habitat for this species is defined by The BAM Bat Guide as "The PCTs associated with the species (as per the TBDC) within 100m of rocky areas containing caves, or overhangs or crevices, cliffs or escarpments, or old mines, tunnels, culverts, derelict concrete buildings."

Sandstone overhangs and small open caves have been recorded within the study area along escarpment within 100 m of the habitat subject land. These are consistent with 'potential breeding habitat' as defined by Section 3.3 of *The BAM Bat Guide*. All recorded overhangs are located within 100 m of the subject land, and a 50 m buffer radius has been applied to generate the species polygon (as defined by the *The BAM Bat Guide* and TBDC). The proposal potentially impacts on breeding habitat, but surveys must be undertaken as per the Threatened Bat Survey Guide to confirm presence of the species and any breeding individuals.

In order to accurately assess potential SAI on Large-eared Pied Bat, further survey is required to finalise the SAI assessment for this species. This would involve harp trapping in areas of the potential breeding habitat features between mid-November and end of January. Age, sex and reproductive status of captured bats must be assessed and recorded.

### ***Deyeuxia appressa***

This species is very rare grass and has only been recorded in two localities: first in 1930 at Herne Bay, Saltpan Creek, off the Georges River, south of Bankstown, then in 1941 from Killara, near Hornsby. It is very likely that this species is extinct as no more recent records have been made in the last 80 years. There is very low probability that this species would be present on the subject land, but as virtually nothing is known about the ecology and habitat constraints required for this species, we cannot exclude as a candidate species. As survey has not been undertaken in December, in accordance with the BAM, we have assumed presence for the purposes of credit calculation.

As per Section 9.1.2.4 of the BAM 2020 the following information, where available, is provided to determine SAI:

#### **The impact on the species' population (Principles 1 and 2) presented by:**

- (a) an estimate of the number of individuals (mature and immature) present in the subpopulation on the subject land (the site may intersect or encompass the subpopulation) and as a percentage of the total NSW population, and

**Response:** The species has not been recorded on the subject land, yet target survey has not been undertaken in the correct month of December. This species is assessed by count of individuals, rather than area, although the data deficient status of this species makes an estimate of count difficult. As there are only two individuals ever recorded and the site is moderately to highly disturbed we consider that, if present, there would only be a few individuals within the site. Subsequently, we have assumed a very conservative five individuals per vegetation zone (Zone 1, Zone 2), which totals to 10 individuals for the subject land. The total size of the population within NSW is unknown, but as there have only

ever been four collections made, it can be assumed that the population, if extant, would be very small.

- (b) an estimate of the number of individuals (mature and immature) to be impacted by the proposal and as a percentage of the total NSW population, or

**Response:** No individuals have been recorded, but for the purposes of credit calculation we have assumed an impact on 10 plants. This is likely to be an over estimate, as only four collections have ever been made of this species. The total population in NSW is unknown.

- (c) if the species' unit of measure is area, provide data on the number of individuals on the site, and the estimated number that will be impacted, along with the area of habitat to be impacted by the proposal

**Response:** n/a

**impact on geographic range (Principles 1 and 3) presented by:**

- (d) the area of the species' geographic range to be impacted by the proposal in hectares, and a percentage of the total AOO, or EOO within NSW

**Response:** The TDBC does not specify the total AOO, or EOO within NSW.

- (e) the impact on the subpopulation as either: all individuals will be impacted (subpopulation eliminated); OR impact will affect some individuals and habitat; OR impact will affect some habitat, but no individuals of the species will be directly impacted

**Response:** No individuals have been recorded, but for the purposes of credit calculation we have assumed an impact on 10 plants. This is likely to be an over estimate, as only four collections have ever been made of this species. The existence and total size of any subpopulation in is unknown. Targeted survey in December is recommended to assist in this assessment.

- (f) to determine if the persisting subpopulation that is fragmented will remain viable, estimate (based on published and unpublished sources such as scientific publications, technical reports, databases or documented field observations) the habitat area required to support the remaining population, and habitat available within dispersal distance, and distance over which genetic exchange can occur (e.g. seed dispersal) and pollination distance for the species

**Response:** The proposal will not fragment any areas of native vegetation or habitat. No published information is available on the ecology or habitat requirements of this species, including dispersal and pollination distance.

- (g) to determine changes in threats affecting remaining subpopulations and habitat if the proposed impact proceeds, estimate changes in environmental factors including changes to fire regimes (frequency, severity); hydrology, pollutants; species interactions (increased competition and effects on pollinators or dispersal); fragmentation, increased edge effects, likelihood of disturbance; and disease, pathogens and parasites. Where these factors have been considered elsewhere in relation to the target species, the assessor may refer to the relevant sections of the BDAR or BCAR.

**Response:** As the area of impact is minimal, there will be no notable changes in threats affecting remaining subpopulations (if extant) or habitat.

## Appendix 2. PLOT DATASHEETS

## Appendix 3. STAFF QUALIFICATIONS AND EXPERIENCE

| Team member (role)                        | Accreditations and qualifications                                                                                                                                                                                                                                                                                                                                                                                                 | Experience                                                                                                                                                                                                                                                                      | Employment history                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Skills and expertise                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| George Plunkett (Botanist)                | <ul style="list-style-type: none"> <li>Biodiversity Assessment Method (BAM) Assessor (Accredited Assessor no. BAAS19010)</li> <li>PhD – Plant systematics, ecology and evolution</li> <li>Bachelor of Science (Honours) – Ecology / Botany, University of New England (UNE), NSW</li> <li>Four-wheel drive vehicle operation</li> <li>Senior First Aid Certificate</li> </ul>                                                     | George has 12 years of experience as a plant taxonomist, flora ecologist and botanist, including a PhD in plant systematics, ecology and evolution, and has a very well-developed understanding of the Australian flora.                                                        | <ul style="list-style-type: none"> <li>2017-Current: Botanist, Travers bushfire &amp; ecology</li> <li>2016-2017: Research Botanist, UNE</li> <li>2010-2011: Research Botanist, UNE</li> <li>2008-2009: Plant Ecologist, Ecotone Flora Fauna Consultants</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                              | <ul style="list-style-type: none"> <li>High-quality report writing</li> <li>Application of the BAM and BOS</li> <li>Highly experienced in botanical survey and ecological analysis</li> <li>Plant identification and taxonomy</li> <li>Flora and fauna assessment</li> <li>Threatened species, ecological communities and endangered population surveys and analysis</li> <li>Habitat tree analysis and assessment</li> <li>Noxious weed identification</li> <li>Tree assessment</li> </ul> |
| Michael Sheather-Reid (Managing Director) | <ul style="list-style-type: none"> <li>Bachelor of Natural Resources (Hons), University of New England</li> <li>BioBanking Assessor</li> <li>Engineering Assistant – CAD Drafting</li> <li>MUSIC Modelling – Stormwater quality and quantity modelling (RMIT)</li> <li>Bush Regeneration II Certificate, Ryde TAFE</li> <li>NSW WorkCover OHS Construction Induction</li> <li>Chemical Handling Certificate, Ryde TAFE</li> </ul> | Michael has a wealth of experience in environmental consulting and on ground management of bushland, wetland and riparian habitats having undertaken environmental assessment, ecological consultancy and restoration in both the private and public sectors for over 22 years. | <ul style="list-style-type: none"> <li>2007- Current: Senior Ecologist, Travers bushfire &amp; ecology</li> <li>2004 -2007: Senior Ecologist, Conacher Travers Pty Ltd</li> <li>2002-2004: Project Manager, Urban Bushland Management Projects Pty Ltd</li> <li>1999-2002: Project Manager Sustainable Vegetation Management Pty Ltd</li> <li>1995-1999: Managing Director Sheather-Reid &amp; Associates Pty Ltd</li> <li>1996-1997: NSW Landcare Liaison Officer, Australian Conservation Foundation</li> <li>1992-1995: Environmental Officer, Dept. Land &amp; Water Conservation</li> <li>1990-1992: Scientific Officer Dept. of Water Resources</li> </ul> | <ul style="list-style-type: none"> <li>Ecological assessment</li> <li>Rezoning studies</li> <li>Biodiversity offset planning</li> <li>Restoration management and coordination</li> <li>Biotic and soil translocation</li> <li>Watercourse assessment</li> <li>Project ecologist services</li> <li>EPBC Act referrals</li> <li>Controlled Activity Approvals</li> <li>Vegetation management plans</li> </ul>                                                                                 |

| Team member (role)              | Accreditations and qualifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Experience                                                                                                                                                                                                                                                                                                                            | Employment history                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Skills and expertise                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sandy Cardow (GIS officer)      | <ul style="list-style-type: none"> <li>Bachelor of Science (Biological Sciences) (Macquarie University)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Sandy has over twenty years of experience in Spatial Information (Geographic Information Systems (GIS)), which includes preparation of mapping in local government roles and has completed a Bachelor of Science (Biological Sciences).                                                                                               | <ul style="list-style-type: none"> <li>2017 – Current: GIS Officer, Travers bushfire &amp; ecology</li> <li>2014 – 2017: GIS Consultant, Forestry Corp. NSW</li> <li>2005 – 2011: GIS Analyst, Forests NSW</li> <li>2002 – 2005: GIS Data Librarian, Forests NSW</li> <li>2000 – 2002: GIS Operator, Forests NSW</li> <li>2000 – 2002: GIS Data Import / Export Officer, Forests NSW</li> <li>1999 2000: GIS Project Officer DECC</li> <li>1998 – 1999: GIS Support Officer DECC</li> <li>1998 – 1999: Wildlife Atlas Data Entry Officer DECC</li> </ul> | <ul style="list-style-type: none"> <li>Geographic Information Systems</li> <li>Data management and analysis</li> <li>Spatial databases and database administration</li> <li>GPS</li> <li>Cartography</li> <li>Natural resource management</li> <li>Client liaison</li> </ul>                                                                                                                                                                                                                          |
| Lachlan McRae (Fauna ecologist) | <ul style="list-style-type: none"> <li>Bachelor of Environmental Science and Management (majoring in Biodiversity and Ecosystems)</li> <li>Bachelor of Environmental Science and Management HONOURS – 1st Class</li> <li>Anabat Insight Advanced Workshop – Titley Scientific</li> <li>Kaleidoscope Pro Advanced Training – Wildlife Acoustics</li> <li>Drive and Recover a 4WD – Out of Town 4WD</li> <li>Provide First Aid – St John Ambulance</li> <li>Trim and Cut Felled Trees and Maintain Chainsaws – Chainsaw Accreditation and Safety</li> <li>Mammal &amp; Amphibian Handling &amp; Microchipping Training – University of Newcastle/Australian Wildlife Conservancy</li> <li>Advanced Reptile Keepers Licence</li> </ul> | Lachlan has several years' experience in fauna survey techniques, threatened species target surveys, acoustic data analysis, and active call identification of vertebrate fauna within coastal habitats of NSW. He has specialist bat identification skills and experience leading threatened species field surveys in NSW, SA, & NT. | <ul style="list-style-type: none"> <li>2019 – 2021: Amphibian Research Assistant - University of Newcastle</li> <li>Jan-Feb 2020: Botanical Intern - Canberra National Herbarium</li> <li>July-Dec 2021: Ecology and Conservation Intern - Australian Wildlife Conservancy</li> <li>2020 – Current: Fauna Ecologist - Travers bushfire &amp; ecology</li> </ul>                                                                                                                                                                                          | <ul style="list-style-type: none"> <li>Threatened fauna target surveys &amp; assessment</li> <li>Flora and fauna species identification</li> <li>Report writing to a high scientific standard</li> <li>Bioacoustic analysis for all fauna groups</li> <li>Microbat identification, harp trapping, and reference call collection</li> <li>Pitfall and radiotracking surveys targeting threatened mammal species</li> <li>Thorough knowledge of experimental design and statistical analysis</li> </ul> |

| Team member (role)                | Accreditations and qualifications                                                                                                                      | Experience                                                                                                                                                                                                                                                                                                       | Employment history                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Skills and expertise                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Corrine Edwards (Fauna Ecologist) | <ul style="list-style-type: none"> <li>Bachelor of Environmental Science and Management. (Hons) (University of New South Wales) (2016-2020)</li> </ul> | Corrine has over 10 years' experience in fauna survey techniques, researching ecological interactions and identification of vertebrate fauna within a magnitude of Australian habitats. She is experienced in leading research projects, experimental design, data collection, data analysis and report writing. | <ul style="list-style-type: none"> <li>2021 – Current: Fauna Ecologist, Travers Bushfire and Ecology</li> <li>2020 – Recipient of the Marilyn Fox Environmental Science Prize</li> <li>2019 – 2020: Research scholarship fellow at the Fowlers Gap Research Station</li> <li>2019 – Research assistant at University of NSW</li> <li>2015-2016 – Reptile Research Assistant, Adelaide Museum</li> <li>2014 – 2015 Amphibian Research Assistant, University of Western Australia</li> <li>2012-14 – Reptile Zookeeper – Australian Reptile Park</li> </ul> | <ul style="list-style-type: none"> <li>Survey techniques for all major vertebrate fauna groups (including threatened species target searches)</li> <li>Fauna identification, morphology and behaviour</li> <li>Fauna field assessment</li> <li>Microhabitat identification</li> <li>Project ecology</li> <li>Experimental design and statistical analysis</li> <li>Scientific report writing</li> </ul> |

## Appendix 4. BAM-C OUTPUTS

**BAM Site – Field Survey Form** Site Sheet no: 1 of 1

| Date                 |          | Survey Name                 | Zone ID         | Recorders                |            |                   |
|----------------------|----------|-----------------------------|-----------------|--------------------------|------------|-------------------|
| 18/10/2021           |          | Greenwich BAM 01 / 18/10/21 | BAM01           | Di'Warman                |            |                   |
| Zone                 | Datum    | Plot ID                     | Plot dimensions | Photo #                  |            |                   |
| 56                   | GDA94    | BAM01                       | 20x50           | ✓                        |            |                   |
| Easting              | Northing | IBRA region                 | In m            | Midline bearing from 0 m | Magnetic ° |                   |
| 332045               | 6255458  |                             |                 | 10° N                    |            |                   |
| Vegetation Class     |          | Open Forest.                |                 |                          |            | Confidence: H M L |
| Plant Community Type |          | PCT 1776                    |                 |                          |            | Confidence: H M L |
|                      |          |                             |                 |                          | EEC: tick  |                   |

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

| BAM Attribute (400 m² plot)                                 | Sum values |
|-------------------------------------------------------------|------------|
| Count of Native Richness                                    |            |
| Trees                                                       |            |
| Shrubs                                                      |            |
| Grasses etc.                                                |            |
| Forbs                                                       |            |
| Ferns                                                       |            |
| Other                                                       |            |
| Sum of Cover of native vascular plants by growth form group |            |
| Trees                                                       |            |
| Shrubs                                                      |            |
| Grasses etc.                                                |            |
| Forbs                                                       |            |
| Ferns                                                       |            |
| Other                                                       |            |
| High Threat Weed cover                                      |            |

| BAM Attribute (1000 m² plot)                           |                    |                      |
|--------------------------------------------------------|--------------------|----------------------|
| DBH                                                    | # Tree Stems Count | # Stems with Hollows |
| 80 + cm                                                | 1 1 1              | 3                    |
| 50 – 79 cm                                             | 1 1 1              |                      |
| 30 – 49 cm                                             | 1                  |                      |
| 20 – 29 cm                                             | 1                  |                      |
| 10 – 19 cm                                             | 1 1 1              |                      |
| 5 – 9 cm                                               | 1                  |                      |
| < 5 cm                                                 |                    | n/a                  |
| Length of logs (m) (≥10 cm diameter, >50 cm in length) |                    |                      |
| 10m Tally space                                        |                    |                      |

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

| BAM Attribute (1 x 1 m plots) | Litter cover (%) | Bare ground cover (%) | Cryptogam cover (%) | Rock cover (%) |
|-------------------------------|------------------|-----------------------|---------------------|----------------|
| Subplot score (% in each)     | 95 95 98 90 90   | a 1 2 1 5 5           | a b c d e           | a b c d 10     |
| Average of the 5 subplots     |                  |                       |                     |                |

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

**Physiography + site features that may help in determining PCT and Management Zone (optional)**

|                    |                  |                      |                  |                 |                                    |                 |
|--------------------|------------------|----------------------|------------------|-----------------|------------------------------------|-----------------|
| Morphological Type | S/Slope outcrop. | Landform Element     | Landform Pattern | Slope           | Microrelief                        | S/Slope outcrop |
| Lithology          | sandstone.       | Soil Surface Texture | Soil Colour      | dark red brown. | Soil Depth                         | ?               |
| Slope              |                  | Aspect               | Site Drainage    | ?               | Distance to nearest water and type | ?               |

| Plot Disturbance                | Severity code | Age code | Observational evidence:                      |
|---------------------------------|---------------|----------|----------------------------------------------|
| Clearing (inc. logging)         | 2             | R        | Underscrubbing. limited shrub & ground cover |
| Cultivation (inc. pasture)      | —             | —        |                                              |
| Soil erosion                    | —             | —        |                                              |
| Firewood / CWD removal          | —             | —        |                                              |
| Grazing (identify native/stock) | —             | —        |                                              |
| Fire damage                     | —             | —        |                                              |
| Storm damage                    | —             | —        |                                              |
| Weediness                       | 2             | —        |                                              |
| Other                           |               |          |                                              |

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

| 400 m <sup>2</sup> plot: Sheet | Survey Name        | Plot Identifier | Recorders |
|--------------------------------|--------------------|-----------------|-----------|
| 1 of 1                         | 1875A08X Greenwich | BAM 01          | DI WARMAN |
| Date                           | 18/10/2021         |                 |           |

| GF Code | Top 3 native species in each growth form group: Full species name mandatory<br>All other native and exotic species: Full species name where practicable | N, E or HTE | Cover | Abund | stratum | voucher |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------|-------|---------|---------|
| T       | 1 <i>Eucalyptus pilularis</i>                                                                                                                           | N           | 2     | III   |         |         |
| T       | 2 <i>E. resinifera</i>                                                                                                                                  | N           | 2     | III   |         |         |
| T       | 3 <i>E. saligna</i>                                                                                                                                     | N           | 3     | III   |         |         |
| T       | 4 <i>Ficus rubiginosa</i>                                                                                                                               | N           | 0.5   |       |         |         |
| G       | 5 <i>Oplismenus aemulus</i>                                                                                                                             | N           | 0.5   |       |         |         |
| G       | 6 <i>Dichondra repens</i>                                                                                                                               | N           | 0.5   |       |         |         |
| T       | 7 <i>Pittosporum undulatum</i>                                                                                                                          | N           | 2     |       |         |         |
| G       | 8 <i>Asparagus setchuanicus</i>                                                                                                                         | E           | 0.5   |       |         |         |
| V       | 9 <i>Ipomoea cairica</i>                                                                                                                                | E           | 0.5   |       |         |         |
| T       | 10 <i>Cinnamomum camphora</i>                                                                                                                           | E           | 2     |       |         |         |
| T       | 11 <i>Legustrum lucidum</i>                                                                                                                             | E           | 2     |       |         |         |
| V       | 12 <i>Anredera cordifolia</i>                                                                                                                           | E           | 0.5   |       |         |         |
| G       | 13 <i>Ehrharta erecta</i>                                                                                                                               | E           | 0.5   |       |         |         |
| S       | 14 <i>Ochna serrulata</i>                                                                                                                               | E           | 0.5   |       |         |         |
| G       | 15 <i>Fumario sp.</i>                                                                                                                                   | E           | 0.5   |       |         |         |
| S       | 16 <i>Plibiscus sp.</i>                                                                                                                                 | E           | 0.5   |       |         |         |
| S       | 17 <i>Solanum nigrum</i>                                                                                                                                | E           | 0.5   |       |         |         |
| S       | 18 <i>Cotoneaster sp.</i>                                                                                                                               | E           | 0.5   |       |         |         |
| G       | 19 <i>Allocaasia macrocarpa</i>                                                                                                                         | E           | 0.5   |       |         |         |
| V       | 20 Fabaceae (pink flower, trifoliate leaf)                                                                                                              | E           | 0.5   |       |         |         |
| S       | 21 Snowball tree                                                                                                                                        | E           | 0.5   |       |         |         |
| T       | 22 <i>Erythrina x sykesii</i>                                                                                                                           | E           | 3     |       |         |         |
| G       | 23 <i>Oxalis sp.</i>                                                                                                                                    | E           | 0.1   |       |         |         |
| T       | 24 <i>Glochidion ferdinand ferdinand</i>                                                                                                                | N           | 0.5   |       |         |         |
| G       | 25 <i>Commelina cyanea</i>                                                                                                                              | N           | 0.5   |       |         |         |
| G       | 26 <i>Mediola caroliniana</i>                                                                                                                           | E           | 0.5   |       |         |         |
| G       | 27 Nutgrass                                                                                                                                             | E           | 0.5   |       |         |         |
| V       | 28 <del>Hederata helix</del> <i>Hedera helix</i>                                                                                                        | E           | 0.5   |       |         |         |
| S       | 29 <i>Ligustrum sinense</i>                                                                                                                             | E           | 0.5   |       |         |         |
| T       | 30 <i>Olea europaea</i>                                                                                                                                 | E           | 0.5   |       |         |         |
| G       | 31 <i>Lactuca scariola</i>                                                                                                                              | E           | 0.1   |       |         |         |
| T       | 32 <i>Syagrus romanzoffiana</i> (seedling)                                                                                                              | E           | 0.1   |       |         |         |
| G       | 33 <i>Sida rhombifolia</i>                                                                                                                              | E           | 0.5   |       |         |         |
|         | 34                                                                                                                                                      |             |       |       |         |         |
|         | 35                                                                                                                                                      |             |       |       |         |         |
|         | 36                                                                                                                                                      |             |       |       |         |         |
|         | 37                                                                                                                                                      |             |       |       |         |         |
|         | 38                                                                                                                                                      |             |       |       |         |         |
|         | 39                                                                                                                                                      |             |       |       |         |         |
|         | 40                                                                                                                                                      |             |       |       |         |         |

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF - circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

**BAM Site – Field Survey Form** Site Sheet no: 1 of 1

| Date                 |          | Survey Name          | Zone ID         | Recorders                |             |
|----------------------|----------|----------------------|-----------------|--------------------------|-------------|
| 18 / 10 / 21         |          | 18TSACX<br>Greenwich | BAM02           | Di WARMAN                |             |
| Zone                 | Datum    | Plot ID              | Plot dimensions | Photo #                  |             |
| 56                   | GDA94    | PCT 1778             |                 | BAM02                    |             |
| Easting              | Northing | IBRA region          | In m            | Midline bearing from 0 m | Magnetic °  |
|                      |          |                      |                 |                          |             |
| Vegetation Class     |          |                      |                 |                          | Confidence: |
| Open Forest.         |          |                      |                 |                          | H M L       |
| Plant Community Type |          |                      |                 |                          | Confidence: |
| 1778.                |          |                      |                 |                          | H M L       |
| EEC: tick            |          |                      |                 |                          |             |

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot.

| BAM Attribute (400 m <sup>2</sup> plot)                     | Sum values |
|-------------------------------------------------------------|------------|
| Count of Native Richness                                    |            |
| Trees                                                       |            |
| Shrubs                                                      |            |
| Grasses etc.                                                |            |
| Forbs                                                       |            |
| Ferns                                                       |            |
| Other                                                       |            |
| Sum of Cover of native vascular plants by growth form group |            |
| Trees                                                       |            |
| Shrubs                                                      |            |
| Grasses etc.                                                |            |
| Forbs                                                       |            |
| Ferns                                                       |            |
| Other                                                       |            |
| High Threat Weed cover                                      |            |

| BAM Attribute (1000 m <sup>2</sup> plot)                  |                    |                      |
|-----------------------------------------------------------|--------------------|----------------------|
| DBH                                                       | # Tree Stems Count | # Stems with Hollows |
| 80 + cm                                                   |                    |                      |
| 50 – 79 cm                                                | 1 1 1              |                      |
| 30 – 49 cm                                                | 1                  |                      |
| 20 – 29 cm                                                | 1                  |                      |
| 10 – 19 cm                                                | 1 1 1              |                      |
| 5 – 9 cm                                                  | 1 1 1              |                      |
| < 5 cm                                                    | 1                  | n/a                  |
| Length of logs (m)<br>(≥10 cm diameter, >50 cm in length) | Tally space        |                      |

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30..., 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

| BAM Attribute (1 x 1 m plots) | Litter cover (%) |    |   |    |    | Bare ground cover (%) |    |   |    |    | Cryptogam cover (%) |   |   |   |   | Rock cover (%) |   |    |   |   |
|-------------------------------|------------------|----|---|----|----|-----------------------|----|---|----|----|---------------------|---|---|---|---|----------------|---|----|---|---|
| Subplot score (% in each)     | 40               | 90 | 5 | 50 | 50 | 60                    | 10 | 0 | 35 | 50 | a                   | b | c | d | e | a              | b | 35 | d | e |
| Average of the 5 subplots     |                  |    |   |    |    |                       |    |   |    |    |                     |   |   |   |   |                |   |    |   |   |

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

**Physiography + site features that may help in determining PCT and Management Zone (optional)**

|                    |     |                      |                       |                  |  |                                    |  |
|--------------------|-----|----------------------|-----------------------|------------------|--|------------------------------------|--|
| Morphological Type |     | Landform Element     |                       | Landform Pattern |  | Microrelief                        |  |
| Lithology          |     | Soil Surface Texture | dark brown sandy loam | Soil Colour      |  | Soil Depth                         |  |
| Slope              | 45° | Aspect               | South                 | Site Drainage    |  | Distance to nearest water and type |  |

| Plot Disturbance                | Severity code | Age code | Observational evidence:                          |
|---------------------------------|---------------|----------|--------------------------------------------------|
| Clearing (inc. logging)         | 2             | R        | Brush Regeneration activity. (Lane Cove Council) |
| Cultivation (inc. pasture)      | -             |          | track work signage and some plants               |
| Soil erosion                    | -             |          | poisoned                                         |
| Firewood / CWD removal          | -             |          |                                                  |
| Grazing (identify native/stock) | -             |          |                                                  |
| Fire damage                     | -             |          |                                                  |
| Storm damage                    | -             |          |                                                  |
| Weediness                       | 3             | R        |                                                  |
| Other                           | -             |          |                                                  |

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

|                                                     |                 |                 |                  |
|-----------------------------------------------------|-----------------|-----------------|------------------|
| 400 m <sup>2</sup> plot: Sheet <u>1</u> of <u>1</u> | Survey Name     | Plot Identifier | Recorders        |
| Date <u>18/10/2021</u>                              | <u>18TSA08x</u> | <u>BAM 02</u>   | <u>DI WARMAN</u> |

| GF Code | Top 3 native species in each growth form group: Full species name mandatory<br>All other native and exotic species: Full species name where practicable | N, E or HTE | Cover | Abund | stratum | voucher |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-------|-------|---------|---------|
| T       | 1 <i>Ficus rubiginosa</i>                                                                                                                               | N           | 5     |       |         |         |
| T       | 2 <i>Brachychiton acerifolius</i>                                                                                                                       | N           | 1     |       |         |         |
| T       | 3 <i>Ligustrum lucidum</i>                                                                                                                              | E           | 2     |       |         |         |
| G       | 4 <i>Asparagus aethiopicus</i>                                                                                                                          | E           | 1     |       |         |         |
| G       | 5 <i>Tradescantia fluminensis</i>                                                                                                                       | E           | 1     |       |         |         |
| T       | 6 <i>Pittosporum undulatum</i>                                                                                                                          | N           | 1     |       |         |         |
| V       | 7 <i>Ipomoea cairica</i>                                                                                                                                | E           | 0.5   |       |         |         |
| G       | 8 <i>Nephrolepis cordifolia</i>                                                                                                                         |             | 0.5   |       |         |         |
| T       | 9 <i>Ligustrum sinense</i>                                                                                                                              | E           | 0.5   |       |         |         |
| T       | 10 <i>Strelitzia regina</i>                                                                                                                             | E           | 0.5   |       |         |         |
| V       | 11 <i>Anredera cordifolia</i>                                                                                                                           | E           | 0.5   |       |         |         |
| G       | 12 <i>Asplenium australasicum</i>                                                                                                                       | N           | 0.5   |       |         |         |
| S       | 13 <i>Ochna serrulata</i>                                                                                                                               | E           | 2     |       |         |         |
| T       | 14 <i>Cinnamomum camphora</i>                                                                                                                           | E           | 0.5   |       |         |         |
| S       | 15 <i>Hibiscus</i> sp.                                                                                                                                  |             | 0.5   |       |         |         |
| T       | 16 <i>Glochidion ferdinandi</i> <del>and ferdinand</del>                                                                                                | N           | 0.5   |       |         |         |
| T       | 17 <i>Podocarpus spicatus</i>                                                                                                                           | N           | 0.5   |       |         |         |
| V       | 18 <i>Eustrephus latifolius</i>                                                                                                                         | N           | 0.5   |       |         |         |
| S       | 19 <i>Notelaea longifolia</i>                                                                                                                           | N           | 0.5   |       |         |         |
| T       | 20 <i>Elaeocarpus reticulatus</i>                                                                                                                       | N           | 0.5   |       |         |         |
| G       | 21 <i>Oplismenus aemulus</i>                                                                                                                            | N           | 0.5   |       |         |         |
| G       | 22 <i>Bidens pilosa</i>                                                                                                                                 | E           | 0.5   |       |         |         |
| T       | 23 <i>Ceratopetalum apetalum</i>                                                                                                                        | N           | 0.5   |       |         |         |
| V       | 24 <i>Gynochthodes jasminoides</i>                                                                                                                      | N           | 0.5   |       |         |         |
| F       | 25 <i>Adiantum hispidulum</i>                                                                                                                           | N           | 0.5   |       |         |         |
| V       | 26 <i>Smilax glycyfla</i>                                                                                                                               | N           | 0.5   |       |         |         |
| T       | 27 <i>Cyathia leichhardtiana</i>                                                                                                                        | N           | 0.5   |       |         |         |
| T       | 28 <i>Livistona australis</i>                                                                                                                           | N           | 0.5   |       |         |         |
| T       | 29 <i>Eucalyptus pilularis</i>                                                                                                                          | N           | 3     |       |         |         |
| G       | 30 <i>Lomandra longifolia</i>                                                                                                                           | N           | 0.5   |       |         |         |
|         | 31                                                                                                                                                      |             |       |       |         |         |
|         | 32                                                                                                                                                      |             |       |       |         |         |
|         | 33                                                                                                                                                      |             |       |       |         |         |
|         | 34                                                                                                                                                      |             |       |       |         |         |
|         | 35                                                                                                                                                      |             |       |       |         |         |
|         | 36                                                                                                                                                      |             |       |       |         |         |
|         | 37                                                                                                                                                      |             |       |       |         |         |
|         | 38                                                                                                                                                      |             |       |       |         |         |
|         | 39                                                                                                                                                      |             |       |       |         |         |
|         | 40                                                                                                                                                      |             |       |       |         |         |

GF Code: see Growth Form definitions in Appendix 1

N: native, E: exotic, HTE: high threat exotic

GF – circle code if 'top 3'.

Cover: 0.1, 0.2, 0.3, ..., 1, 2, 3, ..., 10, 15, 20, 25, ...100% (foliage cover); Note: 0.1% cover represents an area of approximately 63 x 63 cm or a circle about 71 cm across, 0.5% cover represents an area of approximately 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10 m

Abundance: 1, 2, 3, ..., 10, 20, 30, ... 100, 200, ..., 1000, ...

|                                     |                 |                       |          |                                 |                |                         |                                              |
|-------------------------------------|-----------------|-----------------------|----------|---------------------------------|----------------|-------------------------|----------------------------------------------|
| <b>BAM Site – Field Survey Form</b> |                 |                       |          |                                 |                | Site Sheet no: <u>2</u> |                                              |
|                                     |                 | <b>Survey Name</b>    |          | <b>Zone ID</b>                  |                | <b>Recorders</b>        |                                              |
| <b>Date</b>                         | <u>3 2 22</u>   | <u>155A Greenwich</u> |          | <u>GP</u>                       |                |                         |                                              |
| <b>Zone</b>                         | <b>Datum</b>    | <b>Plot ID</b>        | <u>3</u> | <b>Plot dimensions</b>          | <u>20 x 40</u> | <b>Photo #</b>          | <u>1</u>                                     |
| <b>Easting</b>                      | <b>Northing</b> | <b>IBRA region</b>    |          | <b>Midline bearing from 0 m</b> |                |                         |                                              |
| <b>Vegetation Class</b>             |                 |                       |          |                                 |                |                         |                                              |
| <b>Plant Community Type</b>         |                 |                       |          |                                 |                | <b>EEC:</b>             | Confidence:<br>H M L<br>Confidence:<br>H M L |

Record easting and northing at 0 m or midline. Dimensions (Shape) of 0.04 ha base plot

| BAM Attribute (400 m <sup>2</sup> plot)                     |              | Sum values |
|-------------------------------------------------------------|--------------|------------|
| Count of Native Richness                                    | Trees        |            |
|                                                             | Shrubs       |            |
|                                                             | Grasses etc. |            |
|                                                             | Forbs        |            |
|                                                             | Ferns        |            |
|                                                             | Other        |            |
| Sum of Cover of native vascular plants by growth form group | Trees        |            |
|                                                             | Shrubs       |            |
|                                                             | Grasses etc. |            |
|                                                             | Forbs        |            |
|                                                             | Ferns        |            |
|                                                             | Other        |            |
| <b>High Threat Weed cover</b>                               |              |            |

| BAM Attribute (1000 m <sup>2</sup> plot)                         |                    |                      |
|------------------------------------------------------------------|--------------------|----------------------|
| DBH                                                              | # Tree Stems Count | # Stems with Hollows |
| 80 + cm                                                          | <u>1</u>           | /                    |
| 50 – 79 cm                                                       | <u>1</u>           |                      |
| 30 – 49 cm                                                       | <u>✓</u>           |                      |
| 20 – 29 cm                                                       | <u>✓</u>           |                      |
| 10 – 19 cm                                                       | <u>✓</u>           |                      |
| 5 – 9 cm                                                         | <u>✓</u>           |                      |
| < 5 cm                                                           | <u>✓</u>           | n/a                  |
| <b>Length of logs (m)</b><br>(≥10 cm diameter, >50 cm in length) |                    | <u>5</u>             |

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30, ... 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

| BAM Attribute (1 x 1 m plots) | Litter cover (%)       | Bare ground cover (%) | Cryptogam cover (%) | Rock cover (%) |
|-------------------------------|------------------------|-----------------------|---------------------|----------------|
| Subplot score (% in each)     | <u>45 45 100 80 95</u> |                       |                     |                |
| Average of the 5 subplots     |                        |                       |                     |                |

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams.

### Physiography + site features that may help in determining PCT and Management Zone (optional)

|                    |                      |                  |                                    |
|--------------------|----------------------|------------------|------------------------------------|
| Morphological Type | Landform Element     | Landform Pattern | Microrelief                        |
| Lithology          | Soil Surface Texture | Soil Colour      | Soil Depth                         |
| Slope              | Aspect               | Site Drainage    | Distance to nearest water and type |

| Plot Disturbance                    | Severity code | Age code | Observational evidence: |
|-------------------------------------|---------------|----------|-------------------------|
| Clearing (inc. logging)             |               |          |                         |
| Cultivation (inc. pasture)          |               |          |                         |
| Soil erosion                        |               |          |                         |
| Firewood / CWD removal              |               |          |                         |
| Grazing (identifiable native stock) |               |          |                         |
| Fire damage                         |               |          |                         |
| Storm damage                        |               |          |                         |
| Weediness                           |               |          |                         |
| Other                               |               |          |                         |

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<3yrs), NR=not recent (3-10yrs), O=old (>10yrs)

| 400m <sup>2</sup> plot: Sheet of |                                                                                     | Survey Name              | Plot Identifier | Recorders |     |         |       |
|----------------------------------|-------------------------------------------------------------------------------------|--------------------------|-----------------|-----------|-----|---------|-------|
| Date                             | 8/2/22                                                                              | ISTSA Greenwich Hospital | P3              | CJP       |     |         |       |
| GF                               | Top 3 natives in each GF: Full species name mandatory. All others where practicable |                          |                 |           |     |         |       |
|                                  |                                                                                     |                          | N               | E         | HTE | Cover % | Abund |
| 1                                | <i>Anaphora costata</i>                                                             |                          | ✓               |           |     | 30      | 7     |
| 2                                | <i>Pittosporum undulatum</i>                                                        |                          | ✓               |           |     | 20      | 10    |
| 3                                | <i>Glochidion ferdinandi</i>                                                        |                          | ✓               |           |     | 5       | 3     |
| 4                                | <i>Asplenium</i>                                                                    |                          | ✓               |           |     | 0.1     | 1     |
| 5                                | <i>Desmanthes</i>                                                                   |                          | ✓               |           |     | 3       | 10    |
| 6                                | <i>Dicella caerulea</i>                                                             |                          | ✓               |           |     | 1       | 20    |
| 7                                | <i>Carochlaena dubia</i>                                                            |                          | ✓               |           |     | 8       | 30    |
| 8                                | <i>Lomandra longifolia</i>                                                          |                          | ✓               |           |     | 3       | 8     |
| 9                                | <i>Hibbertia dentata</i>                                                            |                          | ✓               |           |     | 0.1     | 3     |
| 10                               | <i>Ochra scutellata</i>                                                             |                          |                 | ✓         |     | 2       | 6     |
| 11                               | <i>Opismenus aemulus</i>                                                            |                          | ✓               |           |     | 3       | 80    |
| 12                               | <i>Eutolagia stricta</i>                                                            |                          | ✓               |           |     | 2       | 20    |
| 13                               | <i>Agapanthus</i>                                                                   |                          |                 | ✓         |     | 4       | 20    |
| 14                               | <i>Aiphanes aegyptiaca</i>                                                          |                          |                 | ✓         |     | 1       | 5     |
| 15                               | <i>Tradescantia fluminensis</i>                                                     |                          |                 | ✓         |     | 5       | 20    |
| 16                               | <i>Olea europaea</i>                                                                |                          |                 | ✓         |     | 1       | 1     |
| 17                               | <i>Cinnamomum camphora</i>                                                          |                          |                 | ✓         |     | 8       | 8     |
| 18                               | <i>Ligustrum lucidum</i>                                                            |                          |                 | ✓         |     | 1       | 2     |
| 19                               | exotic shrub - <i>Raphitopsis indica</i>                                            |                          |                 | ✓         |     | 2       | 10    |
| 20                               | <i>Pteridium esculentum</i>                                                         |                          | ✓               |           |     | 0.1     | 3     |
| 21                               | <i>Ficus rubiginosa</i>                                                             |                          | ✓               |           |     | 8       | 5     |
| 22                               | <i>Adiantum aethiopicum</i>                                                         |                          | ✓               |           |     | 4       | 100   |
| 23                               | spider plant                                                                        |                          | ✓               | ✓         |     | 4       | 200   |
| 24                               | <i>Lepidosperma laterale</i>                                                        |                          | ✓               |           |     | 0.1     | 3     |
| 25                               | <i>Poa annua</i>                                                                    |                          | ✓               |           |     | 0.1     | 3     |
| 26                               | <i>Micolaena stipoides</i>                                                          |                          | ✓               |           |     | 2       | 800   |
| 27                               | <i>Iponomea cairica</i>                                                             |                          |                 | ✓         |     | 0.1     | 3     |
| 28                               | Flowering ginger                                                                    |                          |                 | ✓         |     | 2       | 10    |
| 29                               | vine - <i>Campsis</i>                                                               |                          |                 | ✓         |     | 1       | 5     |
| 30                               | <i>Senna pendula</i>                                                                |                          |                 | ✓         |     | 3       | 5     |
| 31                               | <i>Celtis</i>                                                                       |                          |                 | ✓         |     | 1       | 1     |
| 32                               | <i>Cynodon dactylon</i>                                                             |                          |                 | ✓         |     | 4       | 1000  |
| 33                               | <del><i>Arundina cordifolia</i></del> <i>Araucaria sericea</i>                      |                          |                 | ✓         |     | 2       | 3     |
| 34                               | <i>Hypochaeris radicata</i>                                                         |                          |                 | ✓         |     | 0.1     | 20    |
| 35                               | <i>Cenchrus lamarckianus</i>                                                        |                          |                 | ✓         |     | 0.1     | 10    |
| 36                               | <i>Sida rhombifolia</i>                                                             |                          |                 | ✓         |     | 0.1     | 10    |
| 37                               | <i>Bidens pilosa</i>                                                                |                          |                 | ✓         |     | 0.1     | 20    |
| 38                               | <i>Commelina cyanea</i>                                                             |                          | ✓               |           |     | 1       | 80    |
| 39                               | <i>Eriocharta erecta</i>                                                            |                          |                 | ✓         |     | 3       | 100   |
| 40                               | <i>Cenchrus pubescens</i>                                                           |                          | ✓               |           |     | 2       | 10    |
| 41                               | <i>Archontophoenix cunninghamiana</i>                                               |                          | ✓               |           |     | 0.1     | 1     |
| 42                               | <i>Phoenix canariensis</i>                                                          |                          |                 | ✓         |     | 2       | 1     |
| 43                               | <i>Lantana camara</i>                                                               |                          |                 | ✓         |     | 0.1     | 1     |
| 44                               | <i>Cuscuta robusta</i>                                                              |                          | ✓               |           |     | 4       | 1     |
| 45                               | <i>Brachychiton acerifolius</i>                                                     |                          | ✓               |           |     | 0.1     | 1     |
| 46                               |                                                                                     |                          |                 |           |     |         |       |
| 47                               |                                                                                     |                          |                 |           |     |         |       |

GF Code: see growth form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF - circle code of 'top 3'  
 Cover: 0.1, 0.2, 0.3..... 1, 2, 3 ..... 10, 15, 20, 25 ..... 100% (foliage cover): Note: 0.1% cover = 63 x 63 cm or a circle 71 cm across,  
 0.5% cover = 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10m. Abundance: 1, 2, 3...10, 20, 30...100, 200...1000...

|                                     |                 |                    |                        |                                 |              |                         |          |
|-------------------------------------|-----------------|--------------------|------------------------|---------------------------------|--------------|-------------------------|----------|
| <b>BAM Site – Field Survey Form</b> |                 |                    |                        |                                 |              | Site Sheet no: <u>2</u> |          |
|                                     |                 | <b>Survey Name</b> |                        | <b>Zone ID</b>                  |              | <b>Recorders</b>        |          |
| <b>Date</b>                         | <u>8/2/22</u>   |                    | <u>1875A Greenwich</u> |                                 | <u>GP</u>    |                         |          |
| <b>Zone</b>                         | <b>Datum</b>    | <b>Plot ID</b>     | <u>4</u>               | <b>Plot dimensions</b>          | <u>20x40</u> | <b>Photo #</b>          | <u>1</u> |
| <b>Easting</b>                      | <b>Northing</b> | <b>IBRA region</b> |                        | <b>Midline bearing from 0 m</b> |              |                         |          |
| <b>Vegetation Class</b>             |                 |                    |                        |                                 |              | Confidence: H M L       |          |
| <b>Plant Community Type</b>         |                 |                    |                        |                                 |              | EEC: Confidence: H M L  |          |

Record easting and northing at 0 m on midline. Dimensions (Shape) of 0.04 ha base plot

| <b>BAM Attribute (400 m<sup>2</sup> plot)</b>                      |                     | <b>Sum values</b> |
|--------------------------------------------------------------------|---------------------|-------------------|
| <b>Count of Native Richness</b>                                    | <b>Trees</b>        |                   |
|                                                                    | <b>Shrubs</b>       |                   |
|                                                                    | <b>Grasses etc.</b> |                   |
|                                                                    | <b>Forbs</b>        |                   |
|                                                                    | <b>Ferns</b>        |                   |
|                                                                    | <b>Other</b>        |                   |
| <b>Sum of Cover of native vascular plants by growth form group</b> | <b>Trees</b>        |                   |
|                                                                    | <b>Shrubs</b>       |                   |
|                                                                    | <b>Grasses etc.</b> |                   |
|                                                                    | <b>Forbs</b>        |                   |
|                                                                    | <b>Ferns</b>        |                   |
|                                                                    | <b>Other</b>        |                   |
| <b>High Threat Weed cover</b>                                      |                     |                   |

| <b>BAM Attribute (1000 m<sup>2</sup> plot)</b>                   |                           |                             |
|------------------------------------------------------------------|---------------------------|-----------------------------|
| <b>DBH</b>                                                       | <b># Tree Stems Count</b> | <b># Stems with Hollows</b> |
| <b>80 + cm</b>                                                   | <u>    </u>               |                             |
| <b>50 – 79 cm</b>                                                | <u> </u>                  |                             |
| <b>30 – 49 cm</b>                                                | <u>✓</u>                  |                             |
| <b>20 – 29 cm</b>                                                |                           |                             |
| <b>10 – 19 cm</b>                                                |                           |                             |
| <b>5 – 9 cm</b>                                                  |                           |                             |
| <b>&lt; 5 cm</b>                                                 |                           | <u>n/a</u>                  |
| <b>Length of logs (m) (≥10 cm diameter, &gt;50 cm in length)</b> |                           | <u>0</u>                    |

Counts apply when the number of tree stems within a size class is ≤ 10. Estimates can be used when > 10 (eg. 10, 20, 30, ... 100, 200, 300...). For a multi-stemmed tree, only the largest living stem is included in the count/estimate. Tree stems must be living.

For hollows, count only the presence of a stem containing hollows. For a multi-stemmed tree, only the largest stem is included in the count/estimate. Stems may be dead and may be shrubs.

| <b>BAM Attribute (1 x 1 m plots)</b> | <b>Litter cover (%)</b> | <b>Bare ground cover (%)</b> | <b>Cryptogam cover (%)</b> | <b>Rock cover (%)</b> |
|--------------------------------------|-------------------------|------------------------------|----------------------------|-----------------------|
| <b>Subplot score (% in each)</b>     | <u>50 30 100 20 5</u>   |                              |                            |                       |
| <b>Average of the 5 subplots</b>     |                         |                              |                            |                       |

Litter cover is assessed as the average percentage ground cover of litter recorded from five 1 m x 1 m plots centred at 5, 15, 25, 35, 45 m along the plot midline. Litter cover includes leaves, seeds, twigs, branchlets and branches (less than 10 cm in diameter). Assessors may also record the cover of rock, bare ground and cryptogams

### Physiography + site features that may help in determining PCT and Management Zone (optional)

|                           |                             |                         |                                           |
|---------------------------|-----------------------------|-------------------------|-------------------------------------------|
| <b>Morphological Type</b> | <b>Landform Element</b>     | <b>Landform Pattern</b> | <b>Microrelief</b>                        |
| <b>Lithology</b>          | <b>Soil Surface Texture</b> | <b>Soil Colour</b>      | <b>Soil Depth</b>                         |
| <b>Slope</b>              | <b>Aspect</b>               | <b>Site Drainage</b>    | <b>Distance to nearest water and type</b> |

| <b>Plot Disturbance</b>      | <b>Severity code</b> | <b>Age code</b> | <b>Observational evidence:</b> |
|------------------------------|----------------------|-----------------|--------------------------------|
| Clearing (inc. logging)      |                      |                 |                                |
| Cultivation (inc. pasture)   |                      |                 |                                |
| Soil erosion                 |                      |                 |                                |
| Firewood / CWD removal       |                      |                 |                                |
| Grazing (incl. native stock) |                      |                 |                                |
| Fire damage                  |                      |                 |                                |
| Storm damage                 |                      |                 |                                |
| Weediness                    |                      |                 |                                |
| Other                        |                      |                 |                                |

Severity: 0=no evidence, 1=light, 2=moderate, 3=severe

Age: R=recent (<5yrs), NR=not recent (3-10yrs), O=old (>10yrs)

| 400m <sup>2</sup> plot: Sheet of |                                                                                     | Survey Name               | Plot Identifier |  | Recorders |  |   |   |     |         |       |         |
|----------------------------------|-------------------------------------------------------------------------------------|---------------------------|-----------------|--|-----------|--|---|---|-----|---------|-------|---------|
| Date                             | 8/1/22                                                                              | 1845A Greenwicks Hospital | 184             |  | CP        |  |   |   |     |         |       |         |
| GF                               | Top 3 natives in each GF: Full species name mandatory. All others where practicable |                           |                 |  |           |  | N | E | HTC | Cover % | Abund | voucher |
| 1                                | Ficus rubiginosa                                                                    |                           |                 |  |           |  | ✓ |   |     | 50      | 4     |         |
| 2                                | Lophospermum confertum                                                              |                           |                 |  |           |  | ✓ |   |     | 8       | 2     |         |
| 3                                | Calceolaria serrulata                                                               |                           |                 |  |           |  |   |   | ✓   | 1       | 3     |         |
| 4                                | Lomandra longifolia                                                                 |                           |                 |  |           |  | ✓ |   |     | 1       | 5     |         |
| 5                                | Doryanthes                                                                          |                           |                 |  |           |  | ✓ |   |     | 4       | 2     |         |
| 6                                | Cyperus goenatii                                                                    |                           |                 |  |           |  | ✓ |   |     | 40      | 2000  |         |
| 7                                | Oxalis perenans                                                                     |                           |                 |  |           |  | ✓ |   |     | 0.1     | 20    |         |
| 8                                | Oplismenus acuminatus                                                               |                           |                 |  |           |  | ✓ |   |     | 15      | 200   |         |
| 9                                | Nicotiana glauca                                                                    |                           |                 |  |           |  | ✓ |   |     | 15      | 200   |         |
| 10                               | Sida rhombifolia                                                                    |                           |                 |  |           |  |   | ✓ |     | 0.1     | 5     |         |
| 11                               | Dichondra repens                                                                    |                           |                 |  |           |  | ✓ |   |     | 1       | 200   |         |
| 12                               | Eriocharta erecta                                                                   |                           |                 |  |           |  |   |   | ✓   | 2       | 30    |         |
| 13                               | Senecio decurrens                                                                   |                           |                 |  |           |  |   |   | ✓   | 0.1     | 5     |         |
| 14                               | ivy                                                                                 |                           |                 |  |           |  |   |   | ✓   | 0.1     | 5     |         |
| 15                               | Axonopus fissifolius                                                                |                           |                 |  |           |  |   |   | ✓   | 3       | 100   |         |
| 16                               | Ambrosia Bidentata pilosa                                                           |                           |                 |  |           |  |   |   | ✓   | 0.1     | 3     |         |
| 17                               | Solanum nigrum                                                                      |                           |                 |  |           |  |   |   | ✓   | 0.1     | 3     |         |
| 18                               | Celtis                                                                              |                           |                 |  |           |  |   |   | ✓   | 0.1     | 3     |         |
| 19                               | Asparagus aschmannii                                                                |                           |                 |  |           |  |   |   | ✓   | 0.1     | 3     |         |
| 20                               | Albizia leonardii                                                                   |                           |                 |  |           |  | ✓ |   |     | 3       | 1     |         |
| 21                               | Solanum americanum                                                                  |                           |                 |  |           |  | ✓ |   |     | 0.5     | 1     |         |
| 22                               | Ligustrum lucidum                                                                   |                           |                 |  |           |  | ✓ |   | ✓   | 3       | 1     |         |
| 23                               | Banksia spinulosa                                                                   |                           |                 |  |           |  | ✓ |   |     | 1       | 2     |         |
| 24                               | Pittosporum undulatum                                                               |                           |                 |  |           |  | ✓ |   |     | 4       | 1     |         |
| 25                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 26                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 27                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 28                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 29                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 30                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 31                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 32                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 33                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 34                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 35                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 36                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 37                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 38                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 39                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 40                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 41                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 42                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 43                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 44                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 45                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 46                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |
| 47                               |                                                                                     |                           |                 |  |           |  |   |   |     |         |       |         |

GF Code: see growth form definitions in Appendix 1 N: native, E: exotic, HTE: high threat exotic GF – circle code of 'top 3'  
 Cover: 0.1, 0.2, 0.3..... 1, 2, 3 ..... 10, 15, 20, 25 ..... 100% (foliage cover): **Note:** 0.1% cover = 63 x 63 cm or a circle 71 cm across,  
 0.5% cover = 1.4 x 1.4 m, and 1% = 2.0 x 2.0 m, 5% = 4 x 5 m, 25% = 10 x 10m. **Abundance:** 1, 2, 3...10, 20, 30...100, 200...1000...

## Proposal Details

|                                |                                                |                         |
|--------------------------------|------------------------------------------------|-------------------------|
| Assessment Id                  | Proposal Name                                  | BAM data last updated * |
| 00031474/BAAS19010/22/00031475 | Greenwich Hospital<br>Redevelopment Masterplan | 24/11/2021              |
| Assessor Name                  | Report Created                                 | BAM Data version *      |
| George Thomas Plunkett         | 14/04/2022                                     | 50                      |
| Assessor Number                | BAM Case Status                                | Date Finalised          |
| BAAS19010                      | Finalised                                      | 14/04/2022              |
| Assessment Revision            | Assessment Type                                |                         |
| 4                              | Major Projects                                 |                         |

\* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

## Ecosystem credits for plant communities types (PCT), ecological communities & threatened species habitat

| Zone                                           | Vegetation zone name | TEC name  | Current Vegetation integrity score | Change in Vegetation integrity (loss / gain) | Area (ha) | Sensitivity to loss (Justification) | Species sensitivity to gain class  | BC Act Listing status | EPBC Act listing status | Biodiversity risk weighting | Potential SAI | Ecosystem credits |
|------------------------------------------------|----------------------|-----------|------------------------------------|----------------------------------------------|-----------|-------------------------------------|------------------------------------|-----------------------|-------------------------|-----------------------------|---------------|-------------------|
| <b>Coastal enriched sandstone moist forest</b> |                      |           |                                    |                                              |           |                                     |                                    |                       |                         |                             |               |                   |
| 1                                              | 1841_remnant         | Not a TEC | 31.2                               | 21.3                                         | 0.64      | PCT Cleared - 67%                   | High Sensitivity to Potential Gain |                       |                         | 1.75                        |               | 6                 |

# BAM Credit Summary Report

|   |              |           |      |      |      |                   |                                    |  |  |      |                 |          |
|---|--------------|-----------|------|------|------|-------------------|------------------------------------|--|--|------|-----------------|----------|
| 2 | 1841_managed | Not a TEC | 36.7 | 27.1 | 0.29 | PCT Cleared - 67% | High Sensitivity to Potential Gain |  |  | 1.75 |                 | 3        |
|   |              |           |      |      |      |                   |                                    |  |  |      | <b>Subtotal</b> | <b>9</b> |
|   |              |           |      |      |      |                   |                                    |  |  |      | <b>Total</b>    | <b>9</b> |

## Species credits for threatened species

| Vegetation zone name                                                      | Habitat condition (Vegetation Integrity) | Change in habitat condition | Area (ha)/Count (no. individuals) | Sensitivity to loss (Justification) | Sensitivity to gain (Justification) | BC Act Listing status | EPBC Act listing status | Potential SAIL  | Species credits |
|---------------------------------------------------------------------------|------------------------------------------|-----------------------------|-----------------------------------|-------------------------------------|-------------------------------------|-----------------------|-------------------------|-----------------|-----------------|
| <b><i>Callocephalon fimbriatum / Gang-gang Cockatoo ( Fauna )</i></b>     |                                          |                             |                                   |                                     |                                     |                       |                         |                 |                 |
| 1841_remnant                                                              | 21.3                                     | 21.3                        | 0.5                               |                                     |                                     | Vulnerable            | Not Listed              | False           | 5               |
| 1841_managed                                                              | 27.1                                     | 27.1                        | 0.12                              |                                     |                                     | Vulnerable            | Not Listed              | False           | 2               |
|                                                                           |                                          |                             |                                   |                                     |                                     |                       |                         | <b>Subtotal</b> | <b>7</b>        |
| <b><i>Calyptrorhynchus lathamii / Glossy Black-Cockatoo ( Fauna )</i></b> |                                          |                             |                                   |                                     |                                     |                       |                         |                 |                 |
| 1841_remnant                                                              | 21.3                                     | 21.3                        | 0.5                               |                                     |                                     | Vulnerable            | Not Listed              | False           | 5               |
| 1841_managed                                                              | 27.1                                     | 27.1                        | 0.12                              |                                     |                                     | Vulnerable            | Not Listed              | False           | 2               |
|                                                                           |                                          |                             |                                   |                                     |                                     |                       |                         | <b>Subtotal</b> | <b>7</b>        |
| <b><i>Cercartetus nanus / Eastern Pygmy-possum ( Fauna )</i></b>          |                                          |                             |                                   |                                     |                                     |                       |                         |                 |                 |
| 1841_remnant                                                              | 21.3                                     | 21.3                        | 0.64                              |                                     |                                     | Vulnerable            | Not Listed              | False           | 7               |
| 1841_managed                                                              | 27.1                                     | 27.1                        | 0.29                              |                                     |                                     | Vulnerable            | Not Listed              | False           | 4               |
|                                                                           |                                          |                             |                                   |                                     |                                     |                       |                         | <b>Subtotal</b> | <b>11</b>       |

|                                                                                |      |      |      |  |  |            |            |                 |           |
|--------------------------------------------------------------------------------|------|------|------|--|--|------------|------------|-----------------|-----------|
| <b><i>Chalinolobus dwyeri</i> / Large-eared Pied Bat ( Fauna )</b>             |      |      |      |  |  |            |            |                 |           |
| 1841_remnant                                                                   | 21.3 | 21.3 | 0.64 |  |  | Vulnerable | Vulnerable | True            | 10        |
| 1841_managed                                                                   | 27.1 | 27.1 | 0.29 |  |  | Vulnerable | Vulnerable | True            | 6         |
|                                                                                |      |      |      |  |  |            |            | <b>Subtotal</b> | <b>16</b> |
| <b><i>Deyeuxia appressa</i> / Deyeuxia appressa ( Flora )</b>                  |      |      |      |  |  |            |            |                 |           |
| 1841_remnant                                                                   | N/A  | N/A  | 5    |  |  | Endangered | Endangered | True            | 15        |
|                                                                                |      |      |      |  |  |            |            | <b>Subtotal</b> | <b>15</b> |
| <b><i>Hieraaetus morphnoides</i> / Little Eagle ( Fauna )</b>                  |      |      |      |  |  |            |            |                 |           |
| 1841_remnant                                                                   | 21.3 | 21.3 | 0.64 |  |  | Vulnerable | Not Listed | False           | 5         |
| 1841_managed                                                                   | 27.1 | 27.1 | 0.29 |  |  | Vulnerable | Not Listed | False           | 3         |
|                                                                                |      |      |      |  |  |            |            | <b>Subtotal</b> | <b>8</b>  |
| <b><i>Litoria aurea</i> / Green and Golden Bell Frog ( Fauna )</b>             |      |      |      |  |  |            |            |                 |           |
| 1841_remnant                                                                   | 21.3 | 21.3 | 0.64 |  |  | Endangered | Vulnerable | False           | 7         |
| 1841_managed                                                                   | 27.1 | 27.1 | 0.29 |  |  | Endangered | Vulnerable | False           | 4         |
|                                                                                |      |      |      |  |  |            |            | <b>Subtotal</b> | <b>11</b> |
| <b><i>Miniopterus australis</i> / Little Bent-winged Bat ( Fauna )</b>         |      |      |      |  |  |            |            |                 |           |
| 1841_remnant                                                                   | 21.3 | 21.3 | 0.04 |  |  | Vulnerable | Not Listed | True            | 1         |
| 1841_managed                                                                   | 27.1 | 27.1 | 0.06 |  |  | Vulnerable | Not Listed | True            | 1         |
|                                                                                |      |      |      |  |  |            |            | <b>Subtotal</b> | <b>2</b>  |
| <b><i>Miniopterus orianae oceanensis</i> / Large Bent-winged Bat ( Fauna )</b> |      |      |      |  |  |            |            |                 |           |
| 1841_remnant                                                                   | 21.3 | 21.3 | 0.04 |  |  | Vulnerable | Not Listed | True            | 1         |
| 1841_managed                                                                   | 27.1 | 27.1 | 0.06 |  |  | Vulnerable | Not Listed | True            | 1         |
|                                                                                |      |      |      |  |  |            |            | <b>Subtotal</b> | <b>2</b>  |

|                                                                      |      |      |      |  |  |            |            |                 |           |
|----------------------------------------------------------------------|------|------|------|--|--|------------|------------|-----------------|-----------|
| <b><i>Myotis macropus / Southern Myotis ( Fauna )</i></b>            |      |      |      |  |  |            |            |                 |           |
| 1841_remnant                                                         | 21.3 | 21.3 | 0.33 |  |  | Vulnerable | Not Listed | False           | 4         |
| 1841_managed                                                         | 27.1 | 27.1 | 0.14 |  |  | Vulnerable | Not Listed | False           | 2         |
|                                                                      |      |      |      |  |  |            |            | <b>Subtotal</b> | <b>6</b>  |
| <b><i>Ninox connivens / Barking Owl ( Fauna )</i></b>                |      |      |      |  |  |            |            |                 |           |
| 1841_remnant                                                         | 21.3 | 21.3 | 0.6  |  |  | Vulnerable | Not Listed | False           | 6         |
| 1841_managed                                                         | 27.1 | 27.1 | 0.23 |  |  | Vulnerable | Not Listed | False           | 3         |
|                                                                      |      |      |      |  |  |            |            | <b>Subtotal</b> | <b>9</b>  |
| <b><i>Ninox strenua / Powerful Owl ( Fauna )</i></b>                 |      |      |      |  |  |            |            |                 |           |
| 1841_remnant                                                         | 21.3 | 21.3 | 0.6  |  |  | Vulnerable | Not Listed | False           | 6         |
| 1841_managed                                                         | 27.1 | 27.1 | 0.23 |  |  | Vulnerable | Not Listed | False           | 3         |
|                                                                      |      |      |      |  |  |            |            | <b>Subtotal</b> | <b>9</b>  |
| <b><i>Petaurus norfolcensis / Squirrel Glider ( Fauna )</i></b>      |      |      |      |  |  |            |            |                 |           |
| 1841_remnant                                                         | 21.3 | 21.3 | 0.64 |  |  | Vulnerable | Not Listed | False           | 7         |
| 1841_managed                                                         | 27.1 | 27.1 | 0.29 |  |  | Vulnerable | Not Listed | False           | 4         |
|                                                                      |      |      |      |  |  |            |            | <b>Subtotal</b> | <b>11</b> |
| <b><i>Pseudophryne australis / Red-crowned Toadlet ( Fauna )</i></b> |      |      |      |  |  |            |            |                 |           |
| 1841_remnant                                                         | 21.3 | 21.3 | 0.64 |  |  | Vulnerable | Not Listed | False           | 5         |
| 1841_managed                                                         | 27.1 | 27.1 | 0.29 |  |  | Vulnerable | Not Listed | False           | 3         |
|                                                                      |      |      |      |  |  |            |            | <b>Subtotal</b> | <b>8</b>  |
| <b><i>Tyto novaehollandiae / Masked Owl ( Fauna )</i></b>            |      |      |      |  |  |            |            |                 |           |
| 1841_remnant                                                         | 21.3 | 21.3 | 0.6  |  |  | Vulnerable | Not Listed | False           | 6         |
| 1841_managed                                                         | 27.1 | 27.1 | 0.23 |  |  | Vulnerable | Not Listed | False           | 3         |
|                                                                      |      |      |      |  |  |            |            | <b>Subtotal</b> | <b>9</b>  |

# BAM Vegetation Zones Report

## Proposal Details

|                                |                                             |                         |
|--------------------------------|---------------------------------------------|-------------------------|
| Assessment Id                  | Assessment name                             | BAM data last updated * |
| 00031474/BAAS19010/22/00031475 | Greenwich Hospital Redevelopment Masterplan | 24/11/2021              |
| Assessor Name                  | Report Created                              | BAM Data version *      |
| George Thomas Plunkett         | 14/04/2022                                  | 50                      |
| Assessor Number                | Assessment Type                             | BAM Case Status         |
| BAAS19010                      | Major Projects                              | Finalised               |
| Assessment Revision            | Date Finalised                              |                         |
| 4                              | 14/04/2022                                  |                         |

\* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

## Vegetation Zones

| # | Name         | PCT                                          | Condition | Area | Minimum number of plots | Management zones               |
|---|--------------|----------------------------------------------|-----------|------|-------------------------|--------------------------------|
| 1 | 1841_remnant | 1841-Coastal enriched sandstone moist forest | remnant   | 0.64 | 1                       | Dev (0.21 ha)<br>APZ (0.43 ha) |

## BAM Vegetation Zones Report

|   |              |                                              |         |      |   |                                |
|---|--------------|----------------------------------------------|---------|------|---|--------------------------------|
| 2 | 1841_managed | 1841-Coastal enriched sandstone moist forest | managed | 0.29 | 1 | Dev (0.13 ha)<br>APZ (0.16 ha) |
|---|--------------|----------------------------------------------|---------|------|---|--------------------------------|

# BAM Predicted Species Report

## Proposal Details

|                                |                                             |                         |
|--------------------------------|---------------------------------------------|-------------------------|
| Assessment Id                  | Proposal Name                               | BAM data last updated * |
| 00031474/BAAS19010/22/00031475 | Greenwich Hospital Redevelopment Masterplan | 24/11/2021              |
| Assessor Name                  | Report Created                              | BAM Data version *      |
| George Thomas Plunkett         | 14/04/2022                                  | 50                      |
| Assessor Number                | Assessment Type                             | BAM Case Status         |
| BAAS19010                      | Major Projects                              | Finalised               |
| Assessment Revision            |                                             | Date Finalised          |
| 4                              |                                             | 14/04/2022              |

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**Threatened species reliably predicted to utilise the site. No surveys are required for these species. Ecosystem credits apply to these species.**

| Common Name                     | Scientific Name                 | Vegetation Types(s)                          |
|---------------------------------|---------------------------------|----------------------------------------------|
| Barking Owl                     | Ninox connivens                 | 1841-Coastal enriched sandstone moist forest |
| Dusky Woodswallow               | Artamus cyanopterus cyanopterus | 1841-Coastal enriched sandstone moist forest |
| Eastern Coastal Free-tailed Bat | Micronomus norfolkensis         | 1841-Coastal enriched sandstone moist forest |
| Eastern Osprey                  | Pandion cristatus               | 1841-Coastal enriched sandstone moist forest |
| Gang-gang Cockatoo              | Callocephalon fimbriatum        | 1841-Coastal enriched sandstone moist forest |
| Grey-headed Flying-fox          | Pteropus poliocephalus          | 1841-Coastal enriched sandstone moist forest |
| Koala                           | Phascolarctos cinereus          | 1841-Coastal enriched sandstone moist forest |
| Large Bent-winged Bat           | Miniopterus orianae oceanensis  | 1841-Coastal enriched sandstone moist forest |
| Little Bent-winged Bat          | Miniopterus australis           | 1841-Coastal enriched sandstone moist forest |
| Little Eagle                    | Hieraaetus morphnoides          | 1841-Coastal enriched sandstone moist forest |
| Little Lorikeet                 | Glossopsitta pusilla            | 1841-Coastal enriched sandstone moist forest |

## BAM Predicted Species Report

|                                |                           |                                              |
|--------------------------------|---------------------------|----------------------------------------------|
| Masked Owl                     | Tyto novaehollandiae      | 1841-Coastal enriched sandstone moist forest |
| Powerful Owl                   | Ninox strenua             | 1841-Coastal enriched sandstone moist forest |
| Regent Honeyeater              | Anthochaera phrygia       | 1841-Coastal enriched sandstone moist forest |
| Rosenberg's Goanna             | Varanus rosenbergi        | 1841-Coastal enriched sandstone moist forest |
| Spotted-tailed Quoll           | Dasyurus maculatus        | 1841-Coastal enriched sandstone moist forest |
| Superb Fruit-Dove              | Ptilinopus superbus       | 1841-Coastal enriched sandstone moist forest |
| Swift Parrot                   | Lathamus discolor         | 1841-Coastal enriched sandstone moist forest |
| Varied Sittella                | Daphoenositta chrysoptera | 1841-Coastal enriched sandstone moist forest |
| White-throated Needletail      | Hirundapus caudacutus     | 1841-Coastal enriched sandstone moist forest |
| Yellow-bellied Sheath-tail-bat | Saccolaimus flaviventris  | 1841-Coastal enriched sandstone moist forest |

### Threatened species Manually Added

None added

### Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

| Common Name           | Scientific Name         | Plant Community Type(s)                      |
|-----------------------|-------------------------|----------------------------------------------|
| Glossy Black-Cockatoo | Calyptorhynchus lathami | 1841-Coastal enriched sandstone moist forest |

### Threatened species assessed as not within the vegetation zone(s) for the PCT(s)

Refer to BAR for detailed justification

| Common Name           | Scientific Name         | Justification in the BAM-C |
|-----------------------|-------------------------|----------------------------|
| Glossy Black-Cockatoo | Calyptorhynchus lathami | Habitat constraints        |

## Proposal Details

|                                |                                             |                         |
|--------------------------------|---------------------------------------------|-------------------------|
| Assessment Id                  | Proposal Name                               | BAM data last updated * |
| 00031474/BAAS19010/22/00031475 | Greenwich Hospital Redevelopment Masterplan | 24/11/2021              |
| Assessor Name                  | Report Created                              | BAM Data version *      |
| George Thomas Plunkett         | 14/04/2022                                  | 50                      |
| Assessor Number                | Assessment Type                             | BAM Case Status         |
| BAAS19010                      | Major Projects                              | Finalised               |
| Assessment Revision            | Date Finalised                              |                         |
| 4                              | 14/04/2022                                  |                         |

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## List of Species Requiring Survey

| Name                                                            | Presence              | Survey Months                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><i>Callocephalon fimbriatum</i></b><br>Gang-gang Cockatoo    | Yes (assumed present) | <div> <input checked="" type="checkbox"/> Jan           <input type="checkbox"/> Feb           <input type="checkbox"/> Mar           <input type="checkbox"/> Apr           <input type="checkbox"/> May           <input type="checkbox"/> Jun           <input type="checkbox"/> Jul           <input type="checkbox"/> Aug           <input type="checkbox"/> Sep           <input checked="" type="checkbox"/> Oct           <input checked="" type="checkbox"/> Nov           <input checked="" type="checkbox"/> Dec </div> <input type="checkbox"/> Survey month outside the specified months?                                                        |
| <b><i>Calyptorhynchus lathamii</i></b><br>Glossy Black-Cockatoo | Yes (assumed present) | <div> <input checked="" type="checkbox"/> Jan           <input checked="" type="checkbox"/> Feb           <input checked="" type="checkbox"/> Mar           <input checked="" type="checkbox"/> Apr           <input checked="" type="checkbox"/> May           <input checked="" type="checkbox"/> Jun           <input checked="" type="checkbox"/> Jul           <input checked="" type="checkbox"/> Aug           <input checked="" type="checkbox"/> Sep           <input type="checkbox"/> Oct           <input type="checkbox"/> Nov           <input type="checkbox"/> Dec </div> <input type="checkbox"/> Survey month outside the specified months? |
| <b><i>Cercartetus nanus</i></b><br>Eastern Pygmy-possum         | Yes (assumed present) | <div> <input checked="" type="checkbox"/> Jan           <input checked="" type="checkbox"/> Feb           <input checked="" type="checkbox"/> Mar           <input type="checkbox"/> Apr           <input type="checkbox"/> May           <input type="checkbox"/> Jun           <input type="checkbox"/> Jul           <input type="checkbox"/> Aug           <input type="checkbox"/> Sep           <input checked="" type="checkbox"/> Oct           <input checked="" type="checkbox"/> Nov           <input checked="" type="checkbox"/> Dec </div> <input type="checkbox"/> Survey month outside the specified months?                                  |

## BAM Candidate Species Report

|                                                                                                |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------------------------------------------------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><i>Chalinolobus dwyeri</i></b><br>Large-eared Pied Bat                                      | Yes (assumed present) | <input checked="" type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr<br><input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug<br><input type="checkbox"/> Sep <input type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input checked="" type="checkbox"/> Dec<br><input type="checkbox"/> Survey month outside the specified months? |
| <b><i>Deyeuxia appressa</i></b><br>Deyeuxia appressa                                           | Yes (assumed present) | <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr<br><input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug<br><input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input checked="" type="checkbox"/> Dec<br><input type="checkbox"/> Survey month outside the specified months?                       |
| <b><i>Epacris purpurascens var. purpurascens</i></b><br>Epacris purpurascens var. purpurascens | No (surveyed)         | <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr<br><input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug<br><input checked="" type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec<br><input type="checkbox"/> Survey month outside the specified months?            |
| <b><i>Grammitis stenophylla</i></b><br>Narrow-leaf Finger Fern                                 | No (surveyed)         | <input type="checkbox"/> Jan <input checked="" type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr<br><input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug<br><input type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec<br><input type="checkbox"/> Survey month outside the specified months?            |
| <b><i>Hieraaetus morphnoides</i></b><br>Little Eagle                                           | Yes (assumed present) | <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr<br><input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input checked="" type="checkbox"/> Aug<br><input checked="" type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec<br><input type="checkbox"/> Survey month outside the specified months? |
| <b><i>Leptospermum deanei</i></b><br>Leptospermum deanei                                       | No (surveyed)         | <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr<br><input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug<br><input type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input type="checkbox"/> Dec<br><input type="checkbox"/> Survey month outside the specified months?            |

## BAM Candidate Species Report

|                                                                       |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><i>Litoria aurea</i></b><br>Green and Golden Bell Frog             | Yes (assumed present) | <input checked="" type="checkbox"/> Jan <input checked="" type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr<br><input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug<br><input type="checkbox"/> Sep <input type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input checked="" type="checkbox"/> Dec<br><input type="checkbox"/> Survey month outside the specified months?                                  |
| <b><i>Miniopterus australis</i></b><br>Little Bent-winged Bat         | Yes (assumed present) | <input checked="" type="checkbox"/> Jan <input checked="" type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr<br><input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug<br><input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input checked="" type="checkbox"/> Dec<br><input type="checkbox"/> Survey month outside the specified months?                                                        |
| <b><i>Miniopterus orianae oceanensis</i></b><br>Large Bent-winged Bat | Yes (assumed present) | <input checked="" type="checkbox"/> Jan <input checked="" type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr<br><input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug<br><input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input checked="" type="checkbox"/> Dec<br><input type="checkbox"/> Survey month outside the specified months?                                                        |
| <b><i>Myotis macropus</i></b><br>Southern Myotis                      | Yes (assumed present) | <input checked="" type="checkbox"/> Jan <input checked="" type="checkbox"/> Feb <input checked="" type="checkbox"/> Mar <input type="checkbox"/> Apr<br><input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug<br><input type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input checked="" type="checkbox"/> Dec<br><input type="checkbox"/> Survey month outside the specified months?                       |
| <b><i>Ninox connivens</i></b><br>Barking Owl                          | Yes (assumed present) | <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr<br><input checked="" type="checkbox"/> May <input checked="" type="checkbox"/> Jun <input checked="" type="checkbox"/> Jul <input checked="" type="checkbox"/> Aug<br><input checked="" type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input checked="" type="checkbox"/> Nov <input checked="" type="checkbox"/> Dec<br><input type="checkbox"/> Survey month outside the specified months? |
| <b><i>Ninox strenua</i></b><br>Powerful Owl                           | Yes (assumed present) | <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr<br><input checked="" type="checkbox"/> May <input checked="" type="checkbox"/> Jun <input checked="" type="checkbox"/> Jul <input checked="" type="checkbox"/> Aug<br><input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec<br><input type="checkbox"/> Survey month outside the specified months?                                             |

## BAM Candidate Species Report

|                                                                                |                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------------------------------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><i>Persoonia mollis subsp. maxima</i></b><br>Persoonia mollis subsp. maxima | No (surveyed)         | <input type="checkbox"/> Jan <input checked="" type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr<br><input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug<br><input type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec<br><input type="checkbox"/> Survey month outside the specified months? |
| <b><i>Petaurus norfolcensis</i></b><br>Squirrel Glider                         | Yes (assumed present) | <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr<br><input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug<br><input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec<br><input type="checkbox"/> Survey month outside the specified months?                       |
| <b><i>Phascolarctos cinereus</i></b><br>Koala                                  | No (surveyed)         | <input type="checkbox"/> Jan <input checked="" type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr<br><input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug<br><input type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec<br><input type="checkbox"/> Survey month outside the specified months? |
| <b><i>Pseudophryne australis</i></b><br>Red-crowned Toadlet                    | Yes (assumed present) | <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr<br><input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug<br><input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec<br><input type="checkbox"/> Survey month outside the specified months?                       |
| <b><i>Rhodamnia rubescens</i></b><br>Scrub Turpentine                          | No (surveyed)         | <input type="checkbox"/> Jan <input checked="" type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr<br><input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug<br><input type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec<br><input type="checkbox"/> Survey month outside the specified months? |
| <b><i>Rhodomyrtus psidioides</i></b><br>Native Guava                           | No (surveyed)         | <input type="checkbox"/> Jan <input checked="" type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr<br><input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug<br><input type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec<br><input type="checkbox"/> Survey month outside the specified months? |

## BAM Candidate Species Report

|                                                           |                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------------------------------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><i>Syzygium paniculatum</i></b><br>Magenta Lilly Pilly | No (surveyed)<br>*Survey months are outside of the months specified in Bionet. | <input type="checkbox"/> Jan <input checked="" type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr<br><input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug<br><input type="checkbox"/> Sep <input checked="" type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec<br><input checked="" type="checkbox"/> Survey month outside the specified months? |
| <b><i>Tyto novaehollandiae</i></b><br>Masked Owl          | Yes (assumed present)                                                          | <input type="checkbox"/> Jan <input type="checkbox"/> Feb <input type="checkbox"/> Mar <input type="checkbox"/> Apr<br><input type="checkbox"/> May <input type="checkbox"/> Jun <input type="checkbox"/> Jul <input type="checkbox"/> Aug<br><input type="checkbox"/> Sep <input type="checkbox"/> Oct <input type="checkbox"/> Nov <input type="checkbox"/> Dec<br><input type="checkbox"/> Survey month outside the specified months?                                  |

### Threatened species Manually Added

None added

### Threatened species assessed as not on site

Refer to BAR for detailed justification

| Common name                                                        | Scientific name                                | Justification in the BAM-C |
|--------------------------------------------------------------------|------------------------------------------------|----------------------------|
| Biconvex Paperbark                                                 | Melaleuca biconvexa                            | Habitat degraded           |
| Camarophyllopsis kearneyi                                          | Camarophyllopsis kearneyi                      | Refer to BAR               |
| Eastern Osprey                                                     | Pandion cristatus                              | Habitat constraints        |
| Gosford Wattle, Hurstville and Kogarah Local Government Areas      | Acacia prominens - endangered population       | Refer to BAR               |
| Grevillea shiressii                                                | Grevillea shiressii                            | Refer to BAR               |
| Grey-headed Flying-fox                                             | Pteropus poliocephalus                         | Habitat constraints        |
| Hygrocybe anomala var. ianthinomarginata                           | Hygrocybe anomala var. ianthinomarginata       | Refer to BAR               |
| Koala in the Pittwater Local Government Area                       | Phascolarctos cinereus - endangered population | Refer to BAR               |
| Regent Honeyeater                                                  | Anthochaera phrygia                            | Habitat constraints        |
| Squirrel Glider on Barrenjoey Peninsula, north of Bushrangers Hill | Petaurus norfolcensis - endangered population  | Refer to BAR               |
| Swift Parrot                                                       | Lathamus discolor                              | Habitat constraints        |

## BAM Candidate Species Report

|                                                                                                                                        |                                                  |              |
|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|--------------|
| Tadgell's Bluebell in the local government areas of Auburn, Bankstown, Baulkham Hills, Canterbury, Hornsby, Parramatta and Strathfield | Wahlenbergia multicaulis - endangered population | Refer to BAR |
|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|--------------|

# BAM Biodiversity Credit Report (Like for like)

## Proposal Details

|                                |                                             |                         |
|--------------------------------|---------------------------------------------|-------------------------|
| Assessment Id                  | Proposal Name                               | BAM data last updated * |
| 00031474/BAAS19010/22/00031475 | Greenwich Hospital Redevelopment Masterplan | 24/11/2021              |
| Assessor Name                  | Assessor Number                             | BAM Data version *      |
| George Thomas Plunkett         | BAAS19010                                   | 50                      |
| Proponent Names                | Report Created                              | BAM Case Status         |
|                                | 14/04/2022                                  | Finalised               |
| Assessment Revision            | Assessment Type                             | Date Finalised          |
| 4                              | Major Projects                              | 14/04/2022              |

\* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

## Potential Serious and Irreversible Impacts

| Name of threatened ecological community                | Listing status | Name of Plant Community Type/ID |
|--------------------------------------------------------|----------------|---------------------------------|
| Nil                                                    |                |                                 |
| Species                                                |                |                                 |
| Chalinolobus dwyeri / Large-eared Pied Bat             |                |                                 |
| Miniopterus australis / Little Bent-winged Bat         |                |                                 |
| Miniopterus orianae oceanensis / Large Bent-winged Bat |                |                                 |

## BAM Biodiversity Credit Report (Like for like)

**Deyeuxia appressa** / Deyeuxia appressa

### Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT

No Changes

Predicted Threatened Species Not On Site

Name

**Calyptorhynchus lathami** / Glossy Black-Cockatoo

### Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

| Name of Plant Community Type/ID              | Name of threatened ecological community | Area of impact | HBT Cr | No HBT Cr | Total credits to be retired |
|----------------------------------------------|-----------------------------------------|----------------|--------|-----------|-----------------------------|
| 1841-Coastal enriched sandstone moist forest | Not a TEC                               | 0.9            | 6      | 3         | 9                           |

## BAM Biodiversity Credit Report (Like for like)

| 1841-Coastal enriched sandstone moist forest | Like-for-like credit retirement options                                                                                        |                                                       |              |     |         |                                                                                                                                                            |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|--------------|-----|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                              | Class                                                                                                                          | Trading group                                         | Zone         | HBT | Credits | IBRA region                                                                                                                                                |
|                                              | North Coast Wet Sclerophyll Forests<br>This includes PCT's: 661, 686, 694, 827, 1217, 1237, 1244, 1285, 1504, 1841, 1843, 1915 | North Coast Wet Sclerophyll Forests<br>>=50% and <70% | 1841_remnant | Yes | 6       | Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
|                                              | North Coast Wet Sclerophyll Forests<br>This includes PCT's: 661, 686, 694, 827, 1217, 1237, 1244, 1285, 1504, 1841, 1843, 1915 | North Coast Wet Sclerophyll Forests<br>>=50% and <70% | 1841_managed | No  | 3       | Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

### Species Credit Summary

| Species                                                  | Vegetation Zone/s                           | Area / Count | Credits |
|----------------------------------------------------------|---------------------------------------------|--------------|---------|
| <b>Callocephalon fimbriatum</b> / Gang-gang Cockatoo     | <b>1841_remnant,</b><br><b>1841_managed</b> | 0.6          | 7.00    |
| <b>Calyptrorhynchus lathamii</b> / Glossy Black-Cockatoo | <b>1841_remnant,</b><br><b>1841_managed</b> | 0.6          | 7.00    |

## BAM Biodiversity Credit Report (Like for like)

|                                                               |                                       |     |       |
|---------------------------------------------------------------|---------------------------------------|-----|-------|
| <b>Cercartetus nanus</b> / Eastern Pygmy-possum               | <b>1841_remnant,<br/>1841_managed</b> | 0.9 | 11.00 |
| <b>Chalinolobus dwyeri</b> / Large-eared Pied Bat             | <b>1841_remnant,<br/>1841_managed</b> | 0.9 | 16.00 |
| <b>Deyeuxia appressa</b> / Deyeuxia appressa                  | <b>1841_remnant</b>                   | 5.0 | 15.00 |
| <b>Hieraaetus morphnoides</b> / Little Eagle                  | <b>1841_remnant,<br/>1841_managed</b> | 0.9 | 8.00  |
| <b>Litoria aurea</b> / Green and Golden Bell Frog             | <b>1841_remnant,<br/>1841_managed</b> | 0.9 | 11.00 |
| <b>Miniopterus australis</b> / Little Bent-winged Bat         | <b>1841_remnant,<br/>1841_managed</b> | 0.1 | 2.00  |
| <b>Miniopterus orianae oceanensis</b> / Large Bent-winged Bat | <b>1841_remnant,<br/>1841_managed</b> | 0.1 | 2.00  |
| <b>Myotis macropus</b> / Southern Myotis                      | <b>1841_remnant,<br/>1841_managed</b> | 0.5 | 6.00  |
| <b>Ninox connivens</b> / Barking Owl                          | <b>1841_remnant,<br/>1841_managed</b> | 0.8 | 9.00  |
| <b>Ninox strenua</b> / Powerful Owl                           | <b>1841_remnant,<br/>1841_managed</b> | 0.8 | 9.00  |
| <b>Petaurus norfolcensis</b> / Squirrel Glider                | <b>1841_remnant,<br/>1841_managed</b> | 0.9 | 11.00 |
| <b>Pseudophryne australis</b> / Red-crowned Toadlet           | <b>1841_remnant,<br/>1841_managed</b> | 0.9 | 8.00  |

## BAM Biodiversity Credit Report (Like for like)

|                                   |                               |     |      |
|-----------------------------------|-------------------------------|-----|------|
| Tyto novaehollandiae / Masked Owl | 1841_remnant,<br>1841_managed | 0.8 | 9.00 |
|-----------------------------------|-------------------------------|-----|------|

### Credit Retirement Options

Like-for-like credit retirement options

|                                                    |                                                 |                |
|----------------------------------------------------|-------------------------------------------------|----------------|
| Callocephalon fimbriatum /<br>Gang-gang Cockatoo   | Spp                                             | IBRA subregion |
|                                                    | Callocephalon fimbriatum / Gang-gang Cockatoo   | Any in NSW     |
| Calyptorhynchus lathami /<br>Glossy Black-Cockatoo | Spp                                             | IBRA subregion |
|                                                    | Calyptorhynchus lathami / Glossy Black-Cockatoo | Any in NSW     |
| Cercartetus nanus /<br>Eastern Pygmy-possum        | Spp                                             | IBRA subregion |
|                                                    | Cercartetus nanus / Eastern Pygmy-possum        | Any in NSW     |
| Chalinolobus dwyeri /<br>Large-eared Pied Bat      | Spp                                             | IBRA subregion |
|                                                    | Chalinolobus dwyeri / Large-eared Pied Bat      | Any in NSW     |
| Deyeuxia appressa /<br>Deyeuxia appressa           | Spp                                             | IBRA subregion |
|                                                    | Deyeuxia appressa / Deyeuxia appressa           | Any in NSW     |
| Hieraetus morphnoides /<br>Little Eagle            | Spp                                             | IBRA subregion |
|                                                    |                                                 |                |

## BAM Biodiversity Credit Report (Like for like)

|                                                                  |                                                               |                |
|------------------------------------------------------------------|---------------------------------------------------------------|----------------|
|                                                                  | <b>Hieraaetus morphnoides</b> / Little Eagle                  | Any in NSW     |
| <b>Litoria aurea</b> /<br>Green and Golden Bell Frog             | Spp                                                           | IBRA subregion |
|                                                                  | <b>Litoria aurea</b> / Green and Golden Bell Frog             | Any in NSW     |
| <b>Miniopterus australis</b> /<br>Little Bent-winged Bat         | Spp                                                           | IBRA subregion |
|                                                                  | <b>Miniopterus australis</b> / Little Bent-winged Bat         | Any in NSW     |
| <b>Miniopterus orianae oceanensis</b> /<br>Large Bent-winged Bat | Spp                                                           | IBRA subregion |
|                                                                  | <b>Miniopterus orianae oceanensis</b> / Large Bent-winged Bat | Any in NSW     |
| <b>Myotis macropus</b> /<br>Southern Myotis                      | Spp                                                           | IBRA subregion |
|                                                                  | <b>Myotis macropus</b> / Southern Myotis                      | Any in NSW     |
| <b>Ninox connivens</b> /<br>Barking Owl                          | Spp                                                           | IBRA subregion |
|                                                                  | <b>Ninox connivens</b> / Barking Owl                          | Any in NSW     |
| <b>Ninox strenua</b> /<br>Powerful Owl                           | Spp                                                           | IBRA subregion |
|                                                                  | <b>Ninox strenua</b> / Powerful Owl                           | Any in NSW     |

## BAM Biodiversity Credit Report (Like for like)

|                                                        |                                                     |                |
|--------------------------------------------------------|-----------------------------------------------------|----------------|
| <b>Petaurus norfolcensis</b> /<br>Squirrel Glider      | Spp                                                 | IBRA subregion |
|                                                        | <b>Petaurus norfolcensis</b> / Squirrel Glider      | Any in NSW     |
| <b>Pseudophryne australis</b> /<br>Red-crowned Toadlet | Spp                                                 | IBRA subregion |
|                                                        | <b>Pseudophryne australis</b> / Red-crowned Toadlet | Any in NSW     |
| <b>Tyto novaehollandiae</b> /<br>Masked Owl            | Spp                                                 | IBRA subregion |
|                                                        | <b>Tyto novaehollandiae</b> / Masked Owl            | Any in NSW     |

# BAM Biodiversity Credit Report (Variations)

## Proposal Details

|                                |                                             |                         |
|--------------------------------|---------------------------------------------|-------------------------|
| Assessment Id                  | Proposal Name                               | BAM data last updated * |
| 00031474/BAAS19010/22/00031475 | Greenwich Hospital Redevelopment Masterplan | 24/11/2021              |
| Assessor Name                  | Assessor Number                             | BAM Data version *      |
| George Thomas Plunkett         | BAAS19010                                   | 50                      |
| Proponent Name(s)              | Report Created                              | BAM Case Status         |
|                                | 14/04/2022                                  | Finalised               |
| Assessment Revision            | Assessment Type                             | Date Finalised          |
| 4                              | Major Projects                              | 14/04/2022              |

\* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

## Potential Serious and Irreversible Impacts

| Name of threatened ecological community                       | Listing status | Name of Plant Community Type/ID |
|---------------------------------------------------------------|----------------|---------------------------------|
| <b>Nil</b>                                                    |                |                                 |
| Species                                                       |                |                                 |
| <b>Chalinolobus dwyeri</b> / Large-eared Pied Bat             |                |                                 |
| <b>Miniopterus australis</b> / Little Bent-winged Bat         |                |                                 |
| <b>Miniopterus orianae oceanensis</b> / Large Bent-winged Bat |                |                                 |
| <b>Deyeuxia appressa</b> / Deyeuxia appressa                  |                |                                 |

## Additional Information for Approval

PCT Outside Ibra Added  
None added

# BAM Biodiversity Credit Report (Variations)

## PCTs With Customized Benchmarks

| PCT        |
|------------|
| No Changes |

## Predicted Threatened Species Not On Site

| Name                                                    |
|---------------------------------------------------------|
| <b>Calyptrorhynchus lathami</b> / Glossy Black-Cockatoo |

## Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

| Name of Plant Community Type/ID              | Name of threatened ecological community | Area of impact | HBT Cr | No HBT Cr | Total credits to be retired |
|----------------------------------------------|-----------------------------------------|----------------|--------|-----------|-----------------------------|
| 1841-Coastal enriched sandstone moist forest | Not a TEC                               | 0.9            | 6      | 3         | 9.00                        |

| 1841-Coastal enriched sandstone moist forest | Like-for-like credit retirement options                                                                                        |                                                    |              |     |         |                                                                                                                                                           |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|--------------|-----|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                              | Class                                                                                                                          | Trading group                                      | Zone         | HBT | Credits | IBRA region                                                                                                                                               |
|                                              | North Coast Wet Sclerophyll Forests<br>This includes PCT's: 661, 686, 694, 827, 1217, 1237, 1244, 1285, 1504, 1841, 1843, 1915 | North Coast Wet Sclerophyll Forests >=50% and <70% | 1841_remnant | Yes | 6       | Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
|                                              | North Coast Wet Sclerophyll Forests<br>This includes PCT's: 661, 686, 694, 827, 1217, 1237, 1244, 1285, 1504, 1841, 1843, 1915 | North Coast Wet Sclerophyll Forests >=50% and <70% | 1841_managed | No  | 3       | Pittwater,Cumberland, Sydney Cataract, Wyong and Yengo.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

## BAM Biodiversity Credit Report (Variations)

| 1841-Coastal enriched sandstone moist forest | Variation options                               |                                |              |                            |         |                                                                                                                        |
|----------------------------------------------|-------------------------------------------------|--------------------------------|--------------|----------------------------|---------|------------------------------------------------------------------------------------------------------------------------|
|                                              | Formation                                       | Trading group                  | Zone         | HBT                        | Credits | IBRA region                                                                                                            |
|                                              | Wet Sclerophyll Forests (Shrubby sub-formation) | Tier 3 or higher threat status | 1841_remnant | Yes (including artificial) | 6       | IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
|                                              | Wet Sclerophyll Forests (Shrubby sub-formation) | Tier 3 or higher threat status | 1841_managed | No                         | 3       | IBRA Region: Sydney Basin, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

### Species Credit Summary

| Species                                                       | Vegetation Zone/s                 | Area / Count | Credits |
|---------------------------------------------------------------|-----------------------------------|--------------|---------|
| <b>Callocephalon fimbriatum</b> / Gang-gang Cockatoo          | <b>1841_remnant, 1841_managed</b> | 0.6          | 7.00    |
| <b>Calyptrorhynchus lathami</b> / Glossy Black-Cockatoo       | <b>1841_remnant, 1841_managed</b> | 0.6          | 7.00    |
| <b>Cercartetus nanus</b> / Eastern Pygmy-possum               | <b>1841_remnant, 1841_managed</b> | 0.9          | 11.00   |
| <b>Chalinolobus dwyeri</b> / Large-eared Pied Bat             | <b>1841_remnant, 1841_managed</b> | 0.9          | 16.00   |
| <b>Deyeuxia appressa</b> / Deyeuxia appressa                  | <b>1841_remnant</b>               | 5.0          | 15.00   |
| <b>Hieraaetus morphnoides</b> / Little Eagle                  | <b>1841_remnant, 1841_managed</b> | 0.9          | 8.00    |
| <b>Litoria aurea</b> / Green and Golden Bell Frog             | <b>1841_remnant, 1841_managed</b> | 0.9          | 11.00   |
| <b>Miniopterus australis</b> / Little Bent-winged Bat         | <b>1841_remnant, 1841_managed</b> | 0.1          | 2.00    |
| <b>Miniopterus orianae oceanensis</b> / Large Bent-winged Bat | <b>1841_remnant, 1841_managed</b> | 0.1          | 2.00    |
| <b>Myotis macropus</b> / Southern Myotis                      | <b>1841_remnant, 1841_managed</b> | 0.5          | 6.00    |
| <b>Ninox connivens</b> / Barking Owl                          | <b>1841_remnant, 1841_managed</b> | 0.8          | 9.00    |

## BAM Biodiversity Credit Report (Variations)

|                                                     |                                   |     |       |
|-----------------------------------------------------|-----------------------------------|-----|-------|
| <b>Ninox strenua</b> / Powerful Owl                 | <b>1841_remnant, 1841_managed</b> | 0.8 | 9.00  |
| <b>Petaurus norfolcensis</b> / Squirrel Glider      | <b>1841_remnant, 1841_managed</b> | 0.9 | 11.00 |
| <b>Pseudophryne australis</b> / Red-crowned Toadlet | <b>1841_remnant, 1841_managed</b> | 0.9 | 8.00  |
| <b>Tyto novaehollandiae</b> / Masked Owl            | <b>1841_remnant, 1841_managed</b> | 0.8 | 9.00  |

### Credit Retirement Options Like-for-like options

|                                                       |                                                       |                                                                                            |                                                                                                                                                            |
|-------------------------------------------------------|-------------------------------------------------------|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Callocephalon fimbriatum</b> /Gang-gang Cockatoo   | Spp                                                   |                                                                                            | IBRA region                                                                                                                                                |
|                                                       | <b>Callocephalon fimbriatum</b> /Gang-gang Cockatoo   |                                                                                            | Any in NSW                                                                                                                                                 |
|                                                       | <b>Variation options</b>                              |                                                                                            |                                                                                                                                                            |
|                                                       | Kingdom                                               | Any species with same or higher category of listing under Part 4 of the BC Act shown below | IBRA region                                                                                                                                                |
|                                                       | Fauna                                                 | Vulnerable                                                                                 | Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| <b>Calyptorhynchus lathami</b> /Glossy Black-Cockatoo | Spp                                                   |                                                                                            | IBRA region                                                                                                                                                |
|                                                       | <b>Calyptorhynchus lathami</b> /Glossy Black-Cockatoo |                                                                                            | Any in NSW                                                                                                                                                 |
|                                                       | <b>Variation options</b>                              |                                                                                            |                                                                                                                                                            |
|                                                       | Kingdom                                               | Any species with same or higher category of listing                                        | IBRA region                                                                                                                                                |

## BAM Biodiversity Credit Report (Variations)

|                                                     |                                                  |                                                                                            |                                                                                                                                                            |
|-----------------------------------------------------|--------------------------------------------------|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                     |                                                  | under Part 4 of the BC Act shown below                                                     |                                                                                                                                                            |
|                                                     | Fauna                                            | Vulnerable                                                                                 | Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| <b>Cercartetus nanus/</b><br>Eastern Pygmy-possum   | Spp                                              |                                                                                            | IBRA region                                                                                                                                                |
|                                                     | <b>Cercartetus nanus</b> /Eastern Pygmy-possum   |                                                                                            | Any in NSW                                                                                                                                                 |
|                                                     | <b>Variation options</b>                         |                                                                                            |                                                                                                                                                            |
|                                                     | Kingdom                                          | Any species with same or higher category of listing under Part 4 of the BC Act shown below | IBRA region                                                                                                                                                |
|                                                     | Fauna                                            | Vulnerable                                                                                 | Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| <b>Chalinolobus dwyeri/</b><br>Large-eared Pied Bat | Spp                                              |                                                                                            | IBRA region                                                                                                                                                |
|                                                     | <b>Chalinolobus dwyeri</b> /Large-eared Pied Bat |                                                                                            | Any in NSW                                                                                                                                                 |
|                                                     | <b>Variation options</b>                         |                                                                                            |                                                                                                                                                            |
|                                                     | Kingdom                                          | Any species with same or higher category of listing                                        | IBRA region                                                                                                                                                |

## BAM Biodiversity Credit Report (Variations)

|                                                |                                             |                                                                                            |                                                                                                                                                            |
|------------------------------------------------|---------------------------------------------|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                |                                             | under Part 4 of the BC Act shown below                                                     |                                                                                                                                                            |
|                                                | Fauna                                       | Vulnerable                                                                                 | Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| <b>Deyeuxia appressa/</b><br>Deyeuxia appressa | Spp                                         |                                                                                            | IBRA region                                                                                                                                                |
|                                                | <b>Deyeuxia appressa/</b> Deyeuxia appressa |                                                                                            | Any in NSW                                                                                                                                                 |
|                                                | <b>Variation options</b>                    |                                                                                            |                                                                                                                                                            |
|                                                | Kingdom                                     | Any species with same or higher category of listing under Part 4 of the BC Act shown below | IBRA region                                                                                                                                                |
|                                                | Flora                                       | Endangered                                                                                 | Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| <b>Hieraaetus morphnoides/</b><br>Little Eagle | Spp                                         |                                                                                            | IBRA region                                                                                                                                                |
|                                                | <b>Hieraaetus morphnoides/</b> Little Eagle |                                                                                            | Any in NSW                                                                                                                                                 |
|                                                | <b>Variation options</b>                    |                                                                                            |                                                                                                                                                            |
|                                                | Kingdom                                     | Any species with same or higher category of listing                                        | IBRA region                                                                                                                                                |

## BAM Biodiversity Credit Report (Variations)

|                                                         |                                                      |                                                                                            |                                                                                                                                                            |
|---------------------------------------------------------|------------------------------------------------------|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                         |                                                      | under Part 4 of the BC Act shown below                                                     |                                                                                                                                                            |
|                                                         | Fauna                                                | Vulnerable                                                                                 | Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| <b>Litoria aurea/</b><br>Green and Golden Bell Frog     | Spp                                                  |                                                                                            | IBRA region                                                                                                                                                |
|                                                         | <b>Litoria aurea</b> /Green and Golden Bell Frog     |                                                                                            | Any in NSW                                                                                                                                                 |
|                                                         | <b>Variation options</b>                             |                                                                                            |                                                                                                                                                            |
|                                                         | Kingdom                                              | Any species with same or higher category of listing under Part 4 of the BC Act shown below | IBRA region                                                                                                                                                |
|                                                         | Fauna                                                | Endangered                                                                                 | Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| <b>Miniopterus australis/</b><br>Little Bent-winged Bat | Spp                                                  |                                                                                            | IBRA region                                                                                                                                                |
|                                                         | <b>Miniopterus australis</b> /Little Bent-winged Bat |                                                                                            | Any in NSW                                                                                                                                                 |
|                                                         | <b>Variation options</b>                             |                                                                                            |                                                                                                                                                            |
|                                                         | Kingdom                                              | Any species with same or higher category of listing                                        | IBRA region                                                                                                                                                |

## BAM Biodiversity Credit Report (Variations)

|                                                                  |                                                              |                                                                                            |                                                                                                                                                            |
|------------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                  |                                                              | under Part 4 of the BC Act shown below                                                     |                                                                                                                                                            |
|                                                                  | Fauna                                                        | Vulnerable                                                                                 | Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| <b>Miniopterus orianae oceanensis</b> /<br>Large Bent-winged Bat | Spp                                                          |                                                                                            | IBRA region                                                                                                                                                |
|                                                                  | <b>Miniopterus orianae oceanensis</b> /Large Bent-winged Bat |                                                                                            | Any in NSW                                                                                                                                                 |
|                                                                  | Variation options                                            |                                                                                            |                                                                                                                                                            |
|                                                                  | Kingdom                                                      | Any species with same or higher category of listing under Part 4 of the BC Act shown below | IBRA region                                                                                                                                                |
|                                                                  | Fauna                                                        | Vulnerable                                                                                 | Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| <b>Myotis macropus</b> /<br>Southern Myotis                      | Spp                                                          |                                                                                            | IBRA region                                                                                                                                                |
|                                                                  | <b>Myotis macropus</b> /Southern Myotis                      |                                                                                            | Any in NSW                                                                                                                                                 |
|                                                                  | Variation options                                            |                                                                                            |                                                                                                                                                            |
|                                                                  | Kingdom                                                      | Any species with same or                                                                   | IBRA region                                                                                                                                                |

## BAM Biodiversity Credit Report (Variations)

|                                        |                                     |                                                                                            |                                                                                                                                                            |
|----------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                        |                                     | higher category of listing under Part 4 of the BC Act shown below                          |                                                                                                                                                            |
|                                        | Fauna                               | Vulnerable                                                                                 | Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| <b>Ninox connivens/</b><br>Barking Owl | Spp                                 |                                                                                            | IBRA region                                                                                                                                                |
|                                        | <b>Ninox connivens</b> /Barking Owl |                                                                                            | Any in NSW                                                                                                                                                 |
|                                        | <b>Variation options</b>            |                                                                                            |                                                                                                                                                            |
|                                        | Kingdom                             | Any species with same or higher category of listing under Part 4 of the BC Act shown below | IBRA region                                                                                                                                                |
|                                        | Fauna                               | Vulnerable                                                                                 | Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| <b>Ninox strenua/</b><br>Powerful Owl  | Spp                                 |                                                                                            | IBRA region                                                                                                                                                |
|                                        | <b>Ninox strenua</b> /Powerful Owl  |                                                                                            | Any in NSW                                                                                                                                                 |
|                                        | <b>Variation options</b>            |                                                                                            |                                                                                                                                                            |
|                                        | Kingdom                             | Any species with same or                                                                   | IBRA region                                                                                                                                                |

## BAM Biodiversity Credit Report (Variations)

|                                                       |                                                    |                                                                                            |                                                                                                                                                            |
|-------------------------------------------------------|----------------------------------------------------|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                       |                                                    | higher category of listing under Part 4 of the BC Act shown below                          |                                                                                                                                                            |
|                                                       | Fauna                                              | Vulnerable                                                                                 | Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| <b>Petaurus norfolcensis/</b><br>Squirrel Glider      | Spp                                                |                                                                                            | IBRA region                                                                                                                                                |
|                                                       | <b>Petaurus norfolcensis</b> /Squirrel Glider      |                                                                                            | Any in NSW                                                                                                                                                 |
|                                                       | <b>Variation options</b>                           |                                                                                            |                                                                                                                                                            |
|                                                       | Kingdom                                            | Any species with same or higher category of listing under Part 4 of the BC Act shown below | IBRA region                                                                                                                                                |
|                                                       | Fauna                                              | Vulnerable                                                                                 | Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| <b>Pseudophryne australis/</b><br>Red-crowned Toadlet | Spp                                                |                                                                                            | IBRA region                                                                                                                                                |
|                                                       | <b>Pseudophryne australis</b> /Red-crowned Toadlet |                                                                                            | Any in NSW                                                                                                                                                 |
|                                                       | <b>Variation options</b>                           |                                                                                            |                                                                                                                                                            |
|                                                       | Kingdom                                            | Any species with same or                                                                   | IBRA region                                                                                                                                                |

## BAM Biodiversity Credit Report (Variations)

|                                     |                                 |                                                                                            |                                                                                                                                                            |
|-------------------------------------|---------------------------------|--------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                     |                                 | higher category of listing under Part 4 of the BC Act shown below                          |                                                                                                                                                            |
|                                     | Fauna                           | Vulnerable                                                                                 | Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |
| Tyto novaehollandiae/<br>Masked Owl | Spp                             |                                                                                            | IBRA region                                                                                                                                                |
|                                     | Tyto novaehollandiae/Masked Owl |                                                                                            | Any in NSW                                                                                                                                                 |
|                                     | Variation options               |                                                                                            |                                                                                                                                                            |
|                                     | Kingdom                         | Any species with same or higher category of listing under Part 4 of the BC Act shown below | IBRA region                                                                                                                                                |
|                                     | Fauna                           | Vulnerable                                                                                 | Pittwater, Cumberland, Sydney Cataract, Wyong and Yengo.<br>or<br>Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site. |

## Appendix 5. MICROBAT CALL ANALYSIS



### MICROBAT ANALYSIS REPORT

Drop off Location for SMS and Data: 52 The Avenue, Mt Penang Parklands, Karlong NSW 2250  
 TBE Mailing address: PO Box 7138, Karlong, NSW 2250  
 Email Address for submitting recordings: servicedesk@travers ecology.com.au  
 Our Contact details: (ph) 1300 896 998

|                                                        |                                                |
|--------------------------------------------------------|------------------------------------------------|
| Client Name: Brian Tran                                | Project Name: Greenwich Ecological Survey      |
| Client Contact: 0437 120 772                           | TBE Quote Ref No: Q18TSA08X                    |
| Client Address: 97-115 River Road, Greenwich, NSW 2065 | Detector 1 Location: 33.827975 S, 151.183540 E |
|                                                        | Detector 2 Location: 33.828067 S, 151.184501 E |
|                                                        | Date of Survey: 07-15 March 2021 (8 nights)    |

| SUMMARY OF RESULTS               |                             |            |                                            |
|----------------------------------|-----------------------------|------------|--------------------------------------------|
| ID Method                        | Result                      | Threatened | ID Confidence<br>(Probability low to high) |
| Alternating pulses around 30 kHz | <i>Chalinolobus gouldii</i> | No         | High                                       |

| METHOD DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| An Anabat Swift (full-spectrum) with a unidirectional microphone and a SM4Bat (zero-crossing) with an omnidirectional microphone was used to record bat calls. All recorded files were run through a per-pulse decision tree in Anabat Insight, which filtered out non-bat files and labelled bat files with either a species or species complex. Each automatically labelled file was then manually verified. The call from each species/species complex that was most confidently identified was selected to be used as the image in the "Results" section of this report. All images were taken from within Anabat Insight and shown in either compressed or uncompressed mode, depending on what image best highlighted the diagnostic features. |

| HABITAT & SURVEY CONDITIONS                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The survey period had 70 mm of rain (5 nights with no rain), average wind speed of approximately 20 km/h, and an average maximum temperature of 27.1°C. The Anabat Swift was deployed in a narrow, semi-cluttered potential flyway surrounded with predominantly <i>Angophora costata</i> . The SM4Bat was deployed next to a small rocky overhang facing along a planted, exotic, potential flyway. |

| CALL REFERENCE LIBRARY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Calls were identified using 1) "Bat Calls of NSW" by Pennay <i>et al.</i> (2004) regional guide, 2) "Key to the bat calls of south-east Queensland and north-east New South Wales" by Reinhold <i>et al.</i> (2001), 3) "Bat Calls of Central Eastern NSW" by Chris Corben (2009), 4) Call metrics obtained from discussions with recognised bat experts including Michael Pennay, Brad Law, and Greg Ford, and 4) Travers Bushfire & Ecology collected reference calls were also added to the library. The combined reference calls from these five sources results in a comprehensive, local, reference-call library for all species of microbat that occur in the greater Sydney region. |

## RESULTS

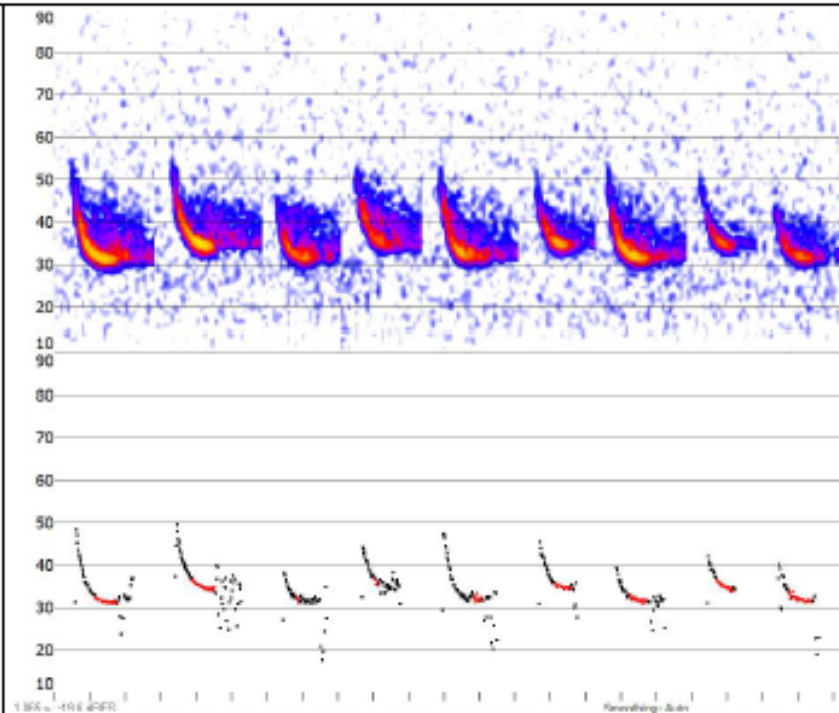
The Gould's wattled bat (*Chalinolobus gouldii*) was the only species identified from the Greenwich recordings. It was recorded on both bat detectors. No threatened species were recorded.

**Figure 1:**

Recorder: Anabat  
Swift

Gould's Wattle Bat  
(*Chalinolobus gouldii*) in  
uncompressed  
mode.

This sequence was  
identified as a *C.*  
*gouldii* call due to the  
alternating  
characteristic  
frequency centred  
around 30 kHz and  
the relatively long  
frequency sweep.

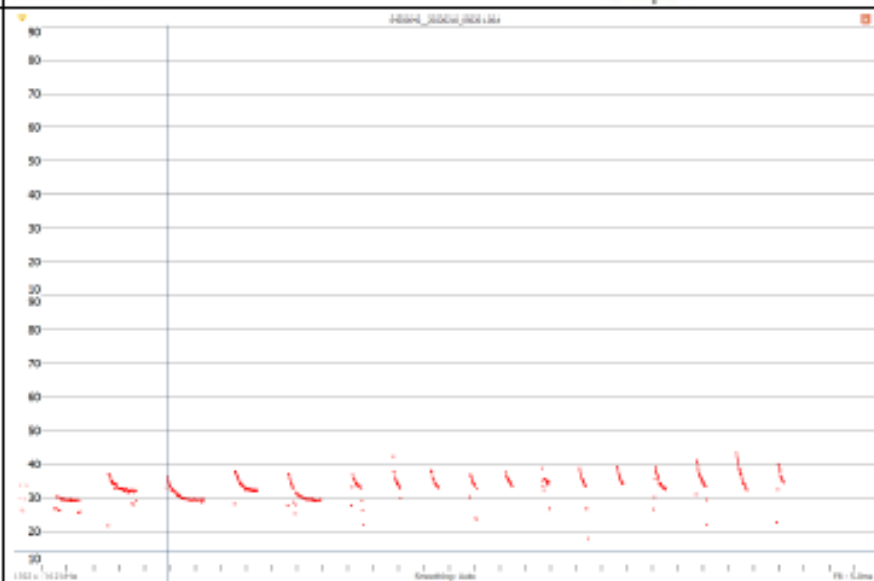


**Figure 2:**

Recorder: SM4Bat

Gould's Wattle Bat  
(*Chalinolobus gouldii*) in  
uncompressed  
mode.

This sequence was  
identified as a *C.*  
*gouldii* call due to the  
alternating  
characteristic  
frequency centred  
around 30 kHz and  
the relatively long  
frequency sweep.



Assessing officer: Lachlan McRae

Date: 16/02/2022

Scientific Licence: SL100848